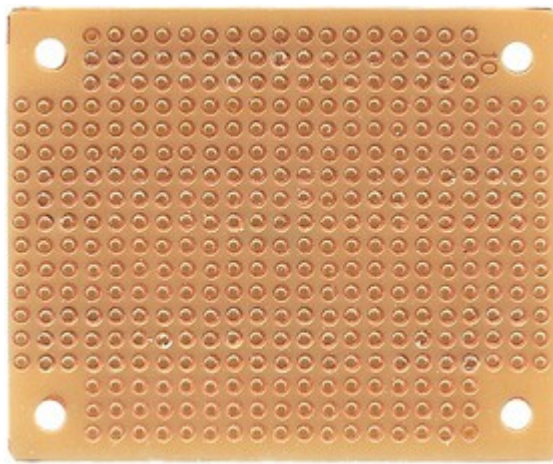


Union College  
ECE-101  
The Joy of Electronics  
Project 1 Audio Amplifier  
Build Final amplifier and Report Guidelines

1. You will be moving your amplifier circuit from the powered protoboard to a piece of perfboard. You will be placing the components on the top side with component leads soldered to the pads on the bottom side. See figure 1 below.



*Figure 1: Bottom view of perf-board showing copper pads*

2. Place the IC socket in the center of the perfboard and create ground/common and +9V buses using copper foil tape. Make sure to connect pieces of tape by soldering.
3. Use what you learned from laying out amplifier on the powered protoboard to create a neat organized parts placement with no component leads crossing.
4. Solder the components to the solder pads using excellent soldering technique.
5. Build the amplifier base to mount the speaker, amplifier circuit and battery. Cut a piece of angle aluminum to mount the volume control and RCA input connector and connect to the amplifier base. Use the tables handed out in class to choose the correct drill bits. Make sure all cut edges are square and file to remove “burs”.
6. Mount the battery clip using a drill and tap. Do not use a nut.
7. Connect the battery clip to the amplifier.
8. Use stranded speaker wire to connect the speaker to the amplifier board.
9. Use audio cable to connect the volume control and RCA connector to the amplifier board. **MAKE SURE** that the volume control increases volume from the speaker when the volume control is rotated in a clockwise direction.

10. Measure signal in signal out for maximum undistorted output. Capture oscilloscope pictures. Calculate voltage gain and power out.
11. Take pictures illustration amplifier construction.

### **Grading:**

#### **Construction 70% of the project grade:**

- Must be neat with wires not crossing.
- Must look good – aluminum cleaned with no "burs".
- Excellent soldering practices must be followed.
- Must use the correct wire colors.
- Layout must be clear and uncluttered with short leads and as few extra wires as possible.
- It must function correctly.

#### **Report 30% of the project grade:**

- Cover page with: project name, your name, course number, date.
- Description of the project including the purpose and the steps in the process.
- Results and outcomes:
  - Include the documentation, questions, pictures, and oscilloscope waveforms from the amplifier you built on the powered protoboard.
  - Document device function such as input signal value, output value, gain. Calculate power output at maximum undistorted output. Pictures of oscilloscope wave forms, both input and output. You may use Matlab or take a picture of the oscilloscope with a camera.
  - Pictures of your project, both on the protoboard and the final amplifier, with labels to indicate construction methods.
  - Discussion of what you learned including problems you encountered and the way you solved them..
  - Include the information and answers to questions from assignment 1.
- Discuss construction technique(s). For example for the audio amplifier we built the circuit on a protoboard first and then on perfboard. Compare the two techniques. Describe what you learned about construction.
- Writing must be clear and concise. Label pictures and graphs and refer to them in the text.

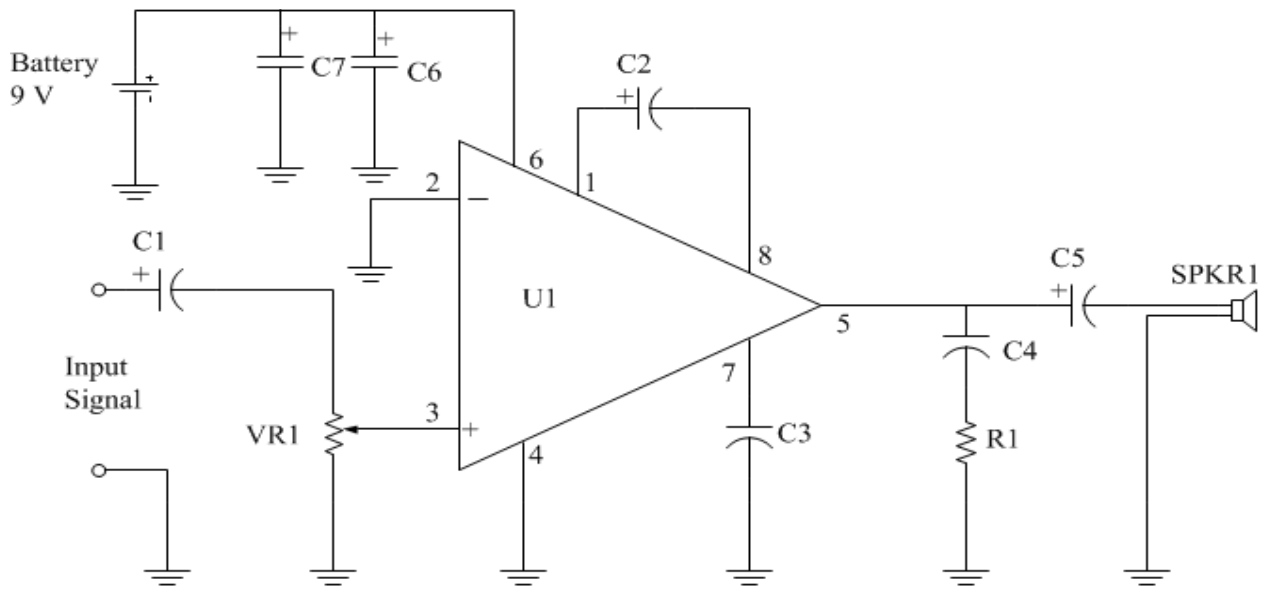


Figure 1  
Schematic for an LM386 Audio Amplifier

Designation	Description	Distributor	Distributor Part Number	Cost
C1, C2, C7	10uf 16 V electrolytic Capacitor			
C3, C6	.1 uF capacitor			
C4	.047 uF capacitor			
C5	220 uF 16 V electrolytic capacitor			
R1	10 Ohm ¼ watt resistor			
VR1	50 k Ohm Audio taper rotary potentiometer			
U1	LM386N-3 amplifier			
SPKR1	8 Ohm 700 mW speaker			