

Shocking News About Inverter/Charger Installations!

TECH DOCTOR™

Five big mistakes you don't want to make
By Don Wilson

When asked questions at my technical seminars, I often find they begin with, "Should I do this..." or "Should I do that?" As you might expect, these are always hard questions to answer regardless of the topic, because each individual operator will have different needs and experiences that are unique to their situation. However, when it comes to questions regarding the installation of inverters/chargers, my responses apply universally, particularly those that fall in the "should not" category. Some of this issue's content may seem rather obvious, or a bit tongue-in-cheek. I hope I don't cause shockwaves (yes – all puns intended!), but follow the logic presented and hopefully, you'll quickly get up to speed.

Q: Should I rate my fuse based on the inverter size?

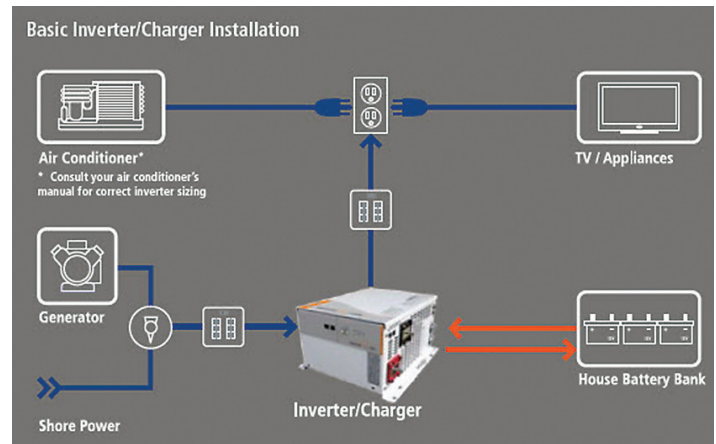
TECH DOCTOR: NEVER rate your fuse according to the rating of the inverter. I can't tell you how often I re-emphasize and repeat this point. Your fuse is not there to protect the inverter, or the electrical load in any circuit. It's there for one primary purpose: to protect the circuit itself. A 3000 W inverter with a 350 A fuse seems appropriate, unless it's wired with 4 gauge wire. At a perfectly acceptable load, the wire will burn well before the fuse fails. The fuse is there to protect the wire (or electrical path) from heat which can cause damage or fire.

Q: Should I put a washer between the cable terminal and inverter, or battery connector?

TECH DOCTOR: NEVER put a washer between the conductor and the connector! All the ground wires in our cars/trucks have those star washers to make a 'better electrical connection.' However, that is acceptable in this circumstance for penetration of paint and due to the low current needs of a 14 gauge wire. On the other hand, when you're putting 4/0 welding cable on a 3000 W inverter, and you put a steel (high resistance) washer between the copper, tin, or brass cable ends and connectors (lower resistance), you create an electrical bottleneck that will get extremely hot. I've seen tons of inverters in repair with melted insulators around the DC connectors which is a sure sign that the flat washer, or lock washer, was placed between the connector and the cable. The lock washer, or star washers, are intended to be in direct contact with the bolt-head or nut to reduce the chance of loosening.

Q: How do I determine the right cable size?

TECH DOCTOR: NEVER blindly follow the recommended cable size, regardless of the installation. If the manual calls for 3/0 wire for lengths over 5', don't assume that it includes installations where the battery is 25' from the inverter. Voltage-drop calculators are all over



the internet and if you can ensure a voltage drop under 0.25 VDC, you're in good shape. Consider the recommendations as a 'minimum' and use your math skills to figure out the proper cable to eliminate excessive voltage drops. After that, don't be afraid to upsize the cable again. Proper performance is the desired result of any installation, and voltage-drop management is the key to performance.

Q: Can I install an inverter/charger in the engine compartment or battery bay?

TECH DOCTOR: NEVER put your inverter/charger in an engine compartment, battery bay or any location containing fuel or flammable, or corrosive, vapors. Inverter/chargers are an ignition source and are incompatible with combustible fumes. If the only close location is in the battery bay, get bigger cables and move the inverter further away (see cable size paragraph above).

Q: What should I know about neutral and ground connections?

TECH DOCTOR: NEVER, EVER tie neutral and ground together, manually, in any installation, period! Neutral is tied to ground at the source of AC power simply to allow the ground wire to be an alternate path for return current during a failure where the hot wire touches the chassis of a device or vehicle. This is intended to trip the breaker. However, when neutral is tied to ground in the vehicle, there's a voltage potential between the ground plane of the vehicle, and the ground plane of the electrical grid connection. If there's resistance on the ground and neutral wires, the current will find some other potential path back to earth ground and that path may be you as you open the door of your vehicle. This isn't the kind of excitement you want to experience!

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