

ICL

NIC

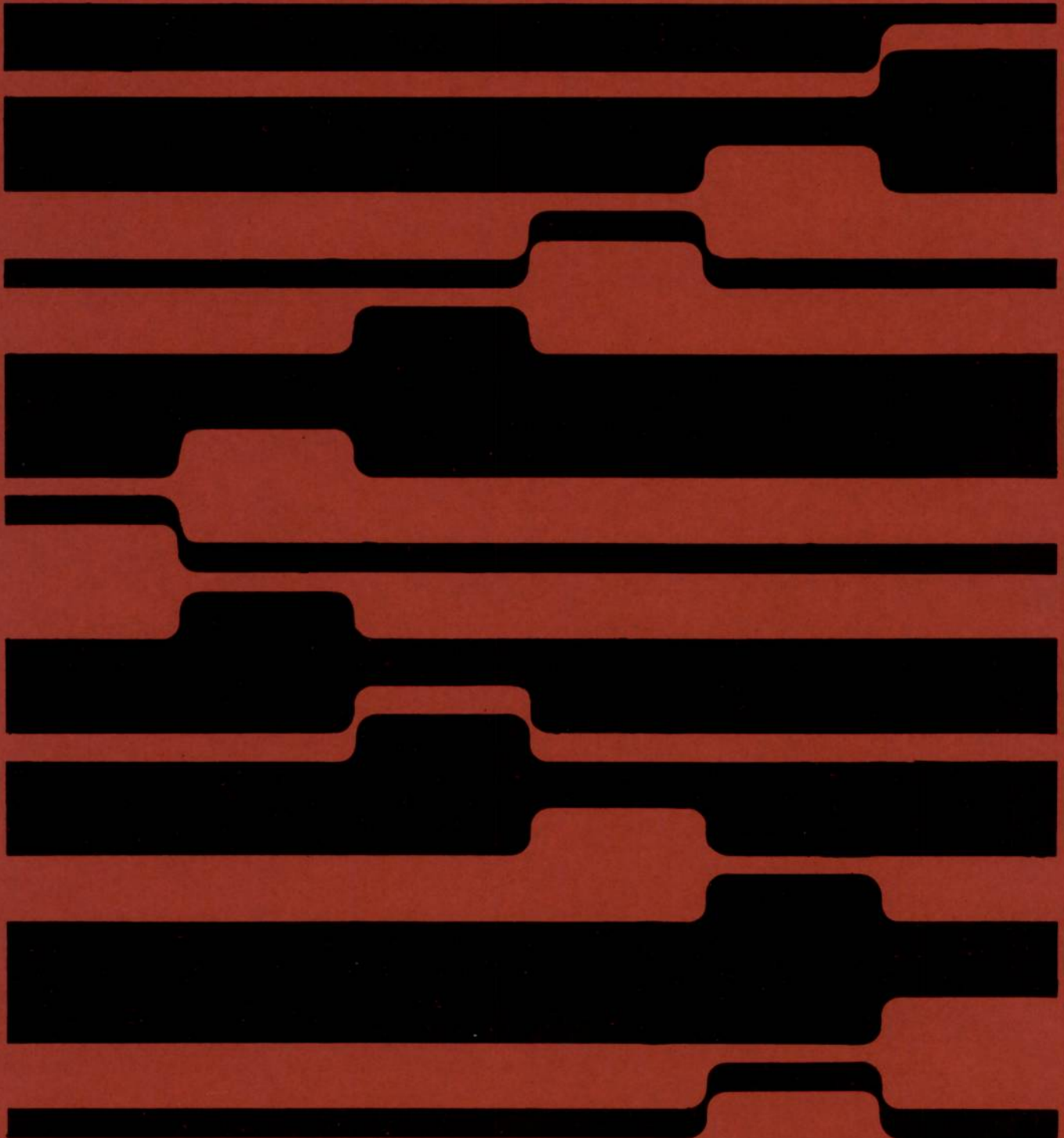
1900 Series

OXFORD UNIVERSITY COMPUTING LABORATORY

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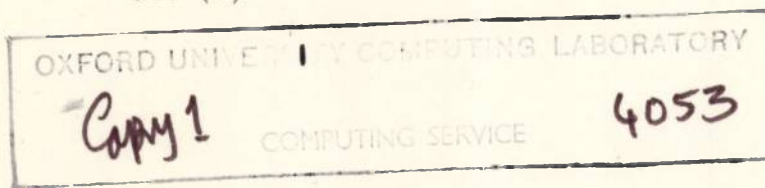


MANUAL (NOTICE NO.)

4/9/68

4053

NIC (1)

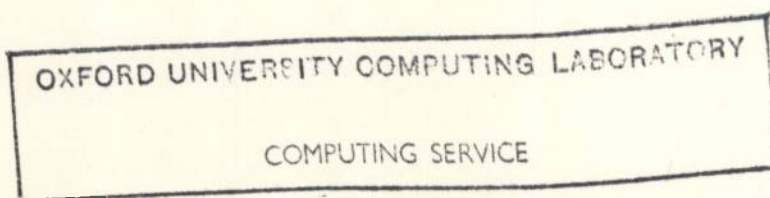


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NIC SYSTEM

A new version of the generator program, #X711/7, and of the NIC master file have been issued. These correct the errors reported in Software Notice 1900/274, items 894 and 895.

FORM 1/230/45(8.68)



Page 1

4033

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NIC GENERATOR PROGRAM AND MASTER FILE

New versions of the NIC generator program, X711/8, and of the NIC master file, have been issued.

User program generated by these will check for the paper low condition, and, when it is encountered will give a message, 'DISPLAY: PL', on the console typewriter, and disengage the line printer.

FORM 1/230/45(10.68)

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MANUAL NOTICE NO. 1

64.73

Page (2)

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NIC GENERATION PROGRAM AND MASTER FILE

New versions of the NIC Generator program, ZVI1-8, and of the NIC Master File, have been issued.

User programs generated by these will check for the paper low condition, and, when it is encountered will give a message (DISPLAY: PL) on the console typewriter, and discharge the printer.

CONTROL UNIT 1000  
SERIAL NO. 1000

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MANUAL (NOTICE NO.)

5/3/69

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NIC (3)

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NIC SYSTEM

A new mark (mark 9) of the NIC system has been issued correcting the errors reported in Software Notice 1900/374, items 178, 179 and 180, and Software Notice 1900/386, item 217.

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**ICL**

**NIC**

**1900 Series**

**Nineteen hundred  
Indexing  
and  
Cataloguing**

OXFORD UNIVERSITY COMPUTING LABORATORY

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Technical Publication 4053

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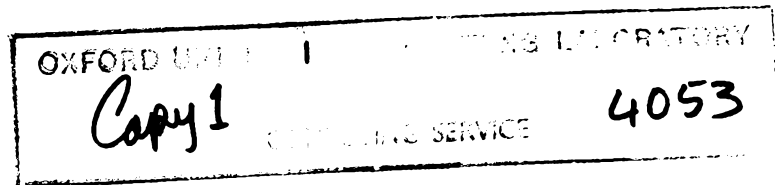
First Edition January 1967

Second Edition September 1967

Reprinted November 1969  
(incorporating Amendment List 1)

Issued by Technical Publications Service  
International Computers Limited  
Head Office: ICL House, Putney, London SW15  
Produced by ICL Printing Services  
at Letchworth, Hertfordshire

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# Preface

The origins of the I.C.T. NIC (Nineteen hundred Indexing and Cataloguing) system are to be found in the needs of libraries. Consequently much of the terminology used to describe the system is library terminology. However, the system has considerable scope for application outside libraries (e.g. parts listings or drugs), that is, it is a general purpose system for processing non-quantitative or natural information. This manual describes the system as it might be applied to documentation of information. The first two chapters give a general description of the system. Succeeding chapters describe in detail the tape files used, data preparation, and the printed output obtained. Next, full computer operating procedures are explained and a worked example is given. The final three chapters examine some aspects of the application of NIC in libraries and in commerce, and of the use of other information retrieval techniques on NIC files. Appendices give details of volumes and timings and also a glossary of some of the terminology used.

Grateful acknowledgement is made to Mr. J.R. Sharp for permission to adapt his SLIC (Selective Listing in Combination) technique for computer use. Further reading on this technique may be found in Mr. Sharp's book entitled 'Some Fundamentals of Information Retrieval' (published by Andre Deutsch Ltd. 1965), in American Documentation Vol. 17, No. 1, January 1966 ('The SLIC Index') and in the report of the ASLIB annual conference in September, 1964.



# I Introduction

The I.C.T. NIC system (Nineteen hundred Indexing and Cataloguing) has been developed to meet the needs of users requiring regular listing and cataloguing of moderately large quantities of documents periodically. Use of NIC will help to reduce the time, cost and effort involved in the manual cataloguing of such documents. It will enable the information centre to offer a vastly improved service to its users by facilitating the presentation of information related to these documents in a manner giving the maximum coverage with the minimum number of catalogue entries. This meets the need for 'current awareness', that is, the speedy listing and presentation of information as soon as it is received. To enable the user to achieve this, NIC offers a combination of several facilities, the precise combination being chosen by the user to meet his specific needs.

