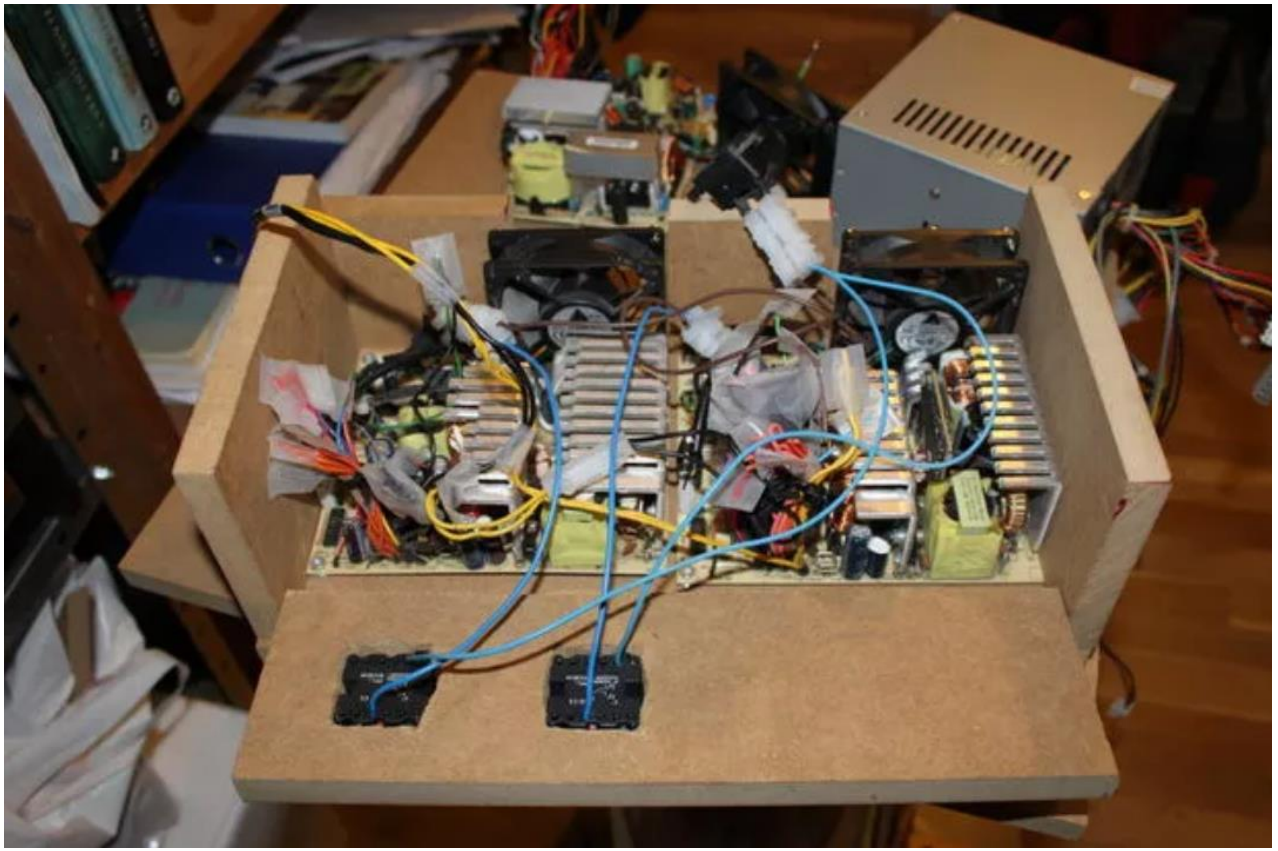
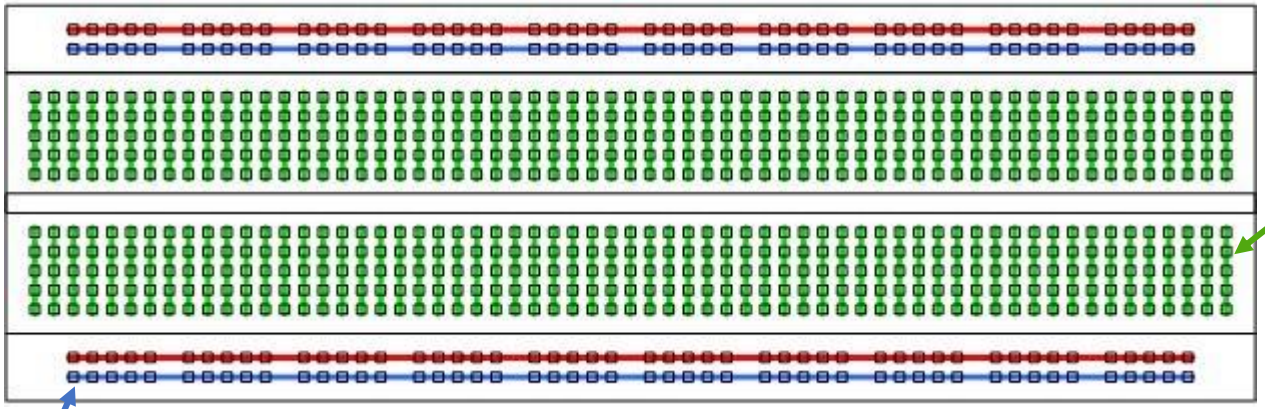
Power Supplies 101 Lab

