Appendix 1 (γ)

DOT/FAA/DL-85/1

Associate Administrator for
Development and Logistics
Washington, D.C. 20591

# Handbook for Preparing and Printing FAA Formal Technical Reports



Program Engineering and Maintenance Service
Federal Aviation Administration
Washington, D.C. 20591

March 1985

Standard







U.S. Department of Transportation
**Federal Aviation Administration**

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| DOT/FAA/DL-85/1 | | |

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| | 11. Contract or Grant No. |
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| 12. Sponsoring Agency Name and Address<br>Associate Administrator for Development and Logistics<br>Federal Aviation Administration<br>Washington, D.C. 20591 | 14. Sponsoring Agency Code |
| 15. Supplementary Notes | |

16. Abstract

This document provides procedures for the preparation of Federal Aviation Administration (FAA) formal technical reports to ensure that results of programs are documented and printed in a uniform and cost-effective manner. This document contains procedures for mostly paper and microfiche copy. However, paragraph 8 contains new information on the submission of phonograph records and cassettes, computer program magnetic tape reports, computer floppy disks, and video tapes. The application of this standard aids in the interchange of technical information and in the reduction of costs in preparation, publication, and dissemination of such information. Reports are the principal means by which the FAA informs other Government departments/agencies and the aviation community of its performance of programs to meet the National Airspace System.

| 17. Key Words | 18. Distribution Statement |
|---|---|
| Formal Technical Reports FAA<br>Writing Contractor Reports<br>Preparing Technical Reports<br>Technical Reports Standard<br>Information Exchange | This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161. |

| 19. Security Classif. (of this report) | 20. Security Classif. (of this page) | 21. No. of Pages | 22. Price |
|---|---|---|---|
| Unclassified | Unclassified | 24 | |

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

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LIST OF FIGURES

1. PURPOSE. This document provides procedures for the preparation of Federal Aviation Administration (FAA) formal technical reports to ensure that results of programs are documented and printed in a uniform and cost-effective manner. This document contains procedures for mostly paper and microfiche copy. However, paragraph 8 contains new information on the submission of phonograph records and cassettes, computer program magnetic tape reports, computer floppy disks, and video tapes. The application of this standard aids in the interchange of technical information and in the reduction of costs in preparation, publication, and dissemination of such information. Reports are the principal means by which the FAA informs other Government departments/agencies and the aviation community of its performance of programs to meet the National Airspace System.

2. EXCLUDED DOCUMENTS. These standards do not apply to FAA operational instructions and directives, technical or training manuals, technical notes, staff studies, letter reports, journal article manuscripts, booklets, preprints or reprints, brochures, pamphlets, and administrative or fiscal reports.

3. REFERENCES.

a. American National Standards Institute (ANSI), Inc., document, Writing Abstracts, Z39.14-1979. Available from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

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

c. 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.

d. ANSI Document, Metric Practice, Joint Sponsors, The American Society for Testing and Materials. Available from the American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018. ANSI/IEEE 268-1982.

e. Department of Commerce, Units of Weights and Measures, National Bureau of Standards Miscellaneous Publication 286, SD Catalog No. C13.10.186. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

f. GPO Style Manual, U.S. Government Printing Office, Superintendent of Documents, Washington, D.C. 20402.

g. Graphic Standards for the U.S. Department of Transportation. DOT Order 1360.6, March 18, 1981, Washington, D.C. 20590.

h. FAA Order 1600.15D, Control and Protection of "For Official Use Only" Information, September 1972.

i. FAA Order 1600.2B, National Security Information.

j. DOT Order 1640.4C, Classification, Declassification, and Control of National Security Information, November 22, 1983.

k. DOD 5220.22M, Department of Defense Industrial Security Manual for Safeguarding Classified Information.

4. DEFINITIONS.

a. Sponsoring Organization. The organization of the FAA having program responsibility for technical effort.

b. Performing Organization. The FAA organization (either headquarters, centers, field, or laboratory); contractors; grantees; or recipients of FAA funds reporting technical research findings which result from investigations, demonstrations, tests, or experiments.

c. Formal Technical Report. A formal technical report encompasses the evaluated relevant facts on a study or phase of a study of a particular art, science, profession, trade, or any FAA-related activity and stands as a permanent official record. This document, placed in a numbered series by each sponsoring organization, is developed and prepared under a specific project, contract, or grant by FAA, industry, state, or university personnel. The prime purpose of a technical report is to disseminate the results of FAA activity to the aviation community and to foster the exchange of information. This report is forwarded to the National Technical Information Service (NTIS), Springfield, Va., where it is sold to the public in paper or microfiche copy.

(1) 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 aviation community. Interim reporting, for example, can be the communication medium for early reporting under a project of considerable duration or relative complexity.

(2) Final Report. A report issued at the completion of a project, or a major portion thereof, to signify the accomplishment and formal closeout of a project or the relevant portion.

