

EENG 303L: ELECTRONICS LABORATORY (by Steve Schennum)

In addition to learning about electronics, the purpose of EENG 303L is to learn and apply good practical experimental work habits. The essential features of good experimental work are:

- 1) the establishment of an efficient work plan
- 2) the recording of good notes
- 3) the effective communicating of results and conclusions to others.

I. Notebook Guidelines

Each experiment should be documented in your laboratory notebook using the format described here.

A. PLANNING: Before coming to the laboratory complete the first four sections, namely:

1. Title and Lab Partner
2. INTRODUCTION: Briefly state the purpose of your experiment.
3. THEORY: Describe in concise detail the theoretical basis for the experiment.
4. ANALYSIS AND DESIGN: Do your mathematical calculations to obtain specific component values. Then select standard component values and calculate new experimental results based on standard component values. Schematic diagrams are usually included in this section.
5. LABORATORY PROCEDURE: Just write out step by step what you plan to do. Usually the lab handout is sufficient, except it should refer to figures in your Analysis and Design section. Circuits should be clearly **referenced** by their figure numbers which you have so carefully included in the *Analysis & Design* section.

B. RECORDING NOTES: While in the laboratory, complete the following sections:

6. DATA COLLECTION: Record raw data as prescribed by your procedure.
7. DATA ANALYSIS: Reduce raw data to tables and/or graphs. Explain differences between measurements and expectations.
8. SUMMARY AND INTERPRETATION OF RESULTS: Write as much as you need to understand what happened.

C. Here are some ADDITIONAL TIPS on organization and neatness of notebooks:

1. Don't use 3 ring binders or spiral notebooks. Use something flat.
2. Number all pages. Begin each experiment on a new page.
Reserve the first page or two for a table of contents.
3. **Number and label** all figures, graphs, and tables.
4. **Number all equations** for reference in your notebook.
5. Use proper device symbols for all circuit components in schematic diagrams. Identify all components in your schematic properly. Symbols representing ICs must include pin numbers. It will be easier to trouble shoot if you do.
6. Add paper added to the notebook neatly.
7. All hand-constructed graphs should be drawn on appropriate linear or log paper.
8. Above all, USE your notebook. Do not scribble a bunch of stuff on scratch paper or bar napkins and then copy it into your notebook. It wastes time.

II. Report Guidelines

A. Outline

The more organized your notebook, the easier it becomes to write your report. To compose a good report you need only extract and present the highlights contained in your notebook, which are easily accessible if your notebook is organized. In the electronics laboratory, memo reports will generally be required. The basic components of a memo report follow.

1. Introduction: **Explain what was done.** Give an overview of the experiment and include circuit diagrams (with figure numbers and captions, of course).
2. Summary of Results: **Present your results** in the form of graphs or tables (graphs are usually better). **NARRATE!** That means **EXPLAIN** your tables and graphs. Include figure/table numbers and captions. In general, avoid theory and definitions here.
3. Analysis of Results: **Compare** your results obtained with theory (expected results). What went wrong? What went right? Make comments. **Give solid logical reasons for errors.**

Write short reports. 3 pages are enough.

B. Effectiveness: The effectiveness (which becomes the **GRADE**) of a report depends on the following considerations:

1. Organization,
2. Brevity: Use as few words as possible, but don't omit vital information.
3. Clarity,
4. Grammar,
5. Punctuation,
6. Spelling,
7. Sentence construction,
8. Tense,
9. Legibility.

C. A few words about style.

- 1) Have somebody **read** your report before submitting it. If your report seems awkward to a peer, it will probably confuse the hell out of me. Proofread and make corrections.
- 2) Feel free to ask for assistance. I will be happy to help you improve your report.
- 3) **Do not** whine or make excuses in a report. While entertaining, such remarks do not constitute good form in a technical report.
- 4) **Include figures or attach block diagrams, schematics, etc..** It is ridiculous to discuss a circuit without presenting a diagram of it. Figures should be in the text, not in an appendix.
- 5) **Do not** use the words "actually", "basically", "very", etc.. Such words do not convey meaning and only add clutter to your text. The words "this", "that", "these", and "those" should be used sparingly, and are **weak** nouns. When using the word "it", make sure the reader can figure out what "it" is with minimal effort. Phrases like "so as", "in order", and "to be" are usually unnecessary.
- 6) The words "just" and "simply" should be used rarely, because they can make the writer sound conceited.
- 7) **Use** a dictionary, and a thesaurus to help you choose accurate words.
- 8) Superlatives, indefinite pronouns, and undue abbreviations should be avoided. Use present tense for permanent facts or truths.
- 9) In Electronics Lab, substance is more important than cosmetics. In other words, a report grade does not depend heavily on the appearance of your report, provided it is reasonably neat, organized, etc., and does not fall apart. It is not necessary to submit fancy binders with designer colors, glorious title pages, bond paper, etc.
- 10) The purpose of a technical report is to communicate. The goal of the writer (that's you) is to **convey technical information as clearly** as possible in a way that requires as little effort as possible on behalf of the reader (that's me) to figure out what you are saying. Minimize the readers need to flip through pages **by putting information in a logical order**. Avoid confusing language. Keep it interesting. Do not repeat things.
- 11) I bothered writing all this stuff because I believe it can help you. Co-workers, employers, and other people worth impressing will tend to judge your intelligence and potential based on your use of language! Not fair, perhaps, but true.