

ELECTRICAL ENGINEERING Laboratory Report Format

An experiment is only as good as the lab report that describes it. Lab reports are an essential part of all laboratory courses and usually a significant part of your grade. A lab report is how you explain what you did in experiment, what you learned, and what the results meant. Students have permission to refer to the lab handout. There is no need to simply restate what is already written in the handout. It is important to use appropriate citations when referring to handouts or other materials. Each group will submit a single report, using this format, for each experiment requiring a formal lab report which contain..

1. Title Page

It would be a single page that states:

- The title of the experiment.
- Your name and lab members
- Your instructor's name.
- The date the lab was performed or the date the report was submitted.

2. Title

The title says what you did. It should be brief (aim for ten words or less) and describe the main point of the experiment or investigation.

3. Introduction / Purpose

The introduction serves to set up the reader for the rest of the report. It includes background information, as well as a description of how this work fits into the broader/wider contexts of the class, field, discipline, etc. It sometimes includes a description of the principles that underlie the experiment, but the details of the work usually fit better into later sections.

Usually the Introduction is one paragraph that explains the objectives or purpose of the lab. In one sentence, state the hypothesis. Sometimes an introduction may contain background information, briefly summarize how the experiment was performed, state the findings of the experiment, and list the conclusions of the investigation. Even if you don't write a whole introduction, you need to state the purpose of the experiment, or why you did it. This would be where you state your hypothesis.

4. Materials / Components and Equipment

List everything needed to complete your experiment.

Example :

While many of the Explorations to follow could be done with a single diode of a single type, there is much to be learned about different diode types, and the myriad applications of multiple diodes.

- 1 - oscilloscope
- 1 - function generator
- 1 - Multifunction DMM (with ohmmeter ranges)
- 1 - dual power supply.
- 2 - 1N914 diodes (or equivalent 1N4148) - a small-signal diode
- 2 - 1N4004 diodes - a low-power rectifier diode
- 1 - 100 μF polarized capacitor
- 1 - 1 $\text{k}\Omega$, 10 $\text{k}\Omega$ _resistors

5. Theory

This section is used to present and/or derive any equations that will be needed to understand the experiment or perform the data analysis.

6. Methods/procedure

In this section, the details of the way the experiment was performed, how the equipment was configured, the way the data was collected, etc., are described. Describe the steps you completed during your investigation. This is your procedure. Be sufficiently detailed that anyone could read this section and duplicate your experiment. Write it as if you were giving direction for someone else to do the lab. You already done the experiment and it well done and success. It may be helpful to provide a Figure to diagram your experimental setup.

7. Data

Numerical data obtained from your procedure usually is presented as a table. Data encompasses what you recorded when you conducted the experiment. It's just the facts, not any interpretation of what they mean during the experiments.

8. Results

Describe in words what the data means. Sometimes the Results section is combined with the Discussion (Results & Discussion).

Include both results, as well as sample calculations when appropriate.

- Make sure results are clearly labeled and set off from the text somehow (eg, in a table or graph), and not simply imbedded in the text.
- Think carefully about whether the information is better presented in a table, a graph, or both. (It is not usually necessary to present the same information in both a graph and a table, though it can occasionally be helpful.)

- Show experimental and theoretical results side by side for easy comparison, e.g. in the same table or graph. In tables, include the percentage deviations of the experimental results from the theoretical predictions. This is important!
- Provide a sample calculation, using one complete set of data. Give the results of the calculations for the rest of your data. It is not necessary to recopy your raw data from the page where you first recorded it. Refer to it as necessary, pointing out trends and identifying special features.
- State the results of your experiment clearly. Figures, graphs and tables may help to support your claims, but do not rely upon them exclusively to convey essential information. Any figures or tables used should be labeled and given a reference number (e.g., *Figure 1, Input Frequency and Capacitor Value*).
- State all significant results explicitly and in verbal form. Organize your paragraphs around effective topic sentences. Use short, declarative sentences for the most part, but vary sentence length for flow and emphasis.

9. Figures & Graphs

Graphs and figures must both be labeled with a descriptive title. Label the axes on a graph, being sure to include units of measurement. The independent variable is on the X-axis. The dependent variable (the one you are measuring) is on the Y-axis. Be sure to refer to figures and graphs in the text of your report. The first figure is Figure 1, the second figure is Figure 2, etc.

example of a schematic of the experimental set up is shown in the figure below.