5. REQUIREMENTS. The FAA-prepared and sponsored formal technical reports shall conform to the requirements herein.

6. LEGAL CONSIDERATIONS. The Government may incur liability for misuse of the intellectual property, i.e., patents, trademarks, copyrights, and trade secrets (as embodied in proprietary technical data and computer software) of others. To ensure that reports receive the widest possible dissemination, writers and editors should observe the following guidelines:

a. Copyright. Copyrighted material shall not be incorporated into a report unless written permission has been obtained from the copyright owner. Use of copyrighted material in one Government publication does not necessarily constitute permission to use the same material in any other Government publication. The copyright owner's permission must apply to each specific

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> **(Copyright owner) hereby grants to the United States Government, a nonexclusive, paid-up license throughout the world; (i) to reproduce in copies or phonorecords, to prepare derivative works, to distribute copies or phonorecords, to perform publicly or display publicly, to identify the work or the portion of it to be copied; and (ii) to authorize others to do so for government purposes.**

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When FAA contracts require that the contractor release copyrights to the Government as a part of the contract, the report shall contain a statement as follows:

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c. Unpublished Work. Unpublished work is protected under the Copyright Act of 1976 even though there is no copyright notice and shall be treated the same as other copyrighted material.

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 any purpose. Such proprietary information will be used only if it is essential to the understanding of a report and only after approval by the DOT Patent Counsel, C-15. Reports containing such proprietary information will bear the legend in paragraph 6e, below, and a statement restricting availability and handling (paragraphs 7c(10) and 7b(11)).

e. Data Use Restriction. If the contractor furnishes information or data which it considers to be proprietary under the terms of the contract, the contractor shall affix the following 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._____, are proprietary to (contractor's name). They may be duplicated and used by the Government with the express limitations that the data may not be disclosed outside the Government; or be used for purposes of manufacture, without prior written 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 all reproductions of these data in whole or in part.**

If the FAA contracting officer believes the marked data is not proprietary, he/she shall seek the advice of DOT Patent Counsel who will attempt to resolve the problem.

f. Trademarks. The term "trademark" includes any word, name, symbol, device or any combination thereof, adopted and used by manufacturers or merchants to identify their 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. Trademarks should be used only when it is impossible to identify the goods by a type designation or a structural feature that distinguishes them from other goods.

g. Trade Names and Manufacturers' Names.

(1) Avoid the appearance of endorsing or favoring a commercial product, commodity, or service. Trade names or 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 sponsoring organization before the report is approved. Such reports shall contain the following notice on the inside front cover:

**NOTICE**

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

h. Patents, Trademarks, Copyrights. All questions relating to intellectual property, i.e., patents, trademarks, copyrights, and trade secrets (as embodied in proprietary technical data and computer software) shall be referred to the DOT Patent Counsel, C-15.

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:

Outside Front Cover
Inside Front Cover (Disclaimer Notice)

Front Matter

Technical Report Documentation Page (DOT F 1700.7)
Preface, Table of Contents, List of Figures
List of Tables, List of Abbreviations, List of Symbols
Executive Summary

Body of Report

Introduction
Main Text
Conclusions
Recommendations
References
Bibliography, Footnotes
Glossary

Appended Material

Appendixes
Index

Inside Back Cover (use for Microfiche storage, maps, etc.)
Outside Back Cover

b. Outside Front Cover.

(1) Description. Include on the cover, information shown in groupings plus special markings such as security classification as specified by the sponsoring organization. When a one-line backstrip (spine lettering identical with report title) is requested for a wraparound cover, at least 120 pages of text and illustrations are required. Backstrips should run from top to bottom on reports. Figure 1A illustrates a typical front cover containing a subtitle; figure 1B is a sample report cover prepared for the Office of Aviation Medicine; figure 1C shows a sample report cover for a report prepared by contractor for joint DOT sponsors.

(2) Report Number. Each report shall carry a unique alphanumeric designation assigned by the sponsoring organization. In its most elementary form, the designation shall consist of five groups. The first and second groups of letters will be DOT/FAA; the third will designate the appropriate FAA or other government organization; the fourth group will designate the calendar year, and the fifth group, the report number sequentially assigned. (see following examples.)

DOT/FAA/PM-84/69

Program Engineering &
Maintenance Service
Washington, D.C. 20591

# Scanning Strategies for Next Generation Weather Radars

## A Study Based on Lifetimes of Convective Atmospheric Phenomena Hazardous to Aviation

P.R. Mahapatra and D.S. Zrnic'

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Severe Storms Laboratory
Norman, OK 73069

April 1984

Revision 1, Supersedes
Report No. DOT/FAA/PM-82/40

Final Report

This document is available to the public
through the National Technical Information
Service, Springfield, Virginia 22161.

U.S. Department of Transportation
**Federal Aviation Administration**

FIGURE 1A. SAMPLE REPORT COVER CONTAINING SUBTITLE

DOT/FAA/AM-84/5

Office of Aviation Medicine
Washington, D.C. 20591

# Characteristics of Medically Disqualified Airline Pilots

Shirley J. Dark

Civil Aeromedical Institute
Federal Aviation Administration
Oklahoma City, OK 73125

April 1984

Final Report

This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.

