Article 11 11/22/2009

Installation of electrical systems on boats today is much different that it was a few years ago. There has been a steady development of electrical devices that can be used to create a modernized electrical system. A major rewiring of a boat requires many factors to be considered during the pre-planning stage. We have to look at the electrical loads, charging sources, fusing, wire size and location of equipment. The installation should be installed following ABYC (American Boating and Yachting Council) specifications to ensure a proper and safe installation. The new equipment now available allows us to reduce the amount of electrical wire in an installation by up to 40%. This also reduces labor, material costs and weight.

We'll cover some of the electrical devices available from Blue Seas and their uses:

- Remote Battery Switch

  In most boats the battery switches are located in inaccessible locations such as engine rooms or they may require long runs of heavy cable to locate the battery switch in a usable location. In the event of an emergency the switch may not be accessible.

  The new remote battery switch can be located close to the source. This eliminates long runs of heavy cable. The switch has a solenoid built into it and can be manually operated or operated remotely from a conveniently located light duty switch.

- Automatic Charging Relays

Previously when charging multiple battery banks, isolators where the preferred chose. They can create problems if not installed properly. The main problem is a 0.5 to 0.7 voltage drop across the diodes as well as heat generated which is lost power. If the alternator has an internal regulator and sense wire then the batteries cannot get properly charged due to a low charge voltage. An isolator requires the sense wire to be connected to the diode output to trick the alternator to output 0.5 to 0.7 volts higher.

The ACR or automatic charge relay séances the voltage output from a charge source and will close when the voltage rises to a predetermined value usually around 13.2 volts. This parallels the batteries during the charge cycle and isolates the battery when the charge source drops. Light duty models are available to handle current up to 120 amps. Heavy duty models will handle up to 500 amps continuously

Heavy Duty Solenoids

We now see more heavy loads on boats which need to be turned on or isolated when not in use. There are bow and stern thrusters, windlasses, davits and dingy platforms. These are high amperage loads requiring heavy duty cabling and a means to operate safely. .

The heavy duty solenoids work well for turning on and off these devices. We can operate these solenoids using light wire and switches in user friendly locations. The solenoids can handle continuous loads of up to 450 amps

Fusing

Proper fusing is very important to protect equipment and prevent overloading of circuits. Equipment today can have current draws up to 700 amps. There are many different types of fuses available and it is important to select the correct type of fuse for a specific operation. The interrupting capacity and amperage rating has to be taken into consideration when selecting fuses. T fuses are the recommended fuse used on inverters and are available up to 400 amps of load and 20,000 amps of interrupting capacity. The wrong type of fuse could cause an aching situation when it fails causing severe burning and damage.

Buss Bars

Buss bars are necessary to connect multiple heavy cables. The terminals on a battery should be limited to one good connection. Heavy loads will suffer resistance and heating if multiple connections are placed on the battery terminals. The buss bars should also be rated for the calculated load.

Digital Switching

Digital switching is becoming more prevalent and seen on many new boats. Cole Hersee is a system that we use. The advantage of this system is to eliminate a mass of wiring running from the loads to operating switches at the helms. In an older boat with twin engines and dual stations you would have a large bundle of wire running from bilge pumps lights and many other system to switches at the

lower helm and then to the upper helm. With digital switching this mass of wires can be eliminated.

The system consists of three components:

A/ Digital switches

These attractive switches are located at each helm and can be programmed to do many different functions as required. They can be ON/OFF, Mon On/OFF, or any combination that maybe required.

B/ Switch Interface Module (SIM)

The SIM will be located near the switches; the switches are plugged into the SIM with individual ribbon cables. Each SIM can handle eight switches. The SIM's are then daisy chained together with a light four wire data cable.

C/ Power Distribution Module (PDM)

The PDM's would be located near the load centres. For example you may have one or two in the engine compartment close to loads like the bile pump, blowers, engine parallel solenoids and any other load in the area. The PDM can handle 8 different circuits at up to 20 amps per circuit. A 100 amp power supply is run to the PDM. The Data cable from the SIM is connected to the SIM

We can then connect the system up to a computer and program each circuit for amperage rating and how we want the switch configured. System alarms can also be incorporated.

This system eliminates a major mass of cabling and future problems.

Maretron NMEA 2000

The future now is NMEA 2000 in which a central 4 conductor data buss which is routed throughout the boat. Sensors, equipment and displays are connected to the buss using data drop cables tied into the main buss. This allows electronic equipment from manufactures of certified NMEA 2000 products to network on a common buss and share information. Devices such as GPS, Depth, wind, and weather and engine data just to mention a few can be displayed on NMEA 2000 chart plotters, computers and standalone displays.

First developed and mainly for electronics we will soon see sensors for all systems on a boat.

This will allow us to operate and monitor

- Engine data
- Tank levels
- Electronics
- AC distribution system
- DC distribution systems

The NMEA buss system also eliminates multiple runs of cabling throughout the boat and makes future addition of equipment easier to install.

Overall the boat systems have become much more advanced in the last few years creating more reliable systems that can be easily monitored. Due to so much equipment networked it takes a professional knowledge and specialized equipment to install and maintain. A computer and specialized diagnostic equipment is a must.