If you give full consideration to these suggestions and incorporate them in your work, a successful effort is not necessarily assured. However, your system development work will surely start off on a sounder basis and you can concentrate on making other mistakes.

Library Information Retrieval Program

By GRETCHEN W. KORIAGIN

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Received May 17, 1962

The Missile and Space Systems Engineering Library was first established as a small department library in 1956. At first all technical reports were indexed according to originating company and author only and were filed by originating company. There were no title or subject files. In early 1958 the expansion of the library holdings made improved report indexing a necessity. Various indexing systems were studied, nearby technical and university libraries were visited, and librarians consulted. The manual Uniterm System of Coordinate Indexing[1] was adopted, and these files and procedures were established late in 1958:

1. The cataloger completed a work sheet indicating the titles, authors, originating agencies, date and subjects[2] of the document.
2. The subjects were uniterms, or unit concepts, selected from the document.
3. The subjects, with appropriate cross references, were compiled in a card file authority list for use by the catalogers.
4. Accession numbers (prefix "ML" for Missile Library) were assigned to each document.
5. The documents were filed by this accession number to conserve filing space (previous files of documents by originating agency required leaving spaces for expansion in each file), to eliminate misfiling, and to aid in retrieval of documents.
6. Card files were established by originating company, title, author, and accession·number so that a report could be located by many types of reference.
7. The index card files were made by typing masters from the work sheets, printing on card stock, and cutting to 3" × 5" size. Many copies of each card were made to be placed in the various files. The filing points were indicated by red lines.
8. The subject index for the documents consisted of the 5" × 8" Uniterm Subject card for each subject used. The accession numbers were manually posted on the Uniterm Subject cards from the work sheets.

The Library performed manual literature searches upon request. The manual literature search of the documents was, and still is, conducted as follows:

1. One or more uniterms which best describe the subject are selected.

2. The Uniterm Subject cards for each subject are compared for common accession numbers. Those accession numbers which are common to all of the cards represent the technical reports on that subject in the Library.
3. The numerical accession number file is then consulted to further identify the selected documents.

During investigation of indexing systems used in southern California, we examined closely the Uniterm System that was being used at the Douglas Aircraft Company, Inc., Long Beach Location Library. They were pleased with the system but were also finding that it was becoming cumbersome to match cards for heavily posted subjects. At that time the number of reports indexed exceeded 10,000. While we felt that the advantage of the Uniterm System outweighed this disadvantage, we were aware that growth would soon cause a similar problem in the Missile and Space Systems Library. Our cataloging volume was almost 5,000 documents a year. Therefore, the Library was extremely interested when representatives of the Computing Engineering Section approached it in January 1959 with questions and ideas regarding mechanization of information retrieval systems. We had the problems of an indexing—retrieval system that would soon become difficult to operate manually. The Computing Engineering Section had high speed computers and printing equipment, and an interest in this information retrieval problem. We began a period of close cooperation and study of operating retrieval systems with the Computing Section. We found the work done by Mr. B. K. Dennis at General Electric especially interesting.
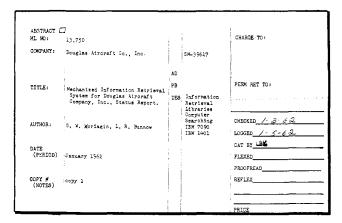

Fig. 1.—Worksheet

After a detailed study of systems and equipment, a proposal for a mechanized information retrieval system was made,[3] and systems and procedures were selected. We decided to retain the method of subject selection and indexing vocabulary, the card files and the manual literature search capability of the manual Uniterm System. In addition high-speed computing techniques would be used to increase accuracy, to save clerical time and to save on the time needed for extensive literature searches. The following equipment was selected to help establish the system:

1. A Friden Flexowriter was selected as input equipment. This machine has the keyboard of an electric typewriter and can be operated by a typist. A visible "hard copy" is produced as the paper tape is punched, providing easy proofreading. The tape can be corrected if errors are found.