U.S. Department of Transportation
**Federal Aviation Administration**

FIGURE 1B. SAMPLE REPORT COVER PREPARED BY THE OFFICE OF AVIATION MEDICINE

DOT/FAA/CT-84/85

FAA Technical Center
Atlantic City Airport,
N.J. 08405

# Application of Thermochemical Modeling to Aircraft Interior Polymeric Materials

Won Dokko
Kumar Ramohalli

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, CA 91109

April 1984

Final Report



U.S. Department of Transportation
Federal Aviation Administration

NASA
National Aeronautics
and Space Administration

FIGURE 1C. SAMPLE REPORT COVER, CONTRACTOR-PREPARED FOR NASA, DOT, AND FAA TECHNICAL CENTER

Report Number:

| 1st Group | | 2nd Group | | 3rd Group | | 4th Group | | 5th Group |
|---|---|---|---|---|---|---|---|---|
| DOT | / | FAA | / | PM | - | 85 | / | 14 |
| DOT | / | FAA | / | CT | - | 85 | / | 101 |
| DOT | / | FAA | / | AM | - | 85 | / | 4 |
| DOT | / | FAA | / | ES | - | 85 | / | 20, II |
| DOT | / | FAA | / | AP | - | 85 | / | 3 |
| DOT | / | FAA | / | EE | - | 85 | / | 2 |

NOTE: When a report consists of two or more volumes, each volume will have the same basic report number with a Roman numeral added, such as DOT/FAA/PM-85/14, I and DOT/FAA/PM-85/14, II.

(3) Sponsoring Organization and Address. Give name, city, state, and zip code of the sponsoring organization.

(4) Title and Subtitle. Use words for the title which indicate clearly and briefly the substance of the report. When combining words for an acronym, spell out combination completely and place acronym in parentheses following words. 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.

(5) Author(s). The Government Printing and Binding Regulations permit the use of the author's name on covers. The author's name shall be subordinated in appropriately smaller type than the subtitle. Give the name(s) of the author(s) in conventional order (for example, John R. Doe, or if author prefers, J. Robert Doe). Author's name on report should be based on professional contribution. Supervision of work or revision of material is not sufficient qualification for authorship.

(6) Performing Organization and Address. Give name, city, state, and zip code. List no more than two levels of an organizational hierarchy.

(7) DOT/FAA Seal Block. Place the DOT/FAA seal block on all reports as shown in figures 1A and 1B. Dual sponsorship may be recognized by inclusion of appropriate seal and identifying information.

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

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

(10) Protection for Uncontrolled Release. Those reports which contain information that officials have determined should be protected against uncontrolled disclosure will be identified and protected as described in documents listed under Paragraph 3, References. Sponsoring organizations shall consult with the Office of Civil Aviation Security (ACS-100) to determine the classification of reports that require protection against unauthorized disclosure in the interest of national security. The ACS also is the authority to prolong classification, if necessary, or declassify information when the need for continued classification no longer exists.

(11) Distribution Statement. Each FAA sponsoring organization shall assign a distribution statement, which is placed on the cover and in Block 18 of the Technical Report Documentation Page. Use one of the following statements as appropriate:

(a) This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.

(b) Approved for U.S. Government use 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 responsible organization).

(c) Approved for Federal Aviation Administration use only. This document is exempted from public availability because (fill in reason). Disclosure of this document outside the Federal Aviation Administration, U.S. Department of Transportation, must have prior approval of the (fill in responsible organization).

c. Inside Front Cover.

(1) General. Special notices, such as reproduction, safety precautions, sponsor's disclaimer, and statement of compliance with special regulations are placed on the inside cover as required by the sponsoring organization.

(2) Disclaimer. Place the following notice on the inside cover of all FAA reports:

NOTICE

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

NOTE: When a report is sponsored by both the FAA and another organization, the disclaimer notice should be amended to effect this sponsorship.

d. Front Matter. The front matter contains preliminary pages prior to the main text of the report.

(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. A model completed page is shown in Figure 2A with instructions for completing the documentation page for the author's use in figure 2B. Adequate and accurate completion of this page is essential to assist documentation of a report by libraries. The documentation page also may be distributed in lieu of copies of the published report. Blank forms are available from the DOT Subsequent Distribution Section, M-494.3. For contractors and grantees, the documentation page is available from the Contracting Officer.

(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. Limit acknowledgments to personnel and organizations associated with the program.

(3) Table of Contents. In the table of contents 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.

(4) List of Figures. Furnish a list of figures. List figure number, legend, and page number of each illustration. Abbreviate lengthy legends.

(5) List of Tables. Furnish a list of tables. List table number, caption, and page number of each table. Abbreviate lengthy captions.

