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Wireless, Solar-Powered SailTimer Wind Vane
How Apps and Appcessories are Changing Sailboat Navigation

Hullspeed is the maximum speed of a keelboat. Since keelboats don't plane on top of the water, their displacement hulls have a maximum speed that is a function of their length at the waterline (LWL). Knowing your boat's maximum speed helps in trip planning. For example, you couldn't get to a waypoint faster than your hullspeed will allow. Knowing your hullspeed is only part of the picture though, because you may not reach your top speed on all points of sail. "Polar plots" are graphs or tables of boat speed for all different wind directions and wind speeds. So if you want to know how long it is going to take to get to that next waypoint, or whether you will be at your favorite anchorage in time for lunch, polar plots help a lot.

Unfortunately, no GPS chartplotter on the market to this point includes polar plots. There is also no GPS chartplotter at any price that calculates your tacking distances. All sailors know that tacking upwind can be a much longer distance than the straight "rhumb line" to the waypoint. But if the GPS chartplotter doesn't account for the actual distance you will be traveling, how can it calculate your ETA correctly?

Ironically, we are at a point in history now where sailors can get more advanced sailboat navigation on their smartphone than on an expensive GPS chartplotter. For example, the SailTimer app (and Charts Edition) is a free download in iTunes, containing advanced sailboat navigation functions that are not available in GPS chartplotters. It can *learn* the polar plots for your individual vessel, and use those to make recommendations about the optimal tacking route. It will also display your exact distance and heading on each tack, and the Tacking Time to Destination (TTD).

Another sign of the times is that sailors can now easily carry all the hydrographic charts they need, on their mobile device, at low cost. For example, with the free SailTimer Charts Edition app, the entire NOAA chart set of the Atlantic coast from Maine to Florida is $16. For Canada, a region such as the Great Lakes, Trent Severn, Rideau Canal, North Channel, and Lake Winnipeg up to the Arctic is $23.99 for the official CHS charts. Compare those app prices to the traditional cost of a single paper chart, or chart cartridges for GPS chartplotters. Plus, the SailTimer app includes free worldwide aerial photos and road maps.

Traditional marine electronics go into storage for the winter. But you can obviously use an Android or iOS (Apple) tablet year-round. In the summer, you can bring it onboard to get a wifi or cellular data connection to the mainland, as well as bringing movies, playing music, taking photos and video, and sharing your trip with friends via email or social networks. The SailTimer app lets you share your GPS track, or a graph of the day's wind and boat speeds. Other apps like Instagram, Facebook and PhotoStream (iCloud) let you share photo albums from your trip.

NMEA is the industry-standard format for exchanging data between marine electronics. As more and more sailors bring iPads and mobile apps onboard, it is also becoming more common to communicate back and forth between an app on the mobile device and traditional marine electronics on board.

For example, maybe your boat had an anemometer installed up at the masthead 10 years ago, and you have recently added an NMEA wifi "multiplexer" from a company like DigitalYacht.com. Multiplexers collect all of the data from instruments like your GPS, anemometer, radar, autopilot and perhaps depth sounder. They collect or multiplex all of that data into one string, which they send throughout the wired network and also wifi. The SailTimer app has an in-app purchase that enables you to receive NMEA0183 data with wifi, so your tacking results can receive real-time updates from your legacy anemometer (which was installed long before iPads and smartphones were even invented). That's pretty cool.

For using a mobile device when the cockpit is heeled over and the spray is flying, a variety of waterproof cases are now available, from soft rubber envelopes to hardcases. They let you use the screen through the case, so that your mobile device is protected. The hardcases are more expensive than the soft sleeves, and are available from companies including Lifejacket, Griffin, LifeEdge and Lifeproof. The soft sleeves can be found in outdoor stores.

With either type of case, it is handy if they include tie-downs, or a mount attachment. Mounts are also becoming more available now. LifejacketCase.com has an optional bracket mount. MountGuys.com has a universal mount for waterproof cases from RAM, called the Flat Surface Mount with Tab-Tite Holder. TheJoyFactory.com has impressive articulated arm-mounts (model MMA105) for their waterproof tablet case (model CWA101). Other mounting hardware is available from RAM and Vogel's online.

"Appcessories" are another major new technology development, with electronics hardware that is controlled from your mobile device. The SailTimer Wind Vane is the first anemometer that can send wind data by wifi to an iPad or iPhone (SailTimerWindVane.com). This is another way to get real-time wind data to the SailTimer app, for displaying your optimal tacks and Tacking Time to Destination. Because it is wireless, there are no wires to install down the mast with the SailTimer Wind Vane. That makes the installation easier, means less weight aloft, and reduces annoying tapping and pinging sounds from wiring in the mast.