2. This paper tape must be converted to magnetic tape for use by the computer. A Systematics Universal Paper Tape to Punched Card Converter, Model C-750, was selected for this task, though other conversion equipment is also available. It converts the paper tape to IBM punched cards, which are in turn written on magnetic tape.

3. Although the IBM 704 was discussed in the program proposal, the IBM 7090 was available when the actual programming was done. The IBM 1401 is also used, as it is a much less expensive machine to operate.

As the detailed analysis of the mechanized system progressed, it was decided to divide the system into sub-systems to be developed in the order which would be of the greatest benefit to the Library and its users.[4] These sub-systems are: (1) the bibliographic data sub-system which includes the putting of the bibliographic data into machinable form, printing the accession bulletin, posting lists, index cards and statistics lists, and (2) the dictionary sub-system which includes the printing and updating of the dictionary of terms used in indexing, and (3) the automatic selective dissemination of information and mechanized retrieval sub-systems. Sub-systems one and two are operational, and the third sub-system is in the analysis stage. A detailed description of the sub-systems is given.[5]

I. BIBLIOGRAPHIC DATA SUB-SYSTEM

A. Operational Sub-System.—This portion of the program has been in operation since May of 1961.

1. The Library cataloger completes a worksheet (Fig. 1) for each document, listing all of the descriptive and analytical cataloging information. The worksheet is given to the operator of the Friden Flexowriter. As the paper tape is punched, a "hard copy" (Fig. 2) used for proofreading is prepared. The paper tape reels are sent to Computing for conversion to magnetic tape for use by the IBM 7090 Computer program.

2. The computer load sheet (Fig. 3) is completed whenever the paper tapes are sent to Computing Engineering. The kind of output desired is indicated on it. The use of this form permits a great deal of flexibility. A set of cards for each accession number (company, title, author,

Fig. 2.—Flexowriter "Hard Copy"

Fig. 3.—Library Request Form

Fig. 4.—Index Card for the Accession Number

and call number) duplicate cards for any particular accession number, or complete production (including a complete set of cards for each accession number plus an acession list statistics and error notes) can be requested.

3. The index cards (Fig. 4, 5, 6, and 7) are printed by the computer with the filing fields indicated, not by the previous red line method, but by being printed at the top of the cards. The cards are mechanically alphabetized for each file. This alphabetical sorting makes interfiling much easier, and greatly reduces filing time.

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DOUGLAS AIRCRAFT CO., INC
ML 13,750

DOUGLAS AIRCRAFT CO., INC                    SM-39617

MECHANIZED INFORMATION RETRIEVAL             INFORMATION
   SYSTEM FOR DOUGLAS AIRCRAFT               RETRIEVAL
   COMPANY, INC., STATUS REPORT.             LIBRARIES
                                             COMPUTER
G. W. KORIAGIN, L. R. BUNNOW                 SEARCHING
                                             IBM 7090
JANUARY 1962                                 IBM 1401

COPY 1
```
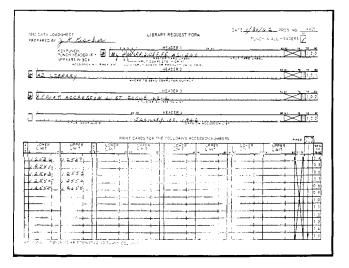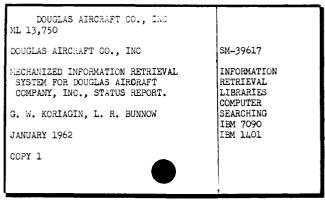
Fig. 5.—Index Card in Order by Originating Agency

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      MECHANIZED INFORMATION RETRIEVAL SYSTEM
ML 13,750

DOUGLAS AIRCRAFT CO., INC.                   SM-39617

MECHANIZED INFORMATION RETRIEVAL             INFORMATION
   SYSTEM FOR DOUGLAS AIRCRAFT               RETRIEVAL
   COMPANY, INC., STATUS REPORT.             LIBRARIES
                                             COMPUTER
G. W. KORIAGIN, L. R. BUNNOW                 SEARCHING
                                             IBM 7090
JANUARY 1962                                 IBM 1401

COPY 1
```
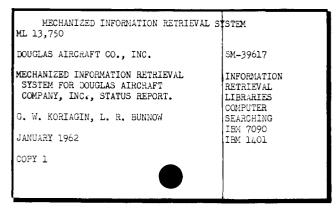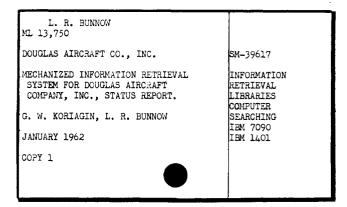
Fig. 6.—Index Card for Title

