

Universal power supply

If you're into solid-state electronics, you need a good, reliable, low-voltage regulated power supply. Here's an inexpensive, easy to build universal supply that meets your needs with room to spare.

by Jeffrey A. Sandler
Contributing Editor



One of the handiest gadgets an experimenter can have is a regulated power supply, especially if it provides a switch-selectable choice of the voltages most often used. Here is just such a supply. Although simple to build, it provides a choice of five or 12 volts at up to one amp. Best of all, if you have a reasonably well stocked junk box, the supply shouldn't cost you more than a few dollars to build.

The heart of most low current power supplies built today is the solid-state voltage regulator chip. Contained in a molded package about one-half inch square and an eighth inch thick, these regulators maintain their rated output voltage to within 100 millivolts.

Choose your own

In actual operation, most regulator chips perform better than their specs. Typically, a 7805 can maintain its five-volt output to within 11 millivolts while the load current demand varies from 150 ma to over one amp. The 7812 typically can hold its output to within 17 millivolts

of its rated 12 volts over the same current range.

The power supply shown here uses the 7805 and 7812 regulators to provide a switch-selectable choice of five or 12 volts. But, if you prefer, you can substitute other regulators in the 7800 series to obtain different voltages. You also can use a double pole rotary switch and several regulators to provide a greater number of selectable output voltages. Listed below are the commonly available regulators:

Regulator number	Radio Shack number	Output voltage
7805	276-1770	5
7806	—	6
7808	—	8
7812	276-1771	12
7815	276-1772	15
7818	—	18
7824	—	24

The 7800 series regulators all require at least two volts greater input voltage than the rated output, even during the low point of the input ripple component. All

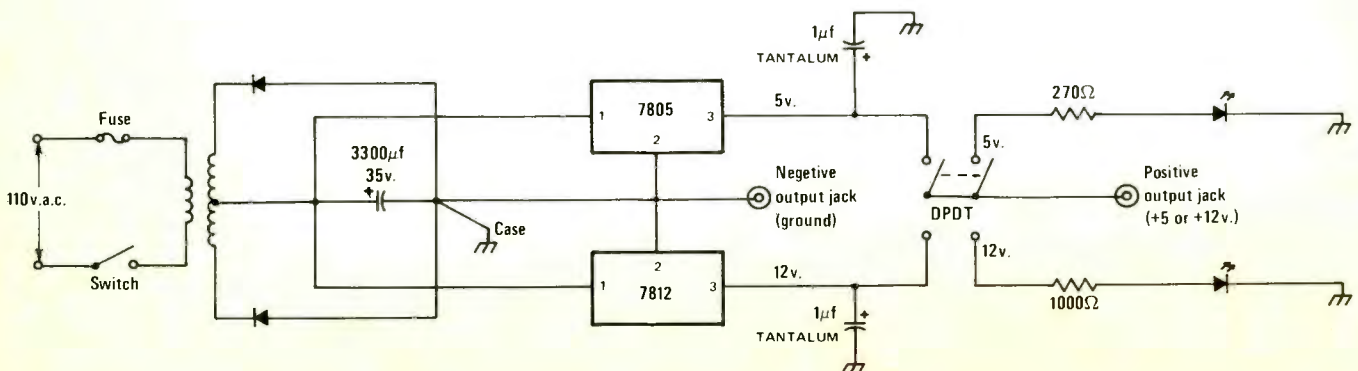
of the regulators, except the 7824, will operate with dc inputs of up to 35 volts. The 7824 will handle inputs of up to 40 volts.