The NIC output consists of a selection or combination of the following:

- SLIC index (Selective Listing in Combination),
- Chain index,
- Subject catalogue cards,
- Bibliography (or other non-dependent descriptive information),
- Author index.

It is possible to combine any of these options, with the exception of SLIC and chain, which are mutually exclusive. To achieve these outputs, the first thing that a user must do is to choose for each document up to five descriptors (words or phrases) which in his opinion adequately describe the contents of the document. These descriptors should be chosen from a controlled vocabulary or thesaurus suited to the needs of the user. They are punched into cards or paper tape together with other relevant information concerning the document reference number, author and bibliography details. The system reads this information onto magnetic tape and sorts it into the required output order. The system then performs the necessary editing to produce the SLIC or chain indexes.

## SLIC INDEX

For a SLIC index, the chosen descriptors for each document, which are not necessarily related to each other, are merged into the minimum number of combinations necessary to give the maximum access. For instance, a string of three descriptors A, B and C could be combined to give the following maximum number of combinations.

A B C	B C	C
A B	B	
A C		
A		

However, the SLIC facility in the NIC system will make AB and A redundant because they are already found in ABC, and B redundant because it is already found in BC. The SLIC index for this string of descriptors will therefore be:

A B C
A C
B C
C

Thus the maximum of seven possible combinations has been reduced to four, but the accessibility offered by the maximum combination is still given by the SLIC combination.

## **CHAIN INDEX**

In a chain index, the chosen descriptors are deliberately interrelated, each descriptor being a subset of the one before it. Thus for a string or a chain of five related descriptors A, B, C, D and E (which are verbal and not symbolic) the first entry to be generated by the computer is ABCDE. Thereafter, each successive entry drops off the left-hand descriptor of the preceding entry. Thus in our example, the five entries generated would be:

A B C D E

B C D E

C D E

D E

E

These SLIC or chain indexes can be printed out in the form of sheet catalogues, and also in the form of 5-inch × 3-inch cards as used by most libraries for catalogue filing and information retrieval. There is one card for each descriptor for each document, and the full set of descriptors is printed at the bottom of the card. The computer produces these card in sequence ready for filing. Author and bibliographic lists are printed on continuous catalogue sheets. Finally, all periodic lists can be cumulated. The cumulated files may be printed out at the option of the user to give indexes suitable for retrospective searching. Caution should be used, however, before cumulating a SLIC index, as a file of unwieldy proportions could be produced.

## **MINIMUM 1900 CONFIGURATION**

One 8K processor (with 5,500 words of available store),  
one card or paper tape reader,  
one 120 or 160 print position line printer,  
four magnetic tape decks (not cassettes).

## 2 The NIC System

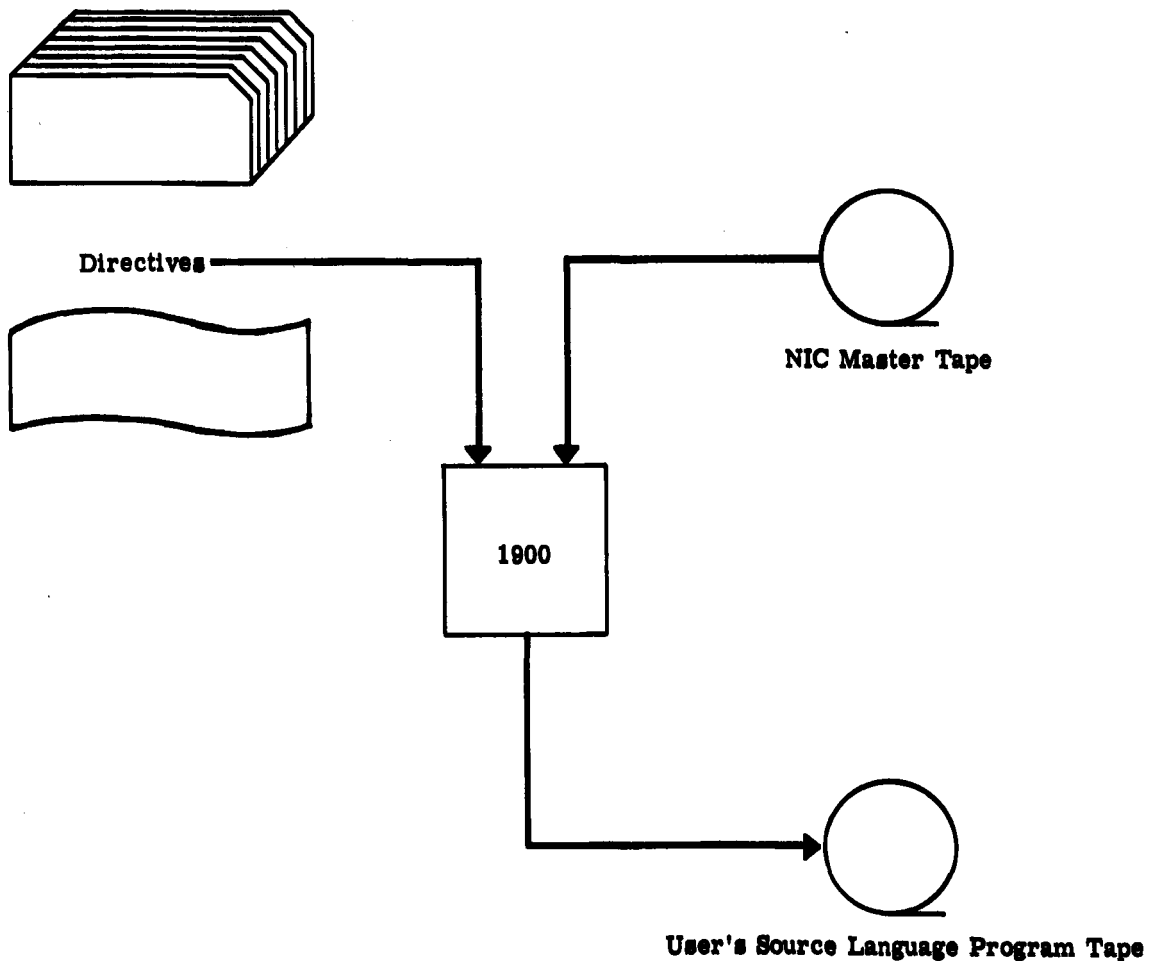
The NIC system consists of three basic computer runs: an initial generator run and two further runs formed by the generator run. These are: run 1 of the user system, in which data is read in, validated, and assembled into the required accession file, and run 2 of the user system, in which the cumulation file (where required) is updated - and may also be printed out - and the accession file is edited and printed

### GENERATOR RUN

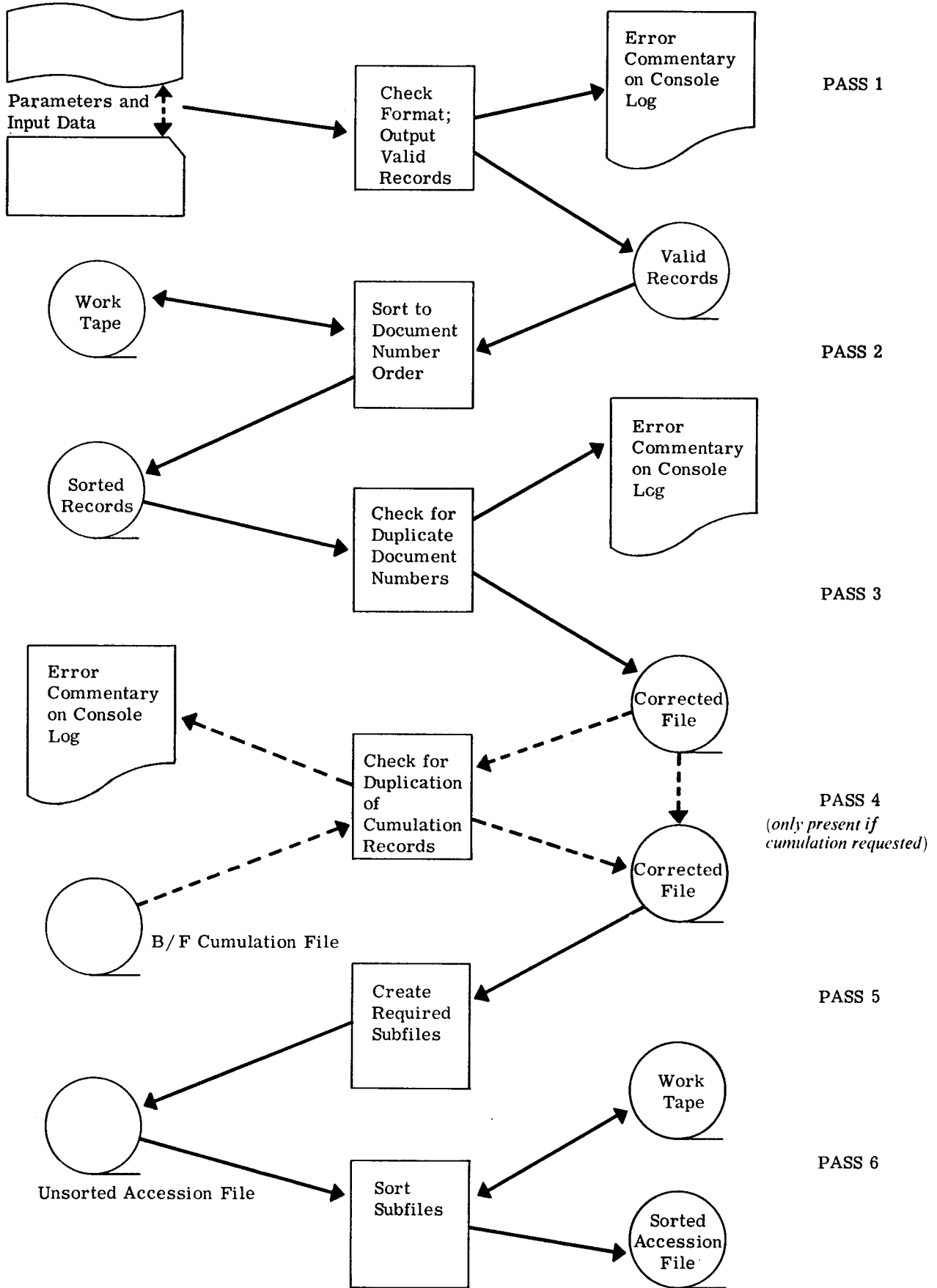
The generator run forms the system requested by the user. The specification for the system is read from directives on cards or paper tape and is then validated in two respects: the format of the specification is checked, then the logic of the specification is checked. If an error is discovered, the run is halted and an error message given on the console typewriter; if the specification is valid, the requested user system is formed and written in source language to a magnetic tape. This having been completed, the generator program deletes itself from the computer.

