

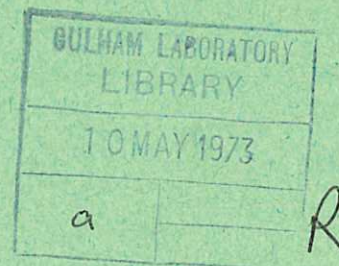
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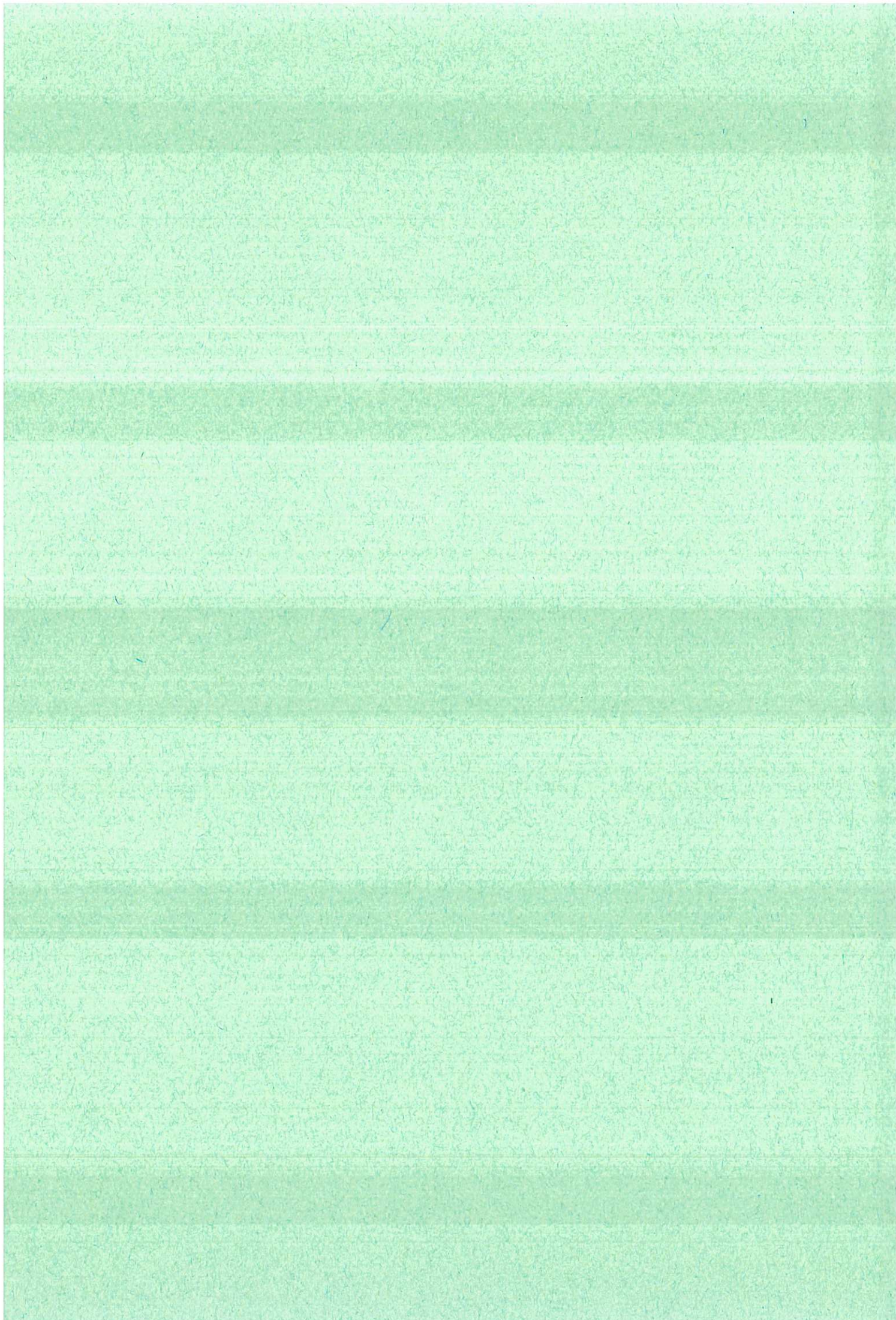
CLM-LM 1/72

General Notes on the Library Bulletin and SDI
programs (1972 version) for the Culham Library.

by

N.E. Martin





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A B S T R A C T

This note describes, in general terms, the programs used to provide the Culham Library's Current Awareness Service, which consists of a Library Bulletin and an S.D.I. Service.

