7

Systèmes combinés

Autopilote + régulateur d'allure

Aujourd'hui, la plupart des bateaux sont équipés d'office d'un autopilote. Ces autopilotes sont une bonne solution pour qui prend le large pour un week-end ou les vacances. Mais plus le voyage que vous comptez faire est long, plus vous vous féliciterez d'avoir également un régulateur d'allure, surtout lorsque vous ne disposez pas d'un grand équipage et certainement lors de traversées océaniques où il s'avère être pratiquement indispensable. Autrement dit, dès que vous vous écartez des côtes, la solution idéale est d'avoir à bord à la fois un autopilote et un régulateur d'allure.

Pour conjuguer les avantages de ces deux systèmes, il existe une méthode ingénieuse qui, bien qu'ayant été à plusieurs reprises décrite en détail dans de nombreux magazines de navigation, n'a pas eu l'impact escompté. Un petit pilote automatique (type Autohelm 800) relié au contrepoids d'un safran pendulaire assisté est capable de fournir l'impulsion de guidage qui est en principe du ressort de la girouette. L'amplification et la transmission de la puissance de pilotage ont lieu comme d'habitude. L'autopilote peut dès lors guider le bateau au compas en consommant très peu d'énergie, puisque l'unique force qu'il doit fournir est celle qui est normalement fournie par la girouette (c.-à-d. la force destinée à la rotation du safran pendulaire). La puissance de pilotage de l'Autohelm 800 multipliée par la force d'amplification du safran pendulaire confère à ce système une puissance lui permettant de piloter sans le moindre problème un bateau de 25 tonnes. Ce système combiné s'avère particulièrement utile lorsque, lors de long voyages et par temps calme, le vent n'est pas assez fort que pour permettre à la girouette de générer un signal valable, mais que le bateau avance assez vite que pour actionner le safran pendulaire assisté.

La combinaison autopilote +

Combinaison Autohelm +

Automate the windvane Back to Terry's Articles

How to integrate an electromechanical autopilot with a windvane self-steerer

Why do it?

A sailing vessel with windvane steering has the advantage of course-keeping with minimal human effort and no expenditure of precious onboard power. But that means you must have enough wind to propel the boat and activate the self-steering device. The usual solution it to install an electromechanical autopilot for the time when it is necessary to turn on the 'iron genoa', or for the light air conditions when there is enough wind to move the boat but not enough to make the windvane work properly.

On VALHALLA, our 1976 Fuji 32 Ketch, wheel steering is done with an Edson worm-screwer steering system (the original Fuji copy was replaced with the real thing) and the windvane is an ancient Aires (silicon-bronze geared model) that predates the construction of the boat. The worm-screw steering, though robust and dependable, has the disadvantage of requiring three turns lock-to-lock but the Aires windvane is powerful and quick enough to handle the helm chores under nearly all sailing conditions. Fitting an electromechanical autopilot (Autohelm 3000) gave only marginal success for the times when the only option was to hand steer, such as during very light airs and when motoring. Though sensitive to heading changes, the speed of the motor/belt drive was insufficient to avoid wandering across the ocean in imitation of a rum-soaked helmsman.

As an aside, light-air performance of any servo-pendulum vane can be improved through a trick I developed when the Autohelm 3000 failed on a light-air passage from Pohnpei to Guam. I noticed that the servo rudder would respond to the windshifts, but the resistance of lines, steering system and main rudder, coupled with slow boat speed, prevented course following. The solution was to trim the boat, engage the windvane steering clutch, and lock the steering system (lashing lines to the wheel in my case). The servo rudder on the windvane then became the steering rudder for the boat and I could once again relax. This arrangement worked well at wind speeds as low as one or two knots with the wind abeam or abaft the beam.

