Fleming 65 Systems Overview

by Steve D'Antonio

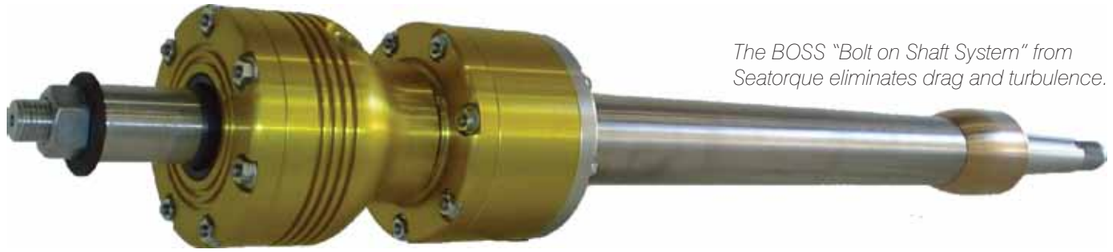
Chris Conklin on watch on Tony Fleming's new 65. VENTURE II incorporates several new, technologically advanced systems.

When Fleming Yachts asked if I'd contribute to Venturer magazine again I was delighted to do so, under one condition. I insisted upon sea trialing the components about which they'd asked me to write. That request was granted while I made a passage from Stornoway in northern Scotland to Reykjavik, Iceland, aboard VENTURE II, Tony Fleming's personal Fleming 65.

VENTURE II is equipped with a variety of innovative products and in-house designs that include the sublimely simple, such as a fold-away safety rail that fits neatly into the lazarette hatch and elegant stainless steel guards designed to prevent the bitter ends of dock lines and other small items from disappearing overboard. Then, there are the more complex tandem 230 volt Outback inverters that easily carry house loads along with the synchronized twin high output Balmar 24 volt alternators. However, three products used aboard VENTURE II deserve special attention. At least two are relatively new to the recreational marine market, while the third is based on a well known, tried and true concept.

I spent nearly a month aboard VENTURE II both dockside and underway. The underway periods varied from delightful and glassy calm to tumultuous Beaufort Force 5-6 conditions. There's no doubt in my mind that the durability, reliability and installations of these components were amply tested. During my time aboard I was afforded unfettered access to every component, compartment, switch, fitting, valve and wire that I could reach with my 5'7", 140-pound frame. It's safe to say, therefore, from a gearhead point of view, there isn't much that escaped my gaze.

> There's no doubt in my mind that the durability, reliability and installations of these components were amply tested.



The BOSS "Bolt on Shaft System" from Seatorque eliminates drag and turbulence.

Seatorque Enclosed Shaft System

The folks at Seatorque have been in the marine industry for over 25 years, building a variety of different types of products from complete boats to their innovative Enclosed Shaft System, sometimes referred to as the BOSS or Bolt on Shaft System. The BOSS was standard equipment on the firm's boats, and they've actually been building the product for sixteen years.

I first encountered the BOSS at the International Boat Builder's Exhibition in Miami four years ago and was intrigued from the start. The founders, Peter and Jana Stolper were exhibiting the product. There wasn't a question I had that they couldn't immediately answer, so I was hooked.

The BOSS consists of an oil-filled 316L stainless steel tube, in which the Aquamet 22HS propeller shaft turns. The shaft is fully supported in the oil bath by a series of roller bearings, reducing drag to an absolute minimum. An oil reservoir is located above the BOSS's forward end, where its level and the clarity of its fluid can be easily monitored.

The clarity and quantity of the system's lubricating oil is easily monitored at a reservoir located above each shaft.

The thrust bearing housing, located inside the vessel is precision machined; the tolerances are kept within one ten thousandth of an inch. It's made of 6061 aluminum, which is treated with a hard anodized finish to minimize corrosion. Flexible mounting bushings located between the BOSS and the vessel's hull isolate and absorb thrust loads as well as vibration.

After studying this installation I believe much of the beauty of the BOSS lies in what it excludes from conventional shaft systems. The enclosed BOSS shaft arrangement eliminates turbulence and the drag it induces. Referred to as the Magnus Effect, it's what causes a spinning baseball to curve. The enclosed design eliminates active, vortex drag. Additionally, the water flow to the propeller is "cleaner" when the spinning shaft is removed from the equation. Inefficiency and drag created by cutless bearings and shaft misalignment are also left behind when the BOSS is employed.

A twin universal joint arrangement absorbs the difference between the engine centerline and shaft angle, which means the need for power-robbing down angle gearboxes can be eliminated.

