The Monitor windvane is a modern, all-stainless-steel version of Nick Franklin's Aries windvane. The servo pendulum action creates a tremendous amount of power. (Scanmar photo)

SELF-STEERING

After ground tackle, the next important category for cruising gear is self-steering. The development of the high-powered, reliable windvane in the 1960s and 1970s has done more to promote long range cruising than any other factor I can think of. Relief from the drudgery of constant steering, watch on and watch off, good weather and foul, makes all the difference.

Let's consider what a self-steering apparatus should do. First, it must be able to handle the boat in the lower wind ranges. Here we are talking strictly about *apparent* as opposed to true wind. Upwind, if there isn't too much sea running, most self-steerers will do well even in the lightest airs. But trouble starts when you turn the boat around and head downwind. Subtracting boatspeed from true-wind speed doesn't leave much apparent wind for the vane to work with. Add to this the problem of substantial shifts in apparent wind direction through small increases or decreases in true-wind velocity, and your windvane is going to have a really tough job when you're running. The quicker the boat is in light airs, the more substantial the problem. Aside from using an autopilot, the only alternative is to fit an oversize control sail to the windvane, try to alleviate the problem under these conditions, and accept the poor results.

At the other end of the spectrum, in heavy weather you have to be able to control the boat while it is being buffeted by wind and sea. If your hull design has the capacity to handle heavy-going downhill with minimum risk of broaching, then your self-steering will be able to do a better job.

Reaching under moderate-and-above conditions is again demanding. With the wind and seas more or less beam on, the hull will want to swing downwind and back up, sailing a giant S-curve as the vane tries to cope. Substantial rudder corrections by the vane will be required.

Not only should the self-steering gear be able to handle various wind and course conditions, but you also should be able to carry all the sail that is comfortable for the crew. Having to shorten down prematurely or having to use specialized rigs to accommodate self-steering is a sign of weakness either in the steering gear or in the design of the vessel.

Ideally, you should be able to push the boat as hard as you desire, commensurate with prudent seamanship, and not worry about the self-steering's ability to handle the boat.

Next, the vessel should be able to keep itself reasonably well on course. Given moderate boatspeed and normal sea states, a variation in course of plus or minus 15 degrees should be a maximum. Any more than this will reduce your distance made good over the bottom and lengthen your trip considerably. It will also substantially reduce crew comfort.

Last, the vane-steering system should be powerful enough so it isn't necessary to jump up every half-hour to adjust sheets or vane settings in order to compensate for moderate changes in wind velocity or boat balance.

It isn't easy to find the proper vane to match your boat. The hardest aspect is getting good data from which to work. If you find a similar vessel powered with a given vane, ask yourself if the skipper has the background to evaluate his system's performance properly. Usually, the answer will be no. I learned this myself the hard way.

Even though *Intermezzo* came to us with a powerful Benmar autopilot, I felt we needed a mechanical vane, both as backup and because I didn't want to be faced with continuously running the engine for the pilot's electrical needs. Knowing nothing about this type of gear, I canvassed marinas.

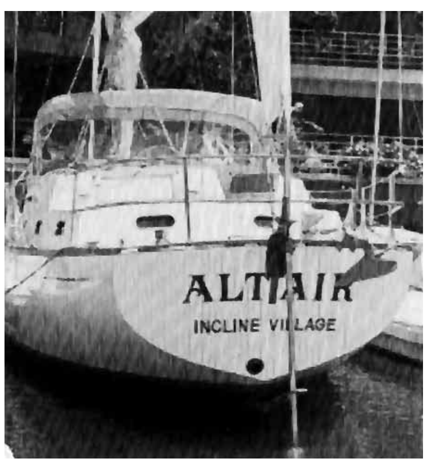
I eliminated several types of vanes right off the bat for aesthetic reasons — a move we came to regret. We finally settled on an RVG unit, based on aesthetics and the fact that I had talked to two owners who had fitted the RVG to boats identical in hull shape to *Intermezzo*. In both cases these skippers indicated that the unit worked well. What I failed to perceive was that their units had been tested only under ideal conditions.

Extreme light winds down the coast of Mexico didn't give us much of a chance to try out our vane. Once we were free of the land en route to the Marquesas and into the trades, we began to put it to work. The first thing we found was that with the RVG at the conn, *Intermezzo* could not carry her full press of sail. With everything up, she would wander all over the ocean, jibing one minute and heading into the wind the next. Since the RVG is a trim-tab/rudder combination, *Intermezzo*'s helm had to be lashed to balance the basic hull/rig configuration. If the wheel was off as little as half a spoke, we would be off course again. It required constant and careful tending. Any slight change in apparent wind angle or speed sent the watch on deck to play with the wheel adjustment. Finally, we were forced to sheet some of our sails — not for speed but for balancing purposes.

