

**ECE214: Electrical Circuits Laboratory**  
**Lab #10 — DC–DC Power Supply**  
Week of 14 April 2015

## 1 Introduction

This is the third of three labs that will culminate in a device that will convert a 9 Volt DC source into a 45 Volt DC source. In this lab, you will add a second stage to the boost circuit from Lab 8 and use the multivibrator circuit from Lab 9 to produce the final DC–DC Power Supply. A block diagram of the system you will design is shown in Figure 1 below.

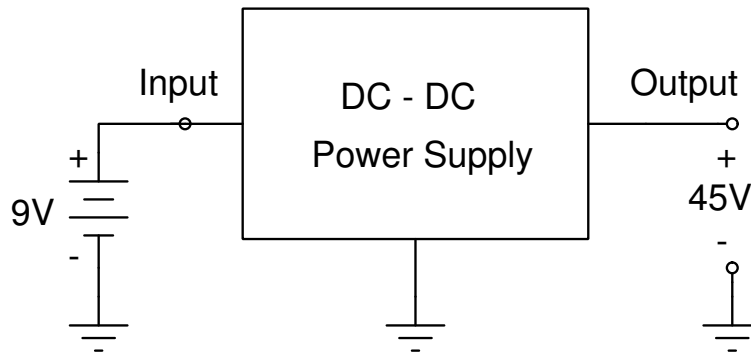


Figure 1: Block diagram of the DC–DC converter.

## 2 Pre-Lab

Design a DC–DC Power Supply to boost a 9 Volt DC voltage to a 45 Volt DC voltage with an output ripple of less than  $1V_{P-P}$ . Use Micro-Cap to simulate the operation of the circuit, and include a plot of the output signal. (The Micro-Cap circuit should have all three circuits connected together: the multivibrator and both boost circuits).

## 3 Lab Procedure

Build and test your DC–DC Power Supply. Report all results in your laboratory notebook and in your final laboratory report.

## 4 Post-Lab

Produce a lab report describing the DC–DC Power Supply according to the instructions provided in ECP 214. Only one report is needed per lab group. Include the following in the report:

1. A component table for your circuit with part numbers from Digikey ([www.digikey.com](http://www.digikey.com)) or Mouser ([www.mouser.com](http://www.mouser.com)).

2. A schematic of the DC–DC Power Supply and all sub–circuits (one stage boost converter, two stage boost converter and astable multivibrator).
3. Simulation results for the DC–DC Power Supply and all sub–circuits.
4. Test results of the DC–DC Power Supply including:
  - (a) photograph showing the circuit with the input connected to a 9 Volt battery (or the 9 Volt power supply) and the output voltage displayed on a DVM.
  - (b) photograph showing the AC ripple measured using the oscilloscope.
5. Estimate the unit cost to build 10,000 Power Supplies. Use the guidelines discussed in class to estimate non–recurring engineering (NRE) costs and the manufacturing costs.
6. E-mail the final report as an attached PDF file to: [vincent.weaver@maine.edu](mailto:vincent.weaver@maine.edu) by 5:00pm on Friday 1 May 2015.