EUR 5079 e

COMMISSION OF THE EUROPEAN COMMUNITIES

MANAGEMENT OF BIBLIOGRAPHICAL DATA BY MEANS OF A SMALL COMPUTER

by

H.A. TASMAN

1974

Joint Nuclear Research Centre
Karlsruhe Establishment - Germany

European Institute for Transuranium Elements

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The ways chosen for disc storage, combines optimum information density with fast selective retrieval through the possibility of random access. One disc cartridge can hold all data from about 3900 entries, together with all necessary programs for loading and retrieval. Nearly all programs were written in FORTRAN, a few are in ASSEMBLER.

The present package contains programs for checking and loading the data, for editing a complete bibliography, either arranged alphabetically on the first author's name, or in order of ascending NSA-abstract number, and for selective retrieval, either on keyword, on author name (primary as well as secondary), on words in the title, or on reference text elements. Overlapped input/output and buffered disc communication greatly improve the speed of operation. To assist manual retrieval where no computer access is available, the attributed keywords can be printed out in matrix form.

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ABSTRACT

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KEYWORDS

DATA PROCESSING
HEAT TRANSFER
FUELS
PROGRAMMING

Management of Bibliographical Data by means of a Small Computer

Introduction

In our institute, a carefully coded bibliography has been established 1), on the specific subject of heat transfer and related phenomena in nuclear fuel materials. As the extent of the file exceeded the volume, which could be readily handled by classical means, an attempt was undertaken to use an available small computer (IBM-1130) for storage, editing, and retrieval. At present, we have information about 3908 titles, arranged in four sections, stored on one disc cartridge, which holds also the necessary monitor, loading, and retrieval programs. Our system has now been operating satisfactorily over two years.

Required Configuration

Our bibliography management programs operate on an IBM-1130 with 8K core memory, one disc drive, a 1442/6 card reader/punch, and a 1132 line printer.

Primary Data Card Files

In our system, the following information is stored:

- primary author's name, with year of publication and 'value code';
- all secondary authors' names;
- the complete title (in english);
- the complete bibliographical reference;
- a keyword, consisting of a combination of up to 16 from 32 general subject codes, and up to 13 from 42 material codes, attribution being based on the complete text.

We implemented the possibility of editing a complete bibliography, arranged alphabeticcally according to the first author's name. As some convention had to be chosen anyway for the arrangement of the primary data (on cards), also in view of corrections, we chose the same alphabetical sequence.

The input data are arranged on three card decks. In all three decks, col. 1-24 contain the primary author's name, left adjusted, with year, sequence letter, and value code. This suffices to define the corresponding entry uniquely. The first of the input decks also contains the keyword (partly in numerical, partly in mnemographic form), the second deck the secondary authors, and the third deck the title and reference.

---

1) J.Richter, H.-E.Schmidt, and H.A.Tasman: EUR-Report (to be published).

Data Storage on Disc

For each of the sections, the data are arranged in six disc files:

- the first of these files contains the primary author's name, with year, sequence letter, and value code, in crammed form (3 characters per 16-bit word). The numerical interpretation of the crammed name can be used for alphabetical sorting. The loading program attributes an entry number to each entry, starting with number 2, under which record number the entry is stored. Record number 1 stores the total number of entries in the section. The required file size is 1 sector / 40 entries.
- the second file contains the keywords as a bit pattern: in 8 16-bit words, only the bits corresponding to the attributed keys and codes are set to 1, which permits storing any combination out of 128 possible keys and codes in only 8 words. Space requirement is 1 sector / 40 entries.
- the third and fourth file contain the secondary authors' names in crammed form, in successive records in one file, (space requirement about 22 sectors / 1000 entries,) whilst the other file serves as a directory: for every entry with secondary authors, a 2-word record contains the position of the first of these names and their number, zeroes indicating, that no secondary authors were specified for the corresponding entry. For the directory, 1 sector / 160 entries is required.
- the fifth and sixth file contain the 'text', i.e. the complete title and the reference, in packed form (2 characters per 16-bit word), stored in successive 1-word records. Space requirement is about 187.5 sectors per 1000 entries. The sixth file, with 4-word records, serves as a directory, indicating in which section at which word the text of a specified entry starts, as well as the length of title and reference. This directory contains no zeroes, as every entry must have a title and a reference. 1 sector / 80 entries is required.

This arrangement combines optimum information density, with the possibility of random access.

A further file KWTXT, in common for all sections, contains the description of the keywords, and the file names for each of the sections.

One system cartridge can hold all loading and retrieval programs, plus the data from about 3900 entries, when arranged in four sections, the largest section being limited to about 2250 entries, when the FORTRAN compiler, the ASSEMBLER, and all unused routines have been deleted.

A simple routine is available, which lists the number of entries in each section, and the space allocated, used, and available in the disc files defined.

Editing a Complete Bibliography

For a complete bibliography, at first a temporary file is set up, which contains every secondary author's name only once, in alphabetical order. Combining this with the primary authors' file, the primary and secondary occurrences of the successive

names are established. Primary occurrences are printed complete, with the secondary authors, text, and keywords, up to 70 characters per line (DIN-A4-Format); secondary occurrences are listed as the numbers of the primary entries. If desired, editing of all sections may be done in one operation, equating at execution time the defined files to those required for the subsequent sections.

Selective Retrieval on Keyword

Selective retrieval is performed on any 'AND'-combination of keys and codes, subject to the same limitations as the original input data. If 'SEARCH' stands for the combination searched, and 'KEY' for the stored keyword, 'EOR' for the exclusive-OR operation, a match can be defined as the condition:

SEARCH.EOR.(SEARCH.AND.KEY) .EQ. 0.

As the basic operations EOR and AND are hardware, this search is fast, requiring only 24 seconds for scanning a file of 2000 entries.

After an array has been filled with the numbers of the matching entries, an (optional) additional limit on the minimum year of publication and/or a minimum value code may be imposed, to reduce the number of references to be printed.

Successive search requests are arranged on cards. Before listing the complete information about all matches, the number of corresponding references is printed. If the operator considers this as too large, he may shift to the next search card by depressing the INT.REQ. key. The search cards contain mnemonics for the section(s) on which the search is to be performed. Equating files is performed at execution time.

The output occurs in the same format as for the complete bibliography, including title and reference, which may allow a first judgement on the relevance of the answer.

Selective Retrieval on Author Name, Title Text, or Reference Text

Retrieval is implemented of all entries, where a specified name occurs either as primary or as secondary author. Matching is tested for the first 18 characters of the name only. Secondary occurrences are listed as complete information, rather than as reference to the number of the primary entry.

Matching may also be searched on title text (such as a word, or a sequence of words), or on reference text (such as the abbreviation of a journal). As these operations require, that the text for each entry be retrieved and unpacked before testing, the search is much slower than that on keywords. Matches are printed as they are found. No combination with keyword search is provided, nor is an additional optional limit on the year and/or the value code.

Title text search is not generally intended as an alternative for keyword search. The keyword attribution is based on the complete text, rather than on the title alone. However, title text search may be used for some verification of the keyword attributions, e.g. for checking, whether at least all entries with the word 'THORIUM' in the title got the appropriate material code attributed.

Bibliography arranged according to the NSA-Reference

For the field of this specific bibliography, the Nuclear Science Abstracts (NSA) is by far the most relevant secondary reference journal. Most entries have actually been referenced in the NSA. Photocopies of all relevant NSA-abstracts have been arranged separately, according to the abstract number. As far as possible, the english translation of non-english titles was copied from NSA.

Therefore, the editing of an NSA-arranged bibliography was implemented: A temporary file of 4-word records is filled with the entry number, NSA-volume number, and abstract number (double integer), of each entry, whose reference text contains the character sequence '(NSA '. From this file, successive arrays are extracted, containing the entry numbers of abstracts in successive NSA-volumes, arranged in ascending abstract number sequence. The output of the corresponding complete information is performed in the same format as for the alphabetical bibliography. The NSA-bibliography serves mainly for checking the input data against the NSA-abstract file.

Also for checking purposes, a shorter routine was written, which lists the entry numbers and primary author's names of entries without NSA reference.

Editing the Keywords in Matrix Form

To facilitate selective keyword search when no computer access is available, the keywords can be listed versus entry number in matrix form, showing an asterisk or other character in those columns where the corresponding key or code has been attributed.

Routines for Checking the Input Data

In the machine, the entries are basically stored in alphabetical primary author sequence. Although a sequence checking and sorting routine has been incorporated in the loading program of the primary authors' and keywords' deck, the time requirements for the sorting increase with the square of the file length, and quickly become prohibitive. Sorting a slightly disordered file of 2000 entries requires 20 hours of machine time!

Consequently, all input decks were strictly arranged in alphabetical order. This order also greatly helps for finding input cards for corrections.

As no mechanical sorter was available, a simple but efficient program was written, which only verifies the correct sequence, and which lists and stacker selects any cards, which are either duplicates of the preceding card, or out of sequence. A correct deck passes through at the rated speed, 300 cards/minute for the 1442/6. This sequence check is recommended each time a modified deck is to be loaded.

Another verification program prints those entries, where the year 'xy' with the author name is not found as the corresponding '(19xy)' in the reference text.

The use of selective title text search for input data verification has been indicated before.

Correction and Updating

No facility was implemented for modifying the stored data, or for adding new entries, other than through the loading of the complete modified deck(s).

Program Language

Nearly all routines are written in FORTRAN, a few are in ASSEMBLER. The use of 'IDEAL FORTRAN' for overlapped input/output, and buffered disc communication, greatly improves the operating speed.

Approximate Operating Times

Operation (section of 1000 entries)	Execution Time excl. Printing	Printing Time per (selected) entry
Sequence Checking	190 sec. 1)	zero, or 0.75 sec. per entry in error
Loading Primary Input Data		
Primary Authors, Keywords	9 min. 1)4)	0.75 sec. 3)
- as above -	5 hrs. 2)5)	as above
Secondary Authors	190 sec. 1)	0.5 sec. 3)
Titles and References	11 min. 1)	2.5 sec. 3)
Selective Retrieval		
Keywords Search	10 sec. 1) + 11 sec.	7 sec.
Author Name	15 sec. 1)	6.3 sec.
Text Search	2 min. 1)	6 sec.
Editing Complete Bibliography		
Alphabetically Ordered	34 min. 2)	10 sec.
NSA-Abstract Sequenced	3 min. 1) + 6 sec./vol.	6 sec.
Keywords in Matrix Form	5 sec. 1)	0.85 sec.

1) proportional to section length
2) proportional to square of section length
3) only if listing specified (CES 0 up)
4) correctly sequenced deck
5) deck slightly out of sequence

Application for Other Purposes

Although written for the specific use with the specialized bibliography on Heat Transfer in Nuclear Fuels, only relatively minor changes should be required to adapt these routines for other purposes. Our special application is implemented in the convention of the keyword specification on the input and search cards, in the routines that interpret these, in the section mnemonics, and in the way the keys and codes are listed.

KEYS AND CODES

KEY — TYPE OF INVESTIGATION —

1. THEORY, MODELS, CALCULATIONS OF TEMPERATURE PROFILES AND CONDUCTIVITY INTEGRALS
2. PROPERTIES OF NON-IRRADIATED MATERIAL
3. IN-PILE BEHAVIOR, IRRADIATION EXPERIMENTS, SIMULATION OF BURN-UP AND TEMPERATURE PROFILE
4. POST-IRRADIATION EXAMINATION, PROPERTIES OF IRRADIATED MATERIAL
5. LOW-TEMPERATURE STUDIES (T BELOW 273K)
6. STUDIES AT INTERMEDIATE TEMPERATURES (T BETWEEN 273 AND 1500K)
7. HIGH-TEMPERATURE STUDIES (T ABOVE 1500K)
8. CONTACT CONDUCTANCE, STUDIES OF FUEL-TO-CLADDING HEAT TRANSFER
9. DEVELOPMENT OF EXPERIMENTAL METHODS

KEY — MATERIAL —

10. SINGLE CRYSTALS
11. SINTERED MATERIAL, HOT-PRESSED MATERIAL
12. LOOSE AND COMPACTED POWDERS (SWAGED, VIBRATED), COATED PARTICLES
13. FUSED AND ARC-CAST MATERIALS (ARC-MOLTEN, DROP-CAST), FILMS

KEY — FACTORS AFFECTING THE INVESTIGATED PROPERTIES —

14. POROSITY, DENSITY, FABRICATION PROCEDURES IN GENERAL
15. STOICHIOMETRY, CONCENTRATION OF CONSTITUENTS, COMPOSITION
16. ADDITIVES, CERMETS, MIXED COMPOUNDS, MULTI-COMPONENT SYSTEMS, ALLOYS, COMPOSITES
17. IRRADIATION EFFECTS, RADIATION DAMAGE, BURN-UP EFFECTS
18. TIME, TRANSIENTS
19. (NOT USED)

— OTHER PHENOMENA INVESTIGATED —

KEY — IN RELATION WITH HEAT TRANSFER STUDIES —

20. ELECTRICAL PROPERTIES, ELECTRONIC STRUCTURE
21. HEAT CAPACITY, ENTHALPY, SPECIFIC HEAT
22. OPTICAL PROPERTIES, INTERNAL RADIATION, EMITTANCE
23. MICROSTRUCTURE, GRAIN GROWTH
24. FISSION GAS RELEASE, FISSION GAS PRESSURE
25. FISSION PRODUCT DISTRIBUTION
26. MELTING POINT, CENTRAL MELTING, MOLTEN MATERIAL
27. MECHANICAL PROPERTIES, IN PARTICULAR THERMAL EXPANSION
28. (NOT USED)
29. MODELS

KEY — TYPE OF PUBLICATION —

30. REVIEW PAPER, DISCUSSION, TABLES, BIBLIOGRAPHY

W (IN COL. 56) - WORK ON HEAT TRANSFER

— MATERIAL CODES —

CODE	-ANION-	CODE	-CATION-
U	URANIUM	O	OXIDES
P	PLUTONIUM	C	CARBIDES
T	THORIUM	N	NITRIDES
X	AMERICIUM, CURIUM, NEPTUNIUM	S	SULFIDES, SELENIDES
M	URANIUM-PLUTONIUM	F	PHOSPHIDES, BORIDES
V	URANIUM-THORIUM	I	SILICIDES
Q	PLUTONIUM-THORIUM	A	OXI-CARBIDES
R	URANIUM-PLUTONIUM-THORIUM	B	OXI-NITRIDES
K	COATED PARTICLES	D	OXI-CARBO-NITRIDES
		E	CARBO-NITRIDES

— ADDITIVES —

THE CODES -
H, ZR, GA, AL, NB, MO, CR, CU, TI, FE, Y, U, SI, B , W, NI, CE, CA, MG, BE -
STAND FOR THE CORRESPONDING CHEMICAL ELEMENTS
SS = STAINLESS STEEL, FS = FISSIUM, ME = METALS IN GENERAL

VALUE CODES (QUAL), FOR INTERNAL USE ONLY

1. WORK OF LITTLE RELEVANCE TO THE PROBLEM
2. MODEST CONTRIBUTION TO THE PROBLEM
3. GOOD WORK, SOMEWHAT OUTDATED
4. SPECIALIZED WORK
5. SPECIALIZED WORK OF IMMEDIATE INTEREST
6. IMPORTANT
7. VERY IMPORTANT, FUNDAMENTAL

Subroutines and Functions Used, other than Monitor Programs

CED console entry switches input 1)
CNVRT conversion routine 1)
CRAM-UNCM cramming/uncramming routine 1)
DFIX conversion real to double integer 1)
DINT-EINT interrupt request servicing routine 4)
FILES routine for equating file to name at execution time 3) 6)
FILL filling integer array 2)
FLSET equates files 1 through 8 to those for specified section
GT190 error message for excessive references, *NSA* only
ICESW input from part of console entry switches 3)
INT sign of double integer 1)
IOND waiting loop for pending interrupts 2)
INTRR prints message when print-out interrupted through *INT.REQ.*-key
IOR-IAND-IEOR logical AND, OR, exclusive-OR 3) 7)
IREST remainder of integer division
JTXTS comparison of integer arrays for alphabetical sequencing
KWCP keyword composer, integer array to bit pattern
KWDC keyword decoder, bit pattern to integer array
KW1 keyword reader for keyword search, interprets, and yields integer array
MASI-MSIA-MADI conversions between A1-format and single and double integers 1)
MIN0 minimum of two integers 3)
MOVE move integer arrays 2)
NAUT error message *AUTHOR NAME NOT PRESENT*
NOBIT value of bit in integer 5)
NRDFT returns number of records in file 3) 8)
PACK conversion *A1*-array to *A2*-array 1)
PAGE page shifting and numbering
PAGEX dummy form of *PAGE*
PAUS allows *PAUS0*-call in *PAUSX*-environment
PAUSE-PAUSX links to *EOJ* 3) 7) in case of normal or error *PAUSE*
PAUS0 Pause Message Print-Out 3) 7)
PR1FL printing routine for complete information
READ overlapped card reading 1)
READ8 buffered disc reading from file 8, 160-word buffer (shorter than *STRD8*, which has 320-word buffer). Record length must be divisor of 320.
RETRD delay loop
REFS routine that retrieves reference text of specified entry
SIGNS searches last occurrence of character in array
SKSP skip and space for 1132 printer 1)
SR1NR searches entry number corresponding to crammed author name
SR2NR searches primary and secondary occurrences of author name
STACK stacker select 2)
STO1 buffered disc writing, file 1, record length divisor of 320
STO3 buffered disc writing, file 3, record length divisor of 320
STO4 buffered disc writing for file 4, record length 3, 6, or 53
STO5 buffered disc writing, file 5, record length divisor of 320
STRD2 buffered disc reading/writing, file 2, record length divisor of 160
STRD6 buffered disc reading/writing, file 6, record length divisor of 318
STRD8 buffered disc reading/writing, file 8, record length divisor of 320
TITL retrieves title text of specified entry
TT1X checks whether title or reference text exceeds 320 characters
UNPK corrected *IDEAL* unpacking routine, *A2* to *A1*; faster and shorter! 9)
WRTD-WRTS-WRTT overlapped printing routines 1)

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1) *IDEAL FORTRAN*, IBM-1130-03.8.002
2) Commercial Subroutine Package (*CSP*), IBM-1130-SE-25x
3) CCT-Smorgaasbord Package
4) see: CAST 41 (August 1971)
5) P.R.Rietmeyer, CAST 33, p. 19-6/6 (Oct. 1970)
6) author: K.A.Foster
7) author: Will Baden
8) plagiat from John Horn
9) see also: CAST 38 (May 1971), p. 21-1/1

Instructions for Use

Conventions for the Input Decks

None of the decks may contain imbedded blank cards, as these signal the end of the deck.

The primary authors' names and keywords are punched in the first decks in the

FORMAT(20*A*1,*I*2,*A*1,*I*1,*T*26,15*I*2,*T*56,*A*1,*T*61,5*A*1,5*A*1,3(2*A*1,1*X*))

NAME YR SL VC KEYS W CAT ANI ADDITIVES

where *NAME* stands for the primary author's name, left adjusted, no special characters other than ., /, &; *YR* are the last two digits of the year of publication; *SL* is a sequence letter in the year of publication; *VC* is the value code; *KEYS* are up to 15 numbers of 2 digits each, >0, ≤31; *W* : W or blank, W indicating work on Heat Transfer in the narrower sense; *CAT* are up to 5 letter-coded cations; *ANI* are up to 5 letter-coded anions; *ADDITIVES* are up to 3 letter-coded additives.

The secondary authors are punched in the second deck in the following

FORMAT(20*A*1,*I*2,*A*1,*I*1,*I*1,3(18*A*1))

NAME YR SL VC SQ SEC.AUT.

where col. 1-24 are identical to those for the corresponding card in the first deck, *SQ* = sequence number 1, 2, ..., allowing up to 9 cards per primary entry, and *SEC.AUT.* stands for up to 3 secondary author names per card, each left-adjusted in field of 18.

The third deck contains the title and reference in the

FORMAT(20*A*1,*I*2,*A*1,*I*1,*I*1,54*A*1)

NAME YR SL VC SQ TEXT.

Col. 1-25 have the same meaning as in the second deck. The title must be separated from the reference by an asterisk (*), the reference must be ended by a dollar sign ($). Asterisk and dollar sign may not occur otherwise. Text may be continued in col. 27-80 of up to 9 cards, identical in col. 1-24, and correctly sequenced in col. 25. Neither title nor reference may exceed 320 characters, not counting the * nor the $.

Sequence Checking

```
// JOB
// XEQ SEQ
.
. Deck to be tested

≥ 2 blank cards
```

Cards, that are either out of SEQuence, or DUPplicates of col. 1-25 of the preceding card, are stacker selected and listed. Correctly sequenced cards pass through at the rated speed. *SEQ* does not verify, whether sequencing in col. 25, if applicable, starts correctly with 1 for each primary entry.

Loading Primary Authors and Keywords

```
// JOB
// XEQ LDAUT    1
*FILES-card (see below)
.
. Primary authors and keywords deck
.
≥ 2 blank cards.
```

Cards which are punched in col. 25, are stacker selected.The author name of cards containing illegal keys or codes, are listed, with a self-explaining error message, and not stored. The *FILES-card defines the section:

section 1, oxide fuels	*FILES(1,*FILOX*),(3,*AUTOX*),(6,*OXTXT*)
section 2, carbides and nitrides	*FILES(1,*FILCN*),(3,*AUTCN*),(6,*CNTXT*)
section 3, cermets	*FILES(1,*FILCR*),(3,*AUTCR*)
section 4, metallic fuels	*FILES(1,*FILME*),(3,*AUTME*),(6,*METXT*)

When dataswitch 0 is raised, the deck is listed in a slightly expanded form.

Loading the Secondary Authors

```
// JOB
// XEQ LDAT2    1
*FILES-card, general type (see below)
.
. Secondary authors' deck
.
≥ 2 blank cards
```

Cards which are out of sequence, or which contain either a non-existing primary author name, or no secondary name at all are not stored, and stacker selected, with a self-explaining error message. If dataswitch 0 is up, the deck is listed.

Loading the Text Deck

```
// JOB
// XEQ LDTXT    1
*FILES-card, general type (see below)
.
. Text deck, beginning with section header card
.
≥2 blank cards
```

The error messages *OUT OF SEQUENCE* and *AUTHOR NAME NOT PRESENT* have the same meaning as for the secondary authors. *LDTXT* tests finally, whether all entries got title and reference; listing, if applicable, those, where *TEXT* is *MISSING*. Missing text must be complemented, before the files can be used. Raising dataswitch 0 causes the text deck to be listed as it is read.

Loading the Keywords Text

As the loading of the keywords text is normally required only once, the program *KWTXL* does not reside permanently on the disc. The following sequence is required:

```
// JOB
// DUP
*DFILE          UA  KWTXT   11
*STORE      CD  WS  KWTXL
.
. KWTXL-Deck, DSF-Format
.
// XEQ          1
*FILES(9,KWTXT) (or any general *FILES-card)
.
. Keys and Codes Deck (90 cards)
.
card with number of sections, FORMAT(I2)
all *FILES-cards of subsequent sections, general type
≥1 blank card
```

After loading, the keys and codes deck is retrieved and listed. Dataswitch 0 up suppresses the listing of the value code meanings.

General type of *FILES-card

```
section 1, oxide fuels :
       *FILES(1,FILOX),(3,AUTOX),(4,OXAT2),(5,OXATN),(7,OXTXT),(8,OXTXN),(9.KWTXT)
section 2, carbides and nitrides :
       *FILES(1,FILCN),(3,AUTCN),(4,CNAT2),(5,CNATN),(7,CNTXT),(8,CNTXN),(9.KWTXT)
section 3, cermets :
       *FILES(1,FILCR),(3,AUTCR),(4,CRAT2),(5,CRATN),(7,CRTXT),(8,CRTXN),(9,KWTXT)
section 4, metallic fuels :
       *FILES(1,FILME),(3,AUTME),(4,MEAT2),(5,MEATN),(7,METXT),(8,METXN),(9,KWTXT)
```

Editing a Complete Bibliography

```
// JOB
// DOCTT    1
any *FILES-card, general type
≥ 1 blank card
```

The first and the last section to be edited, should be entered in the dataswitches 8-11 and 12-15, respectively. CES 8-15 down, causes all sections to be edited. Raising dataswitch 0, suppresses the output of the value indicator. Raising dataswitch 1, suppresses title and reference output. Unless dataswitch 4 is raised, the bibliography is followed by a listing of the keys-and-codes text.

DOCTT requires a *WORKING STORAGE* of about 50 sectors per 1000 entries for the temporary alphabetical secondary authors' file.

Bibliography of a Specified Author

```
// JOB
// XEQ DCAUT
card, containg author name in col. 1-18, left adjusted
blank card (all sections scanned),
       or card with sections to be scanned (first through last) in FORMAT(2I1)
card, containing next author name
blank card, or sections card
.
.
≥3 blank cards
```

Dataswitches 0 and 1 are coded as in *DOCTT*, see above. The maximum number of primary and secondary references per author name, is 80 each, references beyond the maximum are skipped.