After 13 days of rolling around with this unit, we turned on the autopilot, hoisted the chute, and took it easy. The problem was essentially this: the RVG unit, while sold as being able to handle a 50-footer (15.4m), simply didn't have the necessary power. On a smaller yacht it might have per-

This double-ender has a permanently fitted emergency tiller. It makes it easy to connect the Aries vane (seen in the background.) A direct connection like this eliminates the slop of the wheel, cables, and chain, making for a much more positive steering action.

Some form of breakaway coupling is necessary between paddle and vane mechanism. Make sure yours is not overly strong, as the object is to have the coupling give before damage is done. And be sure that a safety line is connected to the paddle!



This is a "Sayes" vane (now manufactured by Scanmar). This vane is simple to install, and easy to maintain. However, it has nowhere near the ability of the servo pendulum vanes.

TOC
Last Chapter
Next Chapter
Help!

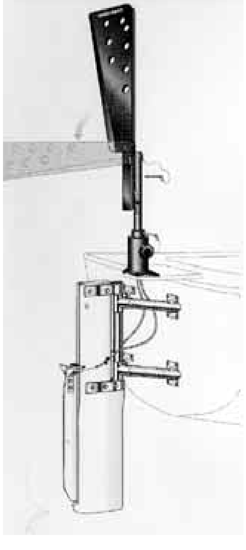
A simple yet effective means of “hooking” the control lines (or chain in this case) from the vane to the tiller.

A Navik vane (below) installed on a center-cockpit yacht. (Scanmar photo)

Mounting a windvane can be tricky. Here are three different approaches to different types of transom sterns. (top two photos courtesy of Scanmar)

These drawings illustrate Autohelm (below left) and Sayes (below right) vanes. The Autohelm rig has the advantage of offering a totally self-sufficient rudder system, capable of steering the boat should the main rudder fail. However, this approach is less powerful than a servo-pendulum rig and works well only on cruising designs that are very easy on their helm.

The Sayes rig has been in use for years and been a part of some very successful circumnavigations. The very simplicity of the system commends it. But it does not have the power or responsiveness of a servo-pendulum system. (drawings courtesy of Scanvik-Scanmar)



formed well, but *Intermezzo* was just too much boat for it.

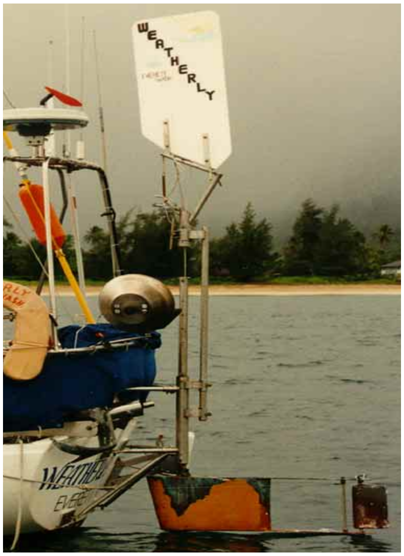
In Taiohai Bay we met Earl Shenk on his beautiful Alden ketch, *Eleuthera*, a powerful, well-rigged 48-footer (14.6m). Earl found that his Aries vane was more than a match for his keel-attached barn-door rudder (and 12 years later, when I met Earl in Papeete, that same vane was on the back of his boat!). Well, if an Aries could handle that situation, it could certainly handle *Intermezzo's* much lighter hull and spade rudder. We sold our rig, put aesthetics aside, and ordered an Aries from England.

The moral is simple. Match the vane to the boat.

WINDVANE TYPES

There are several types of vane systems on the market. The most powerful of these is the servo-pendulum-style similar to Nick Franklin’s Aries. This unit uses an air rudder that you feather into the wind and lock in. As the apparent wind–angle changes, it heels the air rudder over one way or the other. This movement is transmitted to a steering oar which is pivoted on its vertical axis in the water. Since the oar is moving through the water, this change of angle makes it veer to port or starboard. Lines are attached to the oar, which run to the tiller or wheel and control the vessel via its own rudder. The principle of using the vessel’s motion through the water to steer her is simple and provides

TOC
Last Chapter
Next Chapter
Help!



There are all sorts of "home brews" out there (left photo). In this clever design, the air vane operates the trim tab on the back of the auxiliary steering arm. The rudder and trim tab are raised at anchor to prevent fouling.

A Sayes rig (right) offers a simple way of connecting to keel-attached rudders that are mounted some distance in front of the transom. The long attachment "U" adds to leverage, but reduces the speed of response. (Scanmar photo)

unlimited power to turn the main ship's rudder. The faster you go, the more force is available.

The next group of units, such as the RVG or Chrono Marine Chrono Vane, uses an auxiliary rudder. In the case of the RVG, the vane rudder is controlled via a small trim tab that gets its input from a feathering vertical-axis air blade. Chrono Marine goes directly from the horizontal-axis air vane to the water rudder. It's simpler but not quite as good in light airs. Both of these units suffer from being left permanently in the water. If there's one thing vanes don't like, it's a fouled blade or trim tab. They do offer the advantage of providing a means to steer the vessel should the main system develop problems. However, even on well-balanced 35-footers (10.7m), both of these makes will require close attention to sail setting and trim. Vessels over 40 feet (12.2 m) require servo-pendulum vanes.