Conventional shaft installations rely on motor mounts to absorb engine vibration as well as propeller thrust. However, like other thrust bearing systems, the BOSS removes the thrust from the motor mounts; all prop thrust is transmitted to the hull via a cushioned mount. Without the need to absorb thousands of pounds of thrust, the motor mounts can be optimized for absorption of engine vibration and torque alone. The difference between the BOSS and other thrust bearing systems, including those previously used by Fleming Yachts, are several and important. Conventional thrust bearings as well as ordinary shaft installations still require time consuming shaft-to-cutless bearing alignment procedures during the initial set up. Seatorque's BOSS requires no such alignment to multiple bearings because the assembly is a unified, one piece design. The BOSS is a low profile design, taking up significantly less room than conventional thrust bearings between the transmission output coupling and the stuffing box, often where space is at a premium. And, speaking of stuffing boxes, those too are eliminated with the BOSS. The watertight seal is achieved between the non-moving outer casing and the hull.

This rugged thrust bearing and universal joint assembly is built to work hard and fast.

The manufacturer recommended service intervals on the BOSS are generous. Oil changes are required at 3,000 hours while a major overhaul isn't necessary until 10,000 hours or

It's clear to see the maintenance advantages with this system.

ten years have been reached. The manufacturer's unofficial guidance calls for an oil change whenever the vessel is hauled; it's a job that takes less than an hour. In my opinion that makes good sense. Compare these to conventional shaft systems, even those that include a thrust bearing, that require stuffing box maintenance or repair, cutless bearing replacement and shaft/strut alignment and it's clear to see the maintenance advantages with this system.

In summary, the Seatorque BOSS is a well engineered, well supported, proven and reliable system that offers improved economy (the math indicates an increase of 8% more horse power delivered to the propeller, which equates to improved fuel economy) and reduced maintenance.

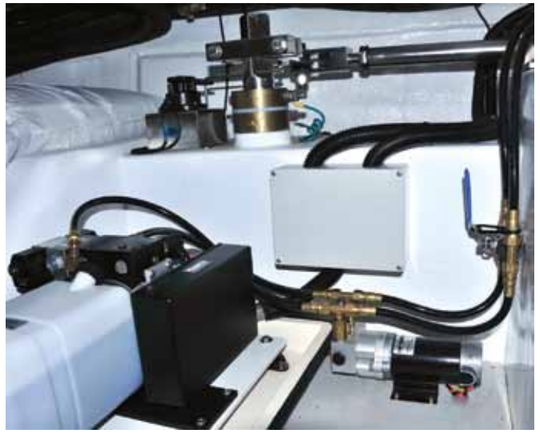
Hypro Electronic Command Steering

When electronic shift and throttle controls first became available to the recreational marine industry there was skepticism, and understandably so. Change for the sake of change is never desirable in the world of boat building. However, when there are clear benefits to making the change, then I sit up and take notice and investigate the strengths and weakness equally. Ultimately, electronic engine controls have proven to be a boon to boat building and boat ownership. The days of struggling with heavy cable controls that were limited to two stations are now thankfully a thing of the past. And, with the manner in which these controls interface with electronically controlled engines their installation and use are as seamless as it gets. Have there been failures? Sure, and word travels fast when a failure of an electronic control occurs. Do you ever hear what

Do you think modern cruise or warships use cables and pulleys or hydraulic lines between the helm and the rudder ?

caused the failure? Rarely. In some cases it's design while in many others it's an installation issue. How many times have you heard of conventional controls failing? Probably not many and that's because it's not news or worthy of dockside gossip. As a professional in the industry I can tell you it happens often, I've probably seen two dozen failures of conventional cable controls in my 20+ years in the industry, in every case it was the result of an installation error or poor maintenance. Statistically, electronic controls are very reliable.

As reliable as electronic controls are, I know what you are thinking. Electronic steering, using only wires between the helm(s) and the rudders? Are you kidding me? No and here's why. Do you think modern cruise or warships use cables and pulleys or hydraulic lines between the helm and the



Located in the lazarette, the Hypro Steering electro-hydraulic pump and ram cylinders do the heavy lifting after receiving electronic signals from the vessel's helm stations. While VENTURE II's autopilot pump serves as a backup, production models will utilize a dedicated pump in addition to the autopilot, creating triple steering redundancy.

rudder, both of which may be hundreds of feet apart? Indeed not and how about modern large aircraft, the originators of "fly by wire?" VENTURE II was originally equipped with conventional hydraulic steering. When plans were discussed to add power assist, and the complexity associated there with, Tony Fleming opted to search for another solution. He and the staff at Fleming Yachts found it in the UK with a company called Hypro Marine. Hypro manufactures a variety of different types of marine steering systems, both manual hydraulic and power assisted as well as a hybrid system, and they are a dealer for a popular hydraulic steering line. However, in the case of VENTURE II and Fleming Yachts the goal was to install a simple, reliable system that, other than hydraulics located at the rudders themselves, was connected to the helms purely electrically.

