

ECE 323: ELECTRONICS II

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PREFACE

SYSTEM OVERVIEW

During the course of this lab, you will be designing and constructing an USB powered audio amplifier. During this project, you will explore the principles of amplification and system design.

The USB audio amplifier project is composed of two pieces: a functional prototype, and a complete “product”. This lab structure is designed to emulate the 30-week Senior Design course in 10 weeks. Six weeks are given to complete the designing, constructing, and testing of the prototype. Three weeks are given to improve the prototype into a “product”. In order to emulate senior design more accurately, the prototype will be graded via given specification, and the improvement portion will be graded by student-determined design specifications.

HOW TO USE THIS MANUAL

During this course, various tasks will be performed from the design of electronic devices, to prototype design, as well as improvement on the prototype. These tasks are divided into individual lab documents that correspond to what is being taught in the Electronics II lecture, and emulate a real design and build engineering process.

Everything learned in lecture is relevant and useful in later (related) courses and in your future career. As various tasks are performed in these labs, try to pay attention to how the lecture material relates to these tasks. Understanding how the lecture material is used and applied will greatly improve your understanding of the topics as well.

IMPORTANT SYMBOLS

During this lab and other TekBots labs, you will encounter the following symbols. So, review or acquaint yourself with these symbols, as they are widely used in this lab manual.



This symbol indicates an **important note** that should be remembered/memorized. Paying attention to notes like these will make tasks easier and more efficient.



This symbol designates **caution**, and the information in this caution-table should be read thoroughly, and adhered to, before moving ahead.

If the caution warning is ignored, the task may appear impossible and/ or can lead to damaged TekBots and systems.



This symbol represents something that helps you make your task easier by reminding you to perform a particular task before the next step. These **reminder** symbols are not normally critical things to complete, but can make things easier.



The **innovation** symbol will give information to enrich your experience. These sections will give more insight into the what, why, and how of the task being done. Use these to learn more, or to get ideas for cool innovations.

LAB STRUCTURE

Section Overview	The section overview briefly describes what will be learned in the section, and what will be done.
Procedure	The procedure portion of each section contains all of the tasks to be completed and relates to the corresponding lecture. Keeping this in mind will help to better understand the lecture as well as the lab material.
Study Questions	The study questions are intended to give more practice and insight into what has been learned in lab and lecture. Some of the study questions will be due in lab.
Challenges	The challenge sections of labs are for extra credit. Performing the tasks in the challenge sections will improve understanding of what is being learned and will result in some outstanding TekBots and innovations.

LAB SAFETY

Safety is always important when working with electricity and electronics. This includes the safety for you, your peers, as well as safety for the circuit components you are working with. Concerns such as high voltage or currents can affect the human body, while static safety and proper component use can affect the life of your circuits.

Personal Safety

When working with high voltage and currents, it is important you remember you can be hurt if your body becomes the 'circuit', since the human body is a conductor of electricity. This issue has long been combated by using the 'one hand rule.' Whenever you are working with a potentially dangerous circuit, turn it off, but if it cannot be turned off, use only one hand when working on it. This will prevent a circuit from being made through your heart, which could be potentially fatal.

Component Safety

Many electrical components are likely to be damaged by static electricity. Static charge can build up to many thousands of volts, but with little energy. This cannot harm humans, but it can easily damage electronic components. To ensure static-safe handling, the best practice is to wear an anti-static strap and connect it to an earth ground such as a computer case or a water pipe. If you do not have an anti-static wristband, you can instead touch a ground every few minutes to discharge your static build up.