(6) List of Abbreviations and Symbols. For less common or specialized terms, define abbreviations and symbols where first introduced in the text. When abbreviations and symbols are numerous, furnish a separate list with definitions. If a list is used, include source organization symbols, e.g., IEEE, ANSI, etc.

(7) Executive Summary. The executive summary is a concise presentation of the key elements of the report with particular emphasis on those elements which are important to managers and decisionmakers.

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. Whenever practical, and without loss of relevant detail, limit report to a total of 96 printed pages.

(2) Introduction. The introduction should orient and prepare the reader to understand the information in the report. The introduction should define the problem, tell the objectives of the investigation, and give historical background in the area of investigation, important dates, period covered, difficulties encountered, etc.

**Technical Report Documentation Page**

| 1. Report No. | 2. Government Accession No. | 3. Recipient's Catalog No. |
|---|---|---|
| DOT/FAA/PM-83/32 | | |

| 4. Title and Subtitle | 5. Report Date |
|---|---|
| CONUS LORAN-C ERROR BUDGET: FLIGHT TEST | December 1983 |
| | 6. Performing Organization Code |
| | 8. Performing Organization Report No. |
| 7. Author(s) L.D. King, K.J. Venezia and E.D. McConkey | |
| 9. Performing Organization Name and Address<br>Systems Control Technology, Inc.<br>2326 S. Congress Ave., Suite 2A<br>West Palm Beach, Florida 33406 | 10. Work Unit No. (TRAIS) DTFA01-83-C-20041<br>11. Contract or Grant No. |
| 12. Sponsoring Agency Name and Address<br>U.S. Department of Transportation<br>Federal Aviation Administration<br>800 Independence Avenue, S.W.<br>Washington, D.C. 20591 | 13. Type of Report and Period Covered<br>FINAL REPORT<br>14. Sponsoring Agency Code<br>APM-420 |

15. Supplementary Notes

16. Abstract

This report contains the description and results of a Loran-C flight test program conducted in the continental United States (CONUS). The data collection period was during July 1983. The purpose of the program was to collect Loran-C signal coverage and accuracy data representative of low altitude, low speed operations typical of helicopters and general aviation aircraft.

The test aircraft used was a Beechcraft Queen Air, Model 65. The aircraft was configured with a data collection pallet and multipin electrical connectors located in the aircraft cabin. A Teledyne TDL-711 navigation receiver was used in the test, utilizing an E-field antenna mounted on the top of the fuselage. A microprocessor controlled data collection system, utilizing a scanning DME and other aircraft navigation instruments, was used to record data and establish aircraft reference position.

Route segments, totaling over 9500 nm covering much of CONUS, were flown during the project. Data were recorded on all route segments. Over 12,000 data points were used in the accuracy analysis. Calibration procedures, used at five locations, reduced errors throughout an area within a 75 nm radius of the calibration point.

| 17. Key Words | 18. Distribution Statement |
|---|---|
| Navigation<br>Flight Test<br>Loran-C | Document is available to the public through the National Technical Information Service, Springfield, Virginia 22161. |

| 19. Security Classif. (of this report) | 20. Security Classif. (of this page) | 21. No. of Pages | 22. Price |
|---|---|---|---|
| Unclassified | Unclassified | 95 | |

Form DOT F 1700.7 FIGURE 2A. SAMPLE COMPLETED TECHNICAL REPORT DOCUMENTATION PAGE

# INSTRUCTIONS FOR COMPLETING TECHNICAL REPORT DOCUMENTATION PAGE

General Instructions: 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. Leave items 2, 3, 6, and 22 blank. Complete the remaining items as follows:

Item 8. Performing Organization Report No.
Insert if performing organization wishes to assign this number.

Item 10. Work Unit No.
Use the number code from the applicable research and technology resume which uniquely identifies the work unit.

Item 11. Contract or Grant No.
Insert the number of the contract or grant under which the report was prepared.

Item 14. Sponsoring Agency Code.
Insert symbol of FAA sponsoring organization.

Item 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.

Item 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.

Item 17. Key Words.
Select specific and precise terms of short phrases that identify the principal subjects covered in the report.

Item 19. Security Classification (of report).
Reports carrying a security classification will require additional markings giving security and downgrading information as specified by the sponsoring element.

Item 20. Security Classification (of this page).
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.

Item 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

(3) Results and Discussion. To understand the results of the investigation, the reader must understand what was accomplished. Describe the nature of the investigation early in the report. Do not let the significant information, the results and the conclusions to which they lead, get buried in a mass of details. Description of procedures should be no more detailed than is necessary to convey the message. The discussion portion of the report analyzes, interprets, and discusses the results, with emphasis on cause effect and/or implication. It points out any qualifications or limitations, and reveals suspected sources or error. It recognizes unexpected results and tries to account for them. The discussion also evaluates the results and investigates their significance. In this process it will, in all probability, arrive at conclusions, decisions, and judgments based on the evidence presented in the report.

