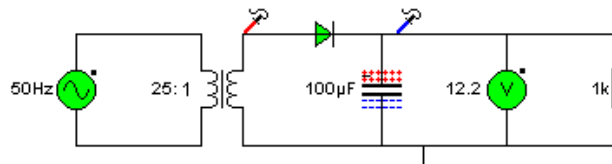


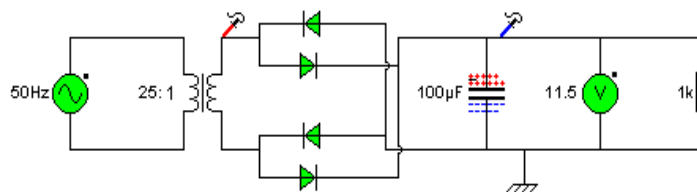
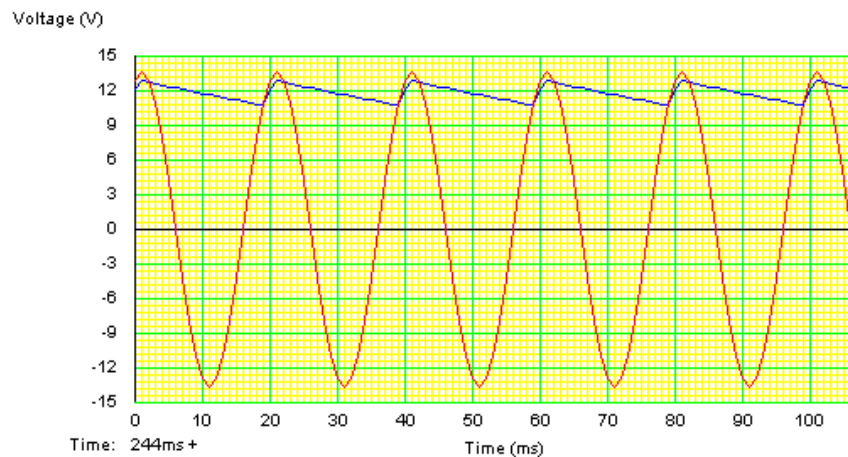
# Mains Power Supplies

Warning: Mains power is dangerous. You should not be using any circuit connected to the mains. However, with the supervision and checking of your teacher you might want to use a mains power supply. One of the plug-top varieties is probably the best and safest.

Battery power is d.c. – direct current. This means the current always flows in the same direction. Mains is a.c. – alternating current. The current is always changing direction – at 100 times a second. UK mains electricity operates at a frequency of 50Hz and an rms voltage of 240v. Rms is a kind of average, meaning the electricity has the same effect as a dc voltage of 240v. The peak voltage of mains is 340v. To change this to the value of dc you require, a transformer and diode is needed. The transformer reduces the voltage and the diode makes sure it is dc.



The simplest method is half-wave rectification which uses just one diode. The transformer turns ratio is 25:1 so the output voltage is  $340/25$  which is nearly 14v. The diode gets rid of the negative half of the wave and the capacitor smooths the result by acting as a charge reservoir. A bigger capacitor would provide more smoothing.



A full-wave rectifier gives a smoother result by using both halves of the ac wave along with four diodes. The left half of the graph shows the result without the capacitor. The diodes have turned both sides of the ac positive. The right half of the graph shows the result after smoothing with the capacitor. The half-wave circuit gives a “ripple voltage” of more than 2 volts; full-wave gives less than 1 volt.