Selective Retrieval on Keyword

```
// JOB
// XEQ EUDOC     1
*LOCALEUDOC,KW1,KWCP,PR1FL
as many search cards as required
≥ 2 blank cards
```

The search cards must contain an asterisk (*) in col. 1, and mnemonics for the sections to be scanned in col. 2-3, 4-5, 6-7, 8-9, where *OX* stand for oxide fuels (section 1), *CN* for carbides and nitrides (section 2), *CR* for cermets (section 3, and *ME* for metallic fuels (section 4). Unused space is left blank. Col. 10-20 are listed, but not interpreted otherwise; they may be used for search identification. If col 21-22 are not blank, they are taken as the minimum year of publication. Col. 24 imposes a minimum value code if not blank. Col. 26-79 contain the searched keys and codes, in the same *FORMAT* as in the primary authors' and keywords' deck. Before printing the complete information, the number of corresponding references is listed. If the operator considers this to be too large, he may shift to the next search card by depressing the *INT.REQ.* key. Dataswitches 0 and 1 are interpreted as in *DOCTT*.

Selective Retrieval on Title Text or Reference Text

```
// JOB
// XEQ TITLE  or:  // XEQ REFS
search card #1
sections card #1
search card #2
sections card #2
.
.
≥ 3 blank cards
```

Matching is searched for the character chain, up to the rightmost non-blank character in each search card. A blank as the rightmost searched character is imposed by punching only this rightmost blank as a dollar sign ($), which is converted into a blank before the search is started. The sections cards are coded as for *DCAUT*, *FORMAT*(2*I*1),, a blank card causing a scan through all sections. Dataswitches 0 and 1 are coded as for *DOCTT*.

NSA-Bibliography

As the NSA-Program does nor reside permanently on the disc, the following sequence is required:

```
// JOB T
// DUP
*STORE       CD  UA  NSA
.
. NSA-Deck, DSF-Format
.
// XEQ NSA       2
*LOCALNSA,REFS,PR1FL,CNVRT,SD,GT190
*FILES-card, general type, specifying section
card, specifying first and last volume of NSA to be edited, FORMAT(2I2)
≥ 1 blank card
```

The maximum number of abstracts per NSA- volume, from the specified section, is 190, any excess being skipped. Multiple references are correctly handled. Dataswitches 0 and 1 are coded as for *DOCTT*.

Missing NSA-References

The program for listing missing NSA- references does not reside permanently on the disc:

```
// JOB
// DUP
*STORE       CD  WS  NSAY
.
. NSAY-Deck, DSF-Format
.
// XEQ
≥ 1 blank card
```

Editing Keywords in Matrix Form

The program *ASTER* does not reside permanently on the disc:

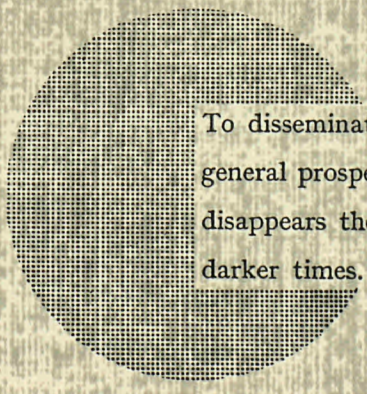
```
// JOB T
// DUP
*STORE       CD  UA  ASTER
.
. ASTER-Deck, DSF-Format
.
// XEQ ASTER    1
*FILES-card, general type, specifying section
≥ 1 blank card.
```

Checking Year-Correspondence

The checking of the year-correspondence presents an additional test of the input data, which is hardly performed more than once. The program *YEAR* does not reside permanently on the disc:

```
// JOB T
// DUP
*STORE       CD  UA  YEAR
.
. YEAR-Deck, DSF-Format
.
// XEQ YEAR
≥ 1 blank card
```

Only those entries are listed, where the year with the authors name and the year in the reference do not correspond. *YEAR* scans all sections.



To disseminate knowledge is to disseminate prosperity — I mean general prosperity and not individual riches — and with prosperity disappears the greater part of the evil which is our heritage from darker times.

Alfred Nobel

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