COMPUTERIZED DOCUMENT PREPARATION

OPERATIONS ANALYSIS DEPARTMENT

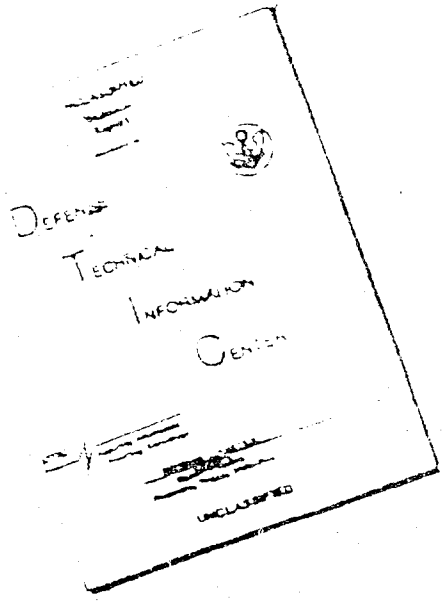
NAVY FLEET MATERIAL SUPPORT OFFICE

Mechanicsburg, Pennsylvania 17055

Report 81

94

DISCLAIMER NOTICE



THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

Security Classification

DOCUMENT CONTROL DATA - R & D

Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified

1. ORIGINATING ACTIVITY (Corporate author) Navy Fleet Material Support Office Operations Analysis Department (97) Mechanicsburg, Pa. 17055	2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP

3. REPORT TITLE

COMPUTERIZED DOCUMENT PREPARATION

4. DESCRIPTIVE NOTES (*Type of report and inclusive dates*)

5. AUTHOR(S) (*First name, middle initial, last name*)

L. HUMMEL
R. NEWMASTER
E. SULLIVAN

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
30 June 1972	22	2

8a. CONTRACT OR GRANT NO b. PROJECT NO 972340 c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) Report 81 9b. OTHER REPORT NO(S) (*Any other numbers that may be assigned this report*)

10. DISTRIBUTION STATEMENT

Distribution of this document is unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY

13. ABSTRACT

The manual preparation of narrative technical documents requires an expenditure of considerable time in the review of massive areas of text wherein no changes have occurred other than retyping and reformatting. The advent of computer technology has made it possible to develop computer assisted document preparation systems which eliminate the need for retyping of those areas of a document which have not undergone change and which automatically effect any required reformatting of such areas. Consequently, when an automated text editing system is utilized, the time and money spent in the preparation of many types of documents is greatly reduced. This report describes one such automated text editing system, the CSMS (Computerized Specification Management System), as developed by NELC (Naval Electronics Laboratory Center), San Diego, California.

DD FORM 1 NOV 65 1473 (PAGE 1)

S 0101-807-6801

Unclassified
Security Classification

COMPUTERIZED DOCUMENT PREPARATION

REPORT 81

PROJECT 972340

Submitted by:

L. HUMMEL
Mathematician

R. NEWMASTER
Mathematician

E. F. SULLIVAN
LCDR, SC, USN

Approved by:

L. BROWN, CDR, SC, USN
Director
Operations Analysis Dept

N. D. CHETLIN, CAPT, SC, USN
Commanding Officer
Navy Fleet Material
Support Office JUN 30 1972

II

ABSTRACT

The manual preparation of narrative technical documents requires an expenditure of considerable time in the review of massive areas of text wherein no changes have occurred other than retyping and reformatting. The advent of computer technology has made it possible to develop computer assisted document preparation systems which eliminate the need for retyping of those areas of a document which have not undergone change and which automatically effect any required reformatting of such areas. Consequently, when an automated text editing system is utilized, the time and money spent in the preparation of many types of documents is greatly reduced. This report describes one such automated text editing system, the CSMS (Computerized Specification Management System), as developed by NELC (Naval Electronics Laboratory Center), San Diego, California.

TABLE OF CONTENTS

I. INTRODUCTION

The preparation of complex technical documentation places a heavy burden on the editorial and secretarial personnel involved. This is especially true when the documentation is of an evolutionary nature requiring a number of revisions and review cycles prior to final approval. This is certainly not a new problem. However, the proliferation of technical literature associated with the information explosion occurring in all technical disciplines has made the problem one of increasing concern in recent years. At the same time, the development of high speed electronic computers has presented the possibility that much of the human effort involved in document preparation can eventually be assumed by the computer. A number of groups have developed computerized document preparation systems and research and development continue at an accelerated pace.

