WHY IT IS IMPORTANT NOT TO BY-PASS OEM (Original Equipment Manufacturer) Systems

Get on the Bus

Brunswick's SmartCraft provides smooth digital operation and allows for new levels of engine and auxiliary system monitoring.

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If your next boat or engine is a product of the Brunwick Corporation (not an unreasonable possibility as they own 48 boat brands plus engine companies) your throttle and shift commands will likely travel to the engine and transmission by bus, not the kind with tires, but a digital control and communication bus called SmartCraft. If the boat is powered with a Cummins Mercruiser Zeus system, movement of the wheel or joystick will also be communicated over a SmartCraft bus. All engine readouts, whether on a monochrome or color LCD, or on familiar looking analog gauges, will be sent from the engine to the helm on a second SmartCraft bus. A third SmartCraft bus may be aboard to control and monitor auxiliary systems such as gensets, trim tabs, tank fluid levels, bilge pumps, and the like.

Unless you are inquisitive, you might not be aware that your power commands and the instrument panel indicators you see are part of an advanced digital bus system, so transparent is it to the user. Steering, throttle and shift controls appear and function identically to those on a conventionally wired boat. Analog gauges look and act like those you have used for years. You will operate your boat as you always have; there is no learning curve. The designers of SmartCraft have succeeded in making

By Chuck Husick

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the technology invisible while providing a previously unachievable level of intelligent monitoring.

The technology used in the SmartCraft digital bus control and communication system originated in the automobile industry in the 1980s with the introduction of electronically controlled engines. A robust control and communication system was needed to operate reliably in a vehicle's electromagnetically hostile environment. A two-wire digital communication system called a controller area network (CAN) bus, now proven in millions of vehicles, has lately been adapted for non-automotive uses, including SmartCraft.

Consider this analogy: A passenger bus cruising down a street carries individuals from numerous locations to whatever destination along the route they desire. The SmartCraft CAN bus carries a variety of "passengers," including some that command actions, such as throttle and shift, and others that simply report on the status of a system, such as tachometer data. Its design ensures that all electronic "passengers" board and leave the bus at the right place and time. A CAN bus ensures a throttle command will always travel from the helm control to the appropriate engine and that the information from the multitude of engine sensors and other equipment will flow through the bus without mutual interference, each to its gauge or digital display. The bus architecture can also make performance information available for computer-aided analysis and troubleshooting.

SmartCraft and other similar bus systems must satisfy stringent reliability requirements comparable to those imposed on aircraft engine and flight control systems. The command signals sent over the bus system must be protected against interference and backed-up with alternate communication pathways to ensure that the operator will always have control of the commanded system. SmartCraft responds to that need utilizing a three-bus system, CAN-X, CAN-P and CAN-V. The CAN-X bus carries only safety-critical information, throttle, shift, and for Zeus-equipped vessels system steering commands. The CAN-P (propulsion) bus provides engine operation and diagnostic information for all displays and functions as an automatic back-up for the CAN-X bus. The CAN-V (vessel) bus carries information from a wide variety of sensors and vessel systems including DC and AC electrical systems, fluid levels and, in some installations, navigation data. Twin-engine SmartCraft-equipped vessels feature two independent CAN-X buses, one for each engine and two CAN-P buses.

The availability of all monitoring data in digital form on the network allows appealing flexibility in the way information is displayed to the helmsman. LCD panels of various configurations are used in addition to a wide variety of conventional-appearing gauges that contain the chips needed to select, decode and display data flowing on the bus.

Ancillary systems that are compatible with SmartCraft include Cummins Onan diesel and gasoline fueled generators, Marine-Air air conditioning systems, Kohler gasoline fueled generators, Xantrex Technology inverters and battery chargers, and a variety of Navman instruments and systems. Connecting SmartCraft-compatible equipment to existing installations is simplified with prewired cables. The multi-pin connectors used in the system are similar to those used in the auto industry, triple sealed to prevent damage from water and designed to allow easy re-attachment in the event cables for ancillary equipment also need to be connected.

In an effort to ensure system integrity, SmartCraft's internal architecture has not been made available except to companies who have joined the SmartCraft network. Although the effort to safeguard the system is desirable from the manufacturer's standpoint, it does, at least initialy, deny use of the data by "outsiders" or third-party aftermarket products. However, given the proven ability of engineers and programmers to hack virtually any digital system, I expect we will see a number of accessory display and control devices become available as the popularity of SmartCraft increases and users find un-served applications.

The presence of a digital command/communication bus creates an opportunity to monitor and analyze the operation of virtually everything on a boat and may be used to arbitrate differences in opinion if a warranty or service issue arises. In the future, virtually every system on a boat, from bilge pumps to the 32-point light on the cabin top, may be part of a comprehensive vessel information system, simplifying and reducing the cost of maintenance. The end result will be a more reliable boat that will be easier and less costly to maintain.