(4) Conclusions. Most reports aim to bring the reader to certain conclusions (figure 3); therefore, the material in any report should be presented in an order that leads logically toward conclusions. Conclusions that stem from the discussion should always be stated in their places-at points where the discussion has led up to them. They then are gathered and restated in a separate part labeled conclusions. Sometimes statements of fact, as well as decisions and judgments, appear under the heading conclusions.

(5) Recommendations. Performing organizations shall include recommendations in advance (draft) reports, when appropriate. However, when the sponsoring organization deems that regulatory issues or administrative policies are involved in the report, it shall notify the performing organization, by letter of transmittal approving the advance report, to delete the recommendations. When recommendations are short, they may be placed on the same page with the conclusions (figure 3).

(6) References, Bibliography, and Footnotes. Include complete identificaton of references as footnotes on bottom of page where first cited to aid in reading from microform. The reference or footnote is noted in the text by a number set sightly superior to the line of type (example [1]). When references and footnotes are numerous, they should be included in a list in the back of the report. Entries should be presented in a uniform style, with complete identifying data, in accepted bibliographic form. Each entry should include authors, title sources, identifying numbers, pagination and dates. Abbreviations are not recommended and should be used sparingly.

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

(f) Appended Material.

(1) Appendixes. Include appendixes only when essential. Unnecessary appendixes add to printing and storage costs and increase paper consumption. Do not use a separate page to announce an appendix; rather, the appendix identification should appear on 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 text of the report. Designate them appendix A, appendix B, etc. When many pages of computer data must be included in the appendixes, produce microfiche in lieu of paper copy to reduce printing costs and conserve paper. Place microfiche in envelope attached to inside back cover.

## CONCLUSIONS

1. Fiber optics technology can be used to remote all airport surveillance radar (ASR) and beacon video, control azimuth, and audio signals required.

2. The required fiber optic hardware can be obtained off-the-shelf.

3. All control, azimuth, and audio signals can be multiplexed on one video grade channel.

4. Video and trigger signals should be multiplexed onto one video channel.

5. The Federal Aviation Administration (FAA) Technical Center can build all interface and control multiplexing hardware required.

6. The recommended test bed will cost approximately $130,000.00.

7. All of the system tests, including reliability testing, can be completed and a report prepared in 18 months after system acceptance by the Technical Center.

## RECOMMENDATIONS

1. Both multiplexed and nonmultiplexed video systems should be installed at the Technical Center so that a comparison of the two systems can be obtained.

2. A repeater should be implemented by echoing signals back to the radar site using the control link hardware.

3. All hardware should be purchased off-the-shelf, preferably from a single manufacturer as a turn key operation, with the exception of the low frequency and control/readback multiplexers which should be built by the Technical Center.

4. The hardware described should be installed at the Technical Center and all system tests described should be performed.

FIGURE 3. SAMPLE CONCLUSIONS AND RECOMMENDATIONS PAGE

(2) Index. If an index is included for a lengthy report consider a simple one-page list and 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 pnotographs 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 clean line art and original glossy photographs (or other types of tone art) rather than screened (halftone) reproductions. Indicate placement in report and code reverse side of photographs. Each illustration should contain a descriptive legend preceded by the figure number.

(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 pages sideways. If an illustration has to be placed sideways on a page, orient it so that the top of the illustraton is at the left side of the page. If illustrations can be reduced and be readable, place more than one on a page or combined with text.

(3) Callouts (Labels). 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 or headliner type size. Strive for high contrast and readabilty.

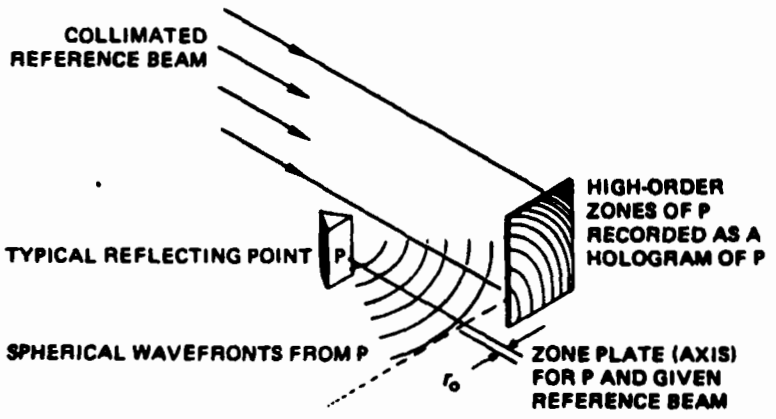


FIGURE 4. SAMPLE PLACEMENT OF CALLOUTS (LABELS)

(4) Color. Because color in reports is expensive, color must not be used unless it is meaningful and 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 (figures 5 and 6). Refer to Government Printing and Binding Regulations for general provisions concerning color printing.