The Hypro rose to the occasion with their Electronic Command Steering or ESC. The ECS utilizes a precision electronic helm or helms (multiple stations can be wired in very easily) and an electronic power unit. The latter is essentially a hydraulic pump, driven by a 24 volt reversing electric motor, which gets its commands from the helm units, again, electronically;

Operation of the electronic helm, seen here from under the console, is precise, effortless and reliable. Long hydraulic plumbing runs are replaced by easy-to-install wiring, and the likelihood of hydraulic leaks are virtually eliminated.

The ECS is light years ahead of conventional, "wet" designs that rely on possibly hundreds of feet of hydraulic hose and gallons of fluid.

much like an autopilot pump operates on an existing hydraulic system. The old hydraulic lines were simply capped off and left in place aboard VENTURE II. It likely would have taken longer to remove them than it did to install the ECS system.

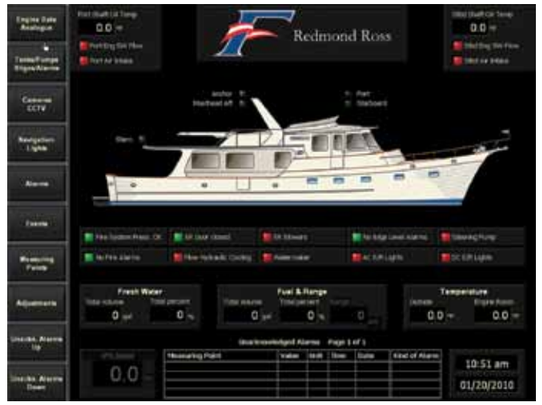
In addition to the ease with which it can be installed, the ECS system offers improved responsiveness with power assisted-like effort. When compared to a conventional hydraulic steering system, much less one that relies on a power assist PTO driven from an engine, the ECS is light years ahead of conventional, "wet" designs that rely on possibly hundreds of feet of hydraulic hose and gallons of fluid. The hydraulic hoses for an ECS system are just a few feet long. The retrofit aboard VENTURE II afforded another desirable result; the turns lock-to-lock were reduced from 5.5 to 4, at one revolution per second. In a traditional hydraulic system that reduction would have been accompanied by increased effort. However, because it's electronic that simply wasn't the case for the ECS. ECS helms are indistinguishable from the "feel" of a traditional hydraulic helm, there's just the right amount of drag and of course there are stops just like any other helm. In using the system, with the exception of reduced effort and increased responsiveness, I couldn't tell the difference.

In VENTURE II's case, redundancy is provided by the autopilot pump, which is plumbed in parallel with the ESC's hydraulic system. For production Flemings, an additional, independent back-up reversing electric pump will be added to the system (making for a total of three separate steering actuation systems). It will in turn be actuated by a port-starboard toggle switch located at the helm, offering redundant control of the hydraulic ram and rudders.

While VENTURE II has four control stations, the pilothouse, flybridge, cockpit and the aft boat deck, ECS is installed only at the pilothouse and the flybridge. However, because it is truly a plug and play system, ECS helms or joystick and rudder angle indicators could easily be installed at these stations or anywhere aboard. The ECS helms are wired individually to the control unit rather than being wired in series, which means if a single unit fails it has no affect on the others. While Hypro may not be a household word in the US, they do have a reputation that precedes them within the industry. Their equipment is used aboard the vaunted Royal National Lifeboat Institute vessels and they recently won a 150 vessel contract to supply the USCG.

It's very likely that electronic steering will become more popular on a variety of vessels in the recreational marine world, especially those that, until now, required PTO-driven power assistance. It simply makes good sense.

Böning Vessel Monitoring System



The MAIN PAGE shows all yacht systems at a glance and is used like an aicraft's pre-flight checklist.