The generated user system programs must then be compiled.

#### *Generator Run*



User's System: Run 1



## **RUN 1**

Run 1 is the first part of the user's system. It controls input to the system, reading the data, validating, creating the accessions file and sorting its individual subfiles (see Chapter 3).

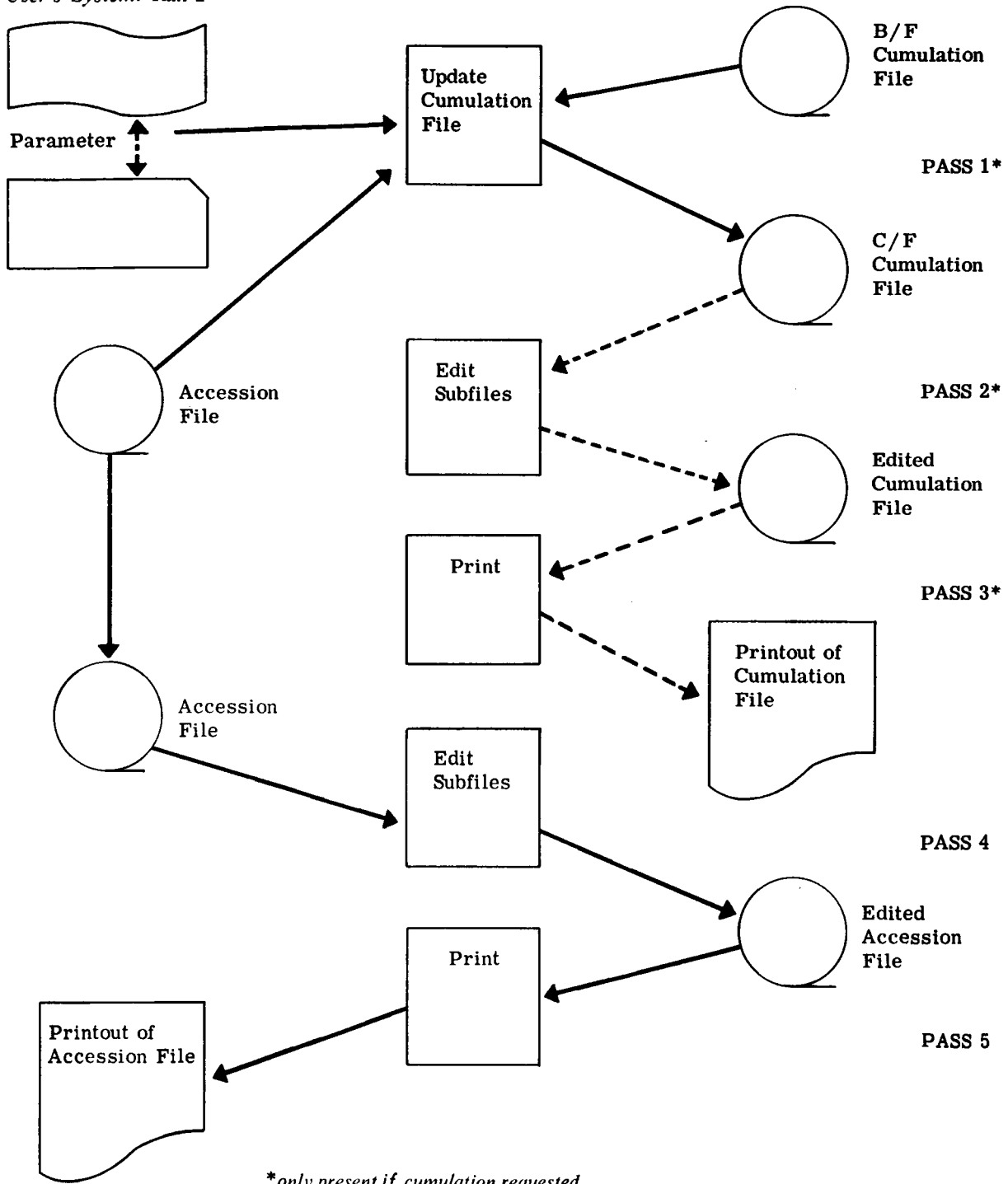
In the *first pass* of run 1, parameters (where cumulation is required) and data are read in from paper tape or cards and checked for format errors. If an error is found, the appropriate record is rejected and an error message typed out. Records with no format errors are written to a magnetic tape file.

This file is sorted into document number order in the *second pass* and a check is made in the *third pass* for duplication of document numbers. If two or more records are found with the same document number, an error message is typed out and all the documents with that document number are rejected.

Where cumulation is to take place, a further check is carried out in *pass 4* checking that no duplication of document numbers already present on the cumulated file occurs.

The required subfiles of the accession file are then created in *pass 5* and in the *final pass* each of these subfiles is sorted.

*User's System: Run 2*



**RUN 2**

Run 2 processes the file formed in run 1, and produces the printed output of the system.

In the *first pass*, the cumulation file, where present, is updated. In *passes 2 and 3*, it is edited and printed out (where the user so requests). The accession subfiles are edited in *pass 4*, and printed out in *pass 5*. When a card catalogue print is requested, the program halts to allow a change of stationery.

Run 2 does not have to be carried out immediately following run 1.

### 3 System Files

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#### MASTER FILES

The master files of the NIC system are known as the accession file and the cumulation file; they are held on standard I.C.T. 1900 series magnetic tapes.

#### Accession File

The accession file contains the records of the documents which have been added to the catalogue since the previous run; it must never occupy more than a single reel of tape.

The accession file may comprise up to four subfiles:

- Information,
- Author,
- SLIC or Chain,
- Card catalogue,

of which the information subfile is obligatory, and the remainder optional. Each subfile is preceded and followed by a user sentinel containing an indication of the name of the subfile and whether it is the beginning or the end of the subfile.

The complete file begins with a header label and start-of-data sentinel and is terminated by an end-of-file trailer label.

#### Example

#### TYPICAL ACCESSION FILE: SINGLE-REEL

HEADER LABEL	START-OF-DATA SENTINEL	INFORMATION START SENTINEL	INFORMATION SUBFILE	INFORMATION END SENTINEL	AUTHOR START SENTINEL	AUTHOR SUBFILE
AUTHOR SUBFILE continued	AUTHOR END SENTINEL	SLIC START SENTINEL	SLIC SUBFILE	SLIC END SENTINEL	CARD CAT. START SENTINEL	CARD CAT. SUBFILE
CARD CAT. SUBFILE continued	CARD CAT. END SENTINEL	END-OF-FILE TRAILER LABEL				

#### Cumulation File

The cumulation file will usually contain the records of all documents which have been added to the catalogue since NIC was first used; it may occupy more than one reel of tape.

The cumulation file may comprise up to three subfiles:

- Information,
- Author,
- Chain or SLIC.

The format is basically the same as that of the accession file.

The following procedure is adopted if the amount of data exceeds the capacity of one reel of tape: when a tape becomes full, it is terminated with an end-of-reel trailer label; the next reel of tape is then opened with a header label and start-of-data sentinel, followed immediately by the next data block.