Smaller craft can make use of the inexpensive direct-air control of tillers such as the QME unit. These are very inexpensive and will get you there, but they don't have the responsiveness for light airs or power for really heavy wind that the other models provide.

Some form of drum arrangement is typically used to connect wheel-steering systems to windvanes.

Trim Tabs

Another interesting approach is to work out a trim tab directly on the rudder. Tom Blackwell did this with the aid of Blondie Hassler's engineering on *Islander*. To the main rudder he attached a trim tab, driven by a vertical-axis air vane. To accomplish control, Tom bored out the stock of the rudder and inserted a long rod down its length. This rod was connected to the air rudder via some linkages at its top and to the trim tab with a bell crank at its bottom. By this means he was able to control *Islander*'s main rudder with the force exerted on the tab. With a transom-hung rudder this approach is even easier, as the trim tab can be attached directly to the aft end of the rudder, with its linkage taking place on top.

Do-It-Yourself Vanes

If you're on a tight budget, don't be afraid to try making a vane on your own. Probably half the people we've met around the world have done it, usually with trim tab–type designs. They were all out sailing and, allowing for some experimenting, their "home brews" seemed to perform well.

TOC
Last Chapter
Next Chapter
Help!

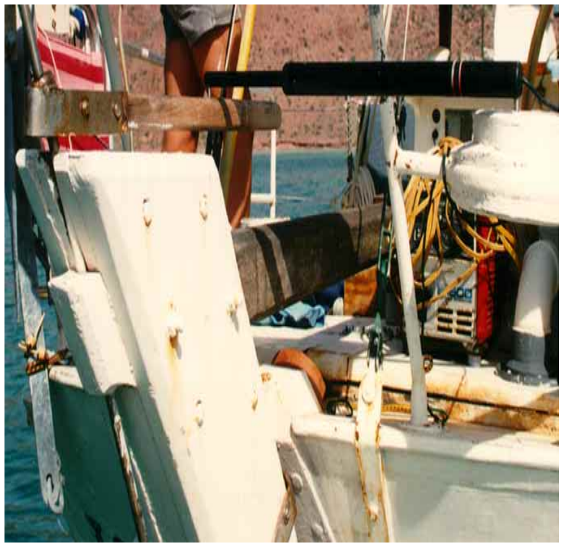
TOC

Last Chapter

Next Chapter

Help!

Islander had a trim tab mounted on the aft end of the rudder (top photos). The rudder shaft was bored for the control rod, which was attached to the gear shown here. A sail was connected to drive the tab.



Look closely at the top of this photo (right), and you will see a pilot-drive rod. This drive rod is connected to a trim tab on the rudder. The trim tab takes minimal pilot power to operate, yet generates tremendous dynamic force from the flow of water over its surface.

Outboard trim tabs work especially well on transom-hung rudders. They are easy to install and accessible for maintenance.

These are twin 1/2-horsepower WH Pilots hydraulic-drive units. Mounted below are the motor controllers. Each of these pumps drives its own ram, giving a totally redundant system.

USING AN AUTOPILOT

The pilot offers several advantages compared to a vane. It will steer when powering, when running under sail in light airs, and when you need to be sure your course is held steady in reference to navigational hazards.

But choosing the correct pilot for your yacht is a complicated (not to mention critical) endeavor. Not only do you have to sort through a host of features, but there is usually a dearth of hard information on how the pilot will really perform on your yacht.

Hull Design Factors

The steering characteristics of sail and power yachts follow the same engineering principles. Beam-to-length ratio is the first criterion. The longer and narrower the hull, the more directionally stable it will be and the less tendency it will have to change course when heeled. This factor becomes increasingly important as the pilot (or helmsman) fights to avoid a broach in big seas. Hull shapes that are sharply V-shaped forward tend to "lock in," which makes steering corrections more difficult. Rounded or flatter forward sections pound a little more but also turn more easily. Rudder configuration has a big impact. Sailboats with balanced spade rudders are easiest on the pilot, while long-keeled designs with attached rudders take more power. Powerboats designed for offshore work will have larger rudders for better control (which are usually counterbalanced with prop-wash to help with steering loads).

Reliability

Intertwined with this basic steering capability are several other concerns. First is reliability. This is associated with how hard the pilot is working relative to its rated load; how it is installed (deck-mounted units, no matter how well sealed, are almost always a source of trouble); and, of course, the inherent design of the unit itself.

How many times have you read about BOC racers carrying half a dozen or more of a given pilot type and using them all! Not much of a recommendation here. Aside from ensuring that the pilot is in a waterproof environment, making sure it is significantly oversized rather than "just right" will pay big dividends.

