

## TOOL BOX

# Create your own 'tacking lines'

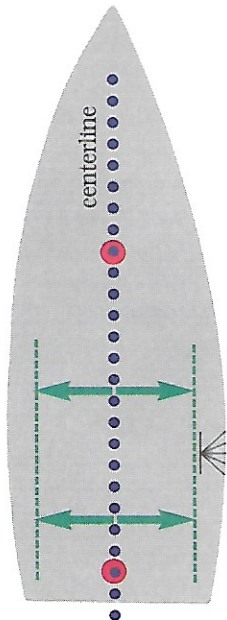
On many bigger boats, having a set of "tacking lines" on each side of the deck can be very helpful for your upwind tactics. These lines (see *sample template on next page*) got their name because they are used primarily for judging when it's time to tack at the layline. However, they have several other valuable uses. They can tell you the true wind direction and help you identify your "ladder rung." And they work downwind, too.

On the next four pages we will discuss how to use a set of tacking lines for racing upwind. Of course, before you can use tacking lines you must have them on your boat. You can either buy a pre-made decal that sticks on your deck, or you can make your own. This latter option is the subject of pages 8 and 9.

Drawing your own lines on the deck is less expensive and lets you customize the lines to your own preference. For example, you might make the lines different colors according to their function. Then, on pages 10 and 11, we will explain how to use the tacking lines to sail smarter on the second beat (or any beat).

In order to use tacking lines, you must know your boat's **tacking angle** in the existing wind and sea conditions. The easiest way to find your tacking angle is by calculating the difference between your compass heading on each tack. Remember that your tacking angle will vary with any change in wind velocity or sea state. If you fill in this chart with your average tacking angle in various wind velocities, you'll have a good starting point.

True wind (knots)	Typical tacking angle (TA°)	Tacking angle for your boat
5	90°	
7.5	82°	
10	75°	
12.5	72°	
15	70°	
20	71°	



One of the keys in constructing a useful set of tacking lines is making sure that your 'baseline' (BC in the template on page 9) is parallel to the centerline of the boat. If it's not, then all your angles will be incorrect.

The first thing you need to do is find the boat's centerline. Start by identifying two points you know are in the middle of the boat, such as the center of the steering wheel and the center of the mast. Hold a taut piece of line between these points to represent the centerline.

Now pick two points on this line – one forward of where you want your tacking lines, and one aft. Measure an equal distance toward the starboard side of the boat from each of these points and put a mark on the deck. Use a straightedge to connect the marks and you will have a line parallel to the centerline. Now use this line for orienting your baseline and angles. Then repeat this process on the port side.

### Follow these simple steps to draw tacking lines on your boat using the template at right.

- 1) Make a photocopy of page 9 and get a pair of scissors, pencil, tape, nail, straight edge and a black marker.
- 2) Cut around the dotted line to create a semi-circular template (this will work for both sides of the boat).
- 3) Using a sharp nail (or other device), poke a small hole in the template, precisely at Point A.
- 4) Find a spot on the starboard deck for the tacking lines. They must be accessible to the tactician, close to the gunwale and free of rear ends and hardware when sailing upwind.
- 5) In this spot, draw a pencil line parallel to the boat's centerline, about a foot long and a foot inside the gunwale. (See lower left part of this page for how to do this.)
- 6) Place the template on top of your pencil line so the baseline BC is exactly on the pencil line. Use tape to fix the template in this position.
- 7) Using the hole at point A, make a mark on the deck at this point. This mark should be directly on top of the original pencil line.
- 8) At the outboard end of each line (by the arrow), place a pencil dot on the deck. Then remove the template.
- 9) Use your pencil and straight edge to connect all these dots to the mark at Point A. All these lines should intersect the original pencil line at the same place (A).
- 10) Now use a black (permanent) marker to draw over these lines. Extend each one to the gunwale.
- 11) Somewhere near the end of each line write its angle (e.g. 65°).
- 12) The last step is to flip the template over and repeat this process on the port side. Use the same hole at A and the same lines (you must look through the paper to see them) for locating your pencil marks.