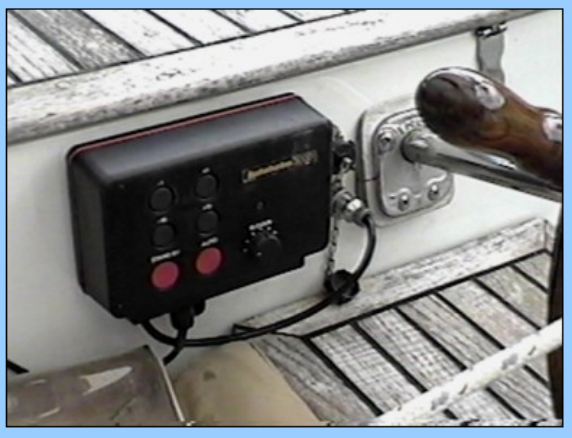
Integration is the answer

Using the sensitivity of the autopilot, with it's flux gate compass, and the power and speed of the windvane as an integrated system is the answer to a helmsman's prayer. Virtually any windvane, commercial or home built, can benefit from this approach. It is only necessary to connect the autopilot output to the windvane input, but that's where your inventive nature is required. Following are two solutions we've used on VALHALLA.

The first solution was based on the Autohelm 3000 motor unit . As shown in *Figure 1*, a mount was made for the motor drive unit attached directly to the vane itself. (In the photo the vane paddle has been removed for clarity though it is normally left connected to permit quick changeover between modes). An aluminum plate was fabricated into an attaching bracket to allow the shaft of the motor to be parallel with the vane axle. A collar over the motor shaft, welded to a rod and coupled to the vane through a fishing net clip and eyebolt, translates the rotation of the motor into a sideways movement of the vane.

Figure 1 Autohelm 3000 installation

Changing modes from windvane to autopilot is simple. With the windvane in a neutral position (vertical in this case), the autopilot arm is rotated to align the fishing net clip with the eyebolt on the vane and the clip is snapped over the eyebolt. Engaging the automatic mode on the Autohelm control box puts the autopilot in command of the windvane.

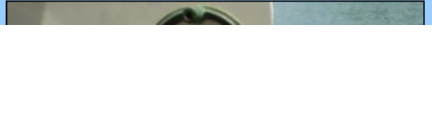


The control box, with flux-gate compass and function buttons, was mounted near the helm, as shown in *Figure 2*. Connectors to the right side distribute power and input from the Autohelm wind vane accessory (which was blown away during Super Typhoon Paka in December 98). A remote control unit attaches to the bottom of the control box and isn't shown.

Figure 2 Autohelm Control box

The upgrade

The Autohelm 3000 line of equipment is obsolete and no longer supported by the manufacturer. Efforts to locate spare parts and components failed, though I searched the media, manufacturers, sailing websites, and the SSCA membership. It was only a matter of time before these old units would fail and that time came during 1999 while cruising the waters and islands around the Republic of Palau.



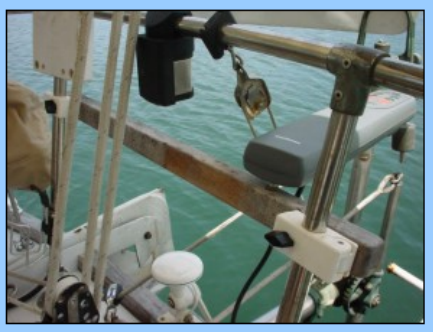
The second solution was to replace the "Rube Goldberg" motor conversion with a tiller steering autopilot. My first

attempt was to use a Navico Tillerpilot TP-200CX and it's companion Hand Programmer CP-600. Unfortunately, over a four month period, I experienced infant mortality failures (within two to six hours use) of two Tillerpilots and four Hand Programmers before sending the units back for a refund.

As a final solution, I installed a Raytheon-Autohelm Tiller Pilot ST1000+ and the Control Unit ST600R. I've had completely satisfactory performance after over 50 hours of use with these units.

Connection to the windvane is simpler than my first solution. *(Figure 3)* The plastic fitting on the end of the Tiller Pilot pushrod was drilled slightly larger than a 1/4 inch bolt. A small metal bracket was fabricated with a 1/4-20 bolt extending through it. This bracket was fitted to the windvane using one of the existing windvane bolts.

Figure 3 Simplified mounting bracket



The Tiller Pilot is mounted on a sturdy wooden brace (Figure 4) attached to the pushpit stanchions with quick-release brackets (the same ones used with the Lifesling hard case).

