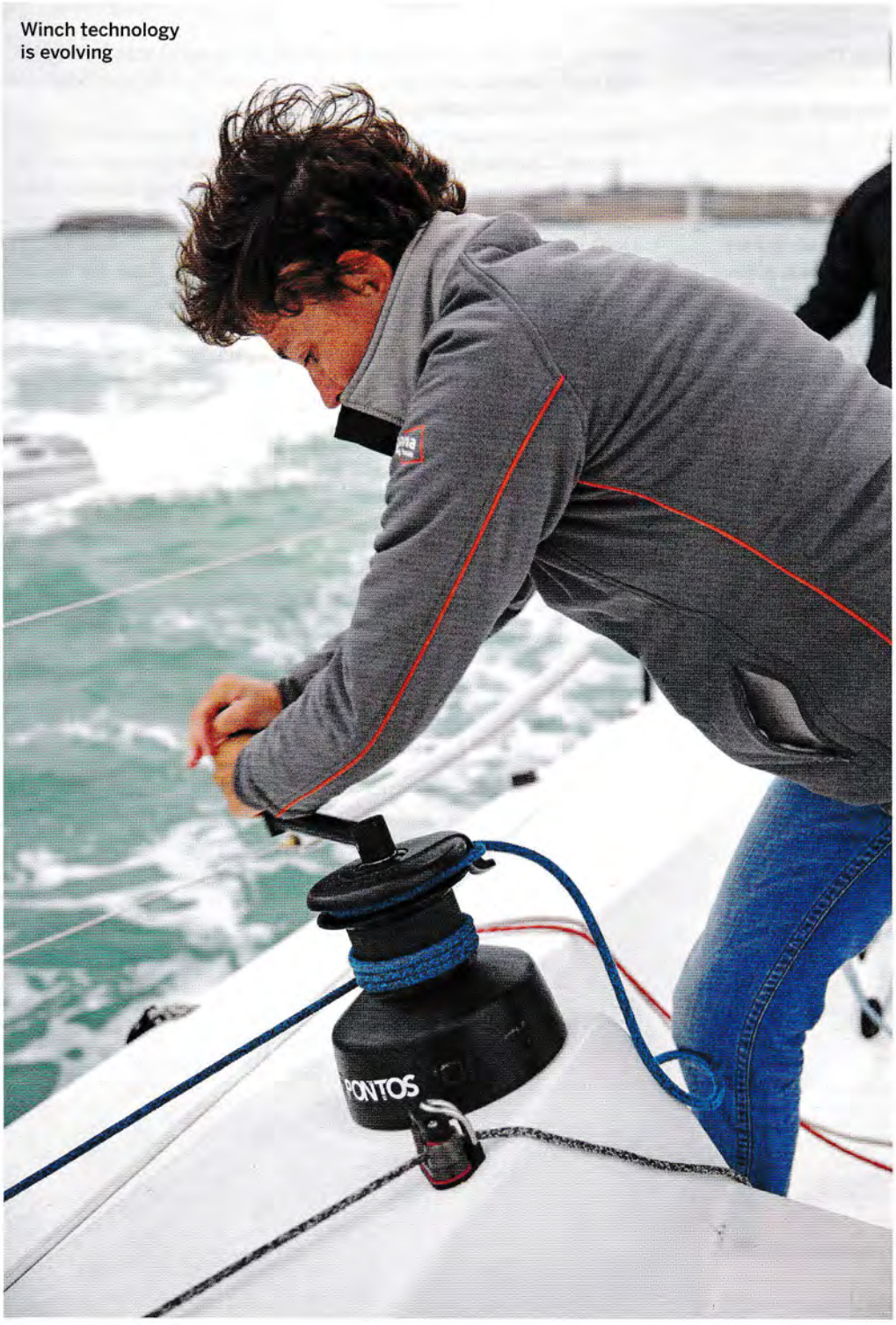
The Daily Grind



Winch technology is evolving

Winch technology has changed little over the last few decades, but now as winches with new features and capabilities are coming from all corners of the industry, it might be time to think about an upgrade

by Christopher White

Winches have been part of the sailing scene for nearly a century. In the days of the J Class they helped sailors hoist massive, heavy sails and control the loads they were under. But it wasn't until the multispeed top-action winches we recognize today were developed in the late 1950s that winches began showing up on smaller cruising boats, and by the 1970s they were commonplace.

