

# The Sailor's Dilemma

by Craig Summers

## Navigation Apps for Small Sailboats



In the late 1940s, the Mahone Bay Plycraft Company began in a factory that still sits on the waterfront in the town of Mahone Bay, Nova Scotia, Canada. When the war ended, Plycraft apparently used aircraft construction techniques from Britain's Mosquito fast bomber to make molded plywood speedboats.

It was very unusual in WWII to design a new aircraft out of wood, but testing showed that the Mosquito could get a better strength-to-weight ratio using wood than a light alloy or steel frame. With plywood, several thin layers of wood bonded together are also stronger and lighter than a single thick layer (hence balsa- or foam-core in boat decks). The shell on the Mosquito was load-bearing (like a boat hull), rather than the usual thin aluminum skin on a frame. In 1941, the Mosquito was one of the fastest aircraft in the world, at least 30 mph faster than fighter aircraft of the time such as the Spitfire.

The Plycraft factory had initial success shipping plywood speedboats (often unfinished), but it burned down in the mid-1950s. Rebuilding gave the opportunity to re-tool for new fiberglass hulls, initially some runabouts but especially a growing line of modern sailboats. Around 1962 the sailboat line was rebranded as Paceship Yachts with a range of boats that were eventually from 7 to 32 feet. By 1981 Paceship sailboats were no longer in production, although there is still an owner group at [www.Paceship.org](http://www.Paceship.org)

The Paceship 17 is shown in the photo. You can launch it from a trailer in under 20 minutes. One person can easily step the mast through the deck, and connect the turnbuckles on 3 stays. The perfect size to pop in for an afternoon sail, or trailer to a campground with a new waterway to explore.

### The Sailor's Dilemma

Some centerboard boats may not point as high as keelboats, which makes selecting the optimal tack headings important. The Sailor's Dilemma refers to the longstanding seafaring problem of whether to pinch tighter upwind to reduce distance (but at lower speed), or to head off the wind for more speed (but longer distance).

The old racer's concept of Velocity Made Good (VMG) from the days before GPS refers to progress towards a way-point upwind. It is a common parameter on GPS chartplotters, but there are a lot of measurement problems for using it in sailboat navigation. Similarly, Estimated Time of Arrival (ETA) was amazing when it became available with LORAN in the 1970s and then GPS in the late 1980s. But even now no GPS chartplotter on the market can determine your tacking distances. Obviously the chartplotter cannot determine your correct ETA if it doesn't know how far you are going to travel.

Dinghy sailboats were never designed to have navigation electronics. But ironically, small craft can now have the most advanced sailboat navigation available, with innovative apps that are easy to use with just a few taps. Vector marine charts, wind angle, weather-routing, race tracking—no different than televised America's Cup races—and all now available in low-cost apps.

We are at a historic inflection point where wireless electronics and chartplotting is now available for sailing dinghies, beach catamarans and trailersailers. That has never been possible before. Even in the smallest sailboat, you can take a smartphone in a waterproof case or ziplock bag.



### Wind Gauge, Racing and Chartplotter Apps

There are a variety of choices of sailboat navigation apps on iOS and Android for chartplotting, marine weather, performance analysis and wind gauges. The following can connect to a wireless anemometer or receive data over wifi from marine electronics: Aqua Map, iRegatta, MID Wifi, NMEA Sail, Sail Buddy, SailRacer, SailTimer, SeaNav, ATrack, Mariner GPS Dashboard, OpenCPN, and SailGrib WR.

**Audio Feedback:** A smartphone/tablet has certain disadvantages out on the water; it is hard to see in bright sunlight, you don't want it to get wet, and most sailing dinghies don't have a good place to put it for easy viewing. If you wear polarized sunglasses to see into the water with less glare, you will also find that the LCD screen is visible in one orientation, but goes nearly black when rotated 90 degrees. Fortunately, several apps give you the option of audio feedback. No screen required. Put your phone away safe and dry, and use a Bluetooth speaker to hear wind conditions or boat speed when they change by more than a set amount. This keeps your hands and eyes free for sailing. You can also turn the screen off to reduce heat and save battery power.