At the same time you're allowing for a more powerful unit, make sure the electric wire leads are oversized to minimize voltage drop (the pilot's ability to do work is directly proportional to the voltage it receives. If undersized wires cost you a 10-percent voltage drop due to increased resistance from undersized wire, the pilot will work 10 percent harder during all of its life).

Power Consumption

The next factor is power consumption. This importance will vary with your ability to generate electricity, and the unpleasantness associated therewith. A good charging prop trolling behind the boat will handle virtually any pilot-related power need. But then there's quite a bit of drag from the prop, and it's noisy. The alternative of running the engine a couple of hours a day to charge the batteries is equally unpleasant. So a pilot that is stingy with power becomes important, as long as it has the strength to handle your yacht when things become difficult.

Power consumption is divided into two categories: the "overhead" required to operate the brains of the system which is on continually, and the power necessary for the drive unit. "Aver-

TOC
Last Chapter
Next Chapter
Help!

age" power-consumption figures touted by marketing personnel should be viewed with suspicion. It's better to find someone with an installation similar to your own, where hull shape and rig look the same, and then find out what the power consumption is really like under ideal and adverse steering situations.

There are two factors to keep in mind about power consumption. First, as we've already stated, voltage drop in the power leads adds to power consumption. Second, DC motors use only enough power to do the work required. A 12-volt 1/4-horsepower might use as much as 20 amps at peak load, but if you're loafing along, with the boat well balanced, actual consumption might be only 2 amps.

Aboard *Intermezzo* we would average about 40 watts per hour in power consumption with our Benmar 12B. With a quartering sea, consumption would double. Her balanced spade rudder went a long way toward offsetting her unbalanced hull form. *Intermezzo II* had another spade rudder and somewhat more balance to the hull form, her power consumption from the Wagner S-50 hydraulic pilot was about the same, even though we were pushing a much bigger boat through the water. Aboard *Sundeer*, with twice the waterline and 50 percent more displacement than *Intermezzo*, power consumption was less than half. This is due to her totally balanced hull form, as well as to the inherent efficiency of the WH hydraulic pilot. And *Beowulf* uses even less power, as being longer she had even more balanced hull form and better beam-to-length ratios. If these hourly power figures sound low, remember you have to multiply them by 24 to get your daily consumption.

In Adverse Conditions

Even a tiny pilot will steer a large ship in smooth water. The real test comes when it is blowing and there's a confused sea running (and, of course, it's cold and wet in the cockpit). How do you find out if a pilot will handle your boat in bad weather? The same procedure outlined above for vanes is the best method. Look for very experienced people, and see what happens.

Do not listen to what the manufacturers or salespeople say. Unless the pilot will handle your boat when the chips are down, it's not worth having (unless you've got a more powerful vane for bad weather).

The Control Head

One of the considerations when choosing a pilot is the "brains" of the system— the control head. The control head starts with an input from either compass or wind indicator and tries to keep your course at a predetermined reference heading. At the simplest, it senses a need for change in direction and sends a signal to a drive motor, which turns the rudder. As your yacht gets close to the right course, the pilot senses the decreasing divergence and orders the rudder to come back toward the neutral helm. If all goes well, you leave a nice straight wake.

There are a series of things the pilot head calculates as it goes about its job. The way in which these calculations are made, and the control the user has over some of them, determine the pilot's capacity to cope with adverse conditions, as well as how much power it takes to operate the entire system.

Most pilots today automate their controls, which makes it easier to operate in smooth-water conditions. There are two problems, however, with the automated pilots. First, they cannot learn (or know) enough to handle your boat in all conditions. Second, speed of response is slowed while they average the data they are "learning."

Unfortunately, the steering requirements do not change over an *averaged* amount of time, but rather on an instant-by-instant basis. While the pilot is learning about one set of conditions, those conditions are changing. You end up with the pilot making its decision on obselete data.

Our feeling is, for offshore work, a pilot that allows you to help it think can be a big advantage. Now let's talk about some of the controls available.

Sea-State Control

Sea state tells the pilot how much off course you are willing to allow the boat to go before the pilot goes to work. In difficult steering conditions where precision is important (such as in extreme heavy weather and when surfing) this should be set to the smallest number, giving the most control.

On the other hand, if you're reaching along with the boat having a natural yaw back and forth on the waves, a wider setting will reduce steering load on the system and power consumption.

TOC

Last Chapter

Next Chapter

Help!

TOC
Last Chapter
Next Chapter
Help!

Rudder-Gain Control

Rudder-gain controls how much the rudder turns for every degree off course the boat has attained. Higher numbers mean faster response. However, there is a limit beyond which the boat will begin to S-curve.

When under power, beating or close reaching, and sailing off the wind in lighter winds, the rudder gain can be kept to a minimum.

As sea conditions deteriorate off the wind and/or you begin to sail more aggressively, more rudder gain will be used. However, if you find yourself shooting by the lee while surfing down a wave, it is a sign that too much gain is being used. In really adverse downwind conditions, or when pushing the boat with the spinnaker, you may want to frequently adjust this gain control.

