

Engineering work term report guide

(for computer, electrical, mechanical and software engineering students)

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1. About your work term report

Your objective is to write a work term report that successfully communicates technical ideas about your work experience. It will outline how technical information was applied to solve an engineering problem that you were directly involved with or interested in.

Your audience

Your audience is your marker, who will either be a co-op coordinator or a faculty member and your peers. An engineering faculty member, an engineering associate, or a coordinator normally evaluates the work term reports. Employers may not grade reports.

Write your report at a technical level that is understandable to this audience, i.e. a reader who has an engineering background but who is not familiar with your work. Avoid acronyms and local jargon used at your work place, or include a glossary to help your audience understand.

Report length

Your entire report should normally be about 3,000 words in length, or approximately 12 to 15 pages of double-spaced text in 12 point font, on standard letter size paper with margins not less than one inch.

Report style

Write your report in a formal style and avoid using first person. Sentences such as "I machined five of these cylinders on the lathe" should be expressed as "Five of these cylinders were machined on the lathe".

Writing style, spelling, punctuation and the report format will constitute 30% of your marks. For information about writing styles, contact your co-op coordinator.

2. Choosing a topic

The easiest way to write a coherent report is to have a topic, then develop a central issue about the topic. It's a good idea to discuss this with your work supervisor and co-op coordinator. Any material presented in the report should be relevant to the central issue. Ideally, a report should tackle an engineering problem you encountered on the work term: provide suitable background, identify the problem, discuss possible solution(s), if applicable discuss how the solution(s) was implemented and what the result was (e.g. did the solution work as desired), and what changes are recommended, if any.

An example of a topic could be the adoption of a new CAD system. Rather than simply including a lot of unconnected information about the system, an issue could be why the change is needed. Any information introduced in the report should relate to why the change is needed. The introduction would include enough information to allow the reader to understand existing problems (e.g.. how the original drawing system works, difficulties when trying to update/access drawings). The requirements for the new system could then be introduced (e.g.. cost savings, speed, ease of use), then a discussion on which system was chosen and why it was chosen would follow. Your conclusions could be that the best system was chosen (based on cost, ease of use, speed, availability, etc.) and you could recommend ways to overcome some of the compromises made (e.g.. purchasing a laser plotter at a later date to reduce up front costs).

By having an issue, the report will follow a logical flow and assist the reader to understand the issue.

Where possible include numbers and reference material to support your statements. For example, stating that "adding a colour printer is not feasible due to costs", is not as convincing as including a table of price quotes from potential suppliers.

Proprietary reports

Before you start writing your report, check with your work supervisor about the content of your report. If it is proprietary (i.e. confidential), then your report will be destroyed or returned to your employer once it is marked by a UVic marker. You should indicate whether your report is proprietary on the title page and ask the co-op office to send nondisclosure forms to your work supervisor.

3. What to include

Include the following items in your report, in the listed order:

1. TITLE PAGE

The title page announces your report to the reader. As an announcement, it should be descriptive of the report content and understandable to the general reader. Terminology specific to your company and uncommon acronyms should be avoided in the title. Your title page must include:

- A report title no longer than 120 characters (a longer title will be truncated on your student transcripts)
- The company name and location
- Your name, student number, e-mail address, and engineering discipline
- The date you submitted the report.
- **IMPORTANT:** a signature from your employer, confirming whether the report is confidential or not. Reports submitted without a signature will NOT be accepted!

[See the sample title page on page 4.](#)

University of Victoria
Faculty of Engineering
Summer 2010 Work Term Report

Colour Sonar Imaging Tool for Fish Stock Assessment

Institute of Ocean Sciences
Department of Fisheries and Oceans
Government of Canada
Sidney, British Columbia

Stu Dent
0412345
Work Term 2
Electrical Engineering
sdent@uvic.ca

September 4, 2006

In partial fulfillment of the requirements of the
B.Eng. Degree

Supervisor's Approval: To be completed by Co-op Employer

I approve the release of this report to the University of Victoria for evaluation purposes only.

The report is to be considered (**select one**): NOT CONFIDENTIAL CONFIDENTIAL

Signature: _____ Position: _____ Date: _____

Name (print): _____ E-Mail: _____ Fax #: _____

If a report is deemed CONFIDENTIAL, a non-disclosure form signed by an evaluator will be faxed to the employer. The report will be destroyed following evaluation. If the report is NOT CONFIDENTIAL, it will be returned to the student following evaluation.

2. LETTER OF TRANSMITTAL

The letter of transmittal not only introduces the report, but also explains its purpose, scope and outlines the major recommendations. Your contribution to the overall project and acknowledgements of others should also be included.

The letter of transmittal follows the title page. It is a letter included with the report and as such, has no page number. Use a standard business letter format, address the letter to one of the Engineering Co-op Coordinators and include your signature at the end.

The letter of transmittal should contain the following information on one page:

- The title of the report
- Your work term number (first, second, third, etc.)
- Your year and discipline, eg. 3A Mechanical, 2B Electrical
- The name and location of your employer
- The main activity of your employer
- Your project or area of work
- The scope of the report, i.e. what facets of the problem are discussed
- Disclaimers, special problems encountered, or extenuating circumstances, if applicable
- A statement that the report is confidential, if it is
- Acknowledgements of helpful people, groups or organizations
- Any other features that may be of interest to the reader.

Here's a sample letter of transmittal:

19-1742 Newton St.
Victoria, British Columbia
V8R 2R2

Mr. Lawrence Pitt
Co-op Coordinator
Faculty of Engineering
University of Victoria
P.O. Box 1700
Victoria, B.C.
V8W 2Y2
September 4, 2001

Dear Mr. Pitt,

Please accept the accompanying Work Term Report entitled "Colour Sonar Imaging Tool for Fish Stock Assessment."

This report is the result of work completed at the Institute of Ocean Sciences, Department of Fisheries and Oceans, Government of Canada. During my second work term as a University of Victoria student, I was engaged to assist in field sonar data collection, and the subsequent computer processing of this data, for the purpose of herring stock assessment. In the course of this work I developed innovative colour sonar imaging software in an effort to process the data more efficiently and accurately. It is this new method of processing sonar data which is the subject of this report.

Through the course of the term, I was given the opportunity to learn much about electronics repair, digital signal processing, computerized data acquisition, and sonar. I feel that this knowledge will be helpful in future work terms, and in my career.

I would like to thank my manager, Sup Ervisor, for his patience and good judgement, as well as the technologists who were always willing to help.

Sincerely,

Stu Dent

3. TABLE OF CONTENTS AND LIST OF FIGURES

The table of contents allows the reader to find the location of a specific section or illustration. It is constructed from the major headings used in the report. Note that the appendices are listed at the bottom of the Table of Contents and that a List of Tables and Figures follows on the subsequent page. Do not list the heading of "Table of Contents" as an item in the table itself. This error is often created by word processing software that creates the table of contents from the header contents of each section.

Here's a sample table of contents:

| TABLE OF CONTENTS | |
|--|-----|
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| SUMMARY | iii |
| GLOSSARY OF TERMS AND SYMBOLS | iv |
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| 3.1 CONDUCTIVE COUPLING | 4 |
| 3.2 ELECTRIC COUPLING | 4 |
| 3.3 MAGNETIC COUPLING | 4 |
| 4.0 EFFECTS OF POWER SYSTEM COUPLING CURRENTS | 6 |
| 4.1 NORMAL CURRENTS | 6 |
| 4.2 HARMONIC CURRENTS | 8 |
| 4.3 FAULT CURRENTS | 8 |
| 4.3.1 Fault Currents and Voltage Induction | 9 |
| 4.3.2 Fault Currents and GPR | 10 |
| 5.0 PREDICTION OF FAULTED POWER SYSTEM INFLUENCE | 12 |
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| REFERENCES | 24 |
| APPENDIX A NEUTRALIZING TRANSFORMER OPERATION | |
| APPENDIX B SYMMETRICAL COMPONENTS | |
| APPENDIX C SELF AND MUTUAL IMPEDANCE CALCULATIONS | |
| APPENDIX D CALCULATION OF ZERO SEQUENCE | |

Here's a sample list of figures:

LIST OF TABLES AND FIGURES

| <u>FIGURES</u> | Page |
|----------------|---------------------------------|
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4. SUMMARY

The summary is written for the general reader who wishes to be familiar with the content of the report while avoiding details. The summary is a separate report, stating the engineering problem, the approach to the solution, the main conclusions and recommendations. It is written after the main report has been completed. Items in the main report such as tables, figures or sections, are not referred to in the summary. The summary is normally presented centered on its own page, and is less than one page in length.

Here's a sample summary:

Summary

In the continuing effort to provide continuous VHF radio service along the entire west coast, the Canadian Coast Guard is presently seeking and testing new locations for high level peripheral radio sites. One such location is the Transport Canada Air Services peripheral RADAR site near Port Hardy on Vancouver Island. This site was tested for field strength in the areas of Goletas Channel, Pine Island, and Port Hardy Harbour. The test used the existing Ministry of Highways repeater to send a signal to the test boat, which sailed around the areas with a test receiver taking measurements at near 5-minute intervals. Both the received signal intensity and the position of the vessel were recorded and the data analyzed and processed. Results showed to be favourable and within Coast Guard standards for VHF communication. The RADAR site would provide a fenced compound, power and microwave link to Telus landlines. Negotiations should be initiated to gain access to these facilities.

5. GLOSSARY (optional)

If your report contains acronyms or terms that may not be familiar to your audience, it may be a good idea to include a glossary explaining these terms.

The glossary defines specialized technical terminology including acronyms, listing them in alphabetical order, while the list of symbols defines the mathematical symbols used in the report.

Any mathematical symbols or constants included in the report should be defined since most mathematical usage is not standardized.

Here's a sample glossary:

| | |
|------------------------|--|
| Balanced power system | A three phase system with all the voltages equal in magnitude but offset by 120° between phases. |
| Bus | Junction of two or more elements such as lines, loads, generators, or transformers. |
| Carbon block protector | Protection device used on telecommunications cable pairs. If a cable pair conductor comes in contact with an abnormally high voltage, the conductor is short circuited to ground by the protector. |
| Carson's equation | A traditionally used expression for calculating mutual impedance between two conductors. |
| Fault | A power system condition when a phase conductor contacts another conductor or ground. The contact may be direct or through an arc. |
| Four-wire system | A three phase power system with a neutral conductor. |
| GPR | Ground potential rise. The difference in voltage of a grounding point to remote ground. |
| Looped system | A power system where lines form a multipath network between supply and loads. |
| Radial system | A power system where lines radiate out from a supply to a load. Any load has only one supply path. |
| Residual current | The net sum of the currents in all phase and neutral conductors at some point in a power system. |
| Three-wire system | A three phase power system with no neutral conductor. |

6. INTRODUCTION

The introduction introduces the report to the reader by:

- making a few background statements about the company/organization
- introducing the subject to be discussed
- mentioning why the subject is important
- outlining the content of the rest of the report.
- containing sufficient background information for the reader to understand the rest of the report.

Introductions should never be longer than the discussion. If a significant amount of background information is required, some of the material may be included as appendices.

The introductory material may be presented in several sections to cover the scope of the report as well as provide the necessary background information. In the sample Table of Contents, the introductory portion is contained in sections 1 through 4.

7. DISCUSSION

The discussion is the foundation of a report. It presents evidence in the form of referenced facts, data, test results, and analysis upon which the conclusions are based. A well-written discussion flows logically from concept to concept to lead the reader to the appropriate conclusions.

The discussion may contain several sections if several concepts are presented. In the sample Table of Contents, the discussion is contained in subsections 5.1 through 5.5.

8. CONCLUSIONS

Conclusions are the results derived from the evidence provided in the discussion. No new material is presented in the conclusion.

When presenting more than one conclusion, state the main conclusion first followed by the others in the order of decreasing importance, to ensure the maximum impact on the reader.

9. RECOMMENDATIONS

Recommendations are an outline of what further work needs to be done based solidly on the information you previously presented in the report. They have the greatest impact when written using action verbs. Again, do not introduce new material or concepts here.

10. REFERENCES

Any information quoted, paraphrased, or summarized is cited as a reference. Citing references assists the reader by indicating where further information can be found and lends credibility to the analysis within your report. Please note: Wikipedia may be neither an accurate nor authoritative reference source, and should not be cited. "Definition by popular consensus" does not constitute a suitable reference. Instead, use original published source material from reputable established sources.

Any material introduced in the report that is not your original work should be followed by a number, which corresponds, to an item in the List of References. The material cited may be tables or figures from other sources, equations which you did not derive, technical specifications or facts used to support your claims.

Note that each listing includes:

- the name(s) of the author(s).
- the title of the document.
 - For book and journal titles, the title is underlined or italicized.
 - For articles in journals, the title of the article is included in quotations.
- other information.
 - For books, the publisher's name and location, and the year the book was printed.

- For articles, the name of the journal, the volume number and the date of issue.
- For reports, the report number, the name and location of the issuer and the date of issue.
- the page number, when applicable.

When citing a reference within the report, the corresponding reference number may be included in square brackets:

- at the end of a sentence just before the period, eg. [2].
- after figure and title labels, eg. Figure 1: Network Design [3].
- after the appendix title if the entire appendix is copied from another source, eg. Appendix A [4].
- at the right hand margin beside a mathematical equation.

In the list of references, list the cited references in the same order as they are referred to in your report. The reference numbers appear in square brackets at the left-hand margin. General References are listed separately in alphabetical order.

The recommended format is [IEEE reference format](#).

[Here's a sample reference page:](#)

Cited references:

- [1] J.A. Smith, *An Introduction to Engineering*, New York: Doubleday, 1981.
- [2] A. B. Brown, P. D. Adams and J. A. Smith, "Improved procedure for error detection," *Can. J. of Elec. Engineers*, Vol. 9, pp. 545-588, Nov. 1979.
- [3] J. A. Smith, "A preliminary analysis of internal waves in the Strait of Georgia," UVic Electrical Engineering Report 84-3, 5 pp., 1984.
- [4] H. Rosenblum, private communication, 1988.
- [5] Phoenix Group, "Flight Simulator Study Results," *Phys. Rev. Lett.*, Vol. 26, p. 1231, 1985.
- [6] B. A. Trubnikov and V. S. Kudryartsev, "Plasma radiation in a magnetic field," in *Proc. 2ns U. N. Cong. Peaceful uses of Atomic Energy* (Geneva), Vol. 31, p. 93, 1958
- [7] IBM ASTAP Program Reference Manual, IBM Corp., 1973.
- [8] A. Harnack and G. Kleppinger, "Beyond the MLA Handbook: Documenting Electronic Sources on the Internet." *Kairos*, [Online serial] 1 (2), (1996 Sum), Available at: <http://english.ttu.edu.kairos/1.2/>

11. APPENDICES (optional)

Any data supplementary to the main ideas of the report may be placed in an appendix. The information may be a description of the processes involved, analytical proceedings, computer printouts, technical specifications, or excerpts from other reports. Any type of information may be placed in an appendix if it is relevant, provided it is referred to in the main report.

An appendix refers to one set of information. If several sets of information are to be included, several appendices may be used. Appendices may be referred to by letter (Appendix A, B, etc.) or by number (Appendix I, II, III or 1, 2, 3, etc.).

Page numbers in appendices are hyphenated, eg. A-1, B-12, etc. In the Table of Contents appendices are listed at the bottom with no page reference to avoid redundancy, since the first page of appendix A would be A-1, and the first page of appendix B would be B-1, etc.

4. Overall format

Page numbering

Except for the title page and letter of transmittal, all pages are numbered. Sections preceding the introduction (Table of Contents, List of Tables and Figures, Summary, and the Glossary) are numbered using lower case roman numerals, i.e., i, ii, iii, iv, etc. Page numbers may be placed at the top middle, top right hand corner, bottom middle or bottom right hand corner of the page. The location of the page numbers should be the same throughout the report to avoid confusion.

Appendices are numbered separately from the rest of the report usually by appendix designation followed by the page number. eg. A-1, A-2, B-1, etc. or I-1, I-2, II-1, etc.

Section numbering

Number sections in the report using a numerals-only system. Headings can either left-justified or indented for each layer.

Headings

Every section in the report has a heading. A heading briefly describes the section that follows and are most often followed by a paragraph rather than another heading. Section and sub-section headings are used in the Table of Contents to assist the reader in locating specific material in the report.

Capitalization

When writing work term reports, covering letters and resumes, try to follow the accepted rules of capitalization. The two most relevant rules are:

Capitalization of government agencies, companies, departments, divisions, and organizations.

Capitalize official names and titles. e.g.:

- Air Pollution Control Division
- Crown Publications
- Keen Engineering Ltd.
- Province of British Columbia

Do not capitalize words such as government, federal agency, department, division, administration, group, company, research and development, engineering, and manufacturing when they stand alone. They are only capitalized when they are part of an official name. e.g:

| Wrong | Correct |
|--|--|
| This is a problem for Research and Development, not Engineering. | This is a problem for research and development, not engineering. |
| | This is a problem for the Research and Development Department, not the Engineering Department. |
| Jane Doe is the head of her Division in the Company. | Jane Doe is the head of her division in the company. |
| | Jane Doe is the head of the Standards Division in ABC |

Do not capitalize words to emphasize them.

Avoid capitalizing words to make them stand out - use *italics* or **bolding** instead. Random capitalization at best detracts from the appearance of your work, and at worst creates the impression that you don't understand basic writing rules.

| Wrong | Correct |
|--|--|
| Advertising and publicity can enhance the Value Package of your product. | Advertising and publicity can enhance the value package of your product. |
| | Advertising and publicity can enhance the <i>value package</i> of your product. |
| Burning is a Chemical Reaction in which Oxygen atoms combine with the atoms of the Substance being burned. | Burning is a chemical reaction in which oxygen atoms combine with the atoms of the substance being burned. |
| | Burning is a <i>chemical reaction</i> in which oxygen atoms combine with the atoms of the substance being burned. |

This information was adapted from *The Elements of Technical Writing*, Gary Blake and Robert W. Bly, MacMillan, pages 59-60.

Tables and figures

Tables and figures illustrate information in an easily understood format. They may be included in the main sections of the report, or if they contain supplemental material they may be contained in an appendix.

If the table or figure that you present in your report was not created by you, but comes from other sources, you must include a reference for the original source in your caption.

Use the following conventions to assist the reader:

- Place the table/figure close to where it is first referred to in the text.
- If the information is not your own, cite the reference number in square brackets at the end of the title, e.g. Figure 1: Network Design [3]
- Wherever possible, try to orient illustrations in the same direction as the main text.

[Here's a sample table:](#)

Table 1

Room Temperature Characteristics

| Wafer- Batch | Size $\mu\text{m} \times \mu\text{m}$ | Φ_B Volts | η | I_S pA | I_S/area mA/cm ² | R_S Ω | I_{-5} nA |
|-----------------|--|-------------------|--------|-------------|---|-------------------|----------------|
| 20-23 | 1.6 x 1.6 | .5131 | 1.368 | 394.2 | 15.40 | 545.7 | -684 |
| 20-23 | 3.8 x 3.8 | .4793 | 1.405 | 8708 | 58.76 | 86.02 | -3540 |
| 13-23 | 1.6 x 1.6 | .5326 | 1.233 | 182.3 | 7.121 | 321.3 | -372 |
| 13-23 | 3.8 x 3.8 | .4341 | 1.376 | 52140 | 351.9 | 73.08 | -53400 |
| 13-23 | 10.8x10.8 | .5007 | 1.487 | 29390 | 25.20 | 15.54 | -3.49e7 |
| 10-23 | 1.6 x 1.6 | .5208 | 1.260 | 290.0 | 11.33 | 419.43 | -1400 |
| 10-23 | 3.8 x 3.8 | .5099 | 1.253 | 2594 | 17.50 | 77.78 | -3420 |
| 10-23 | 10.8x10.8 | .5105 | 1.225 | 19880 | 17.04 | 17.25 | -10300 |
| * | 1.6 x 1.6 | .5848 | 1.058 | 22.99 | .8995 | 845.7 | -8.782 |
| * | 3.8 x 3.8 | .5366 | 1.224 | 721.3 | 6.061 | 280.4 | -51.27 |
| * | 10.8x10.8 | .5455 | 1.349 | 4610 | 4.262 | 57.50 | -280.7 |

Note 1: 10.8 μm x 10.8 μm diodes from Wafer 20 of Batch 23 were too leaky to measure.

Note 2: * means average of Wafer 22 of Batch 18 and Wafers 16, 18 of Batch 19.

Here's a sample diagram:

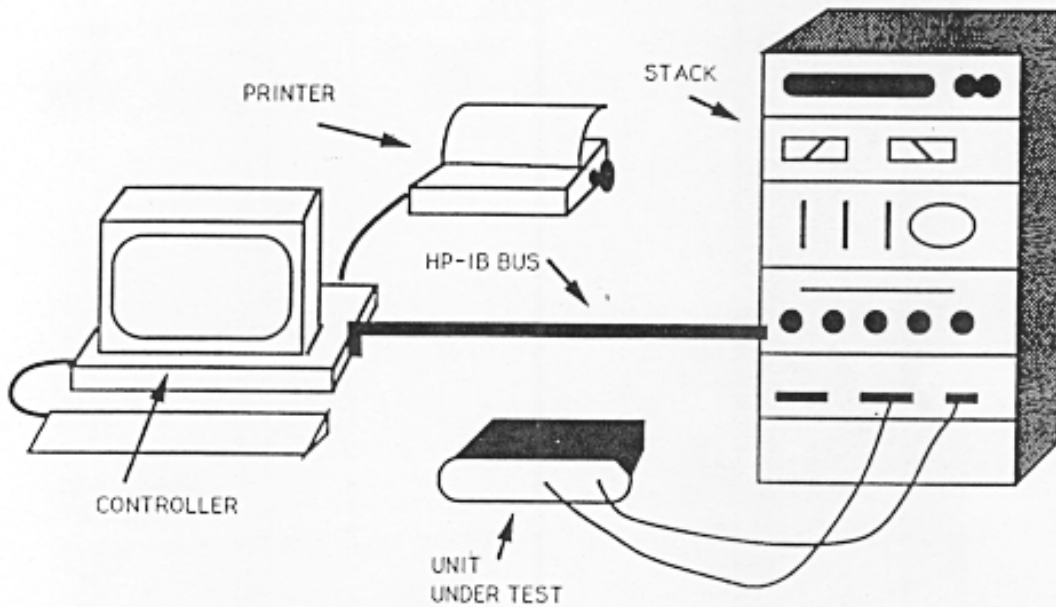


Figure 2: Automated Test Station

Numbering tables and figures

Tables and figures are numbered separately, e.g. Table 1, Table 2, Figure 1, Figure 2.

Refer to the List of Tables and Figures in the sample report. Two options exist for numbering the illustrations. They may be numbered sequentially through the whole report (e.g. Table 1, Table 2, Table 3, Table 4) or they may be numbered sequentially through each section (e.g. Table 1.1 refers to the first table in section 1, Figure 2.4 refers to the fourth table in section 2). If a large number of illustrations are presented, the latter option is the better choice.

5. Additional resources

Need help? Contact your co-op office or refer to these books, which are available in the McPherson Library:

K.L. Thrubian, *A Manual for Writers of Term Papers, Theses and Dissertations*. University of Chicago Press, Chicago, IL, 1996.

H.J. Tichy, *Effective Writing for Engineers, Managers, and Scientists*. Wiley, New York, 1966.

Matt Young, *The Technical Writer's Handbook*. University Science Books, Mill Valley, Calif., 1989.

Michael Alley, *The Craft of Scientific Writing*. Englewood Cliffs, NJ, Prentice-Hall, 1987.