**Polar Plots:** In 1925, Dr. Manfred Curry published one of the classic texts on sailboat navigation: *Yacht Racing and the Aerodynamics of Sails and Racing Tactics* (originally in German, with first translation to English in 1928). The original book and later editions up to 1948 do not mention polar plots—graphs of boat speed on all wind angles around the boat. However, Frank Bethwaite (a WWII aviator) was using polar plots when designing racing dinghies in the early 1970s, as shown in the three books he published beginning in 1992. (There is a great summary of Bethwaite's development of the *Tasar* in *SCA* #26, 2004.) So before computers and GPS, the use of a polar graph to show boat speeds and the fastest heading upwind (*Velocity Made Good*) is probably another technology that came out of WWII aviation.

Another limitation before computers and GPS is that anemometers traditionally did not provide tactical information; they only showed wind angle on a gauge, and left you to guesstimate your optimal tack headings and tacking route. (Then you wonder why you arrived much later than expected.) No-one can do trigonometry in their head, and it is not possible to work out the calculations on paper in a heeling sailing dinghy with the spray flying. Plus you can't redo the calculations on paper every second. Fortunately, several apps can learn your boat's polar plots. The "polars" are a table or graph of your boat speed on all wind angles and wind speeds. That is one component that is needed for doing the correct calculations to find your optimal tack headings.

Racers traditionally used polars as theoretical "targets" for finding the optimal tacks on the upwind leg of a race. That was a way to avoid the trigonometry calculations, but it only worked within the artificial constraint of a race with the first leg precisely upwind. But now any smartphone can find the optimal tack headings in any direction, using tacking distances and boat speeds from polars. So now, whether in a daysailer or racing dinghy, it is quick and easy to display your optimal tacking route and solve The Sailor's Dilemma. •SCA•

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Flying along under sail in a Paceship 17 on the Nicolas River, a side-arm of the Richibucto River in New Brunswick, Canada. Photo courtesy of Kurt Kleinmann



### Bluetooth Wind Instrument

To get wind data into smartphone apps, in 2012 SailTimer came out with the first-ever masthead anemometer that could transmit to smartphones. The wireless, solar-powered Wind Instrument RB™ with a Removable Battery is the 6th generation ([www.SailTimer.co](http://www.SailTimer.co)). It is submersible, and suitable for boats of all sizes. No 12-volt battery required. It is about the size of a handheld wind meter, as you can see in the photo.

If you are a sailor who looks up automatically to check the wind angle and your sails, the SailTimer provides a visual indicator for wind direction. With a quick-release wing-nut, you can put it on/off your masthead in seconds on the boat ramp.

No calibration is required when putting on your mast, because there is a digital compass built into the wind direction arrow to determine wind direction or wind angle. An innovative blade shape is used for the wind cups, so that they remain equally accurate for wind speed whether upright or sailing along heeled over.

The SailTimer Wind Instrument connects on Bluetooth to your smartphone/tablet. Transmission range of 280 feet. If you are using the SailTimer chartplotter app, whenever the wind changes, the app updates your optimal tacks automatically. Many of the apps also have versions for smartwatches, which are easy to see in bright sun, often waterproof, and perfect in small boats.

*A free-shipping coupon is available for SCA readers by emailing [SCAcoupon@SailTimerinc.com](mailto:SCAcoupon@SailTimerinc.com)*



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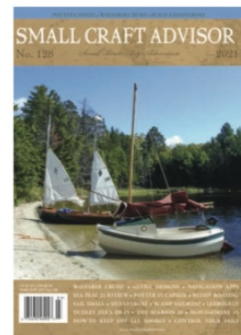
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*On the cover:* John Hippe took this shot during the maiden voyage of his Scamp, *Dragonfly*. Also along were Paul Bargren in his Core Sound 17 (pictured), and Thor Jaquish and John Hagen-Wente, both in sailing kayaks. The week-long cruise took place on Rainy Lake in Voyageurs National Park.