4. The Library publishes bi-monthly lists of document acquisitions. These lists are in two parts: a subject index, and a reproduction of the index cards in order of Library accession number (Fig. 8 and 9). The subject index is an inverted listing of uniterms with accession numbers. This subject index serves as a posting list for the manual listing of the accession numbers on the $5'' \times 8''$ Uniterm Subject cards. These cards will soon be machine posted.

5. As paper tapes are input, the computer screens for typing errors and prints error notes (Fig. 10). Many types of errors can be found by the computer, e.g., errors in the format of the date entry, errors in accession numbers, too many or too few fields (material added or omitted). Entries with errors must be re-typed correctly on the Flexowriter, thus generating a new tape.

6. A list by accession numbers, showing the number of cards printed for each accession number in each filing field is also generated (Fig. 11). This statistics list is used to check for machine and input errors, and to determine whether the right number of cards has been

printed. This list and spot check of the output provide the reliability testing for this part of the program.

B. Abstract Capability.—This program can store and print abstracts of the documents indexed. This capability is not being used at this time because the bibliographic data presently being selected, including the list of descriptors, give quite a clear picture of the document.

C. Additions Under Development.—A program is now being written for the IBM 7090 which will print an up-to-date file of Uniterm Subject cards (uniterms followed by accession number) (Fig 12). A complete new
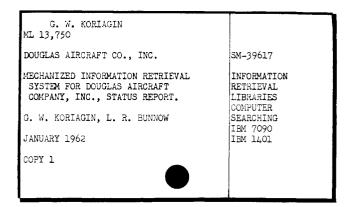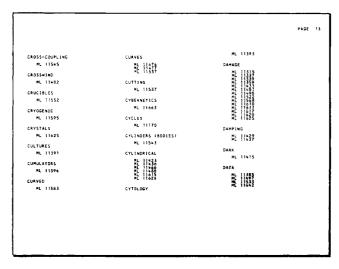
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      L. R. BUNNOW
ML 13,750

DOUGLAS AIRCRAFT CO., INC.                   SM-39617

MECHANIZED INFORMATION RETRIEVAL             INFORMATION
   SYSTEM FOR DOUGLAS AIRCRAFT               RETRIEVAL
   COMPANY, INC., STATUS REPORT.             LIBRARIES
                                             COMPUTER
G. W. KORIAGIN, L. R. BUNNOW                 SEARCHING
                                             IBM 7090
JANUARY 1962                                 IBM 1401

COPY 1
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      G. W. KORIAGIN
ML 13,750

DOUGLAS AIRCRAFT CO., INC.                   SM-39617

MECHANIZED INFORMATION RETRIEVAL             INFORMATION
   SYSTEM FOR DOUGLAS AIRCRAFT               RETRIEVAL
   COMPANY, INC., STATUS REPORT.             LIBRARIES
                                             COMPUTER
G. W. KORIAGIN, L. R. BUNNOW                 SEARCHING
                                             IBM 7090
JANUARY 1962                                 IBM 1401

