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STANDARDIZATION PROGRAM DOCUMENT
PREPARATION SYSTEM

Richard A. Elwell, et al

Army Natick Laboratories
Natick, Massachusetts

February 1972

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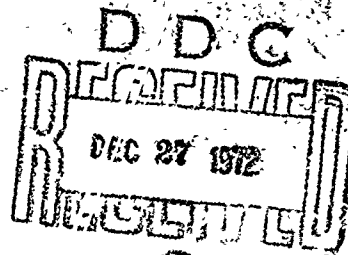
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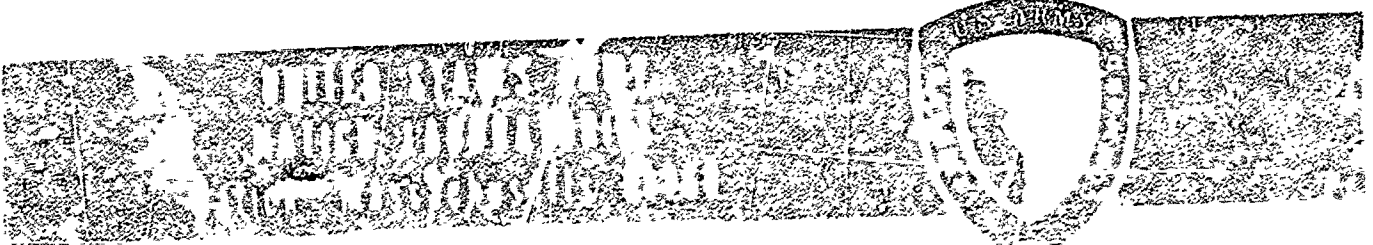
by
Richard A. Elwell

and

Clinton L. Eklund



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Quality Assurance & Engineering Office
U. S. ARMY NATICK LABORATORIES
Natick, Massachusetts

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FOREWORD

This report is the first of a series concerned with the recording, retrieval, and reproduction of technical data using high speed modern business equipment and sound management practices. It has been prepared in response to the widespread interest shown in the document preparation system in operation at the US Army Natick Laboratories. The system is used in support of the Defense Standardization Program, Engineering Support to the Procurement Program and related programs.

Standardization documents such as specifications and standards should properly correlate military requirements with the existing state of technological development and industrial and supply practices. It is essential that these documents be responsive to changing conditions and that they be developed with full consideration of potential emergency conditions. Therefore, changes to standardization documents are expected and are required whenever such changes are justified by technological and scientific progress or by experience in supply, manufacture, or use. The system described herein has been developed to accomplish the foregoing by the most expeditious and economical means, using the most modern equipment and sound business principles.

Acknowledgement is gratefully extended to Mr. Flanagan, Deputy Scientific Director for Engineering at these Labs, for his foresight and support of this system from its inception.

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ABSTRACT

A Government specification has as its primary function in our technological economy, promotion of rational competition for the purpose of securing economic procurement. As such, specifications should properly correlate military requirements with the existing state of technological development. It is essential that these documents be responsive to changing conditions, and therefore, changes to specifications are expected and required whenever necessary. The system described is a method of economically documenting these changes and revising the specification.