4-Jan-2018



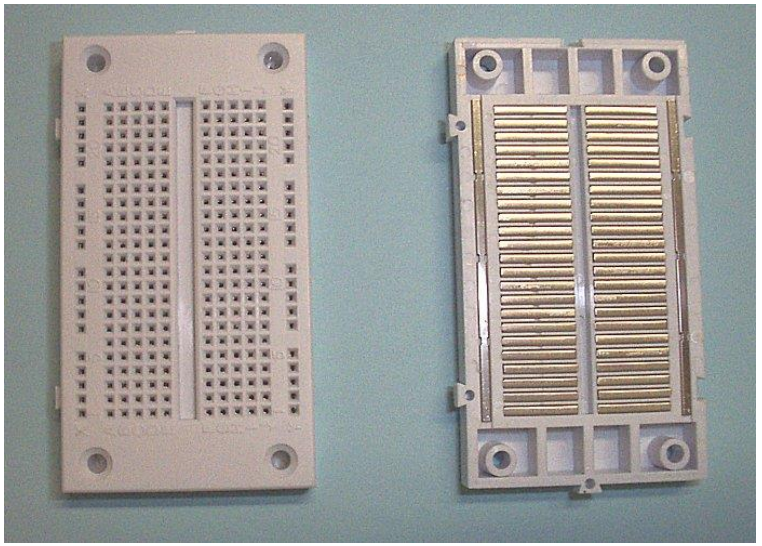
Using a breadboard



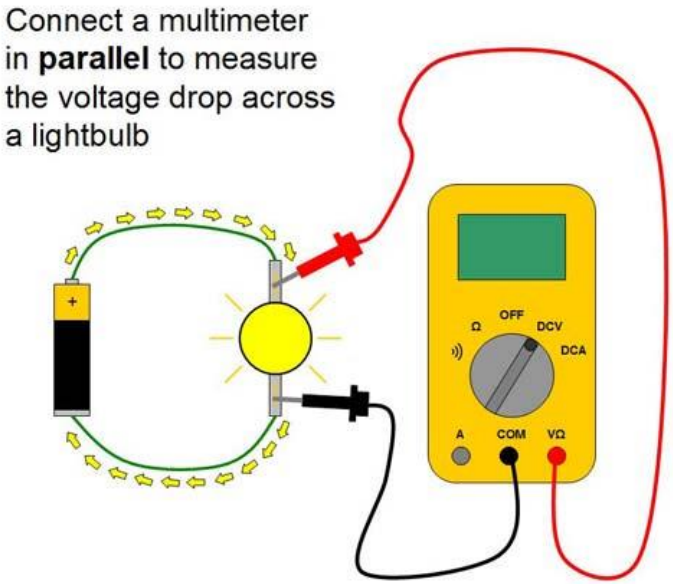
Circuit connections

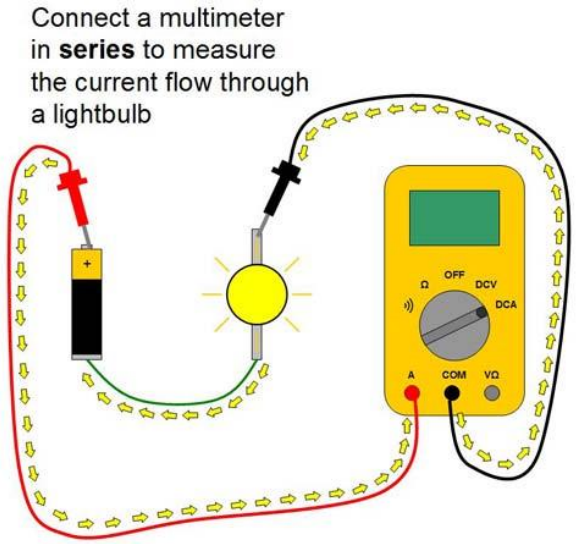
Power supply buses

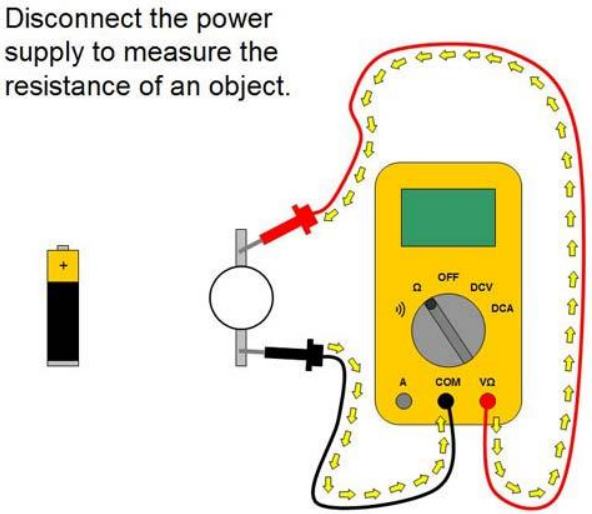