Many of the winches from that era are still onboard boats today, for the simple reason that they still work. "Winches are fairly robust machines. They last decades if maintained properly, and frequently deck gear from the 1980s is still very useable today," says Jim Anderson, U.S. sales manager for Harken. The problem is that for many of those winches, once they stop working they're hard to repair. For example, the companies that manufactured Barient & Barlow winches, which were very popular in the recreational sailing market when they were introduced, don't exist anymore, and spare parts are getting harder to find. If this sounds familiar, it may be time to bite the bullet and upgrade your winches.

As is often the case when updating things onboard, when you're thinking about new winches you need to consider what kind of boat you have and how you use it. Are you a weekend cruiser or a bluewater adventurer? Do you consider yourself a serious racer or do you just make it around the marks on a Wednesday

PHOTO COURTESY OF **PONTOS**

You need to get to know your winches intimately—maintenance is vital

Winches use two sets of levers to increase force. The winch handle is the lever arm; the longer it is, the greater its effect. It rotates the internal levers (gears) to generate torque. To work out the power ratio, divide handle length (10in) by drum radius and multiply by the gear ratio, which you'll find in the maker's specifications. Typically, a size 44 winch will develop 44lb of power for every 1lb of effort in high gear

$$\frac{\text{Handle Length}}{\text{Drum Radius}} \times \text{Gear Ratio} = \text{Power Ratio}$$

night? All of this will determine what kind of winch you're looking for.

You'll be choosing between self-tailing and non-self-tailing (standard) winches. Today, non-self-tailing winches are usually only seen on sportboats in situations where the sail requires constant trimming (flying a spinnaker for instance). Most boats from the 1970s and 1980s had non-self-tailers as standard, while almost all of the winches you find on cruising sailboats built since the late 1980s are self-tailing. Upgrading to self-tailers is the logical choice because they are a real boon for shorthanded sailors. "Lots of guys are replacing standard winches with new self-tailing winches," says Harcourt Shutz, general manager for Lewmar USA.

But that's not all you have to consider. "We ask if someone is looking at a classic style winch or a winch that would be good for all types of rope," says Anderson. "For instance, are you using a soft Dacron-covered rope, or is this a racing boat with a very high tensile strength small diameter sheet or halyard?" The different type of rope you are using will determine the type of "grip" your winch needs to have, i.e. how the drum keeps hold of the rope. "There are two different grips on a winch—shape friction or surface friction," Anderson says. "On Harken's radial winches we have facets that are cut into the drum that we rely on to hold the rope—that is shape friction. This works well for cruisers using standard sailing lines."

Typically, a sailor replacing his winches will know what size winch he is looking for. "If a guy walks up at a boat show who has older equipment, we ask if he has a certain size and use it as a benchmark and we go from there," says Shutz. "The square footage of the sail is the starting point when picking a size. Also taken into account is the weight of the boat."

You also need to take into account how the winch will be used, what sails they will be holding and what strain they will be under. "When sizing winches we focus on the working load and the ultimate load that the particular application would see. Is it a sheet, halyard, etc.," says Anderson. Every winch has a certain power ratio, how much force you will get out in relation to how much you put in. "That's the number on the top of the winch, the power ratio," says Shutz. The power ratio is the combination of the winch's leverage (the difference between the drum radius and the winch handle radius) and the gear reduction (the number of times the handle turns for every rotation on the drum). So for example, for a winch with a 10in long handle and a 5in diameter drum, and a 6:1 gear ratio, the power ratio is 24:1 (10/2.5 x 6). This means that for every pound of effort you put in, you get 24lb out.