**Example**

**TYPICAL CUMULATION FILE: MULTI-REEL**

1st reel

HEADER LABEL	START-OF-DATA SENTINEL	INFORMATION START SENTINEL	INFORMATION SUBFILE	INFORMATION END SENTINEL	AUTHOR START SENTINEL	AUTHOR SUBFILE	END-OF-REEL TRAILER LABEL
--------------	------------------------	----------------------------	---------------------	--------------------------	-----------------------	----------------	---------------------------

2nd reel

HEADER LABEL	START-OF-DATA SENTINEL	AUTHOR SUBFILE continued	AUTHOR END SENTINEL	CHAIN START SENTINEL	CHAIN SUBFILE	END-OF-REEL TRAILER LABEL
--------------	------------------------	--------------------------	---------------------	----------------------	---------------	---------------------------

3rd reel

HEADER LABEL	START-OF-DATA SENTINEL	CHAIN SUBFILE continued	CHAIN END SENTINEL	END-OF-FILE TRAILER LABEL
--------------	------------------------	-------------------------	--------------------	---------------------------

**Deletions**

Records may be deleted from the cumulation file as follows: an input record is punched in exactly the same way as for a normal run, except that the source field (see Chapter 4, page 18) contains only the characters ZZZZ in the first four character positions. This produces the following results: the current accession file will contain normal author and SLIC or chain entries, a bibliography record with only the document number and the message RECORD DELETED, and no catalogue card entry; on the cumulation file, all entries produced from the original input record will be deleted.

It is stressed that the punching of the document number, authors, and descriptors of the record to be deleted must be identical to that of the original entry; if it differs in any respect, complete deletion will not be effected.

If it is required to correct an erroneous record, the original entry must be deleted on one run, and the correct version input on a subsequent run.

**SUBFILES**

The order of the subfiles will always be as shown above; for example, if no author index is required and a chain index is preferred to SLIC, the order of the subfiles in the accession file will be:

- 1 Information
- 2 Chain
- 3 Card catalogue

Assuming that the first two of these are to be cumulated, the cumulation file will contain:

- 1 Information
- 2 Chain

The card catalogue will never appear in the cumulation file, since its cumulation is effected by filing manually the cards produced in the normal run.

### Information Subfile

The information subfile contains all bibliographic information, that is, author(s), title, and source, plus the descriptors. The descriptors are suppressed during the printing of the bibliography index, so no 'bibliography' subfile is created as such.

Each information record is contained in a fixed-length block of 836 characters, one block per document; the records are sorted to document number order within the subfile.

#### Example

	BLOCK LENGTH	DOCUMENT NUMBER	AUTHOR(S)	DESCRIPTORS	TITLE	SOURCE	
No. of characters	4	8	124	100	400	200	

### Author Subfile

Author records are created in fixed-length blocks, one block per document per author; those for individual authors are 32 characters long, those for corporate authors 136 characters long.

#### Examples

##### SINGLE AUTHOR BLOCK

	BLOCK LENGTH	AUTHOR'S NAME	DOCUMENT NUMBER	
No. of characters	4	20	8	

##### CORPORATE AUTHOR BLOCK

	BLOCK LENGTH	CORPORATE AUTHOR INDICATOR	AUTHOR'S NAME	DOCUMENT NUMBER	
No. of characters	4	4	120	8	

All records with a common author are then amalgamated; the new records so produced are of variable length, with maxima of 432 and 528 characters for individual and corporate authors respectively. These figures represent a maximum of 50 document numbers for each author; any additional document numbers will be contained in a new record, and the author's name will be repeated in the printout.

The final order of the records within the subfile is:

first: all individual author records sorted by author's name,

followed by: all corporate author records sorted by author's name,

e.g. ANDERSON J.F.

BROOKS C.

WILLIAMS E.N.

WILLIAMS P.R.

FEDERATION OF BRITISH INDUSTRIES

NATIONAL PHYSICAL LABORATORY

U.S. NAVY

**Descriptor Subfiles**

The SLIC and chain subfiles may be considered together under this heading as their formats are identical.

Descriptor records are created in fixed-length blocks of 112 characters, one block per document.

**Example**

	BLOCK LENGTH	DESCRIPTORS	DOCUMENT NUMBER	
--	--------------	-------------	-----------------	--

No. of characters            4                    100                    8

Records with a common descriptor sequence are then amalgamated, the resulting variable-length records having a maximum length of 504 characters. As in the case of authors, any document numbers in excess of 50 will be contained in a separate record.

The records are sorted within the subfile to alphanumeric order of descriptor sequence, e.g. for a chain index:

```

COMPUTATION
COMPUTERS          I.C.T. 1900 SERIES      PROGRAMMING
COMPUTERS          I.C.T. 1900 SERIES      SYSTEMS
I.C.T. 1900 SERIES PROGRAMMING
I.C.T. 1900 SERIES SYSTEMS
NUMERICAL ANALYSIS COMPUTATION
PROGRAMMING
SYSTEMS
    
```

**Card Catalogue Subfile**

The card catalogue records contain the same data as the information records, with the additional feature of a 'selected descriptor', which appears between the block length and the document number; each descriptor of a sequence is taken in turn and used as the selected descriptor of a new record. Thus an information record with four descriptors will produce four card catalogue records. These occur in fixed-length blocks of 856 characters sorted on the selected descriptor.

**EXAMPLE**

	BLOCK LENGTH	SELECTED DESCRIPTOR	DOCUMENT NUMBER	AUTHOR(S)	DESCRIPTORS	TITLE	SOURCE	
--	--------------	---------------------	-----------------	-----------	-------------	-------	--------	--

No. of characters    4                    20                    8                    124                    100                    400                    200

# 4 Data Preparation

This chapter is divided into three sections:

*Section 1* deals with input to the generator run. The input may be by punched cards or paper tape.

*Section 2* covers data preparation for the user's program when the input medium is punched cards.

*Section 3* covers data preparation for the user's program when the input medium is paper tape.

## SECTION 1: GENERATOR RUN

The input to the generator run is a series of directives on cards or paper tape which define the user's program.

The following items must be specified:

- (a) Input medium - whether cards or paper tape. If paper tape be chosen, a 'format' directive is also required in order to define the character codes which will be used to distinguish between author, title, source, and descriptor records.
- (b) Output requirements - any combination of:
  - Bibliography list,
  - Author index,
  - SLIC or chain index,
  - Card catalogue.
- (c) Which of the above (if any) are to be cumulated.
- (d) Whether serial accession numbering is to be used.
- (e) Type of line printer:
  - 120 print positions,
  - 160 print positions.
- (f) The first three characters of the user's program name.

### Format of Directives

Each directive has a two-digit numeric code in the range 00 to 24 which is punched in the first and second character positions. An alphabetic form of the directive is also punched, starting at character 5. The format and significance of each directive is as follows:

00	CARD INPUT	Input medium punched cards
01	ICT TAPE INPUT	Input medium I.C.T. eight-track paper tape
02		Not allocated
03		Not allocated
04		Not allocated
05		Not allocated
06		Not allocated
07		Not allocated

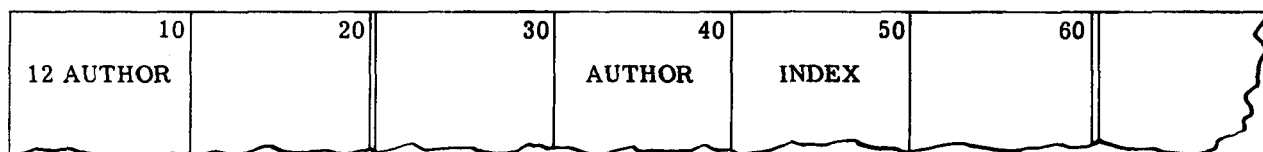
08 BIBLIOGRAPHY	Bibliography list required
09 SERIAL ACCESSION	Documents will be numbered in order of their accession
10 SLIC	SLIC index required
11 CHAIN	Chain index required
12 AUTHOR	Author index required
13 CATALOGUE	Card catalogue required
14 CU BIBLIOGRAPHY	Updated bibliography list required
15 CU AUTHOR	Updated author index required
16 CU CHAIN	Updated chain index required
17 CU SLIC	Updated SLIC index required
18	Not allocated
19	Not allocated
20	Not allocated
21	Not allocated
22 FORMAT A*T*S*D*	Definition of character codes to identify fields on paper tape input. The characters inserted in place of the asterisks will identify author, title, source, and descriptor fields, respectively.
23 PRINT NNN	The type of line printer is defined by inserting 120 or 160 in place of NNN.
24 END XXX	Terminating card for the directive pack. XXX represents the first three characters of the user's program name; the first of these must be alphabetic, the remainder either alphabetic or numeric.

#### Card Input

The numeric directive code is punched in columns 1 and 2 of the card; the alphabetic form of the directive starts at column 5. Only the first four characters of this name (columns 5 to 8) are significant; the remainder may be omitted.

The user also has the option of specifying page headings for the printed output. On cards type 08, 10, 11 and 12, the 40 characters from column 21 to column 60 may be used for this purpose.

It should be noted that the complete block of 40 characters will be placed centrally at the top of each page, so that a heading of less than 40 characters should be punched with the same number of blank characters before and after the heading, unless it is acceptable for the heading to appear off-centre. For example, if the heading AUTHOR INDEX were required on the author printout, the directive card might be punched thus:



#### Paper Tape Input

Each directive occupies one block; the directives are basically the same as those for card input, but differ in the specification of page headings (directives 08, 10, 11 and 12) and details of paper tape format codes, line printer and program name (directives 22, 23 and 24).