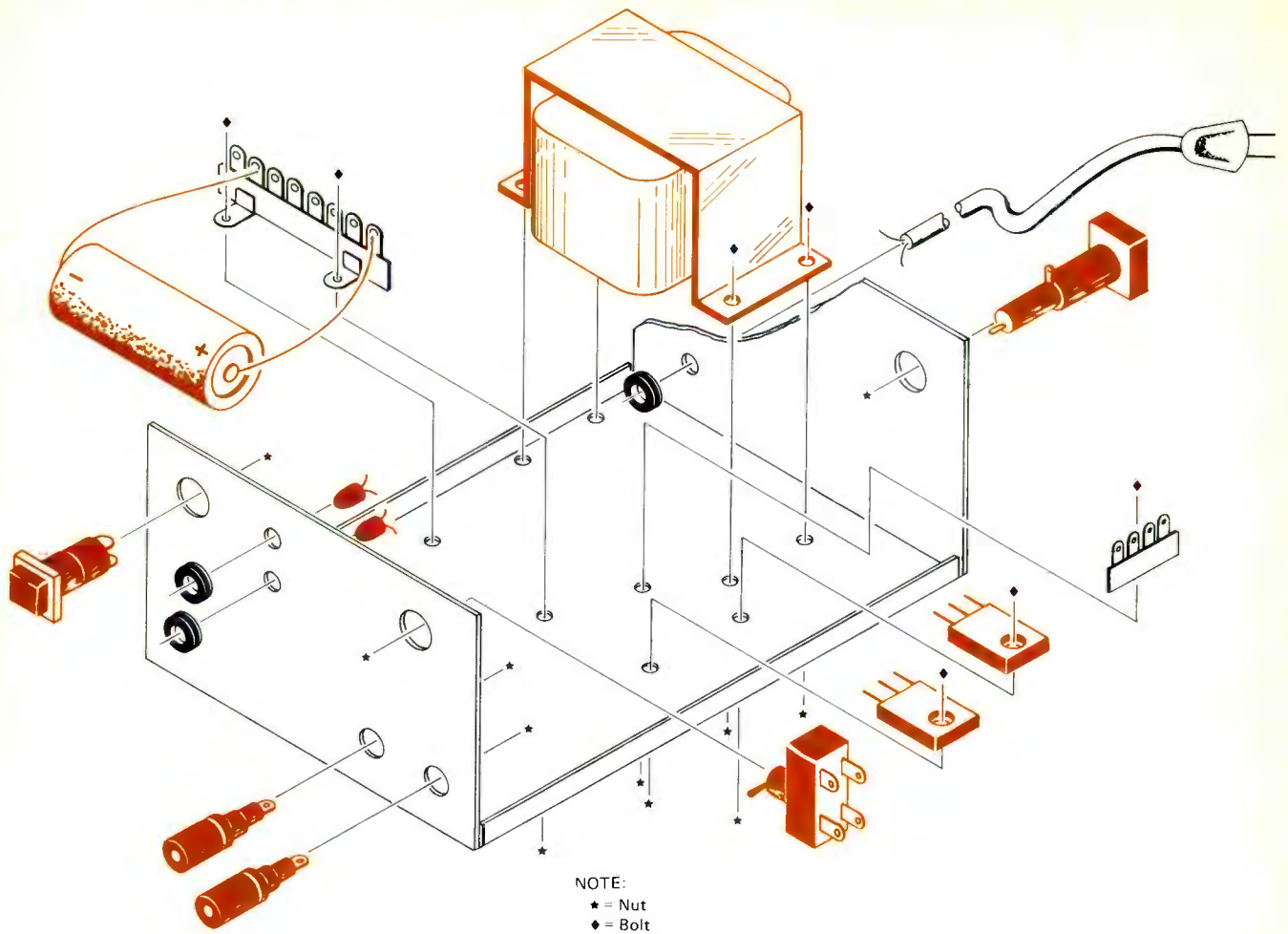
Use your own

If you have your own unregulated dc supply, you can convert it into a regulated supply by adding only the 7800 series regulators to the output. All you need do is make certain the output of your supply is well filtered and at least *two volts greater* than the regulated output you want.

