

Elenco XP-720K Workbench Power Supply Kit

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When you finish assembling the Elenco XP-720K kit, you will have a power supply for your workbench that looks and functions like a commercial piece of equipment. The unit has four power supplies inside a heavy-duty cabinet — a positive supply variable from approximately 1.25 to 15 V at 1 A maximum; a matching negative supply (-1.25 to -15 V at 1 A); a 5 V supply at 3 A, and two fixed outputs of 6.3 V ac at 1 A.

Both the negative and positive variable supplies have a common return; you can combine them for a 2.5 to 30 V supply, assuming you do not use the power supply ground. Similarly, the two 6.3 V ac outputs can be used in series, providing 12.6 V ac, again assuming the common ground terminal is not connected. The ac supplies are powered directly from a transformer connected to the ac line, so they will vary slightly with line voltage.

The key element in any analog power supply is the ac transformer. Don't be surprised how heavy the kit feels when you get it — the husky transformer alone is almost half this weight.

Putting It Together

Elenco is well known in the educational field, and I have built several other kits from them. The assembly

Bottom Line

The Elenco XP-720K kit is easy to build and offers a variety of power supply voltages perfect for workbench projects.



manual includes complete circuit descriptions, clear sketches for parts identification, and brief tutorials on soldering and recognizing part number codes and color codes.

The parts come neatly packaged in plastic envelopes. In addition to the 4 x 3 inch PC board, there were separate bags for the diodes, voltage regulators, and capacitors and resistors. Other bags hold the hardware and panel-mounted components (potenti-

ometers, switches, fuse holder, etc.).

The kit is a fairly complete package. It includes rubber feet for the enclosure, a strain relief for the line cord, and even solder. There is considerable attention to detail. For example, the two diode types used are not the same physical size — one is larger than the other. The diode outlines printed on the circuit board are also different sizes to match the diode size.

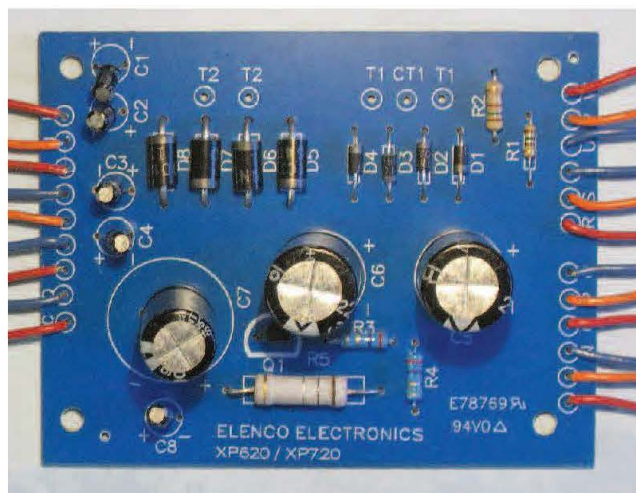


Figure 9 — The printed circuit board does not have very many parts. The wires on the left connect to the front-panel controls and terminals. Those on the right connect to the voltage regulator chips mounted on the heatsink.

Table 2
Elenco XP-720K Power Supply

Input voltage	100 – 130 V ac.
Input current protection	1 A.
Output voltages	+1.25 to +15 V dc at 1 A. –1.25 to –15 V dc at 1 A. (Combined, 2.5 – 30 V dc at 1 A) + 5 V dc at 3 A. 6.3 V ac at 1 A 6.3 V ac at 1 A (Combined, 12.6 V ac at 1 A)
Output regulation	200 mV for dc supplies.
Input regulation	100 mV for dc supplies.
Current protection	Thermal overload on variable supply. Current limited on +5 V dc supply. Input fuse for 6.3 V ac supplies
Short circuit protection	Current limiting on all dc supplies; fuse on 6.3 V ac supplies.
Output impedance	Variable supplies, 0.2 Ω . 5 V dc supply, 0.06 Ω .
Size (height, width, depth):	3 × 8 × 6 inches.
Weight:	7.5 pounds.

Assembling the PC board is straightforward; there are not very many parts to be soldered. This time, I didn't need any magnifying device to solder the components. However, a good wire stripper will speed the work. The wires protruding from the board (see Figure 9) are connected later to the various controls, terminals, and integrated circuits.

The bulk of the kit assembly is either mechanical or connecting the wires, as shown in Figure 9. You should read the directions very carefully — especially when selecting hardware, such as screws and nuts, for a particular step. Thermal conductive grease is supplied in a transparent envelope. Perhaps the best way to use it is to paint the reverse side of the integrated circuits and the transistor using a cotton swab.

The only problem I ran into was using the six self-tapping screws supplied. Two screws hold the large heatsink to the rear of the assembly, and the rest are used to connect the enclosure top cover to the bottom section. I needed considerable force to start and drive these screws halfway in; then they went in easily after that point.

How Well It Works

In a few words, it works very well. In testing a power supply such as this one, there are a few things to keep in mind. First, the variable voltages are controlled by a variable resistor or potentiometer, not a vernier dial with gear reduction. So setting a voltage precisely to the second place after the decimal point can be very difficult.

Next, you have to understand the accuracy of the digital voltmeter used for these tests, and its rounding errors. For this reason, the numbers here are rounded off to the nearest 100 mV, or one digit to the right of the decimal point.

Using a voltage variable transformer, I set the input line voltage to 117 V. With no load, the dc outputs were 1.2 to 18.9 V on the positive variable supply and –1.3 to –18.6 on the negative variable supply. The +5 V output measured 5.0 V. The ac outputs were higher than expected, 13.7 V_{RMS} end-to-end with a center tap.

If you have more than one circuit attached to a supply, the change in output voltage while adding or subtracting a load is of interest. I set both the negative and positive supplies to 4 V and then connected and disconnected a 4 Ω resistor (a 1 A load). The output changed approximately 100 mV on each supply. I saw similar results with the +5 V supply.

Another test of interest is the effect of setting a voltage and connecting a circuit, then shutting off the power and turning it back on after a few minutes.

Several tries showed a small change in voltage in the second decimal place, on the order of 10 or 20 mV. I ran these tests with a 4 Ω resistor — a 1 A load at 4 V on the variable supplies, and a 1.25 A load on the 5 V supply. I ran the same tests on the variable supplies with a 12 Ω load at 12 V with similar results.

Next, I checked stability over time. With the 12 Ω load and the positive variable supply set to +12 V, I shut off the voltmeter and let the power supply cook for 3 hours. When I reconnected the voltmeter, the voltage had changed by about 100 mV. Of course, the results might be different if the room temperature is very hot or very cold.

Finally, I could not resist — I short circuited the positive supply, the negative supply, and the 5 V supply. In each case, when I disconnected the short circuit, the supplies quickly recovered to their previous setting. I did not test a short circuit on the ac supply because it is protected by a 1 A fuse.

The net results of these tests is that, after putting this kit together, you will have a useful bench supply that works well and looks like a professional piece of test equipment.

Manufacturer: Elenco Electronics, 150 Carpenter Ave., Wheeling, IL 60090; www.elenco.com. Price: kit version, \$83.25; assembled, \$125. Available from Elenco directly or from online sources, such as Amazon and TEquipment.

Feedback

■ In “Live Trees Affect Antenna Performance,” published in the February 2018 issue of *QST*, the Figure 5 ordinate label is incorrect. It should be “Front to back ratio, dB.”