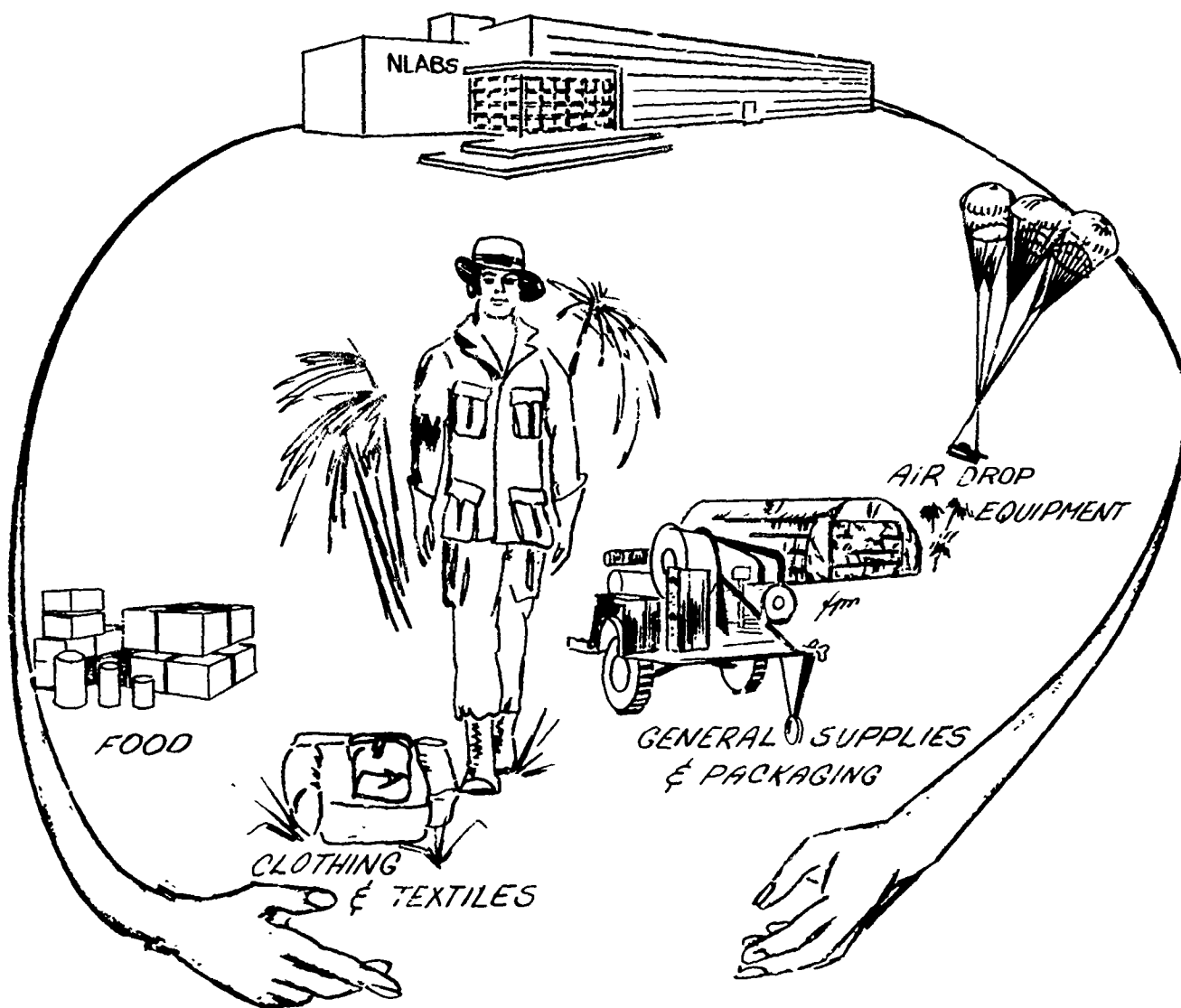


Figure 1. Commodities of the Natick Laboratories

DOCUMENT PREPARATION SYSTEM

A. INTRODUCTION

Proliferation of paperwork has always been a serious problem throughout the Department of Defense. This has been especially true in the processing of specifications and standards, the necessary paperwork of the procurement program. It is becoming apparent that antiquated methods are inefficient and costly and can no longer cope with the preparation, transfer and storage of this mountain of documents.

The US Army Natick Laboratories is responsible for preparing and maintaining 2,400 standardization documents. Of this total about 1,850 are military specifications. The volume of documents requires that the most efficient methods be used to manage and control this "inventory."

Those standardization documents prepared by the Natick Laboratories are concerned with a great variety of items. food (for all the Military Services); clothing (also for all the Military Services) and personal equipment for the individual soldier; shelters, mobile laundries and textile and shoe repair units; air drop equipment; equipment used in preparing or serving food; containers and packing supplies. (See Figure 1).

The old conventional methods of dealing with this volume of documents are wasteful and inefficient. When a specification was initiated, drafts were typed and retyped, edited and re-edited many times. Each revision of the basic specification (there are often as many as 7 or 8 revisions made to keep it up to date) caused another avalanche of papers, more retyping and re-editing. Total "suspense" time frequently stretched to several *months*.

