

## RE-ROUTE POWER AND GROUND FOR HEAD UNIT TO SAME POWER TAP AS AMPS

The power harness going to the helm of most boats has a lot going on. Power for gages, power for navigation lights, power for trim tabs... A lot of things use the power harness going to the helm. Consider that the tachometer is connected to this power harness but also to the ignition circuit... Without bothering to do a load calculation just know that for most boats, the helm power harness is often undersized, has multiple joints or splices, and in general is not a good place to get power for the radio. Why?

The radio connected to the helm power harness sees a lot of noise from the other things connected to it. Consider the tilt and trim circuit of all stern drives and most outboards. To adjust trim, you close a switch and energize a coil in a relay or valve to adjust the drive unit up or down. When you release the switch, the magnetic field in the energized coil collapses and sends a voltage spike back up the harness. Just like the ignition coil of any gas motor. "POP" Every time...

The aforementioned tachometer. Guess what is being induced onto the power harness at the tach when the engine is running. Yup. Engine whine. It is a common complaint on many boat audio systems.

What is the root cause of all of this? Voltage potential.

The ground wire in the helm power harness often isn't zero volts. If you have an amp wired straight to the battery or battery switch, it "sees" the boat's best ground. The ground wire going into the back of your radio when wired to the helm power will measure higher. With a voltage difference between the battery and the radio you can pick up noise. Tach noise, trim switch noise, engine control module, (ECM) noise etc.

Take the time to move the radio's power wire(s) and ground wire to the same power tap as your amplifier. This dedicated power circuit will be cleaner than the helm power harness, and the voltage potential between the head unit and the amp will be minimized or eliminated. Re-wiring your head unit power will remove roughly 90% or more of troublesome noise issues.

## INSTALL SO THAT ALL WIRES LEAD UP TO ELECTRONICS, NOT DOWN

Have you ever seen a chain coming down from a house's guttering? Know why its there? It leads rain water to the ground without a downspout. Water likes to cling to things. In a boat, you are exposed to water from a variety of sources, splashing, rain, condensation... Water loves to hang onto wiring and it will end up there no matter how hard you try to prevent it. Water runs downhill though. Be mindful in your installation to make the wiring come up to the amplifier or radio from below, rather than down to your device(s). This will prevent water from getting into your electronics from your power and signal wiring

**GO**   
**OVERBOARD!**

## DRIP LOOPS

So you say you have to bring power or signal cable to your electronics from above contrary to what is being shared above. Its not the end of the world. Leave yourself enough length in your wiring so that you can do a “drip loop” at some point before your wiring reaches your electronics. A drip loop is a purposeful low spot in your wiring that catches any moisture at a low spot, like rain in a valley. Any water or moisture that ends up on your wiring will simply stop at the lowest point on the wire, and not creep back uphill into your electronics.

## WHEN PRE-DRILLING FIBERGLASS START WITH DRILL IN REVERSE TO PREVENT GEL-COAT CRACKING

Fiberglass really is a pretty easy material to work with, despite the itching that goes with it. It is a tough, somewhat flexible durable material that cuts and drills well. However, we usually see it covered with the finish material on the top that we know as gelcoat. Gelcoat is not flexible... in fact it is quite brittle and easily cracked. There is a proper way to drill through gelcoat. Whether it is a screw hole for fastening down a speaker, or a thru hole for the speaker or radio, one can easily prevent gelcoat chips and cracks by starting the hole by running your drill backwards. Starting the hole in reverse presents a more gentle abrasion to the gel coat rather than a pure cutting action. Running your drill in reverse is far less likely to stress gelcoat to the point of cracking. Once you are through the gelcoat and into the underlying fiberglass, you can switch the drill to run forward to finish the hole.

Screw holes, an extra tip. On screw holes, we necessarily drill a hole that is small enough that our screws will bite into the fiberglass. If they can bite into the fiberglass they will also bite into the gelcoat. \*CRACK\* For holes drilled where you intend to use wood or sheet metal screws, use a counter-sink bit to chamfer the screw hole. This removes enough gel coat so that the screw only bites into the fiberglass and will prevent cracking in your gelcoat

## UNLIKE CAR STEREO FUSE WITHIN 7" OF BATTERY PER USCG

The U.S. Coast Guard is very specific in its Federal Regulations that new boat builders must adhere to. The Coast Guard requires all boat builders to provide over-current protection within 7" of the battery positive power terminal and also within 7" of any branch circuit. Why? Shorted power wires have a potential to start a fire even without a flammable fuel/air mixture. The 7" distance is meant to minimize the length of un-fused power wire on a boat.

Additionally, unlike a car, a boat's engine compartment and fuel tank are quite literally inside the boat. Boats don't have radiators and big open spaces under their engines. A boat's fuel tank is not mounted outside the passenger area under the trunk. Any fuel spills or fuel leaks stay inside the boat and have a potential to create a volatile explosive fuel/air mixture. Any spark inside the boat has a potential to ignite the mixture. It is also important to note that all branch circuits need over-current protection within 7" of their distribution point.

These U.S.C.G. requirements drove our decision to design and build the KMFMF master fuse holder and KMFDB3 fused distribution block. These designs put the fuses literally right at the distribution points.



## BATTERY SWITCH, ACRS, ETC.

Many if not most boats these days have both a cranking battery and a house battery. The cranking battery is there to start the boat, and the house battery is there to run the fun stuff. Central to it all is the oft misunderstood battery switch. The battery switch requires both knowledge and a consistent habit of proper use to be effective.

Understand that with most battery switch installations **EVERYTHING** is connected to the batt switch output. Including the motor and its alternator. That means at any given time you are using and charging only one battery. Sure, if you run the battery down you just switch to the other battery and start the boat, but then you aren't charging the dead battery. You have to turn the battery switch to **BOTH** in order to charge the depleted battery, but if you don't switch back off of **BOTH** at some point you will inadvertently drain both batteries. You killed a battery, switched to the other battery, started the boat, and then accidentally switched through **OFF** on your way to **BOTH**. Congratulations, you likely just blew a few diodes in your voltage rectifier...

Battery switches require a lot of thought to use properly and most boaters aren't the thinking type. There is a better way. Enter the VSR or ACR.

What is a VSR? Voltage Sensing Relay, or sometimes Automatic Charging Relay. An ACR allows you to rewire the boat's electrical system, often completely removing the battery switch. It allows you to do the following:

- Hard-wire the motor and all of the other boat wiring directly to the cranking battery.
- Hard-wire the audio system directly to its own dedicated house battery, (battery bank)
- Leave the two banks completely, (mostly) isolated without the pitfalls and thought process that goes with a battery switch

With a VSR or ACR, when the motor is running, or when connected to a charging source like a battery charger or solar panel the VSR/ACR senses the charge voltage and combines the battery banks to charge both. With a VSR or ACR, (Blue Sea Systems part # 7610 is a good unit) the motor always and only gets its power from the cranking battery. The stereo will never drain down the cranking battery in party cove. As a result regardless how loud or long you played your stereo you can still get back to the dock.

