



ASSISTED SAIL TRIM



Assisted Sail Trim: A New Generation of Simple Sailing



Harken and Jeanneau have introduced a collaborative effort to fundamentally improve cruising and shorthanded sailing. Using sensor-guided, push-button sail control, the new system makes cruising more relaxing for families, shorthanded crews, and solo sailors, and also lets those with limited mobility enjoy the sport without being dependent on others.

The system consists of three OEM packages: Auto Tack simplifies upwind maneuvers, Auto Trim maintains perfect trim and heel, and Sail Management operates electric winches for one-touch hoisting and dousing. All functions, as

well as push-button control over each winch, are operated from a cockpit display. Jeanneau will offer the Auto Tack and Auto Trim packages on its 2015 Jeanneau Sun Odyssey 519 under the name Assisted Sail Trim (AST).

Development and Testing

The history of this project stretches back nearly 30 years. In 1987 Olaf Harken built the concept yacht *Procyon* with the intention to renew interest in sailing as people started to have less leisure time. The 20 m (65') yacht was the first demonstration of a large sloop that could be fully rigged in 5-10 minutes and could be sailed by a small crew from the safety of the cockpit, all without sacrificing performance or comfort.



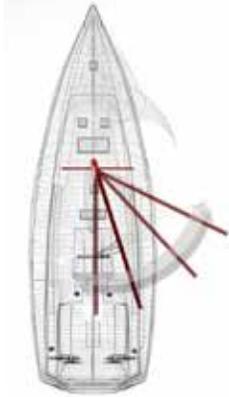
Harken kept in mind the ultimate goals of faster rigging, easier shorthanded sailing, comfort, and safety as it developed the products that resulted in the AST collaboration. In 2004, Harken acquired a 12 m (39') Bénéteau Cyclades to test different ways that load sensing capabilities could be integrated into larger systems. Over the next few years Harken used the boat to develop Rewind™ electric winches and easy push-button mainsheet trimming for yachts not large enough to have captive winches. In 2011, Jeanneau provided a 15.28 m (50'5") Sun Odyssey as a new test platform and worked closely with Harken engineers to refine the system for key audiences. The collaboration resulted in over 6,100 further hours of R&D and testing at sea.



FUNCTIONALITY

Auto Tack

Auto Tack manages the headsail during tacks so the only input needed is the touch of a button and for the helmsman to steer through the tack. The system checks that the boat is heading within 60 degrees of the apparent wind, then eases the old sheet while trimming the leeward sheet of the new tack. Rewind™ or captive winches are the key components that allow electric winches to handle both easing and trimming without the need for a crewmember to take wraps on and off a winch. The result is that instead of crew to handle the headsail and main, only one person needs to tend to steering while passengers can simply relax.



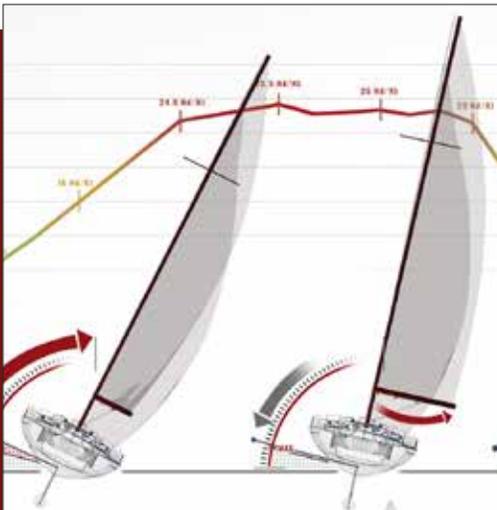
Auto Trim

Auto Trim, which integrates Auto Tack with a trimming system for both the genoa and the mainsheet, is commercially available on the 2015 Jeanneau Sun Odyssey 519. This system handles all trimming and easing while the yacht is reaching or heading upwind. Additionally, the user can choose to set a maximum heel for a more comfortable ride. The system eases the mainsail if the heel setting is exceeded.

To begin using Auto Trim, the user trims the headsail and mainsheet via the control panel and then engages the system. Auto Trim monitors wind speed and apparent direction to maintain perfect trim. If the helmsman bears away or the wind shifts to leeward, the system eases the sheet without any user input. Assisted Tacking handles the transition from one active genoa lead to the other.

Sail Management

Harken has also developed the capability to offer one-touch hoisting, dousing, roller reefing, and furling through the control panel. Either the user or integrated load sensors can immediately pause the system in the event of a jam. The user can then ease the halyard by one meter to correct any problems. Harken will customize the specific functionality to suit the equipment on the boat and the vision of the builder.



SAFETY

One of the goals of the system is to improve safety. Controlled heel and less necessary movement around the boat means less opportunity for slips and falls. Powered functions limit the chance of strain injuries. Integrated load sensing can stop winch operation before exceeding the maximum working loads of lines and equipment.

All three functions utilize load sensing to prevent damage in the event that a jammer is mistakenly left closed or a sheet gets stuck. Once the user corrects the problem they can immediately resume using the system.

Assisted Tacking and Auto Trim work in a range of 5 to 25 knots to ensure the system can handle conditions safely. A crew can still perform all functions manually if the range is exceeded, if they do not wish to use AST, or if power is interrupted.

ASSISTED SAIL TRIM TIMELINE



Procyon

1987-1997

Olaf Harken recruits a team of designers and sponsors to build 20 m (65')-concept yacht *Procyon*. The yacht showcases elements like an A-frame mast, a mainsail with roller reefing, and a canting keel to encourage builders to reimagine the most fundamental parts of the sailboat. The team achieves an ambitious list of goals including a 15% increase in speed, total push-button operation, and a major improvement in comfort, safety, and sail efficiency by limiting heel.

1997-2003

Harken works with the University of Milan and the 2003 America's Cup syndicate *Alinghi* to develop the first sailing-oriented load-sensing technology small enough to fit inside standard winches. The system, internally named Winch Monitor, works flawlessly during practice racing.

2004

Harken decides the expertise gained from Winch Monitor has the greatest potential in the electric winch segment for cruisers. Technical partners who are approached privately show interest but aren't positioned to invest in long-term R&D, so Harken hires staff and purchases a 12 m (39') yacht to turn into a test laboratory.

2007

Harken starts development on the Rewind™ Radial electric winch, the critical element that allows 2-way push-button control on yachts that are too small for captive winches. The design solves a long-standing industry problem of feeding a slack line back into the self-tailer and onto the drum. The Rewind contains streamlined load-sensing and additional electronics to interface with future development.



Rewind Radial electric winch

2009

Harken Italy installs Rewind™ Winches and a push-button mainsheet system on the test boat. Harken winch engineers take the Harken brothers and Bénéteau Group management out for a demonstration—cheers erupt as the helmsman completes an effortless singlehanded tack. Bénéteau officially partners with Harken to continue development with their Jeanneau line.



Touch Trim

2010

Harken releases the Rewind™ Radial electric winch and the Touch Trim in-boom electric mainsheet system. The Touch Trim is a mainsheet trimming and easing system that is fully operated by push-button. It is both the spiritual predecessor of Assisted Sail Trim as well as a standalone proof-of-concept for a winchless, self-contained mainsheet system.

2011 - 2015

Electronics development continues internally. Harken integrates off-the-shelf sensors with the preexisting load-sensing winches and push-button trimming technology. Operation of individual winches, complex coordinated maneuvers, and heel control are all centralized within a control panel at the helm.

Jeanneau provides a larger test yacht, a 15 m (51') Jeanneau 509 Sun Odyssey, and begins planning for a September 2015 release. Harken refines the programming while continuing sea trials and reliability testing.

THE FUTURE

Additional options for headsail management and the interface are in ongoing development. Harken will work with interested OEMs to customize the system for future production yachts.

