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Inverter vs. Generator

TECH DOCTOR™

The ultimate grudge match

By Don Wilson

When talking about mobile power solutions while attending mobile power-esque parties (oh, yeah, we're a lively bunch), someone always tries to make the correlation between an inverter and a generator. When chatting with the average lay-person, even I am guilty of explaining an inverter as "a generator that uses the battery as its fuel tank". This is a bit inaccurate since they have very different roles and benefits. But which is better?

Q: In this corner...the heavyweight Generator!

TECH DOCTOR: Generators are AC power supplies that use fossil fuels as their main source of consumptive energy. In other words, they use fuel (diesel, propane, gasoline) to run an engine. That engine spins a rotating shaft which uses magnets and electrical windings to create electrical AC current. Generators are really good at one thing: taking a relatively light weight and easily acquired energy source (fuel) and creating lots of kilowatt hours of electrical power.

One of the major drawbacks of a generator is they can be terribly inefficient and waste a lot of fuel if they're not used at full (or at least heavy) load for a long period of time. Generators can unnecessarily pollute the environment for a small benefit. For example, if you have a 7kW generator powering your 700W TV/DVD/Surround system, you waste fuel running that big engine for little benefit. On the other end of the spectrum, if you start your generator for the 10 minutes it takes to microwave last night's leftovers, the generator barely gets lukewarm before you've shut it down. This can cause carbon buildup on the critical engine components, shortening the life of your generator's engine. Lastly, generators are heavy and don't surge very well. And they are often oversized to meet load demands. The larger, heavier generators are used so a large in-rush of electrical demand (like an electric motor) doesn't cause the generator to bog down.

Q: In this corner...the lightweight Inverter!!

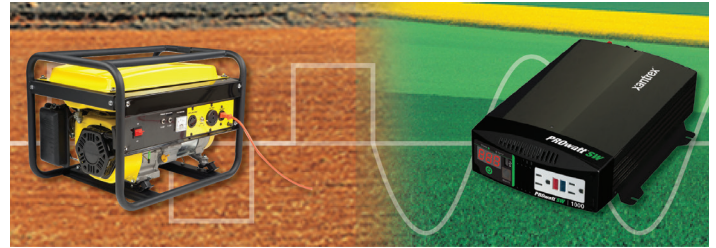
TECH DOCTOR: Inverters are also AC power supplies, but they use stored DC electrical energy in a battery (or a battery bank). They use high-speed electrical switches and transformers to modify the DC to AC, and then change the voltage to create 120V. On the plus side inverters are extremely efficient, compared to generators, and only consume DC power in direct relation to the amount of power they put out. Another major benefit is that they are virtually silent compared to generators.

However, inverters are not a perfect supply since their energy supplies (batteries) are permanently mounted, hard to replenish, and limited. This means that short-term heavy loads (like a microwave), or long-term lighter loads (like an entertainment center) are just right for an inverter with the right battery bank. Lastly, inverters are comparatively light weight compared to generators.

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Also, for their weight, inverters tend to surge very well (typically twice their rated constant power output) compared to their fuel-based nemesis.

Q: And the winner is?

TECH DOCTOR: Everybody loves a winner. However, in the classic Generator/Inverter battle, there is no clear-cut champ. I know, I know, where's the chair-slapping, pile-driving finale that conclusively denotes the winner?

Sure if there was a significant investment in solar panels, an inverter could easily take the place of a generator. This would require a huge initial cost, but the long-term cost of ownership would be less with a solar/battery/inverter system than a generator. While sunshine is free when it's available, you can't purchase it from a friendly neighborhood convenience store like fossil fuels.

Personally, I like the win-win scenario that favors both options in their respective corners of strength. Use the inverter to power anything it can, minus the 'monster loads' like air conditioners. Then when the batteries are depleted, or you need the monster loads to turn on, run that macho generator for a long time (at least an hour) to power the heavier loads, and let the battery charger then give the inverter its efficient power once you're ready to shut the generator down. This one-two punch allows the most efficient use of fuel (only using a pollutant when you're getting the most effectiveness out of your fuel), fewer noisy generator runs so you can enjoy your environment more, and equally important, greater cost efficiency since you'll use less fuel for the same used kilowatt hours.

Wait! There's no tie in a grudge match!!

Ultimately, your system becomes the winner if you do it right. Generators are available from the small 1000W gas/electric to 15kW diesels (sure they get bigger, but the huge units are part of a completely different discussion). Inverters come from 100W "pocket" inverters to 600W in the portable scope, and 600W to 3000W in hard-wired configurations. With some models you can even stack similar inverters to get up to 6000W. If you do your homework right including a lot of math and planning, you can partner a good inverter with a small generator and reap the benefits of a light-weight, highly efficient, usable system that makes you, your chassis, and mother earth very happy. **Everybody wins!**