

## Editorial – Power supplies

Your radio requires electrical energy to operate, and you can provide that energy by one or more kinds of power sources. These power sources can be a battery, a solar panel, a generator, or a PSU (power supply unit). A **power supply** is a device that converts electrical power of one voltage to that of another voltage. As it applies to radio, a power supply converts commercial AC (wall socket alternating current) power into DC (direct current) power, which allows the radio to function.

To be technically clear, **energy** is a quantifiable property that can neither be created nor destroyed, but can only be transformed from one form to another. This implies that our perceivable universe contains a finite amount of this entity, and seemingly quite a lot of it, to our limited realm of experience. On the other hand, **power** is the amount of energy delivered per unit time (per second). Power is not the same as energy, yet correct or not, we often use the two interchangeably; we often say *power* when we really mean *energy*. Essentially, energy is work, and power is the rate at which the work is being done.

While many, if not most older transceivers could accept commercial AC power by being plugged into the wall socket, nearly all transceivers today expect DC power to be supplied to them by PSUs. Transceivers have always technically required DC power to operate, but those that accepted mains (household) power had their supplies built into them. This made older transceivers quite heavy and not very portable. With the separation of the power supply, the transceiver not only became much lighter, but placed the responsibility for adequate electrical energy on an external unit, which could be separately sold, transported, and serviced.

As mentioned near the end of a **previous Cover**, power supplies are of two types, linear and switched-mode (“switching”). A linear PSU attempts to present a voltage that’s directly proportional (linearly related) to its input voltage. A switching PSU presents a voltage that’s derived from an on-off switching process whose duty cycle is determined by current demand. Linear PSUs tend to be heavier, less efficient, audibly noisier, and more expensive, but often simpler to repair, than their switching counterparts. Switched-mode PSUs tend to be RF-noisier than linear PSUs, but modern switching PSUs have largely overcome



that, leaving very few disadvantages compared with linear PSUs. Some older operators feel that linear PSUs are more reliable, but 1) the repair data doesn’t seem to bear that out and 2) switching PSUs have not been out in the market in a sufficient quantity long enough to adequately compare reliability and longevity claims.

When considering the purchase of a PSU, avoid comparing it by its wattage, which can be misleading if its efficiency is unknown. For example, an advertisement for a PSU that reads **530 watts!!** might sound better than one for 500 watts going for the same price. But, if the efficiency of the 530-watt PSU is 78% and the efficiency of the 500-watt PSU is 83%, the 500-watt PSU is probably the better deal, because it consumes less electrical power from your wall socket, even though both are rated at 13.8 VDC and 30 A maximum output.

Also, when purchasing a PSU, if your rig is expecting 13.8 volts, first make sure the PSU can present between **12 volts and 15 volts**, which is within its tolerance. Just as importantly, make sure the PSU can deliver a few more amperes than your rig draws at its highest transmit power setting. Most of today’s 100-watt base station HF rigs, for example, draw about 23 amperes maximum. For them, I highly recommend a PSU that can deliver **30 amperes**. You should always supply more current than your equipment requires because of *inrush current*, which is the sudden spike in current demand when you key up. If the current isn’t available when you press the PTT, the entire transceiver might shut down completely as the voltage tanks while attempting to compensate for the excessive current draw, a phenomenon that baffles many newer operators.

Anything to add? Email [editor@utaharc.org](mailto:editor@utaharc.org)