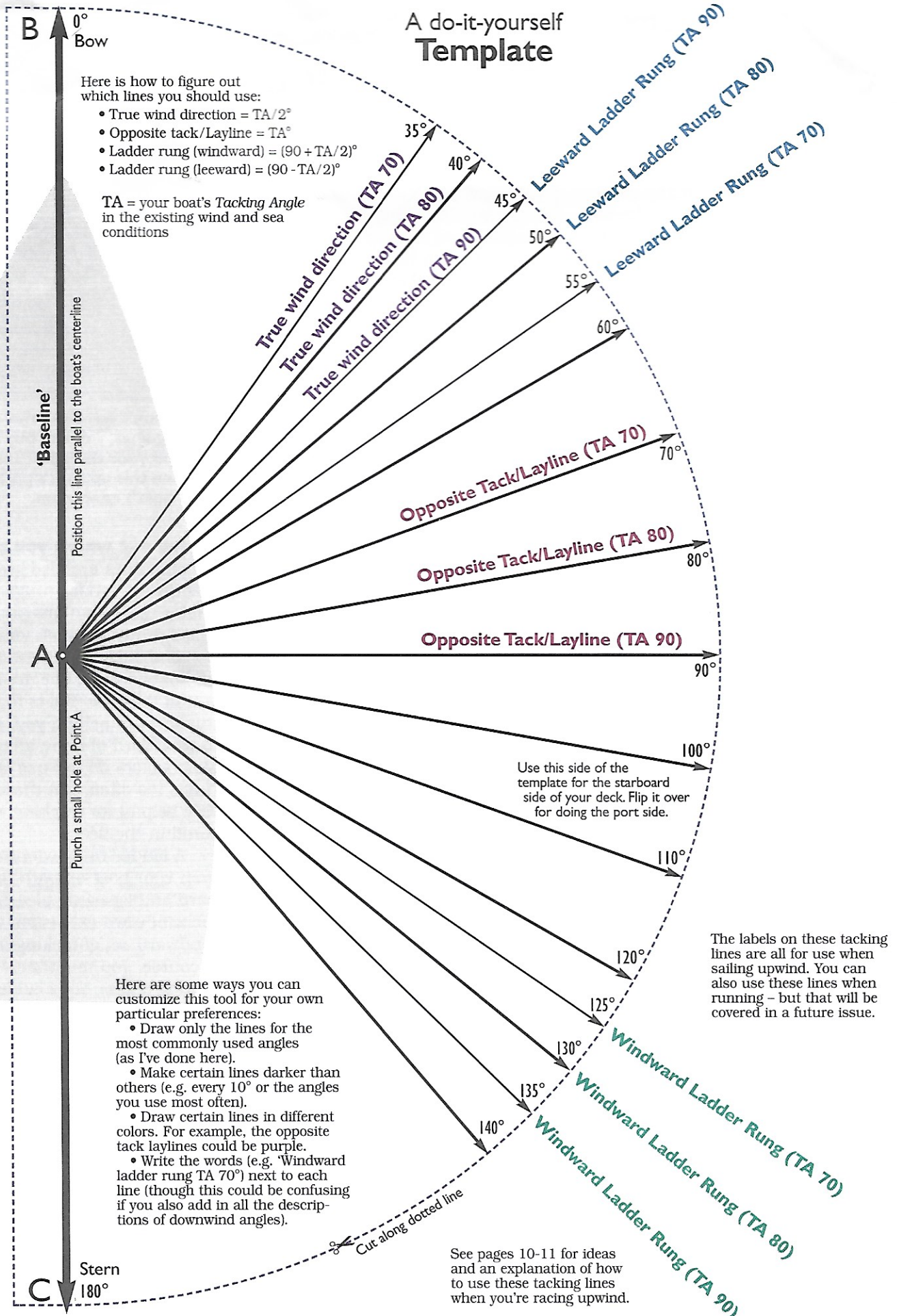


# A do-it-yourself Template

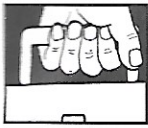
Here is how to figure out which lines you should use:

- True wind direction =  $TA/2^\circ$
- Opposite tack/Layline =  $TA^\circ$
- Ladder rung (windward) =  $(90 + TA/2)^\circ$
- Ladder rung (leeward) =  $(90 - TA/2)^\circ$

TA = your boat's Tacking Angle in the existing wind and sea conditions







## TOOL BOX 2

# How to use your tacking lines

Once you have tacking lines positioned correctly on both sides of your boat, you're ready to sail smart. There are many ways these lines can help you – the key is understanding how they work and then practicing until you are comfortable using them.

### Practice sighting

With your boat tied up at the dock and your sails down, practice taking sights with your lines. To do this effectively, get down low in the cockpit so your eye is nearly at deck level and 6" to 12" inboard of your 'baseline' (see page 9).

Pick a reference point on shore (e.g. a tree or house) and see what it bears on your tacking lines. Do the same on the other side of the boat. Then start with a number of degrees (say 80°) and see where this points to on shore.

