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Is Your Inverter Up to the Task?

Future Truck Considers Dynamic Adjustment of Wheel Rotations Per Mile

Is Your Inverter Up to the Task?

Truck OEMs Know Fleets and Truck Drivers Need Sufficient Surge Power – Here's What to Need to Know

By Steve Carlson

When Your On-Board Appliances Have A Need For Current, Is Your Truck's Inverter Up To The Task? Microwaves, mini-fridges, TVs and DVD players, laptop computers with Internet access – the modern heavy-duty highway truck comes with just about all the conveniences of home.

Unfortunately, those trucks do not come with the electrical system of home.

At home, people do not worry about running multiple electrical appliances at once. The connection to the power grid provides ample electrical capacity to start and run those devices. But on the road, a trucker has to rely on the vehicle's battery and internal electrical system, which is limited in capacity compared to home.

Trucks are equipped with increasingly advanced systems to handle the greater demands for electrical power. Those systems include inverters, in a variety of power levels and types that take DC power from a battery and convert it to 120V AC that most modern appliances use. Those inverters are often combined with chargers and shore power connections. The inverters installed at the truck manufacturing plants are hardwired so that AC power is available in all receptacles inside the sleeper cab.

Inverters should be initially selected based on continuous power output. But even if owners and operators believe they have sufficient power to handle loads, and know how much demand they can put on the system, they can still get into trouble because of a phenomenon known as surge power.

Some electrical devices draw a relatively constant amount of current whenever they are on. However, induction appliances like microwave ovens or appliances that use magnets or transformers, however, need an initial power surge to start, before dropping to a lower level, known as continuous power. Depending on the appliance or application, the need for that start surge power could be up to five seconds. In a nutshell, a 1,000-watt microwave may need up to 2,000 watts for a second or two before settling down to 1,000 watts to heat your food.

If you spec' inverters on your new trucks, which is what we suggest versus installing aftermarket, you're safeguarded. The truck OEMs know fleets and truck drivers need sufficient surge power and it is one reason to select inverters that are available as an OEM spec' option with nearly all truck manufacturers. In addition to offering higher surge, premium inverters offer wide operating temperature range and dead battery charging.

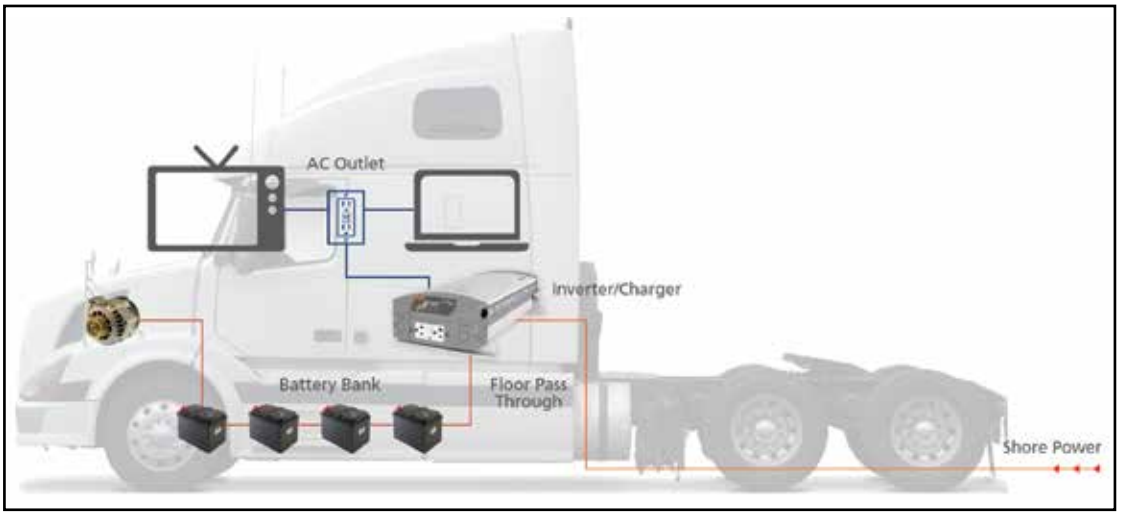
But aftermarket installation can be a different matter. There are a lot of choices when it comes to inverters and the mighty dollar often dictates what you get. The old adage, "you get what you pay for" can be very true. Cheap inverters may be able to start a microwave a few times but may have shorter life expectancy, and in many cases may not even survive the warranty period. The reason is that cheap inverters do not a have much in the way of built-in protection like premium brands. That's especially important to protect the downstream loads from sudden, potentially damaging low AC voltage (brown-out) conditions when connected to unstable shorepower.

High Frequency vs. Low Frequency

There are two types of inverter designs — low-frequency inverters (LFI) and high-frequency inverters (HFI). Low-frequency inverters use high-speed switches to invert (or change) the DC to AC, but drive these switches at the same frequency as the 120VAC sine wave, which is 60 Hz (60 times per second). This requires the inverter's transformer to be larger and heavier but provides higher capacity, longer duration surge.