After much study and experimentation, the responsible standardization management at the U. S. Army Natick Laboratories decided to try the most promising method of controlling and speeding up the whole process: using the magnetic tape typewriter, one of the newest and most efficient tools for word processing.

The purpose of this report is:

1. To show how the magnetic tape typewriter was used in inaugurate a data preparation system.
2. To report the results and conclusions reached after practical experience with this system.

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B. THE MAGNETIC TAPE TYPEWRITER AND WHAT IT CAN DO

1. The typed page

Most people become aware of the magnetic tape typewriter when they see a page it has typed. Invariably they are impressed with it. The typing is clear, even, erasure-free and very easy to read. This report has been produced from a magnetic tape employing a composer system.

2. It can record on magnetic tape

The tremendous advantage of this machine over the "ordinary" typewriter is that it can record directly onto a 1/2 inch magnetic tape. The tape can be automatically played back at very high speed - *automatically* - onto either paper or multilith printing plates. The tape can be easily changed, stored, retrieved, played back again and again.

3. No erasures

An outstanding feature of work with this typewriter: there are no erasures. It types a letter-perfect, error-free page. The explanation for this: while typing onto magnetic tape, the typist can very easily correct the copy, just backspace and strike over. Small errors such as those in spelling, grammar, or punctuation, can be immediately corrected, without wasting time erasing, as necessary with paper. The typist can stop the tape at any point to delete or to insert material.

4. Format

The solid state "logic" of the magnetic tape typewriter enables the typist to prepare copy in a wide choice of formats, such as tabulated, centered, flush left or indented. Once the machine tape is produced it will automatically reproduce the required design: letter spacing and line spacing, as desired.

5. Storage and retrieval of tape

Anything recorded on the magnetic tape is stored in a single-tape cartridge. The cartridges are stored in compartmented boxes and are available at all times. The cartridge can be instantly changed in the machine. Within seconds of retrieval from storage, the recorded data can be scanned, selected and typed out automatically. Magnetic tape can be scanned (i.e., "searched") at the rate of 900 characters per second. That is, the magnetic tape typewriter automatically *finds* any portion of the taped information very quickly.

6. High-speed automatic playback

The magnetic tape typewriter will play back perfect copy from the tape within minutes - automatically. During this interval the typist can be working at some other task. The machine can play back from the tape onto paper or multilith printing plates. The machine print-out speed is up to 150 words per minute.

7. Adding or deleting material

The typist can stop the machine at any point to delete or insert material. She makes "reference points" to indicate where the material is to be corrected. Thus there is no need to retype or re-proof an entire new page or — as frequently happens if the document is typed manually — an entire document.

8. Merging and corrections

Guided by reference marks made by the typist, the magnetic tape typewriter can produce a new master tape from an old master plus corrections.

9. Reusable tape

Magnetic tape can be used repeatedly. Sections of it may be used for standard paragraphs or pages, or for a quick run of "boiler plate" text.

C. THE DOCUMENT PREPARATION SYSTEM

The primary objective of the magnetic tape typewriter program at the Natick Laboratories was to put all new and revised standardization documents on tape. The second objective was to put the entire inventory or paper file of these documents on tape.

The following system or procedures were used in adapting the magnetic tape typewriter capabilities of these goals.

I. New documents

Initially the draft of a new document is recorded on magnetic tape. This is played back on four-part, self-carbon, continuous flat fold paper, double-spaced for easy editing by the responsible technologist.

The typist then incorporates the technologists corrections. She transfers "good" material from the original tape to a new tape. At the same time deletions are made and corrections and additions are recorded on the new tape. The result is an updated (revised) tape which is then played back — automatically — at high speed on multilith printing plates. These are for printing draft copies for coordinating the text with other military and civil agencies.

After coordination, all valid comments are incorporated in a final draft. The revised draft is given to the typist and the information that is unchanged on the master tape is transferred to a blank tape. Deletions are skipped and corrections recorded on the blank tape. When complete a new master tape has been produced the old master

tape can be re-used. She then inserts bond paper in the typewriter. This time the material on the new master tape is played back fast and automatically -- on bond paper. This copy is sent to the Naval Supply Depot, Philadelphia, for printing and distribution. The new master tape is filed for future use.

