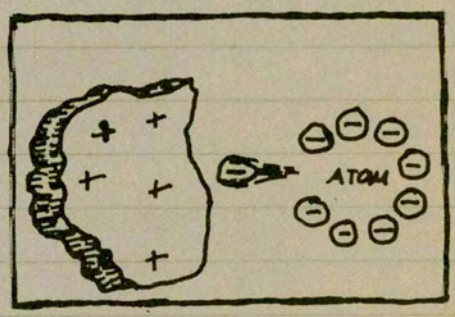
Electricity pumps: batteries and power supplies

Atoms are the key to **electricity.** Everything you can see or touch is made up of atoms. Atoms, in turn, are composed of subatomic particles.

Subatomic particles

An atom has a **nucleus** of particles, with other particles around it like planets around a sun. Particles in the core have positive charges + while those in orbit are negative. - Like magnets, similar particles push away from each other. Opposite charges attract each other. The negative particles are **electrons.**



Silver, copper and other metals have electrons which can easily be jilted away from the nucleus. If something knocks an electron off a copper atom, for instance, the copper atom then is more positive than negative. It is unbalanced, hungry for a replacement electron. If it is near a balanced neutral atom, it will strip an electron from the neutral atom. It will pull that electron across open space to satisfy itself. We call such a flow of electrons: **electricity.**

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Electricity is the flow of electrons.

Atoms which give up electrons easily are **conductors.** Those which hang on tight to electrons are **insulators.**

Here's how to see electricity:

I. Hang metal foil from dry thread.
II. Rub end of plastic comb on wool cloth to build up extra electrons in comb. Bring comb end near metal foil. The foil will move away from comb.
III. Electrons in foil, having moved away from the electrons in the comb, have a + charge in the edge of the foil nearest the comb. So, the now-positive edge of the foil is attracted toward the negatively-charged comb.

Electrons flow through a wire like water through a pipe. If pumps produce water pressure, how do we pressure electrons to flow in a wire?

Volts

It takes a strong **pressure**, called electromotive force, or **emf** for short, to make electrons flow.

Emf usually is referred to as **voltage**. We measure it in volts. The more volts, the more electrons will flow.

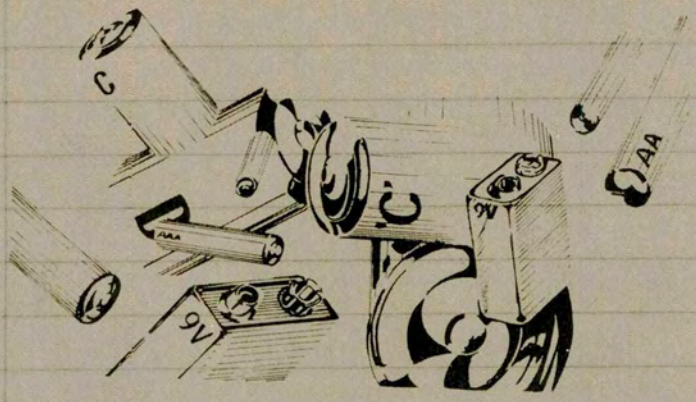
Amps

The flow of electrons is called current. The more volts, the more current that flows.

We measure water flowing in a pipe in gallons. We measure current flowing in an electrical circuit in amperes, or **amps** for short.

Electricity pumps

A pump sucks water from a reservoir in your town and sends it through pipes to your house. The reservoir and pump are your source of water. Similarly, our electrical circuits require a **source** of electrons to flow and a **pump** to move them along.