COPY 1
```

Fig. 7.—Index Cards in Order by Author

Fig. 8.—Posting List and Subject Index to the Accession List

Fig. 9.—Card Image, Part II of Accession List

Fig. 12.—Uniterm-Subject Card

THE FOLLOWING ERROR IN INDEX CARD(S) ML 12807
INCORRECT SPACING BETWEEN FIELDS

THE FOLLOWING ERROR IN INDEX CARD(S) ML 11826
ERROR IN DATE EITHER LOCATION OR
CONTENT

THE FOLLOWING ERROR IN INDEX CARD(S) ML 12451
TOO FEW FIELDS

THE FOLLOWING ERROR IN INDEX CARD(S) ML 13205
LINE TOO LONG

Fig. 10.—Input Error Notes.

ACC NO.	COMPANY	TITLE	AUTHOR	ABSTRACT
12829	1	1	0	0
12836	1	1	2	0
12837	1	2	0	0
12838	1	1	0	0
12842	1	1	3	0
12853	2	1	5	0

Fig. 11.—Statistics list: Check List of 3 by 5 Cards

set of cards can be requested to eliminate errors made by manual postings, or to produce a more legible set of cards. Or, the Uniterm Subject cards can be updated by having individual cards printed for all subjects used in a given period. This would mean the new 5″ × 8″ cards would be printed including all new accession numbers, and thus hand posting on the individual Uniterm Subject cards would be eliminated.

Another program will handle the automatic binding of uniterms. It will search each index card in the magnetic tape file for a given uniterm or set of uniterms. If the required combination is found, the uniterms will be removed and replaced by one or more given uniterms; or an additional uniterm will be added to the index card on the master tape. A posting list or new Uniterm Subject card will be printed to show the changes.

D. Operation Costs for the Bibliographic Data System.—Though the bibliographic data system has been expanded to include other Company Libraries, the figures are for the Missile and Space Systems Library only, and

are based on its experience with an operating system since May, 1961. All figures are for a one-week period unless otherwise stated.

1. Assumptions: (a) The Library catalogs and inputs to the system approximately 100 documents per week. (b) The cost of printing the index cards is approximately equal to the cost of previous preparation methods. (c) The operator time for the Flexowriter is equal to the time required to type the masters under the old system. (d) Forms, load sheets, paper tape and conversion equipment are ignored because of their negligible costs.

2. Tangible Costs: (a) Seven minutes of IBM 7090 running time. (b) Three man hours required of the Computing Engineering Section for machine operation and coordination with the Library. (c) Eight man hours required of the Library for submitting input, checking output and coordination. (d) The purchase cost of the Flexowriter.

3. Tangible Savings: (a) Approximately 6 man hours per week are saved in the manual posting of the Uniterm Subject cards when the computer-printed posting list is used. This is a 60 per cent saving over previous posting methods. This figure will be further reduced by machine posting. (b) Approximately 7 man hours per week are saved in sorting and inter-filing index cards, as they are printed in the required order. This is a 50 per cent saving over previous methods of ordering and filing the index cards.

4. Intangible Savings and Benefits: (a) The accession list has been improved with the addition of a subject index, and by the printing of the index cards in order of accession number. (b) Statistics are provided which were costly to derive manually. (c) With the data in machinable form, many other capabilities such as special reports, security information, etc., may be added easily. (d) The program can make many reliability checks of the bibliographic data for cataloging, clerical, and typing errors. (e) As the system was expanded to include other Douglas Libraries, with a common method of indexing and a common vocabulary, the problem of costly duplicate indexing could be attacked. Though there are possibilities for computer control of this problem, we thought that a union catalog of corporate authors at each library would be an immediate manual solution. Therefore, the program prints extra copies of all corporate authors cards for use in each library.

We have concluded that the tangible benefits almost equal the cost of the operating system. The additional cost seems insignificant when considering the intangible benefits, the most significant being the generation and storing of bibliographic data in machinable form.

E. Tape Handling for the Bibliographic Data System.—
1. Input: (a) The paper tapes are converted to punched cards by the Systematics equipment. (b) The punched cards are then loaded onto magnetic tape. (c) The 7090 computer program stores the index card images on magnetic tape serially by accession number. This becomes a master reference tape. If a change is made to an accession number previously on tape, the newer or most recent entry is accepted.

