

ELECTRICAL GROUNDING SYSTEMS ON A SAILBOAT

There has been a considerable amount of misunderstanding, confusion and incorrect information over the years regarding the grounding systems on boats, and I am going to attempt to clear up some of these questions in this article. A great deal of the confusion lies in the use of the term 'ground' as regards to the electrical systems on a boat. There are actually five separate electrical systems that have the name 'ground' associated with them. Quite often these systems have been electrically connected together, either by design or by misunderstanding, and I feel that they should be separate and distinct systems, each with their own purpose, and their own electrical connections.

These five systems are as follows:

1. The negative 12 volt system from the batteries. This is used to power the 12-volt equipment on the boat, and is 'grounded' to the engine on most boats.
2. The 'ground' wire on the 110-volt system, usually green in color, and connected to a stake driven into the ground. This is used to prevent a shock in the event the positive and neutral wires of the 110-volt system come in contact with each other through a faulty connection.
3. The electrolysis 'ground', which is used to protect dissimilar metals on the boat when used in salt water.
4. The radio 'ground', which is used to help the antenna of a radio or loran achieve greater distance of transmission and reception.
5. The lightning 'ground', which is used to discharge the current from a lightning strike to the 'ground', which in this case, is the water the boat is floating in.

As you can see by these descriptions, these are five separate systems, each with its own purpose, but usually confused with each other because each has the word 'ground' associated with it. If it were not for the common use of the word 'ground', then these systems probably would not be interconnected, which is the case on most of the boats I have surveyed in recent years. Let's go over a brief description, use, and proper connections of each of these systems.

The 12-volt negative wire from the battery is usually grounded to the block on the engine. This is a holdover from the automotive industry, where the metal frame of the car is used to conduct one side of the current, and the electrical components used in a car are fastened to the frame, thereby completing the circuit. On boats, since the hull is not normally used as a conductor, then a separate wire is used to complete this circuit. These wires are usually black in color, and connected to a common buss bar, and then taken to the block on the engine. There is also a large cable, usually black in color, connected from the negative post of the battery to the engine block. This completes the circuit. It is not absolutely necessary to connect all of these wires through the block on the engine. On the new Perkins engines, the negative side on the engine is insulated, and connecting to the block will not complete the circuit. In this installation, the common negative wire from the 12-volt system is taken directly back to the battery.