The numeric code is punched in the first two character positions and is followed by two spaces. The alphabetic form of the directive begins at character 5. On directives other than those listed above, the whole directive name may be punched but only the first four characters will be significant. In the special cases listed above the first four characters only may be punched.

If a page heading is not to be specified on directives 08, 10, 11 or 12, the directive is terminated immediately after the four alpha characters by a newline character; if a heading is to be specified, the character following the four alpha characters will be a % symbol to identify the start of the page heading. A maximum of 40 characters will be allowed for the page heading, if a heading has fewer characters, its position on the page may be selected (within the limits of the 40-character length) by punching space characters before the heading itself. For example, the heading AUTHOR INDEX has 12 characters; if this is punched immediately after the % symbol, 28 space characters will be appended and the complete block of 40 characters put in the middle of the top line of the page; the heading will therefore be offset to the left. If it is required to be in a central position, the number of spaces to be punched before the heading is  $(40 - N)/2$ , where  $N$  is the number of characters in the heading. In this example, 14 spaces must be punched before the heading to make it central; the 14 spaces to follow will be inserted automatically. The spaces must be punched as individual space characters; errors will occur if horizontal tabulations are used. The block is terminated after the heading with a newline character.

The additional information on the 22, 23 and 24 directives is also punched immediately after a % symbol in the ninth character position. The information is expressed in the same way as on cards i.e.

format codes - A\*T\*S\*D\* (where \* represents the user's option for field identifier)

line printer - 120 or 160 print positions

program name - ABC (where A must be alphabetic and B and C may be alphabetic or numeric)

Each block is terminated by a newline character.

Note that the four-character alphabetic code for directive 24 is END $\nabla$ .

#### General

Tables 1 and 2 illustrate the complete range of directives for paper tape and card inputs respectively. Obviously, many of these are mutually exclusive.

If page headings are specified, the same headings will appear on both accessions printout and cumulated printout.

The directives must be input to the generator program in ascending order of directive number. Checks on sequence, format and logic are made; these are described in Chapter 6 (page 34) together with the error messages which may be output.











**Descriptor Card**

Descriptors may be up to 20 characters long, and a maximum of five may be input per document, occupying one card and part of a second.

The format of descriptor cards is as follows:

- Column 1: Type indicator = 4 for descriptor card
- Columns 2 to 9: Document reference number
- Columns 10 to 12: Blank
- Columns 13 to 32: First (or fourth) descriptor
- Columns 33 to 52: Second (or fifth) descriptor
- Columns 53 to 72: Third descriptor
- Columns 73 to 79: Blank
- Column 80: Continuation indicator

I.C.T.1900 SERIES NIC <small>1/1938 (1.47)</small>																																																																															
TYPE INDICATOR	DOCUMENT NUMBER									DESCRIPTOR 1 (OR 4)																				DESCRIPTOR 2 (OR 5)																				DESCRIPTOR 3 (OR 8)																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
4	1	1	2	3	4	5	6	X	RESEARCH																				SCHOOLS																				SCIENCE																														

**Terminator Cards**

The penultimate card in the input pack has a zero punched in column 1 and should be followed by a blank card.

### SECTION 3: USER'S PROGRAM (Paper Tape Input)

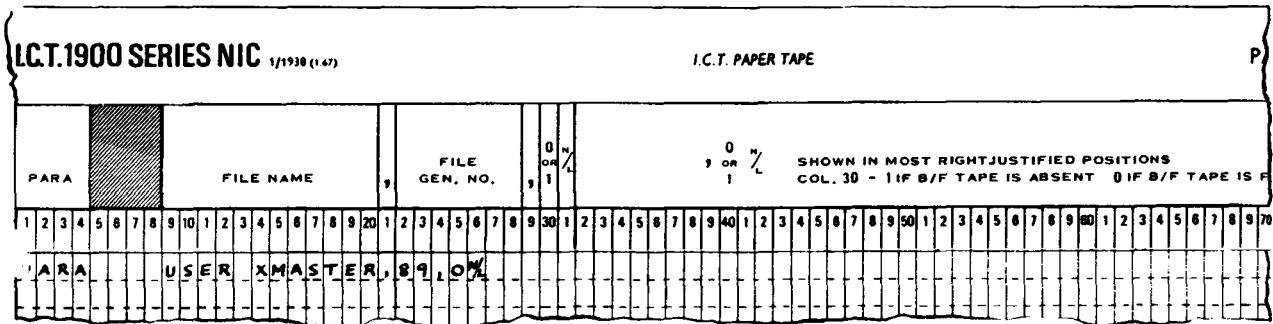
The input data for the user's program consists of bibliographic details of new accessions to the catalogue, preceded, when cumulation is required, by a paper tape parameter block specifying the brought-forward cumulation file.

#### Parameter Block

The paper tape parameter block is used, when cumulation is required, to specify the file name and file generation number of the brought-forward cumulation file. It also contains a switch character to distinguish the initial run of the system when no brought-forward file will be present.

The format of the paper tape parameter block is as follows:

- Characters 1 to 4: The characters PARA
- Characters 5 to 8: Blank
- Characters 9 to 20: The file name of the cumulation file
- Character 21: Comma
- Characters 22 onwards: Variable-length file generation number terminated by a comma, and followed by '0' if a brought-forward cumulation file is present, or '1' if not. This last character is followed by a newline (N/L) character.

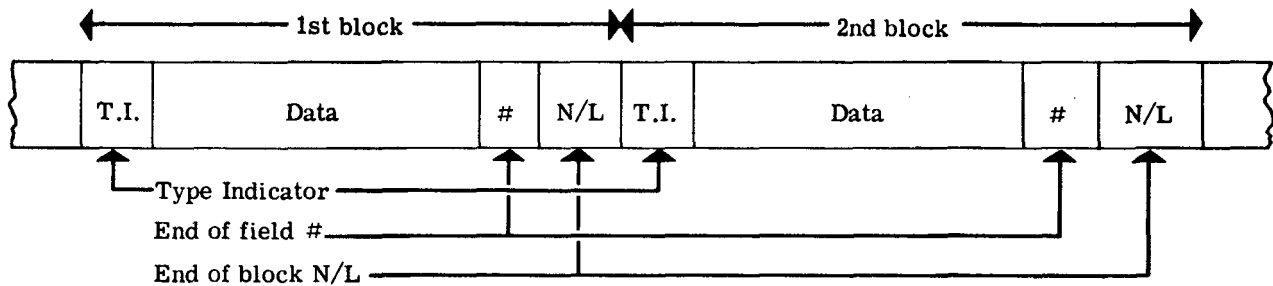


#### Bibliography Information Blocks

Using paper tape input, all information is held in blocks of up to 127 punched characters, including data and control characters (internally these blocks are of 128 characters, as the newline symbol is held as two). Only the 64 characters belonging to the line printer character set may be punched (see page 41).

The first character of each block is a type indicator (T.I.) chosen by the user, and specified in the input to the generator run (see Chapter 4, page 12).

For each document, blocks must be in the sequence: author, title, source, descriptor, and each type of data must be separated from the succeeding type by a hash mark (#) punched immediately before the newline. The general format for data blocks is therefore:



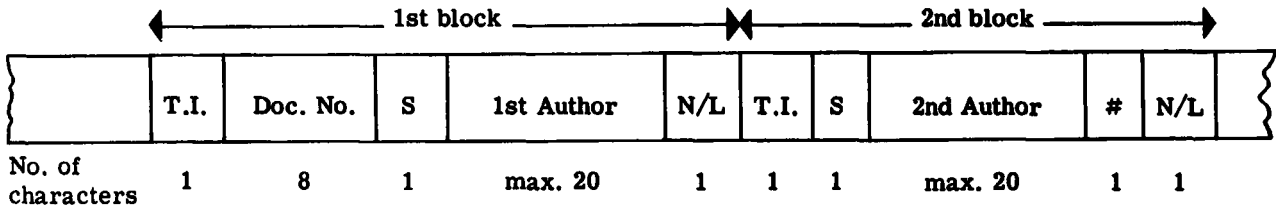
If for any type of block no data is present, the data field should be omitted, and the type indicator should be followed immediately by the # and the N/L.

Certain details should be noted for each type of data.

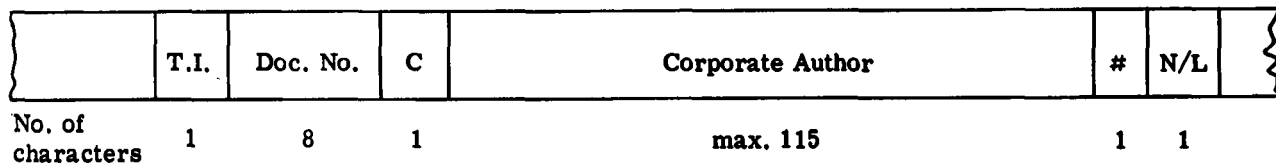
**Author:** Author blocks cater for single authors or for corporate authors. Up to six single authors may be included of a maximum 20 characters each, but each must be put in a separate block. A corporate author up to 115 characters long will occupy one block; any additional characters up to the maximum of 120 will be held in a second block. The type of author is indicated by an S (single author) or a C (corporate author) punched immediately preceding the author's name. Thus for each document there may be from one to six author blocks. The first block of any author set must include an eight-character document number punched in character positions 2 to 9, immediately after the type indicator.