2. Output: (a) The Library load sheet (Fig. 3) dictates the accession numbers to appear on the next accession list, posting lists and cards. (b) The computer program extracts the requested index cards from new input or from the master reference tape and sorts them in accession number order. (c) The requested accession numbers are written in ascending order by accession number on a print tape for the accession list and the index cards. (d) The uniterms are extracted, along with the accession numbers, and sorted in order by uniterm on a print tape to print the posting list. (e) The filing points are simultaneously extracted from each index card and the cards are sorted by each filing point. The index cards (company, title, author) are written in filing order on the print tape. (f) Statistics are also extracted during the processing. (g) The print tapes are used by the 1401 to print the output: (1) the master for the accession list, and (2) the index cards in filing order.

The 7090 is used to extract information and to prepare the output in the desired order; the 1401 to perform the duplicating and printing features required.

II. THE DICTIONARY SUB-SYSTEM

One of the first steps taken in the mechanization of our indexing system was to have IBM cards punched for each subject and reference included in the authority list of subjects. These cards were sorted and printed as a tool for the catalogers, and were up-dated as new subjects were used.

The Dictionary has since developed into a major sub-system of the program, primarily due to the incorporation of the other Douglas Libraries into the system. Though a single concept uniterm approach has been our goal, company needs and usage often have necessitated the "binding" of terms, the additions of many "scope notes" for semantic clarity, and the inclusion in our dictionary of examples of frequent uses of terms. The inclusion of four different spheres of interest and four types of work into one vocabulary took many hours of concerted effort. The disciplines represented in the final product are airframe manufacturing, materials research and testing, fighter and commercial aircraft manufacturing, underseas warfare, life sciences and missile and space systems engineering, and the related technical fields.

This Dictionary has presently 7,467 terms, including the *see* and *see also* references. A sample page (Fig. 13) shows terms, cross references and some examples of word combinations. We are finding that the rate of vocabulary growth is slowing, though additions and changes are made whenever necessary. New words are added by means of a load sheet that results in IBM punched cards. The computer program reflects the changes to the dictionary by printing an up-dated, complete dictionary, or a supplement which lists only additions and changes. When changes are made to the dictionary the program checks for clerical or cross-referencing errors. An IBM 7090 program maintains a copy of this *Dictionary of Terms* on magnetic tape. The dictionary tape is used to print the dictionary upon request, check the validity of uniterms on index cards before they are added to the master reference tape, and assign unique code numbers to uniterms for use by the retrieval programs when searching the tape files. These code numbers are internal to the computer program and are not used as input or reflected in the output of the computer program.

III. AUTOMATIC SELECTIVE DISSEMINATION OF INFORMATION (ASDI) AND MECHANIZED LITERATURE SEARCHING SUB-SYSTEMS

A. ASDI.—To provide complete service to library users, some method must be found to advise them on new information recently catalogued in their fields of interest. The regularly published accession lists are helpful, but there is some time delay in their publication, and generally many pages must be examined to select reports of interest.


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12-30-61                                    PAGE 177

HAWAII

HAWK
    SEE ALSO XM-3

HAWK II

HAWK PULSE ACQUISITION RADAR
    SEE HPAR

HAZARDS
    SEE ALSO SAFETY
    E.G. RADIATION HAZARDS

HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE
    SEE HERO

HEADS, HEAD
    SEE ALSO SKULL

HEADGEAR
    SEE ALSO HELMETS

HEADING (METALLURGICAL)
    SEE UPSETTING

HEADPHONES

HEALTH

HEARING

HEART

HEAT-DISSIPATING
    E.G. HEAT-DISSIPATING SHIELDS

HEAT-RESISTANT
    E.G. HEAT-RESISTANT MATERIALS

HEAT SINKS, HEAT SINK

HEAT TRANSFER

HEAT TRANSFER REACTOR EXPERIMENT
    SEE HTRE

HEAT TREATABLE

HEAT TREATMENT
    SEE ALSO REHEAT TREATMENT
    E.G. SOLUTION HEAT TREATMENT
```

