

## Your Boat's Electrical System

## Boating Tips

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Marine electrical systems may be as simple or as complex as you want to make it or the person who originally wired the boat made it. Even when the area behind the power distribution panel looks like a bowl of spaghetti, if properly labeled most people can make sense of it.

Keep in mind that boats may have AC and DC electrical systems. AC is 110/220 v home electric while DC is low voltage auto and marine electric. Each has a ground or neutral wire that is never shared between AC and DC. With Marine DC, once you determine which is which, label them with something that will not fade nor be easily removed.

The current of all electrical systems run in a circle, i.e. a circuit. A break anywhere in the circle and the circuit fails, the component won't power on.

For AC as well as DC repairs and additions you'll need the following:

- Clamp style circuit tester that also has probes
- Good quality wire cutter with built in crimping
- Separate wire cutter
- Needle nose pliers
- A system for labeling circuits
- Good quality electrical tape
- Various types of connectors of various sizes
- Various sizes of heat shrink tubes
- Wire puller twice the boat's length as well as possibly wire grease
- Wire, buy as needed in the correct size, length and color, twisted or solid

Labeling material must be durable, not failing in extreme hot and cold. There is a wide range of label types and material preprinted, printable or writeable. Add identical labels along a circuit's run to identify it along its path. Use the Internet to locate good quality labels

Add new wires to existing bundles so they don't move hence don't chafe causing a short circuit or break in the wire or secure individual wires to bulkheads or the hull's bracing. Never screw into the hull as you may pierce the hull. Use screw mount cable ties along with common wire ties between mounts. Bundles should also be of common purpose such as bridge electronics, forward head, etc. It's extremely important to keep wiring accessible for future work.

When adding a new component ensure that the wire is correctly sized for the load. The component's installation book will identify its load. Follow ABYC (American Boat & Yacht Council) requirements for color to aid in identifying circuits (information available online). If your boat's initial wiring is correct then proper color coding makes repair easier. For new installations, properly size the breaker for the new circuit.



<https://abycinc.org/page/StandardsSupp58>  
An excellent source of various standards that are continuously researched, developed, and revised by over 400 volunteer marine professionals from all fields of the industry including the US Coast Guard (USCG).

Pulling a wire from for example from the bridge to the power distribution box is neither easy nor simple. Experiment with the wire puller until you are proficient. Rather than a wire puller use a broken or existing wire to pull a new wire. Learn how to splice the replacement wire to the broken wire using the latter as a pull. It's advisable when making repairs to add a pull string. Pull strings need enough length to fully move in both directions. If you use the pull string to pull a new wire, how will you pull another wire or a wire in the opposite direction? If a wire is binds, apply a small amount of wire grease.

Next, when joining or splicing wires use a butt connector correctly sized for the wire. Do NOT use house or AC wire nuts. Then crimp both ends of the butt connector to secure the wires, giving a good tug to guarantee they won't come lose. Employ heat shrink tube in moist environments. (Remember to add the heat shrink tube BEFORE joining the wires.) Use a heat gun on low-medium setting to shrink the tube yet not melt the wire's protective coating. Avoid splices in or underwater.

Finally, never tackle an electrical issue beyond your ability. Begin your electrical learning with simple, easy tasks working your way up to expert. When unsure, ask for help from a competent electrician or employ the Internet for assistance. While DC current won't usually fry you, it can fry your electronics.

This article is given courtesy of the Pamlico Sail & Power Squadron, America's Boating Club™. To learn more about our boating courses, email Linda, our Education Officer at [psps@gmail.com](mailto:psps@gmail.com) or contact her at 252-964-3009. Planning is underway for 2020 and includes 4 hour seminars and advanced courses. Reference our website at <https://pamlicosailandpowersquadron.org/> to learn more and to keep up on the education opportunities offered.