The NELC (Naval Electronics Laboratory Center), San Diego, California, has had such a computer based text editing system in operation since 1964. The system is called the CSMS (Computerized Specification Management System), deriving its name from the fact that it was originally developed to assist in the preparation of procurement specifications for electronic equipments and systems. Since its original development, however, it has been improved and generalized so that it is now suitable for the preparation of additional types of documents. Although the system can be used for the preparation of any document, it is of most value if the nature of the document

is such that frequent revision, editing and updating are required.

The system uses a digital computer to build, format, and print textual and tabular information. The resultant document, along with the necessary CSMS control information, is maintained on magnetic tape in computer accessible form. Output from the system is developed on the computer system's on-line high speed printer.

The author of a document to be processed by CSMS prepares the original rough draft in the usual way. He proofreads the intermediate rough drafts produced by CSMS and checks and approves the final smooth copy output just as he would if the document were being prepared by a completely manual process. However, the amount of proofreading required of the author is greatly reduced since the intermediate rough drafts generated by the CSMS system include only those document areas which have been revised during the current CSMS cycle. As a result, once a particular section of a document is proofread and determined to be correct, no additional proofreading of that area is required. Using a manual method of document preparation, it would be necessary to proofread the entire document each update cycle.

The typist who generates the actual CSMS input must become familiar with the commands necessary to properly use the CSMS system.* After mastering these rules the task becomes one of typing changes and revisions only. The typist will never have to retype a correct page or paragraph, regardless of the number of insertions or deletions to be

*Reference (1) provides a detailed description of the CSMS command repertoire.

made elsewhere in the document. The system maintains those areas of the document which are currently correct and provides for all the renumbering and reorganizing that may be required.

Because CSMS obviates unnecessary proofreading and retyping of previously correct areas of a document, substantial reductions in both cost and required manhours can be achieved through the utilization of CSMS. Reference (2) gives the results of a cost analysis of the use of CSMS in the preparation of procurement specification documents at NELC. These documents typically undergo frequent review and revision cycles prior to final document acceptance. The cost analysis shows that a reduction in cost of approximately 65 percent has been realized at NELC for this type of document.

In 1970, NAVSUP (Naval Supply Systems Command) became aware of the CSMS capability and the possible benefits to be derived from its application to other document preparation tasks throughout the Navy. As a result, NAVSUP purchased the CSMS programs from NELC and assigned FMSO the task of developing a proficiency in the use of the system which could lead to future applications. Continuous coordination between FMSO and NELC is maintained so that additions to the CSMS capability which are developed by NELC are incorporated into the basic version. FMSO will maintain central management of the system and will assist activities desiring to implement the system on a reimbursable basis. Requests for information/assistance should be directed to NPPS (Navy Publications and Printing Service), Washington, D.C. NPPS has overall responsibility for the Automated Publications

Management System of which CSMS is a part.

II. SYSTEM DESCRIPTION

A. OPERATIONAL REQUIREMENTS.

The CSMS program package comprises 13 computer programs. The programs were originally written in COBOL F, but have been converted to ANSI COBOL. However, frequent use of IBM extensions to ANSI COBOL effectively limits the programs to operation on IBM 360 series computers. Facilities requirements further restrict the program package to operation on an IBM 360/50 configuration or larger. All programs operate in a batch mode only, with a maximum core requirement of 100K bytes.

A particular application of the CSMS system can be classified into one of six possible functional categories. Associated with each of these six functions is a unique selection and combination of individual programs from the 13 program package. In order to facilitate the scheduling and control of CSMS applications, job control language packages have been developed for each of the six CSMS functions. These catalogued procedures invoke the required CSMS programs for a particular application and direct the operating system to make the necessary system facilities allocations. The use of these catalogued procedures allows the CSMS user to utilize the system with only a minimum effort on his part and without a need for a complete understanding of the complex computer operations required by the system.

Input to the system is prepared by electric typewriter. The original document is typed along with the required CSMS commands. Concurrent

with the typing of the document, a punched paper tape or magnetic tape cartridge is generated. Transfer of the information from the paper tape or tape cartridge to standard computer tape is then performed. The resulting tape is ready for processing by the CSMS system. An alternative method of preparing CSMS input has been developed for applications in which CSMS is to be used to update or modify already existing documents. In this type of application, the original document is scanned by an OCR (Optical Character Reader), and a magnetic tape is generated. A preliminary program then inserts the required CSMS commands prior to CSMS processing.

