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An innovation for sailboats of all sizes...

New Wind Instrument Designed for Heeling Sailboats

Dr. Craig Summers - SailTimer Inc. Canada

For sailing in the era of mobile and wireless devices, GAM has played a historic role in publishing a series of innovations from the Canadian electronics manufacturer SailTimer Inc. Kind of like what The Rudder magazine did for wooden sailboat design a century ago. A handful of big manufacturers had a monopoly on marine electronics since the dawn of consumer GPS circa 1989. But sailing is a niche market for those conglomerates, which also do defense contracting, automotive, aviation and powerboat products, fish finders, thermal night-cameras, etc. For sailing, they have been slow to innovate, in spite of the explosive growth of smartphones and tablets. Now, in apps like the free SailTimer Charts Edition™, sailors can get advanced navigation functions including optimal tacking routes, Tacking Time to Destination and polar plot learning, that are not available at all in GPS chartplotters.

The mainstream American sailing magazines rely on monthly full-page advertising from the big electronics manufacturers. The big manufacturers send their writers and editors on free trips to fine hotels in places like the Canary Islands to review products. But GAM has published stories on the evolving technology for sailboat navigation based on merit alone. GAM was the first to publish an explanation of why GPS devices should use tacking distances rather

than Velocity Made Good (VMG) to the mark, to calculate how long it would take to sail to a waypoint (May-June 2009 issue). The next year, GAM published an overview of the first GPS to account for tacking distances, The Sailing GPS (Jan. 2010 issue). In the 2012 summer issue, GAM ran an interview on the advantages of Tacking Time to Destination (TTD™) over ETA for sailors. All of these were heretical at the time, flying in the face of the GPS calculations in the big-name chartplotters on every boat. But those chartplotters were designed for automotive, aviation and powerboat markets, not sailing. It is now widely established that if a chartplotter device or software does not account for tacking distances, it is not going to be able to display an accurate ETA for sailboats. GAM has a long history, and has played a important role for real journalism in recent years, documenting the fundamental shift as marine electronics enters a new age of innovation, driven by mobile devices and accessories.

GAM also covered the emergence of the first masthead anemometer that can send wind data through the air to smartphones and tablets, the SailTimer Wind Vane™. Now SailTimer Inc. is announcing a new innovation for masthead anemometers: the first anemometer actually designed to be used on heeling sailboats. The



The Robinson anemometer.

In: Maryland Weather Service, Johns Hopkins Press, Baltimore, 1899. Volume I. Page 316.

pricing is expected to be under \$350, which is unheard-of for masthead anemometers. It is also small and durable enough to be used on small sailboats that flip. Use it with your mobile device, or send NMEA to your existing marine electronics using the optional DC-powered base unit. If you never bought an anemometer before, this could be a game-changer. Even if you have one already, read on to see why this new design provides more accurate wind data.

If you visit Baddeck, NS, former summer home of the famous sailor Alexander Graham Bell, you may notice a tin cup anemometer in the Bell Museum that was made in Bell's shop there at the turn of the 20th Century. It looks the same as anemometer cups now. In fact, cup anemometers were even being used in the 19th Century. The standard mechanical set-up for measuring

wind speed was invented by Dr. John Thomas Romney Robinson, the Director of the Armagh Observatory in Northern Ireland, in 1846. Unfortunately, his cup anemometer was designed to be mounted on the roof of a building, not to be used on a heeling sailboat.

Especially because of the growth of wind farms, there is now extensive documentation showing that cup, propeller and ultrasonic anemometers all lose accuracy when tilted. Obviously propeller anemometers are designed to work with wind along their axis. A propeller is designed to move an airplane forward, not sideways. Similarly, the more an ultrasonic anemometer tilts over, the more its base obstructs the wind flow past its sensors. Airmar notes in some of its brochures that the upper limit

for accuracy on its ultrasonic wind sensors is 30 degrees of tilt, although it does not say how much accuracy has dropped off by that point. Cup anemometers are more common, but their rotation slows down exponentially the more the boat heels over.