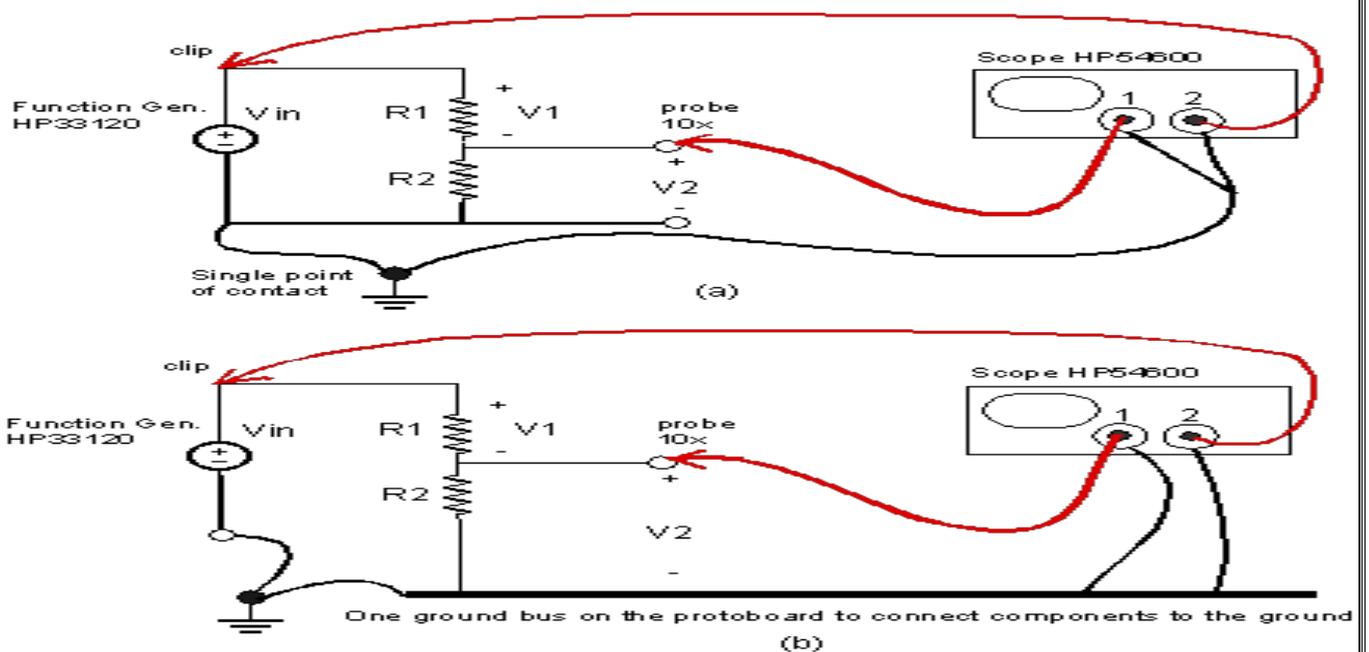


Figure: Sketch of the experimental set up with indication of the Ground terminals, instruments and interconnections: (a) using a single point of contact for the ground; (b) using a ground bus on the protoboard to connect the components and instruments to ground.

10. Discussion or Analysis

This section is used to demonstrate the significance of the results, and to explain why they are or are not consistent with those that would be expected from theory and analysis.

- Discuss the significance, or meaning, of the results.
- Discuss discrepancies between theoretical and experimental results, and their likely causes.
- How do your results relate to your experimental objective(s)?
- Do any of your results have particular technical or theoretical interest?
- How do your results compare to those obtained in similar investigations?
- What are the strengths and limitations of your experimental design?
- Discuss any difficulties encountered in performing the laboratory, what were their sources? How might they be avoided in future experiments?
- Suggest changes that could be used to improve the lab. These may be included in the labs for future generations.

The Data section contains numbers. The Analysis section contains any calculations you made based on those numbers. This is where you interpret the data and determine whether or not a hypothesis was accepted. This is also where you would discuss any mistakes you might have made while conducting the investigation. You may wish to describe ways the study might have been improved.

11. Conclusions

The purpose of this section is to wrap up the lab and summarize what was reported. It is also a place to make suggestions for future improvements. Most of the time the conclusion is a single paragraph that sums up what happened in the experiment, whether your hypothesis was accepted or rejected, and what this means. Most the conclusion are talking about achievement of the objective of the experiments.

Example :



The objective of this project is to design a mobile phone tower.
In this report, a design for a mobile phone tower has been presented. The key features of the tower are... It was found that...



- In this report, a design for a mobile phone tower has been presented. The key features of the tower are... It was found that...



- Two designs for the bridge to be constructed on the Calder Freeway across Slaty Creek have been presented and discussed in this report. Design 1 is a super-T beam bridge and Design 2 is a simple composite I girder bridge. Both designs incorporate round piers on piled foundations, which are used because the soil conditions are unknown and possibly unstable. Design 2 has some advantages because it is made of steel and thus has longer spans and fewer piers.
However, Design 1 is clearly the better design. This design requires minimal formwork in the construction of its concrete deck, it is relatively easy to erect and it maintains stability during transportation and construction. In addition, it is cheaper to build and more durable.

If your experiment confirms or contradicts an established principle or theory, this should be stated clearly. In the plainest terms, your conclusion should answer the question.

12. References

If your research was based on someone else's work or if you cited facts that require documentation, then you should list these references.

Example :

Glendinning, E.H. 1973 English in mechanical engineering, Oxford, Oxford University Press.

Other Suggestions

- Be sure that each table and graph is labeled with a title, numbered, and referenced in the text. Do not include tables or graphs unless there is at least a sentence or two (and often there is much more than this) in the text so that the reader knows why the information has been included and what it has to do with the discussion at that place in the report.
- Be sure that each table and graph has a caption.