CSMS output is developed on the high speed printer attached to the computer being utilized. Either rough draft or final smooth copy output can be requested by the CSMS user. Rough draft output is printed on ordinary computer paper and is double spaced to provide room for editorial instructions to the typist. Final smooth copy output is printed on special unlined paper which can then be used as a reproduction proof for the publication of the document. Various error and exception listings are also generated by the CSMS system for use by the typist.

A print chain providing upper case and lower case characters is required by the CSMS system. Characters or type sizes which are not available on either the input typewriter or the computer print chain cannot be used by the CSMS user. Because of this restriction, areas of a document requiring special fonts or type sizes cannot be processed by the CSMS system.

B. SYSTEM CAPABILITIES.

Words, sentences and paragraphs can be inserted or deleted. The system automatically adjusts lines and renumbers pages and/or paragraphs to accommodate such changes.

Page headings, page numbers, titles and section headings are automatically inserted and maintained on all pages of the document.

Blank pages and blank lines can be automatically generated for the later insertion of illustrations and diagrams.

Right-hand margins are automatically justified, giving the finished product a quality appearance.

A printout of all areas undergoing change during a particular update cycle is automatically provided by CSMS. On request, an outline of selected sections or of an entire document can be produced.

Selected words or phrases can be automatically located, deleted or replaced by a new word or phrase in selected areas or throughout a document.

Sections of a document can be transferred en masse to a different document or for the purpose of creating a new document.

A vocabulary listing is generated which comprises all new words used during the current processing cycle. Locations of occurrence are furnished for words occurring only once or twice. This feature facilitates the location and correction of spelling errors.

Various exception listings are produced which indicate typing errors and invalid CSMS commands.

Selected areas of a document can be transferred within a document or to a different document with concurrent update of the transferred area.

C. OPERATIONAL FUNCTIONS.

The CSMS system provides six general operational capabilities. Any type of CSMS application will be encompassed by one of these six capabilities.

1. File Initiation or Update

This procedure is used to create the first draft of a document or to make insertions or deletions to documents which have been previously processed by CSMS. Words, paragraphs or entire sections can be inserted or deleted. A rough draft printout of all areas of the document which have been modified is automatically generated. On request, a final smooth copy can also be generated by this procedure.

2. Selective Transfer

This procedure is used to transfer selected data from one document to another document or to a different area of the same document. Corrections to the data can also be made during the transfer process. The selected areas can be renumbered as required or transferred with the original numbering. A vocabulary listing and an updated version of the document are automatically generated.

3. Search and Replace

The Search and Replace procedure allows the user to perform a search of an existing document for specified words or phrases to determine the location of each occurrence of the word or phrase. The search can encompass the entire document or can be confined to selected areas of the document. The procedure can also be used to replace the located word or phrase by a designated replacement word or phrase. This feature allows the CSMS user to replace superseded terms in a technical document without having to manually search the document for the specific occurrences of the superseded term. An updated version of the document is generated whenever the replace option of this procedure is used.

4. File Update, Selective Transfer and Search and Replace

This procedure provides the most comprehensive capability available to the CSMS user. Insertion and deletion of data can be combined with selective transfer of data and search and replacement of specified words and phrases. Data can be transferred within a document or from one document to another. The full range of print capabilities can also be invoked through this procedure. A vocabulary listing and an updated version of the document are automatically generated by the procedure.

5. Transfer En Masse

The Transfer En Masse procedure allows the CSMS user to transfer a document in its entirety for the purpose of creating a new document. It differs from the SELECTIVE TRANSFER function in that the entire

document must be transferred. This procedure is used when an existing document is to be used as a data base for the generation of a new document.

6. Selective Print

The Selective Print procedure allows the user to secure printouts of an existing source document. Either a partial printout or a printout of the entire document can be requested. A rough draft, final smooth copy, or document outline can be generated by this procedure. The Selective Print procedure is used when the user desires only a printout of an existing document with no accompanying update or transfer of data. Use of this procedure eliminates unnecessary computer processing since the update and data manipulation programs can be by-passed.