The growing trend these days when sailors upgrade their winches is shifting to electric winches. "The past two years we've seen a pretty good spike in aftermarket electric winch sales," says Shutz. "At the Annapolis

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THE NEXT GENERATION

The winch that could change the way you sail by Graham Snook

How would you take on the global might of the established winch makers? It was this question Michel Chenon and Darryl Spurling of French company Pontos found themselves asking each other. The answer was simple; "We chose to do something they don't—make a four-speed winch," explains Darryl.

Imagine tacking without touching the sheet or the fuss that goes with it—carefully adding loaded turns, feeding the sheet into the self-tacking jaws, fumbling for the winch handle. Instead, how does just turning the winch handle until the genoa is snug sound? Too good to be true? Help may be at hand.

Pontos make two styles of winch: Grinder and Trimmer—think of them as Speed and Power. Both are currently available in sizes 40, 46 and 52. To understand what Pontos has done we need to cover the basics: typically in first gear of a standard two-speed size 40 winch, a single 360 degree revolution of the winch handle recovers around 5in of sheet with a power ratio of around 13:1—for every pound of effort you put in at the handle you'll get 13lb of effort at the barrel. Second gear recovers around 1½in of sheet with a power ratio of 40:1. Let's now take these two gears and call them third and fourth, third being the low gear, fourth being the higher

The Pontos Grinder has two coarser gears: first gear will recover 2ft 4in of sheet with a power ratio of 2.3:1 and second gear pulls in 8in with a 8:1 power ratio. It then switches to something nearer to the traditional gearing for third and fourth gears: 11.6:1 (recovering 5 1/2in) and 40:1. Think about that for a second: one revolution of the handle of a typical size 40 nibbles in 5in of sheet, the same rotation on the Pontos Grinder devours 2ft 4in, or almost six times as much.

The Pontos Trimmer commences with the conventional third and fourth gears, before moving up to the higher fifth (recovering 2in with a 32:1 power ratio) and sixth gears (recovering 1/2in with a massive power ratio of 112.9:1). The Grinder goes through the gears numerically. The Trimmer, however, goes 3,4,6,5. The sixth gear brings in just 1/2in, but rather than be stuck in a very high gear, the fifth gear (nicknamed the pump-gear) is slightly lower than fourth, but not a lot, allowing one to pump the handle in an anti-clockwise direction, to retrieve more line as your energy allows.

This sounds confusing, but as long as you start winding in a clockwise direction, then reverse the direction when you feel the need, there is little to go wrong. It's a simple system that requires no more maintenance than a standard two-speed winch, except for a couple of squirts of lubricant into the extra gear that makes this all possible. Put simply, it's a standard two-speed winch with the addition of a dog clutch to engage (or disengage in the Grinder) a planetary gear set that adjusts the gearing input from the handle.

In a conventional winch, the barrel rotates around a central hub; however, unlike a conventional winch, the teeth inside the Pontos hub—where the gears engage to rotate the barrel—aren't part of the barrel. Instead, they are on a gear ring that can rotate 18 degrees within the hub. This gear ring is held in its shut position by two springs. When the load on the winch reaches 110lb in the Trimmer (132lb in the Grinder) the springs compress, allowing the toothed ring to move to its open position. This then turns the trigger ring, which has angled teeth that push the dog clutch up to engage with the planetary gear. If at any time the load is released, the springs close, the trigger ring reverts to its initial position and a spring pushes the dog clutch open again disengaging it.

It's on the water that you really get to feel what these winches are like to use and see their potential. Take the Trimmer: in use it's more like a three-speed winch, as the pump gear is similar to a traditional final gear of a two-speed winch, but the high gear means that whether you are young or old you can still keep winching in a genoa.

Our test boat for the Trimmer was a Jeanneau Sun Odyssey 40. Using just my finger and thumb to hold the handle I could bring the genoa home when on the wind. Just 1lb of pressure on the handle exerts 112.9lb on the sheet. My only criticism was that when using the pump-gear, a first bit of effort was taken moving the barrel the 18 degrees needed to overcome the springs.

