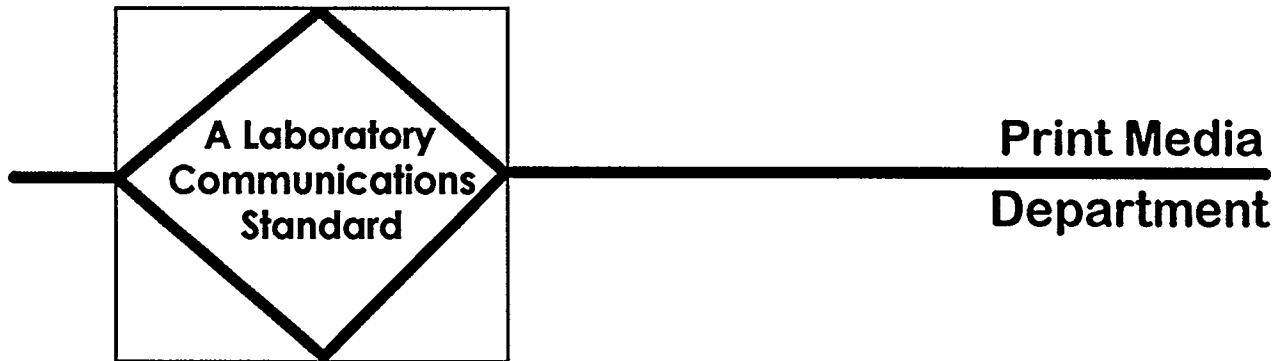


SAND--89-0996-Rev. (4-96)

SANDIA REPORT

SAND89-0996 Revised • UC-900
Unlimited Release
Printed April 1996

Supersedes SAND89-0996,
dated April 1995



Guide to Preparing SAND Reports

Tamara K. Locke, Editor

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550
for the United States Department of Energy
under Contract DE-AC04-94AL85000

Approved for public release; distribution is unlimited.

MASTER

ds
DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

Issued by Sandia National Laboratories, operated for the United States Department of Energy by Sandia Corporation.

NOTICE: This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government, any agency thereof or any of their contractors or subcontractors. The views and opinions expressed herein do not necessarily state or reflect those of the United States Government, any agency thereof or any of their contractors or subcontractors.

Printed in the United States of America. This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from
Office of Scientific and Technical Information
PO Box 62
Oak Ridge, TN 37831

Prices available from (615) 576-8401, FTS 626-8401

Available to the public from
National Technical Information Service
US Department of Commerce
5285 Port Royal Rd
Springfield, VA 22161

NTIS price codes
Printed copy: A11
Microfiche copy: A01

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

SAND89-0996 Revised
Unlimited Release
Printed April 1996

Distribution
Category UC-900

Supersedes SAND89-0996,
dated April 1995

Guide to Preparing SAND Reports

Tamara K. Locke, Editor
Print Media Department
Sandia National Laboratories
Albuquerque, NM 87185

Abstract

This guide contains basic information needed to produce a SAND report. Its guidelines reflect DOE regulations and Sandia policy. The guide includes basic writing instructions in an annotated sample report; guidance for organization, format, and layout of reports produced by line organizations; and information about conference papers, journal articles, and brochures. The appendixes contain sections on Sandia's preferred usage, equations, references, copyrights and permissions, and publishing terms.

Intentionally Left Blank

Contents

Preface	x
Section 1. Policies for Protecting and Reproducing Scientific and Technical Information; Control Numbers; and Review and Approval	1
Policies for Protecting and Reproducing Scientific and Technical Information at Sandia National Laboratories 3	
Introduction.....	3
Protection of Information.....	3
Reproduction of Masters.....	4
Use of Logos	5
Official and Unofficial Sandia STI Reports	5
Control (SAND) Numbers.....	6
Types of SAND Documents.....	6
Definitions of Types.....	7
Abstract.....	7
“Full” SAND report.....	7
Conference paper.....	7
Oral presentation	7
Journal article.....	7
Internal memorandum.....	7
Contractor report	8
Electronic posting.....	8
SAND Numbers for Changed <u>Type</u> of Report	8
SAND Numbers for a Revision	9
SAND Numbers for a Reprint	9
Subsequent Presentation of the Same Paper.....	9
Formal Review and Approval (R&A) of Communications Products 12	
What is Review and Approval?.....	12
Scientific and Technical Information	12
Why are Communications Products Sent through Review and Approval?	13
Participating in the Review and Approval process	13
Reports Requiring Formal Review and Approval.....	13
Exceptions to Formal Review and Approval.....	14
Sandia’s Review and Approval Processes	15
Preparing the Review and Approval Package	15

Getting a Peer Review	15
Completing the Review and Approval Form.....	16
Reporting Requirements.....	17
Changing Types of Approved Communications Products	17
When is a new Review and Approval Needed for Changed <u>Types</u> of Products?	17
Changes and Revisions to Communications Products	19
Should the SAND number be changed?	20
Technical Reports: Reprints	20
Getting reprints if no substantial changes were made.....	20
Getting reprints if the scope of the audience has grown.....	21
Internal Communications Products.....	22
Final Processing of the Package	27

Figures

1-1	Memorandums informing the Print Media manager of changed <u>type</u> of SAND report.....	10
1-2	Memorandum informing the Print Media manager of the subsequent presentation of the same paper	11
1-3	Example of a Review and Approval Form (page 1) for an Unlimited Release document	23
1-4	Example of a Review and Approval Form (page 2) for an Unlimited Release document	24
1-5	Instructions for completing the Review and Approval Form.	25

Section 2. Writing the Report: Definitions, Elements of the Document, Getting Started, Peer Review, Sample Report

Definitions.....	31
Elements of the Document.....	33
Cover — for SAND Report and Internal Memorandum.....	33
Title Page — Unclassified	34
Elements of unclassified title page.....	34
Page number.....	34
Title Page — Classified	35
Elements of classified title page	35
Page number.....	35
Markings	35

Front Matter	36
Acknowledgments	36
Contents.....	36
Foreword	36
Preface	36
Executive summary.....	36
Acronyms and abbreviations	37
Body of the Report	37
References and Bibliography	37
Back Matter.....	38
Glossary	38
Appendixes.....	38
Index.....	38
Distribution.....	38
Getting Started.....	39
Flowchart for Creating SAND Report.....	41
Peer Review.....	42
No Official Sandia Policy	42
Value of a Peer Review	42
The Peer Review Process	42
Obligations of the reviewer	42
Procedural steps of the review	43
Author's Response to the Review.....	43
Sample Report, Annotated with Writing Instructions	45
Section 3. Format, Layout, and Graphics	67
Format.....	69
The Changing Role of the Author.....	69
Sandia's Official Name and Addresses.....	69
Styles for referring to Sandia	69
Sandia's addresses.....	70
Print Styles and Sizes	71
Body text	71
Headings and titles.....	72
Page Margins and Page Numbers	73
Ragged Right Margin vs. Justified Right Margin.....	73
Line Length.....	73

Line Spacing	73
Paragraph Spacing	73
Spacing for Headings and Titles	74
Section or Chapter Numbering	74
Paragraph Numbering	74
Page Numbering	74
For unclassified reports.....	74
For classified reports	75
Headers and Footers	76
Dashes	76
Consistency.....	77
Layout	79
Placement of Figures and Tables	79
Obvious Relationship	79
Pleasing Appearance	79
Graphics	80
Introduction.....	80
Purpose.....	80
Orientation of graphics on page	80
Citing non-Sandian source of graphic.....	80
Numbers, captions, and titles	81
Line Drawings.....	81
Reproducibility	81
Drawing services	82
Value of a good draft and of good communication with artist	82
Graphs.....	83
Oversize Figures	84
Computer Art Generated by Line Organizations	85
Photographs.....	85
Tables.....	86
Purpose of a table.....	86
Limited subject.....	86
Format	86
Lists.....	87

Samples

3-1	Classified internal memorandum cover	90
3-2	Unclassified internal memorandum cover.....	92
3-3	Unclassified title page	94

3-4	Classified title page	95
3-5	Title page for contractor report	96
3-6	Treatment of multiple authors' names on title page.....	97
3-7	Markings and legends for cover and title page	98
3-8	Contents page	113
3-9	Distribution "housekeeping" copies	114
3-10	Distribution pages, unclassified and classified	115
3-11	Text fonts and text sizes for standard SAND reports prepared in the Print Media Department	117
3-12	Margins and headings.....	118
3-13	Example of a double-column format.....	119
3-14	Example of a single-column format	120
3-15	Figure orientations (landscape and portrait).....	121
3-16	Service Order form for graphics	122
3-17	Print sizes and typical reductions.....	123
3-18	Halftones with good contrast.....	124
3-19	An appropriately cropped photograph	125
3-20	Example tables from published reports	126
Section 4. Reproduction and Distribution.....		129
Reproduction.....		131
	Using Print Media's "Report Prep Service"	131
	Preparing Report Masters for Printing	132
	Sending Masters to the Print Shop (Bldg. 802).....	136
Distribution		138
	Submitting Required Items to Document Processing	138
	Distributing the Reports	138
Figures		
4-1	Ordering covers from Print Media Dept. 12615 (Bldg. 894, Room 201)	133
4-2	Checklist for unclassified report masters	134
4-3	Checklist for classified report masters	135
4-4	Service Order form for report cover and Print Shop services.....	137
4-5	Record of Origination & Distribution of Publication, form SA 2900-FBB	139

Section 5. Presentations, Conference Papers, Journal Articles, Book Chapters, and Brochures.....	141
Presentations and Conference Papers — Requirement for SAND Number	143
Presentations	143
Definition.....	143
Approvals	143
Conference Papers	144
Definition.....	144
Approvals	144
Draft copy.....	144
Masters.....	144
DOE (or any other) sponsorship statement.....	145
Release limitations	145
Copyright transfer.....	145
Journal Articles and Book Chapters — Requirement for SAND Number	149
Journal Articles.....	149
Definition.....	149
Approvals	149
Draft copy.....	149
DOE (or any other) sponsorship statement.....	149
Release limitations	150
Copyright transfer	150
Book Chapters	150
Approvals	150
Draft copy.....	150
Release limitations	150
Copyright transfer	150
Brochures	151
Definition.....	151
Approvals	151
Masters.....	151
Release limitations	151
Funding credit.....	151

Figures

5-1	Sample of a conference paper	146
5-2	Example of an oversize format master.....	148
5-3	Master for a simple brochure	152

Bibliography 155

Style Manuals	157
Dictionaries and Usage	158
Desktop Publishing	159

APPENDIX A—Sandia's Preferred Usage..... A-1

APPENDIX B—Equations B-1

APPENDIX C—References..... C-1

APPENDIX D—Copyrights and Permissions..... D-1

APPENDIX E—Glossary of Publishing Terms E-1

INDEX Index-1

Preface

This guide contains basic information needed to prepare a SAND report. Although it is addressed primarily to authors who write and format their own reports, and who often computer-generate their own artwork, it will help all persons who process SAND reports.

The guide is divided into five sections, each dealing with a logical division of the reporting process:

- **Section 1** covers the policies for protecting and reproducing scientific and technical information; it also explains control numbers and the Review and Approval process.
- **Section 2** gives basic guidance on writing a report, as well as information on the peer review process. Most of the actual writing instruction is given in boxed annotations to a sample SAND report. This method was chosen to provide instructions and a sample on the same page for convenience. The annotation is a reminder of what should be included in each section of the report.
- **Section 3** covers format, layout, and graphics, with accompanying examples.
- **Section 4** deals with the final processing of masters through printing and distribution.
- **Section 5** covers presentations, conference papers, journal articles, book chapters, and brochures.

The appendixes provide supporting information about preferred usage, equations, references, copyrights and permissions, and a glossary of publishing terms.

SECTION 1

**Policies for Protecting and Reproducing
Scientific and Technical Information;
Control Numbers;
and
Review and Approval**

Intentionally Left Blank

Guide to Preparing SAND Reports

Policies for Protecting and Reproducing Scientific and Technical Information at Sandia National Laboratories

Introduction

As a subcontractor to the Department of Energy (DOE), funded under DOE contract DE-AC04-94AL85000, Sandia National Laboratories (SNL) is required to conform to DOE Directive 1430.1D in preparing Scientific and Technical Information (STI)

. . . in any format or medium which is derived from scientific and technical studies, work, or investigations which relate to research, development, demonstration, and other specialized areas such as environmental and health protection and waste management. Classified, declassified, and sensitive information are included in the scope of the definition. The primary points of origination of DOE-funded Scientific and Technical Information are management and operating contractors, direct DOE-executed prime procurements, and DOE-operated research activities.

This guide reflects DOE requirements that are concerned with the physical production and protection of STI. It includes information on control numbers, Review and Approval, format of the cover and title pages, elements of the report, required markings, and DOE/OSTI (Office of Scientific and Technical Information) copy requirements. It also reflects Sandia's Laboratory Communications policies.

Protection of Information

The level of protection that must be applied to different types of reports includes —

- (1) Physical protection while the report is being produced.
- (2) Special markings that are applied to the report.
- (3) Distribution limitations as reflected by the markings. The level of protection is divided into three major categories: Unlimited Release, Unclassified Controlled Information (UCI), and Classified.

Unlimited Release — Information in this category requires no special protection and has no distribution limitations.

Unclassified Controlled Information — Information in this category is unclassified but sensitive; it requires both physical protection and marking with limitation statements as specified in DOE Directives. Examples of such categories are Unclassified Controlled Nuclear Information (UCNI) and Export Controlled Information (ECI).

Classified — Information in this category is classified and requires physical protection during document preparation (accountability) and appropriate security markings that show (1) the classification level and category of the information and (2) the physical protection required. Classified information levels are Top Secret, Secret, and Confidential, whereas classified information categories are Restricted Data (RD), Formerly Restricted Data (FRD), and National Security Information (NSI).

See Sample 3-7 for the markings and required physical protection for UCI and classified reports.

Reproduction of Masters

All reproduction from camera-ready masters for publishing of SNL reports **must** be processed through the SNL Print Shop (12615-1): This practice is in compliance with the regulations issued by the Department of Energy and the Joint Committee on Printing.

In addition to reproducing through the standard printing processes, “reproduction” guidelines extend to duplicating on a copier. Multiple copies of drafts for review may be duplicated by non-Sandia sources (such as contract companies used by Sandia) or by Sandians using copiers, provided that no more than 25 copies of the document are produced per job. Again, these copies that can bypass the SNL Print Shop are **only for review purposes** and must not be used as the final publication.

Use of Logos

Laboratory Communications policy says to avoid using the SNL logo (thunderbird) on internal pages of a document. The logo *can be used* in the standard format of Sandia viewgraphs; but if these viewgraphs appear later in a SAND report, the SNL logo should be deleted. In addition, departmental logos should not be used on figures or viewgraphs used in a SAND report.

The DOE seal should not be used on any Sandia document unless the document is produced jointly with the Department of Energy.

Official and Unofficial Sandia STI Reports

Sandia Scientific and Technical Information (STI) reports are controlled by SAND numbers and fall into two categories: official and unofficial.

- Official reports are those that go outside of Sandia. They must (1) comply with DOE regulations, (2) have a control (SAND) number, and (3) go through the Formal Review and Approval Process (described later in this section).
- Unofficial reports are those that do not go outside of Sandia. They are controlled by Sandia policy rather than by DOE regulations. They follow the basic requirements of official reports or may be published as internal memorandums, which have less stringent requirements. (See Samples 3-1 and 3-2.)

Control (SAND) Numbers

SAND numbers (for example, SAND96-1234) are used to track scientific and technical documents and internal memorandums. The SAND number is made up of the year, the sequential number of the report, and sometimes a suffix that indicates the category of the report (for example, SAND96-1112J for a journal article).

SAND numbers are issued at the final stage of Review and Approval by the Print Media Department. This means reports go through Classification and Sensitive Information Dept. 7447, and through Patent and Licensing Dept. 11500, without a SAND number.

Types of SAND Documents

Listed below are the types of SAND documents and an example of the appropriately suffixed control number for each.

Report Type	Suffix	Example
Abstract (for any type) ^a	A	SAND96-1112A
“Full” SAND report	None	SAND96-1112
Conference paper	C	SAND96-1112C
Journal article	J	SAND96-1112J
Internal memorandum ^b	None	SAND96-1112
Brochure	None	SAND96-1112
Book chapter	None	SAND96-1112
Contractor report	None	SAND96-1112

a. When an abstract is developed into any type of report, use the original SAND number with the appropriate suffix for that type.

b. If you want to disseminate an internal memorandum outside of Sandia at a later date, format it into an official SAND report and send it through full Review and Approval. (Internal memorandums have been given SAND numbers since early 1993; before that they were tracked by Reference Symbol numbers.)

Definitions of Types

Note: When you are assigned a SAND number for one type of document, such as an abstract, conference paper, or journal, and the document later becomes a SAND report, use the same SAND number with no suffix. Other guidelines are given in the section “SAND Numbers for Changed Type of Report.”

Abstract

The first step in developing a conference paper or journal article is usually to submit an abstract. An abstract is a very brief synopsis (200 words or less) of what will be covered in a document or presentation.

“Full” SAND report

The full SAND report is a complete, individually bound document such as a progress report or final report on a scientific or technical project.

Conference paper

Conference papers are documents presented at special conferences around the nation (or the world) and are usually published in a proceedings volume that also contains all other papers for that conference. The proceedings sponsor furnishes instructions for preparation of the document masters. The SAND number for a conference paper will not appear on the masters prepared for the conference, but it will be assigned for recordkeeping purposes.

Oral presentation

In addition to oral presentations that require a conference paper, an oral presentation may be made to a company, a public organization, or a conference that does not publish papers. It will not be printed in a proceedings. Probably only an abstract will be required by the sponsoring organization.

Journal article

An article submitted to a journal is usually sent to the journal in draft form and is typeset by the journal.

Internal memorandum

An internal memorandum is a retrievable, informal, sometimes unstructured communication between colleagues within Sandia. The document needs to be reviewed and approved only by the author’s manager, the Classification office, and the Patents office (but not by Print Media). Five copies of the memorandum should be sent to the Technical Library,

Dept. 4414, and the original R&A form should be maintained by the originating organization. If you want to disseminate an internal memorandum outside of Sandia at a later date, format it into an official SAND report and send it through full Review and Approval. An example of a classified internal memorandum cover is shown in Sample 3-1. An example of an unclassified internal memorandum cover is shown in Sample 3-2.

Contractor report

A contractor report documents work that was done under a Sandia purchase order by an external entity such as a consultant or a company and is authored by that entity. If even one Sandia co-authors a report with one or several contractors, the report is still considered a Sandia report rather than a contractor report.

Electronic posting

Electronic postings are those documents published on the Internet and/or the World Wide Web that reflect Sandia activity.

SAND Numbers for Changed Type of Report

If you want to publish a report or present a paper in a form that is different from the form that was originally approved, follow these guidelines:

- **If no technical changes have been made to the document or presentation and the new audience does not change the original distribution limitation, the document or paper does not have to be sent through Review and Approval again. Instead, send a memo to the manager of the Print Media Department, explaining the circumstances of the new publication. Figure 1-1 shows a sample of this type of memo, and more explanation is given in the next section, “Formal Review and Approval (R&A) of Communications Products” (subsection, “Changing Types of Approved Communications Products”).**

For the report number, use the original SAND number with the appropriate suffix for the new document type. For example: conference paper SAND94-2233C becomes SAND94-2233 if it is published as a full SAND report, or SAND94-2233J if it becomes a journal article (Figure 1-1).

- **If any technical changes have been made to the document or presentation, send the information through the Formal Review and Approval Process, and a new SAND number will be assigned by Print Media Dept. 12615, Bldg. 894, Room 201. (See the next section, “Formal Review and Approval (R&A) of Communications Products,” for more information.)**

- If the scope of the distribution or audience has grown beyond the originally approved release but the content of the report has not changed, publish the report as a reprint. On the title page, one space below the "Reprinted" date, insert the following note. Adjust the wording to reflect your situation appropriately. (Note: If the new audience or distribution violates access restrictions, the report or presentation must be sent through the full Review and Approval process again.)

The only change to this report is the release limitation, which has changed from (old limitation) to (new limitation).

If you have other questions, call Print Media Dept. 12615 or the Classification Dept. 7447.

SAND Numbers for a Revision

If substantial technical changes have been made to the content of a full SAND report that is to be republished, it becomes a revision. You may choose to keep the original SAND number followed by the word "Revised" (on both the cover and title page) or to obtain a new SAND number. *The choice to keep the original number might be so that the continuity of the information would be immediately apparent or because the original SAND number has been referenced in other publications.*

NOTE: The **supersession statement** appears (below the print date) on the cover and title page of a revision, whether the original SAND number is used or a new SAND number is assigned. Example of supersession statement:

Supersedes SAND89-0996,
dated October 1993

(Also see cover and title page of this *SAND Guide* for more information.)

SAND Numbers for a Reprint

If no technical changes or distribution limitation changes have been made to the content of a full SAND report that is to be republished, it becomes a reprint. Reprints retain the original SAND number. Also, see the third bullet under "SAND Numbers for Changed Type of Report," above.

Subsequent Presentation of the Same Paper

If you want to present the same paper to a group different from the one you originally addressed, and the distribution limitation is unchanged, send a memo explaining the circumstances to the manager of the Print Media Department, MS 0619. Attach a copy of the original Review and Approval Form (see Figure 1-2).

For a previously approved document to change to a new report type, send an informational memorandum to the Print Media Department. The R&A process does not have to be repeated if there were no substantial changes made to the technical content or if no distribution changes affecting access restrictions were made.

Sandia National Laboratories
Albuquerque, NM 87185

date: February 7, 1996
to: (Manager), MS 0619 (Print Media Department 12615)

from: (Manager), MS 0767 (9604) ← Signed by Department Manager
subject: Presentation of Previously Cleared Material

John Doe will present a conference paper entitled "Microsensors" at Aerojet General in Sacramento, CA, on Tuesday, February 27, 1996. This presentation will cover material previously cleared under SAND96-0641J. The number of the presentation will be SAND96-0641C.

Copy to:
MS 0766 A. C. Smith, 9600
MS 0783 J. D. Doe, 9611

- Attach a copy of approved R&A form from the first version of the report.
- Attach a copy of the Distribution List if document is being changed to a full SAND report.

Sandia National Laboratories
Albuquerque, NM 87185

date: February 7, 1996
to: (Manager), MS 0619 (Print Media Department 12615)

from: (Manager), MS 0533 (2341)
subject: Submission of SAND96-2233C as a Journal Article

John Smith's SAND96-2233C, "Comparisons of Widgets and Gizmos," previously approved as a conference paper, is now being submitted to the *Journal of Solar Energy Engineering* as a journal article, under the number SAND96-2233J.

Copy to:
MS 0533 John Smith, 2341

Figure 1-1. Memorandums informing the Print Media manager of changed type of SAND report.

For subsequent presentation of the same paper to a group different from the one originally addressed, send an informational memorandum to the Print Media Department (MS 0619). The R&A process does not have to be repeated if there were no substantial changes made to the technical content or if no distribution changes affecting access restrictions were made.

Sandia National Laboratories
Albuquerque, NM 87185

date: April 12, 1996
to: (Manager), MS 0619 (Print Media Department 12615)

from: (Manager), MS 1175 (6513)
subject: Presentation of Previously Presented Conference Paper

John Doe has been invited to present the conference paper entitled "Microsensors" that he originally presented at Aerojet General in Sacramento, CA, on Tuesday, February 27, 1996, to a new audience at Los Alamos National Laboratories on June 7, 1996. This presentation will cover exactly the same material that was previously cleared under SAND96-0641C.

Copy to:
MS 1143 A. B. Brown, 6500
MS 1146 J. C. Doe, 6505
MS 0173 P. N. Jones, 7400

• Attach a copy of the signed-off R&A form that was prepared the first time the conference paper was presented.

Figure 1-2. Memorandum informing the Print Media manager of the subsequent presentation of the same paper.

Formal Review and Approval (R&A) of Communications Products

What is Review and Approval?

Every communications product going outside of Sandia, regardless of format and regardless of whether it is Scientific and Technical Information, is considered an official Sandia information product.

Information released from Sandia — whether it is a report, conference paper, journal article, memo, speech, video, or electronic posting — requires appropriate Review and Approval.

Note: *Electronic postings of Sandia information on the external World Wide Web must go through the Formal Review and Approval Process.*

All published communications products go through Sandia's Review and Approval process. This process, established in compliance with requirements listed in DOE Directives 1430.1D and 5650.2B, applies to all information generated with DOE funding. In general, information published outside of Sandia must be reviewed by Sandia's Classification Department, Patent and Licensing Department, and finally by the Print Media Department (details of the process are provided in "Sandia's Review and Approval Process," later in this section).

Scientific and Technical Information

One type of communications product requiring Review and Approval is Scientific and Technical Information, a broad category that encompasses all aspects of work at Sandia including the technical aspects of administrative, financial, and ES&H efforts.

According to DOE Directive 1430.1D, Scientific and Technical Information is "information in any format or medium which is derived from scientific and technical studies, work, or investigations which relate to research, development, demonstration, and other specialized areas such as environmental and health protection and waste management. Classified, declassified, and sensitive information are included in the scope of the definition. The primary points of origination of DOE-funded Scientific and Technical Information are management and operating contractors, direct DOE-executed prime procurements, and DOE- operated research activities."

Scientific and Technical Information can be found in technical reports, journal articles, Internet and Web postings, brochures, theses or dissertations, scientific or technical conference proceedings, regulatory documents, translations, engineering drawings, computer software, computer output, or audiovisual or multimedia presentations.

Why are Communications Products Sent through Review and Approval?

Before any official SNL product can be distributed, it must go through the Review and Approval process. Getting the proper reviews before information is released protects both the author and the Laboratories.

Participating in the Review and Approval process —

- Ensures technical and programmatic accuracy.
- Ensures compliance with DOE Directives 1430.1D and 5610.2B. By providing DOE's Office of Scientific and Technical Information (OSTI) with copies of text, videos, and drawings the communications product's presence is ensured within the DOE complex. OSTI regularly publishes announcements of what it has received, including authors' names and organizations. When your Scientific and Technical Information is sent to OSTI, it reaches a broader audience of your peers and can trigger useful exchanges of ideas and concepts.
- Safeguards data from the consequences of litigation.
- Protects Scientific and Technical Information that is subject to applicable national security controls and the proprietary rights of others. These controls ensure the effective use of federal research and development funds while ensuring the integrity of data, the privacy of records, and the freedom of information.
- Resolves patent and classification issues. Releasing information before it has been adequately reviewed is a risky venture. The risks can come from threats to national security (if the data is classified), patent or copyright loss, appearance of organizational conflict of interest, or inappropriate technology transfer or export. Criminal and civil penalties are associated with unauthorized release.
- Avoids possible embarrassment stemming from mixed messages about Sandia to our external customers, which could result in damage to the Laboratories' image.

Reports Requiring Formal Review and Approval

The following reports must go through the formal Review and Approval process:

- An abstract.
- Any new SAND report.
- A previously reviewed report that is going to a wider audience.
- A revision to the technical content of a previously reviewed report.
- An internal memorandum that is subsequently being published outside of Sandia.

Exceptions to Formal Review and Approval

Publications that do not require full Review and Approval:

- An external publication that is technically unchanged but is being presented in a different form.
- Subsequent presentation of a previously reviewed external publication.
- Reprint of a previously reviewed external publication (requires only Print Media approval).
- Internal memorandum (requires managerial approval and reviews from the Classification Department and the Patent and Licensing Department. The internal memorandum does not require review by the Print Media Department).

Sandia's Review and Approval Process

Preparing the Review and Approval Package

The Formal Review and Approval Process actually begins within each author's (or information provider's) organization when the author prepares the package for review (and any documentation for DOE preapprovals) and then submits the package for internal reviews by peers, management, and an Authorized Derivative Classifier; these reviews are established by the author's organization.

- The package for communications products consists of a pocketed folder, with the draft document or overheads in the right-hand pocket and the Review and Approval Form in the left-hand pocket. Even if the report is in its final form, route a copy of the report, not the original report.

Note: *If the product is a conference paper, include three copies of the conference paper in the folder. Print Media will sign-off on the Review and Approval Form and forward the copies to the Technical Library and OSTI.*

If the communications product itself is in a format that will not fit in a pocketed folder, such as videos or displays, use the right-hand pocket to hold any document-sized representations of the product (scripts, layouts, etc.) and route the product with the folder. If the product is of such a size that routing it is not practical, then arrangements can be made to have representatives from the Classification and Sensitive Information Department and the Patent and Licensing Department go to the product for review.

- Prepare a routing slip listing all the individuals or organizations that must sign the Review and Approval Form, listing the primary author's name last so the package will be returned to the author when completed.
- Staple the front and back of the folder together at the top and right side to secure the contents or use strong rubber bands around the folder in both directions. If the document is bulky, use an envelope.
- Place the package in the mail or hand-carry, as appropriate.

Getting a Peer Review

- According to a Sandia management requirement, information generated at Sandia should undergo a programmatic and technical (peer) review.
- The author's information is submitted to his or her manager or director to start the internal (departmental, or peer) review. Review policies are established from within the author's center. When the review is completed, it is the author's responsibility to incorporate changes suggested by the reviewers into the final document.
- Then the information moves into Sandia's Formal Review and Approval Process.

Completing the Review and Approval Form

- The author completes Sections 1 through 7 of the *Review and Approval Form* (SF 1008-RA, dated 1-96), which is used for all communications products. The author must get appropriate signatures in Sections 5 and 7 (Figures 1-3 and 1-4). Instructions are printed on pages 3 and 4 of the form (Figure 1-5), which are to be detached before the form is routed.
- The communications product (which can be in a draft form, assuming little or no changes to content will be made after Review and Approval) is mailed or hand-carried to Classification and Sensitive Information Department (844-8699). A reviewer from the Classification Department will examine the contents of the communications product and affirm the classification given by the originating organization's Authorized Derivative Classifier (ADC) in Section 5. If there is disagreement about the assigned classification, the Classification reviewer will work with the ADC and the author(s) to arrive at an appropriate classification. The Classification reviewer will then sign-off in Section 8.
- Next, the product is mailed or hand-carried to the Patent and Licensing Department (845-9536), where Section 9 is completed. This department reviews all documents leaving Sandia to identify possible patentable inventions. The Prime Contract requires that such inventions be reported and that the government and Lockheed Martin have certain rights.
- Section 10 will be completed by one of the departments listed at the end of this paragraph if your report or other communications product contains "public communications" (for example, communications products that promote Sandia capabilities; a more detailed explanation is on the Review and Approval Form), or if your product requires color printing and uses three or more colors. Contact the Print Shop, Visual Communications, Corporate Exhibits, or Interactive Media Departments, as appropriate, for help in obtaining DOE approval.

Note: To save time, this procedure for getting DOE approval for public communications or color can be started at the beginning of the Review and Approval process, while other Review and Approval steps are being initiated. DOE approval must be obtained before Print Media can give final approval.

- Print Media (845-8220), located in Bldg. 894, Room 201, reviews your report or other communications product to ensure that it reflects all the DOE reporting requirements on the Review and Approval Form. Print Media ensures that your communications product has been reviewed for classification and sensitive unclassified restrictions, appropriate release of technical information, and distribution limitations.

Note: *If the communications product is a report, make sure it includes the following before it is sent to Print Media:*

- A title page (see Samples 3-3 and 3-4).
- A distribution list, which includes “housekeeping” copies (see Sample 3-9).

When the Review and Approval process is complete, Print Media assigns a SAND number to the information. SAND numbers are used by the Technical Library at Sandia and by OSTI as part of their cataloging and indexing for retrieval.

A Print Media reviewer will sign off in Section 11 of the Review and Approval Form if the communications product meets DOE reporting requirements. If any changes must be made to the product, the reviewer will document these requirements for the author in Section 11. The author is responsible for incorporating these required changes into the report before the report is printed and distributed. Print Media returns the Review and Approval package to the author indicated on the routing slip.

Reporting Requirements

If you are currently involved in a project, check the documentation authorizing the project to see if any reporting requirements were stated as to style and format (text, graphs, maps, or videos; loose-leaf, bound, or special covers) and timing (two progress reports and a final, for example). Also check to see if the sponsor requires pre-review before the work is released outside of Sandia or if the sponsor explicitly requires dissemination restrictions. Sponsors of work at Sandia (other than DOE) may require that the information be released only to the sponsor. In the absence of such a requirement, however, Sandia is obligated to report results of work for others to DOE.

Changing Types of Approved Communications Products

Occasionally an author publishes a document in a format different from the originally approved format. For example, a document that went through Review and Approval as a conference paper is being presented for the first time, or is being presented to an audience that is different from the one originally addressed. Or a conference paper is now being published (with no technical changes) as a full SAND report or as a journal article.

When is a new Review and Approval Needed for *Changed Types* of Products?

Whether or not a new Review and Approval is needed depends on the type of changes that occur:

- *If new product contains no technical changes.* If no technical changes have been made in the product and the new audience does not change the original distribution limitation, the

product is essentially unchanged. Therefore, it does not have to be sent through the Review and Approval process again.

Instead, the author prepares a memo for the Manager of the Print Media Department that states the SAND number of the original product and explains the new circumstances. The author attaches a copy of the original Review and Approval Form (and if the product is becoming a full SAND report, a copy of the report Distribution list). See Figures 1-1 and 1-2.

The “new” SAND number will consist of the original SAND number, along with the appropriate suffix for the current form of the product. For example, if the communications product was previously a journal article numbered SAND93-2293J but will now be presented at a conference, its SAND number becomes SAND93-2293C.

- *If new product does contain technical changes.* If any technical changes have been made in the product, it is essentially a new product. Therefore, the author must send the product through the complete Review and Approval process.

Example: SAND95-1234 was approved in 1995 as an official SAND report. It will now be presented at a conference, but has been updated with technical changes (so is essentially a new product).

The author may request a new SAND number; the title page would appear as follows:

SAND96-0127C
Unlimited Release
Printed July 1996

Or the author may use a new SAND number with a supersession statement:

SAND96-0127C
Unlimited Release
Printed July 1996

Supersedes SAND95-1234
dated April 1995

Note:

- *In the preceding example, the new conference paper cannot use the technical report's original SAND number and add the word "Revised" — SAND95-1234 Revised — because (1) the original technical report, called SAND95-1234, is not itself being republished, and (2) the new conference paper must have a "C" in its SAND number.*
- *Nor can the number "SAND95-1234C — Revised" be used, because "SAND95-1234C" never existed so cannot be revised.*
- *Nor can a "C" simply be added to the original report's SAND number — SAND95-1234C. The new product isn't simply the same material changed from a technical report into a conference paper. Significant technical changes were made. So to avoid confusion, an entirely new SAND number should be used.*

A supersession statement can be used with the new number (as in the above example) to link the conference paper to the original technical report.

If you feel you have a situation not addressed in this discussion, contact the Print Media Department. Also refer to "Control (SAND) Numbers" in Section 1.

Changes and Revisions to Communications Products

The difference between changes and revisions in communications products is basically in the "eye of the author," and it is the author's decision as to whether a new SAND number should be requested or the current SAND number used with a notation of "Revised."

- *Changes.* When a communications product is changed to become substantially different from the original, it is essentially a new product; to avoid confusion, a new SAND number is frequently assigned.
- *Revisions.* When a communications product is revised (updated or expanded with new information), but is not different in its purpose, authors usually choose to use the same SAND number with "Revised" as the suffix.

Should the SAND number be changed?

Factors to consider in deciding whether to change or revise the SAND number include:

- If the revisions were significant and the author considers the revised product to be a new product, then a new SAND number can be assigned. A supersession statement should be added to both the cover and title page below the print date. For example, a title page from an Unlimited Release document with a newly assigned (changed) SAND number might read:

SAND96-0021
Unlimited Release
Printed May 1996

Supersedes SAND93-2364
dated October 1993

- If the revised product has been referenced in a number of other communications products, changing the SAND number could cause confusion. In this case, keeping the old SAND number and indicating "Revised" in the SAND number suffix may be preferred. A supersession statement should be added to both the cover and title page below the print date. For example, a title page from an Unlimited Release document with a revised SAND number might read:

SAND93-2364 Revised
Unlimited Release
Printed May 1996

Supersedes SAND93-2364
dated October 1993

For a change or revision, the communications product needs to go through a new, full Review and Approval process.

Technical Reports: Reprints

Getting reprints if no substantial changes were made

In a reprint, the assumption is made that no substantial changes have been made to the content or distribution limitation. Simple corrections to text, such as substituting a better word or correcting a typographical error or other obvious error, can (and should) be made.

Reprints retain the original SAND number, but the cover, title page, and distribution page must be changed to show the reprint information.

For example, the reprint information for the cover of a reprinted report might appear as follows:

SANDIA REPORT
SAND95-7054 • UC-700
Unlimited Release
Reprinted January 1996 *(The original publication date is replaced by the reprint date.)*

The title page for the same report would show this information:

SAND95-7054
Unlimited Release
Printed October 1995
Second Printing January 1996

At the end of the original distribution page, add the new distribution for the reprinted copies as follows:

Second Printing, January 1996
30 MS 0159 John Doe, 9313
15 MS 6223 Mary Smith, 2122

Reprints may require special approvals; coordinate with the Print Media Department.

Getting reprints if the scope of the audience has grown

If the scope of the audience has grown beyond the originally approved release but the content of the report has not changed, publish the report as a reprint. On the title page, one space below the "Reprinted" date, insert the following note. Adjust the wording to reflect your situation appropriately.

The only change to this report is the release limitation, which has changed from *(old limitation)* to *(new limitation)*.

If you have other questions, call the Service Coordinator in the Print Media Department at 845-8265.

Internal Communications Products

All of the previous information pertains to **external communications products** and to formal **Internal Distribution Only** reports.

Internal memorandums — official communication between colleagues within Sandia — are handled differently. They must be Reviewed and Approved by the author's manager, the organization's Authorized Derivative Classifier, the Classification Department, and the Patent and Licensing Department, but *not* by Print Media. Five copies of the memorandum should be sent to the Technical Library, Dept. 4414, and the original Review and Approval Form should be maintained by the originating organization. (To see examples of classified and unclassified internal memorandum covers, see Samples 3-1 and 3-2.)

If the author wishes to disseminate an internal memorandum outside of Sandia at a later date, the memorandum can be formatted into an official SAND report and sent through the full Review and Approval process.

**Information Release
REVIEW AND APPROVAL FORM**

Originating organization: Please complete through Section 7. Print or type all information. See attached instruction sheets for additional information.

SECTION 1. Controlling information.

SAND No. 96-5132 Other Control No. _____ If other Control No., name of Agency: _____

Is this release the result of CRADA Work for Others Other partnership (Check appropriate box)

No If No, go to Section 2. Yes If Yes, indicate Agreement Number _____ and answer the following question:

Has your partner given approval for this release? Yes No

(You cannot release this information without partner approval. Please provide written confirmation of partner's approval to Licensing and Agreements Processing Dept. 4212/MS 1380, Fax No. (505) 843-4175.)

SECTION 2. Title, Author's Name, Phone, Organization, and Mail Stop.

Title of document (report, viewgraph, video, electronic posting (Internet, World Wide Web, external network), etc.) _____

Engineering Approach to Biomedical Decision Making

Sandia author (or contact) name Albert C. Brown Phone No. 845-9321 Org. No. 6112 Mail Stop No. 0612

Contractor to Sandia. (Contractor's name and contract no.) _____ Principal Case No. 0570.040

SECTION 3. Category of information. Check the category that best describes your product.

Electronic Posting of Information for public access.

Scientific and Technical Information (not electronic postings).

Public Communications to general audiences, e.g., exhibits, brochures, etc., but not electronic postings. (This information requires DOE pre-approval. Contact the Sandia Print Shop 12615-1 (8815) for printed material; Visual Communications 12614 (8815) for videos; Interactive Media 12616 (8815) for multimedia products or technical artwork; Corporate Exhibits 12613 (8815) for exhibits.)

DOE Distribution Category Number UC-409 (Not Required for abstracts, conference papers, journal articles, or electronic postings.)

SECTION 4. Format and Release Event Information. Indicate the format(s) of the information you plan to release, as well as information about the release event.

Format: Abstract Conference Paper (3 copies) Exhibit/Display/Poster Publication Slides/Viewgraphs
 Audio/Video/Film Electronic Posting Journal Article Report Other _____

Release Event: Indicate name of conference, meeting, or publication, the sponsoring organization, and place and date of event. If an electronic posting, provide intended posting location.

Name: _____

Organization: _____

Place: _____ Date: _____

SECTION 5. Classification and Sensitivity of Information. Contact Classification Dept. 7447 (8815) for questions.

Indicate classification level and category or whether unclassified:

Title U Abstract U The Document (body of information) U

Classified -- Limited Dissemination. Indicate additional dissemination limitations.

NWD Sigma _____ SUCI _____ CNWDI _____ NOFORN _____ Other _____

Unclassified -- Limited Dissemination. Indicate all Unclassified Controlled Access Information (UCAI) dissemination limitations.

<input type="checkbox"/> Applied Technology	<input type="checkbox"/> Reactor Safeguards Information (RSI)
<input type="checkbox"/> Export Controlled Information (ECI) ITAR/ECCN _____	<input type="checkbox"/> Sandia Commercially Valuable Information
<input type="checkbox"/> Internal Distribution Only (IDO)	<input type="checkbox"/> Small Business Innovation Research (SBIR)
<input type="checkbox"/> Non-Sandia Proprietary Information	<input type="checkbox"/> Specified Dissemination (Must attach letter of rationale)
<input type="checkbox"/> Official Use Only (OUO) Exemption No. _____	<input type="checkbox"/> Unclassified Computer Software (UCS)
<input type="checkbox"/> Patent Caution / Invention Disclosure	<input type="checkbox"/> Unclassified Controlled Nuclear Information (UCNI)
<input type="checkbox"/> Protected CRADA Information	<input type="checkbox"/> Other (specify) _____

Unclassified -- Unlimited Release. Information is unclassified with no dissemination limitations and is recommended for unlimited release. Distribution may be made worldwide.

Authorized Derivative Classifier (ADC) who is knowledgeable of information sensitivity: Michael Post Michael Post 6112 6-10-96
 Name Signature Org. Date

SECTION 6. Disclosure of Technical Advance

A Technical Advance is an original achievement or nonobvious progress in a scientific or engineering sense, including the creation of software. A Technical Advance may be protected by patent, copyright, or as Sandia Commercially Valuable Information. The Originators of a Technical Advance may be inventors or authors.

Does the subject of this Information Release represent a Technical Advance as defined above?

Yes No If No, skip to Section 7.

If Yes, has a Disclosure of Technical Advance (TA), Form SF 1155-G, been filed with the Sandia Patent and Licensing Center?

Yes SD No. _____ No If No, please follow up with a TA form obtainable from:

- (1) Patent & Licensing Center, paper or PC or Mac diskette ((505) 845-9536 or e-mail: patents@sandia.gov); in California, paper or Mac diskette ((510) 294-2767).
- (2) Sandia's Internal Web (<http://www.patents.sandia.gov/patents>), or
- (3) Sandia Line ((505) 845-6789, Quick Dial Code 1057).

Figure 1-3. Example of a Review and Approval Form (page 1) for an Unlimited Release document.

SECTION 7. Line/Project Signatures and Approvals. Print or type all author information; obtain appropriate signatures from next-level manager. Where concurrence is obtained in case of multiple authors, approval need only go through the principal author's line organization.

Authors' Names (print or type) Albert C. Brown Org. No. 6112 Phone No. 845-9321 Next Level Manager's Signature Laura M. Myers Date 5-22-96

Center Director's or Project Manager's name or signature (depends on Center policy) _____

ORIGINATING ORGANIZATION: PLEASE DO NOT WRITE BELOW THIS LINE.

SECTION 8. Classification and Sensitive Information Review (7447/MS 0175, 8815/MS 9021).

Signature (Signature) Date 6-17-96

SECTION 9. Patent and Licensing Review (11500/MS 0161, 8842/MS 9141).

SECTION 9. Patent and Licensing Information
Copyright Interest? Yes No If Yes, copyright may be asserted, subject to DOE approval.

Copyright Interest: Yes No If Yes, TA form has been or should be submitted.

Yes No If Yes, TA form has been or should be submitted. If Yes, TA form has been or should be submitted and dissemination will be limited.

Patent Attorney's/Agent's Signature (Signature) Date 6-18-96

SECTION 10. Review of Public Communications/Review of Publications Using Color. Public Communications (see Section 3) must be reviewed by one of the following departments: Print Shop (12615-J/MS 0104, 8815/MS 9021), Visual Communications (12614/MS 0551, 8815/MS 9021), Interactive Media (12616/MS 0409, 8815/MS 9021), or Corporate Exhibits (12613/MS 0401, 8815/MS 9021). All publications that require color Xeroxing or color printing and use three or more colors must be reviewed by the Print Shop (12615-J/MS 0104, 8815/MS 9021).

DOE approval received _____

Signature _____ Date _____

2020-01-20 11:45:45.000000000 UTC - Quality Review (12615/MS 9619, 8815/MS 9021)

Signature Tamara K. Locke Date 7-2-96

Figure 1-4. Example of a Review and Approval Form (page 2) for an Unlimited Release document.

INSTRUCTIONS

Review and Approval Form (SF 1008-RA)

Instructions for Completing and Processing the R&A Form

INSTRUCTIONS FOR ORIGINATING ORGANIZATION

Regardless of format or media, before information is released outside of Sandia, it must have classification, patent, publication, and if applicable, technology partner review and approval. Please be as complete and legible as possible.

Section 1: Controlling information.

Print Media Dept. 12615 (8815) issues SAND numbers at the end of the Review and Approval process (after approval in Section 11). If this release is the result of a CRADA, Work for Others, or other partnership, indicate Agreement Number. The technology partner must approve the release, and a written confirmation of this approval must be sent to Licensing and Agreements Processing Dept. 4212.

Section 2: Title, Author's Name, Phone, Organization, and Mail Stop.

This information is used when a reviewer has a question during the Review and Approval process. THE IDENTIFIED AUTHOR SHOULD BE A SANDIA EMPLOYEE. IF THE INFORMATION IS FROM A CONTRACTOR, THE NAME MUST BE A SANDIA CONTACT.

Section 3: Category of Information

Electronic Posting of technical information	Unclassified, unlimited release information to be posted on the Internet, World Wide Web (WWW), or external networks. Information could be technical strengths, Sandia's mission, contact information, access to Sandia, Technology Transfer, or even technology associated with a Sandia project, as identified in the next category.
Scientific and Technical Information to sponsors, government agencies, industries, and (where appropriate) general audiences. (DOE Order 1430.1D)	Information in any format or medium which is derived from scientific and technical studies, work, or investigations which relate to research, development, demonstration, and other specialized areas such as environmental and health protection and waste management. Classified, declassified, and sensitive information is included in the scope of the definition. The primary points of origination of DOE-funded scientific and technical information are management and operating contractors, direct DOE executed prime procurements, and DOE operated research activities. Electronic posting of such information should be identified in the previous category.
Public Communications to non-specific general audiences. (DOE Order 1340.1B)	Includes publications produced with DOE funds and intended for distribution by DOE, its contractors, or its financial assistance recipients to the public, including those of more limited circulation that involve policy changes, or matters of current public controversy or concern. For example: communications that promote capabilities or employment such as posters, exhibits, brochures, booklets, pamphlets, and promotional videos intended to develop customers for Sandia, but not electronic postings. Release of information in this category requires the pre-approval of DOE, which requires considerable lead time. At the beginning of the approval process, contact the Print Shop (12615-1/MS 0619 or 8815/MS 9021), Visual Communications (12614/MS 0551 or 8815/MS 9021), Interactive Media (12616/MS 0409 or 8815/MS 9021), or Corporate Exhibits (12613/MS 0401 or 8815/MS 9021) immediately for assistance. After DOE approval is received, one of the above departments will complete Section 10 of the Review and Approval Form. Press releases are exempt from this R&A process; preparation and distribution of releases are managed by the Community Relations Department.

DOE Distribution Category Number

For unclassified reports, refer to DOE/OSTI-4500-R75: *Program Distribution for Unclassified Scientific and Technical Reports*.

For classified reports, refer to DOE/OSTI-3679-Rev. 75: *Standard Distribution for Classified Scientific and Technical Reports*.

Most secretaries have copies of these distribution reports. Copies may also be obtained from Print Media Department 12615 (8815). In California, Department 8815 assigns the UC category at time of final approval.

Section 4: Format and Release Event Information.

Important: include three copies of conference papers in the Review and Approval packet.

Abstracts, Extended Abstracts	<ul style="list-style-type: none"> Brief or extended abstracts of reports, journal articles, conference papers, and oral presentations.
Audios, Videos, Motion Pictures, Compact Disks	<ul style="list-style-type: none"> Any format.
Conference Papers (3 copies)	<ul style="list-style-type: none"> Papers submitted for review or presentation at technical or non-technical professional conferences, domestic or foreign. Author must provide Print Media Department 12615 (8815) with 3 copies for distribution.
Electronic Posting	<ul style="list-style-type: none"> Unclassified, unlimited release information posted electronically on the Internet, World Wide Web, or external servers, with the intent of providing information about Sandia's technical strengths, current projects, technology interests, technology transfer contacts, etc.
Exhibits, Displays, Posters, Models	<ul style="list-style-type: none"> Any format.
Journal Articles	<ul style="list-style-type: none"> Articles submitted for inclusion in technical or non-technical professional society journals, serials, magazines, and other publications containing separate articles and appearing at regular and frequent intervals. Each issue is numbered or dated consecutively.
Publications, etc.	<ul style="list-style-type: none"> Books, Booklets, Brochures, Chapters, Folders, Flyers, Pamphlets, and Newsletters.

(Section 4 continued on page 4)

Figure 1-5. Instructions for completing the Review and Approval Form.

Section 4. (Continued from page 3)

Reports	<ul style="list-style-type: none"> Topical: Comprehensive statements of the results of work performed on a specific task or phase of a contract, agreement, or financial assistance award. Detailed descriptions of scientific or technological advances, or administrative programs or processes. Progress: Summaries of the work performed during a specific reporting period, including results (positive or negative) of work performed under a contract, agreement, or financial assistance award, regardless of format. Final: Accounting of the total work performed under contract, agreement, or financial assistance award. Comprehensive descriptions of data, figures, photographs, and bibliographic citations in support of the investigations undertaken. May also include summaries of previous topical and progress communications. Official: Information prepared at the request of or in conjunction with a federal agency Headquarters or Field Office.
Slides, Viewgraphs	<ul style="list-style-type: none"> Overhead transparencies, 35-mm slides. Print Media needs a hard copy for the Library.

Section 5: Identification of Information Classification and Sensitivity

The author and the Authorized Derivative Classifier (ADC) assess the content of information for any legitimate and appropriate distribution limitations, classified or unclassified. Unclassified information must not have a limitation placed on it solely to exclude it from Freedom of Information Act requests. The ADC is usually the manager of the author's work, but the cognizant ADC for the project must concur with the determination or sign the release. Classification Department 7447 (8815) should be consulted so that an appropriate determination can be made, should any issues arise regarding the sensitivity of the information being considered for release. "The Document (body of information)" represents "the report," "the briefing," "the conference paper," "the Web page," etc.

It is possible to place multiple limitations on unclassified information. Example: "Export Controlled" and "Official Use Only" can be used together. If "Specified Dissemination" is chosen, be sure to include a letter addressed to Dept. 12615 (8815) explaining rationale for this selection, and indicate the program name that requires limitation on dissemination.

Section 6: Disclosure of Technical Advance

Please answer all questions. These responses help the Patent and Licensing Center determine the patentability of the contents of the communication product. If you need help in answering the questions, please call the Patent and Licensing Center 11500 (8815). Note: Sandia employees whose communication product represents a Technical Advance must file an invention disclosure with the Sandia Patent and Licensing Center before the invention is publicly revealed. Sandia employees file this disclosure by submitting a Disclosure of Technical Advance (TA) form. If the TA form is not filed, and the invention is publicly revealed in an enabling sense, DOE or Sandia will lose the right to file for a foreign patent after the date of such public announcement, and will lose the right to file for a patent in the United States one year following the date of public announcement.

Section 7: Line Signatures and Approvals

The implication of the signatures in this section is that all technical, quality, and sensitivity reviews within the Department and/or the project have occurred as required by the programmatic or Center policy. The section must be signed by the Center Director or Project Manager (or both) as required by individual Center policy. If the author is a manager or higher, review signature must be by someone cognizant of the appropriate technical quality and sensitivity review requirements within the Division (VP). A manager cannot approve his/her own document.

NOTES:

- All publications that require color Xeroxing or color printing and use three or more colors must be reviewed by the Print Shop 12615-1 (8815). The Print Shop will get the necessary approvals and complete Section 10 of the Review and Approval Form.
- After Print Media signs the Review and Approval Form (Section 11) and the report is finalized, to get Print Shop services, the line organization prepares a Laboratory Communications Service Order (form SF 1820-A) if in New Mexico, or a Graphic Arts Work Request (form LS 1820-A) if in California. The New Mexico author can use this same form to request that Print Media prepare a report cover. (To prepare the cover, Print Media also needs a copy of the report's title page and a copy of the signed-off Review and Approval Form.) After receiving the cover, the NM author then attaches the SF 1820-A form to the report and delivers it to the Print Shop (12615-1). Department 8815 will handle all cover requirements for California authors. Finally, Dept. 12615 (8815) will coordinate the publication (but not the electronic posting) with DOE/OSTI (Office of Scientific and Technical Information).

This is the end of the Review and Approval process within the originating organization(s).

INFORMATION ABOUT REVIEWER RESPONSIBILITIES

Section 8: Classification and Sensitive Information Review

A member of 7447 (8815) will review the content of the information. If there are any questions or a difference of opinion, the 7447 (8815) reviewer will contact the author and/or the ADC and will resolve the issues. Allow about two days for Section 8 review. Comments relating to review or dissemination may be added.

Section 9: Patent and Licensing Review

The Patent and Licensing Center 11500 (8842) will review the communications product and Section 6 and, if follow-up is necessary, will assist the inventor or author with the paperwork.

Section 10: Review of Public Information (for all but scientific and technical reports)/Review of Publications Using Color

This section documents that DOE approval was received.

Section 11: Print Media and Electronic Quality Review

Print Media Department 12615 (8815) performs a final review of the content of the Review and Approval Form for completeness and compliance with DOE reporting requirements. For this review, a copy of the report is also needed.

Figure 1-5. (concluded).

Final Processing of the Package

After the Formal Review and Approval (R&A) package has been received by Print Media and the document has been approved, the following happens:

Type of Document	Retained by Print Media, to be sent to the Technical Library.	Sent to Author
Full SAND report	Original R&A Form.	Copy of approved R&A Form. Final draft of report.
Abstract	Original R&A Form. The Abstract.	Copy of approved R&A Form.
Journal Article	Original R&A Form. The Journal Article.	Copy of approved R&A Form.
Conference Paper	Original R&A Form. Three copies of the conference paper. (One copy of the paper goes to the Technical Library and two go to DOE/ OSTI.)	Copy of approved R&A Form.

Notes:

- Be sure to check the copy of the approved R&A Form and final draft report for comments that may have been entered by any of the reviewers.
- The R&A Form will be kept on file at the Technical Library along with a copy of the document.

Intentionally Left Blank

SECTION 2

Writing the Report:

- Definitions**
- Elements of the Document**
- Getting Started**
- Peer Review**
- Sample Report**

Intentionally Left Blank

Definitions

contractor-authored — A document that has been authored by one or more contractors without a Sandia employee as a co-author. Contractor-authored SAND reports are printed with a unique cover that sets them apart from Sandia-authored reports.

format — The physical arrangement and general appearance of text, for example, the margins, style of headings, spacing before and after headings, spacing between paragraphs, location of page number, indentation of text, and use of bullets and rules.

graphics — Line drawings, graphs, photographs, and tables.

layout — The integration and placement of text and graphics on the page: location of figures and tables with respect to their callouts in the text, balanced appearance of facing pages, and consistent treatment of graphics.

levels of edit — The distinction made between the levels of effort to be applied in editing a document. Levels of edit may vary from company to company. Sandia's system is based on three levels: 1 = lowest; 2 = medium; 3 = highest.

markings — Control markings required by Sandia or the US Department of Energy to indicate the level of protection required for a publication. *Portion markings* — markings that apply to a particular portion of a report, such as a figure or a page. Markings appear in large, bold print at the top and bottom of a page, or as otherwise specified for portion markings. Examples of markings are UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION and SECRET.

notices — See "physical protection legends."

physical protection legends — Legends (also called "notices" or "blurbs") are placed on the title page and cover of documents to describe a limitation to access. Sometimes two or more legends may apply to one document.

release statement — This statement is placed immediately under the SAND number on the cover and title pages. It is also called "release category," or "distribution statement." Its purpose is to indicate any limitations on the distribution of the document. Examples are Unlimited Release and Unclassified Controlled Nuclear Information.

SAND report — An official Sandia document that bears a SAND number, for example, SAND92-0045. The term most frequently refers to documents that report scientific or technical information, but it can also refer to documents that report administrative information.

style – *In formatting, style* refers to the sizes and types of print used for body text, headings, and titles; *in writing, style* refers to an author's personal way of using the language.

usage – Usually refers to choosing from two or more acceptable grammatical styles. Also, as the spoken language begins to incorporate terms on a routine basis, those terms may be accepted into the written language based on *usage* by a large segment of educated society.

Elements of the Document

The elements of a SAND report follow a standard sequence (listed below). Deviations may be made when necessary, but we prefer that the standard sequence be adhered to whenever possible. Annotations in the Sample Report contain guidance for the author on what to include in each section.

Not all elements appear in every document, and for practicality a few reports may require a slightly different sequence. The frequency of such deviations should be limited as much as possible.

Cover— for SAND Report and Internal Memorandum

The SAND report cover must be prepared by Print Media (Bldg. 894, Room 201). Print Media bases the master on your report title page, a copy of your completed and signed-off Review and Approval form, and your Service Order form (Figure 4-4). This requirement ensures that all information and markings mandated by the Department of Energy appear on the cover.

A sample cover is shown on page 47. Note the funding statement, which includes the current DOE contract number.

Print Media also prepares the inside front cover, where the legal notice (disclaimer) and notice of copy availability (when applicable) are printed. The request for a cover is processed as a final step before the report is sent to our Print Shop. The process for having covers made is given in Figure 4-1, “How to order covers from Print Media Dept. 12615.”

The form for an internal memorandum cover is no longer available from JIT. The cover may be created on a PC or ordered from Print Media in the same manner as a SAND report cover. See Samples 3-1 and 3-2.

Title Page — Unclassified

See Sample 3-3, which shows an unclassified title page; see Sample 3-6 for suggested treatment of authors' names, and Sample 3-7 for special markings and notices.

Elements of unclassified title page.

An unclassified title page includes the following elements:

- report number.
- distribution category number (UC-XXX).
- release statement (Unlimited Release, Export Controlled Information, etc.).
- print date.
- supersession statement (if the report is a revision): skip a line below the print date and type “Supersedes SANDXX-XXXX, dated (month & year).”
- title of report.
- author(s).
- contract or purchase order number if work was done with non-DOE funds or if report is authored by a non-Sandian on a contract.
- abstract (unless report is being done for an agency with different requirements, e.g., NRC).
- any required notices and markings that limit distribution (such as the Non-Sandia Proprietary Information notice).

Page number.

In unclassified reports, the title page is not numbered. The front cover and inside front cover, made by Print Media just before the report goes to print, are also unnumbered.

Title Page — Classified

See Sample 3-4, which shows a classified title page; see Sample 3-6 for suggested treatment of authors' names, and Sample 3-7 for special markings and notices.

Elements of classified title page.

A classified title page includes the following elements:

- report number.
- distribution category (C-XX).
- any special limitation such as Nuclear Weapon Data and Sigma number.
- print date.
- supersession statement (if the report is a revision): skip a line below the print date and type "Supersedes SANDXX-XXXX, dated (month & year) ."
- title of report, with classification of title in parentheses, for example, (U) or (SRD), after the title.
- author(s).
- contract or purchase order number if work was done with non-DOE funds or if report was authored by a non-Sandian on a contract.
- abstract (with classification of abstract in parentheses after the word *Abstract*).
- classifier information ("Classified by . . .").
- any required notices (such as the Restricted Data notice).

Page number.

In classified reports, the title page is numbered with an Arabic 3. The front cover and inside front cover, made by Print Media just before the report goes to print, are numbered with an Arabic 1 and 2, respectively. (Page numbers for classified reports must be continuous Arabic numbers starting with the front cover as 1 and continuing without interruption to the last page of the document.)

Markings.

Place the classification level (TOP SECRET, SECRET, or CONFIDENTIAL) at the top and bottom of the page, using bold print at least 1/4-inch high. Refer to Sample 3-4.

Front Matter (listed in the order it should appear)

Acknowledgments (optional).

Acknowledgments credit substantial contributors to the work who are not authors. Contributions that are simply part of a person's normal job responsibilities need not be acknowledged. The Acknowledgments statement usually appears on the back of the title page and is numbered *ii* in an unclassified report (page 4 in a classified report).

Contents.

The Contents (do not use "Table of Contents") includes not only a list of headings in the text, but also a list of figures and a list of tables (see Sample 3-8). It should include headings through the third order. The Contents page(s) should be checked, and updated if necessary, after the report is complete. All listings in the Contents should agree exactly with the headings that appear in the text, and all page numbers listed should be accurate.

For figure captions and table titles in the Contents, do not include explanatory text, that is, (1) text that is enclosed in parentheses or (2) text that follows a period at the end of the caption/title. An exception would be to include any parenthetical text that is necessary to distinguish one figure from another. When the report includes only one or two figures and one or two tables, there is no requirement that they be included in the Contents. The Contents list starts on a right-hand (odd-numbered) page, usually *iii* in an unclassified report (page 5 in a classified report). See the Sample Report at the end of this section for an example of a Contents pages.

Foreword (optional).

A foreword (note the correct spelling) is usually written by a person other than the author after the document is finished, and that person's name appears at the end of the foreword. The foreword may consist of comments about the value, background, author's expertise, or other information that person thinks might contribute to the value of the report. An alternative placement of the foreword or preface is before the Contents.

Preface (optional).

A preface is usually written by the author and includes information of interest to the audience but not essential to a clear understanding of the text.

Executive summary (optional).

The executive summary is a self-contained, concise recapitulation of the major points in the body of the report. It includes information on the manner in which the work was done, the nature and purpose of the investigation, the equipment or processes used, a brief discussion of the results, and the primary conclusions or recommendations.

The executive summary is included in the front matter for expediency and it starts on a right-hand (odd-numbered) page. Because it is usually written after the body of the report is completed, placing it with the front matter allows it to be page-numbered in Roman numerals, avoiding the need to renumber the entire report. However, the author has the option to include the executive summary in the body of the report, as the first section, with Arabic numbers.

Acronyms and abbreviations.

If a document is long and contains numerous acronyms, abbreviations, or special mathematical terms that require an explanation, include a list with the appropriate heading.

Capitalization of acronyms. We suggest that the expansion or definition in the list reflect capitalization as it appears in the text; that is, start the expansion or definition with a lower-case letter if that is the way it appears in the text. The fact that the first (or an internal) letter of a word is used in an acronym is not a reason to capitalize that letter in the expansion. Use the same rule you would in ordinary text: If a term is a proper noun, capitalize the first letter of each word; if a term is a title, follow the capitalization rule for titles.

Body of the Report

The first element in the body of the report is an *introduction* (or the executive summary if it is placed here rather than in the front matter). The introduction describes the purpose of the report, its scope (what is discussed, and sometimes what is *not discussed*), and background information that helps the audience understand the problem. For example, it might explain how this work relates to earlier work.

The introduction is followed by a logically organized development of the study that ends with a summary, conclusion, or recommendation section.

References and Bibliography

The references and bibliography immediately follow the body of the report. If the report has appendixes that include references and bibliography, the list of those references and the bibliography appear in the appendix, not in the body of the report. See Appendix C, References.

Back Matter

Glossary.

Including a glossary is optional. In very large, complex documents, a glossary might be valuable.

Appendices.

Appendices are included as supporting documents. They are not essential to the body of the report. Each appendix should be a self-contained section. For example, any references cited in an appendix must be numbered independently (such as A-1) and appear in the reference list for that appendix, not in the reference list for the body of the report. An appendix should in no way be dependent on the body of the report.

Index.

An index is included when more detail is needed than is provided by the contents listing, for example, as in a style guide or other reference document.

Distribution

The distribution list is headed by the word "Distribution" and is the last item in the report. External addresses are listed first (with any foreign addresses at the end), then internal addresses, then the "record" or "housekeeping" copies. Record copies are those required by Sandia and the Department of Energy for their records. See the Sample Report at the end of this section and Samples 3-9 and 3-10 for more information.

Getting Started

For most people, writing is difficult at best, but it needn't be torture. The following steps might save you time and stress when writing a technical report.

1. Define your purpose and pinpoint the audience.

Defining your purpose and pinpointing the audience for a report will help you determine the appropriate structure and level of detail needed in your writing. Why did you do the work (the purpose)? Are you directing your writing to the people who will be receiving your report (the audience)?

2. Outline the major points or sections.

Either in outline or sentence form, list the major topics you want to cover. This will help you organize your thoughts and the rough material, and later it will help you evaluate the draft.

3. Write the easiest sections first.

First, write the sections with which you are most familiar, or those for which you have all the information. Save the more troublesome sections for later. Always write the abstract, summary, introduction, and conclusion last. They must accurately reflect what you have said in the body of your report.

4. Organize the graphics.

Determine what figures and tables you will need. Prepare clear drafts of them.

5. Read the text draft and relate your graphics to the draft.

Check that the graphics are appropriately called out and consistent with the text. Are the graphics themselves clear and easily understood? Do they present information that is pertinent? Does the caption/title clearly reflect what the figure or table contains?

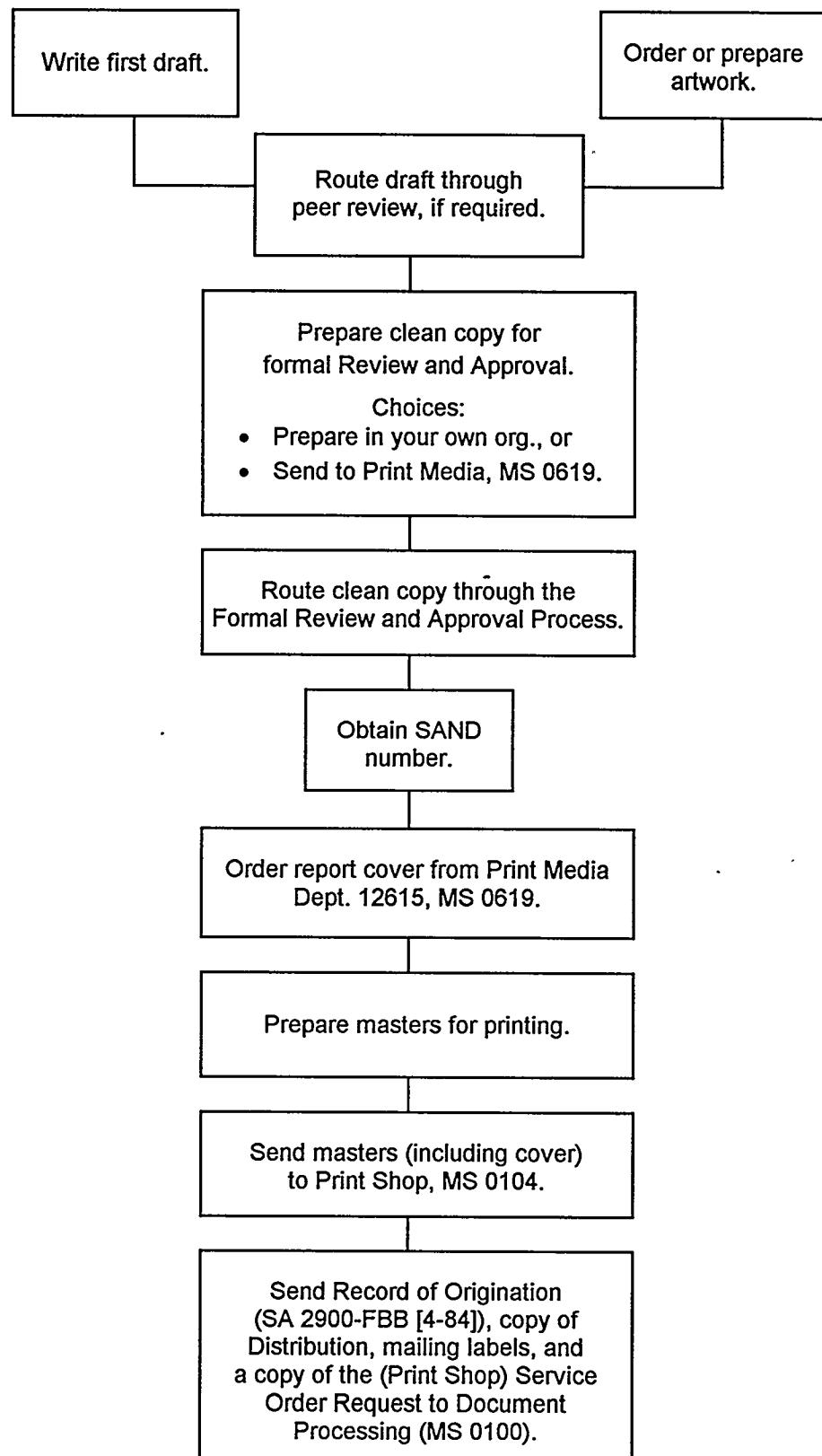
6. Order artwork as early as possible.

To avoid unnecessary delays in publishing your report, order artwork as early in the preparation stage as you feel secure about its accuracy. If you need photographic services, arrange for those as soon as you know your requirements. If you know generally what you want but can't crystallize the concept, consulting with the staff in the technical art or photography groups would probably be helpful.

7. Ask others to review your work. (See Peer Review later in this section.)

Asking others to review your work isn't always easy, but it is crucial. Peer reviews can prevent technical errors and embarrassment and will help you present your material effectively.

Flowchart for Creating SAND Report



Peer Review

No Official Sandia Policy

Sandia has no official policy concerning peer reviews. Some organizations require it while others don't. The points in this section are excerpted from "Peer Review," a four-page leaflet prepared some years ago by Lee Garner of the Technical Writing Division. Unfortunately, no copies of the complete document are now available.

Value of a Peer Review

The value of a peer review is "to protect the author/s/, organization, and discipline from embarrassment created by omissions, flawed reasoning, unfortunate expressions, and oversell."

The Peer Review Process

The reviewer has certain standard obligations and should perform certain procedural obligations as listed in the following paragraphs.

Obligations of the reviewer

The peer reviewer should —

- Evaluate the significance of the work reported.
- Assess its accuracy and appropriateness for publication.
- Check adherence to standards of the organization and publisher.

Tact and sensitivity are important in the reviewing process. If the reviewer thinks important changes must be made, he or she should find a way to achieve these changes without arousing defensiveness or antagonism in the author. And the author must guard against developing a defensive attitude. The answer to both problems is objectivity.

Procedural steps of the review

The reviewer should read the entire manuscript twice, focus on specific areas, and check the mechanics of the document. Lists for each of these steps follow.

Peer reviewer should read the entire manuscript twice:

- The first time with an open mind and in a stream-of-consciousness mode, jotting down quick marginal notes to act as stimuli to more detailed response in the second reading.
- The second time with more attention to detail, writing out reactions and suggesting specific improvements.

Focus on these details:

- A sentence or two in the introduction that expresses the author's specific purpose or intention.
- Statements of assumptions and definitions.
- Sufficient data and correct interpretation; equations expressed and dealt with accurately.
- Adherence to subject and avoidance of digressions, repetitions, and extraneous material; balanced treatment.
- Emphasis on significance of the work and applications.
- Language appropriate to the subject and the readers.
- Graphics that help visualize ideas or data.
- Appropriate title and abstract.

Check the mechanics. The following observations may be useful feedback to the author:

- Can a reader follow the numbering of equations, figures, references?
- Do the legends fully explain the central points of the illustrations? Are the scales of the ordinate and abscissa appropriate?
- Could some data and figures be combined or eliminated? Is metric notation appropriate?
- Are basic sentence problems eliminated? (Problems of expression could obscure exact technical meaning.)

Author's Response to the Review

The author should welcome feedback but carefully assess its validity. Further objective discussion may be needed between author and reviewer to resolve any dilemmas.

Intentionally Left Blank

Sample Report Annotated with Writing Instructions

The following sample was excerpted from an actual report to present all sections that might appear. The boxes at the bottom of each page contain brief writing instructions about what to include in each section.

Information about other formats, graphics, and tables appears in Section 3, which has numerous samples at the end of the section.

Intentionally Left Blank

SANDIA REPORT

SAND96-2346 • UC-706

Unlimited Release

Printed May 1996

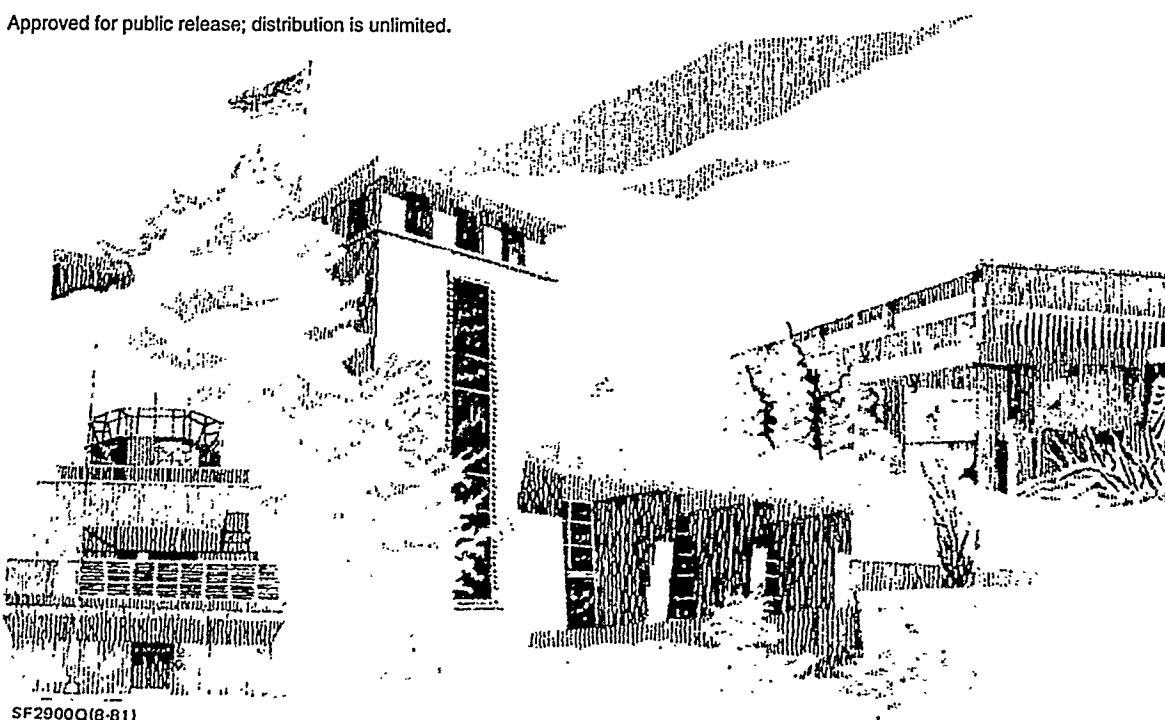
THE VELOCITY INTERFEROMETER SYSTEM FOR ANY REFLECTOR

Mod B, Push-Pull With Double-Delay-Leg and Dual VISAR Modes

O. B. Crump, Jr., P. L. Stanton

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550
for the United States Department of Energy
under Contract DE-AC04-94AL85000

Approved for public release; distribution is unlimited.



SF2900Q(B-81)

Sample Report

Legal Notice (disclaimer) on
inside front cover of report.

Issued by Sandia National Laboratories, operated for the United States Department of Energy by Sandia Corporation.

NOTICE: This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government, any agency thereof or any of their contractors or subcontractors. The views and opinions expressed herein do not necessarily state or reflect those of the United States Government, any agency thereof or any of their contractors or subcontractors.

Printed in the United States of America. This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from
Office of Scientific and Technical Information
PO Box 62
Oak Ridge, TN 37831

Prices available from (615) 576-8401, FTS 626-8401

Available to the public from
National Technical Information Service
US Department of Commerce
5285 Port Royal Rd
Springfield, VA 22161

NTIS price codes

Printed copy: A03 ←

Microfiche copy: A01

Note: The following "A" Codes
are for Unlimited Release
DOE technical reports:

Price code	Range of total pages
MF A01	Microfiche
PC A02	1-10
A03	11-50
A04	51-75
A05	76-100
A06	101-125
A07	126-150
A08	151-175
A09	176-200
A10	201-225
A11	226-250
A12	251-275
A13	276-300
A14	301-325
A15	326-350
A16	351-375
A17	376-400
A18	401-425
A19	426-450
A20	451-475
A21	476-500
A22	501-525
A23	526-550
A24	551-575
A25	576-600
A99	601 & UP

SAND96-2346
Unlimited Release
Printed May 1996

Distribution
Category UC-706

The Velocity Interferometer System for Any Reflector

Mod B, the Push-Pull With Double-Delay-Leg and Dual VISAR Modes

O. B. Crump, Jr., and P. L. Stanton
Explosive Projects and Diagnostics Division
Sandia National Laboratories
Albuquerque, NM 87185

Abstract

The Velocity Interferometer System for Any Reflector (VISAR) is the modern standard for measurement of shock phenomena. This report describes the original VISAR and its evolution into the current Mod B version built for Sandia's Explosive Projects and Diagnostics Division 2514. The Mod B system incorporates the push-pull signal processing introduced in Mod A to reduce sensitivity to target self-light and simplify data reduction, and it introduces the use of two push-pull VISARs to obtain two modes of operation. In the Dual VISAR mode, each VISAR is used independently to track separate targets or separate points on a common target. In the Double-Delay-Leg mode, both delay legs are used to track the motion of a single point. The second delay leg gives a redundant measurement that is used to resolve the ambiguity in the velocity jump in shock-wave experiments.

Abstract:

- Sandia requires that all SAND reports contain an abstract on the title page. Exceptions are rare.
- In a classified report, keep the abstract unclassified when possible.
- Use "key" words to support library searches (information retrieval).
- The purpose of an abstract is to explain the essence of your report to the reader.
- The abstract should be kept short — under 200 words when possible.
- It helps to have other people review your abstract.
- Abstracts are of two types: *informative* and *descriptive*. The informative abstract is preferred.

Continued in bottom box on next page . . .

Acknowledgment

The authors thank R. E. Hollenbach of the Thermomechanical and Physical Division for the very helpful conversation regarding his earlier work with circuit designs for photomultiplier tubes.

Acknowledgment:

Often an acknowledgment is the only recognition given someone who has made an important technological contribution to your work. For this reason it is an important part of the report. Give the contributor's name and tell briefly what the contribution was: "John Doe for his skill in fabricating the special testing equipment." Sandia's policy on acknowledgments was outlined by R. S. Claassen, 8000, in his memo "Publications—Title and Acknowledgments," December 18, 1984:

Acknowledgment of work by others, when appropriate, is an obligation of the author of a Sandia report or a journal paper. It is not necessary, however, to acknowledge work which was performed as a normal part of a work assignment. The important acknowledgment is for professional level contributions. Conceptual level inputs, such as innovative thoughts or original suggestions for an approach to the problem, rank first. Considerable effort at an advanced level, such as analysis of experimental data or refinement of experimental techniques, deserves credit. Recognition should be given to an assistant who has contributed to the work through skill and careful experimentation. Acknowledgments should be stated in a simple, declarative way. Flowery language and admissions of indentured servitude are inappropriate.

Abstract (continued from title page):

Informative abstract. In an informative abstract, you should —

- explain the most important points of the report to give the reader a clear overview of the research, experiment, test, or other activity being reported. The well-written informative abstract may contain all the information certain readers need; other readers may find they want to explore the entire report.
- state the study's purpose, its objectives, or the subject treated. Classify the scope of your treatment as preliminary, brief, comprehensive or exhaustive, experimental, theoretical, or some other appropriate term.
- state the method of attack, parameters, and equipment involved — especially if they are new or unique.
- report results (both expected and unexpected), their degree of accuracy, and their significance.
- note if related or follow-up work is needed or planned.
- insert no illustrations, charts, tables, references, or footnotes; refer to no specific figures or paragraphs.
- write in full sentences, in the active voice when possible.

Descriptive abstract. In a descriptive abstract you outline the organization of your report but do not explain its major ideas. (It is essentially an extended table of contents and is best used for a manual, tutorial, or other reference material.)

Contents

Preface	iv
Summary	v
Nomenclature	vi
Introduction	1
Background	1
The Conventional (Original) VISAR	2
The Mod A (Push-Pull) VISAR	5
The Double-Delay-Leg VISAR	5
The Mod B (Current) System	6
Layout and Operation of the System	6
Operating Modes	18
Photomultiplier Design	xx
Optical Fiducial	xx
Data Acquisition Instrumentation	xx
Example Data	xx
Discussion of Technique	xx
Conclusion	19
References	20
APPENDIX —	21

This report did not have an appendix. If it did have an appendix, the name of the appendix would appear here.

Figures

1 The Original VISAR Model	3
2 Push-Pull VISAR	5
3 Layout for Sandia's Mod B Push-Pull VISAR With Double-Delay-Leg and Dual VISAR Modes	7
4 Schematic of Voltage Divider for High-Speed Photomultiplier	xx
5 Test Setup Used to Produce High-Frequency Optical Input	xx
6 Frequency Response for Photomultiplier Circuit From Test Setup of Figure 5	xx
7 Response of Photomultiplier to a Narrow Optical-Plus Input	xx

(Continue listing all figures in the report)

These figures were omitted because they serve no illustrative purpose.

Tables

This report does not have tables. If you have tables, list them here, using the format for figures.

Contents page:

- Include a contents page if the report is longer than 15 pages; if the report is shorter, a contents page is not required, although you may choose to include one.
- List major headings. Also include level two and three headings if necessary. Headings are the major road signs for the reader, so include the levels that serve the reader. List the headings exactly as they appear in the text (but omit parenthetical material).
- Include a list of figures and a list of tables unless you have fewer than three figures or three tables.

Preface

This report does not contain a preface.
If you have a preface or a foreword, place it here.

Preface and Foreword:

Most SAND reports do not require a *preface* or a *foreword*. However, if you want to give the reader background information that is not appropriate to include in the text, or if someone else wants to write a prefacing statement, place it here.

The *foreword* is usually a prefacing statement made by someone other than the author. (Always check the spelling of *Foreword*; it is not "Forward," one of the most common oversights in writing.)

Sometimes acknowledging statements are included in the preface, making a separate acknowledgment section unnecessary.

Summary

This report does not contain an executive summary.
If you have a summary, place it here.

Executive summary:

- An executive summary is a complete but concise recapitulation of the major points of the entire report. The summary may provide some readers with all the information they need; it will brief others so that they will have a basic concept of the subject before they start reading the report.
- Often, especially in short reports, the abstract contains enough information to eliminate the need for an executive summary (as is the case in this report).
- The length varies according to the content and the audience. If you keep in mind the function of your summary — to briefly recapitulate the *major* points of the report — the length should be self-determining.
- Steps in developing a summary —
 1. Review your report and note major points, significant facts, important considerations, and major conclusions.
 2. List key phrases or sentences you want to include.
 3. Compress information from steps 1 and 2 and coherently connect the ideas.
 4. Have other people review your summary for accuracy, completeness, and proper emphasis.

Nomenclature

BS	beam splitter
PBSC	polarizing beam-splitting cube
PMT	photomultiplier
PZT	piezoelectric translator
VISAR	Velocity Interferometer System for Any Reflector

c velocity of light
C total of light velocity
H total thickness of elements

Group terms according to functions and leave a space between the groups.

d correction for refractive index with window
Dm/n a correction term required when a window material with a stress-dependent refractive index is used

Acronyms, initialisms, and special terms:

When your report contains numerous acronyms, initialisms, or special terms, help your audience by listing them in a special section. Give the sections an appropriate title: nomenclature, acronyms, special terms, or other appropriate words. The audience will appreciate this courtesy. Even though you may think "everyone" will know what you mean, many people who are not thoroughly familiar with the terminology in your particular field will read the report. Also, the report is a permanent record, and by defining the acronyms you are ensuring that the terms will be clear to readers many years later.

When we use the initial letters of words within a phrase to form an abbreviation, we informally refer to that abbreviation (which is usually all caps) as an *acronym*; however, technically speaking, it may be either an *acronym* or an *initialism*. The distinction between the two is that the acronym can be pronounced as a word but the initialism cannot. In practice, the only reason such a distinction must be made is to determine which indefinite article (a or an) to use. (See the last item on this page.)

Treatment of items in the listing:

- Capitalize the expanded terms as you would in text; use capitals only when they are required by the standard rules of grammar — NOT to indicate which letters make up the acronym.
- Group terms in the following order, with a blank line between the groups: acronyms, abbreviations, and general terms; mathematical English letters or terms; mathematical Greek terms.
- When a letter in the listing appears as both capital and lower case, list the lower case terms first.
- The generic title "nomenclature" includes acronyms and initialisms, symbols, and special terms.

Treatment of items in the text:

- At first use in text, enter the phrase as it usually appears (this is the "expanded" term) followed by the abbreviated form in parentheses. In a long report, you may want to refresh the reader's memory in a later section by showing both the acronym and its expansion.
- For an isolated use of the phrase much later in the text, simply use the expanded term.

Pluralizing abbreviations:

Add "s" as in PMTs. Use the apostrophe only when not doing so might cause confusion, as in K_d's.

Using the correct indefinite article:

The choice of an indefinite article (a or an) is based on pronunciation — "a" before consonant sounds and long "u" sounds; "an" before vowel sounds. Examples: an ICBM, a FROG, an FFT, a FORTRAN program, an ADNET.

The Velocity Interferometer System for Any Reflector

Mod B, the Push-Pull With Double-Delay-Leg and Dual VISAR Modes

Introduction

The modern standard for measuring shock phenomena is the Velocity Interferometer System for Any Reflector (VISAR).¹ The VISAR uses coherent, single-frequency light from a laser source to measure the motion of a diffuse, reflective surface. The Doppler shift in the reflected light is detected in a modified Michelson interferometer. The inherent sensitivity, resolution, and frequency response of such a system are essentially limited only by the bandwidth of the optical detectors and recording equipment.

This report describes the development and operation of the VISAR Mod B Push-Pull with Double-Delay-Leg and Dual VISAR modes.

Background

The VISAR development started with the conventional version originated by L. M. Barker and R. E. Hollenbach of Division 1534 and progressed through the Push-Pull VISAR modification (Mod A) made by W. F. Hemsing of Los Alamos National Laboratories.^{1,2} The early 1970s experiments of J. E. Kennedy of Division 5131 and the author first used the double-delay-leg technique incorporated in the current Mod B.³ Each version resulted from a new need. To establish a background for understanding the current version, each of the earlier versions is discussed.

Introduction:

The function of an introduction is to inform the reader of the following:

- The exact *subject* of the report. Try to present a key idea in the first sentence or two.
- The exact *purpose* — why the report is being written; why the work is important.
- The *scope* — the “range” of the subject matter, that is, the detail in which it is discussed (and sometimes in what detail it is not discussed). The scope may require a section of its own.
- The *plan of development* — how you have organized your report. This information should appear near the end of your introduction. (This does not mean that you name each section. Rather it means that you explain the order in which you develop the report; be careful that your explanation is given in the same sequence in which you present the development in the text.)
- Identity of audience to whom you are directing the report and how the information will be used by this audience.
- A brief explanation of any outside sources you are using.
- Background information the readers need to understand the report better. The background sometimes may be long enough and important enough to require a section of its own, as in this example report.

The *length* of your introduction is determined by what is needed to set the stage for your readers to readily get a clear concept of your objective. It may be only a few sentences or it may be quite long; include only what is necessary.

Sample Report

The Conventional (Original) VISAR

The conventional VISAR was developed by Barker and Hollenbach primarily to measure free-surface velocities of materials in gun-impact experiments.¹ In this type of experiment, projectile velocities are very accurately measured (by other means), and well-defined experiments can be performed with results that are predictable in many respects. Uncertainties in the number of missed fringes at a shock jump may be resolved by using the known impact velocity and the impedances of the impactor and target materials.

The features of a conventional VISAR are shown in Figure 1. A diffused beam containing the target Doppler information is returned to the VISAR table, passing through a telescope to reduce the beam diameter. A small part of the light beam is split off to an intensity monitor, and the remainder is routed to the main beam splitter of the interferometer. Half of the signal is sent through a reference leg and half through the delay leg, whose medium is air and fused silica.

This beam is delayed by a time, t , caused by the difference in the index of refraction of the fused silica in the delay leg and the air in the reference leg. The beams are reflected and recombined at the main beam splitter, where interference is developed. A phase shift is produced in the recombined beam by a change in the target velocity. When the beam recombines, half of the recombined beam propagates in two directions away from the beam splitter, and interference phase information is present in each beam. One of the recombined beams is routed to the photo detectors, while the other beam is wasted. A polarizing beam-splitting cube splits the beam into two quadrature components: S and P polarized light beams.

Developing the text:

Decide before your first draft what your primary order of development will be. Making this decision at the very beginning will help you write a closely knit report. Here are suggested methods for organizing particular types of material.

<u>Method</u>	<u>Appropriate Use</u>
Sequential	to write a set of instructions or procedures.
Chronological	to emphasize the time element.
Comparison	to write about a new topic that is similar to others (as in this report).
Division and classification	to describe a device that can be broken into its component parts.
Spatial	to describe the physical appearance of a device, going from top to bottom, outside to inside, and so on.
General to specific	to write about, say, a software program, starting with the general function of the program, going to the larger routines and their functions, then the smaller routines and their functions.
Specific to general	to do the reverse of the previous method.
Decreasing order of importance	follows the same logic as general to specific.
Increasing order of importance	follows the same logic as specific to general.

Different methods in the same report:

Remember that different sections may require different types of development. For example, background may be chronological, and product description may be spatial. Use the same method for similar topics.

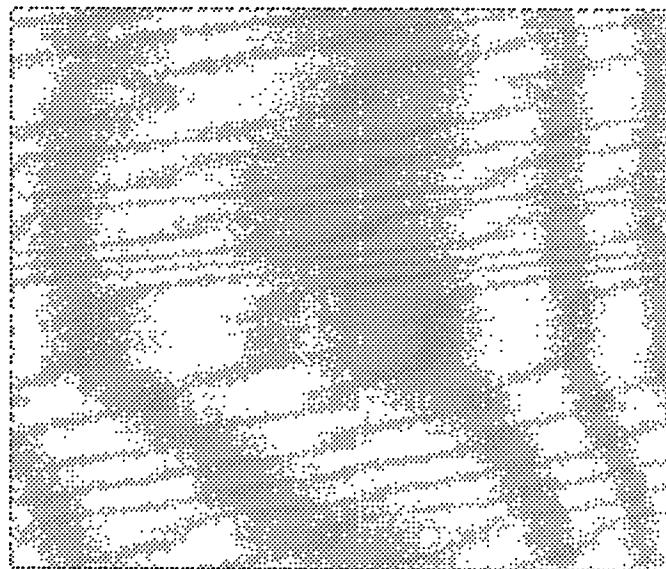


Figure 1. The Original VISAR Model (L. M. Barker and R. E. Hollenbach, Laser Interferometer for Measuring High Velocities of Any Reflecting Surface in *J Appl Phys*, Vol 43, No. 11, Nov 1972.).

Graphics, headings, and reference citations:

Because these topics occur throughout your report, they are combined here for convenience.

Figures and tables (graphics):

- Relate your graphics clearly to the text. Use consistent terminology in both. Use graphics only to serve a specific purpose — not as fillers.
- Use concise figure captions and table titles that clearly describe the content.
- *Do not use duplicate captions or titles.* If a figure or table is not different enough to deserve a different caption or title, maybe you do not need to include it.
- Call out all figures and tables in the text, and call them out sequentially.
- If a figure is taken from a published non-Sandia source, obtain written permission from the previous publisher. Then cite that source in your graphics caption, or above the caption, so that the original source will “travel” with the graphic if someone else decides to use your version of it. Use words such as “Reproduced with permission from (and give the source information, including the publisher).” See pages 80 and D4-D5.

Headings:

- Use headings to flag the logical divisions of your text so the reader can (a) easily understand your method of developing the material and (b) locate a subject quickly.
- Make headings descriptive, brief, and parallel in structure.

Reference citations:

- Cite references by sequential numbering or the author-date system. Sequential-number citations should either be superscript numbers or on the line and bracketed: . . . was reliable.²; . . . was reliable [2]. Author-date citations should appear in parentheses on the line in the following form: (Smith 1992), (Jones et al. 1991), (Smith 1992, Kirkpatrick 1986a and 1986b). Kirkpatrick had two publications in one year, so to distinguish the citations they are labeled “a” and “b” and are listed that way in the reference list.
- If a superscript citation could be misinterpreted as a mathematical exponent, as in “a total of 36 ft²,” write “a total of 36 ft (Reference 2)” or “a total of 36 ft (Ref. 2).” If the reference itself forms part of the sentence, write (for example) “Reference 3 contains diagrams of the unit.”

Sample Report

The target velocity information is contained in the phase-time history of each of the S and P polarized light beams. These beams are monitored by photomultiplier tubes (PMTs). The P polarized light is Data 1, and the S polarized light is Data 2. The recorded output of the PMTs is used to determine the target velocity, which is related to the instantaneous phase, ϕ , by the equation

$$u(t - \tau/2) = \frac{\lambda\phi(t)}{2\tau(1 + \Delta\nu/\nu)} \frac{1}{1 + \delta}$$

where

- τ = delay time in the interferometer
- λ = the source wavelength
- $\Delta\nu/\nu$ = a correction term required when a window material with a stress-dependent refractive index is used
- δ = a correction for refractive index with wavelength⁴

The amplitude (envelope) of the phase information may change during an experiment because the target surface conditions may be altered by the shock wave. Thus, in conventional VISAR, measurement of instantaneous phase involves comparison of each data signal with the instantaneous overall amplitude or intensity.

Equation (1) may be solved for the velocity per fringe (VPF):

$$VPF = \frac{u(t - \tau/2)}{\phi(t)} = \frac{\lambda}{2\tau(1 + \Delta\nu/\nu)} \frac{1}{1 + \delta}.$$

Equations and mathematical English:

- If you handwrite your equations in the draft, use ink and form the characters carefully, especially Greek and other mathematical symbols. Circle any confusing term at first use and write in the margin what it is. Examples are ρ and p (rho and pee); η and n (eta and en); δ and ∂ (delta and partial derivative); χ and x (chi and ex). Write superscripts and subscripts so that the typist or others can easily distinguish them.
- Write any special instructions to the typist on a cover sheet or at the appropriate place in the draft. If you have a strong preference as to where the equations are to be broken at line endings, write instructions. Examples: after equals sign, before operators, no breaks immediately before dx , and so on. Because redoing equations is very time-consuming, any guidance you can give in your draft to help the typist get it right the first time is well worth the effort. The typist is not a mathematician and so must rely solely on the clarity of your draft.
- Punctuation of equations is a personal choice. The smoothest style is to punctuate them according to their function in the sentence. However, some authors prefer to use no punctuation (referred to as "open" style). Indicate your preference at the beginning of your draft, or at the beginning of the equations, so the typist will be certain about the style. Be consistent, whatever your choice. Indented paragraphs in a document with lots of equations allow you to distinguish when an equation occurs in the middle of a paragraph (no indent there).

The Mod A (Push-Pull) VISAR

VISAR Mod A, the Push-Pull VISAR, was developed by W. F. Heming.² The Push-Pull VISAR eliminates some of the problems in the reduction of data recorded from the original VISAR, caused by changes in light intensity in the return beam. The Push-Pull VISAR (Figure 2) makes use of the previously wasted light beam from the main beam splitter. This beam contains the same interference information as the first beam, but is opposite in phase. This light beam is routed to a second polarizing beam splitter, which produces $-S$ and $-P$ polarized light beams in the same manner as the first polarizing beam-splitting cube. These two beams are routed to two additional PMTs.

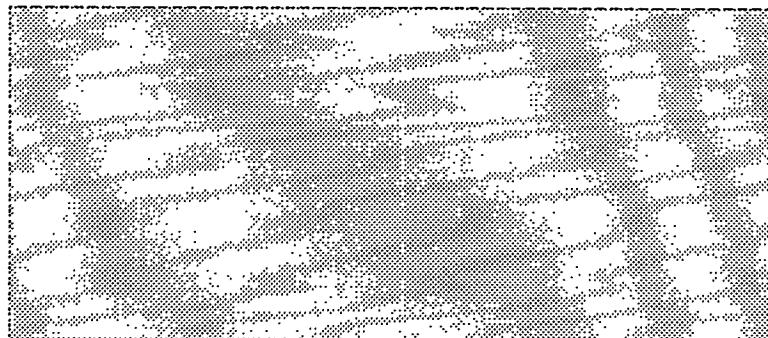


Figure 2. Push-Pull VISAR (uses the waste beam that contains the same Doppler information as the main beam).

The PMT output from the $-S$ polarized light PMT is inverted and added electronically to the output of the $+S$ polarized light PMT. In the resultant signal, the amplitude of the phase information is double the amplitude from one PMT. The P polarized light is likewise summed to provide a quadrature signal with the same phase-time history information. Furthermore, self-light, which contains no phase information, is an equal additive component in both PMTs. Since one of the PMT signals is inverted before summing, the self-light components cancel. Thus, the Push-Pull VISAR system is particularly suitable for use in experiments that produce self-light.

Since each of the electronically combined signals can oscillate symmetrically about zero, overall intensity envelope information is not required for data reduction. For this reason, monitoring of the overall beam intensity is not necessary, although some test diagnostic information is present in the intensity record. In some experiments, the self-light or reflected light may reach saturation levels for the PMTs. Under these conditions, the data records for the Push-Pull VISAR, like those for conventional VISAR, no longer provide reliable phase information. An intensity monitor would reveal the fact that the overall light level was too high in this case.

The Double-Delay-Leg VISAR

In experiments involving shock jumps in surface velocity, the recording equipment cannot track the change in phase. An uncertainty consisting of an integer number of fringes exists at such jumps in the record. The use of a VISAR with two delay legs set at different sensitivities can resolve the ambiguity in the data. The first experiments using the concept of a Double-Delay-Leg VISAR at Sandia Laboratories were performed by Kennedy and the author of this report in the early 1970s.⁵

The Mod B (Current) System

In the Mod B, a second VISAR was added to the Push-Pull VISAR system, giving it the additional capability to measure two separate points. When use of the second VISAR is blocked by adjusting certain beam splitters and mirrors, the system can be used in the Double-Delay-Leg mode to resolve shock jump ambiguity.

Layout and Operation of the System

The Mod B system is assembled on a horizontal breadboard optics table. The laser, a Spectra Physics Model 2000, 5-W, argon ion system, is mounted beneath the table, and the beam is routed up through a hole in the table to the optical train.

The optical layout for the Mod B system is shown in Figure 3. The laser output beam is routed by mirrors M2, M3, M4, and M6 to the target. BS1 is a 50/50 beam splitter, required when the system is used in the Dual VISAR mode. Finally, the outgoing beam passes through a short-focal-length, 5-cm-dia lens to the target. If the target is a diffuse reflector, a cone of the reflected light is collected by the short-focal-length lens, which serves as a collimating lens. The beam is then routed by steering mirrors M6, M5, and M7 into a telescope, which reduces the beam diameter by a factor of 10. The beam passes through a 0.30-nm bandpass filter, the center wavelength of which is 514.5 nm. This filter eliminates extraneous light signals and most of the self-light that may be generated by the target. Next, the beam enters a linear polarizer, which transforms circularly polarized light to linearly polarized light at 45° relative to the table.

When the VISAR is being used in the Double-Delay-Leg mode, part of the beam is sent to the second delay leg by beam splitter BS2. Part of the light is also reflected by BS3 (an 80/20 beam splitter), to be used to monitor beam intensity. The larger part goes to M8 and M9 and is incident on the main beam splitter, a 7.5-cm-dia, 50/50 beam splitter, mounted 11° of normal. From the main beam splitter, half of the beam traverses each of the two legs to mirrors and back to the main beam splitter, where they recombine. Fused silica optical delay bars and a 1/8 wave plate in one leg delay the light by some time, τ :

$$\tau = \frac{2h}{c} \frac{n}{n-1}$$

where

- h = the total thickness of the elements
- c = the velocity of light in free space
- n = the index of refraction of the elements

The interference produced when the two beams recombine at the main beam splitter contains the velocity information. The information is present in both the transmitted and reflected beams, with a phase difference of 180°. The two beams are routed to beam-splitting cubes BSC1 and BSC2. Each cube splits its beam into S and P components, which have a phase difference of 90° introduced by the 1/8 wave plate at the end of the delay leg. The S and P polarized beams of light are then routed to the photomultipliers. The outputs of the two photomultipliers receiving the P polarized light are summed in a differential amplifier, one being

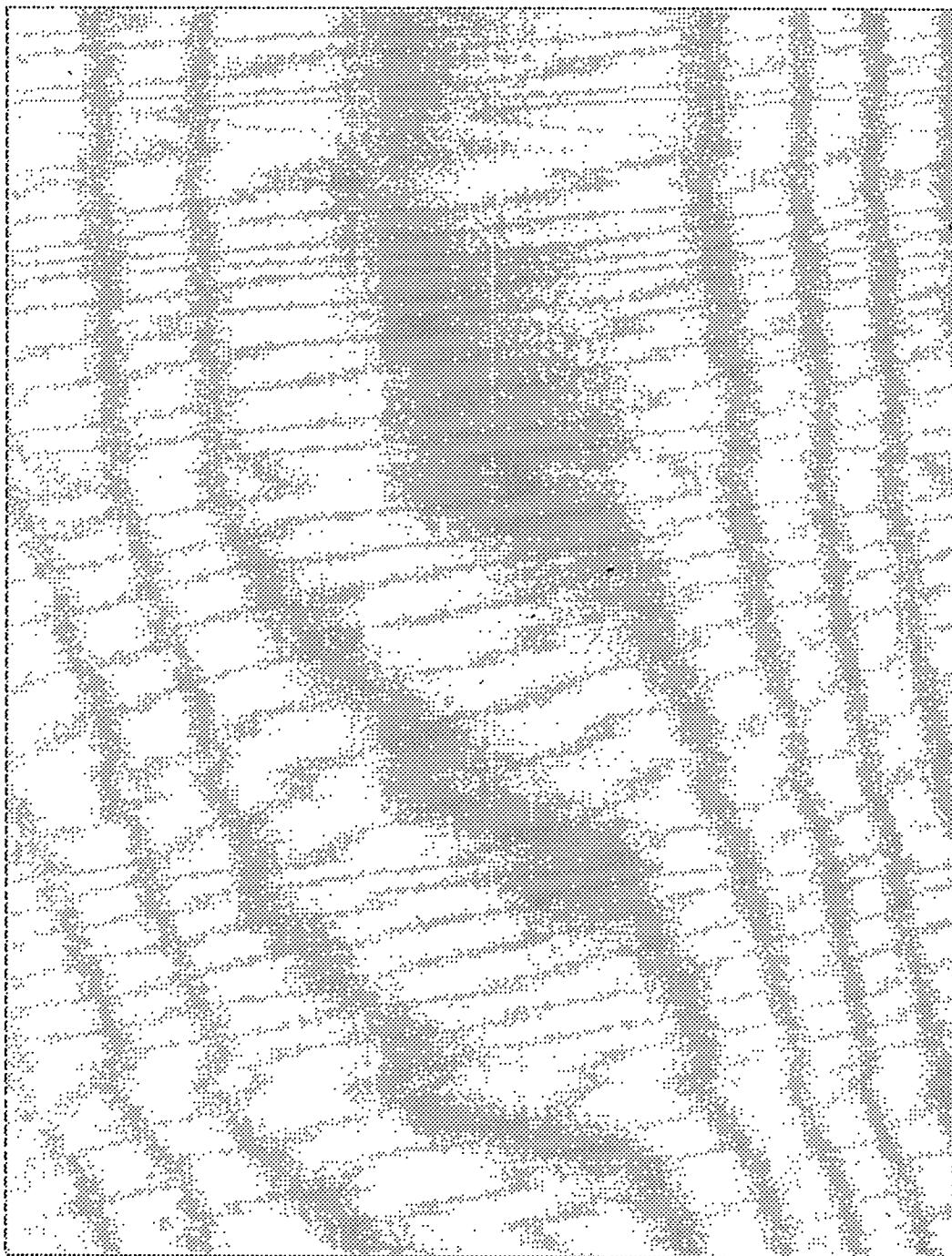


Figure 3. Layout for Sandia's Mod B Push-Pull VISAR with Double-Delay-Leg and Dual VISAR Modes.

Sample Report

inverted. The resulting signal is Data 1. The two outputs of the photomultipliers receiving the S polarized light are combined in the same manner, producing Data 2. Data 1 and Data 2 are quadrature signals containing the velocity information.

The piezoelectric translator (PZT) is used during setup to produce slowly varying phase interference.

Operating Modes

The addition of a second Push-Pull VISAR system on the same table enables the operator to use the system either in the Double-Delay-Leg mode to obtain a redundant measurement from the second system for comparison with the results from the primary system or in the Dual VISAR mode to use the second VISAR to measure a separate point.

Conversion between the Double-Delay-Leg mode and the Dual VISAR mode is simple. It involves three turning mirrors and slight readjustment of the back-off position of the delay-leg mirrors.

Flip mirror M1 must be in position for Dual VISAR experiments and out of position for Double-Delay-Leg experiments since it determines which information enters the second leg. BS1 is required for the double-target VISAR operation since it splits off half of the outgoing beam to be routed to the second target. It should be removed for single-target experiments to increase the available light to the photomultipliers.

BS2 is required for Double-Delay-Leg, single-target experiments since it sends half of the Doppler shifted return beam to the second leg. It should be removed for Dual VISAR experiments since it reduces the single level by a factor of 2.

Since BS2 has finite thickness and is mounted at an angle relative to the light axis, the beam passing through it is offset. Thus, repositioning BS2 required minor adjustment of

Pages 8 through 17 of the report have been omitted because they serve no illustrative purpose.

Conclusion

The Mod B Push-Pull VISAR with Double-Delay-Leg or Dual VISAR mode has proved to be a very useful tool in our diagnostic lab. With the 400-MHz data-recording capabilities, we have been able to characterize numerous flying foil configurations using both the Dual VISAR and Double-Delay-Leg modes without missing fringes caused by frequency response limitations. We have also been able to obtain very reproducible data from similar experiments.

Closure:

- End your report with a summary, a statement of the value of the report, a recommendation, or whatever concluding remarks are appropriate.
- Make some significant point, an indication of possible future use, or some other remarks that keep the readers from feeling they have simply been dropped.
- The current trend is to place the summary at the front of the report, where a busy person can quickly get a "thumbnail" concept. If your summary has been placed at the front of the report, use some other concluding paragraph to tie off the report.

References

¹L. M. Barker and R. E. Hollenback, Laser Interferometer for Measuring High Velocities of Any Reflecting Surface, *J. Appl. Phys.*, vol 43, no. 11, Nov 1972.

²W. F. Hemsing, Velocity Sensing Interferometer (VISAR) Modification, *Rev. Sci. Instrum.*, vol 50, no. 1, Jan 1979.

³J. E. Kennedy, Org. 5131, Sandia National Laboratories, private communication.

⁴J. R. Asay, Shock and Release Behavior in Porous 1100 Aluminum, *J. Appl. Phys.*, vol 46, no. 1, Jan 1975.

⁵J. E. Kennedy and O. B. Crump, Jr., SNL, unpublished results.

⁶R. W. Barnard, DATACO - Digitizer Control and Data Acquisition Program, SAND87-2029. Sandia National Laboratories, in process, Albuquerque.

References:

A general guideline for references is that if an authorized reader of one document would *not* have access to a second document, we should not cite the second document in the original document. For example, in an Unlimited Release document, do not cite another document with any kind of limitation that would keep a reader from accessing it.

Unless it is necessary to do so, do *not* cite (1) an Export Controlled Information document in another document that would be available for foreign distribution, or (2) an UCNI document in another document with no limitation or a less strict limitation, or (3) a classified document in an unclassified document.

In a report going to a wide distribution, avoid referencing unpublished work or verbal communication that would be difficult or impossible for non-Sandia recipients of the report to access.

Format

See Appendix C for guidance on formatting references.

APPENDIX

(Place Title Here)

This report does not contain an appendix.
If you have an appendix, place it after the References.

Appendices:

Use an appendix to include material that supplements the report but is not appropriate to include in the report. The report itself should not suffer if the appendix is removed. Examples of supplemental material appropriate for an appendix are equations, related correspondence, and related tests or experiments.

Note: Give credit to the person who authored an appendix if that person is not one of the authors of the main report.

- Do not use extra material in the appendix simply to "pad" the report (e.g., Product Specifications and other drawings that are not needed to understand the report and that are already in the SNL film banks).
- If you have only one appendix, do not use a letter suffix. Use only the word APPENDIX, followed by a descriptive title. Example: APPENDIX, Memorandum Outlining ABC Company's Experience.
- If you have more than one appendix, use a letter suffix with each. Example: APPENDIX B, Computer Program XYZ.
- Call out each appendix in the text, in alphabetical order. Examples are "... described in the Appendix"; "...described in Appendix A."
- Number tables and figures with the appendix letter followed by the sequential number of the figure or table. Examples: Table B-1; Figure C-6. If you have only one appendix, use "A" before the sequential number. Example: Figure A-1.
- Do not include appendix references in your reference list for the body of the report. Each appendix should be self-contained, as should the report itself. Compile a separate reference list for each and number the appendix references with the suffix for that appendix. Examples: A-1, A-2.
- Include each appendix and its title in the Contents, but do not include any headings of the appendix, or its figures and tables. If that amount of content detail is needed, include it at the beginning of the appropriate appendix as a Contents section. (Remember: Each appendix should be self-contained.)

Sample Report

DISTRIBUTION:

1 R. E. Hollenback
5439 Charlotte Way
Livermore, CA 94550

1 Los Alamos National Laboratory
Attn: W. F. Hemsing, M-7
PO Box 1663
Los Alamos, NM 87545

1 Monsanto Research Corp/
Mound Labs
Attn: B. Nyer
PO Box 32
Miamisburg, OH 45342

2 KTech Corp
Attn: L. Lee
R. Reinhart
901 Pennsylvania Ave.
Albuquerque, NM 87110-7491

1 MS xxxx R. A. Graham, 1132
1 xxxx M. Lewis, 1132
1 xxxx B. W. Duggin, 1221
1 xxxx E. C. Cnare, 1221
1 xxxx G. T. Holman, 1266
1 xxxx D. A. Benson, 1512

**NOTE: This distribution list has
been updated to include mail stops.**

1 MS xxxx L. W. Davison, 1530
1 xxxx J. R. Asay, 1534
1 xxxx L. M. Barker, 1534
1 xxxx L. C. Chhabildas, 1534
1 xxxx C. H. Konrad, 1534
1 xxxx R. D. Hardy, 1534
1 xxxx J. M. Miller, 1534
1 xxxx D. H. Anderson, 2510
1 xxxx J. G. Harlan, 2512
1 xxxx E. J. Hart, 2513
1 xxxx S. G. Barnhart, 2513
1 xxxx L. L. Bonzon, 2514
1 xxxx W. P. Brigham, 2514
20 xxxx O. B. Crum, 2514
1 xxxx D. W. Dugan, 2514
10 xxxx P. L. Stanton, 2514
1 xxxx L. J. Weirick, 2514
1 xxxx R. D. Wickstrom, 2514
1 xxxx P. D. Wilcox, 2515
1 xxxx R. E. Setchell, 5164
1 xxxx W. C. Sweatt, 7556
1 xxxx N. Ng, 8445
1 xxxx Central Tech Files, 8523-2
5 xxxx Technical Library, 4414
1 xxxx Print Media, 12615
2 xxxx Document Processing, 7613-2
For DOE/OSTI

These are record copies, also called "house-
keeping" copies, for Unlimited Release reports.

Distribution lists:

- Use discretion in compiling the distribution list. Keep the number of copies as low as possible and still inform interested people about your work.
- Arrange the list of internal recipients by organization numbers (lowest org. numbers, first).
- If you do not know what housekeeping (record) copies to include on the list, see Samples 3-9 and 3-10, or call Print Media Department 12615.
- The format of this distribution is set up so that the number in the first column is the number of copies going to a single address. If one of the recipients in an "Attn:" list is to receive more than one copy, place the number for that recipient in parentheses following the name. Example: B. Reinhart (3). The advantage of this format is that the chore of totaling the copies to be printed is much easier.
- In unclassified reports, place all housekeeping copies at the end of the list. In classified reports, place 8523 (Sandia/California Library) at the end of the external recipients and all other housekeeping copies at the end of the list. (Classified mail to Sandia/California must go through an approved mail channel and is therefore considered external.)
- In reports dealing with sensitive information such as Export Controlled Information, check that all recipients are authorized to receive that level of information.

SECTION 3

Format, Layout, and Graphics

Intentionally Left Blank

Format

The Changing Role of the Author

In the past, authors (or Information Providers) concerned themselves little with format and layout. Either the secretary or the writing/editing/typesetting organization handled those details. However, since desktop publishing has entered the picture, many authors input their own text, figures, and tables in final or almost final form (with very little reworking by a secretary or typist). The output is then printed on a high-resolution laser printer and submitted as the Print Shop masters. Authors who follow this procedure need to be concerned with the appearance of the report as well as the content. This section gives some guidelines and examples.

Sandia's Official Name and Addresses

Styles for referring to Sandia

Sandia's official corporate name, "Sandia Corporation," should be used in legal and official situations such as contracts, leases, and other formal documents.

In other cases, follow these guidelines:

Formal reference:

"Sandia National Laboratories"
"Sandia National Laboratories/New Mexico"
"Sandia National Laboratories/California"

Note: The city names "Livermore" and "Albuquerque" are no longer used to refer to the different sites.

Informal reference (for internal audiences and others familiar with Sandia):

"Sandia" where an informal reference is appropriate.
"Sandia/NM" and "Sandia/CA" to refer informally to the individual sites.
"SNL/NM" and "SNL/CA" when brevity is necessary or space is limited.

The facilities may also be referred to as "the California laboratory" and "the New Mexico laboratory."

Examples:

Sandia National Laboratories/New Mexico is the site of PBFA II.

The Combustion Research Facility at **Sandia/California** develops and applies new research tools to problems in combustion research.

Sandia National Laboratories is one of the nation's largest research and development engineering facilities.

Sandia has established programs in several areas of renewable energy and conservation.

SNL's lead role in photovoltaic conversion includes crystalline cell research and development. **SNL/CA** develops and applies new research tools to problems in combustion research.

The California laboratory is a leader in this effort. **SNL/California** is home to more than a thousand Sandia employees.

Sandia's addresses:

The US Postal Service requests that we follow the format below to receive mail from outside Sandia:

Sandia National Laboratories
Name (initials and last name or full name)
Mail Stop (MS ####)
P.O. Box 5800
Albuquerque, NM 87185-#### (Mail Stop number)

Sandia National Laboratories
Name (initials and last name or full name)
Mail Stop (MS ####)
P.O. Box 969
Livermore, CA 94550-0969

Sandia National Laboratories
Name (initials and last name or full name)
Mail Stop (MS ####)
P.O. Box 871
Tonopah, NV 89049-0871

Print Styles and Sizes

Body text

Print styles vary with the company producing the software, but usually a similarity in names means the appearance will probably be similar. Century Schoolbook with a 12-point size is a commonly used font and size combination that have stood the test of time. The font used for the body text of this document is Times New Roman at a size of 12 points. It has a larger x-height and is more compact, which means that more text can be put on a page. We suggest that you compare samples of the fonts on your system for readability.

Ease of reading should be the controlling factor in scientific and technical reports. The consensus is that serif fonts, such as Century Schoolbook and Times New Roman are the easiest to read. However, new software is being produced so rapidly that system users must develop their own sense of what is most readable. (See Sample 3-11 for the Print Media Department's recommended text fonts and text sizes in standard SAND reports.)

We discourage the trend to use *very* small print. That practice may produce a neat, attractive page, but it reduces readability — and readability is the goal. Another factor to consider is that most SAND reports will be reduced to 75% when they are microfiched, and the small print then becomes illegible.

Compare the readability of the following examples of the same paragraph, set in different fonts and sizes:

We discourage the trend to use *very* small print. That practice may produce a neat, attractive page, but it reduces readability — and readability is the goal. Another factor to consider is that most SAND reports will be reduced to 75% when they are microfiched, and the small print then becomes illegible.

— *Century Schoolbook, 11 point*

We discourage the trend to use *very* small print. That practice may produce a neat, attractive page, but it reduces readability — and readability is the goal. Another factor to consider is that most SAND reports will be reduced to 75% when they are microfiched, and the small print then becomes illegible. — *Times New Roman, 11 point*

We discourage the trend to use *very* small print. That practice may produce a neat, attractive page, but it reduces readability — and readability is the goal. Another factor to consider is that most SAND reports will be reduced to 75% when they are microfiched, and the small print then becomes illegible. — *Times New Roman, 10 point*

We discourage the trend to use *very* small print. That practice may produce a neat, attractive page, but it reduces readability — and readability is the goal. Another factor to consider is that most SAND reports will be reduced to 75% when they are microfiched, and the small print then becomes illegible. — *Times New Roman, 9 point*

In choosing a print style, look at the spacing between thin letters. If they are too close together in a particular face, the text will be hard to read, so you would want to avoid that face for text. For example, Arial Narrow has little space before and after the i and l: responsibility, RESPONSIBILITY.

Other factors to consider when choosing a style are legibility of superscripts and subscripts and compatibility of text and equation symbols. Symbols in the text should closely resemble those in displayed equations. If a document contains numerous displayed equations, address this problem before starting the document.

Headings and titles

A bold “sans serif” font such as Helvetica, Arial, or Geneva works effectively for headings and titles. It produces a clean, compact line that is easy to read and contrasts well with the text. Bold Arial in Microsoft Word for Windows was used for the headings in this report.

All-Cap vs. Lowercase Headings and Titles. All-cap headings have long been discouraged because long lines of all-caps are difficult to read. And readability is of prime importance in SAND reports. Compare these styles of headings for readability:

ADDRESSOGRAPH REQUIREMENTS FOR MASS MAILINGS TO PLAN PARTICIPANTS IN THE ALBUQUERQUE AREA

Addressograph Requirements for Mass Mailings to Plan Participants in the Albuquerque Area

Addressograph requirements for mass mailings to plan participants in the Albuquerque Area

The lowercase headings can be read at a glance, whereas one must almost study the all-cap version. On the other hand, short all-cap headings (up to three short words) do not present much of a readability problem and can sometimes make heading levels more evident.

MASS MAILINGS

Mass Mailings

Mass mailings

Obviously, the use of all-caps for headings is a judgmental matter. Just consider readability when selecting headings.

Page Margins and Page Numbers

Use at least a 1-inch margin on the page top, bottom, and sides. Place the page number 1/2 inch from the bottom of the page, either centered or flush with the outside margin (see Sample 3-12). Be consistent in placement of the page number because the printer frequently uses it as a guide in aligning the master during the photographing process — and because the report will look better.

Ragged Right Margin vs. Justified Right Margin

The consensus among those who have conducted studies on the subject is that text with a ragged right margin is easier and therefore faster to read than text with a justified right margin. Although justified text may produce a more aesthetic page, it may also create uneven spacing between words that can be distracting. If justified text is chosen, the text should be checked for this problem.

Line Length

For a double-column format, each column should be about 3-1/4 inch wide, with a “gutter” of about 1/4 to 1/3 inch between columns. Total text width should not exceed 7 inches (see Samples 3-11 and 3-13).

For a single-column format, a line of 6-1/4 or 6-1/2 inches is the easiest to read in most standard type sizes and styles (10 to 12 points). Never exceed 7 inches for line length. If you must use a 7-inch line, for readability you should use 11- or 12-point type (see Sample 3-14).

Keep in mind that artwork must be sized to fit within whatever line length you choose.

Line Spacing

As a general rule, use single-line spacing. In reports that contain equations, one-and-a-half- or double-line spacing may be used. Keep in mind that more than 2 or 3 points of white space between lines make reading of the text slower because the eye has to jump from line to line rather than flowing over the text.

Paragraph Spacing

Double-space between paragraphs. Use either block or indent style, but be consistent throughout the report. (If text contains equations, indented paragraphs allow the author to indicate whether text following a displayed equation is a new paragraph.)

Spacing for Headings and Titles

In large reports, dropping the major section titles down two or three spaces from the top of the text area and using larger type help the reader locate new sections quickly. This treatment is called a “drop head.”

Keep headings and titles brief and descriptive of the text they are heading.

Section or Chapter Numbering

In large reports, numbering the sections or chapters can be helpful. Arabic numbers are preferred. Numbering major sections does not require that paragraphs within a section be numbered, although they may be.

Note: In large reports, another aid to the reader is to show the section number and title in a header or footer.

Paragraph Numbering

Paragraph numbering is not required in SAND reports. In reports that have no internal cross referencing, paragraph numbering can even be distracting. However, when it helps the reader locate information in the document, it can be invaluable.

When paragraph numbering is appropriate, try to limit the numbering to two decimal places, for example, 1.2.16. Beyond that, use Arabic numbers and letter designators, such as 1.2.16, subparagraphs a, b, etc.

Page Numbering

For unclassified reports

Front Matter. Number front pages, except title page (no number), with lowercase Roman numerals. If the page following the title page (usually Acknowledgments) is blank, the first numbered page will be *iii*, which will usually be the Contents. (The Contents should begin on a right-hand [odd-numbered] page.) If any subsequent left-hand (even-numbered) page is blank, number that page as usual and center the words *Intentionally Left Blank* on the page. Right-hand pages should never be blank. Using Roman numerals for the front matter allows additions or changes to be made without affecting the page numbers in the body of the report.

Body of the Report. Use either standard or section-number style:

Standard-numbering style. The standard style is preferred. In this style, number pages sequentially from 1 to the end of the report, including any appendixes and the distribution list.

Section-numbering style. Using the section-numbering style is especially valuable in some reports. It can substantially reduce the writing and production time as well as reduce the chance of errors in tracking and referencing graphics and citations. Situations in which this style would be efficient are:

- In a very cumbersome report.
- If there are several authors, each working independently on one or more sections.
- If the production schedule is so short that more than one editor or information processor must work on the report at the same time.
- If there are long appendixes that require pasting on the page numbers.

In these cases, section-numbering the pages is the most efficient; however, because section-numbering makes the final production and processing cycle more difficult, it should be used judiciously.

To use the section-numbering style, first enter the section number, a hyphen, then the page number for that section: 1-1, 1-2; 2-1, 2-2, 2-3, etc. If the report has appendixes, number the pages A-1, A-2; B-1, B-2, etc. In other back matter: for the glossary, use Glos-1, Glos-2; for the index, Index-1, Index-2; for the distribution, Dist-1, Dist-2.

Note: If section-numbering style is used for page numbers, also use the section-numbering style for tables and figures. References may be cited either by section-numbering or by the author-date style. In either case, list the references for a section at the end of that section. More guidance is given on this in the pertinent paragraphs.

For classified reports

Number pages in classified reports with Arabic numbers consecutively from the front cover (page 1) and legal notice (page 2) to the last page in the document. Number blank left-hand pages at the bottom, and center the words *Intentionally Left Blank* on the page.

If the classified report ends on a right-hand page, follow it with a blank left-hand (even-numbered) page with the correct page number, the proper marking, and the words *Intentionally Left Blank* centered on it.

Hand-inserted photographs or other material require special treatment. Call the Print Media Department for this information.

Headers and Footers

In a report that is broken into major sections, using a header with the appropriate section number (if there is one) and the title at the outside margin of each page, is a help to the reader. This is a nicety, not a requirement. In scientific and technical documents, the header is most appropriately used to provide information that helps the reader rather than to embellish the appearance.

The style of a header or footer should be in keeping with the tone of the document. That usually means simple and functional.

Do not use header or footer capabilities to include the Sandia logo, departmental logos, or the words "Sandia National Laboratories" on internal pages of a report, as part of the document design. Using the Sandia logo on internal pages violates Laboratory Communications policy.

Dashes

Each dash has a special meaning. Use the proper dash for the proper meaning. On a typewriter, two hyphens (--) were used as an *em* dash, and typewriters did not have an *en* dash. Most computer software has the capability to produce these symbols, and that capability should be used. The uses for each are described in the following paragraphs.

The hyphen (-) is strictly for hyphenating words.

The en dash (-), so called because it is the approximate width of an *n*, is used primarily with numbers either as a minus sign (when the system being used does not have a special key for the minus sign) or to indicate continuing or inclusive numbers:

An *en* dash (–) makes an acceptable minus sign. *A hyphen (-) is not a minus sign.* Compare the columns below. The alignment on the one using hyphens is ragged; the alignment on the other is correct. In text, -35 mm should be –35 mm, and 525⁻¹⁰ should be 525–¹⁰. If this last example were sized at 9-point, as is often used in figure captions and references, see the difference: 525⁻¹⁰ should be 525–¹⁰. In the version using the hyphen, one wonders whether there is a speck on the paper or a minus sign. After reduction to 75%, the hyphen may not even be visible.

The en dash as a minus sign:

<u>No</u>	<u>Yes</u>
-634	–634
+523	+523
+125	+125
-100	–100

The *en* dash representing continuing or inclusive numbers
(to replace the word “*to*,” indicating continuing or inclusive numbers — note that no space is used with the *en* dash):

Examples:

- ... *on pages 18–21*
- ... *during the week of May 15–21*
- ... *in Articles I–IV.*

Note: Never use the words “*from*” or “*between*” with an *en* dash.

For example, avoid writing: “*from 1967–1972*” or
“*between 1967–1972*.”

“*From*” requires the word “*to*” (as in “*from 1967 to 1972*”) and
“*between*” requires the word “*and*” (as in “*between 1967 and 1972*”).

Another use for the *en* dash is in a compound modifier where one of the elements is two words or is already hyphenated:

New York–San Francisco flight
quasi-public–quasi-judicial branch

The em dash (—), so called because it is the approximate width of the *m*, is used to indicate an abrupt or more emphatic break than the colon or parentheses. Two little hyphens or an *en* dash with space on each side do not convey this emphasis as effectively. If an *en* dash were not available, the hyphens would have to do, but an *em* dash is available.

Proper use of the dashes adds to the professional appearance of a document.

Consistency

Strive for consistent format. An inconsistent and careless-appearing report may make the reader wonder whether the work was also careless. In your final check, look for the following:

- Page numbers are correctly located (the same distance from bottom edge and outside edge of the page in all cases). The Print Shop sometimes uses the page number to line up the masters.
- Margins are consistent.
- If different margins have been used for right-hand pages and left-hand pages, the widest margin is at the binding edge.

- If dropped section heads have been used, all section heads are dropped consistently.
- All other headings, figure captions, and table titles are formatted consistently.

For a more detailed checklist for report masters, refer to Figures 4-2 and 4-3.

Layout

Placement of Figures and Tables

Display figures and tables as soon as possible after they are called out in the text. We recommend placing them either at the top or the bottom of the text area (not in the middle). Such placement presents an unbroken flow of text and usually a more pleasing appearance.

Obvious Relationship

Readers should be able to easily determine the relationship of graphics to the text and of headings to their text.

Pleasing Appearance

A pleasing overall appearance invites readers to be interested in what you have to say. Squeezed-looking pages, especially, discourage readers.

Graphics

Introduction

Purpose

A graphic should convey the essence of information that cannot easily be made clear with words. It should be a functional part of your report, not a filler or an ornament. If a particular graphic does not substantially contribute to the readers' understanding, consider not using it.

Orientation of graphics on page

The two types of orientation of text or graphics on a page are portrait and landscape (also called broadside). **Portrait** refers to orientation in the normal vertical reading position. **Landscape** requires that the page be turned 90 degrees (clockwise) to view the contents of the page. See Sample 3-15.

Because repeated turning of the document is inconvenient for the reader, place graphics in the same orientation as the text, provided that they remain legible at this size.

Citing non-Sandian source of graphic

If a graphic is taken from another work, that information must be included with the graphic. If a graphic is taken from a published non-Sandia source, obtain written permission from the previous publisher. Cite the source in your graphics caption, or above the caption, so that the original source will "travel" with the graphic if someone else decides to use your version of it.

Examples:

"Reprinted with permission from . . ." if the artwork is used as originally presented.

"Adapted with permission from . . ." if redrawn with minor modifications.

"Redrawn with permission after . . ." if redrawn in substantially the same manner.

Note: Changing the graphic slightly does not relieve the author of the obligation to use a source line. See Appendix D, Copyrights and Permissions, for a full discussion about using the work of others.

Numbers, captions, and titles

Each graphic must have a number and a caption (for figures) or title (for tables). Number graphics sequentially, using Arabic numbers (for example, 1, 2, 3 or, if in section-number style, 1-1, 1-2, etc.). Arabic numbers are quick to read and easy to format, especially in the Contents. In contrast, capital Roman numerals (for example, XVIII or XXVII) are very unwieldy to align in the Contents and slow down the reader when they are referenced in the text.

Use a clear, unique caption or title. If necessary, add parenthetical information to distinguish otherwise identical captions or titles. The caption or title should be short, descriptive, and followed by a period. This will be the entry in the Contents listing. Descriptive text (which will not be included in the Contents) may be entered after the period.

For figures, place the caption 1 to 1-1/2 lines under the illustration. Gaps of three or more lines between the figure and caption are distracting. The figure and the caption should appear as a single unit even when nothing else appears on a page. Enter the figure caption in a font different from the text (a small, bold font, but not smaller than 9 or 10 points). If the caption is a small bold font, enter descriptive matter after the caption in the same font, but not bold. Block the caption under the figure unless the figure is very narrow, in which case the caption can be somewhat wider (but do not run it all the way across the page).

For tables, place the title 1 to 1-1/2 lines above the column headings. Enter the table title in the same font used for figure captions (bold, and not larger than about 11 or 12 points). If desirable, descriptive matter can be added after the title in the same font, but not bold.

Line Drawings

Line drawings include maps, charts, schematic diagrams, and line representations of components or other objects. Some line drawings also contain shaded areas.

Reproducibility

Be sure that graphics are of good, reproducible quality.

- All lines in drawings are solid (no broken or dim lines).
- If computer-generated line drawings with colored lines are to be reproduced in black and white, each line is identified by a unique symbol or otherwise clearly labeled. (Note: Certain colors do not translate well into shades of gray. Green, blue, and yellow — in that order — are the least distinguishable from one another in black and white translations.)

Drawing services

Interactive Media Dept. 12616 can help with all drawing needs. To obtain their services, prepare Form SA 1820-A, Service Order form (Sample 3-16), attach your draft, and send or hand-carry the request to Customer Service or the SCIS clerk. If your instructions are complex, hand-carrying would be the better choice. Most Interactive Media jobs are picked up at the Interactive Media building (rather than being sent through the mail) — this gives the requester the opportunity to proof the work.

Classified artwork. Hand-carry all classified artwork. Be sure to include all available classifying information. On the Service Order, fill in the section called “Complete for Classified Work.”

Value of a good draft and of good communication with artist

A well-executed draft and good communication with the Interactive Media Department contribute immeasurably to the quality of the finished graphic. A few minutes spent in clear communication in the early stages saves time and redrawing later.

Here are some guidelines for creating good graphics and checking the effectiveness of a completed one.

- Give the artist a good, easily read draft. Explain, either by note or in person, areas that might be confusing.
- Tell artist, or note on the Service Order form, the end use of the artwork and whether it will be greatly reduced later. Such information helps the artist determine print size, line weight, etc.
- Make the drawing as simple as possible. Do not clutter it with detail that adds nothing to the reader’s understanding.
- Keep information brief and simple, but include all elements needed to convey an accurate picture. Use simple wording; delete unnecessary words and detail.
- Use terminology that is consistent with the text. If you call a thing a “widget” in the text, then call it a widget in the figure. If you use “cm³” in the text, use the same form in the figure — not “cu cm.”
- Use white space effectively to separate callouts; be sure the reader can quickly relate each callout to its respective area.

- Be careful that the callouts do not overpower the drawing; on the other hand, be sure the print is large enough to remain legible after your planned reductions. See Sample 3-17 to compare print sizes after reduction.

If you take your artwork to Interactive Media, the artist can guide you.

- Include a simple key or legend to explain all symbols.
- Be sure tick marks appear wherever they are needed.
- Label both axes of plots correctly and consistently, and use terms and abbreviations that are consistent with those used in text.

In summary, keep your drawing simple, informative, and easily interpreted. Proof the completed drawing carefully.

Graphs

The most commonly used graphs are line graphs, followed by bar graphs and pie charts.

Because line graphs are by far the most commonly used in scientific and technical documents, some basic guidelines are listed here:

- Render curves with a uniform line that presents a smooth flow without angular change in direction unless the angular change is required to present the information accurately.
- Draw ordinary curves and chart lines through the center of data points. If the curve line would make identification of the data point difficult, a white outline should be left around the point. Curves should not be drawn through open data points.
- Use different line thicknesses for different parts of the graph: thickest for the curve, medium for the abscissa, ordinate, and major division lines, lightest for callout arrows, grid lines (if used), dimension lines, and ticks.
- When data points are not required on curves, use callouts or a simple line system (solid, dotted, dashed, etc.) that is explained in a legend.
- If labels directly on a curve create congestion, use a light-weight indicator arrow to a callout in a less congested location.
- Avoid showing grid lines unless they are required.

- Place legends inside a graph if space allows without overcrowding; otherwise place the legend in an appropriate location outside the graph.
- Use vertical labeling for the y-axis of a graph.

Oversize Figures

Some figures (usually engineering releases and strip charts) are too large for a standard page and must be handled as foldouts. Because foldouts are more expensive to print and collate than standard sheets, use them only when absolutely necessary.

Foldout masters. Standard foldout masters come in three sizes, described below, and can be obtained by hand pickup from the Senior Clerk in the Print Media Department.

Term used for the master	Size of available mounting area	Size of printed page	Form No.
1 to 1 foldout	9×15-1/2 in.	11×17 in.	SA 1820-GC
1/8 oversize foldout	10-1/8×17-11/16 in.	11×17 in.	SA 1820-GUC
1/4 oversize foldout	12×20-5/8 in.	11×17 in.	SA 1820-GJC

Oversize masters. Material that is larger than the standard 7×9-in. text size can sometimes be mounted on oversize masters that will be reduced to standard size by the printer. An example is a computer printout that will not fit on the standard page. The oversize masters, unlike the foldout masters, can be ordered from JIT.

The following table lists available oversize masters:

Term used for the master	Size of available mounting area	Size of printed page
1/8 oversize	8×10-3/4 in.	8-1/2×11 in.
1/4 oversize	9-15/16×12 in.	8-1/2×11 in.

Computer Art Generated by Line Organizations

Many organizations now create figures, frequently in color, on their own PCs and use the printout as original art masters or to be electronically integrated into the final document and printed out on the print shop masters. If you computer-generate your own artwork, consider the points made in the previous paragraph. Also pay special attention to the following items.

- If you create your own artwork on the computer, you must make the decisions about print size. The current trend to use very small print for callouts causes problems when DOE/OSTI or our library make copies that are reduced to 75%. Information you consider vital may become lost at that point. Even if the information is not vital, the reader will not know that and will be disturbed about what is illegible. Ten points is the preferred minimum for callouts on the artwork masters, although 9-point type may be legible, especially if it is bold.
- Lines clearly differentiated by color in the original may require some additional identification to be distinguishable in black and white reproduction.
- Representations should be made in black and white if possible. Color should be used for the final report only when it adds information to the graphic. Reproduction by color copier is still tedious. Two-sided printing of color is not done because it quickly gums up the copying equipment. It is possible to print "Intentionally Left Blank" and a page number on the back of a color copy, but that is all.
- Large blocks of color may be indistinguishable from one another when the illustration is printed in black and white. Unless you are sure that the colors will translate into distinguishable shades of gray, use additional identification, e.g., crosshatch, texture, line styles.

Photographs

Among its services, Visual Communications Dept. 12614 provides traditional and digital photography for authors who would like to have professional photographs taken for their reports.

Callouts on photographs should be easy to read, and arrows going from callouts to the point of interest should be clear. Using white arrows or black edged with white, as is done in Sample 3-18 (a), often is effective.

If you are using existing photographs, the best reproductions are made from black and white glossy photographs with good contrast (see Sample 3-18 (b)). Frequently, however, the only available photographs are in color. If you plan to use halftones made from color prints, check that the black and white rendition shows the detail you require. Certain colors

do not translate well to shades of gray. Green, blue, and yellow — in that order — are the least distinguishable from one another in black and white translations.

Cropping extraneous material from photographs can focus attention on the area of interest and allow more detail in the same amount of space. A well-handled photograph is as important as well-written text (see Sample 3-19).

Tables

Purpose of a table

Use a table to —

- present a large amount of data in a small space.
- compare different treatments of a single subject.
- list variable information about a single subject.

Limited subject

Limit a table to one main subject. Comparing too many things in one table is self-defeating. It is better to break the information into separate tables so that the information can be presented in a straightforward manner with a title that clearly describes what the table contains.

Format

Good formatting produces a functional table and often reduces the amount of table text required. Follow these guidelines:

- Number tables sequentially; give them clear and unique titles.
- Label each column with a descriptive heading.
- Express measurements consistently, preferably in SI units.
- Be sure terminology in the table matches that in the text.
- Use footnotes to explain complex circumstances or ideas or to cite data sources.

See Sample 3-20 for helpful information on presenting data in a table.

Lists

SPECIAL NOTE. A simple listing (no columns and no headings) should not be called a table. A table lists or compares *at least two different things*. A list may be boxed and called a figure; however, if no number is required for referencing the list elsewhere in the report, it may simply be included in the text immediately after the sentence introducing it.

Intentionally Left Blank

Samples

The following samples are provided for a quick visual reference. Whenever possible, explanations (enclosed in boxes) are placed on the samples to save the user from searching the text.

Samples

SECRET (UNCLASSIFIED SAMPLE)

SANDXX-XXXX
Internal Distribution Only
(Use Patent Caution, if applicable)

Concepts for (title)

John J. Doe and John H. Smith
(authors)

Printed January 1996

This document contains ___ pages.

Note:

You may reconstruct this form on
your PC or have Org. 12615
(845-8261) make the cover for you.

Another alternative is to copy the
“internal memorandum” block from
this form and mount it on your cover.

internal memorandum •

not to be distributed outside
Sandia National Laboratories

This format is to be used for informal working papers
as distinguished from official Sandia National Laboratories
reports. Review is required for classification
and patent approval. Five copies must be sent to
the Technical Library, 4414.

Formal scientific and technical reports must be
produced in the official Sandia National Laboratories
report format and require full review and Manager or
Director approval.

RESTRICTED DATA

This document contains Restricted Data as defined in the
Atomic Energy Act of 1954. Unauthorized disclosure
subject to Administrative and Criminal Sanction.

Classified by _____ (name) _____, _____ (title) _____, _____ (org. number) _____,

(month and year) _____

SECRET (UNCLASSIFIED SAMPLE)

Sample 3-1. Classified internal memorandum cover.

Secret Internal Memorandum:

This is an example of the cover format for a secret internal memorandum. A title page is not required.

SAND numbers are used to list and track internal memorandums (reference symbols are no longer used). The line organization obtains the SAND number from Org. 12615, 845-8220, and prepares the memorandum.

NOTE: Even though SAND numbers are no longer given out until documents go through the entire Review and Approval process, SAND numbers can be given out to the author of the internal memorandum when the author calls for it. This is because the memorandum only goes through the Review and Approval process through Section 10, but never comes to Print Media. After the Review and Approval Form is completed through Section 10, the author needs to distribute the memorandum and keep the Review and Approval Form on file.

No copies of the internal memorandum may be sent outside SNL, nor may the memorandum be cited as a reference in externally distributed papers and reports.

The line organization is encouraged to send one copy of the internal memorandum to Central Technical Files, 8523; and five copies must be sent to the Technical Library, Dept. 4414; but no copies should be sent to Print Media or to DOE/OSTI.

Sample 3-1. (concluded).

Samples

SANDXX-XXXX
Internal Distribution Only
(Use Patent Caution, if applicable)

Concepts for (title)

John J. Doe and John H. Smith
(*authors*)

Printed January 1996

Note:
You may reconstruct this form on
your PC or have Org. 12615
(845-8261) make the cover for you.

Another alternative is to copy the
“internal memorandum” block from
this form and mount it on your cover.

internal memorandum •

not to be distributed outside
Sandia National Laboratories

This format is to be used for informal working papers as distinguished from official Sandia National Laboratories reports. Review is required for classification and patent approval. Five copies must be sent to the Technical Library, 4414.

Formal scientific and technical reports must be produced in the official Sandia National Laboratories report format and require full review and Manager or Director approval.

Sample 3-2. Unclassified internal memorandum cover.

Unclassified Internal Memorandum:

This is an example of the cover format for an unclassified internal memorandum. A title page is not required.

SAND numbers are used to list and track internal memorandums (reference symbols are no longer used). The line organization obtains the SAND number from Org. 12615, 845-8220, and prepares the memorandum.

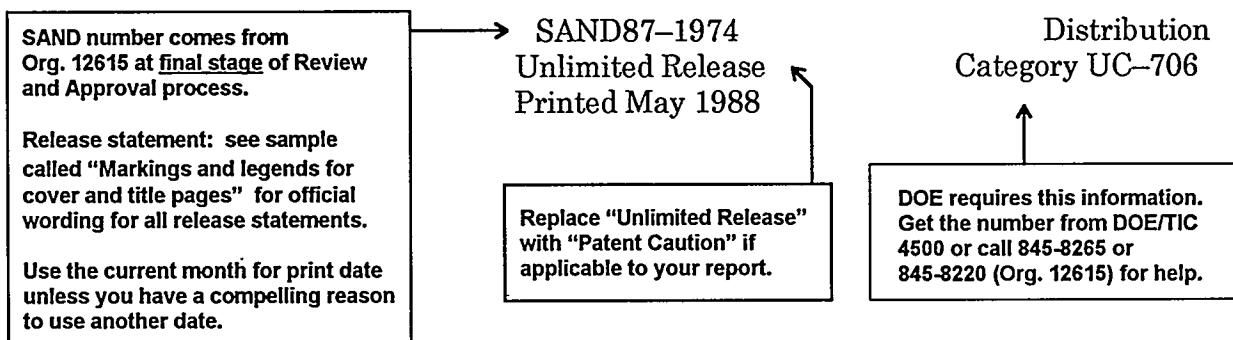
NOTE: Even though SAND numbers are no longer given out until documents go through the entire Review and Approval process, SAND numbers can be given out to the author of the internal memorandum when the author calls for it. This is because the memorandum only goes through the Review and Approval process through Section 10, but never comes to Print Media. After the Review and Approval Form is completed through Section 10, the author needs to distribute the memorandum and keep the Review and Approval Form on file.

No copies of the internal memorandum may be sent outside SNL, nor may the memorandum be cited as a reference in externally distributed papers and reports.

The line organization is encouraged to send one copy of the internal memorandum to Central Technical Files, 8523-2; and five copies must be sent to the Technical Library, 4414; but no copies should be sent to Print Media or to DOE/OSTI.

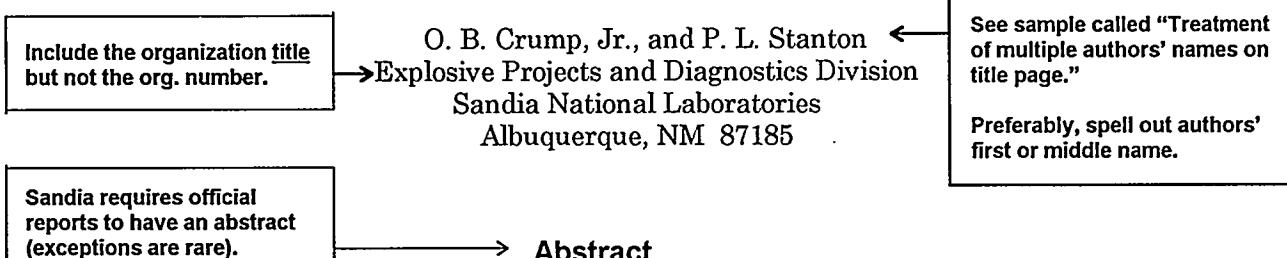
Sample 3-2 (concluded).

Samples



The Velocity Interferometer System for any Reflector

Mod B, the Push-Pull With Double-Delay-Leg and Dual VISAR Modes



The Velocity Interferometer System for Any Reflector (VISAR) is the modern standard for measurement of shock phenomena. This report describes the original VISAR and its evolution into the current Mod B version built for Sandia's Explosive Projects and Diagnostics Division 2514. The Mod B system incorporates the push-pull signal processing introduced in Mod A to reduce sensitivity to target self-light and simplify data reduction, and it introduces the use of two push-pull VISARs to obtain two modes of operation. In the Dual VISAR mode, each VISAR is used independently to track separate targets or separate points on a common target. In the Double-Delay-Leg mode, both delay legs are used to track the motion of a single point. The second delay leg gives a redundant measurement that is used to resolve the ambiguity in the velocity jump in shock-wave experiments.

Use this legend only if your report needs a Patent Caution.

See sample called "Markings and legends for cover and title pages," third column.

(Not all release statements require a legend.)

PATENT CAUTION

This document may reveal patentable subject matter. The information must not be divulged outside Sandia National Laboratories without the approval of the Patent and Licensing Office. Approved external recipients must not divulge the information to others.

Distribution authorized to U.S. Government agencies only; other requests shall be approved by the cognizant DOE Departmental Element.

Sample 3-3. Unclassified title page.

Samples

Be sure classification level is at the top and bottom of each page.

SAND number comes from Org. 12615 at final stage of Review and Approval process.

Use the current month for print date unless you have a compelling reason to use another date.

SECRET

SANDXX-XXXX

Nuclear Weapon Data • Sigma 1
Printed Month 19XX

Get information from R&A form. See sample called "Markings and legends for cover and title pages," second column, for NWD and Sigma guidance.

Distribution Category C-XX

DOE requires this information. Get the number from DOE/TIC M-3679 or call 845-8265 or 845-8220 (Org. 12615) for help.

Final Weapon Development Report for the BXX-X and BXX-X Bombs (U)

See sample called "Treatment of multiple authors' names on title page."

Preferably, spell out author's first or middle name.

Include the organization title, but not the org. number.

**UNCLASSIFIED
Illustration Purposes Only**

D. Leslie Doe
Universal Applications Department
Sandia National Laboratories
Albuquerque, NM 87185

Enter classification of title and abstract as indicated on R&A form.

Abstract (U)

This report describes the status of the BXX-X and BXX-X bombs of first production unit. These bombs each incorporate a Category F permissive action link, a non-violent command disable system. The importance of knowing and stabilizing the ambient working temperature of thermocouple tubes is stressed. Other observations regarding time constants versus pressure changes are also noted.

Classified by B. D. Zzzzzz, Manager, ABC Department 2345, Month, Day, 19XX.

CRITICAL NUCLEAR WEAPON DESIGN INFORMATION DoD DIRECTIVE 5210.2 APPLIES

Insert appropriate notices as indicated on the R&A form. For wording, see sample called "Markings and legends for cover and title pages."

Use margins that are different from those of the Abstract.

RESTRICTED DATA This document contains Restricted Data as defined in the Atomic Energy Act of 1954. Unauthorized disclosure subject to Administrative and Criminal Sanctions.

NATIONAL SECURITY INFORMATION Unauthorized disclosure subject to Administrative and Criminal Sanctions.

Derivatively Classified based upon _____ (enter appropriate information).

Declassify on _____ (enter appropriate information).

These always appear together.

SECRET

Sample 3-4. Classified title page.

SANDXX-XXXX
Unlimited Release
Printed October 19XX

Distribution
Category UC-XXX

Field Examination of Shale and Argillite in Northern Nye County, Nevada*

James R. Connolly
Lee A. Woodward

Department of Geology
and
Institute of Meteorites
University of New Mexico
Albuquerque, NM 87131

Sandia Contract No. XX-XXXX

Note: The current
contract number is
DE-AC04-94AL85000.

Include Sandia contract
(purchase order) number.

Either center it under the
contracting company's
name or footnote it to the
title.

Abstract

Thirty-two locales underlain by clay-rich strata ranging from Cambrian Pioche Shale to Mississippian Chainman Shale and equivalents were examined in northern Nye County, Nevada. The text of the report summarizes data for each stratigraphic unit examined. Checklists for tabulating field data at each locale are included in an appendix. Working guidelines used to evaluate the locales include a minimum thickness of 150 m (500 ft) of relatively pure clay-rich bedrock, subsurface depth between 150 m (500 ft) and 900 m (3000 ft), low topographic relief, low seismic and tectonic activity, and avoidance of areas with mineral resource production or potential. Field studies indicate that only the Chainman Shale, specifically in the central and northern parts of the Pancake Range, appears to contain sites that meet these guidelines.

*The work described in this report was performed for Sandia National Laboratories under Contract No. XX-XXXX.

Sample 3-5. Title page for contractor report.

<p>Multiple authors:</p>	<p>Frank Biggs, Marion P. Apodaca, and Clarence R. Mehl Test Planning and Diagnostics Department Sandia National Laboratories Albuquerque, NM 87185</p> <p>or</p> <p>Frank Biggs, Marion P. Apodaca, and Clarence R. Mehl Test Planning and Diagnostics Department Sandia National Laboratories Albuquerque, NM 87185</p> <p>Two or more departments:</p> <p>J. William Rogers, Jr., and Stephen J. Ward Initiating and Pyrotechnic Components Department</p> <p>Ronald A. Guidotti Exploratory Batteries Department</p> <p>Sandia National Laboratories Albuquerque, NM 87185</p> <p>Sandia and an outside company:</p> <p>Randall R. Nason and August E. Binder Project Engineering Department Sandia National Laboratories Albuquerque, NM 87185</p> <p>John L. Darby Science and Engineering Associates, Inc. Albuquerque, NM 87190</p> <p>Editor:</p> <p>Randall R. Nason, Editor Project Engineering Department Sandia National Laboratories Albuquerque, NM 87185</p> <p>Authors and editor:</p> <p>Frank Biggs and Marion P. Apodaca Test Planning and Diagnostics Department</p> <p>Edited by</p> <p>Stephen J. Ward Initiating and Pyrotechnic Components Department Sandia National Laboratories Albuquerque, NM 87185</p>
---------------------------------	---

Sample 3-6. Treatment of multiple authors' names on title page.

Samples

Markings and Legends for Cover and Title Page and Physical Protection of Limited Access SAND Documents

All SAND documents require a special marking or legend, or both. This table lists the markings and legends to be used with various types of reports. To ensure proper physical protection, the markings and legends appropriate for a particular report should be placed on the draft copy as soon as possible. Just before a SAND report is printed, the line organization requests a cover master from the Print Media Department. At that time a comparison is made of the author's title page and the completed Review and Approval Form, and any discrepancies are resolved.

Legend for different print styles in this table:

- **Bold text, Initial Caps, ALL CAPS:** Place in SAND report as indicated.
- *Italicized text:* explanatory matter.

Name of Notice	Cover and Title Page Release Statement (<i>place in top block under the SAND No.</i>) Required Markings (<i>shown in all caps; place as indicated</i>). <i>and</i>	Legend to be Placed on Cover and Title Page; deviations are noted.
-----------------------	--	---

UNCLASSIFIED UNLIMITED RELEASE DOCUMENTS (DOE G 1430.1D-1,II,2.1) Physical Protection: None required.		
Unlimited Release	<i>On cover only→</i>	Approved for public release; distribution is unlimited.

Sample 3-7. Markings and legends for cover and title page.

Name of Notice	<p>Cover and Title Page Release Statement (place in top block under the SAND No.)</p> <p>and</p> <p>Required Markings (shown in all caps; place as indicated).</p>	<p>Legend to be Placed on Cover and Title Page; deviations are noted.</p>
----------------	--	--

UNCLASSIFIED CONTROLLED INFORMATION (UCI)

Physical Protection: See notes at end of table. (DOE G 1430.1D-1,II,4.1.13.2)

	(DOCUMENTS GOING TO FOREIGN COUNTRIES. Such instances are rare. If the need for instructions should arise, see order 1430.2B,VII for guidance.)	
Applied Technology	Applied Technology (DOE G 1430.1D-1,II,4.1.13.2,1,i)	<p>APPLIED TECHNOLOGY</p> <p>Any further distribution by a holder of this product or data therein to third parties representing foreign interests, foreign governments, foreign companies, and foreign subsidiaries or foreign divisions of U.S. companies shall be approved by the (insert appropriate NE Program Office official from list below), * U.S. Department of Energy. Further, foreign party release may require DOE approval pursuant to 10 CFR 810, and/or may be subject to Section 127 of the Atomic Energy Act.</p> <p>____</p> <p>* (a) Associate Deputy Assistant Secretary for Reactor Systems, Development, and Technology</p> <p>(b) Associate Deputy Assistant Secretary for Reactor Deployment</p> <p>(c) Deputy Assistant Secretary for Space and Defense Power Systems</p> <p>(d) Deputy Assistant Secretary for Naval Reactors</p>

UNCLASSIFIED CONTROLLED INFORMATION (Continued) →

Sample 3-7 (continued).

Samples

Name of Notice	<p>Cover and Title Page Release Statement (<i>place in top block under the SAND No.</i>)</p> <p>and</p> <p>Required Markings (<i>shown in all caps; place as indicated</i>).</p>	<p>Legend to be Placed on <u>Cover</u> and <u>Title Page</u>; deviations are noted.</p>
----------------	--	--

Internal Distribution Only (IDO)	<p>Internal Distribution Only</p> <p>Note: DOE Distribution Category Number (UC-# or C-#) should <u>not</u> appear on cover or title page. Leave this line blank on the R&A form, since report does not go to DOE/OSTI.</p> <p>Note: <i>Distribution list begins as follows:</i></p> <p>INTERNAL DISTRIBUTION ONLY:</p> <p>Note: For unclassified reports, delete the following from the standard distribution "housekeeping" copies:</p> <p>MS 0100 Document Processing, 7613-2 For DOE/OSTI</p> <p>For classified reports, keep the following in the standard distribution "house-keeping" copies:</p> <p>MS 0619 Print Media, 12615 (Org. 12615 will process the document, but <u>not</u> forward it — as it does for reports going outside of Sandia — to DOE/OSTI.)</p>	
----------------------------------	---	--

UNCLASSIFIED CONTROLLED INFORMATION (Continued) →

Sample 3-7 (continued).

Name of Notice	Cover and Title Page Release Statement (place in top block under the SAND No.) and Required Markings (shown in all caps; place as indicated).	Legend to be Placed on Cover and Title Page; deviations are noted.
----------------	---	---

UNCLASSIFIED CONTROLLED INFORMATION, Continued

Export Controlled Information (ECI)	Export Controlled Information <i>On cover only</i> → (DOE G 1430.1D-1,II,4.1.13.2,1,d) <u>Marking:</u> EXPORT CONTROLLED INFORMATION <i>(Place at the bottom of each internal page, per Sandia Classifications Dept. decision, 12-2-94.)</i> <i>On both cover and title page</i> →	EXPORT CONTROLLED INFORMATION This product contains technical data, the export of which is restricted by the Nuclear Nonproliferation Act; the Arms Export Control Act (22 U.S.C. 2751, et seq.); the Atomic Energy Act of 1954, as amended (42 U.S.C. 2077); or the Export Administration Act of 1979, as amended (50 U.S.C. 2401, et seq.). Violations of these laws may result in severe administrative, civil, or criminal penalties. Distribution authorized to U.S. Government agencies and their contractors; other requests shall be approved by the cognizant DOE Departmental Element.
Naval Nuclear Propulsion Information	Naval Nuclear Propulsion Information (DOE G 1430.1D-1,II,4.1.13.2,1,f)	<i>(No specified legend. Distribution is very limited. See DOE Directive.)</i>
Official Use Only (OUO)	Official Use Only <i>Place legend on front cover only</i> → <u>Marking:</u> OFFICIAL USE ONLY <i>(Place at the top and bottom of cover, title page, and back cover.)</i> Note: "Originator" and "date" are from R&A Form, section 5: ADC's name and date ADC signed form.	OFFICIAL USE ONLY Contains information which may be exempt from public release under the Freedom of Information Act (5 USC 552), exemption number(s) <u> </u> (insert appropriate exemption number(s) from Information Management Manual, Section VII:2.7). Approval by the cognizant Sandia or Department of Energy Departmental Element prior to public release is required. Originator: <u>(Name)</u> Date: <u>(Month-Day-Year)</u>

UNCLASSIFIED CONTROLLED INFORMATION (Continued) →

Sample 3-7 (continued).

Samples

Name of Notice	Cover and Title Page Release Statement (<i>place in top block under the SAND No.</i>) and Required Markings (<i>shown in all caps; place as indicated</i>).	Legend to be Placed on Cover and Title Page; deviations are noted.
-----------------------	--	---

UNCLASSIFIED CONTROLLED INFORMATION, Continued

Patent Caution/ Invention Disclosure	Patent Caution <i>If Patent Caution is marked on R&A form, place these two legends on front cover only.</i> <i>(This Patent Caution legend was approved by the Patent and Licensing Office in lieu of the one in DOE G 1430.1D-1,II,4.1.13.2,1,a.)</i> <i>If Invention Disclosure is marked on R&A form, place this notice on front cover only.</i> <ul style="list-style-type: none"> • <u>No release statement for Patent Interest.</u> • <u>No release statement for Copyright Interest.</u> 	PATENT CAUTION This document may reveal patentable subject matter. The information must not be divulged outside Sandia National Laboratories without the approval of the Patent and Licensing Office. Approved external recipients must not divulge the information to others. Distribution authorized to U.S. Government agencies only; other requests shall be approved by the cognizant DOE Departmental Element. A disclosure of invention relating to the subject of this publication (<i>or presentation</i>) has been filed with the U.S. Department of Energy.
Non-Sandia Proprietary Information	Non-Sandia Proprietary Information <ul style="list-style-type: none"> • <u>NOTE for Distribution:</u> We suggest you DO NOT SEND reports containing Non-Sandia Proprietary Information to DOE/OSTI. If report <u>does</u> go to DOE/OSTI, do <u>not</u> include the Non-Sandia Proprietary Information in the report. • <u>The abstract should not include Non-Sandia Proprietary Information.</u> <p><u>Marking:</u></p> <p>NON-SANDIA PROPRIETARY INFORMATION</p> <p><i>(Place at the top and bottom of cover, title page, and back cover.)</i></p> <p>(DOE G 1430.1D-1,II,4.1.13.2,1,g)</p>	NON-SANDIA PROPRIETARY INFORMATION This technical data contains Non-Sandia Proprietary Information furnished under contract no. _____ with the U.S. Department of Energy. Disclosure outside the Government is not authorized without prior approval of the originator, or in accordance with provisions of 48 CFR 952.227 and 5 U.S.C. 552. Distribution authorized to U.S. Government agencies only; other requests shall be approved by the cognizant DOE Departmental Element.

UNCLASSIFIED CONTROLLED INFORMATION (Continued) →

Sample 3-7 (continued).

Name of Notice	<p>Cover and Title Page Release Statement (place in top block under the SAND No.)</p> <p>and</p> <p>Required Markings (shown in all caps; place as indicated).</p>	<p>Legend to be Placed on Cover and Title Page; deviations are noted.</p>
----------------	--	--

UNCLASSIFIED CONTROLLED INFORMATION, Continued

Protected Battery Information	<p>Protected Battery Information</p> <p><i>Place legend on front cover only</i> →</p> <p><i>The abstract should not include Protected Battery Information.</i></p> <p><u>Marking:</u></p> <p>PROTECTED BATTERY INFORMATION</p> <p><i>(Place at the top and bottom of cover, title page, and back cover.)</i></p> <p>(DOE G 1430.1D-1,II,4.1.13.2,1,j)</p>	<p>PROTECTED BATTERY INFORMATION</p> <p>This product contains Protected Battery Information which was produced under Contract/CRADA No. _____ and is not to be further disclosed for a period of up to five years after the completion of the individual project, or not prior to <u>(date)</u>.</p>
Protected CRADA Information	<p>Protected CRADA Information</p> <p><i>Place legend on front cover and title page.</i> →</p> <p><i>The abstract should not include Protected CRADA Information.</i></p> <p><u>Marking:</u></p> <p>PROTECTED CRADA INFORMATION</p> <p><i>(Place at the top and bottom of cover, title page, and back cover.)</i></p> <p>(DOE G 1430.1D-1,II,4.1.13.2,1,b)</p>	<p>PROTECTED CRADA INFORMATION</p> <p>This product contains Protected CRADA Information which was produced <u>(date)</u> under CRADA No. _____ and is not to be further disclosed for a period of _____ from the date it was produced except as expressly provided for in the CRADA.</p> <p>Note: "(date)" refers to the publication date of the report (month and year), per Technology Transfer dept. and OSTI representative (1-16-96).</p>
Small Business Innovation Research (SBIR)	<p>SBIR Proprietary Information</p> <p><u>Marking:</u></p> <p>SBIR PROPRIETARY</p> <p><i>(Place at the top and bottom of cover, title page, and back cover.)</i></p> <p>(DOE G 1430.1D-1,II,4.1.13.2,1,e)</p>	<p>SMALL BUSINESS INNOVATION RESEARCH</p> <p>PROPRIETARY DATA</p> <p>Further dissemination only as directed by the cognizant DOE Departmental Element.</p>

UNCLASSIFIED CONTROLLED INFORMATION (Continued) →

Sample 3-7 (continued).

Samples

Name of Notice	Cover and Title Page Release Statement (<i>place in top block under the SAND No.</i>) and Required Markings (<i>shown in all caps; place as indicated</i>). 	Legend to be Placed on <u>Cover</u> and <u>Title Page</u>; deviations are noted.
----------------	--	---

UNCLASSIFIED CONTROLLED INFORMATION, Continued

Sandia Commercially Valuable Information	Sandia Commercially Valuable Information Note: Distribution is ONLY to Sandia INTERNAL recipients. (Federal Register 10 CFR 1004.3(e) as of 1-11-95) Note: Sandia Commercially Valuable Information is Sandia's version of Non-Sandia Proprietary Information.	SANDIA COMMERCIALLY VALUABLE INFORMATION This document may reveal Sandia Commercially Valuable subject matter. The information must not be divulged outside Sandia National Laboratories without the approval of the Patent and Licensing Office. Approved external recipients must not divulge the information to others.
Unclassified Computer Software (UCS)	Unclassified Computer Software Note: UCS requires a special legal notice; see 1360.4B. (1360.4B)	UNCLASSIFIED COMPUTER SOFTWARE This computer software has been developed under sponsorship of the Department of Energy. Any further distribution by any holder of this software package or any data contained therein outside of DOE offices or other DOE contractors, unless otherwise specifically provided for, is prohibited without the approval of the DOE Energy Science and Technology Software Center (P.O. Box 1020, Oak Ridge, TN 37831) or Sandia National Laboratories.

UNCLASSIFIED CONTROLLED INFORMATION (Continued) →

Sample 3-7 (continued).

Name of Notice	<p>Cover and Title Page Release Statement (<i>place in top block under the SAND No.</i>)</p> <p>and</p> <p>Required Markings (<i>shown in all caps; place as indicated</i>).</p>	<p>Legend to be Placed on <u>Cover</u> and <u>Title Page</u>; deviations are noted.</p>
----------------	--	--

UNCLASSIFIED CONTROLLED INFORMATION, Continued

UCNI	<p>Unclassified Controlled Nuclear Information</p> <p><u>Marking:</u></p> <p>UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION</p> <p><i>(Place at the bottom of each internal page. If space is limited, the acronym "UCNI" may be used instead.)</i></p> <p>(DOE G 1430.1D-1,II,4.1.13.2,1,c; 5650.3A)</p> <p>Reviewing Officials at Sandia are → specifically trained and designated as such. They determine whether a document contains, does not contain, or no longer contains UCNI. They are granted authority by a formal memorandum from the Sandia Classification Officer.</p>	<p><i>UCNI has two legends. Rely on the responsible UCNI Reviewing Official for guidance as to which version to use.</i></p> <p><i>Before document is formally determined to be UCNI, use this legend:</i></p> <p>NOT FOR PUBLIC DISSEMINATION May contain Unclassified Controlled Nuclear Information subject to Section 148 of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2168). Approval by the Department of Energy prior to release is required.</p> <p>Distribution authorized to the Department of Energy and DOE contractors only; other requests shall be approved by the cognizant DOE Departmental Element.</p> <p><i>After document has been determined by a Reviewing Official to be UCNI, use this legend:</i></p> <p>UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION NOT FOR PUBLIC DISSEMINATION Unauthorized dissemination subject to civil and criminal sanctions under Section 148 of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2168).</p> <p>Reviewing Official: _____ (Name/Title) Date: _____</p> <p>Distribution authorized to the Department of Energy and DOE contractors only; other requests shall be approved by the cognizant DOE Departmental Element.</p>
------	--	--

UNCLASSIFIED CONTROLLED INFORMATION (Continued) →

Sample 3-7 (continued).

Samples

Name of Notice	<p>Cover and Title Page Release Statement (<i>place in top block under the SAND No.</i>)</p> <p>and</p> <p>Required Markings (<i>shown in all caps; place as indicated</i>).</p>	<p>Legend to be Placed on <u>Cover</u> and <u>Title Page</u>; deviations are noted.</p>
----------------	---	--

UNCLASSIFIED CONTROLLED INFORMATION, Continued

Specified Dissemination	<p>Specified Dissemination</p> <p>NOTE for Review and Approval form: In Section 5 of the Review and Approval Form, request the SPECIFIED DISSEMINATION category, and provide a letter of justification addressed to the Print Media Dept. from the agency or the Sandia/DOE Project Office that requires the distribution be limited. Classification and Sensitive Information Dept. 7447 will review the letter and ensure the appropriateness of the use of the Specified Dissemination category.</p> <p>Note: The report's Distribution list begins as follows:</p> <p>SPECIFIED DISSEMINATION:</p> <p>Note: If the Specified Dissemination distribution list does not include DOE, do not send report to DOE/OSTI.</p>	<p>SPECIFIED DISSEMINATION Only those recipients listed under "Distribution" are authorized to receive copies of this report. They are not authorized to disseminate the information further without permission from the originator or the agency that required the distribution restriction.</p>
Work For Others (WFO)	<p>Note: If an unclassified Work For Others document is to be sent to DOE/OSTI, but is <u>not</u> DOE-funded, use "UC-000" on the R&A Form for the DOE Distribution Category Number, Section 3. "UC-000" should <u>not</u> appear on the cover or title page.</p> <p>Funding statement: On the report cover, use the contract or agreement number (instead of the DOE contract number) of the funding agency that sponsored the work. Example of a funding statement: "This work was supported by _____ under Contract _____."</p> <p>Distribution list: Authors are encouraged to include a Distribution list with their Work For Others report, containing at least the "housekeeping" copies (see Sample 3-9).</p>	

Sample 3-7 (continued).

CLASSIFIED DOCUMENTS (DOE G 1430.1D-1,II,4.1.13.3)

Classified documents have levels of classification: TOP SECRET (TS), SECRET (S), and CONFIDENTIAL (C). They also have categories of classification and other limitations: RD, FRD, NSI, NWD, Sigmas, CNWDI, SUCI, Special Handling (No Foreign), and US/UK. These levels, categories, and other limitations may be used in various combinations. For example: SRD, SFRD, CRD, SNSI.

Classifier	<i>All classified documents must have the "Classified by" statement on the title page and cover.</i> 	<i>Classified by <u>(ADC's name)</u>, <u>(title)</u>, <u>(org. number)</u>, <u>(month and year)</u>.</i>
LEVELS:	<i>All classified documents must be marked with the classification level:</i> <i>Marking:</i> TOP SECRET <i>If you have a Top Secret document, contact Classification & Sensitive Information Dept. 7447 for marking requirements.</i>	
TOP SECRET		
SECRET	 <i>Marking:</i> SECRET <i>Place at the top and bottom of each page in bold letters at least one-fourth-inch high.</i>	
SECRET		
CONFIDENTIAL	 <i>Marking:</i> CONFIDENTIAL <i>Place at the top and bottom of each page in bold letters at least one-fourth-inch high.</i>	
CONFIDENTIAL		
CATE-GORIES:	<i>In addition, various categories may be required.</i>	
RESTRICTED DATA (RD)		RESTRICTED DATA This document contains Restricted Data as defined in the Atomic Energy Act of 1954. Unauthorized disclosure subject to Administrative and Criminal Sanctions.
FORMERLY RESTRICTED DATA (FRD)		FORMERLY RESTRICTED DATA Unauthorized disclosure subject to Administrative and Criminal Sanctions. Handle as Restricted Data in Foreign Dissemination. Section 144.b, Atomic Energy Act, 1954.

CLASSIFIED DOCUMENTS (Continued) →

Sample 3-7 (continued).

Samples

Name of Notice	<p>Cover and Title Page Release Statement (place in top block under the SAND No.)</p> <p>and</p> <p>Required Markings (shown in all caps; place as indicated).</p>	<p>Legend to be Placed on Cover and Title Page; deviations are noted.</p>
----------------	--	--

CLASSIFIED DOCUMENTS, Continued

<u>CATE-GORIES</u> (cont.): National Security Information (NSI)	<p>National Security Information</p> <p><i>Also add this notice to the cover and title page→</i></p> <p><i>(Distribution Statement F, DOE G 1430.1D-1,II,4.1.13.3)</i></p>	<p>NATIONAL SECURITY INFORMATION</p> <p>Unauthorized disclosure subject to Administrative and Criminal Sanctions</p> <p>Derivatively Classified based upon _____ (enter appropriate classification guidance information).</p> <p>Declassify on _____ (enter appropriate information).</p> <p>Further dissemination to other than DOE and DOE contractors only as directed by the cognizant DOE Departmental Element; requester must possess appropriate security clearance, need-to-know, and facility approval by the DOE Office of Security Affairs for classified documents.</p>
<u>ACCESS LIMITATION DESIGNATORS:</u> NWD	<p>Nuclear Weapon Data • Sigma _____</p> <p><i>Note: A Sigma number must appear on any NWD report.</i></p> <p><i>NOTE: Insert the appropriate Sigma legend. (See Sigma information on the next page).</i></p>	

CLASSIFIED DOCUMENTS (Continued) →

Sample 3-7 (continued).

Name of Notice	<p>Cover and Title Page Release Statement (place in top block under the SAND No.)</p> <p>and</p> <p>Required Markings (shown in all caps; place as indicated).</p>	<p>Legend to be Placed on <u>Cover</u> and <u>Title Page</u>; deviations are noted.</p>
----------------	--	--

CLASSIFIED DOCUMENTS, Continued

	<p><i>Certain dissemination limitations are to be used for certain Sigmas, according to their number and the classification and category of the report:</i></p> <p>(DOE G 1430.1D-1,II,4.1.13.3)</p> <p><i>For SRD Sigma 1, 2, 11, 12, & 13 documents, add this legend to the cover and title page.</i> →</p> <p><i>Note: For Sigma 12 ONLY, add this WARNING.</i> →</p> <p><i>For all RD Sigma 3, 4, 5, 9, & 10 documents, all CRD Sigma 1, 2, & 11 documents, and <u>all non-Sigma RD documents</u>, add this legend to the cover and title page.</i> →</p> <p><i>For all FRD Sigma 3, 4, 5, 9, & 10 documents, and <u>all other FRD and NSI documents</u>, add this legend to the cover and title page.</i> →</p>	<p>Further dissemination to other than DOE and DOE Weapon-Complex contractors only as directed by the DOE Office of Military Application; requester must possess final SECRET clearance, RD access authorization, need-to-know, and facility approval by the DOE Office of Security Affairs.</p> <p>SIGMA 12 WARNING — LIMITED ACCESS</p> <p>This document contains Sigma 12 information relating to nuclear directed energy weapons. This document may only be read by persons whose names appear on the approved Sigma 12 access list.</p> <p>Further dissemination to other than DOE and DOE contractors only as directed by the cognizant DOE Departmental Element; requester must possess appropriate security clearance, Restricted Data access authorization, need-to-know, and facility approval by the DOE Office of Security Affairs.</p> <p>Further dissemination to other than DOE and DOE contractors only as directed by the cognizant DOE Departmental Element; requester must possess appropriate security clearance, need-to-know, and facility approval by the DOE Office of Security Affairs for classified documents.</p>
--	--	---

CLASSIFIED DOCUMENTS (Continued) →

Sample 3-7 (continued).

Samples

Name of Notice	Cover and Title Page Release Statement (place in top block under the SAND No.) and Required Markings (shown in all caps; place as indicated).	Legend to be Placed on Cover and Title Page; deviations are noted.
----------------	---	---

CLASSIFIED DOCUMENTS, Continued

	<p>Nuclear Weapon Data • Sigma <u>14 or 15</u></p> <p>Sensitive Use Control Information Access Restricted</p> <p><i>Check that all recipients are on the Sigma 14/15 access list maintained by Use Control Systems & Stockpile Support Dept. 2123. Applies to a minimum classification of Secret.</i></p> <p><i>Pending revision of DOE Directive 5610.2, use legends for SRD or FRD Sigmas, described previously, as well as the Sigma 14 or 15 legend.</i></p>	<p>SENSITIVE USE CONTROL INFORMATION</p> <p>ACCESS RESTRICTED</p> <p>This document contains sensitive use control design information. Further dissemination of this information must be on a strict need-to-know basis and authorized by either the SNL Sigma 14/15 Facility Coordinator, the program manager, the use control access list, or the DOE Headquarters Deputy Assistant Secretary for Military Applications and Stockpile Support.</p>
CNWDI	<p>Critical Nuclear Weapon Design Information</p> <p><i>When the document is to be (or may be) distributed to DoD, the above limitation should be placed directly under the NWD line.</i></p>	<p>CRITICAL NUCLEAR WEAPON DESIGN INFORMATION</p> <p>DoD DIRECTIVE 5210.2 APPLIES</p>
Special Handling or No Foreign	No Foreign Distribution	<p>SPECIAL HANDLING REQUIRED</p> <p>NOT RELEASEABLE TO FOREIGN NATIONALS</p> <p>The information contained in this document must not be disclosed to foreign nationals or their representatives.</p>

CLASSIFIED DOCUMENTS (Continued) →

Sample 3-7 (continued).

Name of Notice	<p>Cover and Title Page Release Statement (<i>place in top block under the SAND No.</i>)</p> <p>and</p> <p>Required Markings (<i>shown in all caps; place as indicated.</i>)</p>	<p>Legend to be Placed on <u>Cover</u> and <u>Title Page</u>; deviations are noted.</p>
----------------	--	--

CLASSIFIED DOCUMENTS, Continued

US/UK	US/UK Atomic Information	<p>US/UK ATOMIC INFORMATION</p> <p>This document contains US and UK Atomic Information exchanged by the Governments of the United States and the United Kingdom in accordance with the "Agreement for Cooperation on the Uses of Atomic Energy for Mutual Defense Purposes." This document will be handled in the same manner as documents containing either United States or United Kingdom ATOMIC markings under the terms of that agreement.</p>
Specified Dissemination	<p>Specified Dissemination</p> <p>NOTE for Review and Approval form: In Section 5 of the Review and Approval Form, request the SPECIFIED DISSEMINATION category, and provide a letter of justification addressed to the Print Media Dept. from the agency or the Sandia/DOE Project Office that requires the distribution be limited. Classification and Sensitive Information Dept. 7447 will review the letter and ensure the appropriateness of the use of the Specified Dissemination category.</p> <p>Note: The report's Distribution list begins as follows:</p> <p style="padding-left: 40px;">SPECIFIED DISSEMINATION:</p> <p>Note: If the Specified Dissemination distribution list does not include DOE, do not send report to DOE/OSTI.</p>	<p>SPECIFIED DISSEMINATION Only those recipients listed under "Distribution" are authorized to receive copies of this report. They are not authorized to disseminate the information further without permission from the originator or the originator's designated representative.</p>

Sample 3-7 (continued).

Samples

NOTES FOR SAMPLE 3-7:

PHYSICAL PROTECTION OF DOCUMENTS

Physical Protection of Limited-Access SAND Documents (UCI and Applied Technology)

- Maintain physical control of document at all times while working on it. Never leave it unattended in an uncontrolled area.
- Store document in a secure container (locked desk or equivalent) or controlled office area or facility (vault) when not in use.
- Destroy working papers in such a manner that they cannot be reconstructed. (Use a shredder, for example.)
- Use cover sheet SF 1008-UCN (for UCNI) or SF 1008-UCA (for UCI) on document at all times.

Physical Protection of CLASSIFIED Documents

- Make sure that all personnel with access to classified documents have the appropriate security clearance and a need-to-know.
- Maintain physical control of document at all times. Never leave it unattended in an uncontrolled area.
- Store CLASSIFIED documents in DOE-approved locked safe or vault when not in use.
- Destroy working papers in such a manner that they cannot be reconstructed. (Use a shredder, for example.)
- Use properly marked front and back cover sheets on each copy of the draft document and on the masters: for SECRET, use Form SF 704 for the front cover and Form SA 2900-HE or -HEA for the back cover; for CONFIDENTIAL, use Form SF 705 for the front cover and Form SA 2900-HEA for the back cover.

Sample 3-7 (concluded).

Contents

Executive Summary	7
Nomenclature	8
Introduction	9
Purpose	10
History	11
Scope	13
Geologic Aspects	14
Gravity Data.....	15
Hydrology.....	15
Caprock	23
Salt	26
SPR System Considerations	30
Cavern Configurations	30
SPR Caverns.....	30
Union Texas Petroleum Caverns	33
Cavern Integrity Issues.....	35
etc.	
References	53
APPENDIX A —Bayou Choctaw Regional Geologic History	59
APPENDIX B —Bayou Choctaw Well Data	63
 Figures	
1 Well locations and cross section index	15
2 Salt stock configuration, (a) Isometric view and (b) Contour of top of salt	18
3 Strategic petroleum reserve caverns.....	33
 Tables	
1 Stratigraphic nomenclature and geologic column	27
2 Geotechnical data; strategic petroleum reserve caverns.....	32

Comments:

Format. Present the contents listing in a format that clearly distinguishes the organization of the report. One way to do this is to insert a space above major divisions and indent subheads appropriately. Another is to use bold print for the major divisions, as is done here.

Figure numbers. Use only number designators in the number column. Do not use letter suffixes (a, b or A, B). Rather, use a composite figure title and include the (a) and (b) (or A and B) subtitles as part of the composite as in the Figure 2 listing above.

Figure captions. Use only the actual caption. Do not include descriptive text. Although copying the full caption with descriptive matter is faster and easier for the author, the extra text prevents quick and easy identification of the main figure topic.

Sample 3-8. Contents page.

Samples

The following "housekeeping" copies should appear at the end of each SAND report distribution list:

Unclassified Unlimited Release Documents:

1	MS 9018	Central Technical Files, 8523-2
5	0899	Technical Library, 4414
1	0619	Print Media, 12615
2	0100	Document Processing, 7613-2 For DOE/OSTI

For *unclassified* reports, use both mail stop and org. No. Mail sent without mail stop numbers will be delayed.

* Unclassified Limited Release Documents:

Internal Distribution Only

1	MS 9018	Central Technical Files, 8523-2
5	0899	Technical Library, 4414
1	0619	Print Media, 12615

All Other Limited Release Documents

1	MS 9018	Central Technical Files, 8523-2
5	0899	Technical Library, 4414
1	0619	Print Media, 12615
2	0100	Document Processing, 7613-2 For DOE/OSTI

* Classified Documents:

(List at the end of **external** recipients):

1	M0800	Central Technical Files, 8523
---	-------	-------------------------------

For SNL/CA *classified* reports use mail channel and org. No. — not mail stop. The Classified station is located in 8523 (8523-2 is for unclassified).

(List at the end of **internal** recipients):

5	MS 0899	Technical Library, 4414
2 (micro-fiche)	0899	Technical Library, 4414 **
1	0619	Print Media, 12615

This copy is for DOE/OSTI, after Org. 12615 processes it.

* If the document has a "Patent Caution" or "Patent Interest," always include 3 copies for Org. 11500 (Patent and Licensing Office). The format for an Org. 11500 entry (to be used for any classification level except Unclassified, Unlimited Release) is as follows: At the END of the housekeeping copies, add —

3 0161 Patent and Licensing Office, 11500

** The Print Shop is now creating two microfiche copies of each technical report for the Technical Library. Security procedures require that these microfiche copies be identified in the distribution lists of classified documents; the microfiche copies do *not* have to be identified in the distribution lists of unclassified documents.

Sample 3-9. Distribution "housekeeping" copies.

Example of an *unclassified* distribution:

DISTRIBUTION:

2 Los Alamos National Laboratory
Attn: J. C. Stevenson, WDP-WD
M. George, M4
P.O. Box 1663
Los Alamos, NM 87545

3 Lawrence Livermore National Laboratory
Attn: R. F. Chatham, L125 (2)
A. B. Palmen, L394
P.O. Box 808
Livermore, CA 94550

1 University of Waterloo
Dept. of Stat. and Actuarial Sciences
Attn: B. D. Johnson
Waterloo, Ontario N2L 3G1
CANADA

1 MS 0841 E. R. Farmer, 1500
Attn: D. G. Anderson, 1501

8 0827 J. R. Dallas, 1502
Attn: R. Collier

1 0832 P. J. Walker, 1551

1 0574 D. R. Jones, 5941

12 9106 J. S. Kendall, 8417

5 0314 L. G. Grant, 9811

* 1 9018 Central Technical Files, 8523-2

* 5 0899 Technical Library, 4414

* 1 0619 Print Media, 12615

* 2 0100 Document Processing, 7613-2 ← (if have Unlimited Release)
For DOE/OSTI

* 3 0161 Patent and Licensing Office, 11500 ← (if have a Patent Caution)

List foreign addresses in alphabetical order by country after other external recipients but before internal recipients. Place name of country (in all caps) on the last line of the address.

Use both mail stop and organization number. Mail sent without mail stop numbers will be delayed.

Example of a heading for a continued (to next page) *unclassified* distribution:

DISTRIBUTION (continued):

* Include "housekeeping" copies in all unclassified reports as indicated (see Sample 3-9 on previous page for complete list).

Sample 3-10. Distribution pages, unclassified and classified.

Samples

Example of a classified distribution:

DISTRIBUTION:

2	M3669	Los Alamos National Laboratory Attn: J. C. Stevenson, WDP-WD M. George, M4 P.O. Box 1663 Los Alamos, NM 87545	On all classified reports, check that all mail channels are authorized and current.
3	M0830	Lawrence Livermore National Laboratory Attn: R. F. Chatham, L125 (2) A. B. Palmen, L394 P.O. Box 808 Livermore, CA 94550	
6	M0701	US Department of Energy Attn: Maj. Gen. W. W. Hoover Washington, DC 20545	SNL/CA addresses go after external addresses. Use mail channel and org. No., <u>not mail stop</u> , for classified mail.
1	M0800	J. S. Kendall, 8417	
1	M0800	P. R. Walker, 8417	← Classified station is located in Org. 8523, not in Org. 8523-2.
* 1	M0800	Central Technical Files, 8523	
1	MS 0841	E. R. Farmer, 1500 Attn: D. G. Anderson, 1501	For SNL/NM, use both mail stop and org. No. Mail sent without mail stop numbers will be delayed.
1	0827	J. R. Dallas, 1502 Attn: R. Collier	←
2	0832	P. J. Walker, 1551	
1	0574	D. R. Jones, 5941	
* 5	0899	Technical Library, 4414	See footnote ** in Sample 3-9.
* 2 (micro-fiche)	0899	Technical Library, 4414	← This copy is for DOE/OSTI, after Org. 12615 processes it.
* 1	0619	Print Media, 12615	←
* 3	0161	Patent and Licensing Office, 11500	← (if have a Patent Caution)

Example of a heading for a continued (to next page) classified distribution:

DISTRIBUTION (continued):

* Include "housekeeping" copies in all classified reports as indicated.

Sample 3-10 (concluded).

Document Title, 24 point (22 point, if title is long) Helvetica Bold

Chapter Title, 20-point Helvetica Bold

Level 1 Sidehead, 18-point Helvetica Bold

This is an example of 12-point Times New Roman text. Print Media uses 12-point Times New Roman (or Century Schoolbook) for standard SAND reports.

These first two paragraphs illustrate a ragged right margin.

Level 2 Sidehead, 14-point Helvetica Bold

This is an example of 12-point Times New Roman text. Print Media uses 12-point Times New Roman (or Century Schoolbook) for standard SAND reports.

These second two paragraphs illustrate a justified margin.

Level 3 Sidehead, 12-point Helvetica Bold *Italic*

This is an example of 12-point Times New Roman text. Print Media uses 12-point Times New Roman (or Century Schoolbook) for standard SAND reports.

Level 4 Sidehead, 11-point Helvetica Bold

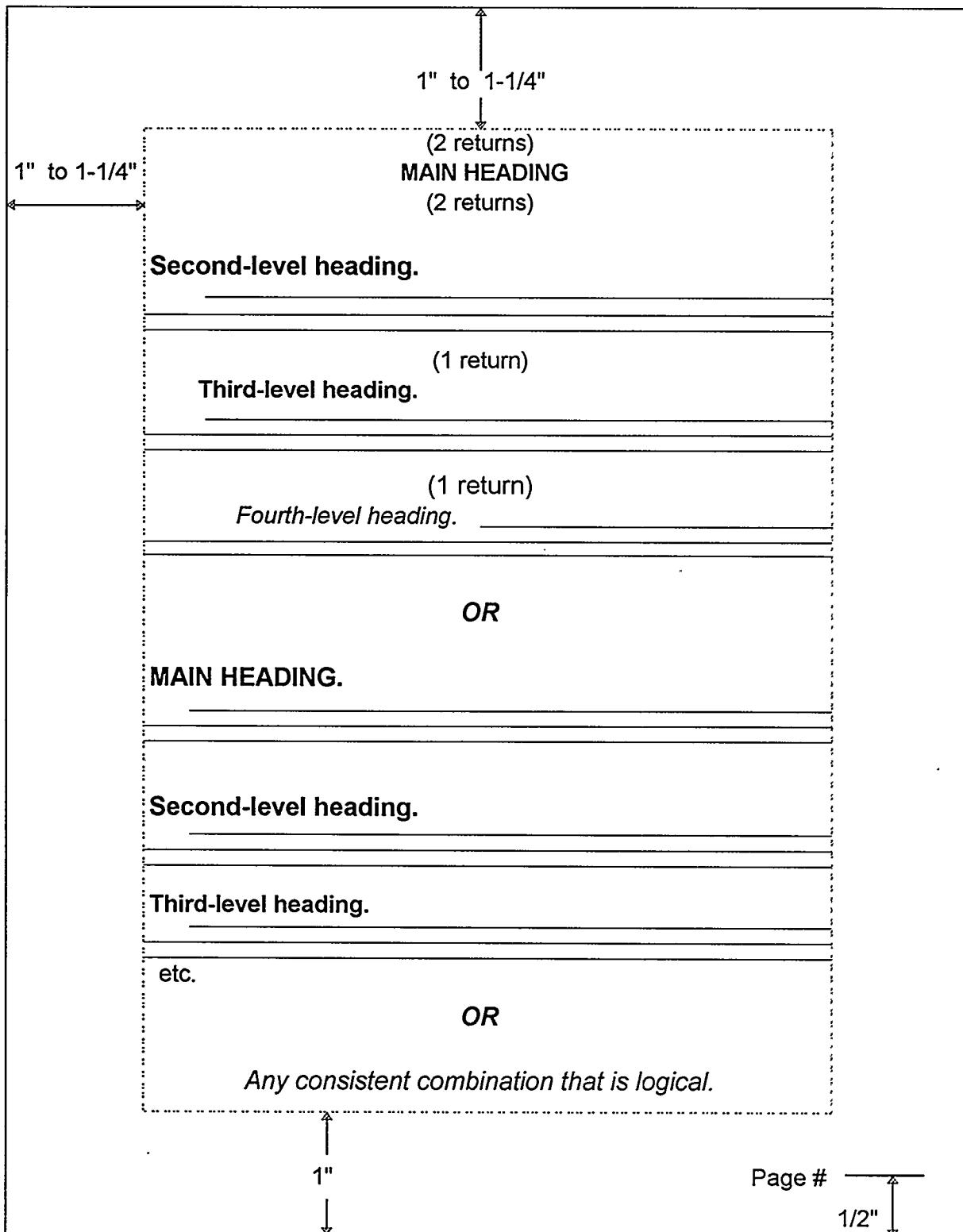
This is an example of 12-point Times New Roman text. Print Media uses 12-point Times New Roman (or Century Schoolbook) for standard SAND reports.

**Level 5 run-in heading, 10-point
Helvetica Bold.** This is an example of 12-point Times New Roman text. Print Media uses 12-point Times New Roman (or Century Schoolbook) for standard SAND reports.

**Level 6 run-in heading, 11-point New
Century Schoolbook, *Italic*.** This is an example of 12-point Times New Roman text. Print Media uses 12-point Times New Roman (or Century Schoolbook) for standard SAND reports.

Sample 3-11. Text fonts and text sizes for standard SAND reports prepared in the Print Media Department.

Samples



Sample 3-12. Margins and headings.

Document title,
24-pt. Helvetica

Design Guidelines for Human-Computer Dialogues

Chapter title, 20-pt. Helvetica

Introduction

Purpose

Level 1, 18-pt. Helvetica

The growing role of computers in Sandia systems such as the Command and Control Systems and the Safeguard Systems places increasing importance on the design of effective human-computer dialogues. Critical concerns for the software designer are the anguish and frustration of users, the degraded user productivity, the potential for human errors, the increased training costs, and the need to redesign and reimplement the user interface. These problems can be avoided, or at least minimized, through knowledge of their causes and remedies. This report provides guidelines for designing effective interactive dialogues.

Emphasis is limited to the human-computer dialogue as it is related to software design. Issues related to the design of computer hardware, keyboard layout, display quality assessment, workstation arrangement, etc., are explicitly excluded. However, assumptions concerning the hardware, such as use of electronic visual displays as the medium for human-computer interaction, the use of such words as ENTER, CANCEL, and NEXT PAGE, and the use of a keyboard are implied for simplicity in discussion.

Principles of Human-Computer Dialogue Design

“User friendly” is a term used frequently in describing human-computer dialogues. User friendly dialogue is easy to use, simple to learn, not likely to produce errors, and intrinsically

satisfactory to the user. To achieve these qualities, the software designer should consider the following principles in user psychology: compatibility, consistency, flexibility and control, brevity, feedback, and operator workload (Williges and Williges, 1984).

Compatibility

Level 2, 14-pt. Helvetica

The presentation of information and input requirements should be compatible with the user's expectations. For example, word processor operators should not be required to understand system messages meant for programmers in troubleshooting problem areas. When a user is required to process the information in any fashion, errors are likely to occur. The designer's goal should be to avoid the need to translate, transpose, or interpret information displayed on the screen.

Consistency

Display formats, language, labels, and operation of the computer system should be consistent throughout the course of the dialogue. This permits the user to develop a concept of the system and thus operate the system in a predictable manner.

Flexibility and Control

The reaction of many novice users to computer systems is fear and frustration. Such behavior often results from inability to decide what to do, when to do it, or how to do it. If the system is flexible, the intended users should be able to operate it effectively.

Sample 3-13. Example of a double-column format.

Design Guidelines for Human-Computer Dialogues

Document title,
24-pt. Helvetica

Introduction

Chapter title, 20-pt. Helvetica

Purpose

Level 1, 18-pt. Helvetica

The growing role of computers in Sandia systems such as the Command and Control Systems and the Safeguard Systems places increasing importance on the design of effective human-computer dialogues. Critical concerns for the software designer are the anguish and frustration of users, the degraded user productivity, the potential for human errors, the increased training costs, and the need to redesign and reimplement the user interface. These problems can be avoided, or at least minimized, through knowledge of their causes and remedies. This report provides guidelines for designing effective interactive dialogues.

Emphasis is limited to the human-computer dialogue as it is related to software design. Issues related to the design of computer hardware, keyboard layout, display quality assessment, workstation arrangement, etc., are explicitly excluded. However, assumptions concerning the hardware, such as use of electronic visual displays as the medium for human-computer interaction, the use of such words as ENTER, CANCEL, and NEXT PAGE, and the use of a keyboard are implied for simplicity in discussion.

Principles of Human-Computer Dialogue Design

“User friendly” is a term used frequently in describing human-computer dialogues. User friendly dialogue is easy to use, simple to learn, not likely to produce errors, and intrinsically satisfactory to the user. To achieve these qualities, the software designer should consider the following principles in user psychology: compatibility, consistency, flexibility and control, brevity, feedback, and operator workload (Williges and Williges, 1984).

Compatibility

Level 2, 14-pt. Helvetica

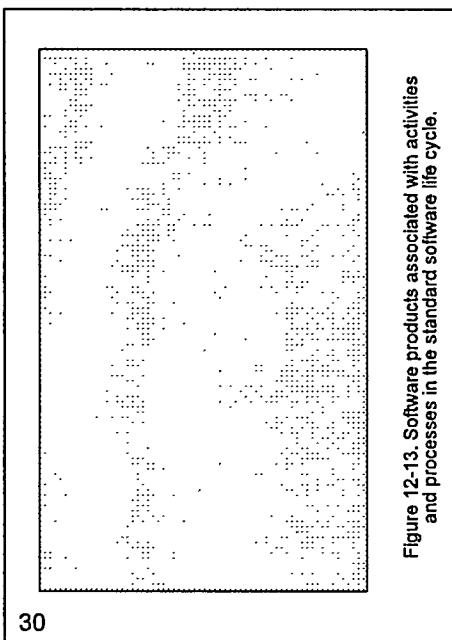
The presentation of information and input requirements should be compatible with the user's expectations. For example, word processor operators should not be required to understand system messages meant for programmers in troubleshooting problem areas. When a user is required to process the information in any fashion, errors are likely to occur. The designer's goal should be to avoid the need to translate, transpose, or interpret information displayed on the screen.

Consistency

Display formats, language, labels, and operation of the computer system should be consistent throughout the course of the dialogue. This permits the user to develop a concept of the system.

Sample 3-14. Example of a single-column format.

Landscape Orientation,
Left-hand page



Landscape Orientation,
Right-hand page

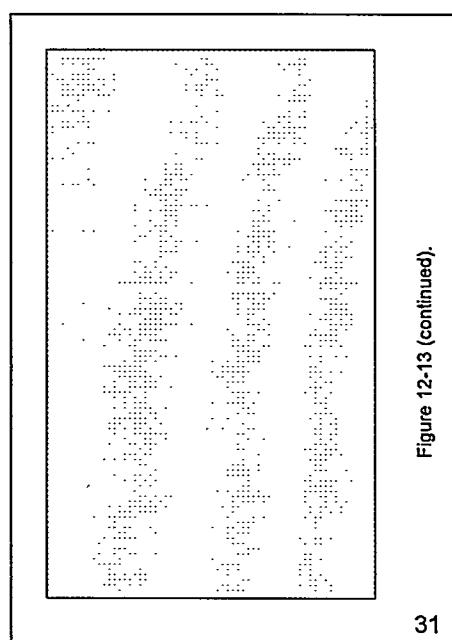


Figure 12-13. Software products associated with activities and processes in the standard software life cycle.

Portrait Orientation,
Left-hand page

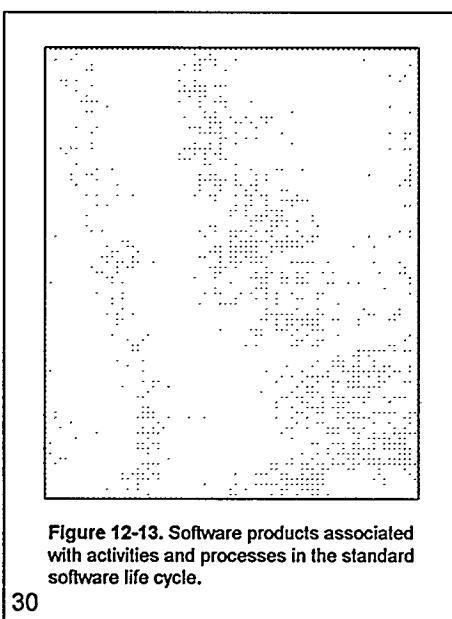


Figure 12-13. Software products associated with activities and processes in the standard software life cycle.

Portrait Orientation,
Right-hand page

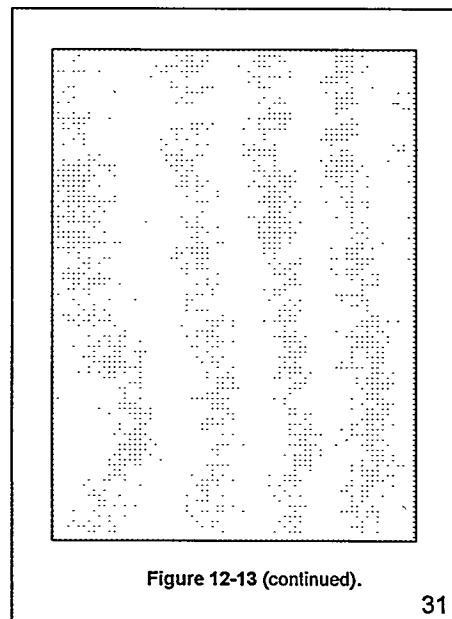


Figure 12-13 (continued).

Sample 3-15. Figure orientations (landscape and portrait).

Samples

SA 1820 A (2 95)

LABORATORY COMMUNICATIONS
Service Order
See Instructions on reverse side

Order No. CP2314

<input type="checkbox"/> 12613 Corporate Exhibits MS 0401 Ph 844 2168				<input type="checkbox"/> 12614 Visual Communications MS 0551 Ph 844 7167	<input type="checkbox"/> 12615 Print Media MS 0619 Ph 845 8265	<input checked="" type="checkbox"/> 12616 Interactive Media, MS 0409 Ph 844 6416
Requester	Name MARY WALTERS					
	Org 1425	Mail Stop MS 0124	Phone 845-1122	Date 6-10-96	Date 6-17-96	Required Completion Date
Approval	Signature (Required) (signature)		Date 6-10-96			Phone 845-1122
Job Title	Two-Dimensional Transit Program		SAND No 96-2189	CLASSIFIED?	Security Class	
				<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>Fill out space below</i>	<input type="checkbox"/> Mat'l	<input type="checkbox"/> Info
Case Number Information:						
Case No 1 0645.200		Charging Org 1425	\$ Amount or % 50%	Cost Seq 3	Case No	Charging Org
2 0123.400		1237	50%	4		\$ Amount or %
DISPOSITION						
<input checked="" type="checkbox"/> Call for pickup Ph 845-1122		<input type="checkbox"/> Send to Mail Services MS 0100 for Dist Name Mary Walters MS		<input type="checkbox"/> Store Negatives (Still Photo) (Customer must submit a Photo Info Form for Unclassified only)		
SSN _____ Name _____ MS _____ Bldg/Rm _____						
Item No	No of Originals	Qty	Description of Work and/or Notes			
<p>1 DRAW attached FIGURE 1 from draft provided. Generate one laser proofing copy, then one ITEK print.</p> <p>2 CREATE FIGURES 2, 3, and 4 on enclosed (MAC) diskette in Photoshop. Drafts attached.</p>						
COMPLETE FOR CLASSIFIED WORK						
Security Class	Classified by	Date of Classification	Title	Org	MS	
INFORMATION BELOW TO BE FILLED IN BY SERVICE CENTER PERSONNEL						
RECEIPT FOR CLASSIFIED: I hereby assume responsibility for receipt of classified material identified herein and will handle, store and transmit it in accordance with existing regulations						
Name	Org	MS	Signature	Date		
Service Center Rep	Org	MS	Phone	Date Rec'd		
Assigned to	Org	MS	Phone	Estimate		
Plates	Press	Bindery	Impressions	Item No		
Completed job picked up by						
Name	Signature		Date	\$		
Send Service Order Requests involving forms to Dept 13213, MS 0612, for approval						
PRESS HARD THE LAST COPY IS YOURS						

Sample 3-16. Service Order form for graphics.

When ordering artwork, think about the size you would like the text to be in your final report, and be sure the callouts are large enough to bear the reduction you have in mind.

The following table will help you visualize various reductions.

Point Size	Original Size	Reduction	
		To 75% (Most microfiche)	To 50%
22	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE
20	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE
18	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE (smallest legible size)
16	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE
14	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE
12	ORIGINAL SIZE (Normal type)	REDUCED SIZE (smallest legible size)	REDUCED SIZE
10	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE

Sample 3-17. Print sizes and typical reductions.

Samples



(a) Arrows and text. Using double-sided arrows is recommended for this type of photograph because they show up against the light or dark background. Attention should also be given to the legibility of text on a photograph.



(b) Quality of halftone. A halftone should be slightly lighter than the desired final because each printing of the figure gets a little darker.

Sample 3-18. Halftones with good contrast.



(a) Before. This original photograph contains peripheral detail that detracts from the center of interest. The figure should be cropped to focus on the center of interest.



(b) After. The photograph has been cropped and then enlarged to emphasize the center of interest. Approximately the same amount of vertical space was used.

Sample 3-19. An appropriately cropped photograph.

Samples

Table 1. Example Table

Major Sources of Funding	(Operating BA in \$M)		
	FY85*	FY86†	FY87‡
Department of Defense	159.0	181.5	147.0
Other Federal Agencies [§]	16.2	16.3	25.0
Nuclear Regulatory Commission	32.1	38.4	38.0
All Other**	0.7	0.6	1.0
Total Work for Others Than DOE	208.0	236.8	211.0
Percent of Total Operating Funding	22	25	19

A spanner line should be used over subheads that have a common heading.

* The first year . . .

† Increased costs affected the amount . . .

‡ The most recent figures . . .

§ Other federal agencies included . . .

** Start doubling up on the symbols at this point.

Standard order for footnotes. Number or letter footnotes are also acceptable. Whatever is used should clearly stand out as a footnote.

Table 4-2. Enhanced-Field Switching vs. Uniform-Field Switching

Enhanced-Field Switching	Uniform-Field Switching	Second Enhanced-Field Switching
Arc is generated <i>early</i> in the charge cycle. Because the field stress is <i>low</i> , initial arc velocity is <i>low</i> . The pulse-forming line (PFL) charges as the arc propagates across the gap.	Arc is generated <i>late</i> in the charge cycle. Because the field stress is <i>high</i> , initial arc velocity is <i>high</i> . The PFL charges very little as the arc propagates across the gap.	Arc is generated <i>early</i> in the charge cycle. Because the field stress is <i>low</i> , initial arc velocity is <i>low</i> . The pulse-forming line (PFL) charges as the arc propagates across the gap.
Arc <i>generation</i> time is small, minimizing variations in arc <i>generation</i> time.		
Pins 0.6 cm in diameter are placed . . .	Pins 5 cm in diameter are placed . . .	Pins 0.6 cm in diameter are placed . . .

Sample 3-20. Example tables from published reports.

Table 4. Computed flow at the center of elements illustrated in Figure 8

Center of Element	Flow Rates ($10^{-5} \text{ m}^3/\text{day}$) for								Ratio of Vector Magnitudes for Various Cases		
	(1) Case 1*		(2) Case 2		(3) Case 3		(4) Case 4		(5) Case 2/ Case 1	(6) Case 1/ Case 3	(7) Case 1/ Case 4
	H [†]	V	H	V	H	V	H	V			
43	0.0	0.46	0.0	0.45	0.0	0.57	0.029	0.62	0.99	0.80	0.74
44	0.0	0.42	0.0	0.41	0.0	0.52	0.017	0.64	0.99	0.81	0.65
45	0.0	0.37	0.0	0.36	0.0	0.48	0.027	0.66	0.98	0.77	0.56
46	0.0	0.29	0.0	0.27	0.0	0.42	0.049	0.69	0.96	0.69	0.41
74	0.037	1.3	0.038	1.3	0.047	1.5	0.058	1.7	0.99	0.85	0.74
75	0.051	1.2	0.054	1.2	0.040	1.4	0.053	1.8	0.99	0.83	0.68
76	0.083	1.1	0.087	1.1	0.066	1.3	0.075	1.8	0.98	0.81	0.61
77	0.13	0.91	0.14	0.88	0.13	1.2	0.12	1.8	0.97	0.77	0.50
105	0.12	0.99	0.12	0.99	0.11	1.1	0.055	1.2	1.00	0.91	0.82
106	0.16	0.97	0.17	0.97	0.13	1.1	0.052	1.2	1.00	0.93	0.82
107	0.26	0.97	0.27	0.96	0.22	1.0	0.063	1.2	1.00	0.95	0.83
108	0.43	0.99	0.45	0.99	0.45	1.0	0.069	1.2	1.01	0.98	0.90

* Cases are described in Table 2.

† "H" connotes horizontal component of flow; "V" connotes vertical component of flow.

Table 5. Volumes of water entering a drift for the drift analysis

Case	Description	Flow Through Drift (m^3/day)	Ratio of the Flow Entering Drift to the Influx* for the Modeled Area (%)
1	Vertical emplacement of waste packages — drift located in welded tuff (Sample 19) and backfilled with clay.	9.2×10^{-7}	0.55
2	Vertical emplacement of waste packages — drift located in welded tuff (Sample 19) and backfilled with sand.	8.2×10^{-20}	0.0
3	Vertical emplacement of waste packages — drift located in welded tuff (Sample 19, k_s increased) and backfilled with clay.	4.3×10^{-7}	0.26
4	Vertical emplacement of waste packages — drift located in welded tuff (Sample 19, k_s decreased) and backfilled with clay.	2.8×10^{-5}	17

*Influx = $1.671 \times 10^{-4} \text{ m}^3/\text{day}$ **Sample 3-20 (concluded).**

Intentionally Left Blank

SECTION 4

Reproduction and Distribution

Intentionally Left Blank

Reproduction

The final processing of a document consists of (1) preparing the masters to be sent to the Print Shop, (2) sending the master pages, cover, and Service Order to the Print Shop, and (3) preparing and submitting the Record of Origination & Distribution of Publication form, a copy of the Distribution list, a copy of the Service Order used to order Print Shop services, and the mailing labels that Document Processing will need to process the report for distribution.

Using Print Media's "Report Prep Service"

Authors can either prepare their own reports to be printed and distributed (a summary of instructions follows) or use the "Report Prep Service" offered by Print Media Dept. 12615 (MS 0619, Bldg. 894, Room 201). Print Media normally charges authors about four hours to complete the work, but costs vary depending on which parts of the service are used.

Report Prep Service:

- After the Review and Approval Form is signed off through Section 11, Print Media verifies that the report is ready for printing — that all Sandia and DOE report requirements were met and all required report changes and corrections were made. (These changes and corrections were described by a Print Media reviewer in Section 11 of your Review and Approval Form.)
- Print Media completes the necessary paperwork, including a Service Order form (after getting requirements from the author) to request the Report Prep Service (which includes the report cover) and Print Shop services. The Record of Origination is completed. Copies are made of all the paperwork and distributed to the appropriate offices.
- The author's secretary is provided with the information needed to prepare labels for the report.
- The report cover is prepared, then proofed by the author.
- The report, cover, and Service Order are delivered to the Print Shop.

For more information on the Report Prep Service, call Irene Silva at 845-8261.

Authors who want to prepare their own reports for printing and distribution should use the following instructions.

Preparing Report Masters for Printing

Steps for preparing the master package for printing are as follows:

1. Incorporate comments from the Review and Approval Form (Section 11), if any were specified.
2. Order report cover and legal notice masters from Print Media Dept. 12615, Bldg. 894, Room 201 (Figure 4-1). These masters must be included in the package going to the Print Shop. (Be sure to remove any temporary cover and legal notice pages you have been using on draft copies.)
3. Check masters carefully for the following:
 - Sequential page numbering.
 - Appropriate page numbering. For example, for two-sided printing, check that all right-hand pages have odd numbers and all left-hand pages have even numbers.
 - Color-copied pages (*unclassified*). Check that they are all right-hand pages and that each is backed up with a blank page with no printing on it except for "Intentionally Left Blank" and the page number. (In our Print Shop, color copies cannot yet be backed up with a printed page; the second run-through gums up the copier.)
 - Color-copied pages (*classified*). Check that they are all right-hand pages for single-side-only printing. (See above entry for unclassified color-copied pages.)
 - No blank pages except those preceded by a color-copied page, or those falling at the end of a section or at the end of the document.
 - Report title page and Distribution page(s) are included.

(More comprehensive checklists for a final check of the masters for unclassified and classified reports are shown in Figures 4-2 and 4-3.)
4. Carefully proof the cover; if corrections are needed, return cover to Print Media Dept. 12615.
5. Put the cover and legal notice masters with the other masters.

You are now ready to send the report, along with a Service Order form (Figure 4-4), to the Print Shop, Dept. 12615-1, Bldg. 802, Room B50.

Note: Submit SAND reports to the Print Shop with a copy of your completed Review and Approval Form (SF 1008-RA), signed off through Section 11.

HOW TO ORDER COVERS FROM PRINT MEDIA DEPT. 12615:

Make your request on a Service Order form (Form SA 1820-A)(2-95). See sample below.

Attach to the Service Order:

- (1) A copy of your title page, carefully checked for completeness and accuracy (see Figure 4-2 or 4-3 for title page requirements), and
- (2) A copy of your Review and Approval Form (SF 1008-RA), signed off through Section 11.

On the Service Order, show the total number of pages in the document. For classified reports this should be the number of the last page of the document; for unclassified documents that do not have sequential numbering from beginning to end, you will need to total the number of pages for all sections.

Mail or hand-carry the request to Print Media Dept. 12615, Bldg. 894, Room 201. If a classified title page has a classified title or abstract, be sure to use a red and white striped envelope.

Proof your cover after you receive it; you are responsible for its correctness.

Covers are processed within 24 hours.

SA 1820-A (2-95)		PRINT MEDIA assigns #																																																																																																																															
LABORATORY COMMUNICATIONS Service Order																																																																																																																																	
See Instructions on reverse side																																																																																																																																	
Order No. CP 3245																																																																																																																																	
[] 12615 Corporate Estates, MS 0401 [] 12614 Visual Communications MS 0551 [] 12615 Print Media, MS 0619 [] 12616 Interactive Media, MS 0409 Ph. 844-7160 Ph. 844-7167 Ph. 844-8265 Ph. 844-6418																																																																																																																																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Requester</td> <td style="width: 15%;">Social Security No.</td> <td style="width: 15%;">Name</td> <td style="width: 15%;">Phone</td> <td style="width: 15%;">Date</td> <td style="width: 15%;">Required Completion Date</td> </tr> <tr> <td>Org. 6352</td> <td>Mad Shop</td> <td>MS #123</td> <td>845-4321</td> <td>6-10-96</td> <td>6-11-96</td> </tr> <tr> <td>Approval</td> <td>Signature (Required)</td> <td></td> <td>Date</td> <td>Social Security No.</td> <td>Phone</td> </tr> <tr> <td></td> <td>Mary Smith</td> <td></td> <td>6-10-96</td> <td>845-4321</td> <td></td> </tr> <tr> <td>Job Title</td> <td colspan="2">HYDRAULIC TESTING of XX FORMATION</td> <td>SAN No. 96-2118</td> <td colspan="2">CLASSIFIED? Security Class [] Yes [] No [] Not yet determined [] Mat. [] Info</td> </tr> <tr> <td colspan="6" style="font-size: small;">Case Number Information: Case No. 0344.900 Charging Org. 6352 S. Amount or % 100 Cost 100</td> </tr> <tr> <td colspan="6" style="font-size: small;">DISPOSITION: [] Call for pickup [] Send to _____ [] Send to Mail Services, MS 0100 for Del. [] Store Negative (25% Free) [] Customer must submit a Photo Info Form for Unclassified only Name: Requester: MS: _____</td> </tr> <tr> <td colspan="6" style="font-size: small;">SSN: Name: AFS Bldg/Rm:</td> </tr> <tr> <td colspan="6" style="font-size: small;">Item No. of Checks Qty Description of Work and/or Notes</td> </tr> <tr> <td colspan="6" style="height: 100px; vertical-align: top; padding: 10px;"> <p>Please prepare COVER for SANDAG-2118 (16 pages + Cover).</p> <p>Copies of the report title page and signed-off Review and Approval Form are included.</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> </td> </tr> <tr> <td colspan="6" style="text-align: center; padding: 5px;">COMPLETE FOR CLASSIFIED WORK</td> </tr> <tr> <td colspan="6" style="text-align: center; font-size: small;">INFORMATION BELOW TO BE FILLED IN BY SERVICE CENTER PERSONNEL</td> </tr> <tr> <td colspan="6" style="text-align: center; font-size: small;">RECEIPT FOR CLASSIFIED</td> </tr> <tr> <td colspan="6" style="text-align: center; font-size: small;">I hereby assume responsibility for receipt of classified material identified herein and will handle, store, and transport it in accordance with existing regulations</td> </tr> <tr> <td colspan="6" style="text-align: center; font-size: small;">Name: _____ Org. _____ MS _____ Signature _____ Date _____</td> </tr> <tr> <td colspan="6" style="text-align: center; font-size: small;">Service Center Rep. _____ Org. _____ MS _____ Phone _____ Date Rec'd. _____</td> </tr> <tr> <td colspan="6" style="text-align: center; font-size: small;">Assigned to _____ Org. _____ MS _____ Phone _____ Date _____</td> </tr> <tr> <td colspan="6" style="text-align: center; font-size: small;">Plates _____ Press _____ Bindery _____ Impressions _____ Item No. _____</td> </tr> <tr> <td colspan="6" style="text-align: center; font-size: small;">Completed job picked up by _____ Name: _____ Signature _____ Date _____</td> </tr> <tr> <td colspan="6" style="text-align: center; font-size: small;">Send Service Order Requests Involving forms to Dept. 13213, MS 0612, for approval</td> </tr> <tr> <td colspan="6" style="text-align: center; font-size: small;">PRESS HARD - THE LAST COPY IS YOURS</td> </tr> </table>				Requester	Social Security No.	Name	Phone	Date	Required Completion Date	Org. 6352	Mad Shop	MS #123	845-4321	6-10-96	6-11-96	Approval	Signature (Required)		Date	Social Security No.	Phone		Mary Smith		6-10-96	845-4321		Job Title	HYDRAULIC TESTING of XX FORMATION		SAN No. 96-2118	CLASSIFIED? Security Class [] Yes [] No [] Not yet determined [] Mat. [] Info		Case Number Information: Case No. 0344.900 Charging Org. 6352 S. Amount or % 100 Cost 100						DISPOSITION: [] Call for pickup [] Send to _____ [] Send to Mail Services, MS 0100 for Del. [] Store Negative (25% Free) [] Customer must submit a Photo Info Form for Unclassified only Name: Requester: MS: _____						SSN: Name: AFS Bldg/Rm:						Item No. of Checks Qty Description of Work and/or Notes						<p>Please prepare COVER for SANDAG-2118 (16 pages + Cover).</p> <p>Copies of the report title page and signed-off Review and Approval Form are included.</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p>						COMPLETE FOR CLASSIFIED WORK						INFORMATION BELOW TO BE FILLED IN BY SERVICE CENTER PERSONNEL						RECEIPT FOR CLASSIFIED						I hereby assume responsibility for receipt of classified material identified herein and will handle, store, and transport it in accordance with existing regulations						Name: _____ Org. _____ MS _____ Signature _____ Date _____						Service Center Rep. _____ Org. _____ MS _____ Phone _____ Date Rec'd. _____						Assigned to _____ Org. _____ MS _____ Phone _____ Date _____						Plates _____ Press _____ Bindery _____ Impressions _____ Item No. _____						Completed job picked up by _____ Name: _____ Signature _____ Date _____						Send Service Order Requests Involving forms to Dept. 13213, MS 0612, for approval						PRESS HARD - THE LAST COPY IS YOURS					
Requester	Social Security No.	Name	Phone	Date	Required Completion Date																																																																																																																												
Org. 6352	Mad Shop	MS #123	845-4321	6-10-96	6-11-96																																																																																																																												
Approval	Signature (Required)		Date	Social Security No.	Phone																																																																																																																												
	Mary Smith		6-10-96	845-4321																																																																																																																													
Job Title	HYDRAULIC TESTING of XX FORMATION		SAN No. 96-2118	CLASSIFIED? Security Class [] Yes [] No [] Not yet determined [] Mat. [] Info																																																																																																																													
Case Number Information: Case No. 0344.900 Charging Org. 6352 S. Amount or % 100 Cost 100																																																																																																																																	
DISPOSITION: [] Call for pickup [] Send to _____ [] Send to Mail Services, MS 0100 for Del. [] Store Negative (25% Free) [] Customer must submit a Photo Info Form for Unclassified only Name: Requester: MS: _____																																																																																																																																	
SSN: Name: AFS Bldg/Rm:																																																																																																																																	
Item No. of Checks Qty Description of Work and/or Notes																																																																																																																																	
<p>Please prepare COVER for SANDAG-2118 (16 pages + Cover).</p> <p>Copies of the report title page and signed-off Review and Approval Form are included.</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p>																																																																																																																																	
COMPLETE FOR CLASSIFIED WORK																																																																																																																																	
INFORMATION BELOW TO BE FILLED IN BY SERVICE CENTER PERSONNEL																																																																																																																																	
RECEIPT FOR CLASSIFIED																																																																																																																																	
I hereby assume responsibility for receipt of classified material identified herein and will handle, store, and transport it in accordance with existing regulations																																																																																																																																	
Name: _____ Org. _____ MS _____ Signature _____ Date _____																																																																																																																																	
Service Center Rep. _____ Org. _____ MS _____ Phone _____ Date Rec'd. _____																																																																																																																																	
Assigned to _____ Org. _____ MS _____ Phone _____ Date _____																																																																																																																																	
Plates _____ Press _____ Bindery _____ Impressions _____ Item No. _____																																																																																																																																	
Completed job picked up by _____ Name: _____ Signature _____ Date _____																																																																																																																																	
Send Service Order Requests Involving forms to Dept. 13213, MS 0612, for approval																																																																																																																																	
PRESS HARD - THE LAST COPY IS YOURS																																																																																																																																	

Figure 4-1. Ordering covers from Print Media Dept. 12615 (Bldg. 894, Room 201)

<p><input type="checkbox"/> Does Review and Approval (R&A) Form include all approvals?</p> <p>Cover</p> <p><input type="checkbox"/> Is all information on the cover prepared by Department 12615 correct?</p> <p>Check that the following cover items agree with the title page:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Report number(s) and DOE Distribution Category (UC) number (except for Internal Distribution Only and Work for Others reports that do not have housekeeping copies) <input type="checkbox"/> Release information and print date <input type="checkbox"/> Report title <input type="checkbox"/> Author(s), preferably first name, initial, and last name of each; check spelling carefully <input type="checkbox"/> Legends <input type="checkbox"/> Does cover include additional legends indicated on R&A form, but not required on title page (e.g., Patent Caution and ECI)? <input type="checkbox"/> Does cover have "Prepared by . . ." statement? <p>Legal Notice (Disclaimer)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Does legal notice appear on unnumbered page 2? <input type="checkbox"/> If Unlimited Release, is the price information included below the legal notice: "Available at . . .?" <input type="checkbox"/> Is the price code number correct? 	<p>Title Page</p> <p>Does title page have the following information?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Report number <input type="checkbox"/> Release statement (Unlimited Release, Patent Caution, or other statement as indicated on R&A form) <input type="checkbox"/> Print date (month and year without comma) <input type="checkbox"/> Is the DOE/OSTI distribution category (UC-XXX) in the upper right-hand corner? (Internal Distribution Only and some Work for Others do not require a distribution category) <input type="checkbox"/> Full title of report <input type="checkbox"/> Author(s), preferably first name, initial, and last name of each; check spelling carefully <input type="checkbox"/> Name of author(s)' organization(s) — but not the organization number <input type="checkbox"/> Company name and address, including zip code (87185 for Sandia/NM) <p>Body of Report</p> <p>Is page numbering correct? Check for the following:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Page numbers in proper location <input type="checkbox"/> No skips in sequence <input type="checkbox"/> Are the title page and the first page of body of report (the page with Introduction, Background, or similar headings) right-hand pages? <input type="checkbox"/> Do Contents listings (including figures and tables) agree with the text, and are page numbers listed correctly? <input type="checkbox"/> Are graphics of good, reproducible quality? <p>Distribution</p> <ul style="list-style-type: none"> <input type="checkbox"/> Are names, organizations, and mail stops up to date? <input type="checkbox"/> Are housekeeping copies correct?
<p>Revisions</p> <p><input type="checkbox"/> The word <i>Revised</i> appears after SAND# on cover and title page <i>unless</i> a new SAND# is used.</p> <p><input type="checkbox"/> The supersession statement, with a blank line above it, appears below the Printed (date) line on cover and title page. The statement reads the same whether it is for SANDxx-xxxx Revised or a new SAND#. It is: "Supersedes SANDxx-xxxx dated (month & year)."</p>	<p>Reprints</p> <p><input type="checkbox"/> On cover, the reprint date replaces the previous print date.</p> <p><input type="checkbox"/> On title page, <i>the previous print date is retained</i> and the reprint date is added below it.</p> <p><input type="checkbox"/> On distribution page, the original distribution is retained, followed by a blank line or two, then "Second (etc.) Printing, (date):" which is followed by another blank line and the new distribution. No housekeeping copies required.</p>

Figure 4-2. Checklist for unclassified report masters.

- Does Review and Approval (R&A) Form include all approvals?

Cover

- Is all information on the cover prepared by Department 12615 correct?
- Is the cover numbered page 1?

Check that the following cover items agree with the title page:

- Report number(s)
- Nuclear Weapon Data & Sigma # or other limitations; no DOE/OSTI Distribution Category Number (C#)
- Print date
- Report title with classification in parentheses
- Author(s), preferably first name, initial, and last name of each; check spelling carefully
- Legends

- Does cover include additional legends indicated on R&A form, but not required on title page (e.g., Patent Caution and ECI)?
- If report is going to outside recipients, does the notice "Only those recipients external to . . ." or "Reproduction of the report . . ." appear as last item on cover?
- Does cover have "Prepared by . . ." statement?
- Does documentation block appear on cover?
- Is the total number of pages correct?

Legal Notice (Disclaimer)

- Does legal notice appear on page number 2?
- No price blurb appears

Title Page

Does title page have the following information?

- Report number
- Limitation statement(s) as marked on the R&A form (such as Nuclear Weapon Data - Sigma)
- Print date (month and year without comma)
- Distribution Category (C#)
- Full title of report followed by classification [e.g., (U) or (SRD)]
- Author(s), preferably first name, initial, and last name of each; check spelling carefully
- Name of author(s)' organization(s) — but not the organization number
- Company name and address, including zip code (87185 for Sandia/NM)
- Does classification [e.g., (U) or (SRD)] follow the word *Abstract*?
- Are all classification markings and legends included?

Body of Report

Is page numbering correct? Check for the following:

- Page numbers in proper location
- No skips in sequence
- If Secret or Confidential, no double page numbers, and all blank pages state *Intentionally Left Blank*
- If last page of report is a blank left-hand page, it must be numbered and state *Intentionally Left Blank*

- Are the title page and the first page of body of report (the page with Introduction, Background, or similar headings) right-hand pages?
- Do Contents listings (including figures and tables) agree with the text, and are page numbers listed correctly?
- Are graphics of good, reproducible quality?

Distribution

- Are names, organizations, and mail stops up to date?
- Are housekeeping copies correct?

Figure 4-3. Checklist for classified report masters.

Revisions	Reprints
<p><input type="checkbox"/> The word <i>Revised</i> appears after SAND# on cover and title page <i>unless</i> a new SAND# is used.</p>	<p><input type="checkbox"/> On cover, the reprint date replaces the previous print date.</p>
<p><input type="checkbox"/> The supersession statement, with a blank line above it, appears below the Printed (date) line on cover and title page. The statement reads the same whether it is for SANDxx-xxxx Revised or a new SAND#. It is: "Supersedes SANDxx-xxxx dated (month & year)."</p>	<p><input type="checkbox"/> On title page, <i>the previous print date is retained</i> and the reprint date is added below it.</p> <p><input type="checkbox"/> On Distribution page, the original distribution is retained, followed by a blank line or two, then "Second (etc.) Printing, (date):" which is followed by another blank line and the new distribution. No housekeeping copies required.</p>

Figure 4-3 (concluded).

Sending Masters to the Print Shop (Bldg. 802)

DOE regulations state that all reproduction of SAND reports must be done through the Sandia Print Shop (Sandia/NM Dept. 12615-1, MS 0104).

1. Prepare a Service Order, Form SA 1820-A (Figure 4-4).
Note: Retain the blue copy of the Service Order. You will need to send it to Document Processing (MS 0100) later, along with the Record of Origination and mailing labels.
2. Mail or hand-carry the report masters and the Service Order form to Print Shop Dept. 12615-1 (MS 0104). If you hand-carry the masters to the Print Shop, the goldenrod copy of the Service Order will be date-stamped and returned to you. If you mail the masters to the Print Shop, remove the goldenrod copy of the Service Order form and retain it for your records.

Note: Submit SAND reports to the Print Shop with a copy of your completed Review and Approval form (SF 1008-RA), signed-off through Section 11.

If you have indicated on the Service Order that the printed copies are to go to Mail Services, Document Processing will intercept the reports in the mail room and process them for distribution. See the following section for Document Processing procedures.

LABORATORY COMMUNICATIONS

Service Order

See Instructions on reverse side.

Order No. CP2764

12613 Corporate Exhibits, MS 0401 12614 Visual Communications MS 0551 12615 Print Media, MS 0619 12616 Interactive Media, MS 0409
Ph. 844-2168 Ph. 844-7167 Ph. 845-8265 + PRINT Ph. 844-6416

Requester	Social Security No		Name	SHOP		
	Org. 12313	Mail Stop MS 0512	Phone 845-3214	Date 2-5-96	Required Completion Date 2-19-96	
Approval	Signature (Required) Harold Martin		Date 2-5-96	Social Security No.	Phone 845-3214	
Job Title	Animation of Robotic Structures		SAND No. 96-3211	CLASSIFIED? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Fill out space below	Security Class. <input type="checkbox"/> Mat'l. <input type="checkbox"/> Info.	

Case Number Information:

Case No.	Charging Org.	\$ Amount or %	Cost Seq.	Case No.	Charging Org.	\$ Amount or %	Cost Seq.
1. 0589.290	12313			3.			
2				4.			

DISPOSITION: Call for pickup Send to: **MASTERS** Send to Mail Services, MS 0100 for Dist. Store Negatives (Still Photo)
Ph. _____ Name: Harold Martin MS 0512 (Customer must submit a Photo Info Form for Unclassified only.)

SSN	Name	MS	Bldg/Rm
Item No.	No. of Originals	Qty.	Description of Work and/or Notes
1	PRINT MEDIA - Prepare covers for SAND96-3211 and return to Harold Martin. (46 pages + cover)		
2	23 PRINT SHOP - Print standard SAND report covers. Print 23 copies of attached masters, pages back-to-back.		
3	RAPID SERVICE - Color Xerox pgs. 3, 7, 13, 15, 17 with backing pages marked "Intentionally Left Blank." Hand-insert color copies into printed pgs. of document.		
4	Staple at left margin. # of copies requested: (23) # of originals: (48)		

COMPLETE FOR CLASSIFIED WORK

Security Class.	Classified by	Date of Classification	Title	Org.	MS
-----------------	---------------	------------------------	-------	------	----

INFORMATION BELOW TO BE FILLED IN BY SERVICE CENTER PERSONNEL

RECEIPT FOR CLASSIFIED: I hereby assume responsibility for receipt of classified material identified herein and will handle, store, and transmit it in accordance with existing regulations.

Name	Org.	MS	Signature	Date
Service Center Rep.	Org.	MS	Phone	Date Rec'd.
Assigned to	Org.	MS	Phone	Estimate:
Plates	Press	Bindery	Impressions	Item No.
Completed job picked up by				
Name	Signature		Date	\$

Send Service Order Requests involving forms to Dept. 13213, MS 0612, for approval

PRESS HARD - THE LAST COPY IS YOURS

Figure 4-4. Service Order form for report cover and Print Shop services.

Distribution

If you indicated on the Service Order form that the report copies are to be sent to Mail Services for distribution, Document Processing Dept. 7613-2 will intercept the copies there and prepare them for distribution. To do so, they need several items from the line organization.

Submitting Required Items to Document Processing

Immediately after the masters go to the Print Shop, take the following action to give Document Processing the information needed to process the reports for final distribution.

1. Prepare Record of Origination & Distribution of Publication Form (SA 2900-FBB) (see Figure 4-5).

Instead of listing addressees as requested on the form, simply type "SEE ATTACHED" and go to step 2.

2. Attach a copy of the Distribution list from your report.
3. Attach a copy of the Service Order form that was used to order Print Media (cover) and Print Shop services.
4. Make self-adhesive address labels (1) for all internal and external addressees who are to receive unclassified reports, and (2) for all internal addressees who are to receive Confidential or Secret reports. The Mail Services Team will supply labels for external addressees who are to receive Confidential or Secret reports. If report is Secret, also prepare RCIs (for all Secret reports) and RITs (if the Secret report is going outside of Tech Area I).
5. Enclose items 1 through 4 in an envelope addressed to Document Processing, Dept. 7613-2 (MS 0100).

Distributing the Reports

Mail Services distributes the reports after Document Processing has prepared them.

RECORD OF ORIGINATION & DISTRIBUTION OF PUBLICATION

- W - Atomic Weapon Data Report (SAND Report)
Secret and Sigma 1, 2, or 3 (limit codes
B, C, D, N, O, or P)
- R -- DOE R&D Report - check only if document is
Secret (limit code F, R or T only)
- Blank = Check only if neither Atomic Weapon Data nor R&D Report (limit codes must not be B, C, D, N, O, P)

▲Limit Codes		
A = SRD	H = CRD, Sigma 1	P = SFRD, Sigma 3
B = SRD, Sigma 1	I = CRD, Sigma 2	T = SFRD R&D
C = SRD, Sigma 2	J = CRD, Sigma 3	M = SNSI
D = SRD, Sigma 3	K = CRD, PR&S	R = SNSI, R&D
E = SRD, PR&S	L = CRD, R&D	S = CNSI
F = SRD, R&D	N = SFRD, Sigma 1	X = CNSI, R&D
G = CRD	O = SFRD, Sigma 2	

ORIGINATOR: Do not enter classified information on this form.

Date Prepared

Graphic Arts Work Request No.

May 7, 1996

Status Code 1 7	● Check One 3 <input type="checkbox"/> W <input type="checkbox"/> R <input type="checkbox"/> Blank		CNWDI <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Control No. 6-19 (R/S if Secret, Short Title if Conf. or Unc.) SAND96-7871				
	Class 31-32 U	Chg. Pgs. Reqd. 33 <input type="checkbox"/> No. KP Oper. note— Punch "N" if checked; else leave blank.		Short Title 34-46 SAND96-7871	Doc. Date (Mo-Da-Yr) 05-00-96	▲ L/C 53	No. Pages 54-58 178	Total Copies 76-80 72
COPY NUMBER		MAIL CHAN. OR STA. NO. 64-67	ORG. NO. (SLA only)	ADDRESSEE (NAME ONLY FOR DISTRIBUTION TO SLA: NAME & ADDRESS FOR OUTSIDE SLA)				
From 23-26	To 27-30							

ADDRESSEE
(NAME ONLY FOR DISTRIBUTION TO SLA:
NAME & ADDRESS FOR OUTSIDE SLA)

SEE ATTACHED.

Quotations

Tammy Locke

Order

Org. 12615

Phone

Phone 845-9367

REMARKS

Figure 4-5. Record of Origination & Distribution of Publication, form SA 2900-FBB.

Intentionally Left Blank

SECTION 5

Presentations, Conference Papers, Journal Articles, Book Chapters, and Brochures

Intentionally Left Blank

Presentations and Conference Papers — Requirement for SAND Number

Presentations and conference papers must have a SAND number. See *Control (SAND) Numbers* in Section 1 of this guide. The SAND number is used to track the document; it does not appear on the document when the masters are submitted to the conference.

Presentations

Definition

Presentations are oral or written offerings that may range from formal presentations, requiring that the presenter submit a draft to the requesting group, to very informal, where the requester asks for nothing.

Approvals

Formal Review and Approval (R&A) must be obtained for all presentations made outside of Sandia (see Section 1). The full paper must be reviewed if the author prepares one. If the presentation is so informal that no paper is prepared, at least an abstract must be submitted for R&A.

Conference Papers

Definition

Conference papers are presentations made to professional societies. A professional society such as IEEE NSREC requires that all presentations be accompanied by reproducible masters to be included in a “proceedings” document. Some conferences require an abstract; an extended abstract or summary, usually 2 to 4 pages; and the full paper.

Approvals

Each form of the conference paper (abstract, extended abstract, or the full paper) must be formally reviewed at Sandia (see Section 1). *The Review and Approval Form must be accompanied by three copies of the conference paper when the R&A package is sent to Print Media.*

Draft copy

Many professional societies require that drafts of papers be submitted for consideration by the society review committee. Such a draft must go through the R&A process. If the draft is accepted, then the author is usually required to furnish camera-ready masters so that the paper can be included in the “proceedings” of the conference.

Masters

The sponsoring society usually furnishes guidelines for preparation of the masters (how to prepare them and when they must be submitted). Sample pages of a typical conference paper are shown in Figure 5-1. Many conferences now accept masters prepared on 8-1/2×11-in. paper; others still require that the paper be submitted on oversize masters such as the one shown in Figure 5-2.

The SAND number for a conference paper will not appear on the masters, but it will be used for tracking the paper during the review process and for other recordkeeping purposes. The SAND number suffix for a conference paper is “C.” Example: SAND96-1132C.

DOE (or any other) sponsorship statement

All conference papers must include a credit line (also referred to as a “funding statement,” “support statement,” or “sponsorship statement”). This can appear on the title page, footnoted to “Sandia National Laboratories” below the name(s) of the author(s) or to the title of the document, as appropriate (see Figure 5-1). It can also appear on the last page of the document.

If all the work was funded by the DOE, the DOE-Sandia sponsorship statement must appear on the first page of a conference paper and credit the current contract number. If some other government agency or company contributed all or part of the funding, appropriately indicate that information as well. The DOE-Sandia sponsorship statement is as follows:

This work was supported by the United States
Department of Energy under Contract
DE-AC04-94AL85000.

Release limitations

When the R&A form shows a release limitation, such as Export Controlled Information, include the appropriate legend in the conference paper, immediately after the abstract (see Sample 3-4). Also, be sure that the proceedings in which the paper will appear have a limitation as stringent as the limitation of your paper.

Copyright transfer

If the conference asks for a copyright transfer, see page Appendix D.

The ASSESS Outsider Analysis Module

Alfred Winblad, Mark Snell, Sabina Erteza Jordan
Sandia National Laboratories,* Albuquerque, New Mexico, U.S.A.

Brad Key, Bryan Bingham, Scott Walker
Science & Engineering Associates, Inc., Albuquerque, New Mexico, U.S.A.

ABSTRACT

The Outsider Analysis (Outsider) module is part of the Analytic System and Software for Evaluating Safeguards and Security (ASSESS). Outsider and the ASSESS Facility Descriptor (Facility) module together supersede the Systematic Analysis of Vulnerability to Intrusion (SAVI) software package. Outsider calculates $P(I)$, the probability that outsiders are interrupted during an attack by security forces at the facility, and $P(W)$, the probability of security system win, and has other features not found in SAVI. Analysts can select intruders from a set of ten reference threats, ranging from well-equipped terrorists to intruders with no equipment at all. New analysis algorithms run 60 to more than 100 times faster. New reports detail how safeguards are defeated at each element in a path and give other data critical to effective upgrade decisions. Outsider takes as input a facility security system defined in Facility and produces intermediate results for the ASSESS Collusion module.

INTRODUCTION

The Outsider Analysis (Outsider) module is part of the Analytic System and Software for Evaluating Safeguards and Security (ASSESS) developed under contract to the U.S. Department of Energy [1].

Outsider calculates the vulnerability of facilities defined in the ASSESS Facility Descriptor (Facility) module to intrusion by outsiders [2]. Other ASSESS modules analyze facility security against other kinds of threats [3,4]. All ASSESS modules run on IBM-PC compatible computers within Microsoft WindowsTM, a graphical user interface.

Outsider and Facility together supersede the Systematic Analysis of Vulnerability to Intrusion (SAVI) software, developed in 1987 by Sandia National Laboratories and Science & Engineering Associates, Inc. [5,6]. Along with an improved user interface based on Microsoft Windows, Outsider has new modeling and reporting capabilities

that make it faster and easier to set up and run intrusion analyses, to determine specific areas of vulnerability, and to identify and test potential upgrades.

THE OUTSIDER ANALYSIS MODULE

Outsider analyses are based on the SAVI model of timely detection, with major improvements in threat definition, algorithm performance, and deceitful intrusion modeling [7]. SAVI and Outsider both calculate the probability of interruption, $P(I)$. $P(I)$ is the probability that the security force at a facility can respond to an alarm and interrupt intruders before they complete their mission. Outsider also calculates $P(W)$, the probability of system win. $P(W)$ is defined as the product of $P(I)$ and $P(N)$, where $P(N)$ is the probability the response force can neutralize the intruders once interruption occurs. Outsider can get $P(N)$ from the ASSESS Neutralization Analysis module [8] or directly from the analyst. For more about how Outsider calculates $P(I)$ see Reference 7.

The value of $P(I)$ for a given path is determined by locating the last point in the path, called the Critical Detection Point (CDP), where an alarm can cause the response force to deploy with enough time left to stop the intruders. Protection elements before the CDP provide detection; those after the CDP provide delay. Thus, in calculating $P(I)$ for each path, delay safeguards in protection elements before the CDP and detection safeguards after the CDP are not effective. Outsider can find the ten most vulnerable (lowest $P(I)$) paths for a range of ten response force times (RFT).

Outsider is a Microsoft Windows application. As such, it looks and works like other Windows applications, such as Facility and Microsoft Excel. Figure 1 shows the Outsider application as it might look after an analysis has been completed. A Control Panel displays and sets threat and analysis settings, and three support windows, Diagram, Results, and Graphs, display analysis information. Each support window can be moved and sized independently inside the main window. Outsider provides both mouse and keyboard control.

*This work was supported by the United States Department of Energy under Contract DE-AC04-94AL85000.

Figure 5-1. Sample of a conference paper.

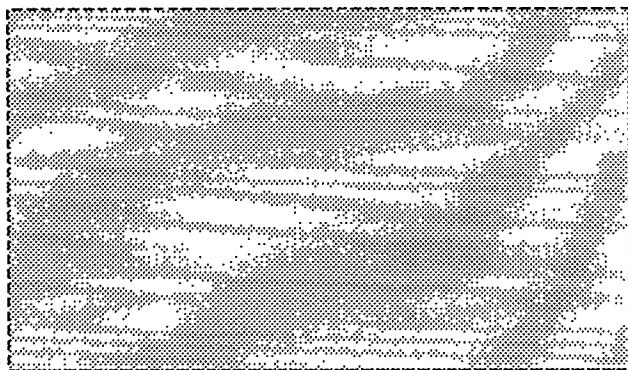


Figure 1. The main Outsider Analysis screen

After starting Outsider, an analyst can load a physical protection system description created in Facility or a previously saved analysis. The protection system, in the form of an Adversary Sequence Diagram (ASD), appears in the Diagram window. The analyst can then choose threat and response force settings using the Control Panel, and run the chosen analysis. After the analysis is finished, the Control Panel is used to select any path and see it highlighted on the Diagram. A detailed textual description of the path including intrusion methods and individual safeguard performance values is shown in the Results window. The Graphs window displays user-selectable information about sets of paths, including a graph of the protection system's sensitivity to response force deployment time. After reviewing the analysis results, the analyst can save them to a file, print reports, create a collusion analysis support file, or modify settings and reanalyze.

Control Panel

The Control Panel shown in Figure 2 displays all of the settings that control an Outsider vulnerability analysis.

When an Outsider analysis is completed, the most vulnerable intrusion paths through the facility protection system are accessed through the Control Panel's Path Matrix. Outsider can display up to 100 of the most vulnerable paths based on the number of requested paths and response force times. The Path Matrix columns represent the most vulnerable intrusion paths. The analyst may request that up to 10 of the most vulnerable paths be identified. Each row of the matrix represents a single response force time from the specified range, which may also have as many as 10 RFTs. Therefore, the Path Matrix can be as large as 10 by 10. The Path Matrix controls indicate the number of requested paths and RFTs as well as the current highlighted path in the matrix. All data associated with the highlighted path is displayed automatically in the Diagram, Results, and Graphs windows. Using these controls, the analyst can efficiently review the vulnerability of all paths in the matrix.



Figure 2. The Outsider Analysis control panel

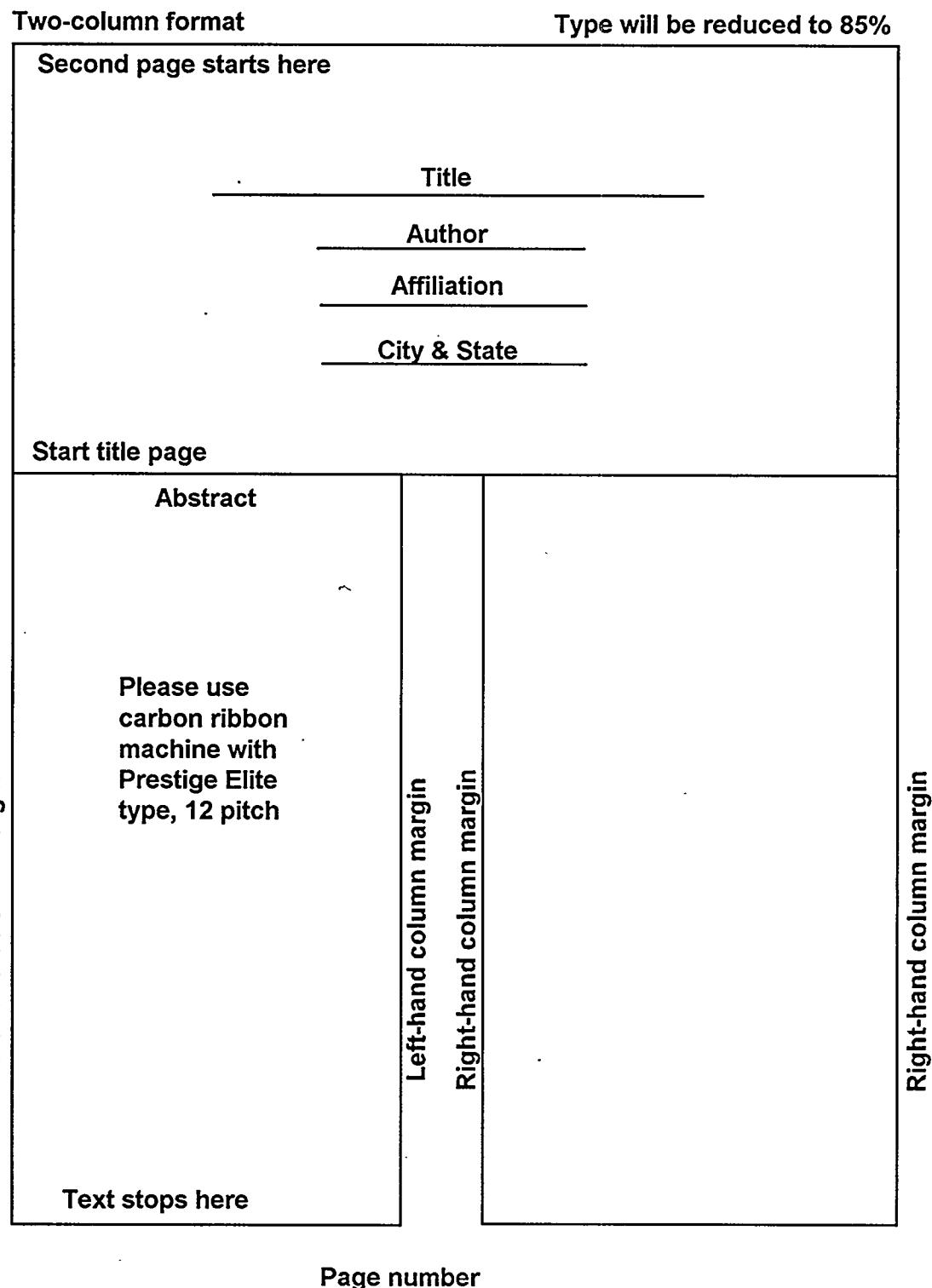


Figure 5-2. Example of an oversize format master.

Journal Articles and Book Chapters — Requirement for SAND Number

Journal articles and book chapters must have a SAND number (see Section 1). The SAND number is used to track the document at Sandia and DOE; it does not appear on the document that is submitted to the publisher.

Both journal articles and book chapters are considered “open-literature” publications.

Journal Articles

Definition

Journal articles are manuscripts submitted to professional journals, either in draft form (following the journal’s specifications for the draft) or on camera-ready masters.

Approvals

Each form of a journal article (abstract or final draft) must be formally reviewed before it leaves Sandia. See Section 1 for R&A instructions. The R&A must be accompanied by one copy of the journal article when the R&A package is sent to Print Media.

Draft copy

A draft copy, usually double-spaced and in near-final form, is sent to the journal. If the article is accepted, the journal will send instructions for preparation of the final manuscript and submission of artwork. A SAND number is needed for a journal article but is not put on the document. The SAND number suffix for a journal article is “J.”
Example: SAND96-2334J.

DOE (or any other) sponsorship statement

The funding organization must be given credit in the article. This is usually done in the acknowledgment section near the end of the article.

If all the work was funded by the DOE, the DOE-Sandia sponsorship statement (also referred to as a “funding statement” or “support statement”) should appear in the acknowledgment section of the journal article and credit the current contract number. If some other government agency or company contributed all or part of the funding, appropriately indicate that information as well. The DOE-Sandia sponsorship statement is as follows:

This work was supported by the United States Department of Energy under Contract DE-AC04-94AL85000.

Release limitations

When the R&A form shows some release limitation, such as Export Controlled Information, include the appropriate legend on a cover sheet. Also, be sure that the journal in which the article will appear has a limitation as stringent as the limitation of your article.

Copyright transfer

If the publisher asks for a copyright transfer, see Appendix D.

Book Chapters

Approvals

The manuscript for a book chapter must go through the formal Review and Approval process.

Draft copy

Instructions for preparation of the chapter are supplied by the publisher.

Release limitations

When the R&A form shows some release limitation, such as Export Controlled Information, include the appropriate legend on a cover sheet or insert it in the chapter as directed by the publisher. Also, be sure that the book in which the chapter will appear has a limitation as stringent as the limitation of your chapter.

Copyright transfer

If the publisher asks for a copyright transfer, see Appendix D.

Brochures

Definition

Brochures are leaflets or booklets that have special formats and frequently contain color photographs and special displays. If they are prepared for distribution within the federal government or for marketing purposes, they usually are "slick" publications that fall into the category of Public Information Publications. A sample of a simple brochure appears in Figure 5-3.

Approvals

Brochures that will be distributed outside Sandia or used inside Sandia for a general audience must be approved by DOE. To initiate the procedure for DOE approval, contact the Print Shop Consultant at 845-8328 as soon as a complete draft copy is available.

Masters

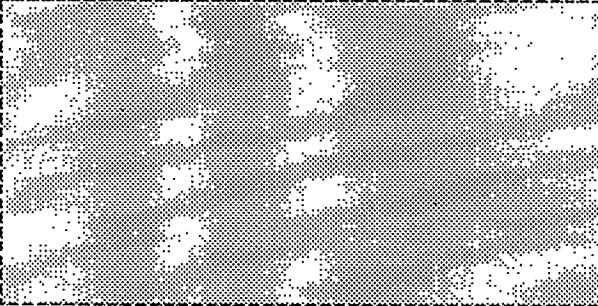
For assistance in the design and layout of masters for brochures, contact one of the graphic design (Publications) specialists in Print Media Department 12615.

Release limitations

All appropriate release limitations (as shown on the R&A form) must be reflected in the brochure in some appropriate manner.

Funding credit

Credit must be given for the funding organization, such as Lockheed Martin. The designer in Org. 12615 can assist with its wording and placement.



Central Receiver Test Facility located southeast of Albuquerque, New Mexico

Sandia National Laboratories

Central Receiver Test Facility

For technical details about the CRTF contact:

CRTF Supervisor
Division 6222
Sandia National Laboratories
Albuquerque, NM 87185
(505) 844-2280

For details of the national program to develop the Central Receiver concept contact:

Solar Central Receiver Department 8450
Sandia National Laboratories
Livermore, CA 94550
(415) 422-2568

For information about the US Department of Energy support of this technology contact:

Director, Solar Energy Division
Albuquerque Operations Office
US Department of Energy
PO Box 5400
Albuquerque, NM 87185
(505) 846-5206

Director, Solar Thermal Technology Division
US Department of Energy
1000 Independence Ave., SW
Washington, DC 20585
(202) 252-1535

(a) First (front) sheet of brochure

Questions Frequently Asked by CRTF Visitors

How do Central Receiver power plants produce electricity from the heat of the sun?

Briefly, a central receiver system consists of a field of individually guided mirrors, called heliostats, that redirect the sun's energy to a receiver mounted on top of a tower. In the receiver, the radiant solar energy is absorbed in a circulating fluid and then is either transferred to a storage system for use during a later period or used directly to power a conventional steam turbine/generator.



How much land does the CRTF occupy?

The CRTF occupies about 9 acres — the heliostats are situated on about 8 acres (the size of 7 football fields), and the tower and its utilities occupy about 1 acre.

How much did the CRTF cost?

When completed in 1978, the CRTF cost just over \$21 million. In a Central Receiver power plant, the heliostats and their computer control systems account for almost half the total cost; the tower, solar receiver, and thermal storage systems for about one-fourth; and the electric power plant for the remainder. Specifically, the CRTF heliostats, including the computer control systems, cost about \$35 thousand each. Costs have decreased, and will continue to decrease, as further technical improvements are made and as production quantities increase. Heliostats for the Solar 1 power plant near Barstow, California, for example, cost about \$15 thousand each. Similarly, the computers, which accounted for about 5% of the total cost of the CRTF, will represent only 2% to 3% of plant costs in future central receiver systems.

How much electricity could the CRTF produce?

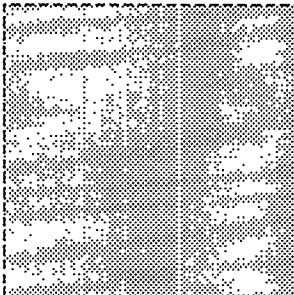
The CRTF field contains 222 heliostats that can direct up to 5 megawatts of solar radiation onto the receiver or other experimental objects. If we were to convert the 5,000,000 watts of heat to electricity, we could get about 1,500,000 watts — enough to power about 750 homes.

How big is the CRTF tower?

The CRTF tower is 200 feet tall and its 8-foot-thick foundation is 50 feet below ground. A total of 150 truckloads of concrete was required to complete the structure. The tower's large elevator can lift test items weighing up to 200,000 pounds to the top or to any of the north-facing test bays.

Is the US the only country developing a Central Receiver system?

France, Spain, Italy, Switzerland, Israel, Germany, Japan, and Russia are also working on central receiver concepts. Most of these countries are involved in the design and operation of test facilities like the CRTF and in conducting experiments associated with the facilities.



Does rain, snow, dust, or hail hurt the mirrors?

Rain, snow, and other natural forms of moisture actually help keep the mirrors clean by washing away accumulated dust. Hail and dust storms have not harmed the mirrors. Only hail over 1 inch in diameter is likely to break the mirrors.

How hot is the solar beam at the CRTF?

If we put an uncooled object in the beam, we can generate temperatures of over 4000°F. The metal tubes in a solar receiver reach only 1000°F to 1500°F because the fluid inside carries most of the heat away.

Can the solar beam be used as a "star Wars" weapon?

No! We are unable to target on fast moving objects and it is impractical to highly focus the sun at very long ranges. Even if we could overcome these technical difficulties, we would have only a "fair weather" weapon.

Has any testing at the CRTF had practical results?

The CRTF developed the receiver and heliostats in use at Solar 1, a 10-megawatt electric solar power plant now in routine operation near Barstow, California. Advanced heliostats tested at the CRTF are now being used in Spain at an international central receiver facility and in California at a facility that supplies steam for enhanced oil recovery.

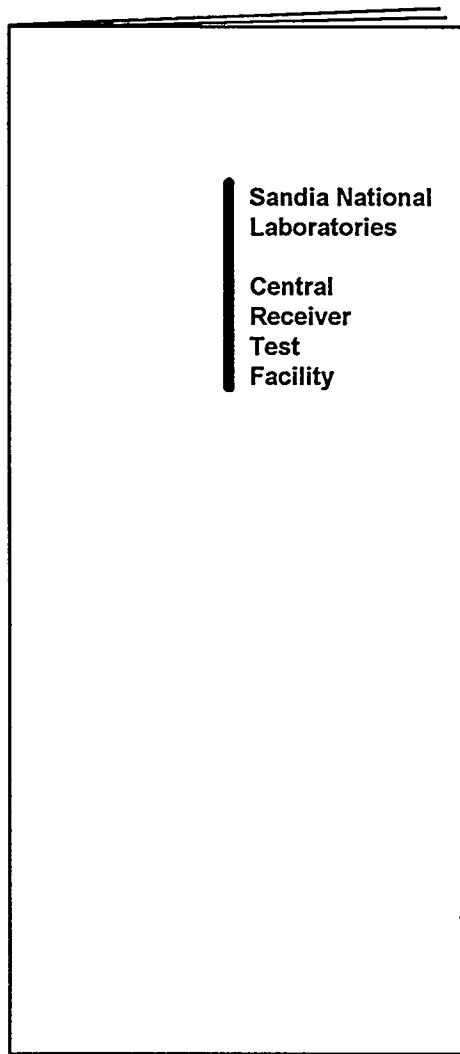
What are the CRTF mirrors made of?

The mirrors are made of two layers of glass with reflective silver between the glass layers. The quality of the glass is like that in your windows at home. The silver in one heliostat (25 mirrors) weighs only about 1 ounce.

The molten salt and sodium working fluids tested for receivers, storage, and steam production are now the leading candidates for the commercial development of central receiver systems.

(b) Second (back) sheet of brochure

Figure 5-3. Master for a simple brochure.



(c) The folded brochure

Figure 5-3 (concluded).

Intentionally Left Blank

BIBLIOGRAPHY

Intentionally Left Blank

Style Manuals

C. T. Brusaw, G. J. Alred, and W. E. Aliu, *Handbook of Technical Writing*.
St. Martin's Press, New York, 1982.

Easy-to-use reference arranged alphabetically by subject. Covers grammar, usage, style, format, and hints about writing; includes examples. Well indexed. Comes in paperback.

R. A. Day, *How to Write and Publish a Scientific Paper*.

Contains a good two pages on tense in scientific writing (118-119).

Lois Hutchinson, *Standard Handbook for Secretaries*. McGraw-Hill, New York, 1969.

Contains sections on grammar and usage and a wide range of other information not included in style manuals. For example, the section on time includes charts of standard time around the world and the standard time zone of each state as well as exceptionally informative definitions of such things as the world date line, Greenwich Mean Time, the equinoxes, and the solstices.

W. A. Sabin, *The Gregg Reference Manual*. McGraw-Hill, New York, 1994.

Completely covers punctuation, capitalization, treatment of numbers, abbreviations, plurals and possessives, compound words, grammar, and format. Highly recommended for anyone who needs to know the fine points of usage.

United States Government Printing Office, *Style Manual*. Government Printing Office, Washington, DC, 1984.

The standard for government publications. Contains capitalization, hyphenation (or not) of compound words, punctuation, standard abbreviations, and a wealth of miscellaneous information not easily found elsewhere — for example, plant and insect names, tables of geologic terms, etc.

University of Chicago Press, *The Chicago Manual of Style*. University of Chicago Press, Chicago, 1982.

The "Bible" of academic writing and for many publishers and journals. Has chapters on production and printing; majority of space is devoted to minutiae of rules concerning punctuation, tables, references, and bibliographic forms. Highly detailed and not easy to use, but is an undisputed authority, especially for references. Recommended for anyone publishing in academic presses and for those responsible for references/bibliographic forms.

Dictionaries and Usage

The American Heritage Dictionary, College Edition. Houghton Mifflin, Boston, 1985.

Print is easy to read. Drawings and photos in margins illustrate words that are hard to visualize. Handy usage section follows words often misused/abused. Guides at top of page give both first and last word on that page. A friendly reference.

Dictionary of Scientific and Technical Terms, fourth edition. McGraw-Hill, New York, 1989.

Includes scientific and technical words and phrases; omits most words already contained in other standard dictionaries. Field in which term is used is given in parentheses after the word. No pronunciation, verb tenses, or etymologies. Useful information in appendixes, for example, Greek alphabet, periodic table, mathematical signs and symbols, specialized abbreviations and acronyms. Highly recommended as resource for Sandia departments.

William Strunk, Jr., and E. B. White, *The Elements of Style*, third edition. Macmillan Publishing Co., New York, 1979.

This classic is a small gem. Can't be beat for elementary rules of usage, principles of composition, form, and style. Easy to read.

Webster's New Collegiate Dictionary. G. & C. Merriam and Company, Springfield, MA, latest edition.

Has become a standard reference at Sandia.

Desktop Publishing

Roger Parker, *Looking Good in Print*. Editorial Experts, Inc., Alexandria, VA, 1988.

A reference guide for desktop publishers. Illustrated examples, hints, checklists, and before-and-after design presentations.

Intentionally Left Blank

APPENDIX A
Sandia's Preferred Usage

APPENDIX A

Intentionally Left Blank

Style, Usage, and Grammar

Introduction

As stated in the introduction to this document, we make no attempt to present an exhaustive guide to style, usage, and grammar. Because excellent references are available to cover these subjects (see Bibliography), we limit our treatment to topics that seem to cause the most trouble and to Sandia's preference when two or more choices are offered by standard references.

Definitions

Style

Style is a personal thing. It is the way a writer or author phrases things. It might be highly idiosyncratic, such as very formal and erudite; it might be very clipped, with short sentences and abrupt transitions — yet correct and acceptable for some audiences; or it might be affected. The list is endless.

The style that should be used for SAND reports is a more neutral style that communicates the author's information without distracting idiosyncrasies. That also allows including the work of several authors in one report without heavy rewriting.

Usage and Grammar

Usage and grammar are closely related. Usage describes the choices we make among the various words and constructions available in our language — between formal and informal expression and standard and nonstandard expression: "Am I not invited?" or "Ain't I invited?" This example is extreme, but it makes the distinction clearly. Grammatically, *ain't* works well as a verb, but usage has determined that it is nonstandard. On the other hand, "Aren't I invited?" has become an acceptable phrase in speech, but not in writing. It combines a singular subject and a plural verb, which is certainly not grammatically correct. Three dictionaries agree on this usage of *ain't*: *The American Heritage Dictionary*, *Random House*, and *Webster*. *Webster* tends to be more lenient than the other two in accepting *ain't* in literary writing for its shock value, especially when used in common spoken phrases such as "Ain't that something!"

Another example, common in the technical world, is the current trend to use *that* to introduce a restrictive (essential) clause and *which* (with the clause bracketed by commas) to introduce a nonrestrictive (nonessential) clause. Either of these words is grammatically

APPENDIX A

correct, but technical usage dictates a separation of the uses as described in the previous sentence.

Grammar is what is structurally correct; it is fairly static. Usage has to do with the appropriateness of the choices we make based on current acceptance.

Preferences

In the following pages we include, mostly in tabular form (for quick reference), some information about grammar and currently preferred usage (or Sandia's choices). They appear in the following order:

- Clauses — Use and punctuation (“as well as” is not a conjunction and therefore does not use a plural verb when teamed up with a simple, one-element subject).
- Verbs (the substitution of simple, direct verbs for weak and wordy ones).
- Substitutions for formal and incorrect terms (such as “consensus” for “consensus of opinion”).
- Terms most frequently used as one word (“aboveground” as an adjective, for example).
- Prepositions — which to use (self-explanatory).
- Prefixes (which are written solid), suffixes (which are hyphenated), and some confusing singulars and plurals.
- Homonyms and other confusing sets of words.

CLAUSES — Their types, the words that introduce or connect them, and how they are punctuated.

A clause is a group of words that has a subject and a verb.

Independent clauses

An *independent clause* expresses a complete thought. Two independent clauses in the same sentence are connected by a coordinating conjunction or a conjunctive adverb. (See these headings for a list.)

Note: Frequently ideas are expressed in two independent clauses, implying that they are of equal importance, when ideally one of them should be expressed in a dependent clause to represent the information correctly.

Punctuation of independent clauses.

If the independent clauses are joined by a coordinating conjunction, a comma is used before the coordinating conjunction. *Example:* “I just received the job from Al Smith, and I hope to have his estimate ready soon.”

If the independent clauses are joined by a conjunctive adverb such as *however*, a semicolon is used before the conjunctive adverb and a comma after it. *Example:* “The tests must be finished by Friday; however, the results won’t be available for another month.”

Exception: No comma is needed after *then*, *thus*, *or hence*, unless a strong pause is wanted at that point. *Example:* “Then they decided to start over.”

Dependent clauses

A *dependent (or subordinate) clause* contains a subject and a verb, but it does not express a complete thought. It merely adds information to the independent clause of which it is a part.

A dependent clause may be *essential* or *nonessential* to the thought expressed in the independent clause of which it is a part. An *essential (restrictive) clause* adds information that is essential to the meaning of the independent clause. A *nonessential (nonrestrictive) clause* adds interesting but nonessential information to the independent clause.

Adjective dependent clauses. An adjective dependent clause modifies a noun or pronoun in the independent clause. Words that introduce adjective dependent clauses (and link the dependent clauses to independent clauses) are either relative pronouns (such as *that*, *which*, *who*, *whose*, and *whom*) or adverbs (such as *when* and *because*).

APPENDIX A

That* vs. *which

In technical writing, a distinction is made between the use of *that* and *which* to introduce adjective dependent clauses.

- *That* introduces essential clauses.

Example of an essential clause:

“The component *that* was damaged was returned to the manufacturer.”

(Since there were several components, the adjective clause is essential to explain which one was returned to the manufacturer. Notice that essential clauses are not set off by commas because they are essential to the complete meaning of the sentence.)

- *Which* introduces nonessential clauses.

Example of a nonessential clause:

“The component, *which* was damaged, was returned to the manufacturer.”

(Since there was only one component, the adjective clause is not essential to explain which component was returned to the manufacturer. Notice that nonessential clauses are set off by commas because they are parenthetical information. The basic meaning of the sentence would be complete without them.)

Conjunctions

Conjunctions connect words, phrases, and clauses. Their use in this function is discussed in the following paragraphs.

Coordinating conjunctions

Coordinating conjunctions connect things of equal value. The most common coordinating conjunctions:

*and but
or nor*

and sometimes —

so yet

A subset of coordinating conjunctions is **correlative conjunctions**, which are coordinating conjunctions that come in pairs, such as:

*either . . . or,
neither . . . nor,
not only . . . but also,
both . . . and,
whether . . . or.*

Coordinating conjunctions can connect words, phrases, independent clauses, or subordinate clauses.

Examples:

Words: Scientists *and* engineers attended the conference.

Phrases: The author's story revealed a childhood of great hardship *and* of intense disappointments.

Independent clauses: The results of the test were inconclusive, *but* they provided valuable background.

Subordinate clauses: The test results showed that the experiment was well conducted *and* that it provided valuable information.

Conjunctive adverbs

A conjunctive adverb is an adverb that is part of the independent clause that it introduces. It is a conjunction because it connects that independent clause to the independent clause preceding it.

The most common are:

<i>accordingly</i>	<i>moreover</i>
<i>also</i>	<i>so</i>
<i>besides</i>	<i>therefore</i>
<i>consequently</i>	<i>then</i>
<i>however</i>	<i>thus</i>

Examples:

“The test results showed that the experiment was well conducted and that it provided valuable information; *however*, it was not conclusive.”

“The test provided valuable but inconclusive information; *consequently*, the project leaders were forced to conduct further tests to get a conclusive result.”

APPENDIX A

Subordinating conjunctions

Subordinating conjunctions connect a dependent clause to the main clause. They are used to present information that is secondary to the main clause. It may be essential to the meaning of the main clause (called an *essential* or *restrictive* clause), or it may be merely additional information that is not essential to the meaning (called a *nonessential* or *nonrestrictive* clause). See punctuation of these clauses on the following page. The most common subordinating conjunctions are:

<i>although</i>	<i>that</i>
<i>after</i>	<i>then</i>
<i>as</i>	<i>through</i>
<i>because</i>	<i>unless</i>
<i>before</i>	<i>when</i>
<i>if</i>	<i>where</i>
<i>since</i>	<i>whereas</i>

Examples:

“The test results showed that the experiment done on May 12 was inconclusive *because* the equipment was faulty.”

“*Unless* the faulty equipment is repaired, no tests can be conclusive.”

VERBS

The following list suggests simple, direct verbs that can be substituted for the more wordy versions in the first column. Applying some of the suggestions listed will help you be brief and concise.

Weak and Wordy Phrase	The Simple, Direct Verb
achieve purification	purify
analyses were made	analyzed
are found to be in agreement	agree
are known to be	are (except in rare cases)
are of the opinion that	think that, believe that
arrive at a decision	decide
bring to a conclusion	conclude, complete, end, finish
carry on the work of developing	continue developing
connection is made	connects
carry out, has been carried out	(<i>avoid unless something is physically carried</i>)
carry out experiments	experiment
carry out mixing	mix
carry out purification	purify
failed to find	did not find
give an indication of	indicate
give proof of	prove
give a weakness to	weaken
institute an improvement in	improve
is applicable	applies
is characterized by,	be, have
has the character of	resembles, looks like
is found to be	is
is indicative of	indicates
is suggestive of	suggests
make:	
a study of	study
adjustments to	adjust
an approximation of	approximate
an exception of	except
mention of	mention

APPENDIX A

(Continued)

Weak and Wordy Phrase	The Simple, Direct Verb
obtain an increase or decrease in temp.	raise or lower the temperature
perform an examination of	examine
proceed to separate	separate
present a report	report
present a summary	summarize
put out a list	list
succeed in doing, making, etc.	do, make, etc.
take cognizance of	note, notice, heed
take into consideration	consider
was seen, was noted	<i>(these phrases are sometimes unnecessary)</i>
undertake a study of	study

SUBSTITUTIONS FOR FORMAL AND INCORRECT TERMS

The following list contains common offenders that are formal, ungrammatical, or redundant.

Instead of using:	Consider using:
aforesaid	stated previously
at this point in time	now, at present, at this time
attendee	participant
center around	center on, in, or at; revolve around
consensus of opinion	consensus
due to	because of
equivalent as far as acceptability is concerned	equally acceptable
firstly, secondly, etc.	first, second, etc.
idea	intention, impression (<i>if that is what you mean</i>)
in the case of	in
irregardless	regardless
it would be reasonable to suggest	it may be
orientate	orient
pertaining to	on, about
preventative	preventive
prior to	before
recent	in the past year (<i>usually</i>)
share (something) in common	share, or have (<i>these things</i>) in common

APPENDIX A

TERMS USED MOST FREQUENTLY AS ONE WORD

aboveground (<i>adj.</i>)	indepth (<i>adj.</i>)
antimissile	offload
boiloff (<i>adj., noun</i>)	phaseout (<i>adj., noun</i>)
burnout (<i>adj., noun</i>)	pulldown (<i>adj., noun</i>)
cutoff (<i>adj., noun</i>)	railcar
database	servomotor
deenergize	setup (<i>adj., noun</i>)
downhole	startup (<i>adj., noun</i>)
electronvolt	walkthrough (<i>adj., noun</i>)
flowchart	workplace
flyby (<i>adj., noun</i>)	

PREPOSITIONS — WHICH TO USE

abhorrence <i>of</i> a thing	consist <i>of</i> (make up <i>of</i>); <i>comprised of</i> is incorrect when used in this sense
abhorrent (disgusting) <i>to</i> a person	credit <i>for</i>
abide <i>by</i> a decision	
abide (dwell) <i>with</i> a person	
abounds <i>in</i> or <i>with</i>	deal <i>in</i> goods or services
absolve <i>from</i> responsibility	deal <i>with</i> someone
absolve <i>of</i> crime	depend or dependent <i>on</i> , but independent <i>of</i>
accede <i>to</i>	despite (takes no preposition)
accountable <i>for</i> actions	differ <i>from</i> (of two things)
accountable <i>to</i> a person	differ <i>with</i> another person
accused <i>by</i> a person	differ <i>about</i> , <i>over</i> an issue
accused <i>of</i> a deed	differ <i>on</i> amounts, terms
acquaint <i>with</i>	different <i>from</i> (not <i>than or to</i>)
adapt <i>to</i> a situation	disagree <i>on</i> an issue
adapt <i>for</i> a purpose or need	disagree <i>with</i> a person
adapt <i>from</i> the original form	discrepancy <i>between</i> two things
adept <i>in</i>	discrepancy <i>in</i> one thing
affinity <i>between</i>	dispense <i>with</i>
agree <i>to</i> a proposal	
agree <i>with</i> someone	employ <i>for</i> a purpose
agreeable <i>to</i> (<i>with</i> is permissible)	expect <i>from</i> things
angry <i>at</i> a thing or condition	expect <i>of</i> people
angry <i>with</i> a person	expert <i>in</i>
approve <i>of</i> actions	
argue <i>for</i> or <i>against</i> a policy	familiarize <i>with</i>
argue <i>with</i> a person	foreign <i>to</i>
based <i>on</i> or <i>upon</i> (<i>on</i> is preferred)	
beneficial <i>to</i>	
compare <i>to</i> the mirror image (assert a likeness)	identical <i>with</i>
compare <i>with</i> the reverse side	in spite <i>of</i>
(analyze for similarities or differences)	independent <i>of</i> (not <i>from</i>)
comply/compliance <i>with</i>	infer <i>from</i>
concur <i>in</i> (to indicate consensus)	
concur <i>with</i> a person	necessary <i>for</i> an action
confer <i>on</i> or <i>upon</i> (give to)	necessary <i>to</i> a state of being
confer <i>with</i> (talk to)	
conform <i>to</i> (in conformity to or with)	occupied <i>by</i> things, people
consist <i>in</i> (exists in)	occupied <i>with</i> actions
	opposite <i>of</i> qualities
	opposite <i>to</i> positions
	plan or planning <i>to</i> (not <i>on</i>)
	proceed <i>with</i> a project

APPENDIX A

proceed *to* do something (begin)

profit *by* things

profit *from* actions

qualify *as* a person

qualify *by* experience, actions

qualify *for* a position, award

responsibility *for, of*

retroactive *to* (not *from*)

speak *to* (tell something *to* a person)

speak *with* (discuss something *with* a person)

surrounded *by* people

surrounded *with* things

talk *to* a group

talk *with* a person (discuss)

PREFIXES

Prefixes seldom require a hyphen. Unless you have a specific reason to use a hyphen after a prefix (see exceptions below), write the word solid.

Exceptions:

- The prefixes *ex-* (when it means former), *quasi-*, and *self-* always require a hyphen: *ex-champion*, *quasi-professional*, and *self-starter*.
- Prefixes before proper names require hyphens: *anti-Communist*.
- Prefixes that end with an *a* or *i* and the base word begins with the same letter:
- *ultra-active*, *anti-inflammatory*. (Note: Prefixes ending in *e* or *o* followed by a base word starting with the same letter are *not* hyphenated: *electrooptic*, *coordinate*.)
- A hyphen may be needed to retain the clarity of a word, as in *re-cover* (to cover again), *multi-ply* (more than one ply), and *un-ionized* (not ionized).

Examples of prefixes written without a hyphen:

electro:	electromagnetic	post:	posttest, postdate
multi:	multidimensional	pre:	pretest, predate
non:	nonnuclear	pro:	pronuclear
out:	outperformed, outsized, outpatient	prot:	protagonist
over:	overrated, overloaded	proto:	prototype
		psych:	psychasthenia
		psycho:	psychometrics
		under:	undercut, underpaid

APPENDIX A

SUFFIXES

Suffixes seldom require a hyphen.

Exceptions:

- Always use a hyphen before the suffix *-elect* : President-*elect*.
- Use a hyphen to avoid tripling a consonant: bell-*like*.

SOME CONFUSING SINGULARS AND PLURALS

Sandia National Laboratories (SNL) *is* . . .

Sandia National Laboratories, New Mexico (SNL/NM) *is* . . .

Sandia National Laboratories, California (SNL/CA) *is* . . .

. . . the Laboratories *is* . . . (when referring to SNL)

. . . the laboratories *are* . . . (when referring to two or more other laboratories)

data *are* . . .

appendixes (indexes, etc.) *are* . . . (Note: use the English plurals for words of Latin origin when such plurals exist.)

a number *are* . . . ; the number *is* . . .

HOMONYMS AND OTHER CONFUSING SETS OF WORDS

affect (v): to have an influence on, to cause a change (. . . how pollution *affects* health).

effect (v): to bring about or execute (. . . layoffs designed to *effect* savings).

effect (n): something that is the result of a cause; the end result (. . . the *effect* of a drug on the nervous system).

among: used with *three* or more things (discussed *among* the six scientists).

between: used to stress one-to-one relationships, whether they be between people or things.

assure: to give confidence to a person or to tell a person that a thing is certain or true. (The technician *assured* his supervisor that all the nuts had been tightened securely.)

ensure: to make sure. (*Ensure* that the nut is tightened securely.)

insure: to protect financially against loss. (The house was *insured* against fire.)

averse to: disinclined toward — not necessarily strongly opposed to (used of people).

adverse: (adj.): unfavorable; opposed to (used of things more than people).

capability: the quality of being capable in any way, as physically, intellectually, or emotionally.

capacity: power — often of the mind (. . . had the *capacity* for hard work)

ability: the possession of a particular attribute that allows a person to do a particular thing. (. . . has the *ability* to do beautiful cabinetry)

coherent: sticking together; consistent; logical.

cohesive: sticking together (used chiefly of physical objects, but sometimes of groups of people, as the *cohesive* nature of the group).

cogent: convincing.

complicated: difficult because of several factors or points that must be taken into account (a *complicated* test).

complex: difficult because of an involved combination of factors (a *complex* lifestyle).

consequent: following, as a result or effect.

subsequent: following, in the sense of later.

consist of: used with one thing made up of one or more components or parts. (The program *consists of* ten sessions.)

consist in: used to indicate an inherent quality. (The beauty of his style *consists in* its simplicity.)

comprise: make up; is made up of — *comprise* can relate from the singular to the plural. (The building *comprises* three offices and one storage room.) Or it can relate from the plural to the singular. (The rooms that *comprise* this building . . .). Do not use *comprised of*.

APPENDIX A

constitute: make up (Industry and initiative *constitute* the cornerstone of economic success.)

compose: (means much the same as *constitute*, but implies a unity of dissimilar things to make a whole.) (Land, sea, and air *compose* our universe.)

continual: implies occurrences that are very close together, usually with short breaks between.

continuous: implies an unbroken succession of occurrences.

constant: implies that the action is frequent and repeated in the same manner each time, probably with the same results.

discreet: having or showing prudent or careful behavior

discrete: separate, distinct, or individual

disinterested: impartial, unbiased

uninterested: not interested

due to: attributable to; caused by — used as a predicate adjective following a linking verb. (His hesitancy is *due to* fear.) (Not considered by most usage panels to be acceptable as a preposition, as in "He hesitated *due to* fear." Use *because of* instead.)

because of: indicates a result of an action or condition, or a reason for an action or condition. (He hesitated *because of* fear.)

e.g.: *exempli gratia* (for example) — indicates that examples will follow (e.g., cables and connectors)

i.e.: *id est (that is)* — indicates an explanation or listing will follow (i.e., the top of the vehicle)

Note: The trend is to use the Americanized styles, *for example* and *that is*.

explicit: something expressed directly, with clarity

implicit: something implied, but not directly expressed. (*Implicit* in his memorandum was the possibility of a reorganization.)

flammable: capable of being set on fire.

inflammable: use *flammable*.

nonflammable: not capable of being set on fire.

forceful: full of power, with vigor (The proponent spoke *forcefully* [with vigor].)

forcible: effected by force (a *forcible* entry). **Note:** Both words mean possessing or using force, but *forcible* is used primarily with physical things and *forceful* with abstract concepts.

fortuitous: happening by chance or accident — the event can be lucky, unlucky, or neutral

fortunate: happening by good fortune or favorably

fuse: wire or strip of fusible metal inserted in an electric circuit to prevent current overheat (NATO's 1978 definition)

fuze: device designed to initiate explosion (NATO's 1978 definition)

imply: hint at; suggest indirectly.

infer: reach a conclusion based on evidence (We *infer* from your memorandum that . . .)

impracticable: not able to be put into practice, although theoretically possible.

impractical: not manageable; not suitable or sensible. **Note:** *unpracticable* and *unpractical* are seldom used.

insoluble: incapable of being dissolved.

unsolvable: incapable of being solved.

it's: the contraction of *it is* (It's the first time we have had this problem.)

its: possessive pronoun (Its performance was excellent.)

lay: present tense of put or place (*Lay* is a transitive verb; therefore it requires an object.) (The instruction was to *lay* the cloth over the statue.)

The past tense and past participle of *lay* are *laid*. (The schoolboy *laid* his books on the grass.)

lie: recline; be supported by a surface that is usually horizontal; exist or be inherent (*Lie* is an intransitive verb; therefore it never has an object.) (The invalid just *lies* in bed month after month. The dust *lies* undisturbed on the abandoned piano. The book *lies* on the table.)

Note: One explanation for the many incorrect uses of various forms of *lie* and *lay* is their tenses. The past tense of *lie* and the present tense of *lay* are the same: *lay*.

Tenses: The tenses are

lie, lay, has (had) lain, is lying

lay, laid, has (had) laid, is laying

Which to use: If the subject, whether it is a person or an object, is doing the reclining, use the correct tense of *lie*. (A person *lies* down today, but *lay* down yesterday, and has *lain* in bed for a week. The book is *lying* on the desk.) If the word is being used to mean “put” or “place,” use the correct tense of *lay*. (The student *lays* books on the table every day. Yesterday she *laid* two books there. Before that she had *laid* four or five there every day.)

liable: legally subject to or responsible for (in technical writing, reserve *liable* for this specific meaning — do not use it to mean *likely*).

likely: a condition of probability (something is *likely* to happen).

mutual: implies something given and received reciprocally (Our mistrust is *mutual*); also may mean “shared,” as in *mutual* friendship.

in common: possessed jointly, or shared, but with-out reciprocity (What we have *in common* is a determination to successfully complete this project.)

precipitately: hurriedly, in the sense of “rash” (The scientist plunged *precipitately* into a detailed report of the incomplete project.)

precipitously: steeply (used primarily in the physical sense, but sometimes figuratively, as in, “The stock market dropped *precipitously*.”)

APPENDIX A

preparatory: preparing (His *preparatory* remarks prevented a mass exodus.)

prefatory: acting as a preface (His *prefatory* remarks explained the reasons for his speech.)

preliminary: preceding; something that comes before the main thing — it may or may not be related to the main thing (His *preliminary* remarks were about the unrelated but entertaining events of his day.)

revolve: to go around another thing (The earth *revolves* around the sun.)

rotate: to go around a thing's own axis (The earth *rotates* on its axis.)

stimulus: something that incites to action.

stimulant: a drug, food, or drink that quickens some bodily or mental function.

transitional: intermediate (a *transitional* phase).

transitory: lasting a short time (A caterpillar's life is *transitory*.)

transient: passing through; lasting a short time (*Transient* guests were a welcome relief after the full-time boarders she had previously.)

APPENDIX B

Equations

APPENDIX B

Intentionally Left Blank

EQUATIONS

The rules presented here are based on the American Institute of Physics *Style Manual* and the American Mathematical Society *Mathematics into Type*. Equation styles vary with different disciplines. If your organization already has an established format, follow it.

Accuracy and Consistency

Accuracy is extremely important in equation typing. Resolve uncertainties in the draft, input accurately, and check your work carefully — typos can easily slip through.

Use the same style and format consistently throughout a single report. Consistency of format and usage is one mark of a professional-looking product.

Explanatory Charts

The following charts appear at the end of this section:

- Definitions of Parts of Speech (knowing how symbols function as parts of speech will help you understand spacing).
- Abbreviations of Functions.
- Signs and Symbols.
- Greek Alphabet.

Procedures for Inputting from Handwritten Copy

Read all the draft *before you start typing* to spot problem areas.

As you read through the draft, mark problem areas. Pay special attention to

- superscripts and subscripts.
- look-alike characters:

$a, \alpha, \infty; \beta, \delta; w, \omega$ (omega, not script w); $\Gamma, T; \eta, n; \kappa, k; \gamma, \lambda; \mu, u;$
 $v, \upsilon, v; \iota, i; \rho, p; \xi, \zeta; \tau, t; \chi, x.$

- continuity of equation numbers — not all equations require numbers, but the ones that are numbered must be in unbroken sequence.

Formatting Equations

Line spacing

The spacing of lines in equation typing depends on the type of equipment you have:

- Use single-spaced text if your equipment prints subscripts and superscripts within the 1-line space.
- Use 1-1/2-line spacing if it does not.
- Use double-spaced text only if nothing else works.

The final product should be easy to read, but not spaced out excessively.

Centered, indented, or flush left

Whether you center, indent, or flush-left equations on the page depends on several factors: your equipment, the column width (line length), and certain specified formatting requirements.

Centered equations are slightly preferred by many organizations. However, on some equipment, centering is so time consuming that you might consider indenting all displayed expressions by a standard paragraph indent or even starting them flush with the left margin. Any of these practices is quite acceptable.

Special formatting requirements may be specified by your organization or by a particular professional society.

Equation number

Enclose the equation number in parentheses and place it flush with the right margin, either even with the last line of the equation (the fastest method) or even with the center line of the equation.

Punctuation

Two styles of punctuation are acceptable: *text* style and *open* style.

Text Style: To punctuate in the *text* style, read the displayed equation as if it were text and punctuate it accordingly. A displayed mathematical expression is often the continuation or completion of the text that introduces it, as in the following example.

...This solution resulted in

$$L = \log \left| \frac{TT_o - 1 + pp_o}{TT_o - 1 - pp_o} \right|$$

$$= T_o - p_o \cos \theta$$

$$= \log \left| \frac{T + p}{T - p} \right|$$

where

T = time

p_o = perpendicular, and

pp_o = perpendicular pitch.

Open Style: To punctuate in the *open style*, use no comma or periods at the end of any equation line (although you may use them *within the line*).

Spacing within the equation

Refer to Definitions of Parts of Speech (page B-11) if you are not familiar with the grammatical function of expressions in equations (that is, nouns, verbs, collectives, etc.).

Use no space in the following instances:

- Between a number and the symbol it multiplies or between two or more symbols that multiply each other: $3b$; $5aB$; $3\delta xy$
- Before or after superscripts and fences:

$$3x_{y-2}d; \exp[(y-1)/(z+n)]$$

APPENDIX B

- Within subscript or superscript expressions: $b^{n-1} \lim_{a \rightarrow 0}$

Use one space as follows (indicated by):

- Before and after verbs: $a = b; y \geq 8z$
- Before and after conjunctions: $a + b; (b^{n-1} + 2bx)$
- Before but not after $+, -, \text{ or } \pm$ when they are used as adjectives:

$$-x(a + b) = -3; x = \pm 3$$

- After commas: y_1, y_2, \dots, y_n
- Before and after sigma-class symbols:

$$a \int x dy \quad \lim_{c \rightarrow p} \inf \sum_{n=p}^{\infty} f^{(n)}(c) II ah$$

- Before and after the following functions:

$$\begin{array}{lll} \sin: a \sin x; \lim: \lim_{c \rightarrow p} \inf p; & \tanh: 2 \tanh \theta \\ \log: \log x; & \exp: \exp a^n; & \log \log: \log \log x \end{array}$$

Exception: If any of the above functions is preceded or followed by a superscript or subscript, parenthesis, brace, or bar; then the space between them is eliminated: $[(x - y)\log x] \quad (a_2 \sin x) \quad \sin(a - x)$

- Before and after a vertical rule that appears singly or a colon that is used as a mathematical symbol: $a | b \quad \text{as : } a \in A \quad A = (x | P)$
- Before a back inferior (a subscript placed *before* a term), as the $2x$ in this example: $a_{2x} b \quad b_{1x_2} ah$.
- Before and after ds, dp, dx , and similar combinations of d and another symbol following: $\int f(x) dx \quad \iiint dr d\theta dr$

Superscripts and Subscripts in the Same Expression

When superscripts and subscripts are used together, align them consistently (either stacked or staggered). If the terms have several characters, you can change the form as in the third column below.

<u>Superscripts and subscripts</u>	<u>Staggered</u>	<u>Changed form</u>
x_m^n	x_m^n	
x_c^{a-b}	x_m^{a-b}	$(x_c)^{a-b}$
x_{ay}^{mn}	x_{ay}^{mn}	$(x_{ay})^{mn}$

Fractions

Use slashed fractions in text and in superscripts and subscripts; in display, use barred fractions (or a combination if that adds clarity — see **In Display**).

Slashed Fractions in Text

Use *slashed fractions* in text to avoid unattractive, spread-out lines.

Slashed Fractions in Superscripts and Subscripts

Use slashed fractions (1/8, 1/4) in superscripts and subscripts. The single-key fraction ($\frac{1}{8}$, $\frac{1}{4}$) may be too small to read, and the barred, or stacked, fraction is too awkward.

<u>This</u>	<u>Not this:</u>
$x^{1/8}$	$x^{\frac{1}{8}}$
<i>Note use of parentheses to retain clarity</i> —>	$y^{(a+b)/(x-y)}$

APPENDIX B

Because authors usually focus on the information rather than the format when they write, they often use stacked fractions within the text. To change stacked fractions to slashed fractions, follow the guidelines below:

<u>Stacked</u>	<u>Replace with this:</u>	<u>Or this:</u>	<u>Not with:</u>
$\frac{a + 1}{b}$	$(a + 1)/b$	$(a + 1)b^{-1}$	$a + 1/b$
$\frac{a}{(x + 1)^3}$	$a/(x + 1)^3$	$a(x + 1)^{-3}$	
$\sin \frac{a}{x}$	$\sin(a/x)$	$\sin a/x$	

In Display

Use *stacked*, or *barred*, fractions in display.

Exception: The appearance of multilevel stacked fractions can often be improved by changing the stacked portion in the numerator to a slashed fraction, and the same in the denominator. See the following example:

<u>Stacked</u>	<u>Replace with one of these:</u>
$\frac{\sin a}{x}$	$(\sin a)/x$ $\sin a/x$
$\frac{a}{x^3}$	a/x^3 ax^{-3}
$\frac{a}{(b - c)^2}$	$a/(b - c)^2$ $a(b - c)^{-2}$
$\frac{\partial}{\partial \theta} F(u, k, \theta)$	$\partial F(u, k, \theta)/\partial \theta$ $(\partial/\partial \theta)F(u, k, \theta)$

The Exponential Function

The terms e [as in e^x] and \exp [as in $\exp(x^2 - 1)$] mean the same thing and can be interchanged as necessary to accommodate space. Consistency in the form used is not necessary; both forms can be used within the same sentence or display.

	<u>Instead of:</u>	<u>Use:</u>
To avoid double superscript:	e^{x^2-1}	$\exp(x^2 - 1)$
To avoid fractions in the superscript:	$e^{\frac{a-b}{c+d}}$	$\exp\left(\frac{a-b}{c+d}\right)$ or $\exp((a - b)/(c + d))$

Matrices and Determinants

Always set matrices and determinants in display. Set them in columns and rows and enclose them with brackets, parentheses, or lines:

$$\begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ 1 & 2 & 3 \end{bmatrix} \quad \begin{vmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ 1 & 2 & 3 \end{vmatrix}$$

Line Breaks

When an equation is too long for one line, break it according to the following rules:

- Break before a verb that does not occur within fences (see page B-11 for definitions).
- Break at any other space (see “spacing”), except
 - after a collective sign, do not break until there is an operator outside of fences
 - after an integral sign (\int), do not break until a d occurs; then break after the next punctuation, or before a verb.

APPENDIX B

- When a set of fences is followed directly by another set of fences, break between them and insert a sign of multiplication (\cdot or \times) before the carried-over set of fences.

Exception: This rule does not apply if the fences are preceded by a sigma-class symbol or if they have a slash between them.

Alignment of Line Breaks

If a single expression contains a series of equal signs, break at the equal sign and align the expressions vertically on the equal signs. See example on page B-5, “Punctuation, Text Style.”

When breaking at a point other than an equal sign, align subsequent lines of the equation with the first character following the equal sign:

$$\frac{d\sigma}{dE_k d\Omega} = \frac{7.95 \times 10^{-26}}{8\pi 137} \frac{1}{E_k} \frac{p}{p_o} \left| \frac{8\sin^2 \theta (2T_o^2 + 1)}{p_o^2 \Delta_o^4} - \frac{2(5T^2 + 2TT_o + 3)}{p_o^2 \Delta_o^2} \right.$$

$$\left. - \frac{2|p_o^2 - E_k^2|}{Q^2 \Delta_o^2} + \frac{4T}{p_o^p \Delta_o} + \frac{L}{pp_o} \right| \frac{4T_o \sin^2 \theta |3E_k - p_o^2 T|}{p_o^2 \Delta_o^4}$$

“Copying” Equations

A common practice in word processing is to copy similar equations and change the variables within the new equation. This practice is a great time-saver. However, when you “copy,” carefully proof *each character* and *each symbol* in the new version. Common errors are failing to change signs ($+$ to $-$) or incorrectly modifying one character within a term: $3n_p[M - 1]$ to $3np[M - 1]$.

Proofing Equations

- When you proof your own output, *check each character*. Pay special attention to:
- symbols such as $<$ and $>$

- superscripts and subscripts
- fences (Does each opening fence have a closing fence?)

Definitions of Parts of Speech

Operators:

Conjunctions: + - × ± ∪ ∩ √ ∧ ∙ ∙ ∙ ∙ ∙ ∙ ∙ ∙

Fences:

```
{ [ < ( | | } ] > ) | |
```

Nouns: italic, Greek, German, and Hebrew letters; numerals —

a; ab; 3; 3 $\alpha\beta$

Sigma-class symbols:

Collective signs: Σ Π \cup \cap \wedge \vee \oplus \otimes

Abbreviations of Functions

The most commonly used abbreviations for functions and operators are defined below:

ad	adjoint	lim sup	limit superior
arg	argument	ln or log	logarithm
Coker	Cokernel	lub	least upper bound
cos	cosine	max	maximum
cosh	hyperbolic cosine	min	minimum
cot or ctg	cotangent	mod	modulus
coth	hyperbolic cotangent	P	Property
det	determinant	PL	Piecewise Linear
dim	dimension	Re	Real
exp	exponential	sin	sine
GL	General Linear	sinh	hyperbolic sine
hom	homology	SL	Special Linear
Im	imaginary	tan	tangent
inf	inferior	tanh	hyperbolic tangent
ker	kernel	tr	trace
lim	limit	wr	wreath
lim inf	limit inferior		

Signs and Symbols

$+$	Plus		Multiplied by
$-$	Minus	:	Ratio
\times	Multiplied by	$\sqrt{}$	Square root
\div	Divided by	$\sqrt[3]{}$	Cube root
$=$	Equal to	Σ	Summation of
\pm	Plus or minus	\prod	Product sign
\mp	Minus or plus	π	Pi (3.1416)
\equiv	Identical with, congruent	\cup	Union sign
\neq	Not equal to	\cap	Intersection sign
\approx	Nearly equal to	!	Factorial sign
\cong	Equals approximately	\in	Is an element of
$<$	Less than	\notin	Is not an element of
$>$	Greater than	Δ	Delta
\leq	Less than or equal to	∇	Nabla; del
\geq	Greater than or equal to	∞	Variation
\subset	Included in	∞	Infinity
\supset	Excluded from	\hbar	$h/2\pi$
\perp	Perpendicular to	∂	Partial differential
\parallel	Parallel to	\int	Integral
\angle	Angle	\oint	Contour integral
\therefore	Hence, therefore		

APPENDIX B

Greek Alphabet

<u>Identity</u>	<u>Lower Case</u>	<u>Capital</u>
alpha (a)	α	A
beta (b)	β	B
gamma (g)	γ	Γ
delta (d)	δ	Δ
epsilon (e)	ε	E
zeta (z)	ζ	Z
eta (e)	η	H
theta (th)	θ	O
iota (i)	ι	I
kappa (k)	κ	K
lambda (l)	λ	Λ
mu (m)	μ	M
nu (n)	ν	N
xi (x)	ξ	Ξ
omicron (o)	\circ	O
pi (p)	π	Π
rho (r)	ρ	R
sigma (s)	σ	Σ
tau (t)	τ	T
upsilon (u)	υ	Y
phi (ph)	ϕ	Φ
chi (ch)	χ	X
psi (psi)	ψ	Ψ
omega (o)	ω	Ω

APPENDIX C

References

APPENDIX C

Intentionally Left Blank

References

Any reference style that adheres to an *established* form is acceptable because SAND reports fall into so many different disciplines and because often each discipline has its own reference style. The major criteria are that

- the style used must be *consistent* within a report
- the reference must contain *complete publication data* (publisher, city, date)

The following examples show a simplified reference style that you may want to use. For examples of a more abbreviated form that can be used when readership is limited to a small group who are extremely familiar with the sources cited, see page C-13.

Ways to Cite References

The two ways to cite references are

- by **sequential numbers**, the most standard way until recent years.
- by **author-date**, becoming widely used in technical fields because it has no sequence problem and gives the reader more information in the text.

APPENDIX C

Sequentially Numbered References

Citing in the text

Cite numbered references in text by using sequential Arabic numbers, either superscripted or on the line in brackets.

Example: . . . *theory*.¹ or . . . *theory* [1].

When the citation is an integral part of the sentence, use the following form: *Reference 1 contains . . .* or
. . . contained in Reference 1.

When a reference in the superior-numbered style could be confused with a mathematical exponent (13 cm²), put the reference on the line as follows: . . . *at 13 cm* (Ref. 2).

Citing multiple references

Use one of the following forms to cite multiple references.

Examples:

Two in sequence: *theory*.^{1,2} or [1,2]

More than two in sequence: *model*¹⁻⁶ or [1-6]

Nonsequential: *Laboratory*.^{1,4,8} or [1,4,8]

A combination: *Laboratory*.^{1,4,8-12} or [1,4,8-12]

Citing a reference the second time

To cite a reference the second time, repeat the number originally assigned to it.

Placing references relative to punctuation marks

Place *superior-numbered* citations after all marks of punctuation except the dash.

Place citations that are enclosed by brackets or parentheses before all marks of punctuation except quotation marks.

Listing in the Reference section

Numerical references are entered in numerical sequence in the Reference list. Examples of Reference lists appear on pages C-11 through C-13.

Author-Date References

Advantages

An advantage of the author-date style is that an author can add or delete a reference at any time without affecting other citations since no sequence is involved.

Another advantage is that in multiple-author reports, each author can work independently without affecting the citations of other authors.

Citing in the text

Cite in text by author and date:

Examples:

- one author: . . . *Dickson apparatus (Seyfried 1979)*
- one work with two authors: . . . *had been determined (Seyfried and Thornton 1980)*
- one work with more than two authors: . . . *in the sediment (Seyfried et al. 1980)* (Note: In the reference list, show all authors.)
- more than one work cited: . . . *in the sediment (Seyfried 1979; Krumhansl 1982; Bischoff and Seyfried 1982).*
- a citation that is part of the sentence: . . . *and as Seyfried (1979) maintains, . . .*
- specific parts of a cited work indicated: . . . *(Seyfried 1979, vol. 2)*
- more than one work by the same author in the same year: . . . *(Seyfried 1979a, 1979b)*

APPENDIX C

Author-Date References (*continued*)

**Placing
references
relative to
punctuation
marks**

Place references before all marks of punctuation. Example:
... A series of experiments with a titanium-lined thermal gradient apparatus was begun in FY81 (Seyfried and Thornton 1981).

**Listing in the
Reference
section**

In the Reference section, list author-date style references in alphabetical order. Hang indent is preferred (see pages C-11 through C-13).

Listings in the Reference Section — Sequential Style

Book, multiple authors R. L. Smith, R. M. Thompson, J. D. Doe, and T. J. Jones, *Computer Modeling of Gas Lasers*. Plenum Press, New York, 1978.

Book, multiple editors F. A. Hopf, Amplifier Theory, in *Physics of Quantum Electronics*, S. F. Jacobs, M. Sargent III, and M. O. Scully, ed., vol. I, pp. 77-176. Addison-Wesley, Reading, MA, 1974.

Book, general editorship *Blasters Handbook*, 17th ed. E. I. duPont de Nemours and Co., Wilmington, DE, 1977.

Book chapter Manuscript Preparation and Copyediting, in *The Chicago Manual of Style*. The University of Chicago Press, Chicago, IL, 1982.

Multiple-volume works:

general title A. B. El-Kareh and J. C. J. El-Kareh, *Electron Beams, Lasers, and Optics*, vol. I and II. Academic Press, NY, 1970.

individual title for each volume Conrad O. Jones, *Operation Plowshare*, vol. III of *Studies in Peaceful Uses of the Atom*. The Isolation Press, Los Alamos, NM, 1978.

Journal article:

submitted D. B. Haidvogel, A. R. Robinson, and E. E. Schulman, The Accuracy, Efficiency, and Stability of Three Numerical Models With Application to Open Ocean Problems. Sandia National Laboratories report SAND86-1052J (submitted to *Journal of Computational Physics*).

accepted but not published G. L. Weatherly and P. J. Martin, On the Structure and Dynamics of the Oceanic Bottom Boundary Layer, Sandia National Laboratories report SAND87-2213J (to be published in *Journal of Computational Physics*).

APPENDIX C

Listings in the Reference Section — Sequential Style (continued)

Journal article:

(continued)

published

F. Schreiner, S. Fried, and A. M. Friedman, Measurement of Radio-nuclide Diffusion in Ocean Floor Sediment and Clay, in *Nuclear Technology*, vol. 59, pp. 429-38, 1982.

Conference paper:

unpublished

G. L. Weatherly and P. J. Martin, On the Structure and Dynamics of the Oceanic Bottom Boundary Layer. Sandia National Laboratories report SAND87-2213C. Fifth Annual NEA-Seabed Working Group Meeting, Bristol, England, March 3-5, 1987.

published in proceedings

G. L. Weatherly and P. J. Martin, On the Structure and Dynamics of the Oceanic Bottom Boundary Layer, in *Fifth Annual NEA-Seabed Working Group Meeting*, held in Bristol, England, March 3-5, 1987. Sandia National Laboratories, Albuquerque, NM, 1988. (Note: The name of the company or society publishing the proceedings is listed as the publisher. In this case it was Sandia.)

Report, unclassified

Seabed Programs Division 6334, *The Subseabed Disposal Program: 1983 Status Report*, SAND83-1387. Sandia National Laboratories, Albuquerque, NM, October 1983.

Report, classified

Author, *Report Title (U)*, SANDxx-xxxx. Sandia National Laboratories, Albuquerque, NM (SRD), August 1988.

Thesis

C. W. Young, Depth Prediction for Earth-Penetrating Projectiles. PhD thesis, University of New Mexico, 1980.

Foreign title

Ch'en Shich-ch'i, *Ming-tai shou-kung-yet ti yen-chiu*. (Studies on government-operated handicrafts during the Ming dynasty). The Mandarin Press, Hong-Kong, 1978.

Translation

V. L. Bouch-Bruevich, *Electronic Theory of Heavily Doped Semiconductors*. American Elsevier Publishing Co., NY, 1966, translation.

Listings in the Reference Section — Sequential Style (continued)

Corporate author	American National Standards Institute, <i>Scientific and Technical Reports: Organization, Preparation, and Production</i> . ANSI Z39.18-198-X. American National Standards Institute, Inc., 1430 Broadway, NY, 1989.
<u>Unpublished data:</u>	
memorandum, unclassified	D. G. True, Penetration of Projectiles Into Seafloor Soils, Sandia National Laboratories memorandum to D. R. Anderson, December 10, 1982.
memorandum, classified	D. G. True, Penetration of Projectiles Into Seafloor Soils (title classification), Sandia National Laboratories memorandum (RSxxxx-xx-xxx) (memorandum classification) to D. R. Anderson, December 10, 1982.
interview	Statement by C. J. Osgoode, solar energy engineer, in personal interview at Barstow, CA, November 13, 1979.
speech	Opinion expressed by Conrad O. Jones, engineer, in an address "Is solar power cost effective?" at the University of New Mexico, Albuquerque, NM, December 31, 1978 (tape on file at the Sandia National Laboratories Reference Library).
letter	Letter from Conrad O. Jones, Division Supervisor, Engineering Division 0001 of Sandia National Laboratories, December 31, 1978.
Professional paper	W. H. Bradley, Origin and Microfossils of the Oil Shale of the Green River Formation of Colorado and Utah. U.S. Geological Survey Professional Paper 168, 1931.
Standard	Calibration Techniques for the Calorimeter Assay of Plutonium-Bearing Solids Applied to Nuclear Materials Control, ANSI N15.22-1975. American National Standards Institute, Inc., New York, 1975.
Newspaper article	Study Labels Alcohol Fuel As Threat to Food Supply, <i>Dallas Times Herald</i> , March 16, 1980, Sec. A, p. 14.

APPENDIX C

Listings in Reference Section — Sequential Style (*continued*)

Legal document 43 CFR 192.14. ← (Code of Federal Regulations)

21 F.R. 623. ← (Federal Register)

New Mexico Revised Statutes, Title 24, Article 7.

U.S. Congress, Uranium Mill Tailings Radiation Control Act of 1978. Public Law 95-604, 95th Congress, November 8, 1978.

Listings in the Reference Section — Author-Date Style

Author-date style The author-date style in the Reference section differs from the sequential-number style in only three respects:

- The order of listing is alphabetical.
- Hang indent is used if that format is available.
- The date is placed immediately after the authors' names:

Example: S. D. Maksimovic and J. R. Lipscomb, 1982, *Sealing Openings in Abandoned Mines by Pneumatic Stowing*, RI8730. U.S. Bureau of Mines, Pittsburgh, PA.

APPENDIX C

Examples: Listings in the Reference Section -- Sequential-Numbering Style

1. F. L. Oetting, M. H. Rand, and R. J. Ackerman, in *The Chemical Thermodynamics of Actinide Elements and Compounds, Part I: The Actinide Elements*. International Atomic Energy Agency, Vienna, Austria, 1976.
2. M. Hansen, *Constitution of Binary Alloys*. New Book Co., 1958.
3. F. A. Shunk, *Constitution of Binary Alloys, Second Supplement*. McGraw-Hill Book Co., New York, 1969.
4. A. N. Vol'skii and Y. M. Sterlin, *The Metallurgy of Plutonium*, Translated From Russian. Jerusalem, Israel, Program for Scientific Translations; available from the U.S. Dept of Commerce, Clearinghouse for Federal Scientific and Technical Information, Springfield, VA, 1970.
5. W. G. Moffatt, *The Index to Binary Phase Collections*. General Electric Co., Schenectady, NY, 1979.
6. J. G. Parr and A. Hanson, *An Introduction to Stainless Steel*. American Society for Metals, Akron, OH, 1965.
7. D. F. Bowersox and J. A. Leary, The Solubilities of Selected Elements in Liquid Pu. II. Titanium, Vanadium, Chromium, Manganese, Airconium, Niobium, Molybdenum and Thulium, in *J Nuc Mat* Vol. 27, No. 2, pp. 181-86, February 1968.

Examples: Listings in the Reference Section of Report — Author-Date Style

M. Hansen, 1958, *Constitution of Binary Alloys*. New Book Co.

W. G. Moffatt, 1979, *The Index to Binary Phase Collections*.
General Electric Co., Schenectady, NY.

Nevada Department of Conservation and Mineral Resources,
1979a, *Regulations for Drilling Water Wells*. Carson City,
NV, 36 p.

Nevada Department of Conservation and Mineral Resources,
1979b, *Regulations and Rules of Practice for Drilling Oil and
Gas Wells*. Carson City, NV, 26 p.

F. L. Oetting, M. H. Rand, and R. J. Ackermann, 1976, *The
Chemical Thermodynamics of Actinide Elements and
Compounds, Part I: The Actinide Elements*. International
Atomic Energy Agency, Vienna, Austria.

J. G. Parr and A. Hanson, 1965, *An Introduction to Stainless
Steel*. American Society for Metals, Akron, OH.

F. A. Shunk, 1969, *Constitution of Binary Alloys, Second
Supplement*. McGraw-Hill Book Co., New York.

A. N. Vol'skii and Y. M. Sterlin, 1970, *The Metallurgy of
Plutonium, Translated From Russian*. Jerusalem, Israel,
Program for Scientific Translations; available from the U.S.
Dept of Commerce, Clearing-house for Federal Scientific and
Technical Information, Springfield, VA.

APPENDIX C

Listings in the Reference Section of Report — Abbreviated Style

The Reference list in a publication that will be distributed only to a select group of readers, all of whom are familiar with the subject of the report and the references listed, may be done in abbreviated style, that is,

- do not italicize title or enclose it in quotation marks
- initial-cap first word only of a single-volume publication (such as a book or report)
- initial cap all major words of a journal
- use abbreviated style for journal volume and page (22:131-39)

Examples:

J. H. Adlam and J. N. Burcham, 1964, *in J Sci Instrum*, 43:93.

or if you are using sequential-number style:

(vol.:pp.)

J. H. Adlam and J. N. Burcham, *in J Sci Instrum*, 43:93-96
(1988).

M. Hansen, 1958, Constitution of binary alloys. New Book Co.

W. G. Moffatt, 1979, The index to binary phase collections.
General Electric Co., Schenectady, NY.

Nevada Department of Conservation and Mineral Resources,
1979a, Regulations for drilling water wells. Carson City, NV,
36 p.

Nevada Department of Conservation and Mineral Resources,
1979b, Regulations and rules of practice for drilling oil and gas
wells. Carson City, NV, 26 p.

APPENDIX D

Copyrights and Permissions

APPENDIX D

Intentionally Left Blank

Copyrights and Permissions

Copyright Transfers

Copyright instructions in DOE Order 1430.2B, VIII,2b(2) for open literature publications state, ". . . In submitting the manuscript to the publisher, the author must include the following statement (the same language shall be used on the copyright transfer form if the publisher sends the author a transfer form):

"The submitted manuscript has been authored by a contractor of the U.S. Government under contract No. (*insert the contract number*). Accordingly, the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. Government purposes."

Should a journal or other publisher insist on a transfer of copyright, discuss the situation with Sandia's Legal Department.

Permission for Using Another's Work

To use work from a copyrighted source, obtain written permission of the copy-righting publisher. If the work is not copyrighted, obtain written permission from the author. If you have other questions, call your Information Specialist at the Library or the Legal Department (Org. 11000).

The following summarizes information furnished by various members of the Library staff and Org. 11000 (Legal).

- Anytime you are reproducing another person's work — even if it is only a sentence, an illustration, or that person's idea — you should obtain the author's permission, if possible. You also must give credit to the author, cite the source, or both. Use words such as "Reproduced with permission from (*and give the source information, including the publisher*). See "Figures and tables (graphics)" on page 57, and "Citing non-Sandian source of graphic" on page 80.
- If you are planning to reproduce material protected by copyright, you may need permission from the publisher, even if the author is a Sandian. If in doubt, write for permission.

APPENDIX D

- Government reports and publications prepared by U.S. government employees are considered “public domain” materials and are not subject to copyright laws. Therefore, they can be reproduced — but be sure to cite the author and source.
- Copyright duration for work done for a corporation such as Sandia (called “work made for hire”) is 75 years from the date of first publication, or 100 years from the date the work was first created.

Permission to reproduce material protected by copyright must be obtained in writing. A letter to the publisher should contain the following information:

- Title, author and/or editor, and edition of materials to be duplicated.
- Exact material to be used, giving amount, page numbers, chapters and, if possible, a photocopy of the material.
- Number of copies to be made.
- Use to be made of duplicated material.
- Form of distribution (newsletter, SAND report, classroom materials, etc.).
- Whether the material is to be sold.
- Type of reprint (photography, offset, typeset, etc.).

Send the request, along with a self-addressed return envelope, to the permissions department of the publisher in question (Figure D-1).

The Library, Org. 4414, will assist you in getting the publisher's address if you do not have it.

The process of granting permission may require time for the publisher to check the status of the copyright and to evaluate the nature of the request, so it is advisable to allow sufficient lead time — six weeks at least. Some publishers may charge a fee for granting this permission. In other cases, permission may be given, provided that proper credit is given in the reproduced material.

Sandia National Laboratories
Albuquerque, NM 87185-5800
March 14, 1996

(Note: Italics indicates information that will vary.)

Permissions Department
Scientific American
415 Madison Avenue
New York, NY 10017

Permissions Department:

On behalf of Sandia Corporation, this is a request for permission to reproduce the following:

Unnumbered figure "Four offshore oil platforms are compared schematically with two onshore structures of comparable height" on pages 40-41 of Ellers, Fred S., Advanced Offshore Oil Platforms, Scientific American, V. 246, no. 4, 1982.

A copy of the figure is attached.

The figure will be used in a Sandia report entitled _____, SAND96-_____. This is an *internal report that will be available to the public through NTIS after its initial distribution to approximately _____ individuals.*

Full credit will be given to *Scientific American*.

Sandia Corporation is a subsidiary of Lockheed Martin. Sandia Corporation operates Sandia National Laboratories on a no-profit, no-fee basis for the U.S. Department of Energy.

Your prompt consideration of this request will be greatly appreciated.

Sincerely,

*John J. Doe
Title (if appropriate)
Org. Name and Number
MS ####*

Figure D-1. Example of a letter to a publisher of copyrighted material

APPENDIX D

Intentionally Left Blank

APPENDIX E

Glossary of Publishing Terms

APPENDIX E

Intentionally Left Blank

Glossary of Publishing Terms

acetate — a flexible plastic material for making overlays on paste-ups; can be transparent or translucent.

airbrush — a method of painting with a compressed air unit that emits a fine spray; often used to enhance a photograph or other rendition.

alphanumeric — consisting of letters, numbers, and symbols.

author-date — a style of referencing that cites sources by author and date rather than by a number; a good style to use when immediate knowledge of the source for the reference is of value.

auxiliary view — in artwork, a detail of an object that shows something that would not usually be seen.

ascender — the part of such letters as d, b, f, and h that extends above the body (or x- height) of the letter.

back margin — the inside margin of a page (next to the binding edge).

balloon detail — an enhanced detail set apart from the main image.

base line — in type, a line connecting the bottoms of the capital letters or the x-type letters (no ascenders or descenders).

Ben Day screen — a pattern placed over artwork to create a tint, texture, or screen effect.

binary — the binary system of numbers, which employs only the numbers 1 and 0; it is the basis for all modern digital computers.

bit — a binary digit, the smallest possible unit of information, resulting from a choice between 0 and 1; see also *binary* and *byte*.

bleed — an illustration that continues off the edge of the page is said to *bleed*.

bleed space — in artwork, the negative, or white, space surrounding an image.

blind folio — a page number counted but not actually shown in the makeup of a book.

blow up — to enlarge physically.

body type — the type used for the text of a work, as distinguished from *display* type used for chapter openings, subheadings, etc.

broadside — horizontal orientation of text or graphics on a page; also called landscape or horizontal. Examples are wide tables and illustrations. The *left* side of a broadside table or figure is considered the bottom for pagination purposes.

bullet — a large dot (•) placed at the beginning of a line for emphasis; also see *centered dot*.

burnish — to cause adhesive material to adhere to artwork by rubbing with a blunt instrument.

byte — a sequence of binary digits (bits), less than an entire word, processed by the computer as a whole.

callout — in artwork, any typed material that denotes specific information—usually connected to a part of the artwork by an indicator line or

APPENDIX E

arrow — in text, a reference to a figure or table by its number.

camera-ready copy — artwork, type proofs, typewritten materials, etc., ready to be photographed for reproduction without further alteration.

caption — the text set below a figure; includes the figure number and title and often some descriptive material.

caret — a sign (^) used to indicate insertion of corrections immediately above the symbol in a draft or at the side in a galley.

centered dot — a heavy dot (•) placed before a paragraph or items in a list; also called a bullet; a lighter centered dot (·) is used to indicate multiplication in equations.

character — a letter, numeral, symbol, or mark of punctuation.

collage — an illustration made by pasting photographs, line cuts, type, etc., in combination.

collate — to arrange the pages of a book or report in proper sequence for binding.

communications architecture — the development of a unified, consistent, and integrated set of standards and guidelines for the development of multimedia communications products with respect to appearance, content and format, and process and quality.

compositor — a highly skilled person who electronically formats and arranges text, tables, etc., into camera-ready masters.

cover stock — heavy paper used for the covers of reports, pamphlets, etc.

crop — to cut down an illustration, such as a photograph, by removing areas extraneous to the center of interest.

crop marks — marks that indicate the corners of the portion of artwork or photograph to be reproduced; also marks at the four corners of a mat or other master to indicate the area to be reproduced (not needed if the entire item is to be reproduced).

cutaway — the cutting away of the cover of an object to expose the inner details.

dagger — a symbol used in citing footnotes.

descender — the part of such letters as p, q, and y that descends below the body (or x-base) of the character.

diagram — in artwork, a line drawing that represents the functioning of a thing rather than its physical details.

display — to set part of the copy on its own line or lines, apart from the rest of the text.

display type — type that is larger or bolder than the type used for the text. Display type is used for title pages, chapter headings, etc.; it is also used extensively in posters.

dogleg — an arrowed extension line from a callout that has an angled corner to connect it to an item in a drawing.

em dash — a long dash (—) that is approximately the width of a capital M in the print style being used.

en dash — a medium-length dash (–) that is approximately the width of a capital N in the print style being used.

exploded view — drawing of a disassembled object to show all working parts and how they fit together.

film negative — photographically produced reverse image transparency; commonly used when a clear-on-black image is desired.

film positive — photographically produced transparency; commonly used when a black-on-clear image is desired.

flush left; flush right — text or figures that are aligned vertically along the left or right margin.

flush and hang — text that is set with the first line flush left and the following lines in the same paragraph indented; also called *hanging indentation*; this glossary is set flush and hang.

foldout — an oversize sheet, often a map, illustration, or table, folded to fit the trim size (final publication size) of a publication.

folio — a page number. An *expressed folio* is printed on the page; a *blind folio* is not printed on the page but is counted in the numbering of the pages.

font — an assortment (usually containing the alphabet, Arabic numerals, and commonly used symbols) of a particular style.

format — the shape, size, style, and general appearance of a document as determined by type, margins, headings, etc.

galley proof — typeset text used for proofing the masters; it is printed by some inexpensive process.

glossy — a black-and-white (B&W) photographic print that has a high-gloss coating; the most desirable print from which to make halftones.

graph — statistical information presented in graphic form based on a coordinate system.

gutter — the white space between two columns of text; the inner margins of two facing pages of a book or report.

half title page — a page at the beginning of a major division of a publication on which just the number (if there is one) and the title of that division are centered in large, bold type; also called *part title*.

halftone — a process whereby a continuous tone image such as a photograph is broken into a dot image for copying by the printer; also called screen print.

hanging indentation — see *flush and hang*.

ITEK — see *PMT*.

image area — the rectangular area within which text and graphics can be placed on a mat or on an electronic screen; the actual rectangular area consumed by an image.

indicator — in artwork, the line that extends from a callout to a particular area of the figure.

inferior character — a small letter, numeral, or figure that prints partly below the base line: A₂; also called a subscript.

justification — the spacing out of a line of type so that it will align along

APPENDIX E

both the right and left margins, as in newspaper columns.

landscape — orientation of graphics or art across the long dimension of the page.

layout — a designer's conception of the finished job, including spacing and type specifications; also the arrangement of text and graphics in a document.

leaders — a row of dots, evenly spaced, to carry the reader's eye from one object to another to make the relationships between the objects easier to follow; used in contents and tables, for example.

leading — vertical spacing for text, measured in points; line spacing.

legend — the explanatory or descriptive material accompanying an illustration, chart, or table; the key to symbols in such items.

line drawing — a drawing made up of black-and-white lines, with no shaded areas.

line weight — the weight (thickness) of a line.

makeup — the arrangement of composed type into pages.

matte print — photo print with a dull, non-glossy finish.

mount — to glue or tape separate pieces of text or graphics to a backing surface such as a mat to compose a page of text or an illustration; being replaced by electronic composition.

negative space — the white space, or unprinted area of a page.

nonphoto blue — light blue pencil or ink that does not reproduce

photographically; the instrument or ink should carry the label *nonphoto blue* — a "sky blue" pencil cannot be substituted.

opaquing — the hand operation of painting over small imperfections in negatives with a light-stopping paint.

optical center — a point on a page, pleasing to the eye, that is above the actual center of the page, usually about three lines above the center.

original art — reproducible artwork that is created from rough drafts.

orphan — a short word (less than five letters) on a line by itself; considered poor composition.

overlay — a sheet of acetate, tracing paper, or similar transparent material placed over a paste-up, either to hold copy that will appear in another color or for special instructions on the job.

part title — the number or title of a division of a report or book, more important than a chapter or section title and usually printed alone on a separate page preceding the one to which it refers; also called *half title*.

paste-up — see *mount*.

perfect binding — binding by which the pages of a book are held together with adhesive along the back edge and the cover is a continuous sheet that wraps from the front to the back of the document; spine labels are often used with perfect bindings.

phototypesetting — the reproduction of text by projecting it onto film to be reproduced by a film process.

pica — a printer's unit of measurement equal to 12 points, or about 1/6 inch. The most standard typing, whether on a word processor or a PC, is produced on 12-point (1 pica) spacing; this produces 6 lines to an inch and 54 lines to a page, the same as most typewriters.

PMT — photomagnetic transfer, a process that creates high-contrast screened prints; frequently referred to at Sandia as ITEK, which is a trade name.

portrait orientation — see *landscape*.

ragged right — left edge of text begins directly under the line above, but the right edge runs ragged.

recto folio — the number on a right-hand page; a right-hand page.

register mark — a special mark resembling a cross placed in the margin of a paste-up to provide a point of reference for positioning overlays for color work or other separately processed portions of a master.

rendering — in artwork, the delineation of a drawing in black and white or color to refine details, create depth, model with a light source and shadow, or otherwise add visual interest.

reversed image — a high-contrast photographic print, white on a dark background.

Review and Approval process — at Sandia, a formal review process required for all communications going outside Sandia.

review copy — a copy prepared from the draft for review by the author

and others before the final masters are prepared.

rule — a ruled line on a page, either horizontal or vertical.

sans serif type — a type style that has no cross-lines on the terminal strokes; frequently used for display type such as headings and callouts. The bold type in this glossary is sans serif and the light-faced type is serif.

screen print — see *halftone*

shade pattern — a pattern used to delineate a certain portion of a drawing.

spine — the back of a book, connecting the front and back covers. Lettering on a spine usually reads from the top (as the book sits on a shelf) down, or from left to right when the front of the book is facing up.

stet — an editing/proofing mark used to reinstate text that has been marked out. The text to be left in is underlined with a dotted line, and the word *stet* is written above it or in the closest margin. Literally, *stet* means "let it stand."

subhead — a heading that marks the divisions of a chapter or section; any heading that is inferior to another heading.

subscript — a character or symbol printed partly below the line, A_B; also called an inferior character.

superscript — a character or symbol printed partly above the line: X²; also called a superior character.

tick marks — small indicator lines that border a graph box to denote numerical values.

APPENDIX E

tip in — to paste a leaf or leaves into printed sheets or bound books.

transparency — a black-and-white or full-color positive on transparent film, viewed by means of light projected from the back.

trim size — the final size of the whole page, including all margins, after trimming. Slick brochures and similar documents that are nonstandard in size are frequently trimmed after they are bound.

type — in artwork, any text that is directly related to a drawing, such as callouts, titles, or legends.

typeface — style of type.

verso folio — the number on a left-hand page; a left-hand page.

view graph — also *vugraph*, derived from a trade name; a transparency used with overhead projection equipment to project an image on a screen.

widow — a single short line at the top or bottom of the page or column; considered poor composition.

white space — See *negative space*.

Index

Abbreviations: 37, 54, 157, 158
functions abbreviated (equations): B-12

Abstract: 7, 53, 133, 135, 143, 145, 146, 149
classified or unclassified: 34, 35
extended abstract: 144

Non-Sandia Proprietary Information: 102

OUO/UCNI: 64

Protected Battery/Protected CRADA Information: 103

replacing executive summary: 53

Review and Approval process: 13, 27

sample abstract: 49, 50, 94-96

SAND number: 6
writing abstract last: 39

Acknowledgments: 36, 50, 52, 74, 137
in journal article: 149

Acronyms: 37, 54, 158

Address labels: 138

Address, Sandia's: 69, 70, 134, 135

Appendices: 37, 38, 51, 65, 75

Applied Technology: 99, 112

Arabic numbers: 35, 37, 74, 75, 81

Articles, indefinite: 54

Audience: 39, 55
brochures: 151
internal: 69
new: 8, 11, 13, 18, 21, 22

Authorized Derivative Classifier (ADC): 15, 16, 22

Author-date reference: 57, 75, C-5, C-6, C-11, C-13, E-3

Authors (multiple): 94, 95, 97

Authors' names: 13, 94, 95, 97, 134, 135, C-5, C-6
appendix: 65
author-date references: C-5
conference paper: 145
contractors: 8, 31
internal memorandum: 90, 92

Back matter: 38, 75 (see *Glossary*, see *Appendices*, see *Index*)

Bibliography: 37
for *SAND Guide*: 155-159

Blank pages: 74, 75, 85, 132, 135

Body of document: 37-39, 65, 71, 74, 75, 134, 135

Body text: 71, 72

Book chapters: 6, 149, 150, C-7

Brochures: 151
sample brochure: 152, 153
SAND number: 6
trimming brochures: E8

Captions: (see *Figure captions*)

Changing a previously approved report: 7-9, 18-22
sample memo: 10
SAND number for: 20-22

Chapter:
book: 6, 149, 150, C-7
numbering: 74

Checklists (prior to printing):
for unclassified report master: 134
for classified report master: 135

Classification Department approval: 6, 7, 9, 12-17, 101, 105-107, 111
for internal memorandum: 90, 92

Index

Classification levels/categories: 4, 35, 95, 107-112

Classified:
artwork: 82
distribution list: 99, 114-116, 135
document: 49, 64, 66, 75, 107-112
internal memorandum: 90
title page: 95
title page notices: 98-112

Classifier, Authorized Derivative (ADC): 15, 16, 22

Clauses: A-5 thru A-8

CNWDI (markings): 108

Color printing: 16, 85, 132, 151

Columns:
Double-column format: 73
Double-column example: 119
Single-column format: 73
Single-column example: 120

Computer art: 85

Computer software: 12, 56

Conclusions: 37, 39, 63

Conference papers: 6-8, 10-12, 18, 19, 144, 145, C-8
funding statement for: 145
Review and Approval: 15, 18, 19, 27
sample: 146, 147
SAND number: 6, 7, 143

Conjunctions: A-7, A-8

Contents: 36, 81, 113, 134, 135
page numbering: 36, 74, 81
sample: 51, 113
treatment of appendix: 65

Contractor reports: 4, 6, 8, 31, 34, 35, 96
sample title page: 96
SAND number: 6

Control markings: 31

Control (SAND) numbers: (see *SAND numbers*)

Copying documents: 4, 85

Copyright Interest: 102

Copyrights/permissions: 13, 57, 80, D-3 thru D-5

Copyright transfer: 145, 150, D-3

Cover:
checklist: 134-136
contractor reports: 31
cover sheets for classified: 112
internal memorandum: 33, 90-93
markings and legends: 23, 98-112
ordering: 132, 133
price codes for inside cover: 48
sample: 47
SAND reports: 9, 17, 20, 21, 33-35, 75, 131-138
Service Order form for report cover: 137

CRADA information: 103

Critical Nuclear Weapon Design Information (CNWDI): 110

Crop marks: 125, E-4

Dashes: 76, 77
em dash: 76, 77, E-4
en dash: 76, 77, E-4

Descriptive abstracts: 50

Desktop publishing: 69, 159

Developing/organizing text: 33-41

Disclaimer: (See *Legal notice*)

Distribution:
category: 99, 106, 134, 135
checklist: 134, 135
foreign: 38, 64, 99, 100, 109
internal memorandums: 90, 92
limitations: 3, 4, 8, 9, 14, 16, 18, 21, 31, 34, 98-112
of reports: 138

Distribution list: 38, 66, 75, 99, 102, 104, 106, 114-116, 136
"housekeeping" copies: 99, 106, 114
sample (unclassified): 115
sample (classified): 116

Document processing: 99, 131, 136, 138, 139

DOE Directive 1430.1D: 3, 12, 13

Double columns: (see *Columns*)

Double page numbers: 135

Drafts: 4, 7, 15, 16, 27, 144, 149-151

Draft copy markings: 98, 112

Edit, levels of: 31

Electronic posting: 8

Elements of document: 33-41

Equations: 58, 72-73
abbreviations of functions: B-12
accuracy/consistency: B-3
copying: B-10
definitions (parts of speech): B-11
exponential function: B-9
formatting: B-4 thru B-6
fractions: B-7, B-8
Greek alphabet: B-14
inputting from handwritten copy: B-3
line breaks: B-9, B-10
math signs/symbols: B-13
spacing: B-5, B-6
superscripts/subscripts: B-7, B-8

Executive summary: 36, 37, 53

Export Controlled Information (ECI): 64, 66, 101, 145, 150

Extended abstract: 144

Figures: 5, 57, 85, 87
captions: 36, 57, 76, 81, 82, 85, 113
cropping: 125

halftones: 124
in abstracts: 50
in appendixes: 65
listed in Contents: 36, 51, 113
numbering: 65, 75, 113
orientation: 121
oversize: 84
placement: 79, 81
samples: 124, 125

Flowchart for creating SAND report: 41

Fonts: 71, 72, 81

Footers: 74, 76

Footnotes: 77, 132
funding statement in conference paper footnote: 145
in abstract: 50
Sandia contract number in contractor report: 96

Foreword: 36, 52

Format: 17, 69-78
changing: 18-20
contents page: 113
double-column: 119
equations: B-4 thru B-6
oversize: 148
references: C-3 thru C-14
single-column: 120

Formerly Restricted Data (FRD) marking for: 107

Forms (examples):
Record of Origination & Distribution of Publication: 139
Review and Approval form: 23-26
Service Order form to order graphics: 122
Service Order form to order report cover: 133
Service Order form to order report cover and Print Shop services: 137

Index

Front matter (contents page, acknowledgments, etc.): 36, 37, 74

Function abbreviations: B-12

Funding statement:
for conference paper: 145
for SAND report cover: 33, 47
for journal article: 149, 150

Work for Others: 106

Glossary: 38, 75
(publishing terms): E-1 thru E-8

Grammar: 157, A-3, A-4

Graphics: 31, 39, 57, 80
citing non-Sandian source of graphics: 80, D-3 thru D-5
numbering graphics: 81
orientation: 80
Service Order form for: 122

Graphs: 83

Greek alphabet or terms: 54, 58, B-14

Halftones: 85, 124

Hand-inserted material: 75

Headers: 74, 76

Headings: 31, 36, 37, 51, 57, 65, 72, 74, 81, 86, 87, 115-118

Homonyms: A-17 thru A-20

Housekeeping copies: 38, 66, 99, 106, 114-116, 134-136

Hyphen: (see *Dashes*)

Indefinite articles: 54

Index: 38, 75

Intentionally Left Blank: 74, 75, 85, 132, 135

Internal Distribution Only (IDO): 22, 90, 92, 100, 114, 134

Internal memorandums: 6-8, 13, 14, 17, 33, 90-93, C-9
sample (classified): 90, 91

sample (unclassified): 92

Introduction: 37, 39, 43, 55, 113, 119, 120, 134, 135

Invention disclosure: 102

Journal articles: 6-8, 10, 12, 18, 27, 149, 150, C-7, C-8

Justification (Letter of): 106, 111

Justification (text): 73, 117, E-5, E-6
(also see *Ragged right text: E-7*)

“Landscape” orientation: 80, 121

Legal notice (disclaimer): 33, 104, 134, 135
ordering cover with: 132
page number for: 75
sample: 48

Legends: 31, 94, 98-112

Levels of edit: 31

Limited access document: 98-112

Logo (SNL): 5, 76

Mailing labels: 131, 136

Margins: 73, 77, 117, 118

Markings and legends for cover and title pages: 98-112

Masters: 84, 85, 98, 112, 131, 132-137, 148

Math signs and symbols: 54, 57, 58, 158, B-13

Memorandums: (see *Internal memorandums*)

Multiple authors: 97

National Security Information (NSI): 108

Naval Nuclear Propulsion Information: 101

No Foreign: 107, 110

Non-Sandia Proprietary Information: 102

Non-Sandia author: (see *Contractor reports*)

Non-Sandian source of graphics: 80, D-3 thru D-5

Notices: (see *Legal notices (disclaimer)*)

Nuclear Weapon Data (NWD): 95, 108, 110, 135

Odd-numbered pages: 36, 37, 74

Official reports: 5, 94

Official Use Only (OUO): 101

Oral presentation: 7, 143

Orientation (landscape and portrait): 80, 121

Page, blank: 74, 75, 85, 132, 135
at the end of sections: 37, 132

Page margins: (see *Margins*)

Page numbering: 34-36, 73-75, 85, 132, 134, 135
appendices: 75
classified reports: 35, 75, 135
front matter: 74, 75
placement: 73
section style: 75
standard style: 75
unclassified reports: 34, 74, 75, 134

Paragraph numbering: 74

Paragraph spacing: 73, 74

Parts of speech (equations): B-11

Patent Caution: 90, 92, 94, 102, 114-116

Patent Interest: 102, 114

Peer review: 15, 40-43

Permissions/copyrights: 57, 80, D-3 thru D-5

Photographs: 85, 86
camera ready: E-4
cropping: 86, 125

glossy: E-5

hand inserted in classified reports: 75

Physical protection legends: (see *Notices*)

Pie charts: 83

"Portrait" orientation: 80, 121

Preface: 36, 51, 52

Prefixes: A-15

Prepositions: A-13, A-14

Presentations: 7-12, 14, 102, 143, 144
subsequent presentation to different group: 8-12, 14

Price codes (for inside cover): 48

Print date: 9, 20, 21, 34, 35, 94, 134-136

Print Shop: 4, 16, 33, 41, 116, 131, 132, 136-138, 151

Print (text):
sizes: 71, 83, 85, 117, 123
styles:
in body text: 71
in headings and titles: 31, 32, 36, 51, 57, 65, 72, 74, 78, 81, 86, 87, 113, 118

Printing: 4, 16, 85, 124, 131, 132, 136, 137

Pronouns, relative: A-5, A-6

Proprietary Data: (see *Non-Sandia Proprietary Information*)

Protected Battery Information: 103

Protected CRADA Information: 103

Protecting information: 3, 4, 12, 13, 31, 98-112

Public information: 151

Publishing terms: E-3 thru E-8

Punctuation: C-4, C-6
of clauses: A-5 thru A-8

Index

of equations: B-5, B-6

Ragged right text: 73, 117, E-7

Record copies for DOE and SNL: 38, 66 (see *Housekeeping copies*)

Record of Origination & Distribution of Publication form: 41, 131, 136, 138

sample: 139

References: 37, 38, 57, 64, 113, 158, C-3 thru C-14

abstract: 50

appendixes: 65

author/date system: 57, 75, C-3, C-5, C-6, C-11, C-13

Contents page: 51, 113

internal memo: 91, 93

reference symbols: 6, 91, 93

samples: 64

section-numbering style: 75

sequence in document: 65

sequential numbering system: 57

to documents with distribution limitations: 64

to unpublished work or verbal communication: 64

References and Bibliography: 37, Appendix C
(*also see Bibliography*)

Relative pronouns: A-5, A-6

Release limitations: 9, 22, 145, 150, 151

Release statement: 31, 34, 94, 98-112, 134

Report Prep Service (Print Media): 131

Reprints: 8, 9, 14, 21, 22, 80, 134, 136

Restricted Data (RD): 90, 95
marking for: 107, 109

Review and Approval: 3, 5, 6, 8, 9, 12-27, 41, 91, 93-95, 106, 111, 131-136, 143, 144, 150, E-7

form: 23-26

process for internal memorandums: 6, 8, 13, 14, 17, 91, 93

Revisions: 9, 13, 20, 34, 35, 134, 136

SAND number: 9

supersession statement: 9, 34, 35

Roman numerals: 37, 74, 81

SAMPLES: 90-127

Sample 3-1. Classified internal memorandum cover: 90, 91

Sample 3-2. Unclassified internal memorandum cover: 92, 93

Sample 3-3. Unclassified title page: 94

Sample 3-4. Classified title page: 95

Sample 3-5. Title page for contractor report: 96

Sample 3-6. Treatment of multiple authors' names on title page: 97

Sample 3-7. Markings and legends for cover and title page: 98-112

Sample 3-8. Contents page: 113

Sample 3-9. Distribution "house-keeping" copies: 114

Sample 3-10. Distribution pages, unclassified and classified: 115, 116

Sample 3-11. Text fonts and text sizes for standard SAND reports prepared in the Print Media Department: 117

Sample 3-12. Margins and headings: 118

Sample 3-13. Example of a double-column format: 119

Sample 3-14. Example of a single-column format: 120

Sample 3-15. Figure orientations (landscape and portrait): 121

Sample 3-16. Service Order form for graphics: 122

Sample 3-17. Print sizes and typical reductions: 123

Sample 3-18. Halftones with good contrast: 124

Sample 3-19. An appropriately cropped photograph: 125

Sample 3-20. Example tables from published reports: 126, 127

SAND documents: 13, 15, 31
abstract: (see *Abstract*)
covers: 9, 17, 20, 21, 33-35, 75, 131-138
definition: 5, 6, 12
flowchart for creating: 41
logo (SNL): 5, 76
markings and legends for: 98-112
odd-numbered pages: 36, 37, 74
protecting the document: (see *Protection information*)
references and bibliography: 37, Appendix C
reprints: (see *Reprints*)
revisions: (see *Revisions*)
sample, annotated: 47-66
types: 6-8

SAND numbers: 5-11, 18-22
for conference papers: (see *Conference papers*)

for changed type of report: 8-11, 18-22
for journal articles: (see *Journal articles*)

Sandia Commercially Valuable Information: 104

Scientific and Technical Information: 3, 5, 6, 12, 13, 48

Sections: 56, 74, 78
appendices: 38, 65
blank pages at the end of section: 37, 132
body of report: 37
description of entire report: 33-38
numbering: 74-76
samples: 47-66

Sensitive Use Control Information (SUCI): 109

Service Order form: 33, 82, 122, 131, 138
for cover: 133
for cover and Print Shop services: 137
for graphics: 122

Sigma number: 95, 107-110, 135

Signs and symbols, mathematical: (see *Math*)

Single-column format: 73, 120

Singulars and plurals: A-6

Small Business Innovation Research (SBIR): 103

Source lines: (see *Copyright/permissions*)

Special Handling: 107, 110

Specified Dissemination: 106, 111

Sponsorship statement: (see *Funding statement*)

Style: 17
definition of: 32, A-3
print style: 71-73, 75

Index

Style manuals: 157-159

Subcontractor: (*see contractor reports*)

Subscript: E-7

SUCI (markings): 110

Suffixes: A-16

Summary: (*see Executive summary*)

Superscript: E-7

Supersession statement: 9, 19, 20, 34, 35, 134, 136

Support statement: (*see Funding statement*)

Symbols, mathematical: (*see Math*)

Table of Contents: (*see Contents*)

Tables: 39, 51, 87, 134, 135

- definition: 86, 87
- in abstracts: 50
- in appendixes: 65
- numbering: 65, 86
- on Contents page: 36, 113
- placement: 79, 81
- samples: 126, 127
- titles: 57, 81

Text, body:

- sizes: 71, 83, 85, 117, 123
- styles:
 - in body text: 71
 - in headings and titles: 31, 32, 36, 51, 57, 65, 72, 74, 78, 81, 86, 87, 113, 118

That vs. *which*: A-5, A-6

Title page: 31, 33-35, 98, 133-136

- abstract: 49, 50
- authors' names on: 97
- classified: 35
- conference papers: 145
- contractor report: 96
- footnote on: 96
- for internal memorandum: 91, 93
- markings: 8, 9, 19-22, 98-112
- numbering: 34, 35, 74
- printing: 132
- reprint: 9
- sample (classified): 95
- sample (unclassified): 94
- sample (for contractor report): 96
- unclassified: 34

Unclassified Computer Software (UCS): 104

Unclassified Controlled Information (UCI): 4, 99-106

Unclassified Controlled Nuclear Information (UCNI): 105

Unlimited Release: 3, 4, 19-21, 23, 24, 64, 66, 98, 114, 115, 134

Unofficial reports: 5

Unpublished work: 64

US/UK Atomic Information: 110

Verbal communication, citing: 64

Verbs

- simple, direct: A-9, A-10

Which vs. *that*: A-5, A-6

Work for Others (WFO): 106, 134

DISTRIBUTION:

- 8 InfoMatrix
5301 Central, NE
Suite 1520
Albuquerque, NM 87108
- 1 Professional Training Company
Attn: H. Moody
PO Box 2578
Corrales, NM 87048
- 6 Technically Write
P.O. Box 761
Tijeras, NM 87059
- 15 Tech Reps, Inc.
5000 Marble, NE
Albuquerque, NM 87110
- 1 Kevin Mahony
Mason & Hanger
Highway 60 East
Amarillo, TX 79177
- 2 ea All SNL/NM Mailstops
 - 1 0327 O. B. Crump, 2654
 - 1 1380 M. Monson, 4202
 - 1 0644 L. S. Lopez, 14712
 - 1 0702 A. Van Arsdall, 6200
 - 2 1326 S. J. Kozemchak, 6312
 - 1 0736 D. Gunckel, 6400
 - 1 0734 N. E. Brown, 6624
 - 1 0717 C. J. Mora, 6642
 - 1 0743 R. A. Garber, 6907
 - 1 1065 C. Madigan, 7254
 - 2 9021 R. H. Tucker, 8535
 - 1 0309 J. Baldo-Pulaski, 2413
 - 1 1011 J. N. Adams, 12111
 - 1 1011 R. S. Henderson, 12111
 - 50 0899 L. Velardez, 4415
 - 18 0619 G. Williams, 12615
(For all 12615 employees)
 - 1 9018 Central Technical Files, 8523-2
 - 5 0899 Technical Library, 4414
 - 1 0619 Print Media, 12615
 - 2 0100 Document Processing, 7613-2
For DOE/OSTI