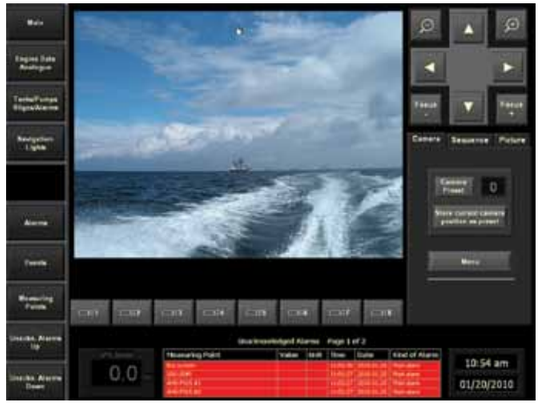
Today, with PDAs, wifi and Skype, it's all about instant, seamless and easy communication for both voice and data. Now with the latest Apple iPhone IV product that includes video communication, the days when Star Trek's communicators and sensor arrays become reality are not far away.

While it may not be 2001 A Space Odyssey's HAL, it's a close second.

Perhaps not unpredictably, many fictional concepts have become reality and in the case of VENTURE II it's called the Böning Automationstechnologie, a German manufacturer of ship automation technology located near Bremen. While it may not be 2001 A Space Odyssey's HAL, it's a close second because there's very little the Böning system can't tell you about a vessel into which it's been wired.

Aboard VENTURE II, using a vast network of sensors, the Böning system monitors a multitude of items, from battery voltage and shore power input to bilge alarms and the vacuum imparted on cooling water inlets for various raw water consumers. It's also capable of controlling navigation lights and, on upcoming systems, more gear will be monitored as

Individual sensors monitor a wide variety of systems and conditions. Here, a vacuum sensor measures restriction caused by a buildup of debris or fouling in a raw water intake. This will alert the captain to a problem long before reduced water flow becomes critical.



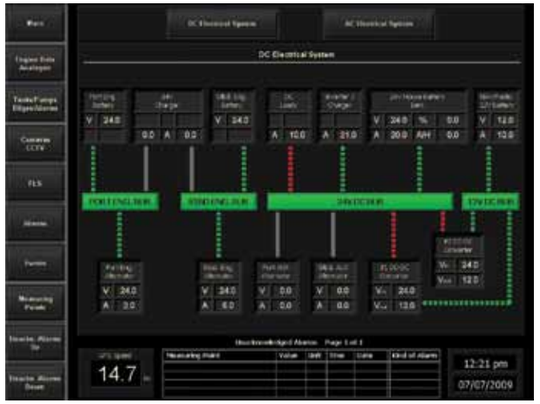
Up to eight color cameras can be monitored throughout the vessel. Pan, tilt and zoom functions are controlled from the monitor.

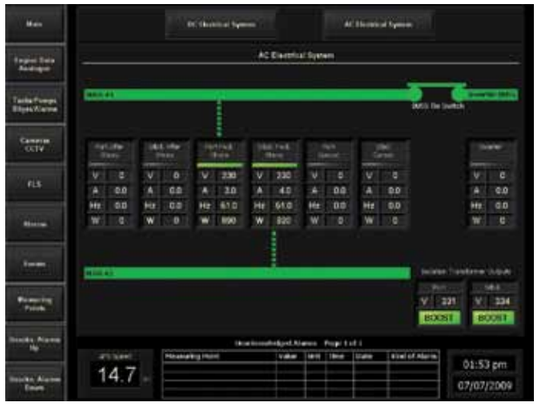
well as controlled via the Böning touch screen display. If that's not enough, the system is also integrated with the vessel's video system. It's capable of utilizing up to eight camera inputs (VENTURE II has four) as well as the FLIR infrared night vision system and the Furuno Navnet 3D displays. Cameras have full pan, tilt and zoom function and this is controlled via touch screen virtual knobs.

The first time I sat in VENTURE II's helm chair I immediately noticed the quality and readability of the MAN engine instrument display. It's as crisp, clear and as understandable as any I've ever seen. Information is provided both graphically and numerically, and there is just the right amount of information, not too many pages to drill down through to see what's needed. It's really a joy to view. As I researched the Böning system I discovered that they manufacture MAN's instrument panels. This made sense since the Böning display was equally as crisp and clear, and the information it provides is logical, if not just a little too small for reading from any distance. Listing all of the individual sensors and capabilities here isn't possible. However there were a few that stood out as especially useful.

They include AC and DC voltage, amperage, amp-hours (for the battery bank), alternator and charger output, a log of "events", such as alarms for bilges or voltage, fluid level in all tanks, status of the engine room fire suppression system, hydraulic fluid flow, engine room temperature, condition of engine room air intake scuttles and watermaker operation. There are over 105 inputs to Böning system on VENTURE II.