Counter Rudder

Counter rudder is a time-based correction factor, normally adjusted only on boats that respond sluggishly to the helm. On a modern, good-steering sailboat it should not need much fiddling.

If your face controls get out of kilter for the conditions in which you are sailing, the pilot may begin to make S-curves, swerving first to one direction and then another. You can get things back to an even course by reducing rudder gain, minimizing counter rudder, and opening up the sea-state control a few notches.

Log Your Settings

You will find various settings work well for different combinations of sail, wind, and sea conditions. As you find these settings, note them in your log for future reference.

Weather Helm

Some pilots allow for automatic weather-helm correction. In this case, we find a time-based learning circuit that averages what is happening, and then applies a correction. This works fine in smooth water, but in heavier going it desensitizes the pilot to what is happening, making a difficult steering job even harder.

If your pilot does have this feature, try to make sure you have a way to turn the feature off if necessary.

Compass Choices

The pilot gets the raw course data from some sort of a compass device. The speed at which this data is updated is critical to good self-steering when sailing in big seas. Most pilot manufacturers use “flux-gate” compasses that electronically measure their reference heading.

The problem with flux-gate compasses is that the raw data varies all over the place, so the compass-generated data is averaged over time to get a steady heading. This averaging period typically runs from one-half to a full second (or more). For heavy going this time frame is way too slow.

To alleviate this problem, and that of northerly turning error (see below), there are now available digital gyro-compasses, which are small, low on power consumption, and which are becoming more moderate in price. These gyros give an instantaneous readout of heading change (and are in fact called rate-of-change sensors).

However, they do not know on an accurate basis what exact direction they are heading! So they are typically integrated with a flux gate for the actual course heading, while their fast updates are used for steering corrections.

The final way to go is to use a magnetic-card compass (like in the binnacle) with a magnetometer mounted underneath to sense heading. These can be quite fast acting, typically as quick as 0.05 second an update. A potential problem comes from viscous drag of the motion-dampening fluid, which slows things down. This can be adjusted by using a oversize compass bowl, providing more room between compass card and bowl side.

Northerly Turning Error

When you find yourself heading close to magnetic north, you will notice that the response rate of the pilot slows down. When steering the boat in difficult conditions, it may appear as if something has gone wrong with the pilot. However, this is the result of the reduction in magnetic pull on the compass due to the fact that the compass magnets are nearly lined up with the earth’s magnetic north pole. The only way around this is to alter course or to have some form of gyro compass aboard.

Sensing Rudder Position

A major variable is how the pilot head senses the rudder angle. The simplest pilots ignore rudder position and depend solely on course angle. But for accurate steering, the control head must know the exact rudder angle.

This can be accomplished by counting drive-motor rotations or measuring lead-screw location. But the most accurate system is to have a separate rudder-angle indicator mounted right on the rudder shaft.

Heavy-Weather Steering

One of the advantages of the hand-tuneable pilots is the ability to optimize steering control (the effort exerted by the pilot) against the power you want to expend from the battery bank. The tighter the steering control, the more power you will use. In heavy weather or where exact course-keeping is mandated by navigational hazards, power is secondary. Under more pleasant conditions you can reduce power required by allowing the pilot more room to wonder off course.

Power Packs

Having received its data, made its calculations, and reached its final decision, the pilot must now communicate this data to the rudder. The drive unit, which carries out the orders of the pilot, is the most important part of the self-steering equation, and unfortunately, the least understood.

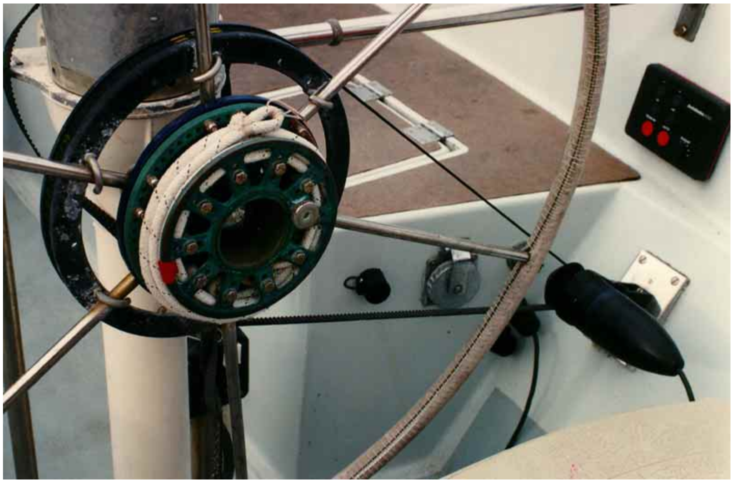
The problem comes in the drive-motor size that is usually recommended by pilot manufacturers. *Only a small amount of power is normally required*. But there are times when you need a lot, typically four to ten times the average. These are the conditions that an offshore pilot should be set up for.