When using the Sailtimer Wind Vane and app, just enter your waypoint to see the optimal tacks and Tacking Time to Destination. The Wind Vane works with a variety of other apps on other platforms, as well. For example, there is also a free Android app on SailTimerWindVane.com with a traditional wind gauge display, showing your wind angle. The SailTimer Wind Vane also works with other apps available in iTunes, including iNavX, Boat Instruments, and also with iRegatta which is available for both Android and iOS.

Whether you use Android or iOS, the beautiful color displays on smartphones and tablets allow a range of new functions to be displayed, that have not been possible on traditional marine electronics. For example, the wind angle is also shown as an arrow moving around the boat in the SailTimer app (Figure 1). There is also a very useful graph showing the True and Apparent wind speeds for the day plotted with your boat speed, which is an interesting way to review the day's sail (Figure 2).

Defining polar plots based on your individual sailboat is also an important advantage of using the SailTimer Wind Vane and app. Polar plots have been expensive and difficult to obtain until now. But as with the intuitive interface on iPads and iPhones, polar plots are now a feature that can be used by all sailors, right on their mobile device. Velocity prediction simulations have been the standard way that manufacturers and advanced racing teams have gotten polar plots. But these are only estimates, and are the same for all boats of the same type. The SailTimer app collects actual data on your individual boat's speed on all points of sail. You can see the data being saved while you are underway. You can turn on/off the Polar Learning as needed, and can save as many polars as you want, for different sail combinations. When the SailTimer app has more accurate data on your boat speed, it can provide better results for your optimal tacks and Tacking Time to Destination.

Catamaran sailors will especially appreciate the use of polar plots for calculating tacking results in the SailTimer app. Multihull sailboats do not follow the standard hullspeed formula of keelboats, even though they may have displacement hulls. Rather than try to work out a formula, using custom polar plots in the SailTimer app simplifies the whole process. There is no need to try to calculate the multihull's maximum speed if a low-cost app can simply save the polar data for the boat speed with all wind directions and wind speeds.

Figure 1: Optimal Tacks in SailTimer app

Figure 2: Graph of Wind and Boat Speeds
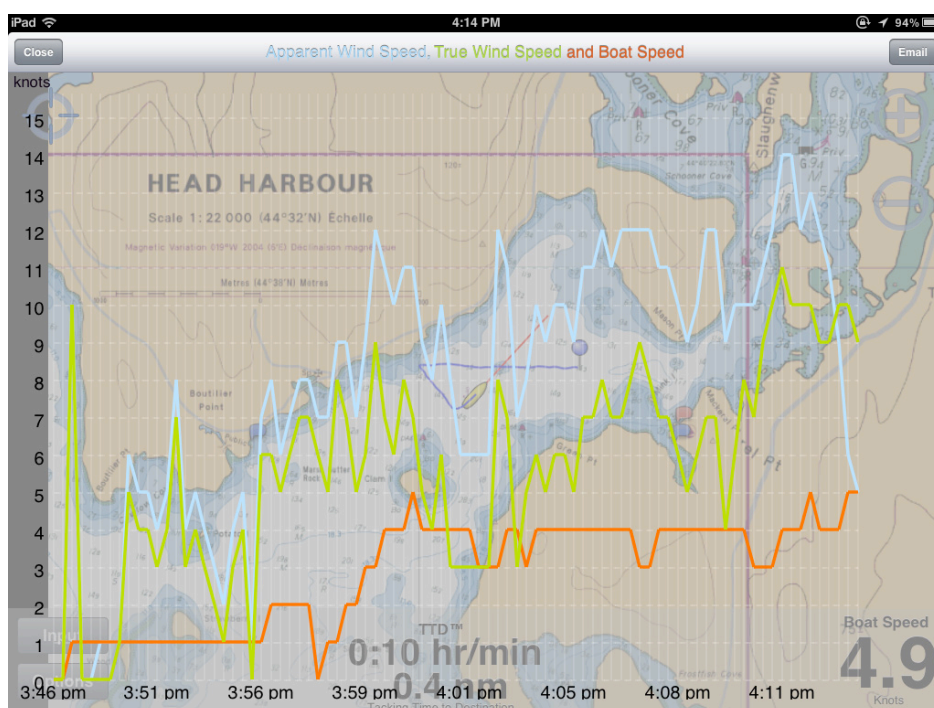
Figure 3: SailTimer Wind Vane

Bird photo courtesy of G. Willecke, skipper of Wahoo II.