Several major decisions were made when the programs were re-written for an ICL 4/70 (programs already existed for use on KDF 9) and the reasoning behind the final design choices is explained. Where appropriate, some possible future developments of the programs are also considered.

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Introduction

In almost everyone's experience there are two activities, subsidiary to his main job of work, which are taking up more and more of his time; namely, keeping up to date with current developments in his field, and finding out what information already exists when investigating a new field. This problem is most acute in a research environment, such as Culham, and consequently the Library has always provided a number of services which lift some of the burden from the individual.

There are three major services. First, a regular bulletin is produced and widely circulated which gives the titles and sources of all items, relevant to the general work of the Laboratory, which have been received by the Library during the current period. Second, a more specialised selective dissemination of information (S D I) service is provided for some members of the Laboratory, who are very quickly notified of any items received during the current period which match their personal requirements. Third, a retrospective retrieval service is available, covering a much larger data base, which may be searched for information on a particular topic. There are a variety of other services provided on a personal level by the Library and Information Office Staff and there is, of course, direct access to the Library's stock. However, in this note I am only concerned with the first two facilities which may be grouped together under the heading of 'Current Awareness Services'.

Reason for rewriting

For some while now the current awareness services have been largely computerized and when the time came to change the service from the KDF 9 to 4/70 it was considered a minimum requirement that existing facilities should be maintained. As the current awareness service was, by that time, 'tried and tested' the question was bound to arise; "why not convert the programs directly?" There are three reasons why this was impractical.

Introduction

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First; the programs necessarily involve a lot of character handling and, in doing so, make certain assumptions, about the number of characters held in a word, which are invalid for the 4/70. It would, therefore, be necessary either to alter these assumptions or to change the type of variable used to hold the characters either of which would have involved a lot of work. Second; the main routines of the KDF 9 programs are written in Fortran which is not designed for character handling and has no paper tape I/O facilities. Consequently there are a number of routines written in KDF 9 Usercode which would need re-writing in 4/70 Usercode, thus perpetuating the problem. Third, and possibly most important; the existing programs were too restrictive and did not meet all requirements, they were difficult to amend, since they were scantily commented and no documentation was available.

Bearing these points in mind it was felt that this was a good opportunity to rewrite the programs in a more suitable form. It is hoped that the finished article not only meets current requirements but will also prove easily adaptable to any future developments. Should it be necessary to amend the coding, each routine is fully documented, both internally and externally, and the whole is written in a high level language well suited to character handling, which removes the need for any obscure bit manipulation, or other such programming tricks.

Choice of Language

At the beginning of the project a decision had to be made regarding the programming language to be used. For ease of writing, debugging and later, amending, the choice was restricted to the high level languages, only three of which had a reasonable chance of being available on the 4/70. These three; Fortran IV, Algol and IMP, are considered in order.

The advantages of Fortran are fairly obvious. It is familiar to most programmers and is widely available on a large number of computers, though the various implementations may differ. For a high level language it compiles into very efficient object code with little trouble. However, the text handling facilities are primitive (and in some instances, notably on the 4/70, they are non-existent) and the language is logically messy. There is no true byte access facility.

Algol, on the other hand, has a good logical structure and is rigorously defined, both the KDF 9 and 4/70 implementations adhering closely to this definition. Also, an interactive compiler existed on the KDF 9 which could have been used to facilitate debugging. However, there are still no text handling facilities and the language has the added disadvantage of not compiling into very efficient object code.