There are two elements involved in power. The first is speed. A tiny motor geared down sufficiently will turn the largest rudder, albeit so slowly as to make steering somewhat problematic. This leads to claims of a given (small) pilot handling an 80-foot (24.4m) motorsailer with ease (in smooth water under power). But that same pilot may have trouble with the average 40-footer (12.2m) in modest quartering seas. *Rudder response speed* is important because it determines the time it takes the pilot to get you back on course. If you are broad reaching in a following sea, the stern is slapped by a wave, and you begin to round up, or worse, broach; it's the speed of rudder response that keeps you out of trouble. *But to turn the rudder rapidly takes a lot of power*, delivered efficiently.

Of course, the conditions during which you really need this power are few and far between. My own experience is that a properly powered autopilot will use 10 percent or less of its available steering torque 75 percent of the time, and full power will be used less than one percent of the time. Still, it is that one percent you have to design toward if you are heading offshore. If you're sailing close to home, then a smaller unit will probably do.

How much power do you need? As a basic rule, it's better to be overpowered than underpowered. Beyond this, a rudder turning rate of between 8 and 15 degrees per second, under the heaviest rudder loading, is the range you should shoot for.

As you get to the faster response speed, the helm-control head must get smarter to be able to



Two self-steering drums are attached to this helm. The forward drum (black) is for the Autohelm pilot. An external drive like this almost always fails rather quickly due to exposure to the elements. The after drum is for the Aries vane, so that when the pilot fails, the crew can still have a form of self steering.

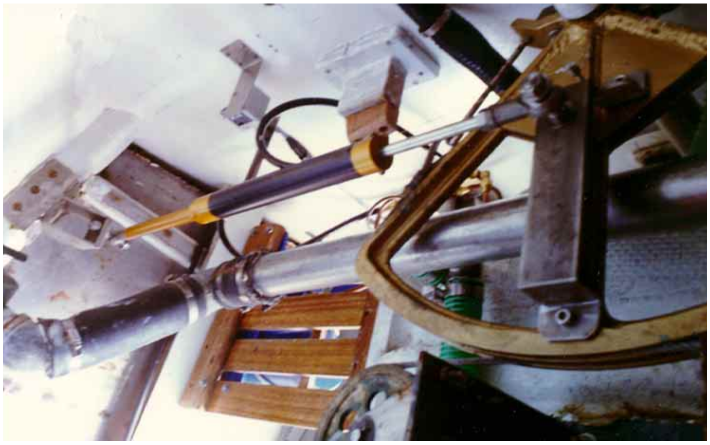
handle the quick response without oversteering.

If oversteering becomes a problem, and it will at some point in almost all situations where a powerful drive system is used, it can be dealt with by reducing rudder gain on the pilot-control head.

Mechanical Drive Units

Mechanical drives are usually limited to about 1/6 horsepower. They deliver their power via a gearbox with a toothed gear linked to the steering chain or via a drive-screw actuator. The latter devices are considered somewhat more efficient, although maintenance problems have caused most manufacturers to drop them.

However, 1/6 of a horsepower won't handle more than an easy-steering 45-footer (13.7m) in any sort of a quartering sea. So for larger yachts the choice narrows down to shortening sail and balancing the boat so that it's more easily steered by the small motor, and then finally taking over by hand, or going to hydraulic power packs.



Connecting a hydraulic ram to a conventional quadrant can be accomplished quite easily, as shown here. However, make sure that the spacer bar and its connecting bolts are robust!

A 1/4-horsepower WH pump set. If copper tubing is used, flares must be carefully made, the tubing should be supported, and the best-quality hydraulic tubing (not refrigerant tubing) used. We prefer to use high-pressure hose or stainless-steel tubing in systems where the operating pressure are likely to be high.

Hydraulic Drives

If you already have a hydraulic steering system, the decision is easy. Your pilot will plumb directly into the basic steering lines. But if you have chain-and-cable steering, plumbing in a hydraulic system can be a big pill to swallow.

In the latter case, you have to attach a hydraulic cylinder to your quadrant to do the steering when the pilot is being used. When the pilot is off, open a valve to recirculate the hydraulic fluid through the cylinder. This leaves some drag on the wheel. Or, you can attach the hydraulic cylinder to a tiller arm that has a latch mechanism so the cylinder can be totally disconnected from the hand-steering system.

Until recently there were only two types of hydraulic pumps: small hydraulic pumps (about 1/6 horsepower) that reversed when you wanted to reverse rudder direction, and which stayed off when you were on course, and pumps which ran full time using solenoid valves to switch the direction of fluid flow to the hydraulic cylinder. These latter units eat lots of power and are very noisy. Now, thanks to new electrical controllers and some clever design work, larger horse-

TOC
Last Chapter
Next Chapter
Help!

power units are available. WH Pilots in Seattle makes units up to 1/2 horsepower, which can be reversed back and forth. They are penurious with the watts and quiet, to boot.