III. SUMMARY

The CSMS text editing system provides a cost effective method for reducing both the time and effort required to produce technical documentation of an evolutionary nature. System operation at NELC and evaluation by FMSO have demonstrated that substantial savings can be realized through the use of CSMS for this type of document. The system is somewhat limited by the quality of output and available type font associated with the high speed printer utilized for CSMS processing. For those applications for which the quality of a high speed printer is satisfactory, the system can be used for the preparation of any type of document.

As experience is obtained in the use of the CSMS system, additional areas of application are anticipated. For example, FMSO is currently engaged in a project in which the final CSMS output is placed on tape rather than printed on the on-line high speed printer. This CSMS output tape is then used as input to a photocomposition process. A variety of type fonts and type sizes can be produced by this photocomposition process and the resulting document should be of exceptionally high quality. The results of the project will be presented in a forthcoming FMSO report.

NELC is continually modifying and improving CSMS and applicable changes will be incorporated into the system maintained by FMSO as they are completed.

APPENDIX A: REFERENCES

(1) Computerized Specification Management System User's Manual, Naval Electronics Laboratory Center Technical Document 97, R. M. Kiendra, 23 March 1971.

(2) The Computerized Specification Management System, Naval Electronics Laboratory Center Technical Report 1759, R. D. Baechtold, 16 April 1971.

APPENDIX B: DESCRIPTION OF COMPUTERIZED PREPARATION OF A DOCUMENT

It is considered appropriate to provide an example of the various stages of development in the CSMS process. The four stages required for update of a document are described below. The subject of the text happens to be CSMS, however, any subject could have been addressed.

A. Stage 1 - Development of Original Hand-Written Document (See Page B-3). No requirements are placed on the author by the fact that the document is to be processed by CSMS. The author's original draft of the document is prepared just as it would be if the document were to be produced by a completely manual process.

B. Stage 2 - Preparation of First Input to CSMS (See Pages B-4, 5). The original document prepared for CSMS processing requires CSMS commands to be inserted. The free format illustrates the fact that the typist need not be concerned with spacing between words or justification of lines since CSMS will provide automatic formatting of the data. However, the typist can instruct the system to retain the input format of the data whenever this is desired.

C. Stage 3 - Preparation of Rough Draft Output from CSMS (See Pages B-6, 7). Such a rough draft is automatically generated by CSMS whenever an area of a document is modified. The rough draft printout is double spaced to provide space for corrections and notations to be made on the copy preparatory to subsequent updates. The line numbers appearing on the

printout are those assigned by CSMS for addressing purposes. The typist uses these line numbers when she inserts or deletes words or lines in later updates.

D. Stage 4 - Preparation of Final Copy of Document (See Page B-8). The final CSMS output resulting from the original draft is printed on unlined paper and is single spaced. Additional copies can now be reproduced as required.

Types of Text Recognized by CSMS

T2 Text

Text which is to be left and right justified by the computer is called computer-controlled or T2 text. Under computer control, words are shifted from line to line and left or right until the appropriate line length is achieved. Words are not hyphenated. Since chain and bar printers do not have proportional spacing, lines are filled out by inserting spacing between words to achieve final alignment on the right side of the document. Usually the body of any textual material is allowed ~~to~~ to be under computer control. In fact this is the default condition if the text type is not explicitly stated.

To indicate a new paragraph under the same level of indentation (header), the typist needs only to carriage return and indent for the new paragraph. The depth of paragraph indentation is maintained by CSMS. Consequently, typist consistency is required on this point.

T1 Text

Text which is not to be adjusted by the computer can be encoded as T1 text. This format allows complete

TYPES OF TEXT RECOGNIZED BY CSMS

.Insert level 1/1.2

Types of text recognized by CSMS

.Insert level 1/1.2.1

T2 Text

Text which is to be left and right justified by the computer is called computer-controlled or T2 text. Under computer control, words are shifted from line to line and left or right until the appropriate line length is achieved. Words are not hyphenated. Since chain and bar printers do not have proportional spacing, lines are filled out by inserting spacing between words to achieve final alignment on the right side of the document. Usually the body of any textual material is allowed to be under computer control. In fact, this is the default condition if the text type is not explicitly stated.