2. Revised documents

About 400 standardization document revisions per year are prepared at Natick Laboratories. Revisions are necessary for various reasons, but usually to keep the information up to date or to clarify the data. Under the conventional manual typewriter system revision of a specification took a lot of time and was inefficiently prepared.

In the present system, if the basic document is not already on tape, it must be recorded on tape. The procedure is as in the section above. If, however, it is already on magnetic tape, it can be revised very quickly and easily.

First a double-spaced draft is produced by high-speed playback of the magnetic tape on continuous, flat-fold paper.

The product engineer/technologist reviews this paper draft and adds to it all his recommended changes. He lines out material to be deleted. He writes in changes to be made. For longer changes he may write the new section on paper to be attached to the draft.

The revised draft is given to the typist. The information that is unchanged on the master tape is transferred to a blank tape. Deletions are skipped and corrections recorded on the blank tape. When complete a new master tape has been produced the old master tape can be re-used. She then inserts multilith plates in the typewriter. The material on the new master tape is then played back rapidly and automatically onto the multilith plates.

The typist has had to type onto the new master tape only the changes and not (as usual in the conventional system) retype the entire document. Similarly, the technologist has to proof only the changed material. In this way both time-consuming retyping of the whole document and reproving of the entire text have been eliminated.

With a new master tape so easily and quickly achieved, revisions are processed very efficiently.

3. Transferring paper document to magnetic tape

Since magnetic tape is so much easier to handle or to revise, the entire inventory of NLAB standardization documents will be recorded on tape. First the military specifications, then federal specifications, and finally military standards. These tapes are filed for easy updating whenever the need arises.

D. SUMMARY

The magnetic tape typewriting system has been in operation at NLABS for about 5 years. It is an established program and an estimate can be made of its effectiveness.

1. Increased production

The volume of documents processed is about 3 times what it was under the conventional system. This output includes full processing of new documents and revised documents and putting the entire "paper file" of military specifications on magnetic tape. A total of 1,700 military specifications are now on tape. As part of the continuing program of keeping documents up to date, over 400 specifications have been revised. Military standards and about 200 Federal specifications are also being recorded on tape.

2. Faster processing

The magnetic tape typewriting system results in much faster processing and much earlier release of the document. This is inevitable since the flow of copy has been speeded up by eliminating much of the retyping and re-editing and by the high-speed automatic playback by the typewriter. It is estimated that lead time for the average specification has been cut from 48 to 26 weeks. Also, it is estimated that a revision can be prepared in 1/3 the time it took using the former or conventional typewriter system. Magnetic tape can be instantly retrieved, changes quickly made and the new master tape played back automatically at high speed.

3. Quality

Automatic typing from the magnetic tape is not only fast and accurate, but very attractive and easy to read. It sets a new level of typing quality with its uniform color, density and precise alignment on every page.

4. Optimum use of staff

This system makes a far better use of personnel. The typist does not have to waste time in whole-report retyping or even in whole-page retyping. She can easily insert changes and the machine will re-style the text. The automatic playback releases her to work at other tasks while the typewriter types the entire manuscript.

The technologist is relieved of the clerical chore of re-proofing an entire document whenever changes are made. Only those parts changed need to be proofed and therefore he can devote more time to the technical aspects of his work.

It has been estimated that there has been between 40 and 50% reduction in manhours required for typing and proofreading standardization documents. The typists and technologists are obviously relieved of unnecessary, wasteful repetitive tasks.

5. Savings

It has been shown that a great deal of time, labor and materials have been saved by using this system. The sum of all these savings comes to a significant amount. It is estimated that this system has, to date, released five typists from routine typing of specification drafts to other priority work. This system is in consonance with the NLABS policy towards the institution of management innovations designed to conserve resources in the face of steadily declining funds.

6. Conclusions

Because of the magnetic tape typewriter system the NLABS has been able to operate its Defense Standardization Program with greater efficiency so that there is an increase in the volume of work done, suspense time is shortened, quality is heightened and significant savings are effected.