You're probably wondering what sort of loss you take in power consumption with the bigger pilots. They're almost identical to smaller motors, if they are the on/off variety referred to above. As we've already mentioned, in direct-current motors the power consumption is proportional to load. In low-load conditions the small motor will be marginally more efficient. But at higher loads, the bigger motors, because they run much cooler, actually take less power.

Pilot Options

There are a couple of last considerations for your autopilot. The first is a remote control. This can be a very handy device, especially if equipped with a cord long enough to get you forward of the cockpit. You'll want to be able to change course and steer manually from your remote.

A number of companies offer windvane-steering options.

A rudder-angle indicator can be handy, especially if you have hydraulic steering. It should be mounted where it can be seen from anywhere in the cockpit.

WH makes a remote steering wheel which is an excellent device for handling the boat under power and in heavy weather. Basically, this is a small wheel which, when actuated, turns the rudder much like the power steering on a car. When the wheel is back to center, the autopilot grabs control again. In heavy weather, where you may want to take control from time to time in lulls or puffs or in breaking seas, being able to use the wheel instantaneously saves many hours on the regular steering wheel.

We've also found that using the pilot to dock the boat gives us better maneuverability. Our hydraulic pumps can swing the rudder much faster than we can do it by hand.

SSB/Pilot Interference

When first using the autopilot be sure to check it when broadcasting with your SSB or ham rig. You may find that the pilot swerves when you broadcast. This is not unusual, and will take some work by your electronics installer to mitigate. *Be extremely careful when checking this out, as the pilot may take you through a very fast turn!*

In some situations, you may not totally be able to suppress the SSB-to-pilot interference. If this is the situation, put a sign by the SSB to remind you that you need to have someone steering when using the SSB.

Safety

The autopilot is a wonderful tool, without which we'd all be carrying lots of extra crew.

However, it's only a machine, and you must be prepared for failure at any time.

When you are working on deck, always do so with the thought in the back of your mind that the pilot could quit at any time. Avoid getting into a situation which could be dangerous if the pilot failed precipitously.

We all have a tendency to let the pilot do all of the work when we're offshore. Nevertheless, it is important to keep a careful watch.

Backup

The pilot is such a key piece of cruising gear (perhaps the most important piece of gear aboard) that carrying a backup unit makes good sense. Our recommendation is to carry it uninstalled, wrapped in foil to provide additional protection from a lightning strike.

If you do carry a second unit, before leaving, install it yourself to make sure that it works properly and is tuned and ready to go.

If your pilot drives the rudder hydraulically, it also makes sense to carry a spare hydraulic cylinder and extra hydraulic fluid.

Pilot Compass Interference

Be careful not to put magnetic items near the pilot compass. This includes other compasses, radio speakers, tin cans, metal tools, etc. You can test the impact of these when tied to a dock by checking compass readings and then moving the items in question.

The issue here is not so much one of throwing the compass reading off (the actual compass reading is not critical unless you are using this output for navigation), as it is slowing the compass down. Compass response rate is a vital ingredient in steering under adverse conditions, so do everything possible to keep the compass efficient.

TOC

Last Chapter

Next Chapter

Help!

One of the key ingredients in the WH Pilot system is its motor controllers. These "smart" devices not only to tell the hydraulic pumps which way to turn, but at the end of each power sequence they use "dynamic braking" to instantly stop the steering system. This allows you to use much more rudder gain than otherwise would be possible, a critical feature when steering in difficult conditions.

If you have a gimbaled compass unit make sure nothing can interfere with the swinging action of the gimbals.

Which Manufacturer?

There are so many choices of pilots available today that it is hard to sort out the wheat from the chaff. For the past ten years Linda and I have been using Will Hamm's pilots from the WH Pilot Company in Seattle, Washington. These are the fastest acting, best steering, and most reliable pilots we've found. Since his primary market is commercial fishing boats, you know the stuff is going to be good. When we occasionally run into a boat that has one of Will's pilots the comment is always the same: "We can't understand why anyone would buy anything else!"

Vane or Pilot?

Having reviewed both types of gear, how do you decide what's best for you? That depends on your type of sailing, budget, and generating capacity. Certainly the windvane offers the advantage of eliminating the power consumption of the pilot. And, in heavy airs, a servo-pendulum unit will have the muscle to control you well after most autopilots have given up the ghost.

There appears to be little difference in cost. An inexpensive exposed pilot will be less money than a vane, but it's a lot less reliable. With a good-quality pilot installed versus a good-quality vane, costs are probably a tossup.

As we stated earlier, if you're heading offshore, a backup system is a must in the self-steering category. On smaller boats where vanes are feasible, the combination of vane and pilot makes sense. The vane handles long sea passages, while the pilot takes care of light airs, running, and powering. Plus, you have a backup system if one fails.

If you have to make a choice due to budget considerations, I'd opt for the pilot. We've found it less demanding on the crew than even our powerful Aries in moderate weather. In the 30 to 40 percent of our cruising that has been spent in very light airs, it's the only way we could keep our boats moving with light sails without having to keep a close eye on course and sail trim.