*Examples*

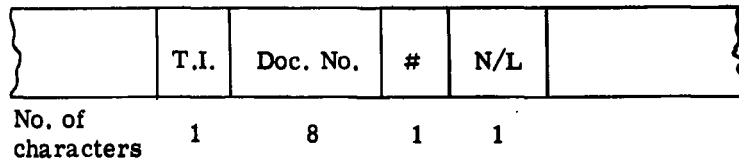
**TWO SINGLE AUTHORS (TWO BLOCKS)**



**CORPORATE AUTHOR (ONE BLOCK)**



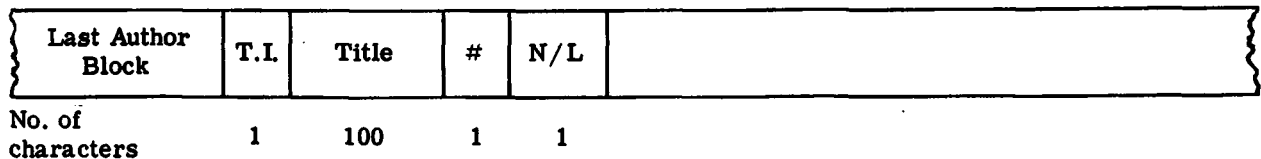
**NO AUTHORS (ONE BLOCK)**



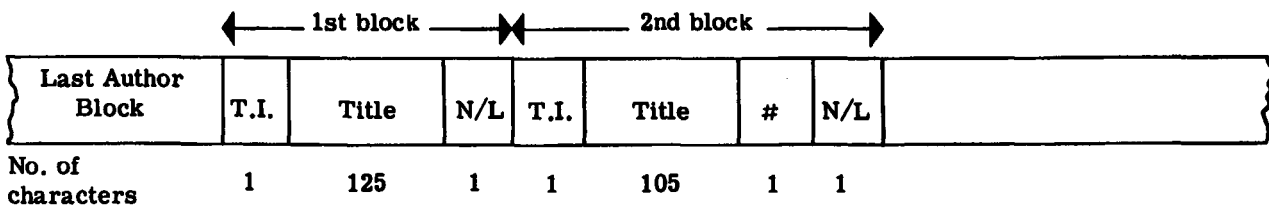
**Title:** The title blocks follow immediately after the last author block. A title may occupy a maximum of 400 characters (i.e. up to four blocks).

*Examples*

**100-CHARACTER TITLE (ONE BLOCK)**



**230-CHARACTER TITLE (TWO BLOCKS)**



NO TITLE (ONE BLOCK)

Last Author Block	T.I.	#	N/L	
-------------------	------	---	-----	--

No. of characters      1      1      1

**Source:** Source blocks follow immediately after the last title block. Source information may occupy a maximum of 200 characters (i.e. up to two blocks).

*Examples*

75-CHARACTER SOURCE (ONE BLOCK)

Last Title Block	T.I.	Source	#	N/L	
------------------	------	--------	---	-----	--

No. of characters      1      75      1      1

200-CHARACTER SOURCE (TWO BLOCKS)



Last Title Block	T.I.	Source	N/L	T.I.	Source	#	N/L	
------------------	------	--------	-----	------	--------	---	-----	--

No. of characters      1      125      1      1      75      1      1

NO SOURCE (ONE BLOCK)

Last Title Block	T.I.	#	N/L	
------------------	------	---	-----	--

No. of characters      1      1      1

**Descriptors:** Descriptor blocks contain one descriptor each and follow immediately after the last source block. Up to 5 descriptors may be included for any one document, and each descriptor may occupy up to 20 characters. Therefore for each document there will be from one to 5 descriptor blocks.

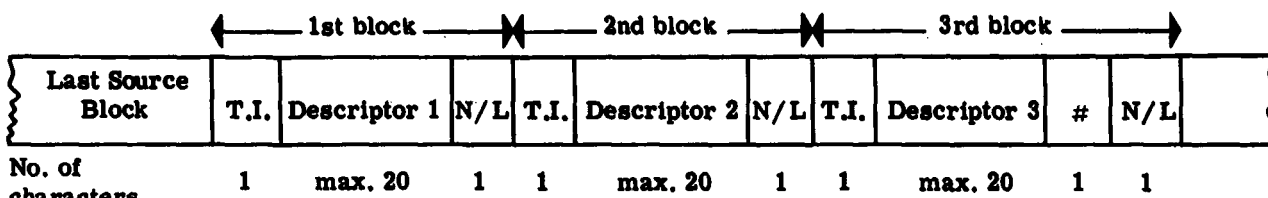
*Examples*

ONE DESCRIPTOR (ONE BLOCK)

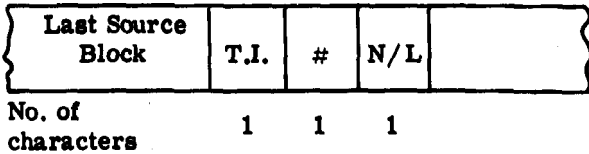
Last Source Block	T.I.	Descriptor	#	N/L	
-------------------	------	------------	---	-----	--

No. of characters      1      max. 20      1      1

**THREE DESCRIPTORS (THREE BLOCKS)**



**NO DESCRIPTORS (ONE BLOCK)**



**Terminator Block:** The final block consists of the four characters #END followed by a newline character. Flip-tops, obtainable from I.C.T., may be used as an aid to paper tape data preparation.



# 5 Printed Output

The five printout options that the NIC system offers have already been dealt with briefly in Chapter 1. In this chapter, fuller descriptions are given of the format of each printout, together with illustration.

## GENERAL

The heading (if any) specified on the directive card (see Chapter 4, page 12) will appear at the top of each page of the corresponding printout; if a cumulated printout is specified, the same heading is used as for the period accessions printout.

The formats described in the following sections are the same for both period accessions and cumulated printouts.

In general, page numbering is conventional; where serial accession numbering is used, however, an alternative system of page numbering for the bibliography is available, which will be described under that heading. Page numbers appear in the top right-hand corner of the page.

## 1 BIBLIOGRAPHY

Bibliography records are printed in two columns in alphanumeric order of document numbers. The document number appears on the left with authors alongside it in two columns; below the authors are the full title and source; the descriptors are not printed.

Corporate authors occupy three lines of 40 characters each (120 p.p. printer) or two lines of 60 characters each (160 p.p. printer). Titles and sources are set out in lines of 48 characters on the 120 p.p. printer and 68 characters on the 160 p.p. printer.

### Example

#### BIBLIOGRAPHY ENTRY (120 p.p.)

100Z0018	PACKAGED PROGRAMS ICT DATA PROCESSING JOURNAL NO 25 UNDATED P17	163H0040	BLUMBERG PLANNING DATA PR
100Z0055	JENSEN E UNTRANSLATED PAPER IN DANISH ON A TECHNIQUE FOR STORING 1R DATA IN A SERIAL FILE SOURCE UNKNOWN	163Z0065	NEVILLE SIMON H CHESS EXITY IN ND J
158H0044	TE NUYL N THE L UNITE DOCUMENTATION SYSTEM REV DE LA DOCUMENTATION VOL 25 NO 3 AUG 1958 PP65 73	163Z0066	UHR MET A P ALU I
16110023	MCDANIEL J N P L THE GRAMMATICAL INTERPRETATION OF RUSSIAN INFLEC TED FORMS USING A STEM DICTIONARY NATIONAL PHYSICAL LABORATORY 1961	165Z0001	C
16110024	DAVIES D W N P L DAY A M		

The use of serial accession numbering makes it possible to cumulate the bibliography by merely adding each period accession printout to the previous ones. For this purpose, the first document number appearing on each page is used as the page number; this is achieved by specifying directive 09 (see Chapter 4, page 12). It should be noted that whereas it is possible to use serial accession numbering without specifying directive 09 (in which case cumulation would be effected by directive 14), the use of directive 09 with non-serial accession numbering is not permitted.

## 2 AUTHOR INDEX

The author index consists of an alphabetic list of all individual authors together with their associated document numbers, followed by a similar list of corporate authors.

Individual authors appear in three or four columns to a page, depending on the type of line printer. Each column contains authors' names on the left with document numbers in alphanumeric order for each author on the right. An author's name is not repeated unless the record is continued in a new column or page, or more than 50 documents are accredited to him (see Chapter 3, page 9).

### Example

#### INDIVIDUAL AUTHOR PRINTOUT (120 P.P.)

AUTHOR INDEX				1
7810	EINSTEIN M	4310	ELEANOR D W B	134134
7925		4861	ELK R	10
7954	EISER J K	342		110
134577		7514		1101
234584		14612		1111
41	EIZMAN R L	999		1211
49		1000		1212
37412	ELCOCK J B	3215		1311
59068	ELDRIDGE C W	60451		1314
161	ELDRIDGE S T	91110		1415

A corporate author entry occupies one line of print; the associated document numbers are set out in columns below it.