If you don't already have a dc supply, you may have a transformer, diodes and filter capacitors in your junk box. You can use just about any power supply circuit you'd like. However, the basic dc supply circuit shown in the schematic will work well, and uses readily obtainable parts.

The power supply shown is built into a Radio Shack cabinet. You can build your supply in just about any enclosure you have laying around. Parts layout is not critical. The only requirement beyond using good construction practices is that





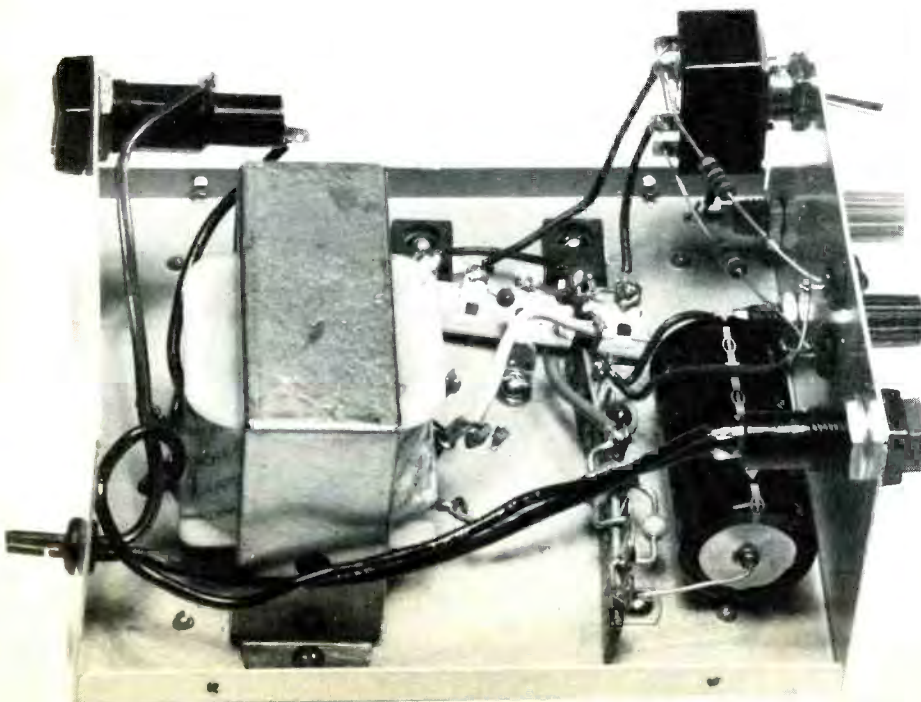
the 7800 series regulators be mounted directly to the chassis or be otherwise heat sunk.

The LED voltage indicators can be replaced by a voltmeter, or eliminated. If

you do leave out a voltage indicator, make sure you label the switch positions in large, easy-to-read lettering.

Operation of the regulated supply is straightforward. Just connect the circuit

to be powered to the output connectors, and turn on the supply.



Component	Radio Shack number
Resistor, 270 ohm	271-016
Resistor, 1000 ohm	271-023
Capacitor, 3500 mfd @ 35 V	272-1021
Capacitors (2), 1 mfd tantalum	272-1406
7805 regulator	272-1770
7812 regulator	272-1771
LEDs (2)	276-041
Transformer, 25 V CT @ 2 A	273-1512
SPST on-off switch	275-617
DPDT toggle voltage switch	275-666
Fuseholder	270-365
Fuse, 1/2 amp slow-blow	270-1282
Terminal strip, 5 terminal	274-688
Terminal strip, 8 terminal	274-692
Binding posts (2)	274-662

In addition, you'll need miscellaneous hardware, a case or chassis, line cord and strain relief to complete the supply. Radio Shack part numbers are given because of their availability in small quantities. All of the parts can be obtained from mail-order parts supply houses as well.

All of the 7800 series regulators have built-in current limiting. Even if you should accidentally short the output leads, the output current will be held to a level the regulator can safely handle. While this will protect your power supply, it won't protect the circuit being powered.