Internals of board



Using a Multimeter



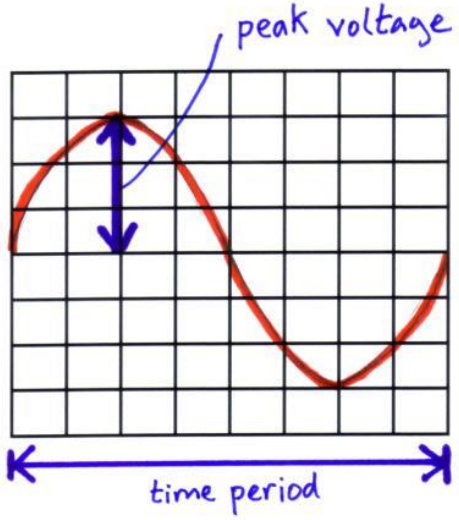


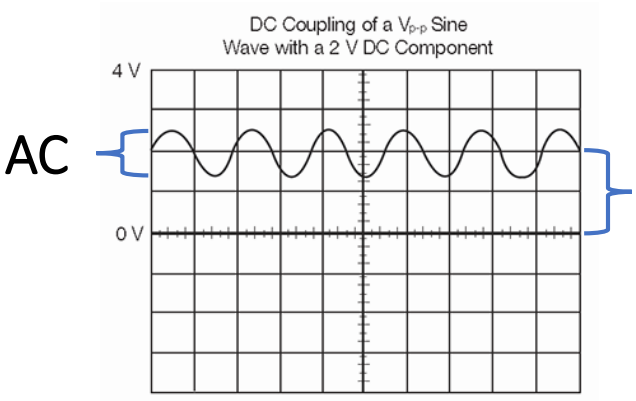


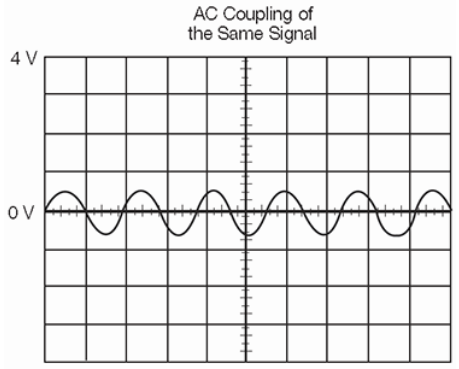
- Voltage across
- Current through
- Resistance of
- Continuity of