### Example

#### CORPORATE AUTHOR PRINTOUT (120 P.P.)

AUTHOR INDEX			
ASSOCIATION OF BUSINESS ADMINISTRATORS	KINGSTON ON THAMES		
678CC125	95176512	8567901	
COLLEGE OF LIBRARIANSHIP UNIVERSITY OF ABERYSTWYTH			
165Z0001	247A5001	290M7000	
INDUSTRIAL DEVELOPMENT CORPORATION CHARTERED ACCOUNTANTS DEPARTMENT			
269B007B	A1117654	A115907	
U S AIR FORCE RESEARCH LIBRARY BRANCH	AIR FORCE SYDNEY RESEARCH LABORATORIES		
164D0062	200C000		

## 3 SLIC INDEX AND CHAIN INDEX

The formats of the printouts of the SLIC and chain indexes are the same. The descriptor sequences occur in alphanumeric order and each descriptor sequence, whatever its length, occupies one line; the associated document numbers are set out in columns below it. The descriptor sequence will be repeated if the record is continued on a new page, or if the sequence has more than 50 document numbers (see Chapter 3, page 10). The difference in the output from the two indexing systems is illustrated as follows.

A document input with five descriptors, A, B, C, D, E, in that order would give rise to entries under the following descriptor sequences.

<i>SLIC Index</i>	<i>Chain Index</i>
ABCDE	ABCDE
ABCE	BCDE
ABDE	CDE
ABE	DE
ACDE	E
ACE	
ADE	
AE	
BCDE	
BCE	
BDE	
BE	
CDE	
CE	
DE	
E	

**Example**

**CHAIN INDEX (120 P.P.)**

CHAIN INDEX							
MAGIC FLUTE THE	ORCHESTRATION						
MOZART	3MOZ40738	3MOZ52391		ORCHESTRATION			
MUSIC	3MOZ40738	3MOZ52391		MAGIC FLUTE THE	ORCHESTRATION		
ORCHESTRATION	3MOZ40738	3MOZ52391					
	1BAC20719	1BEE40491	1BER70029	2BER68813	1DV024374	1HON1	
	1JAN64788	1MOZ33016	1MOZ71547	3MOZ40738	3MOZ52391	4MOZ8	
	1STR44128						

**4 CATALOGUE CARDS**

Catalogue cards are printed on perforated stationery in the standard size of 5 inches x 3 inches. Two or three columns of cards may be produced, depending on the type of line printer. The cards are produced in alphanumeric order of the selected descriptor.

Corporate authors are set out in three lines of 40 characters each. Titles occupy lines of 46 characters, sources lines of 44 characters. Due to lack of space on the card, a maximum of 230 characters (5 lines) of the title and 132 characters (3 lines) of the source will be printed.

**Example**

**CARD CATALOGUE (120 P.P.)**

The format of each card is as follows: the selected descriptor appears in the top left-hand corner, the document number in the top right; below these are the authors' names, in two columns, or the name of the corporate author; the title and source follow, and the full descriptor sequence appears at the bottom of the card, also in two columns.

CLASSIFICATION	164G0019	CLASSIFIED LISTS	165H0003
BOURTON, K		BOTTLE, R.T	
INFORMATION RETRIEVAL: A BUSINESS ASSET		A USER'S ASSESSMENT OF CURRENT AWARENESS SERVICES	
THE MANAGER, JULY 1964 P.33		J. DOC., VOL.21, NO.3, SEPTEMBER 1965 PP.17	
CLASSIFICATION	CONCEPT COORDINATION	ASSESSMENT	CLASSIFIED LISTS
IR	STORAGE	CURRENT AWARENESS	KWIC
		TIMES, RETRIEVAL	
COORDINATE INDEX	164I0070	CODES	164D0062
SHAW, T.N	UNILEVER RESEARCH	U.S. AIR FORCE, RESEARCH LIBRARY BRANCH,	
A PUNCHED CARD INDEX TO TECHNICAL REPORTS		TECHNICAL SERVICES, AIR FORCE CAMBRIDGE	
		RESEARCH LABORATORIES	
ASLIB CONFERENCE PAPER, 1964		DEFENSE DOCUMENTATION CENTRE: MONOGRAPH CATALOGUING MANUAL	
COORDINATE INDEX	GROUP SELECT	U.S. DEPT. OF COMMERCE, NATIONAL BUREAU OF	
ICT	SCRTER	STANDARDS, INSTITUTE FOR APPLIED TECHNOLOGY.	
		REPORT AD613337	
		CATALOGUING	CODES

**Example**

**SINGLE CARD**

IR	10020055
JENSEN E	
UNTRANSLATED PAPER IN DANISH ON A TECHNIQUE FOR STORING IR DATA IN A SERIAL FILE	
SOURCE UNKNOWN	
BIT ECONOMY	COMPRESSION
FILE ORGANISATION	IR
SERIAL FILING	

# 6 Operating Instructions and Error Procedures

## SECTION 1: OPERATING INSTRUCTIONS

The NIC system consists basically of three computer runs: a generator program and a pair of generated programs. Normally, the generator program will be run once, and thereafter, the programs generated will be run at regular intervals.

The operating instructions for the generator run are shown on this page; on pages 28 and 29 are the operating instructions for running the user's programs on a configuration where only four magnetic tape units are available. If cumulation is requested, five tapes are used, involving a tape change in the middle of each run if only four decks are available; on larger configurations, this change may be eliminated by loading the extra tape on a fifth deck. The appropriate instructions are shown on pages 30 and 31.

When running the first of the generated programs, the operator should use the FIND instruction to give the program as much core store as is available. This will increase the efficiency of the SORT program which is used in this run. This procedure is particularly recommended if the card catalogue option is included, as this particular sort is the longest in time.

### #X711 - Operating Instructions

<i>Sequence</i>	<i>Operator Action</i>	<i>Effect</i>
1	Load library tape.	
2	Load scratch tape.	
3	Load NIC master tape (without WPR).	
4	FI #X711	Loads generator program from library tape.
5	Load directives on card or paper tape reader	
6a	GO #X711 20 for paper tape input	Directives are read and validated; appropriate segments are read from master tape and the required programs output onto the scratch tape*. The message SYSTEM COMPLETE is output on the console typewriter.
6b	GO #X711 21 for card input	

*Note:* The output tape must then be compiled using #XPLJ.

\* Now labelled NICUSERSFILE, FGN 1, RP 28 days.

### Run 1 of Output Program - Operating Instructions for 4 M/T Decks

<i>Sequence</i>	<i>Operator Action</i>	<i>Effect</i>
1	Load program tape.	
2	Load scratch tape.	
3	†FI #RUN1	Writes run 1 to scratch tape.
4	*Unload program tape.	
5	Load three scratch tapes	
6	FI #RUN1	Reads permanent program into core store.
7	Load data onto card (or paper tape) reader.	
8	GO #RUN1 20	Program begins.
9	*	Message: NEEDS B/F CUMULATION FILE
10	Unload tape used as unit 3.	
11	Load B/F cumulation file.	Message: NEEDS SCRATCH TAPE
12	Unload B/F cumulation file.	
13	Reload scratch tape.	
14		Message: END OF INPUT RUN
15	Magnetic tape used as 3 is input tape for run 2.	

†RUN1 is used throughout these instructions; in practice this should be replaced by \*\*\*1, where \*\*\* are the three letters specified by the user at generator stage to name the program.

\*Steps 9 to 13 only occur when cumulation is requested.

## Run 2 of Output Program - Operating Instructions for 4 M/T Decks

<i>Sequence</i>	<i>Operator Action</i>	<i>Effect</i>
1	Load program tape.	
2	Load scratch tape.	
3	†FI #RUN2	Writes run 2 to scratch tape.
4	Unload program tape.	
5	Load magnetic tape output from run 1.	
6	FI #RUN2	Loads permanent program into core store.
7	*Load B/F cumulation file.	
8	Load scratch tape.	Used as C/F cumulation file.
9	If cumulation print required, AL #RUN2 30 2	
10	Load parameter data onto card (or paper tape) reader.	
11	GO #RUN2 20	Message: NEEDS SCRATCH TAPE
12	Unload B/F cumulation file.	
13	Load scratch tape.	Used to edit author and SLIC or chain subfiles.
14	**	Message: CHANGE STATIONERY
15	Change line printer stationery to catalogue cards.	
16	GO #RUN2 21	
17		Message: END OF RUN

†As in RUN1, for RUN2 put \*\*\*2.

\*Steps 7 to 10 and step 12 only required if cumulation is requested.

\*\*Steps 14 to 16 only required if card catalogue requested.

**Run 1 of Output Program - Operating Instructions for 5 M/T Decks**

<i>Sequence</i>	<i>Operator Action</i>	<i>Effect</i>
1	Load program tape.	
2	Load scratch tape.	
3	†FI #RUN1	Writes run 1 to scratch tape.
4	*Unload program tape.	
5	Load B/F cumulation file.	
6	Load three scratch tapes.	
7	FI #RUN1	Reads permanent program into core store.
8	Load data onto card (or paper tape) reader.	
9	GO #RUN1 20	Program begins.
10		Message: END OF INPUT RUN
11	Magnetic tape used as 3 is input tape for run 2.	

†RUN1 is used throughout these instructions; in practice this should be replaced by \*\*\*1, where \*\*\* are the three letters specified by the user at generator stage.