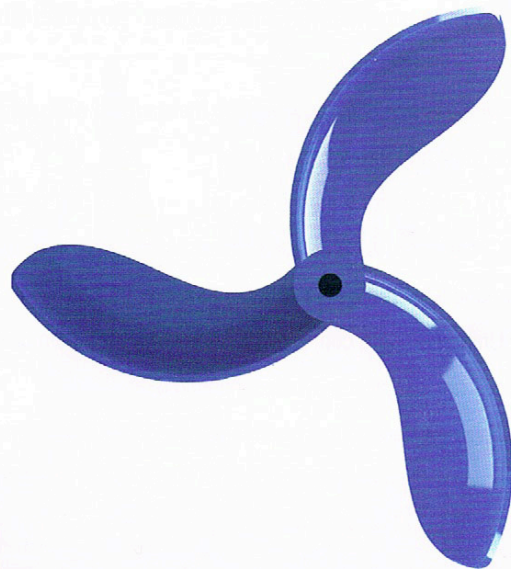
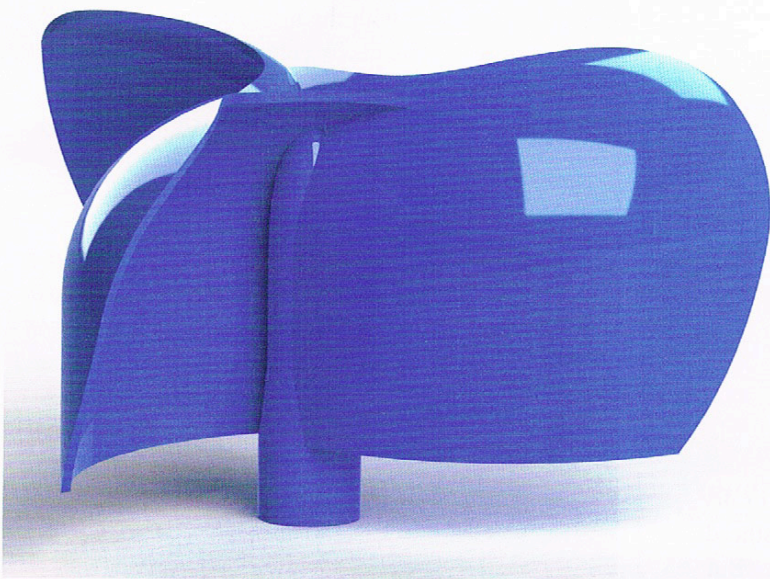
This is a problem for sailors, who have a right to expect accuracy in their marine instruments, particularly expensive ones like masthead anemometers. It is also a problem for sailboat navigation. For example, the SailTimer™ app is able to receive wireless wind data and update your optimal tacks and Tacking Time to Destination automatically. But if the design of your anemometer means that it is inaccurate every time your boat heels over -- i.e., when you are actually sailing -- you are not going to

get accurate navigation results.

SailTimer Inc. has announced an innovative new product to improve sailboat navigation: the SailTimer Wind Instrument™. The company recently filed a patent on new wind cup blades that it developed, that do not lose rotation speed when heeled over. Whether you want to use a traditional wind gauge to see the wind angle, or use chartplotter software like the SailTimer app to display your optimal tacks and TTD automatically, this new wind cup design offers a new standard for accuracy.

As an innovative small technology company, SailTimer Inc. was able to come up with a radical new wind cup design through its internal R&D, using a combination of computer simulations and 3D printing for physical wind testing. As you can see

Innovative new design for wind cup blades is sturdy and small enough to fit in the palm of your hand (just 7 cm wide).