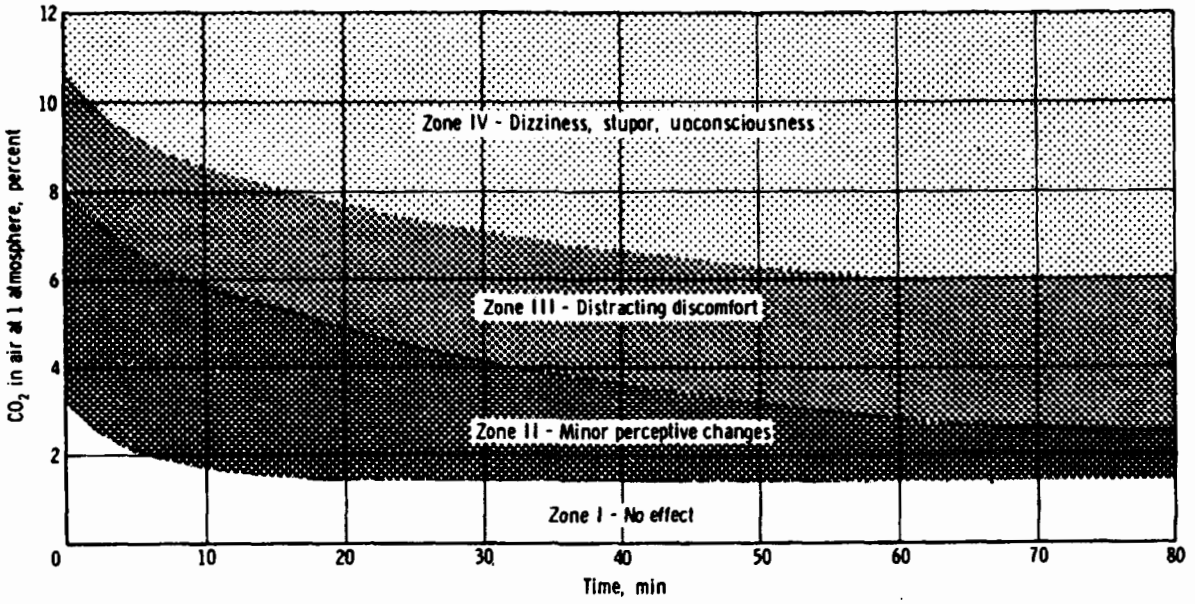


FIGURE 5. SAMPLE SCREENING USED AS SUBSTITUTES FOR COLOR

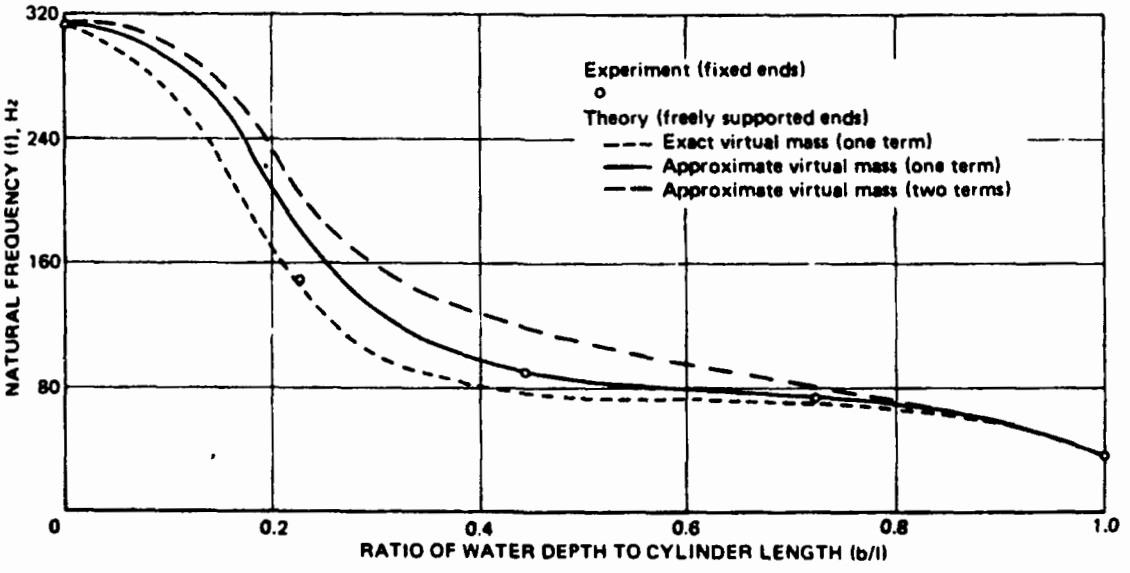


FIGURE 6. SAMPLE CODING
USED AS SUBSTITUTES FOR COLOR

(5) Fold-Ins . Wherever possible, avoid the use of oversize illustrations that must be folded. Often large illustrations can be planned for facing pages or optically reduced to fit this format. Where oversize illustrations cannot be reduced without sacrificing legibility, use facing pages where feasible.

(a) Fold-ins shall, so far as possible, be oriented and sized so as to require folding in one direction only (folds parallel to binding).