To indicate a new paragraph under the same level of indentation (header), the typist needs only to carriage return and indent for the new paragraph. The depth of paragraph indentation is maintained by CSMS. Consequently, typist consistency is required on this point.

.Insert level 1/1.2.2

T1 Text

Text which is not to be adjusted by the computer can be encoded as T1 text. This format allows complete control by the typist who must do all centering and alignment. Each line that is typed will

be reproduced onto the final document exactly as typed. The following is an example of a typical T1 text.

```
.t1
    Use    T1 text
        - titles for pictures or graphs
            - text of tables
                - lists of data
                    - highlighting

.t2
```

The typist determines how text is to be processed by the computer via the CSMS commands, .t1 or .t2, followed by a carriage return and the text to be composed. To exit T1 text format, the typist must type the CSMS command .t2 or some other valid CSMS command.

```
.begin new page
```

A	SOURCE	R			CYCLE
		2	1.	L2.01	A
		2	1.1	L2.02	A
	A	2	1.2 Types of text recognized by CSMS	L2.03	A
				1.04	
	A	2	1.2.1 T2 Text	L2.05	A
				1.06	
			Text which is to be left and right justified by the computer is	2.07	
			called computer-controlled or T2 text. Under computer control, words are	2.08	
			shifted from line to line and left or right until the appropriate line	2.09	
	A	2	length is achieved. Words are not hyphenated. Since chain and bar	2.10	A
			printers do not have proportional spacing, lines are filled out by	2.11	
			inserting spacing between words to achieve final alignment on the right	2.12	
			side of the document. Usually the body of any textual material is	2.13	
	A	2	allowed to be under computer control. In fact this is the default	2.14	A
	A	2	condition if the text type is not explicitly stated.	2.15	A
				1.16	
			To indicate a new paragraph under the same level of indentation	2.17	
			(header), the typist needs only to carriage return and indent for the	2.18	
			new paragraph. The depth of paragraph indentation is maintained by CSMS.	2.19	
	A	2	Consequently, typist consistency is required on this point.	2.20	A
				1.21	
	A	2	1.2.2 T1 Text	L2.22	A
				1.23	
			Text which is not to be adjusted by the computer can be encoded as	2.24	
			T1 text. This format allows complete control by the typist who must do	2.25	
	A	2	all centering and alignment. Each line that is typed will be reproduced	2.26	A
			onto the final document exactly as typed. The following is an example of	2.27	
	A	2	a typical T1 text.	2.28	A

A SOURCE	R			CYCLE
			1•29	
A	2	Uses for T1 text	1•30	A
A	2	- titles for pictures or graphs	1•31	A
A	2	- text of tables	1•32	A
A	2	- lists of data	1•33	A
A	2	- highlighting	1•34	A
A	2	- formulae	1•35	A
		The typist determines how text is to be processed by the computer	2•36	
		via the CSMS commands, .t1 or .t2, followed by a carriage return and the	2•37	
		text to be composed. To exit T1 text format the typist must type the	2•38	
A	2	CSMS command .t2 or some other valid CSMS command.	2•39	A
A	2		P1•40	A

1.
1.1
1.2 Types of text recognized by CSMS

1.2.1 T2 Text

Text which is to be left and right justified by the computer is called computer-controlled or T2 text. Under computer control, words are shifted from line to line and left or right until the appropriate line length is achieved. Words are not hyphenated. Since chain and bar printers do not have proportional spacing, lines are filled out by inserting spacing between words to achieve final alignment on the right side of the document. Usually the body of any textual material is allowed to be under computer control. In fact this is the default condition if the text type is not explicitly stated.

To indicate a new paragraph under the same level of indentation (header), the typist needs only to carriage return and indent for the new paragraph. The depth of paragraph indentation is maintained by CSMS. Consequently, typist consistency is required on this point.

1.2.2 T1 Text

Text which is not to be adjusted by the computer can be encoded as T1 text. This format allows complete control by the typist who must do all centering and alignment. Each line that is typed will be reproduced onto the final document exactly as typed. The following is an example of a typical T1 text.

Uses for T1 text
- titles for pictures or graphs
- text of tables
- lists of data
- highlighting
- formulae

The typist determines how text is to be processed by the computer via the CSMS commands, .t1 or .t2, followed by a carriage return and the text to be composed. To exit T1 text format the typist must type the CSMS command .t2 or some other valid CSMS command.