It's the Grinder that I think will mess with the minds of most sailors. Without exception, every journalist who tried it on the JPK10.80 racer-cruiser was left smiling with a look of disbelief. First off, it's blisteringly quick. You'll also find that by the time you look up to see the sail shape, it's already in—such is the

Pontos uses a new four-speed technology to make trimming sails that much easier

winch's effectiveness. Working the winches single-handed during a tack is a breeze: take the slack out of the windward sheet and add three turns around the winch barrel, then feed it in the self-tailing jaws and insert the winch handle. The helm then tacks as normal, cast off the leeward sheet when you would usually, then start to crank on the preloaded winch in a clockwise direction, remembering that for every 1.3 turns you're pulling in a yard of sheet. As the load increases you change direction and winch in an anti-clockwise direction.

If you listen for a click you can hear it, though in the action of a tack you might not, but as you reverse the winching direction it will change up a gear. Even if you carry third gear longer, you still have to reverse the direction to change up gear. The only negative is that the first few times I found second gear was carried on longer than necessary, so the use of third gear was sometimes a short jolt of clockwise before powering away in the opposite direction in fourth. This isn't as bad as it sounds, and with time I'm sure I could spread the use of the gearing evenly. It has probably taken you longer to read what happens during a tack than to actually tack.

While the obvious advantage is speed, there are many others: safety and ease of use being the main two: safety because there is no contact with the sheet or the load from it when usually the operator would have to add turns before winching; ease of use because as long as someone knows which way is clockwise and can wind a winch, they can sheet in without any further instruction—except maybe "Stop!"

PHOTO COURTESY OF **PONTOS**

RESOURCES

Harken	harken.com
Lewmar	lewmar.com
Antal	antal.it
Andersen Winches	andersenwinches.com
Seldén	seldenmast.com
Pontos	pontos.fr

There are 14 models of Antal's two-speed self-tailing XT winches, and they come in hard black aluminum or chrome (shown)

Harken's two-speed self-tailing Radial winches are lightweight, strong and come in a wide range of sizes

Seldén's line of manual self-tailing reversible winches is great for racers

Andersen's self-tailing winches are designed for small and mid-sized monohulls and multihulls

Lewmar's Revo electric winches feature backwinding, so you can trim and ease the sail at the push of a button