(b) All fold-in items may be gathered following the references to them, or at the end of each volume and assigned figures or table numbers in sequence according to their location in the volume. Each fold-in with a blank reverse page, shall be assigned two consecutive numbers in the main page sequence, with the first to be odd, e.g., 151/152.

(c) Each page shall be folded so that page numbers and caption shall be immediately visible to the reader, without its being necessary for the reader to unfold the page.

(d) When necessary for readability, fold-ins may be printed with a blank apron to the left, so that with the book closed the entire unfolded printed surface can be read.

(e) Where fold-ins are numerous and cannot be split, consideration should be given to folding and inserting these into an envelope pasted to inside back cover.

(6) Numbering. Number each illustration to which reference is made in the text. Illustrations without text reference are undesirable and should be used only in exceptionally rare cases. An example would be a simple sketch comprising part of an elaborate table. Number all illustrations in a volume (in body of report only) consecutively with numerals in a single series starting with 1, preceded by the word FIGURE. In any report, this usage must be consistent. Where an illustration covers several pages, repeat the caption, including figure number on each page (example: sheet 1 of 3, 2 of 3, etc.). Number illustrations within appendixes in a manner consistent with the appendix letter, such as figure A-1, B-2, etc. Figure captions appear under the illustrations.

h. Formulas and Equations.

(1) General. Prepare mathematical matter with extreme care. Use machine or transfer-type composition when available. Identify symbols after first use or in a separate list to aid in reading from microform. Make opening and closing parentheses, brackets, and braces the same height as the tallest expression they enclose. Separate numerator from 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 groups as a whole. Short equations, not part of a series, may be placed in the text rather than displayed separately.

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

i. 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-pitch 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 7. Table captions appear above the table.

TABLE 1.–SHORT-TIME XXXXXXXXXXXXXXXXXXXXXX ← *Caption*

*Boxhead*

| Temperature, K | Specimen type (a) | Ultimate tensile strength, $N/m^2$ | Elongation between buttonheads, cm | Reduction of area, percent |
|---|---|---|---|---|
| *Footnote reference* | | Tungsten | | |
| 1700 | 1 | $2200 \times 10^3$ | 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 7. 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 applicable unit of measure or degree in the column headings of tables (for 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 and Captioning. Number each table to which reference is made in the text. Short tables (i.e., those comprising six lines or less including headings, and three columns or less) may be included without being assigned numbers and captions, provided they clearly refer to and are integrated into the surrounding text and when consecutive, are separated from each other by at least one line of text. Other requirements for numbering and captioning are similar to those for illustrations.

(5) Abbreviations and Symbols. To the extent possible, use abbreviations and symbols for the text, illustrations and tables from Order 1000.15A, FAA Glossary; Order 7340.1H, Contractions; and the American National Standards Institute, Inc., (ANSI) standards listed below. FAA personnel may obtain FAA documents in their offices and ANSI documents on loan from the following libraries: the DOT Library Services Division, M-493.2; Aeronautical Center Library; FAA Technical Center Library; and libraries located in the regions. Contractors and grantees may obtain the FAA documents through the FAA contracting officer and the ANSI documents by writing ANSI, 1430 Broadway New York, N.Y. 10018.

American National Standards Institute, Inc. Standards

| Number | Title |
|---|---|
| Y32.9-1976 | Electrical and Electronic Graphic Symbols and Reference Designations |
| Y10.5-1968 | Quantities Used in Electrical Science and Electrical Engineering, Letter Symbols for |
| Y10.7-1954 | Aeronautical Sciences, Letter Symbols for |
| Y10.8-1962 | Structural Analysis, Letter Symbols for |
| Y10.10-1953 | Meteorology, Letter Symbols for |
| Y10.11-1953 (R1959) | Acoustics, Letter Symbols for |
| Y10.12-1955 | Chemical Engineering, Letter Symbols for |
| Y10.17-1961 (R1973) | Selecting Greek Letters Used as Letter Symbols for Engineering Mathematics, Guide for |
| RD16-1980 | Illuminating Engineering Nomenclature and Definition for |

j. Distribution List. Do not include a distribution list.

8. PRODUCTION.

a. Composition.

(1) Size of Type. Use standard 10 and 12-pitch type size for the text of the report:

This is 10-pitch type.

This is 12-pitch type.

(2) Final Camera-Ready Copy. For maximum page coverage, do not use block paragraphs. Rather, return all succeeding lines to the left margin as typed here. Give consideration to typing on oversize paper (10 1/2" X 14") for a two-column format. This format allows a 25 percent photographic reduction and reduces printing costs and conserves paper. Unless a report is classified, do not use: "This page left blank intentionally." This increases the number of pages to be printed and increases the cost and time required to make pages ready for printing, i.e., sizing pages, making plates or negatives, etc. Note blank pages to the printing specialist by circle folio, or number pages, for example /8, to instruct the printer and reader that page 8 is blank. Do not include two and three line pages, noting "Chapter and Title" only or "Appendix and Title." Place this information at top of page containing the start of text. For information on the use of numbers in text, refer to the GPO Style Manual.