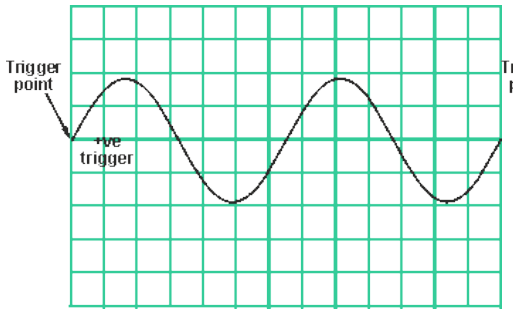
Using an Oscilloscope

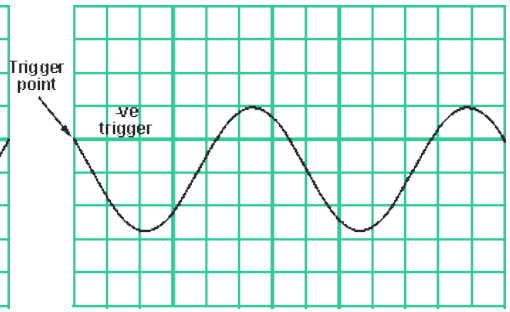
- Axes
- Coupling
- Triggering
- Cursors
- Measuring



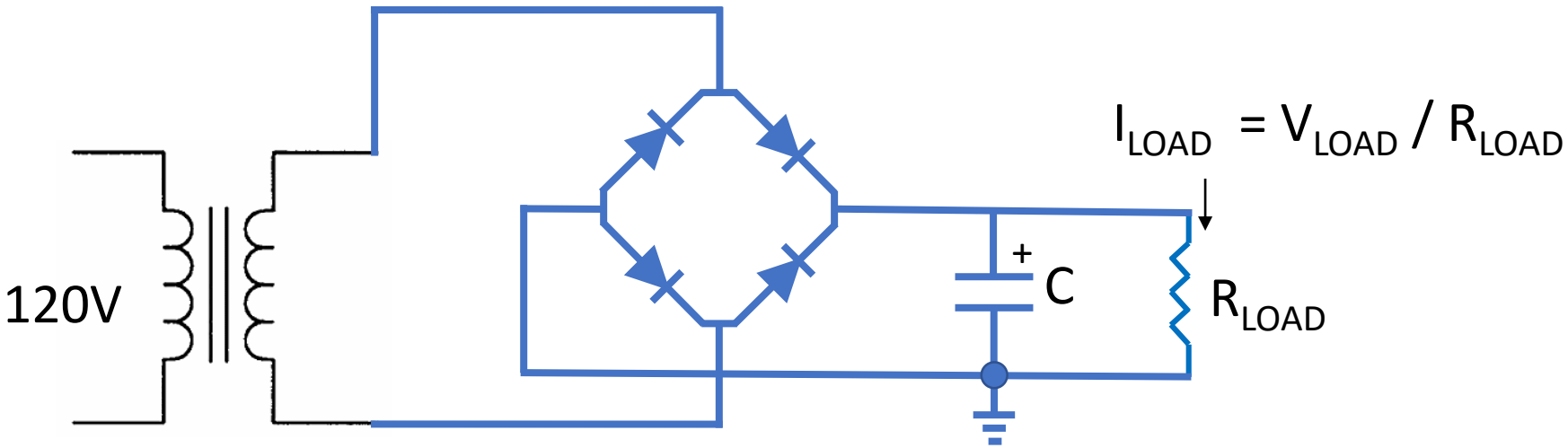








Build your AC-DC supply!