Batteries

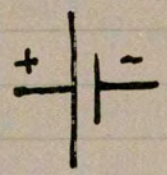
A **battery** is a source of electrons and a pump at the same time. It provides:

a. electrons to flow (current)
b. pressure to move it along (voltage)

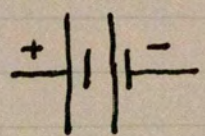
Plus and minus

A battery has a plus (+) and a minus (-) connection. Electrons flow between them when you hook a **circuit** or path between them. Here's how we use a schematic diagram to symbolize a battery and other parts of a simple electronic circuit:

Battery symbols



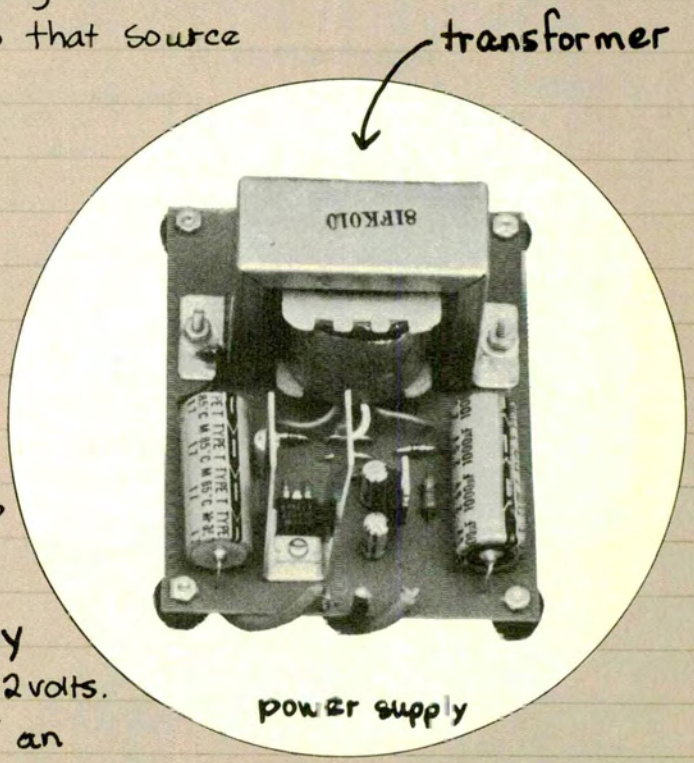
single-cell battery



multiple-cell battery

Power supply: man-made battery

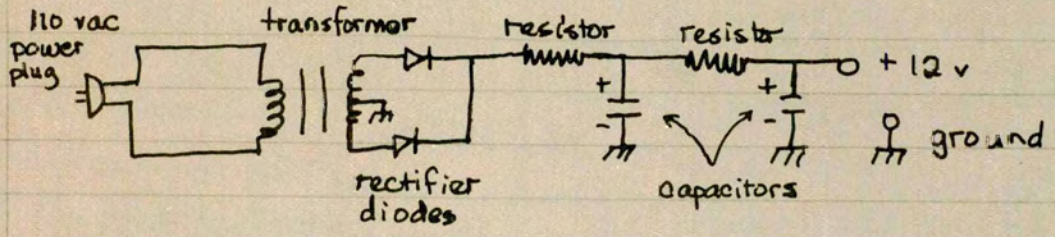
As users of electricity, we don't always have to use batteries. Power companies sell electricity, that they generate and send through wires to your house. We tap into that source at a wall plug outlet.

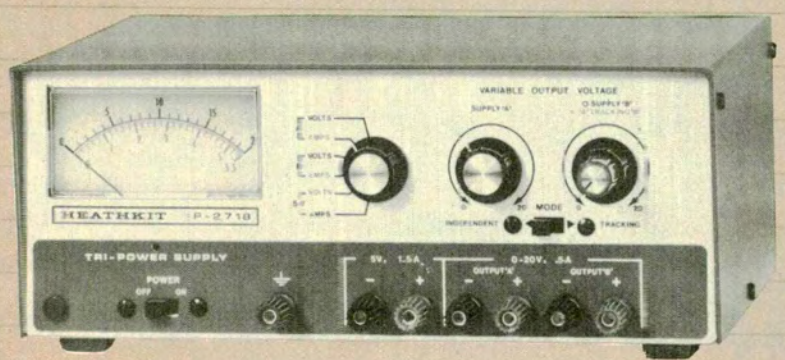


110 Volts

Power company electricity is standardized at 110 volts. How can you use that to power up a CB radio designed to run on 12 volts from a car battery?

Easy! Build a **power supply** to step 110 volts down to 12 volts. Here's the schematic of an easy-to-build power supply:





Example of a ready-made power supply you might buy at your radio store.