The programmability of the system is vast as well. Set points for monitored items can be established to trigger events or alarms, all of which are logged until cleared by the user. While dockside in Iceland where shore power is limited, it wasn't unusual to exceed the available supply (a paltry 16 amps). When power was lost the Böning would sound the alarm, alerting us that it was necessary to either start a generator or reset the breaker after shedding some loads. The alarm would remain on the "events" page until cleared. Additionally, if power output from the boosting isolation transformer fell below the





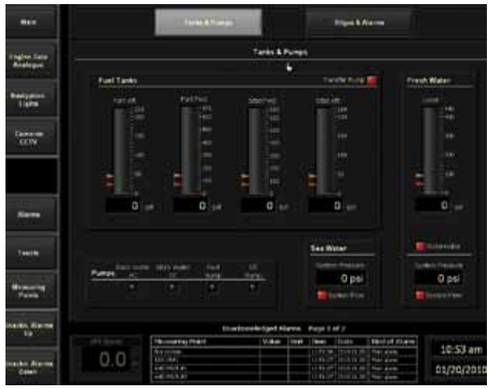
Optional AC and DC monitoring provides an extraordinary amount of information about the vessel's electrical systems.

set point of a given voltage (because low dock voltage could be boosted no further) an alarm would sound as well. When one of VENTURE II's navigation lights failed, the Böning knew it, switching to the backup fixture.

Achieving this monitoring nirvana comes at a price; albeit a small one. There are a number of junction boxes and multiple wire bundles located and routed throughout the vessel, not to mention many individual sensors. However, when a system such as this is installed as the vessel is being built the time required is comparatively low. The result is the ability to monitor, from a single screen or location (or from multiple screens if the user desires) nearly anything one may wish to monitor aboard his or her Fleming.

As an adjunct to the Böning system, a Yacht Sentinel has been installed on recently completed Flemings. The Yacht Sentinel utilizes a simple and familiar SMS text messaging system to alert

Using column pressure the system determines the quantity of fuel that is in the tank. Moving parts are virtually eliminated, ensuring reliability and accuracy.



Fuel and water tanks are accurately monitored as well as the status of pumps and system flow. Two tank level alarms can be set indicating near-empty or empty.

Rugged, water resistant junction and relay boxes such as these serve to consolidate sensors located in each area of the vessel.

owners, skippers or service personal to a variety of conditions aboard the vessel. Optional sensors include high bilge water, open hatches, anchor watch, temperature, shore power supply and battery voltage, to name a few. The unit itself relies on shore power (and/or the vessel's inverter) or batteries for operation. It also has an internal back up battery, which means it works even if all power aboard is lost. A built in GPS unit will also send an alert if the vessel is moved beyond a set "geofence" point and polling the Yacht Sentinel via SMS, from anywhere in the world, will generate a response with the status of all monitored systems.

Communication with the Yacht Sentinel can be set up for up to three mobile phone numbers using the Sentinel's self contained SIM card (it's pay as you go so there's no contract or additional fees). Information that is sent is further secured in that access requires the use of a PIN. The unit itself is not much larger than a paperback book and its power consumption is miniscule. The Yacht Sentinel installed aboard new Fleming Yachts offers unrivaled peace of mind.

Systems installations are a tricky thing, particularly critical systems such as steering, propulsion and monitoring. When engineered and installed properly and when integrated into the vessel as a whole rather than on a piecemeal basis, the user never has to think about their operation, they simply work and work well. The Seatorque BOSS, Hypro ECS and Böning systems installed aboard VENTURE II do just that.

Editor's Note: VENTURE II, like VENTURE I, serves as a test bed for new systems, technology and accessory equipment. Before changes are made to Fleming's production models these new products are tested in real life conditions and while functioning for thousands of miles at sea.

TORRID
The Most Trusted Name in Marine Water Heaters

QUALITY FLEMING STANDARDS...
FOR MORE THAN 20 YEARS!

On a Fleming, the quality and attention to detail is everywhere-right down to the water heater.

Glass Lined Tanks, Stainless Steel Jackets, Removable Heat Exchangers, Adjustable Thermostats, Incoloy Sheathed Elements, and a **5-Year Warranty** are only a few of the reasons our products last and perform...year after year after year. Contact your nearest dealer today or visit our website for more details!

MARINE WATER HEATERS
SIZES & FORMATS

TORRID CUBE DESIGN

Cubed3
6 Gallon
10 Gallon
17 Gallon

Horizontal
6 Gallon
10 Gallon
17 Gallon

Vertical
6 Gallon
10 Gallon
15 Gallon
20 Gallon
30 Gallon
40 Gallon
50 Gallon
65 Gallon
85 Gallon
120 Gallon

White Powder Coat and Dual Heat Exchanger options available.
Standard configuration is 120V 1500W

View our complete product range online!
www.torridmarine.com