

# Voltage Stabilization

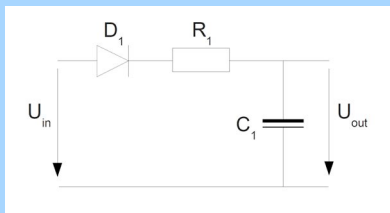
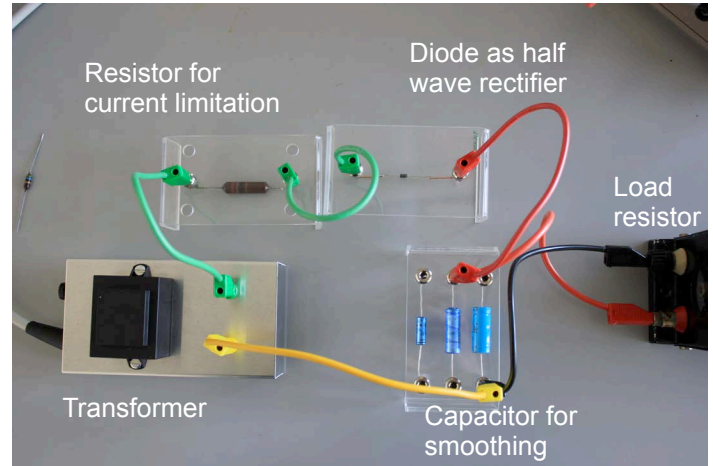
## Idea of experiment

Setup a stable DC voltage source.

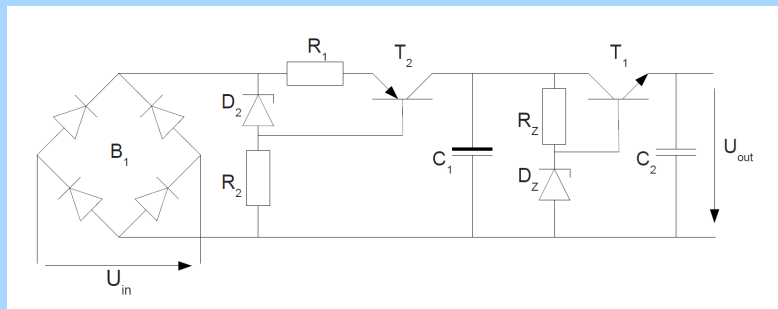
This is an often encountered problem in a Physics research lab, as stable, low noise voltage supplies are needed for a multitude of tasks.

Students setup and evaluate several different options to produce a stable DC voltage source with low baseline ripple and low load dependence.

Use of basic components as well as 'real life' integrated circuits to advance basic understanding and link to more complex realizations that might be encountered in future work.



Half wave rectifier with smoothing capacitor



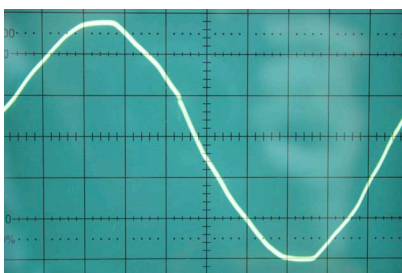
Full wave rectifier with smoothing capacitor C1, active short circuit protection, Zener diode stabilization and transistor

## Preparation

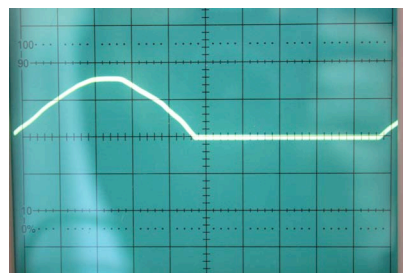
Gain general understanding of electronic components capacitors, diodes, rectifiers, transistors.

## Step by step setup of the circuit

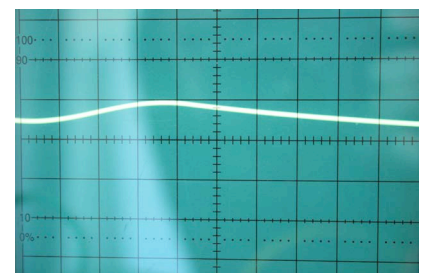
Simple current limitation with resistor  
Half wave rectification with diode  
Smoothing capacitor  
Rectify, and smoothing capacitor, for a DC voltage with low ripple.  
Zener diode and transistor for a load stable voltage.  
'Real world' alternatives LM7800 and LM317 integrated circuits are also tested.  
Circuit is analyzed with oscilloscope, also very helpful for further lab work.  
In the report the results are compared to theoretical predictions.



Full AC



Half wave rectified



Smoothed with a capacitor