Fig. 13.—Dictionary Page

In studying methods of automatically sending this type of notification, we benefited in particular by the work done by H. P. Luhn of IBM.[6] Our sub-system for ASDI is in the analysis stage. We anticipate that it will proceed as follows:

1. The library will interview the users of the ASDI system to establish their interest profiles. These profiles will be described in the terms of the vocabulary used in indexing. This program will begin with a select group of users, and will be expanded when it is beyond the experimental stage.

2 The library will use a load sheet to input the interest profiles into the ASDI program. A magnetic tape file of all profiles will be maintained, and when an accession list is printed, these new references will be screened against all interest profiles.

3. A copy of the index card for the selected reference is printed with a tear-off stub containing the user's identification. Provisions will be made for him to indicate his interest in the document (Fig. 14).

Fig. 14.—Automatic Selective Dissemination
of Information Reply Card

4. The user may retain the index card for his personal file. The stub will be mailed to the Library for action on the document request. Then the engineer's identification and response will be punched into IBM cards and input to the ASDI program. This program will accumulate and print statistics which the Library will use to adjust the interest profiles.

5. Analysis of the statistics supplied, and experimentation by manual adjustment of the interest profiles will result in a proven system for automatic adjustment of profiles which will then be mechanized.

B. Literature Searching.—A majority of the search techniques will be common to the ASDI program because the same search logic and the same input will be used. Mechanized literature searching will take place when the search logic has been proven by experience with the ASDI program, and when enough of the libraries' holdings are on magnetic tape to make a search of the tape file meaningful. The catalogued holdings of all the participating libraries in the Company will be searched upon request. Parallel searches can be made, to cover all aspects of a question, with little addition to the cost. A literature search will be conducted as follows:

1. A user will describe his literature search question to a librarian familiar with the vocabulary used in cataloging.

2. If the librarian decides that the search should be performed by the computer, the user and the librarian complete the required load sheet using the indexing vocabulary. Criteria for this decision are: scope of the

question, volume of postings per term and how soon it is required.

3. The literature search will be made that evening unless priority warrants faster service.

4. The bibliography will be in the form of 3″ × 5″ cards or a listing of the images of the index cards.

The 7090 computer program will be capable of performing at least 100 literature searches simultaneously. However, a 1401 program will also be written which will search the magnetic tape file as fast as the 7090 program, but with the capability of making only a few searches simultaneously. The 1401 program will cost less to run and will be used when the number of required searches is small. We estimate that the 7090 and 1401 programs will search the magnetic tape file at the rate of 150 references per second.

EVALUATION

Experience with the system has modified our initial ideas and we have made some additions and refinements we had not anticipated in the original proposal. The program has always been considered to be flexible. Time has been the biggest factor in the development of our program. All aspects of the program could not be ready simultaneously. Not only do the analysis and the programming take time, but time is needed to evaluate what has been developed to know the direction to proceed. Steps which seem natural at the program's inception are not always logical when the system begins to operate.

The vocabulary of indexing is the key to the whole system. The vocabulary evaluation done by the participating libraries has been difficult and time consuming. It is very helpful to consult subject specialists or to use someone else's vocabulary but this is not always possible. The ASTIA vocabulary, for example, was published more than a year after we started our program, however we have found it very helpful. If "pure uniterming" is used, there is no need for generic postings as each term is free or single. But, as concepts are combined for compromise or clarity, we feel that generic postings, handled by machine, should be considered.