Figure 4 Tiller pilot mounting

Changing modes is similar to the previous. With the windvane in it's neutral position and turned to match the axis of the Tiller Pilot at a 90 degree angle, the pushrod is slipped over the attaching bolt and the unit engaged via function buttons on the top of the Tiller Pilot or the remote Control Unit. Although the angle of the attaching bolt and the friction of the threads on the bolt provide a secure fitting, a nut is placed over the end of the attaching bolt for extended use or during rough conditions.

Activating the Tiller Pilot and making course changes is done through function buttons on the top of the unit or from the Control Unit, located convenient to the helm. *(Figure 5)* Though close enough to reach over the pushpit from the helm seat, it doesn't permit course changes while seeking shelter under the dodger or from below, which is possible with the Autopilot Control Unit. Both the Navico and Raytheon-Autohelm tiller pilots are designed to be mounted 90 degrees to the axis of the boat, to permit tiller steering. Using the units in approximate alignment with the axis of the boat causes the boat heading in the display of the Tiller Pilot and the remote controllers to be in error by 90 degrees. A bonus feature I discovered about the Raytheon-Autohelm units was the ability to adjust the display to any desired heading, unlike the Navico unit which only permitted a plus or minus ten degree adjustment.

Figure 5 Autopilot Control Unit

Other vanes

The Monitor Windvane is a servo pendulum vane similar to the Aires and is easily integrated as I have done on VALHALLA. I previously integrated a tillerpilot with the Auto-Helm windvane (not to be confused with the Autohelm brand), which is an auxiliary rudder/trimtab type of self-steering system. It's vane is similar in motion to that of the Aires and Monitor - rotating about a horizontal, or nearly so, axle. Other vanes, such as the Saye's Rig, using a pendulum trimtab on the main rudder, rotate about a vertical axis but can be integrated easily with a mounting lever. Whatever the brand, Windhunter, Windpilot, Fleming, Cape Horn, Sailomat or those previously mentioned, the integration of an electromechanical autopilot with the windvane gives the best of both worlds.

Back to top

JLG-STW 05 sept. 07
Voir profil

Réponse à Tatave: génial, voilà un membre de STW qui a testé la technique. Ce serait vraiment très intéressant si tu pouvais décrire ton montage en détail, et si possible montrer quelques photos! J'aimerais tester un montage de ce type sur un régulateur Navik.

[répondre]

schooner 05 sept. 07
Voir profil

Belle documentation très complete surtout sur les régulateurs. Cela me conforte dans mon idée que la meilleure solution pour un bateau de grand voyage est de l'équiper d'un régulateur assisté d'un petit pilote électrique.

[répondre]

Tatave 06 sept. 07
Voir profil

Je peux indiquer le montage sur un Atoms, mais le principe est le même pour les autres, et plus facile encore si le contrepoids esr coulissant.

D'abord mesurer la course du contrepoids, elle sera surement inférieure à celle du pilote. Pour éviter qu'il ne vienne pas pousser comme une brute sur notre fragile balancier, il faut rallonger la tige du contrepoids pour que la course soit légèrement supérieure à celle du pilote. Si le contrepoids est amovible c'est encore mieux, il suffit de le remplacer par un levier de longueur adéquate. Fixer une tête homme sur ce levier, j'en ai fabriqué une avac un boulon de 6, mais si on peut en trouver une toute faite on gagnera du temps. La tête homme est donc horizontale, la tête du vérin sera tournée d'un 1/4 de tour. Il ne reste plus qu'à poser une patte percée au diamètre du pilote sur le balcon le plus proche, de façon à ce que le vérin à mi-course positionne le balancier en position neutre.

Sur mon bato le pilote était à tribord, il diminuait le cap en tirant, il faut évidemment orienter la tourelle de façon à ce qu'elle fasse de même (une chance sur 2)

J'espère avoir été clair. Si tu me montre une photo du contrepoids du Navik je peux regarder comment faire. J'ai une photo pour illustrer, si tu m'indiques comment la joindre...

[répondre]