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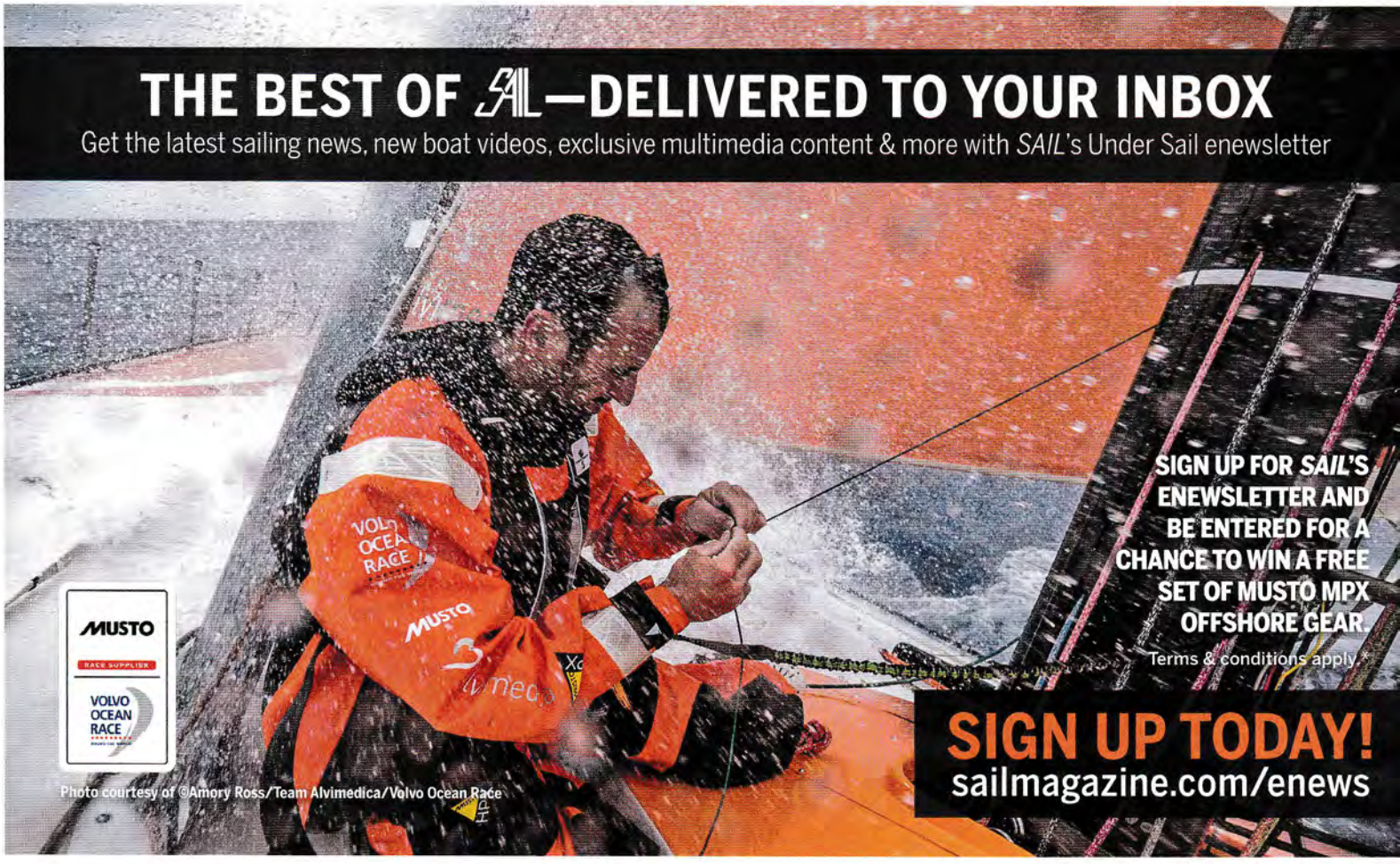
show last year we had an all-time high for inquiries on electric winches." And there is good reason for the shift in the market. "To hoist a main sail can be a hard job for a small crew and just to push a button means safe and convenient sail handling," says Jan Karlsson, a design engineer with Swedish-based Seldén Mast. "As we see it, powered winches are already something builders of cruising boats above 40ft must offer."

WHAT LIES AHEAD

In the last few years we have seen yet another choice come onto the market when you're deciding to upgrade your winches—reversible winches, which allow a sailor to trim and ease a sail without having to touch the line. "The advantage of not having to touch the line when releasing it is obvious," says Karlsson, whose reversible winches won a Pittman Innovation Award when they were introduced in 2010. "It's safer, you can do it with one hand and you do not need to take the handle out of the drum."

"We see the shift really going to a more push-button sailing style, where you can trim and release the sail from the helm station," says Shutz. Lewmar developed its Revo line for just this reason.

There have also been developments in the materials used for winches, moving from classic bronze and stainless steel to aluminum and chrome. As with many of the pieces onboard a boat, the aim is always to reduce weight. "A lot of the development in terms of materials and construction that we use in our grand prix products trickle their way down in a couple years and become a standard offering," says Anderson. "New composite bearings, new alloys—all things that lead to weight savings." The materials used in your winches, be they traditional or cutting edge, are one more piece of the puzzle you'll have to consider when looking to upgrade your existing components.

If you have older non-self-tailing winches it might be time to upgrade

So, while it took a good two or three decades for winch technology to develop, the winches available to sailors today are more advanced than ever before, and the developments keep coming. From powered winches to reversible winches, new lightweight materials to advanced construction, to what might be the most advanced winches yet (see "The Next Generation," on page 54), if you're thinking about upgrading your winches, there has never been a better time. S