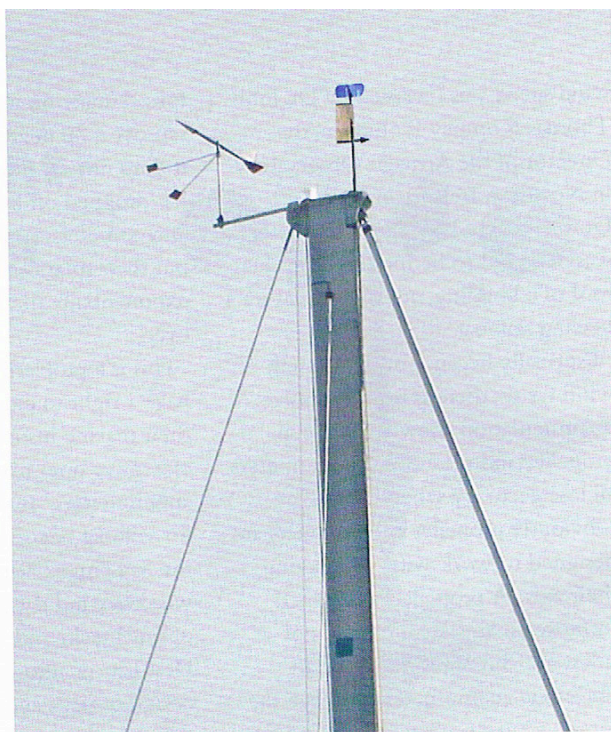
When the boat heels and the wind is from below, the blades don't stop; they function like a propeller!

in the accompanying figures, the brightly-coloured new wind cup blades catch the wind like a standard wind cup when upright. But when they lean away from the wind as the mast heels over, they have been carefully shaped to act more like a propeller. Rather than slowing down when the boat heels over, as standard cup anemometers do, the company was actually so successful in its design that the new blade wants to accelerate and rotate faster. The blade shape was therefore adjusted to reduce this effect when tilted, and to respond more when upright, so that if the wind is constant, the blades keep on spinning the same regardless of tilt.

Innovative features planned for the next-generation SailTimer Wind Instrument:

- Submersible.
- The first mounted anemometer suitable for small sailboats. A masthead anemometer traditionally was wired to an LCD screen at the helm. But this one can transmit to your phone or tablet. Priced for small sailboats too.
- Vertical design with very small footprint. No horizontal support arm for birds to land on.
- Wireless and solar-powered, so there are no wires to install down the mast and through the boat.
- UV resistant for the tropical sun.
- Circuit board is completely encapsulated, with no air or moisture around it to create condensation, and no gasket to leak.
- Unlike standard cup, propeller and ultrasonic anemometers, it does not lose accuracy when heeling over.
- This new version has been redesigned with fewer parts to substantially reduce the price. The circuit board is actually in the tail of the wind direction arrow to reduce space and parts.
- Self-contained: no base unit is required. (An optional DC-powered accessory unit is available for connecting to NMEA wiring.)
- Small enough to be portable, with a detachable vertical rod.
- Quick-release mechanism for masthead, stanchion and other mounts during launch or haul-out.

Sailing is in a new era now. Many people have mobile devices, which can easily go in a waterproof case or dry-bag. You could never have a chartplotter or a masthead anemometer on an old Albacore or a Laser before. But



now with the new SailTimer Wind Instrument at the masthead, even small centerboard sailboats, trailer-sailors, one-design racing classes, and Hobie Cats can have the same advanced wind sensing, tacking routes and chartplotting as large yachts (or better!).

The company will be taking pre-orders as it begins manufacturing in the coming months. This new product is called the SailTimer Wind Instrument to distinguish it from the previous version. Even though this is the first anemometer designed for heeling sailboats, and the only one that can transmit to a range of apps on mobile devices, it is still expected to cost 70% less than a certain other wireless anemometer from a major marine electronics manufacturer (at least with the pre-ordering until it gets into retail stores). The new website for this new product is at www.SailTimerWind.com, where you can sign up for further information or to be notified when pre-ordering is available.. GAM



Craig Summers Ph.D. leads the electronics manufacturing and software development at SailTimer Inc., conducting on-water testing at St. Margaret's Bay, Nova Scotia. Views and opinions expressed in this new product announcement are those of the author and not necessarily those of GAM. For more information go to www.SailTimerWind.com