The good thing about tacking lines is that they're pretty easy to use. Once you're confident, go out on the water and practice there. Here is some useful race info that you can calculate.

### Make a layline call

Knowing the angle you would sail on the opposite tack is important

for calling accurate laylines. This is probably the most common and valuable use of tacking lines.

When you want to call a layline to the windward mark, there are basically two ways to do this:

1) You can take a bearing on the mark and then compare this to your tacking angle. For example, you might say to the skipper, "The mark is at 75° and our tacking angle is 80°, so we have five more degrees to go."

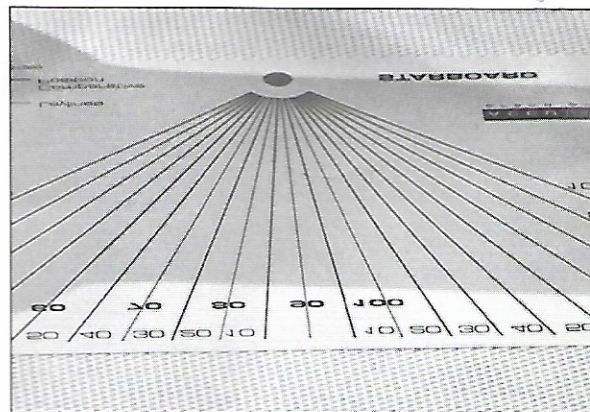
2) Or you could simply sight the line corresponding to your tacking line (e.g. 80°) to see if it's aimed at the mark yet. If the mark is still on the windward side of this line, tell your skipper that you are not yet fetching the mark.

It's easy to practice this when you are warming up for a race. Before every tack, use your tacking lines to predict where you will be heading on the opposite tack. Then check how close you were after you tack and get up to speed.

Remember that tacking lines will not give you exact laylines because they do not account for leeway (sideways slippage of any boat sailing upwind), current, or other affects such as bad air or windshifts. So you must still use this tool in conjunction with your own observations and best judgment.

### Find the longer tack

You can also use tacking lines to figure out the true wind direction. Divide your tacking angle in half and you will have the degree line to use for wind direction. Why is this important? By sighting this line (assuming you can see the windward mark too), you'll be able to determine which tack is longer to the mark. If this line points to the right of the mark, then starboard tack is longer. If it points to the left of the mark, then port tack is longer.



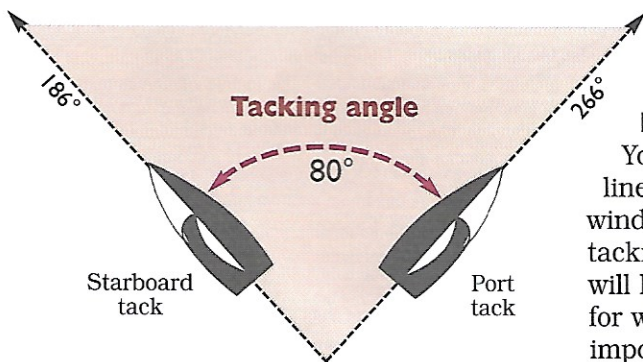
If you don't want to draw your own tacking lines, you can buy a decal to stick on your deck. Just make sure you line this up so it's parallel to your boat's centerline.

### Figure out where you stand

Tacking lines are also great for identifying "ladder rungs." Your ladder rung is an imaginary line that's drawn through your boat, perpendicular to the wind direction. All boats on this line are equal with you in the race. Boats to leeward of this line are behind you, and boats to windward of it are ahead of you. Most sailors do not use ladder rungs too often, but these can be very helpful for tracking where you stand in the fleet.

A ladder rung extends away from your boat on both the windward and leeward sides. To identify the windward extension, use the windward set of tacking lines (and, of course, you must know your tacking angle). Your ladder rung is equal to 90° plus half of your tacking angle. For example, if your tacking angle is 80°, you should use the 130° line to identify your ladder rung.

This same ladder rung extends out the other (leeward) side of your boat, too. To find this one, you have to use the tacking lines on the leeward side of your boat. This time the line to use is 90° minus half the tacking angle. For an 80° tacking angle, the ladder rung will be at 50° (see diagram on opposite page). •



A boat's tacking angle is the difference between her heading on starboard tack and her heading on port tack. For example, if she steers 186° on starboard tack and 266° on port, her tacking angle (the angle through which she turns when tacking) is 80°. This is very important to know when using tacking lines.



