

# Three Top Tips to Maximize Your Electrical System

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Put these easy performance and safety enhancers to work

By Don Wilson



Our previous Tech Doctor articles have been delivered in an easy-reading Q&A format. For this installation, however, we're going to take a different approach and focus on three key issues that affect the performance or efficiency of your electrical systems. No questions, just answers...lots of answers!

## **Location, Location, Location!**

As we know, location is one of the major keys to a successful real estate sale. You wouldn't want to buy a house in the southern suburbs if you work north of downtown. It's just inefficient.

Likewise in our world, location is equally critical. Battery, inverter, charger, and load panel locations can be fairly flexible to a certain extent. These devices carry the bulk of the current, so their location should be strategically positioned as close together as is safely possible to maximize efficiency.

## **Size Matters!**

Imagine if you worked only a mile from your home and had a freeway on-ramp a minute from your driveway. Driving to work would be a breeze! On the other hand, imagine having to navigate daily through five miles of congested, winding neighborhood roads and your drive time and ease suddenly becomes unpredictable!

Ask any operator and they will agree that in any vehicle or boat, size is everything. Larger battery bank means more time between charging. Larger charger means shorter generator run times. Larger inverter means less heat generated, and more headroom for additional plugged-in loads. Even more important is the wire size. Just like our roadway analogy, the smaller the wire, the less traffic (electricity) can travel over the wire without incurring problems.

Best rule of thumb? Ensure less than 0.25 volt drop over the length of the wire under the worst-case current load. Voltage-drop calculators are available on the Internet but require solid data such

as wire size, material (copper, aluminum, etc), current rating (breaker size) and length of circuit. A 0.25 volt drop is good; 0.1 volt drop is great!

## **Tighten Up!**

I've saved the third and most important consideration for last. Never forget: a loose connection requires that the current will flow through only the touching parts. Like pesky pot-holes in the road that cause swerving, jarring and potential damage, loose connections require that current "dodge" the bad connection and flow down a restricted path. These loose connections cause higher resistance, higher voltage drops, and extreme heat that can easily spark a fire.

Another loose connection consideration involves the inappropriate usage of wire nuts which are expressly designed for single strand residential AC wiring usage. When used improperly on multi-stranded wire, this application can cause the threads of the nut to literally cut through the fine strands and ultimately create a weaker connection with less integrity than using crimped butt-splices or solder and shrink tubing! Here's another red flag; Look for corrosion accumulation around wiring, especially where there are connections, or copper. Battery connections, or any exposed material, should have some type of protective coating to prevent gasses or water mist (which, in winter can contain corroding chemicals) from causing corrosion which will eventually seep into the connection and restrict current flow.

Finally, besides these simple tightening and cleaning protocols, be sure your electrical systems checklist calls for a review of water levels in batteries and a system check on your inverter/charger systems.

Three easy tips ... all designed to maximize your time and fun on the road or on water!

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