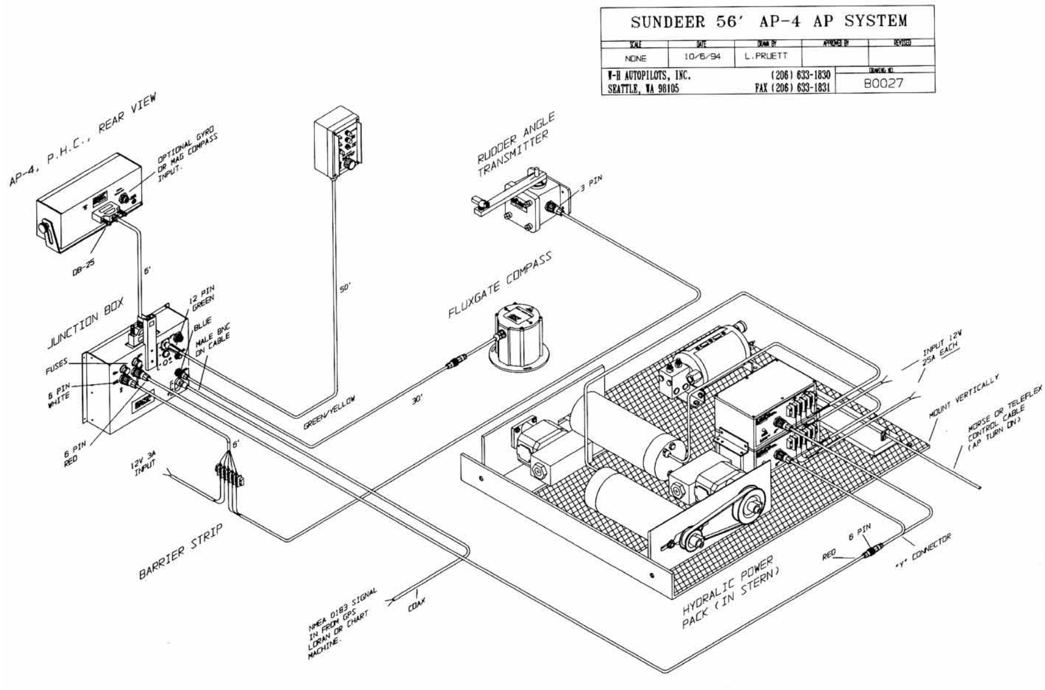
On *Intermezzo* we had both vane and pilot and found that the pilot was in use over 80 percent of the time. So in *Intermezzo II* and subsequent boats we went with pilot only (with a backup, of course).

Finally, when the going is good, experiment with sheet-to-tiller or wheel rigs. The possibilities are many, and given a bit of sea room and time, virtually any boat can be made to self-steer on one basis or another.

Rest offshore is very much a function of motion. And motion, in the final analysis, is related to how good a job the pilot or vane can do. The harder your charge is to handle when conditions are other than ideal, the more important the pilot's capability.

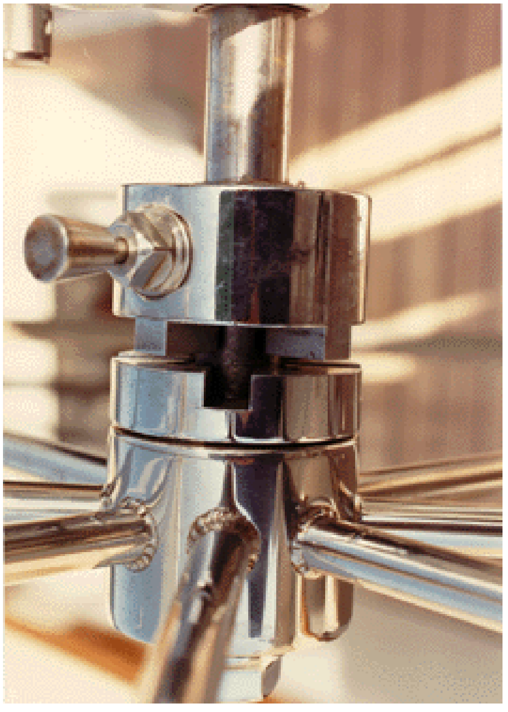
TOC
Last Chapter
Next Chapter
Help!

TOC
Last Chapter
Next Chapter
Help!



This is the schematic for the system we supplied on the Sundeer 56s. The hydraulics feature two 1/4-horsepower pump sets and motor controllers. A single pump set would do the job 98 percent of the time. However, when driving hard in gale conditions, the second pump set gave the system enough muscle to steer rapidly in breaking seas. A second pump set also offers a level of redundancy.

WH made up this custom remote for *Sundeer* with anchor windlass and electric sheet-winch buttons on the side. It made the job of short-handed sailing much simpler.



A simple steering-wheel disconnect to reduce the flywheel load of the wheel when the autopilot is being used.