High-frequency models typically drive the switches at a frequency closer to 50 KHz (50,000 times per second) or higher, thus allowing for a smaller, more efficient transformer and overall smaller package. However, HFI designs typically deliver a lower surge, for shorter periods of time than their LFI counterparts. Low-frequency inverters can have a longer surge duration up to five seconds for the most demanding loads.

To find surge ratings, we recommend you go to the manufacturer's website and search out the continuous power and surge (and surge duration) specifications. It



should be easy to find. If you can't find it, you should call the company's tech support.

When choosing an inverter, your first consideration should be safety, followed by electrical performance. When comparing inverters, be sure to look for the TMC RP163 recommended UL- 458 rating. UL-458 is the certification mark given to mobile power systems (such as inverters and converters) that have been tested by a third party lab (UL) and are compliant to their strict safety standards, intended to keep occupants of a vehicle safe.

Fleets have many choices when choosing power inverters. Choosing the correct size and surge capacity are critical, but not the only considerations. By specifying an established and quality brand, fleets will have peace of mind knowing that their drivers are not only safe, but also have reliable power that will endure the harsh demands of electronics in a mobile environment.

Steve Carlson is the Xantrex OEM and fleet manager. Steve, a TMC member, has over 20 years of experience working in the industry. To learn more about installation and other topics around inverters, Carlson says Xantrex offers information through its Tech Doctor series, featured at: http://xantrex.com/power-products-support/tech-doctor.aspx.

Steve Carlson

No Inverter on That Truck? Here's How to Fix That Problem

The invertor — that box of electronics that makes it possible to run all sorts of on-board and in-cab appliances off a truck battery — is rapidly becoming a standard option or feature on vehicles shipped by manufacturers.

But that still leaves a big portion of the fleet that is inverter-less.Are the owners, operators and drivers of those trucks out of luck?

Not at all.

The good news is that, while the task does require a bit of research and some decision-making, retrofitting a truck with an aftermarket inverter is a relatively straightforward task.

First comes the decision about buying an inverter and what type and size. Inverters come in a vast array, including some inexpensive models you can buy at truck stops and plug into the vehicle's cigarette lighter.

I don't advise going that route. Drivers get more frustrations that way, which may negate any savings realized from buying on price rather than quality.

The size and brand of inverter should be based on such considerations as what and how much is going to be plugged into it, surge capacity, if the inverter is UL-certified, if it has a low battery voltage disconnect, and has added features —- such as the ability to re-charge a completely dead battery if plugged into shorepower.

Next comes the decision on where in the truck cabin to mount it. I recommend mounting it under the sleeper bed, behind a protection bracket to prevent tools, chains and other gear from beating it up. That's not the only option, but several considerations enter into play here. You really want to make sure it's not in a compartment that's going to get a lot of moisture. You don't want it real close to an outside access door.

While inverters do their work of converting DC battery power to appliance-friendly AC power largely unseen, they do need to breathe. Even though most top quality inverters have a very wide operating temperature range (check your spec's before you buy), you don't want it in a place where it's going to get a blanket or luggage thrown on top of it. You want some air space so it can pull in some cool air to cool off circuits.

One other no-no on location: never, put an inverter/charger in an engine compartment, battery bay or any location containing fuel or flammable, or corrosive, vapors. nverter/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.

How convenient it is to plug in appliances and other device into the inverter may also determine where and how the inverter is mounted. Ideally, inverters should be installed within 10 feet of the battery bank; moving farther away may require larger DC cables to compensate for a drop in voltage over a longer distance. In most cabs, it's a matter of having a sealed-access path from the floor of the sleeper, and then the cables can go right to the batteries below.

Some models of inverters have a ground-fault interrupter receptacle on the front of the unit, so appliances can be plugged directly into them. Wiring kits are also available to connect the inverter to receptacles installed in convenient places in the sleeper cab.

Depending on the complexity of cable routing and connections, your fleet techs can often complete the installation in an hour or two.

If all those considerations sound a bit overwhelming for the individual to handle an installation, that's okay.

Avoid self-installations unless you are skilled and knowledgeable about the requirements for performing these specific types of installations and have studied the operation/install guide. Self-installation in and of itself doesn't void a warranty, but an installation done incorrectly leaves tell-tale signs that could leave the owner without warranty protection should a problem arise.

Using a service center is an acceptable alternative, so long as the staff is knowledgeable and competent in installing complex electronics, and has some experience with the specific make and design of inverter being installed.

The best approach for installation is to leave the job to the OEMs, who through their dealers have the knowhow and experience for issues like inverter location and cabling options. It's not the least expensive option, at least initially, but it could well pay for itself over the long haul in safety and reliability. The OEM can offer applications support and recommendations on cable size, compartment size and cooling.

— Steve Carlson