The system has no provision at this time for the use of links or roles. The problem of "false drops" or incorrect information resulting from literature searches has not been a large one. Though it can definitely be a problem and many examples can be created to show how false drops can occur, we have not found this to be a significant problem after three years of operation. The careful selection of indexing terms and the depth of indexing is an important feature of the system. We average twelve terms per document at this time, but are planning to index even more deeply. Some specific advantages to the system we have developed are:

1. The library is deriving output in the form of computer-prepared index cards, posting lists and accession lists, in the process of putting information on tape. The computer has saved much time and clerical effort by producing index cards in filing order and by organizing the accession lists. This mechanization of the library card files would never in itself justify the use of a large

computer program, but the number of items on tape is constantly being increased. As the tape file grows, literature searching becomes more valuable.

2. A sufficient number of components of our data is in machinable form to allow for great future flexibility in our output. The rules that form the input typing requirements are detailed so that other information can be extracted at a later date if desired. The following have been considered: (a) Additional statistics as the number of times descriptors have been used, or the average number of descriptors per document. (b) Document usage statistics for "weeding" purposes. (c) Lists of documents by security classification for classified document inventories. (d) Lists by date of document for de-classification purposes. (e) The possible replacement of index card files by book indexes. (f) The addition of generic relationships to the "Dictionary of Terms," which would be handled automatically by the computer.

3. The maintenance of the normal library card files and the manual uniterm search methods in conjunction with the computer program is advantageous in that multi-level access to material is available. We feel that the computer prepared output, dissemination of information automatically, and literature searching techniques will supplement, and will be supplemented by the library card indexes.

4. The fine working relationship with Computing Engineering has been a major advantage to the program. The cooperation and interest in our common problems have resulted in a system we feel is unique—one that is both user, Library and machine oriented.

At this point, what is operational is proceeding well and is being received with satisfaction. We feel that we have the flexibility to expand and grow. We are looking forward to the development of the third and most important phase of our program, the ability to handle literature searches mechanically.

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(1) "The Uniterm System of Indexing, Operating Manual," Documentation Incorporated, Washington, D. C., 1955.
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(3) Bunnow, L. R., "Study of and a Proposal for a Mechanized Information Retrieval System," Report No. SM-37418, Douglas Aircraft Co., Inc., Santa Monica, Calif., May, 1960.
(4) Koriagin, G. W. and Bunnow, L. R., "Mechanized Information Retrieval System for Douglas Aircraft Company, Inc., Status Report," No. SM-39167, Douglas Aircraft Co., Inc., Santa Monica, Calif., Jan., 1962.
(5) Unless otherwise stated, all information refers to the Missile and Space System Engineering Library.
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PACIR: Practical Approach
to Chemical Information Retrieval*

By JULIUS FROME and PAUL T. O'DAY
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Office of Research and Development, Washington, D. C.
Received May 18, 1962

I. INTRODUCTION

This paper describes a "Practical Approach to Chemical Information Retrieval" (PACIR). The object of the PACIR system is to provide a flexible universal approach to specific compound retrieval that is not limited to the unique charateristics of a particular area of chemistry, that is adaptable to various types of hardware, that employs a maximum of machine assistance in the analysis, that provides a file that may be organized according to the need of the user, and that is practical from the economic viewpoint.

It will be apparent that emphasis is placed on problems of efficiency and accuracy in analysis. To a great extent, it is in this area that the economic feasibility of a given approach is determined. Complications in analysis, imposed by complexities of translation of the analyzed subject matter to useful machine recognizable symbology, can easily add confusion and inaccuracy to the analysis

step. This can well render a system that is theoretically sound an empirical failure. The PACIR system attempts to keep these rigidities and dangers to a minimum.

The keywords at all steps in creating the system have been flexibility, clarity, and simplicity.

II. EVOLUTION OF THE SYSTEM

Over the past five years, the Office of Research and Development of the U. S. Patent Office has experimented with and put into operation a number of chemical retrieval systems[1-5] employing a variety of machines and approaches. A description of the contributions of these projects is necessary for full understanding of the reasons behind many of the features of the PACIR approach.

Early efforts were made to solve the problems of searching the rapidly growing and important area of steroid chemistry. This led to the use of a composite one-punch-card-per-document approach which has been revised and updated and is now in general use, both in