

VOLTAGE CONVERTERS

I have a bunch of tools and some stereo equipment that was designed to run on the standard European supply of 220 volts, 50-Hz AC. Isn't there some way I can easily make, buy, or otherwise acquire a transformer that will let me operate those devices off 120 volts, 60-Hz AC?—A. Sfakianos Placitas, NM

There are lots of places to get transformers that turn 220 volts AC into 110 volts AC, and they should work when their supply connections are reversed as well, but only for the voltage, not the frequency. You indicated in your letter that the frequency difference wasn't important for the equipment you wanted to use so I don't understand why you're having so much trouble.

There are two basic types of commercially available converters used for converting 220 volts AC to 110 volts AC, and they're sold in just about every electronics store; even Radio Shack carries them. With a transformer I use, I can turn the supply leads around and step up the line voltage from 110 volts AC to 220 volts AC (actually 120 to 240). There isn't any problem in doing that as long as you make sure you have the right type of voltage converter.

Converters are made with either transformers or diodes. You can tell the difference between them when you're looking at the package by the weight and the wattage rating. Transformer-based converters are much heavier than the diode-based ones and usually have a maximum rating of about 50 watts or so. The package information should list them as being suitable for electronic equipment, battery chargers, camera flash units, and so on. Since there's a transformer inside the package, the voltage is actually divided in half, (or doubled, when you use it backwards). The output of those converters is a sinusoid.

Diode-based converters are much lighter, and even though the package

is the same size, they usually have a maximum rating of 1000 or 1500 watts. You'll find them recommended for things like heaters, lamps, and so on. If you try and use one of those appliances with a transformer operated converter, you'll probably wind up destroying both the converter and whatever you have plugged into it. With the diode-based converters, you can't turn them around and expect to double the input voltage.

Generally, diode-based converters only produce half-wave rectified AC instead of a full sine wave, and they don't cut the voltage in half either. As with any diode voltage drop circuit, the output is .67 times the input voltage. If you put 220 volts AC across the input, you're going to get about 148 volts AC at the output. That may not be much of a problem for most resistive loads, but you should realize that overdriving a heater is going to make it hotter than it was designed to be and that can cause a real problem.