In comparison, IMP is a language designed to make use of the byte oriented computers and consequently provides comprehensive text handling facilities. The language is Algol-like in structure and thus logically sophisticated and it has the advantage of user-extension through a macro scheme. Its main (and only) disadvantage is that it is a new language, only available on IBM 360 and ICL 4/70 computers, and requires a special interface (SIM). However, this problem is ameliorated somewhat by the fact that the IMP compiler and a large proportion of SIM are written in IMP, and are directly amendable by Culham, thus enabling the majority of problems to be solved on-site

Obviously these points are not exhaustive, but the main advantage of IMP seemed to be the ability to clear errors without recourse to long-winded ICL processes, while the main disadvantage is the need for the SIM interface to be re-written for Multijob. (This latter has since proved problematical, almost entirely through lack of communication with ICL.)

In retrospect, IMP proved a very satisfactory language for this type of problem, but, until it becomes more widely used, some concern must be felt regarding the transferability of the programmes and the continuation of support from the authors (i.e. ERCC).

General

There are four major and two subsidiary programs in the suite, together with a number of minor ones. The major programs are:- LIBRIP, handling input of current data, LIBULW and LUBULM, handling weekly and monthly bulletin production respectively; and LIBSDI, handling the selective dissemination of information (SDI). The two subsidiary programs CRMJN and CRPROF create the master journal title file and the master profile file respectively.

The provision of a suite of programs, each handling a part of the current awareness service and communicating via disc files, allows the Library the maximum flexibility in planning their work load. Equally, control of the intermediate file lies with the user, thus enabling any number of runs to be carried out using the same data without adversely affecting any other files. Since the input program will either start a new file or append to an existing file, data may be input in any number of batches and the SDI and Bulletin programs may be run against the cumulation of these batches as convenient. The only restriction on the number of files in existence at any time is the total space allocated to the user by the system.

Lack of flexibility in the use of programs would be annoying but manageable; lack of flexibility within the programs would present a greater problem. The biggest drawback of the KDF 9 programs was their inability to adapt to the unexpected. While one cannot, in the nature of things, be certain that all eventualities have been catered for, one can provide a framework sufficiently flexible to accommodate a reasonable number of changes. This framework is provided by the internal record template which is common

to all the main programs and the input record template which is specific to the input program. The internal record template has been made as general as possible to cover a wide range of record types, which the input record templates, or input profiles as they are called, are specific to each type of input record. They describe the input record format and relate it to the internal record template. A change in the input format of any record type or the addition of a new record type is catered for simply by altering the input profile, no coding need be amended, and the output routines are not altered.

Occasionally however, changes involving the coding of a routine are unavoidable (if only because a new bug is found) and then it is important that the user can be sure any changes made will not have unexpected results. To this end the programs have been kept modular in form and full documentation is available for every routine.

Internal Record

The internal record template is the backbone of the entire suite. All internal operations on a record take place in terms of this internal format. Input records are converted to this form and output records are created from it. This structure allows input to be taken from any source providing the input can be converted to this internal form and output to be in any format, to any medium. Input and output formats are therefore completely independent.

To accommodate diverse record types the internal record must be as flexible as possible, the content and position of each field being held within the record. This has been achieved by the use of a two part record consisting of a fixed length directory and a variable length text record. The directory length is fixed such that pointers are provided to all possible text fields, while the variable length text section contains only non-null entries. The specification of which fields are compulsory, which

optional and which multiple is dependent on the current implementation, as it is set up, in profile form, in the initialisation section of the input program.

LIBRIP - The Input Program

General

This program may be run any number of times during a week (or whatever cycle period is appropriate) to add input records to the specified files.

Any input record is analysed according to the relevant input profile which specifies the expected format. Any format error causes a record to be rejected but the only content check that is made takes place on the journal number which carries a modulus 11 check digit to guard against transcription errors. Each field in the input record is cleared of spurious characters (leading and trailing blanks, line feeds, tabulation characters, etc.) and linked to the appropriate field pointers in the internal record. The internal code used is ISO code since this is the code used by the SIM system and translation is carried out as required. This allows input to be taken from any source, in any format without incompatibility.

The internal record is then created, using the internal record profile, from the character strings forming the input records, and the appropriate pointers are set up in the directory. This two-part record (directory and text) is then added to the bulletin and/or SDI and cumulation files as required. The bulletin file is an inverted file since later access to it will always be index oriented, the index being by journal number within section code. The other files are written sequentially, but in direct access mode so that they may be accessed directly at a later stage. Certain statistics are collected at this stage and written to a file which is logically associated with the current SDI file. Since these files may be cumulated there must be some protection against system crashes or other job

failures and this is provided by maintaining a control block with each file which is not updated until all output to that file is completed. Thus, should a job fail half way though it may safely be rerun without danger of duplicating records or over-writing data since the information in the control blocks still refers to the previous run.

Since control of the files is completely in the hand of the user there is a danger that an input run may cumulate on to the wrong data. As a safeguard, each file carries the week number of the week it was created and this number will be checked by any of the programs if the appropriate option is chosen.

Should any problems arise with the program, despite all the precautions which have been taken, there is a built in diagnostic facility, which is a standard option, which follows the processing of a record from its input through analysis to the creation of its final, internal form.

Culham Input

If input were to be taken from a ready prepared source (eg. INSPEC, Clearinghouse) the existing input routine would have to be replaced by a straightforward conversion routine to present the next record in the required format. The existing routine for our own input is a more complex process; involving, as it does, raw data.

Input is made up of a number of records, each record describing a recently received pamphlet, book, etc. together with selected items from the periodicals taken by the Library. This data is currently input in the form of paper tape, punched on a KDF 9-code tape typewriter. Each record on the tape is separated from the next by a record separator character and is made up of a number of fields separated by unit separator characters. The use of separators allows records and fields to be of any length (provided they remain within the limitations of the machine), or null, and permits a completely free format within the fields. The choice of characters for use

as record and unit separators is purely a matter of local convenience and can be altered in the initialisation section of the program. Any number of input tapes may be presented to a run simply by stopping punching on one tape and starting punching on a new one. The end of the input file is signified by a null record.

The input data tends to be 'batched' to some extent, in that several items are frequently input from one journal, or several books are input together. Obviously there will be a certain amount of information common to all items in the 'batch' and to avoid the necessity for duplicate punching the concept of a 'batch heading' and the contents of the 'batch' is used. To maintain an overall pattern for the different types of input record, each 'batch heading' contains journal details while the details of each item make up the contents of the batch. For compatibility the non-journal items (eg. books, etc.) are treated as items within a 'special journal' (eg. each report forms an item in the 'journal' "reports"). Special journal numbers are allocated to these input types.

The use of journal numbers as identifying terms implies the existence of a master journal title file from which the titles are to be extracted. However, there are occasions when it would be preferable to include the title in the particular item rather than add a new journal number and title to the master list. In particular it may be desirable to treat a compound item - such as a Conference Report - as a journal and its constituent items; thus allowing the individual papers to be retrieved at a later date and not simply the Conference title. Obviously we do not wish to add this 'one-off' title to the master file, so a pseudo-journal facility is available. This allows the required title to be input as part of the batch heading and it is subsequently stored in the internal record of each item within the 'batch'. A special pseudo-journal number is used to distinguish these items from normal input. Pseudo-journal facilities are available for all input types, including journals.

While the input record is generally free format, certain assumptions have to be made with regard to the author field, since an indexing term (the surname, if applicable) has to be extracted. This problem cannot always be solved by positioning and it would be tedious for the typist to demand that the author always appeared exactly in the index form, therefore, the routine extracts most author indexing terms by positioning, but the facility exists for any part of the authors field to be enclosed in "index marks" which serve to identify the index terms of that author.

Future Developments

There are two main developments which will, hopefully, occur in the near future. The first concerns the use of ready prepared input from other sources (INSPEC, NSA, etc.) and could be easily achieved by using the simple conversion routine, mentioned previously, in place of the input routine. Care would have to be taken to see that records were not duplicating previous Culham input and would not cause duplication in the future (eg. by inclusion of pre-publication issues) but this could be largely avoided. The second development which could occur involves the use of an on-line terminal, rather than the Ultronic tape typewriter, for data preparation. This only requires an upper/lower case terminal and a new data reading routine and would prove a great time saver in the Information Office. Input data amendment would take seconds rather than tens of minutes and would exclude all the mechanical dangers (misreading, mispunching) inherent in copying tapes. Faulty runs of the input program caused by the tapes being misread or mishandled would also be avoided. The terminal might also be used for production of the bulletin, but this would depend on the quality and speed of the output which must compare with printed material.

The Bulletin Programs

General

There are two programs producing paper tape output from which a bulletin is produced. The first, LIBULW, is a special case of the second,

LIBULM, but since it is run four times as frequently (once a week, as oppose to once a month) it was considered more economical to have a separate program. The differences between the two are largely in the main routine, with minor differences in output format and the presence of extra routines in LIBULM to handle the special indexes it provides.

The output format is completely controlled by the program. Lines are both right and left justified before output, unless they are too short, and all line feeds and extra spacing is provided by the output routines. This means that the output line width may be varied at will to suit current requirements simply by altering a control card, no coding alterations are necessary. It would be possible to perform similar justification on a page of bulletin output, but a very complex algorithm would be required to produce as satisfactory result as that achieved, with very little effort, by the human operator. In view of this a subsidiary line printer listing is produced to give the user a 'look-ahead' facility, to assist him in setting out the records.

Automatic diagnostic facilities are available in both programs. They follow the processing of each record from the file, through formatting, to output and are initiated by inclusion of the appropriate control card.

LIBULW Weekly Bulletin

This is a special case of the monthly bulletin program, processing one input file only and covering all sections of the bulletin. Input is taken from the bulletin file produced by the input program, which is already concorded. The indexing blocks are read from the file and sorted to the required order (journal number within section). These records are then read from the file in the required order, and output, with all appropriate headings and subheadings, to the paper tape.

LIBULM Monthly Bulletin

This program takes input from any number of specified files and outputs a bulletin covering selected sections only. Additional output includes an author index and a report number index (both of which are cumulated to a larger index which is not produced here) to this bulletin and a section covering Culham authors.

For each input file specified the indexes are read into core and references to items in the required section are transferred to a master index, together with an additional item specifying the 'file of origin'. When all the indexes have been read the contents of the master index are sorted to ascending order of journal number within section (retaining the input order of any matching records) and this master index is then scanned in the normal way to produce the output paper tape. The additional indexes (to the authors and report numbers) are produced at the same time, while a note is made of any Culham author's items, which are to be duplicated at the end of the bulletin. Since input order is retained when two items match, the user can control the order of his output by specifying his input files in the required order.

Developments

Currently output is to paper tape, which is both slow and troublesome. It is hoped that the use of an upper/lower case remote terminal will enable output to be channelled through a line file to the terminal, thus bypassing the tape medium. It would be a relatively simple matter to alter the output routine to channel records wherever desired. Perhaps an upper/lower case printer could be used, but it is doubtful whether the output quality, would be good enough, since the bulletin is distributed both internally and externally and, as such, must meet normal publishing standards.

LIBSDI Selective Dissemination of Information

General

This program provides a fast personal current awareness service for the users in the system, by selecting and printing, for each user, details of those records contained in the current week's input which match his stated interests.

Profiles

A users interests are defined by a set of profiles, each profile consisting of a series of key words and phrases (together with various other identifiers, if required) joined by logical connectors. These profiles are held in core throughout the program, thus avoiding the need to transfer large arrays to and from backing store.

The possibility of using a weighting system to match the profile terms was considered, but eventually rejected. The attraction of this method is that it gives finer control over the acceptance or rejection of a record; however, it is much more difficult to adjust to the best advantage and requires a far higher degree of communication between the recipient of SDI and the Information Office than either have the time for. This would inevitably result either in uniform weights being allocated, which defeats the object, or an arbitrary weight being allocated which would never be properly adjusted due to lack of feed back. The non-weighted system adopted follows the original KDF 9 pattern, which has proved generally satisfactory, extended to allow a far wider range of terms, which should enable retrieval of non-relevant items to be almost eliminated.

The format of the profiles at input is kept simple to avoid confusion and to allow the user as much flexibility as possible in his specification.. A look-ahead analysis method is used to convert from this input form to a more specific internal form, which is then stored in a disc file for future use by the SDI program. The internal form is designed so that each section

of a profile is self-specified, thus allowing the matching routine to exit from a profile as soon as a match/no match decision is made.

The terms that may be specified in a user's profile are keywords or key-phrases, which may appear in the title or keyword section of a record, journal numbers and authors. At this stage the advantages and disadvantages of using a thesaurus were carefully considered. The advantages are those of consistency and speed of matching. Assuming a thesaurus exists it is necessary to classify the words in the profile and the input record once only, allocating a numerical equivalent to each and a single comparison will give a match/no match result for any word. Non-thesaurus words are ignored and, providing keywords are allocated appropriately at input, all valid records should be retrieved and vice versa. The disadvantages of a thesaurus are the problems of its initial compilation and continued updating, the space it would occupy, and the restriction it places on the search terms used. The compilation of a comprehensive thesaurus to cover even a limited field requires not only a great deal of time and effort, but also a good knowledge of the relevant area. This amount of effort is not available at Culham, and none of the existing thesauri are really suited to our needs. The problem of space could, of course, be handled by transfer between core store and backing store, but that would add to the time taken to examine the thesaurus, thus reducing the time advantage. The restriction on the choice of search terms is the most important problem. Unlike the user of an on-line retrieval system, the user of an SDI service has no immediate feed back; he must, therefore, be able to specify exactly what he wants on his profile. If his interests change he wants to add new terms to his profiles and if his new interest lies on the fringe of the general field he may have to wait until the thesaurus is updated before he can receive any output. Equally the program cannot be used to handle data in any other field until a new thesaurus has been compiled.

The disadvantages of a thesaurus are important, but the, apparently large, advantage of speed is not as great as might appear. Analysis of about 2500 non-trivial words in the plasma-physics field (chosen from three thesauri)^{*} showed that 93% of word pairs will mis-match on their first character - i.e. a single compare. Thus, the speed advantage only affects 7% of the text and must be partially offset by the time taken to search the thesaurus in the first place. So we have to consider a slight time advantage, against the main disadvantages of restriction of terms, in the light of the requirements of an SDI service. In an SDI service, unlike on-line retrieval, speed is not the first priority. While it is always desirable to be cost-conscious and minimise computing time, this must not be done at the expense of an efficient service and a good user image. The relevance of the information distributed is most important, while the time taken depends on the postal service rather than an extra second spent on computing! Consequently it was decided to treat all non-trivial words as valid search terms, both in the profiles and the records, keeping a manual thesaurus for use when compiling the profiles, which would be particularly helpful in deciding truncation points when entering words stems.

Processing

Each word is read in turn from the input file and pointers are set up to the keywords and to the non-trivial words in the title. These pointers are sorted to alphabetic order of the words and any duplicate entries are ignored. The internal profile array is then scanned and any matching profile causes the disc reference of the current record to be added to the current users selection list. When all the records have been processed each user has a list (which may be empty) of items which match one of his profiles. The users are then scanned and for each user with a non-null selection list an SDI notification is produced.

*R.G. Lerner's Thesaurus (AIP)
Glossaire de Physique des Plasmas
Major Word Glossary (KDF9 SDI program)

The majority of the searching takes place on the keywords and on the non-trivial words of the title; it is here, therefore that every effort must be made to avoid wasting time. A pair of character strings are matched character by character, stopping as soon as a mis-match is found. The profile terms and the terms in the record are both processed in alphabetic order thus allowing the smallest number of comparisons to decide the result. (A modified version of this method is used for authors, which are not necessarily in alphabetic order in the record, since it is considered less time consuming to check each one than to set up pointers and sort them to order as there are generally only a few authors of an item (frequently, one).) To speed the program up still further the internal profiles are so arranged that a user's profiles may be left at any level, for any other level as soon as a decision is made. These measures ensure that character by character matching is not much slower than a word oriented scheme and allow the greater versatility of word stem matching.

As for all major programs of the suite, built in diagnostics are available. These follow the comparison of each record input with each profile in the system and can, therefore, produce a very large quantity of output. For this reason, selective diagnostics are available which give the comparison of all input records with the profiles of specified users only. Since the diagnostics are so exhaustive, they take up a lot more time in this program than in the others and need to be used with care.

Statistics

As explained previously, each intermediate SDI file has, associated with it, a statistics file. This program adds retrieval details to the information already collected and produces both a current statistical analysis and a cumulative statistical analysis before adding to the cumulative statistics file. The cumulation, like all files, is under the control of the user who must handle the start and length of each statistical cumulation period as desired.

Developments

It had been suggested that recipients of SDI should have the option of having selected records output to a line file, rather than to the line printer. However, this is not a very attractive idea since it would involve either a potentially large number of control cards, or a usercode subroutine, or a system allocated file, any of which would add to the size of an already large program. Another possibility also concerned with output, is the use of special stationery with a tear-off order/comment slip to encourage user reactions to the material they are receiving.

The main development must be in the sophistication of the user's profiles. Great scope exists for precise specification, but equally there is great scope for badly constructed profiles. A good deal of time and effort could be well spent, by both recipient and Information Office, ensuring that each user has the most efficient profile. This would not only give an excellent User image, but also, if carefully planned, increase program efficiency.

To enable the format and contents of the internal record to be as flexible as possible a two part record is used, which consists of a fixed length directory and a variable length text record.

A1.1 The directory

The directory has two entries for each possible field in the text and two elements specifying the length of the directory (number of elements) and the overall length of the text record (in bytes). The two entries specifying a field of the text give the start position of the first byte of the field (relevant to the start of the text array) and the length of the first (and possibly only) entry in that field. If the field is absent from the text both the entries in the directory are zero.

<u>Index</u>	<u>Contents</u>	<u>Ref.</u>
1	Length of directory (in multiples of 2-bytes). Currently 32	
2	Overall length of associated text array (in bytes).	
3/4	Reference to CODEN	10
5/6	Reference to Culham reference number.	21
7/8	Reference to source reference number (if not Culham input).	22
9/10	Reference to title of item.	30
* 11/12	Reference to authors.	41
* 13/14	Reference to authors' affiliation.	42
* 15/16	Reference to bibliographic details.	51
17/18	Reference to additional note.	52
19/20	Reference to source language (if not English).	61
21/22	Reference to translation details.	62
23/24	Reference to title of source (if not standard journal).	70
* 25/26	Reference to subsidiary reference numbers.	81
* 27/28	Reference to keywords	82
* 29/30	Reference to references made from item.	90
31/32	Reference to code character.	100

Notes:

- (a) The text of the record is held in alphanumeric form - including such things as the journal number. The numbers in position 40, 47, 72, 63 and 74 are binary numbers in multiple entry fields, specifying the length of the following entry.
- (b) The author field may have multiple entries; therefore, although this record only has one, it is followed by a zero byte (position 40).
- (c) The last character of this record is in position 75 but the overall length of the text is 76. This is the rounding effect.
- (d) Case differences are preserved in the internal record.
- (e) The routines which are used to print the record assume that the first entry in the bibliographic field will be the journal number and that the last will be the date.

Appendix II Common Words and their Internal Representation

To avoid the unnecessary task of examining each trivial word in the title of an article the following words have been specified 'common' and do not take part in the matching process.

A AN AND AS AT

BY

FOR FROM

IN INTO

OF ON ONTO

THAT THE TO

WITH

These words are held internally in a special single-word representation, which can handle words up to six characters in length.

A	(02000000)	16
AN	(02E00000)	16
AND	(02E20000)	16
AS	(03300000)	16
AT	(03400000)	16
BY	(05900000)	16
FOR	(0CF90000)	16
FROM	(0D27B400)	16
IN	(12E00000)	16
INTO	(12EA3C00)	16
OF	(1E600000)	16
ON	(1EE00000)	16
ONTO	(1EEA3C00)	16
THAT	(28800000)	16
THE	(28828000)	16
TO	(28F00000)	16
WITH	(2E9A2000)	16

The words to be treated as common are given as part of the data and this list may be altered or extended as required providing only words of ≤ 6 characters are specified.

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JOURNAL	NO OF ITEMS INPUT	NO OF ITEMS DISTRIBUTED		NO OF USERS RECEIVING ITEMS
		TOTAL	% OF I/P	
065004	3	3	(100.0)	7
070008	1	0	(0.0)	0
074003	1	1	(100.0)	4
085005	1	0	(0.0)	0
094004	2	2	(100.0)	4
102007	1	1	(100.0)	5
156000	1	0	(0.0)	0
205000	11	9	(81.8)	12
251002	1	1	(100.0)	2
261008	16	13	(81.2)	22
339007	2	2	(100.0)	10
359008	1	1	(100.0)	3
383006	2	1	(50.0)	2
390002	3	2	(66.7)	6
432007	2	1	(50.0)	1
474001	3	3	(100.0)	13
477000	3	3	(100.0)	14
496005	1	1	(100.0)	2
508003	3	2	(66.7)	3
999015	1	1	(100.0)	7
999023	21	20	(95.2)	40
999031	5	0	(0.0)	0
999040	6	1	(16.7)	1
999058	3	0	(0.0)	0

TOTAL 94 68 (72.3)

TOTAL NUMBER OF USERS 81
 NUMBER OF USERS SERVED 53 (65.4)
 AVERAGE NUMBER OF ITEMS PER USER 5.2

ANALYSIS OF ACCUMULATED STATISTICS

WEEKS 7147-7148

JOURNAL	NO OF ITEMS INPUT	NO OF ITEMS DISTRIBUTED		NO OF USERS RECEIVING ITEMS
		TOTAL	% OF I/P	
041008	8	6	(75.0)	17
043000	1	1	(100.0)	7
065004	3	3	(100.0)	7
066000	1	0	(0.0)	0
070008	1	0	(0.0)	0
074003	1	1	(100.0)	4
085005	1	0	(0.0)	0
094004	2	2	(100.0)	4
102007	1	1	(100.0)	5
114501	1	0	(0.0)	0
156000	1	0	(0.0)	0
205000	11	9	(81.8)	12
207003	1	1	(100.0)	4
219001	3	1	(33.3)	1
245002	1	1	(100.0)	1
250006	1	1	(100.0)	1
251002	1	1	(100.0)	2
256004	7	5	(71.4)	17
261008	16	13	(81.2)	22
339007	2	2	(100.0)	10
359008	1	1	(100.0)	3
369003	2	1	(50.0)	3
383006	2	1	(50.0)	2
390002	5	4	(80.0)	11
391009	5	4	(80.0)	15
398003	6	6	(100.0)	21
400008	21	19	(90.5)	31
428000	8	8	(100.0)	21
432007	2	1	(50.0)	1
474001	3	3	(100.0)	13
477000	3	3	(100.0)	14
488002	1	1	(100.0)	5
496005	1	1	(100.0)	2
508003	3	2	(66.7)	3
512000	8	8	(100.0)	22
999015	1	1	(100.0)	7
999023	21	20	(95.2)	40
999031	5	0	(0.0)	0
999040	66	52	(78.8)	43
999058	3	0	(0.0)	0

TOTAL 231 184 (79.7)

AVERAGE 115.5 92.0

