ELECTRICAL ENGINEERING DEPARTMENT

REPORT FORMATS

University of Wisconsin – Platteville

First Edition

2009

TABLE OF CONTENTS

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Introduction

Technical reports are written for two different audiences:

1. *Managers*, who want to know (in as few words as possible, and without searching the entire report for the information):
    a. *What* was done and *why*;
    b. Whether or not the project was successful (*e.g.*, were the project goals achieved);
    c. Whether or not cost and time constraints were met, and by how much;
    d. Anything else important enough to call to the attention of management.
2. *Engineers*, *scientists*, *and technicians*, who want to know (in sufficient detail *that they can duplicate the work*):
    a. How it was done (including how unexpected problems were overcome);
    b. How the circuit/system/product performs its intended function.

Formal Reports

A formal report contains the following:

1. Title Page: contains the title of the project/report, to whom the report is submitted, by whom it is prepared, the date it is submitted, and the **abstract**. (An example title page is shown on the next page.)

2. Abstract: a *short* paragraph indicating what the project was and what solution was found.

3. Table of Contents: contains page numbers of the titles and subtitles of different sections of the report.

4. Introduction: a brief description of the problem, how it was approached, and what procedure was used to solve it. It may also give the reader some information on what was done in the sections following the introduction (for longer reports).

5. Development: describes the details of the methods, procedures, techniques, etc., used in solving the problem. This section usually has subsections such as model development, calculations, experimental procedure, applications, etc.

6. Discussion: a discussion of the findings and any discrepancies.

7. Conclusion and Suggestions: This section is a brief summary of what the findings were and what the significance of the work is. If it is a research project, it also contains suggestions about future research areas.

8. References: This is a list of the books, reports, papers, Internet sources, and computer software that were used to complete the project and write the report. All references listed must be cited in the report; if no references are *cited*, don't *list* any. References are listed in the same order in which they were *first* cited.

9. Appendices: Any method or tool which is not the primary concern of the research or project but is used in the project can be put into an appendix. Computer programs developed and used to solve a problem usually go in an appendix unless the purpose of the project is the development of the program itself. Do not put computer outputs (such as PSpice or POWERWORLD output) in an appendix without discussing their significance in the body of the report. In other words, if a computer output is not discussed in the body of the report, then that output should not be placed in the appendix. Appendices are numbered (or lettered) and are attached to the end of the report in numerical (or alphabetical) order. The order must be the same as the order in which the appendices were *first* cited in the report. *All appendices must be cited by number* (*or letter*) *in the text of the report*.

Click here to download a formal-report template in MS Word format.

*The title is 16- to 18-point **bold** font in all capitals.*

FUSION REACTOR DESIGN

All other material on the title page is in the same font as used for the body of the report.

For group reports, list authors alphabetically by last name.

Orville Klutz
Harvey Mudslinger

EE 4450: Power Systems

May 12, 2008

*The word **Abstract** is in **bold** font.*

Abstract: A fusion reactor was designed, built, and tested. Helium-3 was used for fuel because another design group cornered the market on deuterium in Platteville. The reaction was contained by the magnetic field from a 4-T magnet borrowed from the MRI machine at the Southwest Medical Center. The calculated output-power level was 22.3 MW, but the measured output power was only 2.5 MW for five minutes, after which the reactor overheated and melted through the floor of the Power Laboratory. That's why the reactor was unavailable for project checkoff. The authors believe that the lava flow that erupted from the Power Laboratory and covered the UWP campus is sufficient proof that the reactor (1) was actually built and (2) worked, and do not think they deserved the low grade they received for the project.

Informal Reports

An informal report consists of a memo plus attachments and contains the following sections:

1. Heading (required)**:** To whom the report is submitted, who wrote it, when it was written, and what it is about. (An example of the first page of an informal report is included on the following page.)

2. Summary (required)**:** The summary is a brief (one or two paragraphs) description of the project and the results, plus a brief mention of cost and schedule (so that managers don't have to read the entire report to find this information). It should never extend onto the second page of the report.

3. Design (optional)**:** Describes the design of the project.

4. Testing (optional)**:** Describes how the circuit or system was constructed and tested.

5. Simulations (optional)**:** This section includes the *results* of any numerical simulations done for the project. (Listings of software belong in an attachment unless development of the software was the purpose of the project.)

6. Results or **Conclusion** (required): This section summarizes the results of the project, compares the measured results to the design goals and numerical simulations, gives detailed breakdowns of costs and time spent (if required), etc.

7. References (required)**:** This section contains a list of all references cited in the report. If no references are cited, none should be listed. The references should be listed in the order in which they are *first* cited.

8. Attachments (optional)**:** Attachments to an informal report serve the same function as appendices in a formal report. All attachments must be cited in the report and must be in the same order as *first* cited.

In an informal report, each section does *not* have to start on a separate page. However, never end a page with a section heading.

Click here to download an informal-report template in MS Word format.

No page number on first page

To: Prof. D. M. Drury

From: Orville Klutz

RE: EE 4610, Laboratory Project #2

Date: 30 February 2008

*Note that the **colons** align*

Leave extra space above section headings

Summary

A summary for *managers* should come first, so that they don't have to read the entire report to find the information of interest to them (*e.g.*, cost and schedule information and whether or not the project was successful).

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The summary is exactly that — a *summary*. It should not extend onto the second page.

Design

The design process is explained in sufficient detail such that *any engineer working in the same field will be able to understand what was done and duplicate the work.*

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IEEE-Format Reports

The format (including a template) is given in great detail at

http://www.ieee.org/web/publications/authors/transjnl/#article

Format errors frequently occur because of lack of attention to the following:

1. Figure captions and figure numbering.

2. Equation format and equation numbering.

3. Font types and sizes.

4. Table formats and table numbering.

General Information

Format

Except as listed below, for **formal and informal reports** use the format specified in these sections of *A Manual for Writers of Research Papers, Theses, and Dissertations*, 7th ed., by Kate L. Turabian (University of Chicago Press, 2007):

1. Tables and Figures: Sections 26.1 – 26.3.

2. Typeface, Line Spacing, and Pagination: Sections A.1 – A.2.

Format Exceptions

The following are *not* taken from Turabian:

1. Type Font: Use 11- or 12-point type for the body of the report and 10-point type for figure and table captions.

2. Figure Backgrounds: Dark backgrounds (commonly produced by PSpice and screenshots) are *not* acceptable.

3. Schematic Diagrams:

a. The ground symbol ( or) must point downward, not sideways () or upward ( ).

b. Most software used to generate schematics does not support subscripts, therefore symbols that are subscripted in the text of the report (*e.g.*, resistor R_7) can be labelled without subscripts (*i.e.*, *R*7) in schematics.

4. Figures and Tables: All figures and tables must be numbered (or lettered) *and must be cited by that number* (*or letter*) *in the text of the report*.

5. References:

a. Use the method of citing and listing references specified by the IEEE at

http://www.ieee.org/web/publications/authors/transjnl/#article

and click on IEEE Style Manual .

b. References, by definition, can be referred to by others. They must be *archived* (*i.e.*, stored) someplace accessible by the readers of the report. Therefore:

(1) C*lass notes can* ***never*** *be references*. (If an equation from class notes is used, the *entire*

derivation of the equation must be included — so that another engineer can judge its validity — with a statement crediting the person who did the derivation.) HINT: Find the equation in the textbook and reference that.

(2) In industry, project reports are archived someplace (*e.g.*, a manager's filing cabinet). Therefore reports submitted earlier in the semester may be used as references.

(a) For formal reports, the format is the IEEE standard referenced above.

(b) For informal reports:

Memo to D. M. Drury from Orville Klutz, 30 February 2008. Subject: Perpetual Motion Machine.

Grammar and Composition

1. Rules:

a. For **formal and informal reports**, use the rules specified in Sections 20 – 24 of *A Manual for Writers of Research Papers, Theses, and Dissertations*, 7th ed., by Kate L. Turabian (University of Chicago Press, 2007).

b. For **IEEE-Format reports**, use the rules specified in

http://www.ieee.org/portal/cms_docs_iportals/iportals/publications/authors/transjnl/stylemanual.pdf

2. Description Details:

Incorrect — To measure the signals, I used the oscilloscope. I took one of the thick cables from the wall and connected the red clip lead to my circuit where the red clip lead from the function generator was attached. Then I connected the black clip lead to my circuit where the black clip lead from the function generator was attached. Then I connected the BNC connector on the other end of the cable to the Channel 1 input of the scope. Then I got a thin cable with a box labelled 10:1 on it from the rack on the wall and connected it to the end of the 1-kΩ load resistor that had the gold stripe on it. Then I connected the black clip lead from the thin cable to the other end of the 1-kΩ load resistor. Then I made a screen shot of the oscilloscope display and put it in this report as Figure 3. (*Explanation*: This contains too much unnecessary detail. Managers don't care and other engineers know how to measure signals with an oscilloscope. *Every* use of the word "then" in the above is unnecessary.)

Correct — The input and output signals were measured with an oscilloscope. A 50-Ω coaxial cable was used as a test probe for the input signal, but a high-impedance probe was used to measure the output signal so that a large capacitive load would not be connected to the output. (*Explanation*: Says the same things as the above description, but uses far fewer words and actually explains why a high-impedance probe was used — something another engineer might want to know.)

Incorrect — I started biasing the transistor by calculating the value of the emitter resistor. I used the

1/3–1/3–1/3 rule to calculate an emitter voltage of 4 V and chose an I_C of 8 mA. Then I calculated the resistor value from the equation

$$R_E = \frac{V_E}{I_C}$$

which gave me R_E = 500 Ω, but IEEE didn't have any 500-Ω resistors so I used 510 Ω. Then I calculated the base voltage using the equation

$$V_B = V_E + 0.7$$

which gave me 4.7 V. Then I proceeded to calculate the base resistors **. . .** *ad nauseum* (*Explanation*: Again, there's too much unnecessary detail. Managers don't care about this and another engineer knows how to bias a BJT.)

Correct — I biased the transistor at a *Q*-point of 3.5 V (to get sufficient signal swing) and 8 mA (to achieve sufficient gain). (*Explanation*: Managers can easily skip this and it tells other engineers all they need to know.)

Equations

a. For **formal and informal reports:** Equations must be *typed* in the format used in math or engineering textbooks (*i.e.*, with superscripts and subscripts and *without asterisks **or dots** denoting multiplication*), *NOT* in the format used for computer programming. HINT: Learn to use the equation editor in WordPerfect or Microsoft Word.

b. For **IEEE-Format reports**, the equation editor in the word processor (*e.g.*, WordPerfect or Word) ***must*** be used.

Common Knowledge

Information commonly known to engineers and engineering managers (Ohm's Law, Kirchhoff's Laws, Maxwell's equations, Newton's laws of motion, etc.) can be used without citing references.

Report Assembly

Unless specified otherwise by the instructor, reports are to be *stapled* together (no paper clips!) with a *single* staple in the upper left-hand corner.

Common Grammatical Errors

1. Writing in passive voice (*i.e.*, the subject receives the action of the verb and there is no direct object) produces many grammatical errors. Writing in active voice whenever possible makes these errors impossible. *Examples*:

Incorrect — (Passive voice) **The output voltage was measured using the oscilloscope.** (*Explanation*: The voltage could not have used the oscilloscope; "using the oscilloscope" becomes the infamous dangling participial phrase.)

Correct — (Active voice) **I measured the output voltage using the oscilloscope.** (*Explanation*: *I* was the one who actually used the oscilloscope. Students who do not like to write in first person — or who are *required* to write in the third person — can write, "The author(s) measured . . ." or "The engineer measured . . .") Alternate phrasing: **I measured the output voltage with the oscilloscope.** (*Explanation*: This construction avoids any possibility of a dangling participle — *with* is a preposition, not a verbal.)

2. ***Data*** is the *plural* form of ***datum***. *Examples*:

Incorrect — **This data is . . .**

Correct — **These data are . . .**

3. ***It's* = it is**; ***its*** (no apostrophe) **= belonging to it** (possessive form of the pronoun *it*).

4. Unnecessary changes in verb tense.

5. The report describes a laboratory *project* or a design *project*, not a *laboratory* or a *lab*. (The *laboratory* or *lab* is the room in which the measurements were made.)