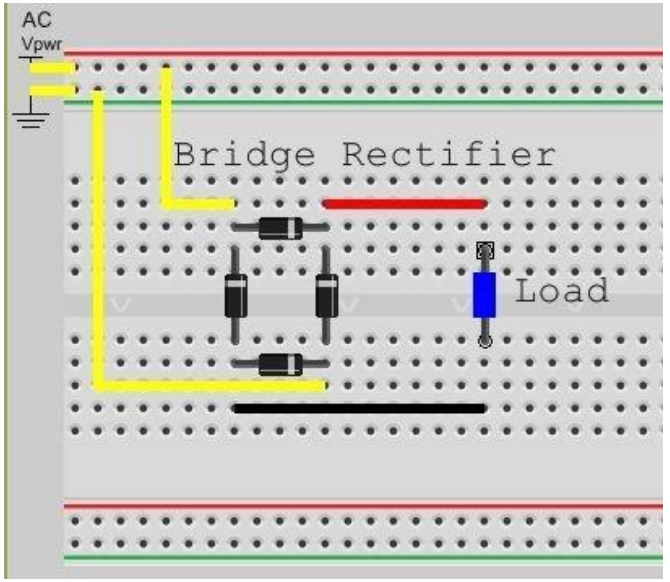


Watch polarity:

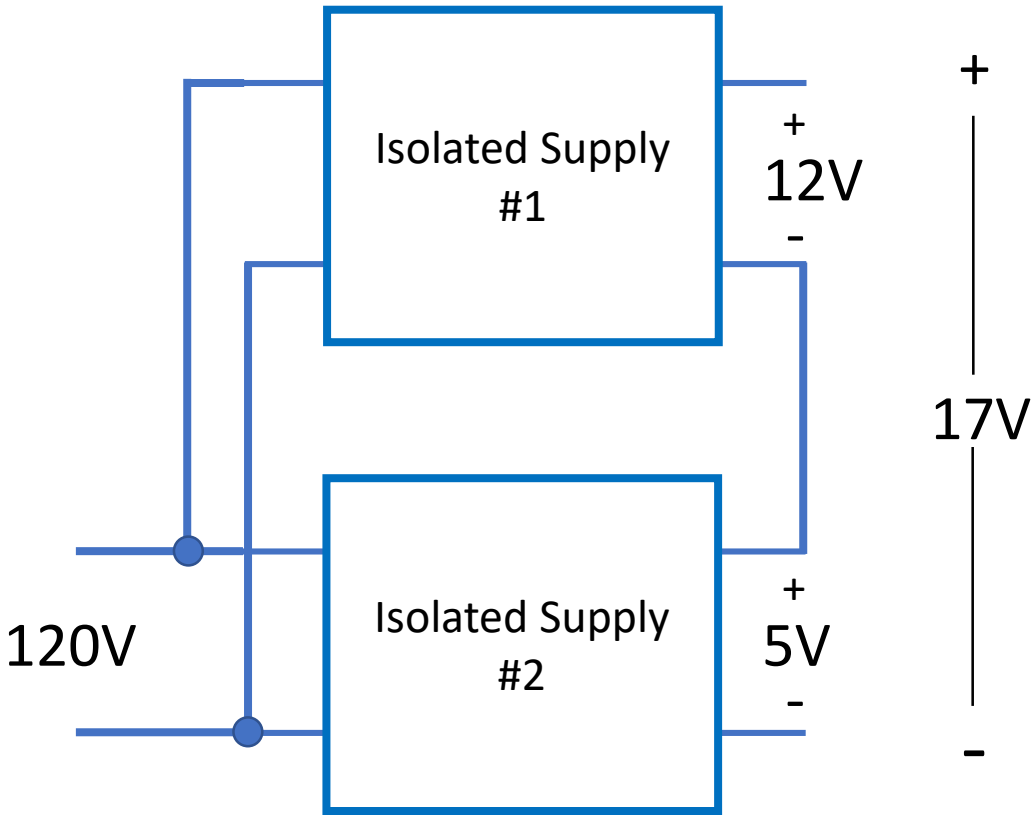
- Diode stripes
- Capacitor +/-

Experiment with it

- Change R_{LOAD}
- Change C



Isolated supplies



Some supplies have isolated outputs

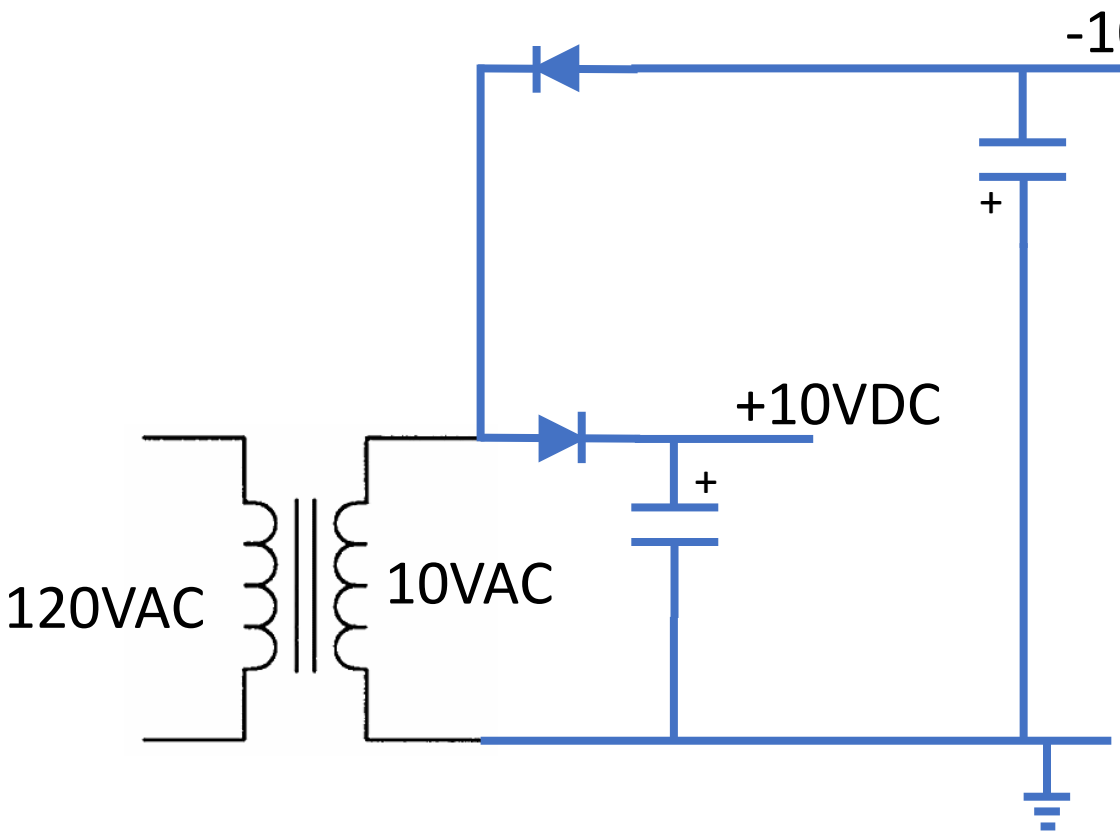
- Also called galvanic isolation
- Provides safety
- Reduces noise between circuits by avoiding hard connected ground nodes

Supplies can be added or subtracted by connecting them:

- e.g. Two +5V supplies can be turned into +/-5V

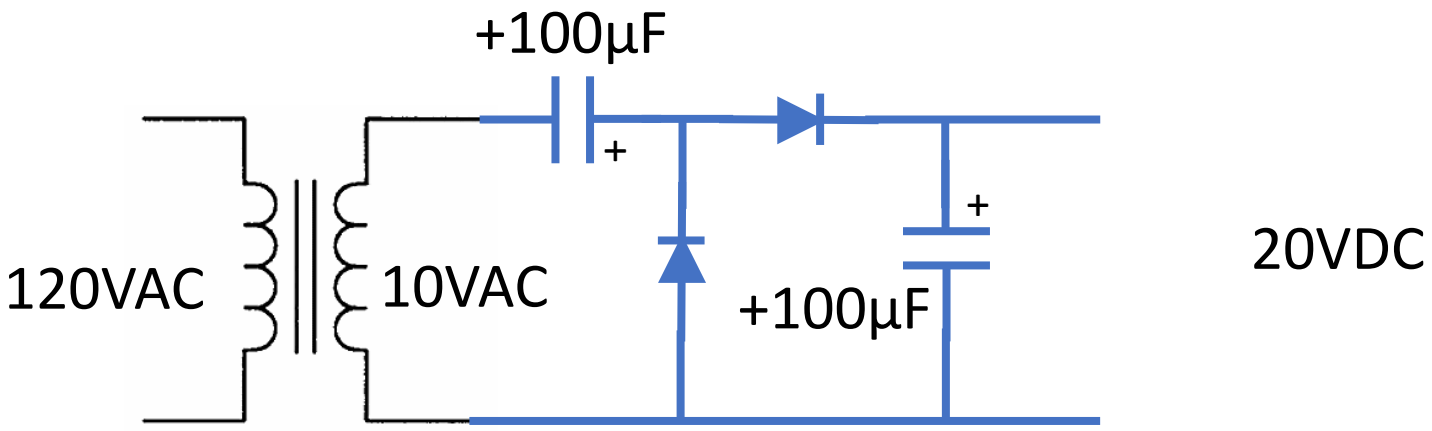
Try it out! More detail on how switch mode supplies work

Bored? Try this bipolar supply:



Watch capacitor polarity!

Bored? Try this doubler:

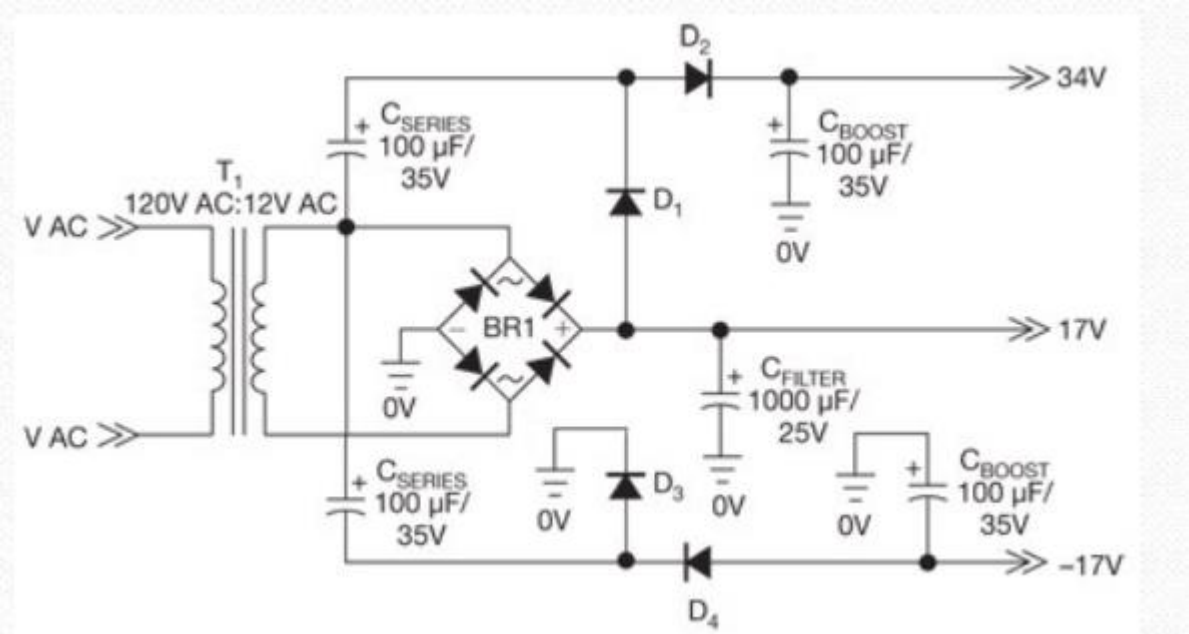


This is sort of a variant of a “charge pump” or “flying capacitor” converter which is an inductor-less boost converter. This is a simple circuit for low current x2, x4, x6, etc. or inverting conversion.

In a DC circuit you could run an oscillator (e.g. 555 timer) and feed it into a couple of diodes and caps to generate a negative supply such as -5V from +5V.

A free pin on an Arduino could feed a charge pump (tone(1000)).

Bored? Try some of all of this:



Bored? Try some of all of this: