

**STANDARDS FOR THE
PREPARATION AND PUBLICATION OF DOT
SCIENTIFIC AND TECHNICAL REPORTS**

Appendix to Order DOT 1700.18B, "Acquisition,
Publication and Dissemination of DOT
Scientific and Technical Reports."



May 1975

R & D Management Report

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National Technical Information Service,
Springfield, Virginia 22161.

**U.S. DEPARTMENT OF TRANSPORTATION
Office of Assistant Secretary for
Systems Development and Technology
Washington, D. C. 20590**

1. Report No. DOT-TST-75-97		2. Government Accession No. PB 245400		3. Recipient's Catalog No.	
4. Title and Subtitle STANDARDS for the Preparation and Publication of DOT Scientific and Technical Reports				5. Report Date May 1976	
7. Author(s)				6. Performing Organization Code DOT/TST	
9. Performing Organization Name and Address Office of R&D Plans and Resources Office of the Assistant Secretary for Systems Development and Technology U.S. Department of Transportation				8. Performing Organization Report No. DOT-TST-75-97	
12. Sponsoring Agency Name and Address SAME AS ABOVE				10. Work Unit No. (TRAIS)	
				11. Contract or Grant No.	
				13. Type of Report and Period Covered N/A	
				14. Sponsoring Agency Code TST	
15. Supplementary Notes This document is used as performance exhibit in all DOT RD&D contracts and grants.					
16. Abstract <p>The document provides standards for the preparation, publication, and distribution of scientific and technical reports issued by DOT and DOT contractors. The standards do not apply to technical or training manuals, journal articles, brochures or pamphlets. The document contains guidelines for report formats, title pages and covers, metric conversions, use of illustrations and physical layout requirements. Report review and acceptance procedures are specified, as are the rules for assignment of document numbers and distribution of accepted reports.</p>					
17. Key Words technical documentation R&D management information processing			18. Distribution Statement This document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia, 22161.		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 21	22. Price

Form DOT F 1700.7 (8-72) Reproduction of form and completed page is authorized

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1. PURPOSE. This document establishes standards for scientific and technical reports prepared by or for the Department of Transportation (DOT). The application of these standards aids in the interchange of scientific and technical information and in the reduction of costs in the preparation, publication, and dissemination of such information. This document is reviewed periodically by a DOT R&D Information Working Group convened to ensure its compatibility with Congressional and DOT requirements and conformance to national documentation standards. It also is included as Appendix 1 to Order DOT 1700.18B, "Acquisition, Publication, and Dissemination of DOT Scientific and Technical Reports," and as an exhibit in all DOT R&D procurement contracts, as applicable.

2. EXCLUDED DOCUMENTS. These standards do not apply to operational instructions and directives, technical or training manuals, journals and journal article manuscripts, preprints or reprints, brochures or pamphlets. Also excluded are Technical Sharing, management and administrative documents. However, at the discretion of the sponsoring organization, those documents which contain significant technical information may be included.

3. REFERENCES.

a. American National Standards Institute (ANSI) document, Writing Abstracts, Z39.14-1971; \$3.50; Available from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

b. Bibliographic Procedures and Style: A Manual for Bibliographers in the Library of Congress. \$0.70. Available from the Superintendent of Documents, U.S. Government Printing Office, D.C. 20402.

c. ANSI document, Guidelines for Format and Production of Scientific and Technical Reports, Z39.18-1974, \$4.00; Available from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

d. U.S. Congress Joint Committee on Printing, Current Government Printing and Binding Regulations; Available from the Joint Committee on Printing, U.S. Congress, Committee Room S-151, U.S. Capitol, Washington, D. C. 20510.

e. Department of Defense/Engineers Joint Council, Thesaurus of Engineering and Scientific Terms, 1967. Available from the Engineers Joint Council, 345 East 47th Street, New York, NY 10017.

f. Department of Commerce, List of Business and Economic Terms, COM-73-12000, December 1973, AD-641092; Available from the National Technical Information Service, Springfield, Virginia 22161.

g. ASTM document Metric Practice Guide, Z210.1 - 1973. Available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103, designation E380-72.

h. Department of Commerce, Units of Weights and Measures, National Bureau of Standards Miscellaneous Publication 286, SD Catalog No. C13.10.286, \$2.25; Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402.

4. DEFINITIONS.

a. Sponsoring Agency: The DOT organizational element having program responsibility for scientific or technical effort. A public body (state, city, commission, etc.) also may be a sponsoring agency in cooperation with a DOT element.

b. Performing Organization: The DOT element (either headquarters, field, or laboratory), contractor, grantee or recipient of DOT R&D funds reporting specific scientific or technical research findings which result from investigations, demonstrations, tests or experiments.

c. Interim Report: A report issued during the course of a project, or a major part thereof, to reflect completion of a specific phase of a project assignment. This method of reporting can also be used where a periodic report of progress is of interest to the transportation community at large. Interim reporting, for example, can be the communications medium for early reporting under a project of considerable duration or relative complexity.

d. Final Report: A report issued at the completion of a project, or a major portion thereof, to signify the accomplishment and formal "close-out" of a project.

e. Transportation Research Information Services Network (TRISNET): TRISNET is sponsored by DOT to improve the efficiency and effectiveness of the transportation-related information services. It includes such services as the Highway Research Information Service (HRIS), Railroad Research Information Service (RRIS), Maritime Research Information Service (MRIS), TRISNET Repository at NTIS, and other services still under development.

5. REQUIREMENTS. DOT-sponsored scientific and technical reports shall conform to the requirements of Document DOT-TST-75-97, security regulations, and implementing instructions of the sponsoring organization.

6. LEGAL CONSIDERATIONS. The Government may be subject to liability for misuse of the literary or intellectual property (patents, trademarks, "proprietary information") of others. To ensure that technical reports can receive the widest possible dissemination, report writers and editors should observe the following guidelines:

a. Copyright. No copyrighted material may be incorporated into a report unless written permission of the copyright owner has been obtained. Prior use of copyrighted material in another Government publication does not necessarily constitute permission to use it in a DOT publication. Where permission has been obtained and the material is used in a report, it shall be identified by a statement substantially as follows:

Reprinted from (title of publication) by (name of author)
by permission of (name of copyright owner). Year of first
publication _____.

b. Courtesy requires that acknowledgment or credit be given (by footnote, bibliographic reference, or a statement in the text) for the use of the material contributed or assistance rendered by someone else though no copyright notice is involved.

c. Unpublished work may be protected under common law or equity even though there is no copyright notice. Problems relating to the protection given to unpublished work will be referred to the Office of the General Counsel.

d. Privately Owned Information: To avoid restriction on availability of reports, every effort should be made to avoid the use of proprietary information accepted by the Government for limited purposes. Such proprietary information will be used only if it is essential to the understanding of a report and only after approval by the Office of the General Counsel. Reports containing such proprietary information will bear a statement restricting availability and handling, as required (Paragraph 7b(9)).

e. Data Use Restriction: In the event that the Contractor furnishes any information or data which the Contractor considers to be proprietary under the terms of the contract, the Contractor shall affix the following use restriction legend to such proprietary data, shall mark such data with the number of the prime contract, and subcontract, if applicable; and shall deliver such proprietary data directly to the Government. No other legend is authorized and the Government will thereafter treat the data in accordance with such legend.

DATA USE RESTRICTION

These data, furnished under U.S. Government Contract No. _____, may be duplicated and used by the Government with the express limitations that the data may not be disclosed outside the Government, nor be used for purposes of manufacture, without prior permission of the contractor. These restrictions do not limit the Government's rights to use or disclose any data obtained from another source without restriction. This legend shall be marked on any reproduction of these data in whole or in part.

f. Trademarks; The term "trademark" includes any word, name, symbol, device or any combination thereof, adopted and used by a manufacturer or merchant to identify his goods and distinguish them from those manufactured and/or sold by others. It is improper to use a "trademark" to identify goods not manufactured or sold by the owner of a trademark or his licensee. In general, the use of trademarks is discouraged. Where feasible, goods should be identified by a type designation or a structural feature that distinguishes them from other goods.

g. Trade Names and Manufacturer's Names:

(1) Under Section 522 of Title 5, United States Code, as implemented by DOT Public Affairs Management Manual, DOT Order 1210.5, 2-6-74, reports which once were not available to the public, may be obtained by anyone who wants them. Particularly to be avoided is the appearance of endorsing or favoring a commercial product, commodity or service. Trade names or the names of manufacturers will not be given unless the report will not contain meaningful information without them.

(2) When trade names or manufacturers names are used in a report, this fact will be specifically brought to the attention of the reviewing office before the report is approved. Such reports shall contain the following notice on the inside front cover (no border required):

NOTICE

The United States Government does not endorse products or manufacturers. Trade or manufacturer's names appear herein solely because they are considered essential to the object of this report.

(3) DOT operating elements should first refer all legal considerations to their appropriate General Counsels before seeking legal advice at the Departmental level.

7. FORMAT.

a. Order of Elements. When some or all of the following elements are appropriate for a report, they will be included and the standard order will be as follows:

	Self Cover
	Inside Self Cover
	Technical Report Documentation Page
	Preface
Front Matter	Metric Conversion Factors
	Table of Contents, List of Illustrations, List of Tables, List of Abbreviations and Symbols
	Introduction
Body of Report	Main Text
	Conclusions
	Recommendations
	Appendices
	Glossary
Reference Material	References
	Bibliography
	Index
	Self Cover

b. Self Cover.

(1) Description. Whenever possible, use self covers (of the same weight paper as the text) for all reports. Include on the cover the information shown in groupings plus special markings (such as security classification) as specified by the sponsoring operating elements. Recommended group related items are shown in Figure 1A. A sample of dual-sponsored cover is shown in Figure 1B. Items on self covers also may be prepared by standard typewriter.

(2) Report Number. Each report shall carry a unique alphanumeric designation provided by the sponsoring operating element (for example, CG-D-14-74; FAA-RD-75-10; or FHWA-PA-RD-75 for a state-sponsored report in cooperation with a DOT element). When a report is prepared in more than one volume, repeat the report number on all volumes and add the appropriate volume number in Roman numerals (for example, FAA-RD-75-10,I and FAA-RD-75-10,II).

(3) Title and Subtitle. Display the title prominently and use words which indicate clearly and briefly the substance of the report. Set subtitle, if used, in smaller type or otherwise subordinate it to the main title. When a report is prepared in more than one volume, repeat the primary title and report number and identify each separate volume. On reports documenting computerized models use the term "Computerized Model" as the major subtitle.

(4) Author(s). The Government Printing and Binding Regulations permit the use of the author's name on self covers. The author's name shall be subordinated in appropriately smaller type than the title. Give the name(s) of the author(s) in conventional order (for example, John R. Doe, or if author prefers, J. Robert Doe). The author's name shall not be placed on the cover if the publication is bound with a separate cover (index stock).

(5) Performing Organization and Address. Give name, street, city and zip code. List no more than two levels of an organizational heirarchy.

(6) DOT Insignia. Place the DOT insignia on all reports as shown in Figures 1A and 1B. In cases where a public body (state, city, commission, university, etc.) is a sole sponsoring agency, the DOT insignia may be deleted and appropriate public body substitution made. Dual sponsorship may be recognized by inclusion of appropriate insignias and identifying information.

(7) Date. Each report shall carry a date by month and year. The sponsoring element may specify the basis for dating. If it does not, the originator will provide a date.

(8) Type of Report. Indicate nature of report, i.e., interim or final. If the report is a revision, state whether it supersedes the previous edition.

(9) Distribution Statement. Each DOT sponsoring operating element shall assign a distribution statement, which is placed on the self cover and printed on all copies. The statement that appears on the cover must also appear in Block 18 of the Technical Report Documentation Page. Refer to Order DOT 1210.5, DOT Public Affairs Management Manual of 2-6-74 for additional information concerning availability of documents. Use one of the following as appropriate:

GROUP I

Report No. CG-D-14-74

GROUP II

Title

**REMOTE SENSING OF
OIL SLICKS**

Subtitle (if any)

Author(s)

John R. Doe

*Performing
organization
name and address*

**ABC Laboratories, Inc.
405 Main Street
Zedburg, TN 37000**

*DOT
insignia*



Date

SEPTEMBER 1974

Type of report

FINAL REPORT

*Distribution
statement*

Document is available to the U.S. public through the
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Springfield, Virginia 22161.

GROUP III

Prepared for

*DOT
Operating element
DOT
headquarters element
and address*

**U.S. DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD
Office of Research and Development
Washington, D.C. 20590**

**FIGURE 1A. SAMPLE, SELF COVER (Items on cover also
may be prepared by standard typewriter).**

EVALUATION OF THE STRUCTURAL INTEGRITY OF AN AIRCRAFT LOADING WALKWAY UNDER SEVERE FUEL-SPILL FIRE CONDITIONS

George B. Geyer

Lawrence M. Neri

Charles H. Urban

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

National Aviation Facilities Experimental Center

Atlantic City, New Jersey 08405



OCTOBER 1974

FINAL REPORT

Document is available to the U.S. public through the
National Technical Information Service,
Springfield, Virginia 22161.

Prepared for

U. S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

Systems Research & Development Service

Washington, D. C. 20590

AIR TRANSPORT ASSOCIATION OF AMERICA

Washington, D.C. 20006

**FIGURE 1B. SAMPLE, SELF COVER - DUAL SPONSORS (Items on cover
also may be prepared by standard typewriter).**

(a) Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161.

(b) Approved for U.S. Government only. This document is exempted from public availability because (fill in reason). Transmittal of this document outside the U.S. Government must have prior approval of the (fill in DOT sponsoring element).

(c) Approved for (fill in DOT sponsoring operating element) only. This document is exempted from public availability because (fill in reason). Transmittal of this document outside the (fill in sponsoring operating element), Department of Transportation must have prior approval of the (fill in responsible office).

(10) Sponsoring Name and Address. Give name, city, state, and zip code of the sponsoring agency. When a public body (state, city, commission, university, etc.) is a sponsoring administration in cooperation with the DOT, grouping will reflect this cooperation, such as:

Prepared for
DEPARTMENT OF TRANSPORTATION
Atlanta, GA 30334

in cooperation with
(DOT Headquarters element, address)

c. Inside Self Cover. Special notices, such as reproduction, safety precautions, sponsor's disclaimer, and statement of compliance with special regulations are placed on the inside self cover as required by the sponsoring agency. Place the following notice on the inside self cover of all DOT reports:

NOTICE

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for the contents or use thereof.

d. Front Matter.

(1) Technical Report Documentation Page (DOT F 1700.7). Include one completed Technical Report Documentation Page as the first right-hand page after the cover in each report or volume. The documentation page replaces the traditional front title page and abstract page. A model completed page is shown in Figure 2A, with instructions for completing the documentation page for the author's use. Adequate and accurate completion of this page will assist documentation of a report. The documentation page also may be distributed in lieu of copies of the published report. This form is available for DOT operating elements from the DOT Warehouse, Publications and Forms, TAD-443.1. For contractors and grantees, the documentation page is available from the Contracting Officers of the sponsoring operating elements. The information presented on the documentation page is the basis for input into the TRISNET and the National Technical Information Service (NTIS).

1. Report No. FAA-RD-74-74,I		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle ANALYSIS OF PREDICTED AIRCRAFT WAKE VORTEX TRANSPORT AND COMPARISON WITH EXPERIMENT Volume I - Wake Vortex Predictive System Study				5. Report Date April 1974	
				6. Performing Organization Code	
7. Author(s) M.R. Brashears, N.A. Logan, S.J. Robertson, K.R. Shrider and C.D. Walters				9. Performing Organization Report No. LM-74-2B	
9. Performing Organization Name and Address Lockheed Missiles & Space Company, Inc.* Huntsville Research & Engineering Center 4800 Bradford Drive Huntsville AL 35807				10. Work Unit No. (TRAIS) FA405/R4115	
				11. Contract or Grant No. DOT-TSC-593	
12. Sponsoring Agency Name and Address U. S. Department of Transportation Federal Aviation Administration Systems Research and Development Service Washington DC 20590				13. Type of Report and Period Covered Final Report April to December 1973	
				14. Sponsoring Agency Code FAA/ARD-500	
15. Supplementary Notes *Under contract to: U. S. Department of Transportation Transportation Systems Center Kendall Square Cambridge MA 02142					
16. Abstract <p>A unifying wake vortex transport model is developed and applied to a wake vortex predictive system concept. The fundamentals of vortex motion underlying the predictive model are discussed including vortex decay, bursting and instability phenomena. A parametric and sensitivity analysis is presented to establish baseline uncertainties in the algorithm to allow meaningful comparison of predicted and measured vortex tracks. A detailed comparison of predicted vortex tracks with photographic and groundwind vortex data is presented. Excellent agreement between prediction and measurement is shown to exist when sufficient wind data are available. Application of the Pasquill class criteria is shown to be an effective technique to describe the wind profile in the absence of detailed wind data. The effects of wind shear and the Ekman spiral on vortex transport are discussed. It is shown that the combination of wind shear and ground plane may be possible mechanisms underlying vortex tilting and a theoretical explanation is advanced that is somewhat supported by comparison with the experimental data. Finally, recommendations for further vortex data collection in the vicinity of an airport are presented.</p> <p>Volume II, 246 pages, contains appendices.</p>					
17. Key Words Vortices Ground Plane Aircraft Wakes Vortex Tilting Wake Turbulence Vortex Transport Wind Shear Wake Vortex Predictive System			18. Distribution Statement Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161.		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 256	22. Price

Form DOT F 1700.7 (8-72)

Reproduction of form and completed page is authorized.

FIGURE 2A. SAMPLE, COMPLETED TECHNICAL REPORT DOCUMENTATION PAGE

Make items 1, 4, 5, 7, 9, 12, 13, and 18 agree with the corresponding information on the report cover. Use all capital letters for main title (item 4). Leave items 2, 6, and 22 blank. Complete the remaining items as follows:

3. Recipient's Catalog No. Reserve for use by report recipient.
8. Performing Organization Report No. Insert if performing organization wishes to assign this number.
9. Performing Organization Name and Address (include zip code).
10. Work Unit No. (TRAIS). Use the number code from the applicable research and technology resume which uniquely identifies the work unit in the Transportation Research Activity Information Service. For Highway Planning and Research (HP&R) Program reports, include the FPC Code assigned in the study.
11. Contract or Grant No. Insert the number of the contract or grant under which the report was prepared. For Highway Planning and Research (HP&R) Program reports, include also the State study number.
15. Supplementary Notes. Enter information not included elsewhere but useful, such as: Prepared in cooperation with..., Translation of (or by)..., Presented at conference of..., To be published in..., Other related reports.
16. Abstract. Include a brief (not to exceed 200 words) factual summary of the most significant information contained in the report. An abstract should state the purpose, methods, results, and conclusions of the work effort. For the purpose, include a statement of goals (objectives, aims). For methods, include experimental techniques or the means by which the results were obtained. Results (findings) are the most important part of the abstract and selection should be based on one or several of the following: new and verified events, findings of permanent value, significant findings which contradict previous theories, or findings which the author knows are relevant to a practical problem. Conclusions should deal with the implications of the findings and how they tie in with studies in related fields. Do not repeat title or other items provided on this page. When a report consists of a number of volumes, include the title of each of the other volumes in each abstract.

Reports presenting the results of computerized model development will use the following structure for the preparation of abstracts:

1. Technical Model description (Nature of the model or simulator)
 2. Areas of model application
 3. Special model requirements
 - a. Areas of model application
 - b. Other special considerations.
17. Key Words. Select specific and precise terms or short phrases that identify the principal subjects covered in the report. The sponsoring element may specify that key words shall conform to standard terminology, such as that given in the Department of Defense/Engineers Joint Council Thesaurus of Engineering and Scientific Terms, or a Thesaurus of Terms established by the sponsoring element.
 18. Distribution Statement. Enter one of the authorized statements (Paragraph 7b(9)) used to denote releasability to the public or a limitation on dissemination for reasons other than security of defense information. Refer questions on the statements to the sponsoring element.
 19. Security Classification (of report). Note: Reports carrying a security classification will require additional markings giving security and downgrading information as specified by the sponsoring element.
 20. Security Classification (of this page). Note: Because this page may be used in preparing announcements, bibliographies, and data banks, it should be unclassified, if possible. If a classification is required, identify the classified items on the page by an appropriate symbol.
 21. No. of Pages. Insert the number of pages having printed material, including front and inside covers.

FIGURE 2B. INSTRUCTIONS FOR COMPLETING TECHNICAL REPORT DOCUMENTATION PAGE.

(2) Preface. Among possible uses, a preface may show the relation of the work reported on to associated efforts, give credit for the use of copyrighted material, and acknowledge significant assistance received.

(3) Metric Conversion Factors. Include a Metric Conversion Factors page (Figure 3) in the report to provide the reader with information for converting to metric measures. Additional units may be included as they apply to the contents of the report. The Metric Conversion Factors page may be obtained from the DOT Warehouse, Publications and Forms, TAD-443.1, or copied from this document. Include page on reverse side of preface or form.

(4) Table of Contents. In the Table of Contents (not suggested for a report of less than ten pages), list principal headings as they appear in the report with the page numbers on which the headings occur. Do not list items from the front matter. Start the Table of Contents on a right-hand page.

(5) List of Illustrations. Furnish a list of illustrations only if it is considered essential. List figure number, legend, and page number of each illustration. Abbreviate lengthy legends.

(6) List of Tables. Furnish a list of tables only if it is considered essential. List table number, caption, and page number of each table. Abbreviate lengthy captions.

(7) List of Abbreviations and Symbols. Define symbols and abbreviations where first introduced in the text. When symbols and abbreviations are numerous, furnish a separate list with definitions. If list is used, include organization symbols, e.g., IEEE, ANSI, etc.

NOTE: To save space, items (5), (6), and (7) should follow on at the end of the Table of Contents. Do not present each of these on a new page.

e. Body of Report.

(1) General. The contents and organization of the body of a report shall be determined by the nature of the work. However, limit the contents to that information required by the sponsoring organization to inform the reader. Eliminate unnecessary details and appendixes. To reduce primary and secondary reproduction costs and to expedite review, approval, printing and distribution, keep the number of pages to a minimum. Start the first section on a right-hand page. This section usually provides work objectives and background information. Succeeding sections describe work procedures, apparatus involved, tests performed, results achieved, and related matters, as appropriate. The terminal sections usually present conclusions and recommendations. Start new sections or chapters at the top of the next succeeding page, be it left- or right-handed.

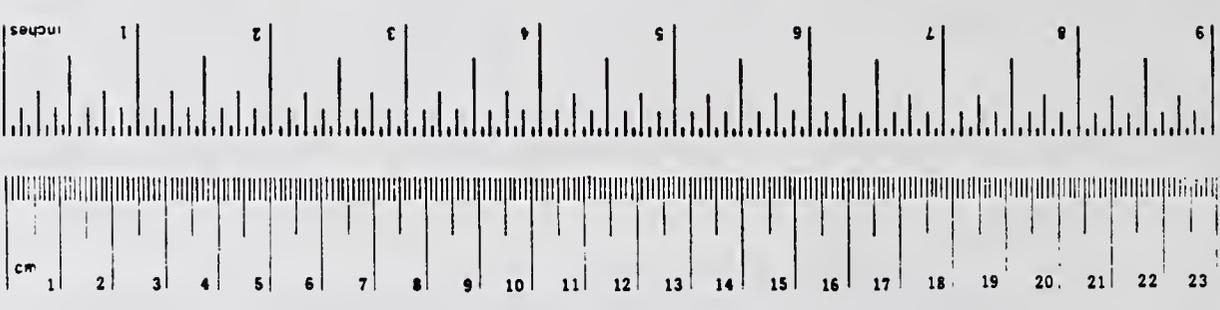
(2) Headings. Headings shall stand out from the text with their relative importance apparent.

(3) Numbering System. Number headings and paragraphs only when the numbers are needed for clarity or when extensive cross-references are used.

METRIC CONVERSION FACTORS

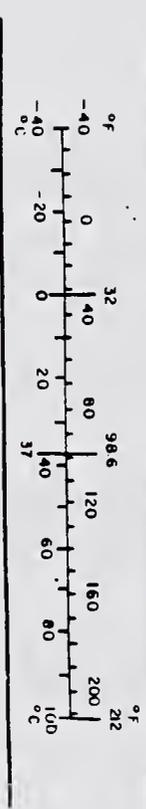
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tblsp	tablespoons	5	milliliters	ml
fl oz	fluid ounces	15	milliliters	ml
	fluid ounces	30	milliliters	ml
c	cup	0.24	liters	l
pt	pint	0.47	liters	l
qt	quart	0.96	liters	l
gal	gallon	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	acres
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	short tons
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



* 1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C1310 286.

FIGURE 3. METRIC CONVERSION FACTORS

f. Reference Material.

(1) Appendixes. Start an appendix on a right-hand page. Do not use a separate page to announce an appendix; rather, the appendix identification should appear at the top of the page with the content starting immediately on the same page. Each appendix shall be cited in the table of contents and from the appropriate position in the body of the report. When more than one appendix is used, designate them Appendix A, Appendix B, etc. When only one appendix is used, no designation is necessary.

(2) Glossary. Define special terms where first introduced in the text. When such terms are numerous, list them as a glossary in alphabetical order.

(3) References, Bibliography, and Footnotes. Include complete identification of references as footnotes on bottom of page where first cited to aid in reading from microform. When references are numerous, they should be included in a reference list in the back of the report. Entries should be presented in a uniform style, with complete identifying data, in accepted bibliographic format. Each entry should include authors, title, sources, identifying numbers, pagination, and dates. Abbreviations are not recommended and should be used sparingly. Refer to Paragraph 3b, REFERENCES.

(4) Index. If an index is included for a lengthy report, make it as complete as the nature of the report and its probable usage requires.

g. Illustrations.

(1) General. Treat illustrations consistently throughout a report. Prepare them so that details and callouts (labels) will be clearly legible after final reproduction. Crop or mask photographs to eliminate insignificant detail. Do not add border frames to outline illustrations or use backdrop tones in line drawings unless they contribute substantially to clarity. For reproducible copy, submit only clean line art and only original photographs (or other types of tone art) rather than screened (halftone) reproductions and indicate smallest size acceptable.

(2) Placement. Locate illustrations near the first text reference made to them except in special situations, such as when a report contains only a few text pages and many illustrations; in such cases, place the illustrations in numerical sequence in the back of the report. It is preferable that illustrations be placed so that they may be viewed without turning the page sideways. If an illustration has to be placed sideways on a page, orient it so that the top of the illustration is at the left side of the page.

(3) Callouts (Labels). So far as practicable, place callouts horizontally, unboxed and near the item called out, as shown in Figure 4. Make callouts in upper case lettering and consistent in size and typeface throughout a report. Use a typewriter of headliner type size. Strive for high contrast and readability.

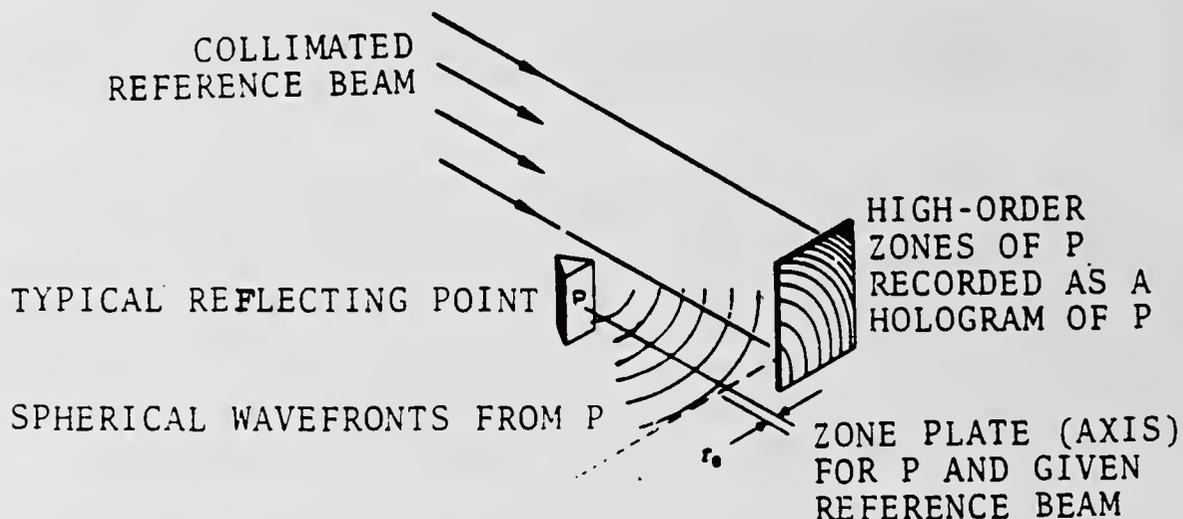


FIGURE 4. SAMPLE PLACEMENT OF CALLOUTS (LABELS).

(4) Color. Color must not be used unless specifically authorized by the sponsoring agency. Often screens, cross-hatching, pattern lines, reverses, dots, or similar techniques can be used as effective substitutes for color (Figure 5). Refer to Government Printing and Binding Regulations for general provisions concerning color printing.

(5) Fold-ins. Wherever possible, avoid the use of oversize illustrations that must be folded. Often most large illustrations can be planned for facing pages. When used, fold-ins should be presented on a right-hand page.

(6) Numbering. Number illustrations to which reference is made in the text consecutively in Arabic numeral, preceded by the word "FIGURE", for example, FIGURE 1, FIGURE 2, or FIGURE 1-1, FIGURE 1-2, FIGURE 2-1, etc. Number illustrations within appendixes in a manner consistent with the appendix letter, such as Figure A-1, Figure B-2, etc. If only one appendix, use Figure A-1, etc.

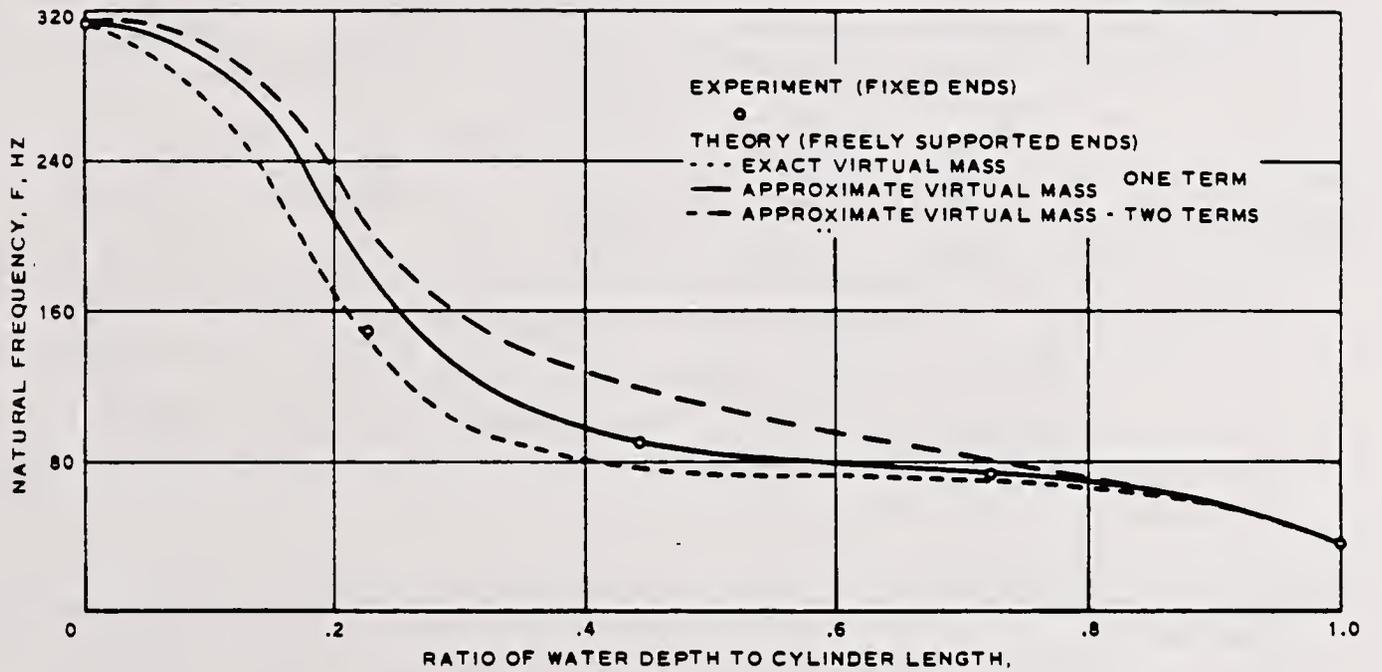
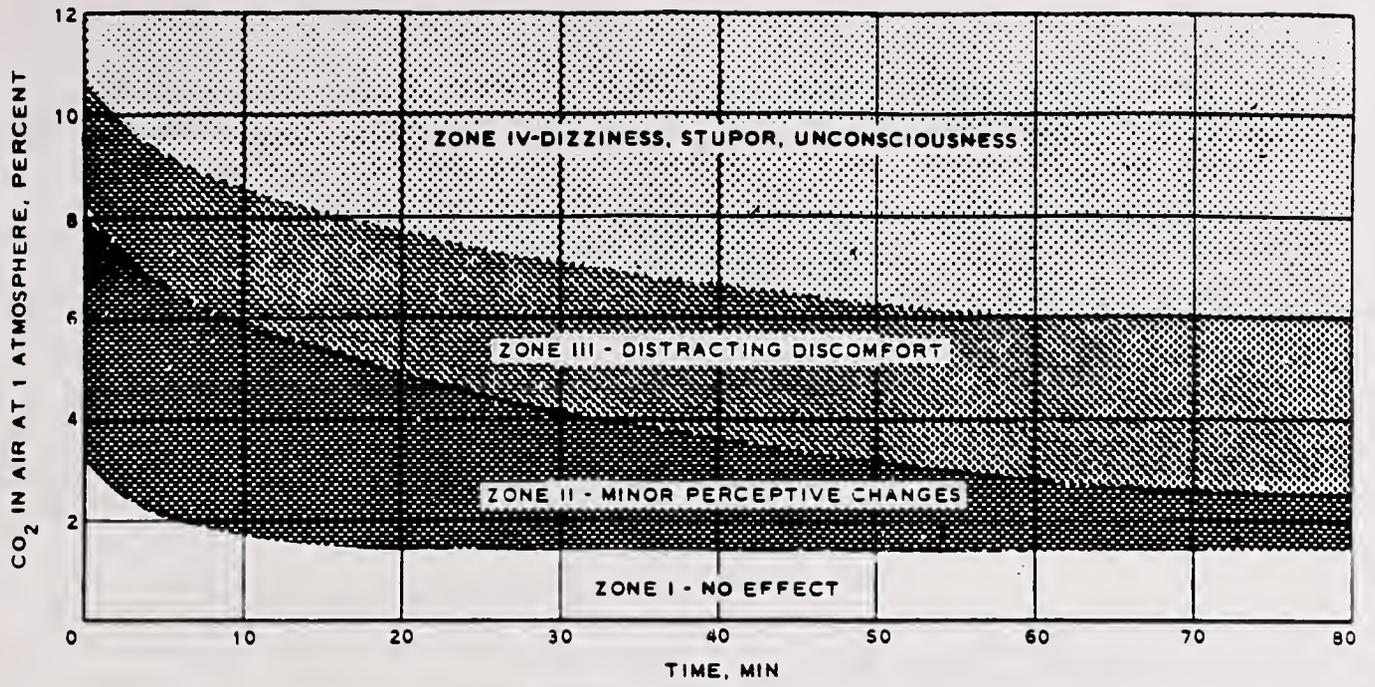


FIGURE 5. SAMPLE, SCREENING (TOP) AND CODING (BOTTOM) USED AS SUBSTITUTES FOR COLOR.

(7) Figure Titles. Accompany each illustration, except for self-explanatory sketches, by a descriptive legend. The legend is ordinarily placed under the illustration and follows the figure number. Figure titles should appear as upper case and of the same type style as used for the text.

h. Tables.

(1) General. Tables should be as simple as possible so that the reader can easily grasp the meaning of the data. Use letters and numbers in tables that will be at least 6-point or larger in the final reproduced report. If tables are to be reproduced directly from a computer generated printout, the characters on such printout should be sharp and unbroken. A sample table is shown in Figure 6.

TABLE 1. - SHORT-TIME XXXXXXXXXXXXXXXXXXXXXXXXXXXX ← *Caption*

Temperature. K	Specimen type (a)	Ultimate tensile strength. N/m ²	Elongation between buttonheads, cm	Reduction of area, percent
<i>Footnote reference</i>		Tungsten		
1700	1	2200 × 10 ³	1.57	95
1900	1	1312	1.60	75
2060	1	987	.69	36
2260	1	674	.51	25

^a Recrystallized at 2370 K for 1/2 hour in vacuum. ← *Footnote*

FIGURE 6. SAMPLE TYPICAL TABLE LAYOUT. For more complete information on tables, see the Government Printing Office Style Manual.

(2) Placement. Locate tables near the first text reference made to them, except in special situations such as when a report contains only a few text pages and many tables. In such cases, place the tables in numerical sequence in the back of the report. It is preferable that tables be placed so that they may be viewed without turning the page sideways. If a table has to be located sideways on a page, orient it so that the top of the table is at the left side of the page.

(3) Headings and Columns. Give repetitive unit of measure or degree in the column headings of tables. (Example %; \$; °F.) Do not repeat in the columns. When tables continue on two or more pages, note the continuation and repeat the table and column headings and rulings on each page.

(4) Numbering. Number tables to which reference is made in the text consecutively in Arabic numerals, preceded by the word "TABLE", for example, TABLE 1, TABLE 2, or TABLE 1-1, TABLE 1-2, TABLE 2-1, etc. Number tables within appendixes in a manner consistent with the Appendix letter, such as "TABLE A-1, TABLE B-2," etc.

(5) Captions. Give each table, except short ones which run in with the text, a descriptive caption following the table number. Place caption above the table.

i. Equations.

(1) General. Prepare mathematical matter with extreme care. Use machine or transfer-type composition when available. Identify symbols after first use to aid in reading from microform or in a separate list. Make opening and closing parentheses, brackets, and braces the same height as the tallest expression they enclose. Separate numerator from the denominator with a line as long as the longer of the two. Center both numerator and denominator on the line.

(2) Placement. Indent or center a displayed equation in the line immediately following the first text reference made to it. Break equations before an equal, plus, or multiplication sign. Align a group of separate but related equations by the equal signs and indent or center the group as a whole. Short equations not part of a series may be placed in the text rather than displayed.

(3) Numbering. Number equations which are part of a series or which are referred to in the text consecutively in Arabic numerals; for example, (1), (2), or (1-1), (1-2), (2-1), etc. Enclose each number in parentheses at the right margin on the last line of the equation numbers. Number equations within appendixes in a manner consistent with the appendix letter, such as (A-1), (B-2), etc.

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e. Page Size, Stock, and Ink. Reports shall be printed using paper approximately 8 by 10 1/2 inches or 8 1/2 by 11 inches in size. Use black ink on opaque white paper. Both sides of the sheet shall be used to the maximum extent practicable. Different colored paper in reports sections shall not be used.

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