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

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

(5) Line Spacing. For final camera ready copy, use single spacing for reports prepared by typewriter or word processing equipment for reproduction except when extra spacing between lines is necessary to assure clarity of run-in equations, symbols, etc. This permits less pages in reports to reduce manpower and material costs in printing and distribution. For those reports under 96 pages, microfiche copy is reduced to one film sheet.

(6) Margins. Use margin of approximately 1" on all sides of text pages of standard 8 1/2" X 11" paper. Oversize paper (10 1/2" X 14") will be reduced to required margins.

(7) Metric Units. Include both the International System of Units and the customary system of units within the text, and on graphic charts and photographs, as necessary. For example, 36 inches (91 centimeters) or 36" (91 cm). Do not use a period with metric unit names and symbols except at the end of the sentence.

(a) The spelling of "meter" and "liter" is preferred over "metre" or "litre."

(b) The use of nautical miles and knots will continue subject to future review.

(8) Page Numbering. Number all pages in the report consecutively at bottom center in one of two sequences. The first uses lower-case Roman numerals (i, ii, etc.) for the front matter. The Technical Report Documentation Page, Form DOT F 1700.7, is page i. The other front matter items follow on numbered pages as listed in section 7a. The second, for the body of the report, uses numbers starting with 1 (always a right-hand page), and the others follow in a single sequence. Where the reverse side of an odd numbered page is blank, number the odd page, 7/8, for example, to instruct the reader that page 8 is blank. In special cases, number by sections, chapters (1-1, 1-2, 2-1, 3-1, etc; appendixes are numbered A-1, A-2, B-1, B-2, etc.).

b. Limitation. Contractors shall furnish a single-spaced typed reproducible copy on one side only of the final approval report within the time specified in the contract. Only clean tone or line art and original typed text shall be submitted. Contractors shall not become prime sources of printing for agencies unless so authorized by the Joint Committee on Printing. Refer to the Government Printing and Binding Regulations. Both duplicating and printing must conform to these regulations. Printing in excess of that allowed by the Joint Committee on Printing shall not be a preplanned contractual requirement.

c. Workmanship. Reports published under this document are micro-reproduced. Filled-in or broken letters, illegible text or illustrations (including lettering), or similar imperfections are not acceptable. The use of copy machine copies, blueprints, and diazo prints is not acceptable since they do not reproduce well when photographed for printing.

d. Cover Size, Stock, and Ink. Report covers shall be cut to page size. They may be of 8 1/2" x 11" vellum or card stock. Use black ink on covers. Covers with windows or plastic covers shall not be used.

e. Page Size, Stock, and Ink. Reports shall be printed on 8 1/2" x 11" paper using black ink only. Both sides of the sheet shall be used for printing to the maximum extent practicable. Different color paper separations and tab dividers shall not be used.

f. Binding. Side-stitching, saddle-stitching, or glue-back binding shall be used.

g. Decorative Features and Advertising. Decorative features, cartoons, and advertising display shall not be placed on pages.

h. Microfiche Copies. To reduce excessive paper consumption, the FAA produces and distributes microfiche copies in place of paper copies in areas where the use of the system is effective. The sponsoring organization makes the determination of whether to produce the report by microfiche. The use of microfiche copies has shown that manpower and material costs are substantially reduced in printing, distribution, and storage of reports, and offers additional benefits of speed, ease of handling, and increased convenience to the user. Reports are available in microfiche copies from the NTIS and the Defense Technical Information Center.

i. Phonograph Records and Cassettes. Phonograph records and cassettes are audio devices used to achieve specific communications objectives and can be bound into reports. Inclusion of phonograph records or cassettes in reports must be approved by the sponsoring organization.

j. Computer Program Magnetic Tape Reports. Computer magnetic tape reports shall not be provided unless directed in the contract or grant or approved by the sponsoring organization. In preparing computer magnetic tape reports, the performing organization shall provide the sponsoring organization with one copy, unless otherwise directed in the contract or agreement. When a tape is to be made available to the public through the NTIS, the sponsoring organization shall forward the original tape with its documentation (Form NTIS-231) through the DOT Library Services Division, M-493.2, 800 Independence Avenue, S.W. Washington, D.C. 20591. This form covers number of reels, tracks, density, character code, and special features.

k. Computer Floppy Disks. Computer floppy disks, containing the technical report, shall not be provided unless directed in the contract or grant or approved by the sponsoring organization. When approval is given and mutually satisfactory formats are available, one copy of such disks shall be in print format rather than machine internal format. The orginating organization shall maintain the original data base for at least 4 months.

l. Video Tapes. Video tapes of technical reports shall not be produced unless directed in the contract or grant or approved by the sponsoring organization. When approval is given and mutually satisfactory formats are available (VHS or Beta), copies shall be submitted as requested by the sponsor. The originating organization shall coordinate recording and playback speeds and the number of hours of play. If video tapes are to be shipped, ensure that high-protective envelopes are used with proper labels applied.