\*Steps 4 and 5 are only necessary when cumulation is requested.

## Run 2 of Output Program - Operating Instructions for 5 M/T Decks

<i>Sequence</i>	<i>Operator Action</i>	<i>Effect</i>
1	Load program tape.	
2	Load scratch tape.	
3	† FI #RUN2	Writes run 2 to scratch tape.
4	Load magnetic tape output from run 1.	
*5	Load scratch tape.	Used as C/F cumulation file.
6	FI #RUN2	Loads permanent program into core store.
7	Unload program tape.	
*8	Load B/F cumulation file.	
9	Load scratch tape.	Used to edit author and SLIC or chain subfiles
*10	If cumulation print required, AL #RUN2 30 2	
*11	Load parameter data onto card (or paper tape) reader.	
12	GO #RUN2 20	
13	**	Message: CHANGE STATIONERY
14	Change line printer stationery to catalogue cards.	
15	GO #RUN2 21	
16		Message: END OF RUN

† As for RUN1, for RUN2 put \*\*\*2.  
 \* Steps 5, 8, 10 and 11 only necessary when cumulation is requested.  
 \*\* Steps 12 to 14 are only necessary when card catalogue is requested.

## SECTION 2: ERROR PROCEDURES

These may be considered under four headings:

- 1 Validation of directives
- 2 Validation of punched card input data.
- 3 Validation of paper tape input data.
- 4 Miscellaneous.

### 1 Validation of Directives

The format of the error messages output during the generator run is as follows:

ERRn xy

where *n* is an error symbol which will be found in the table below, and *xy* is the directive number.

<i>Symbol</i>	<i>Significance</i>
A	Code numbers out of sequence or duplicated.
B	Format directive (22) present, but no paper tape input directive (01).
C	First three characters of program name (directive 24) not within the prescribed range.
D	Both SLIC (10) and chain (11) directives specified.
E	Neither 120 nor 160 print positions specified for line printer (23).
F	Card input (00) specified, but format directive (22) also present.
H	Paper tape input (01) specified, but no format directive (22).
I	Both card input (00) and paper tape input (01) specified.
J	Neither card input (00) nor paper tape input (01) specified.
K	No % symbol on directive 22 or 23 or 24.
L	% symbol followed immediately by newline.
M	Ninth character of directive 08 or 10 or 11 or 12 is neither % symbol nor newline.
N	Page heading longer than 40 characters.
X	Code number not within the prescribed range or not yet allocated.
Y	Code number and directive name do not correspond.
1	Non-numeric directive code present.

After typing out the message, the program halts; the faulty directive must be corrected and the program run again.

### 2 Validation of Punched Card Input Data

Each record, consisting of at least four cards, is input in ascending order of type indicators. An error message is output if the type indicator read in does not agree with the 'expected' type indicator. This is set to unity initially, and is incremented by one unless a card has a continuation indicator in column 80, in which case the expected type indicator remains the same; when a type 4 card with no continuation indicator is encountered, the expected type indicator reverts to unity.

The output message is of the form:

pNNNNNNNN XXXXXXXX READ: TYPE r EXPECTED

where *p* is the type indicator, N...N the document number, X...X the first eight characters of data from the card just read and *r* the expected type indicator. The information X...X should be adequate to identify the exact card which has been rejected. Having encountered an error of this type, the program searches for the next type 1 card and continues. The faulty record is not processed.

The error represented by this message may be any one of the following:

- (a) Cards are correctly punched but out of order.
- (b) Field missing.
- (c) Card with continuation indicator is followed by one of different type.
- (d) Card with no continuation indicator is followed by one of same type.

The action to be taken in (a) and (b) is obvious. In cases (c) and (d) it may be that the continuation indicator is incorrect or that the following type indicator is incorrect; this can only be decided by inspection of the data.

A check on the document number is also made. The document number should only change when a new type 1 card is encountered; if it does so under any other circumstances, a message is output as follows:

NNNNNNNN DOCUMENT NUMBER ERROR P P P P P P P P

where N...N is the document number of the previous card, P...P that of the present one.

Checks are also made on the length of fields. If data is punched after the 400th character of the title or the 200th character of the source, a message is output as follows:

NNNNNNNN XXXXXX TRUNCATED AT AAAAAAAAAA

where N...N is the document number, X...X the word TITLE or SOURCE and A...A the last eight characters accepted.

Author and descriptor fields are checked in a similar manner, the error message being as follows:

NNNNNNNN XXXXXXXXXXXX FIELD OVERFLOW

Where N...N is the document number, and X...X the word AUTHOR or DESCRIPTOR. When any of these errors is encountered, the faulty record is rejected; the program does not halt but displays the error message and then continues to process the next record.

### 3 Validation of Paper Tape Input Data

The error messages in the paper tape input routine each occupy two lines on the console typewriter. The first line presents the document number and field type of the card just read, in the form:

DOC. NO NNNNNNNN FIELD TYPE P

The second line contains one of the messages which will be described below.

The formats of the various records may be seen in Chapter 4. The maximum size of a block is 128 characters including newline. If data is punched beyond the 128th character, the following message will be output:

NO NEWLINE CHARACTER

The records are input in order of field type, including dummy entries for blank fields. The 'expected' field type is set up on the basis of whether the previous block was or was not terminated with a hash mark - if a hash mark was present, a new field type is expected. If the field type read is not as expected, one of the following may be the reason:

- (a) New field type but no hash mark terminating previous field.
- (b) Same field type after previous field terminated by hash mark.
- (c) Field missing.

The message output in all these cases is:

NO # SEPARATING TWO FIELDS OR FIELD MISSING

and the appropriate action must be determined by the user.

If a field type indicator is read which is not one of the four characters specified in the generator run, the message

INVALID FIELD TYPE

will be output.

The number of data characters in each field is counted and if the limits specified in Chapter 4 are exceeded, the message

**FIELD TOO LONG**

will be output.

The type of author (corporate or single) is indicated by C or S as the tenth character of an author block. If neither is specified, the message

**AUTHOR FIELD NEITHER C NOR S**

will be output; if successive blocks in one author field have C and S, the message

**AUTHOR FIELD BOTH C AND S**

will be output.

In all cases of error in the paper tape input data, the record containing the error will be rejected, and the program will continue with the next.

#### **4 Miscellaneous**

(a) **TAPE FILE GEN NO OUT OF RANGE**

(b) **CARD (or TAPE) FORMAT ERROR**

These messages result from errors on the parameter card (or paper tape block) preceding the input data. The first indicates that a file generation number of 800,000 or more has been specified; the second indicates a format error. Chapter 4 should be referred to for the correct format.

(c) **LINE PRINTER NOT ALLOCATED**

The line printer should be allotted by program when printing is due to start. If the above message occurs, the following operator action is necessary:

GI (\*\*\*\*2) *nn*

GO (\*\*\*\*2)

where *nn* is the absolute unit number of the appropriate line printer. On processors 1904 and upwards, the program name (shown in parentheses) is required; the three asterisks should be replaced by the three characters specified by the user.

(d) **MAGNETIC TAPE FAILURE**

This message may be output if, when reading from a magnetic tape, a parity error or a long block is encountered. If it occurs in run 1, the necessary action is to return to stage 3 of the operating instructions (see Chapter 6, page 30). If failure occurs in run 2, it indicates that either the current accession file or the brought-forward cumulation file is faulty.

(e) **INCORRECT INPUT TAPE**

This message may be output during a generator run. It indicates that the NIC master file is not of the correct format. A correct file must be loaded and the generator run restarted.



**DATA PREPARATION**

The data related to this article now has to be punched into cards. The following formats show how the information is entered onto punching documents.

*Parameter Card*

I.C.T.1900 SERIES NIC 1/1938 (1.67)

PARA	FILE NAME	FILE GEN. NO.	0 OR 1
1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
PARA	CUM FILE	16,0	

0 OR 1 SHOWN IN MOST RIGHT JUSTIFIED POSITIONS  
COL. 30 = 1 IF B/F TAPE IS ABSENT 0 IF B/F TAPE IS PRESENT

NOTE: The file generation number is a variable field starting at column 22. It must terminate with a comma, and a 0 if a brought-forward cumulation file is present, a 1 if it is not.

*Author Card (Type Indicator 1)*

I.C.T.1900 SERIES NIC 1/1938 (1.67) SING

DOCUMENT NUMBER	AUTHOR 1 (OR 4)	AUTHOR 2 (OR 5)	AUTHOR 3 (OR 6)
1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
176298621	FURNESSE, B. A.		

NOTE: Column 10 is left blank if single authors are entered and punched with a 1 if a corporate author is entered.

*Title Card (Type Indicator 2)*

I.C.T.1900 SERIES NIC 1/1938 (1.67)

DOCUMENT NUMBER	TITLE
1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
276298621	THE HEAT TREATMENT OF METALS

*Source Card (Type Indicator 3)*

I.C.T.1900 SERIES NIC 1/1938 (1.67)

DOCUMENT NUMBER	SOURCE
1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
376298621	ENGINEER'S WEEKLY VOL 10 NO 8 AUG 66

I.C.T.1900 SERIES NIC 1/1938 (1.67)																																																																																RD CONTINUATION 21 RD 1
TYPE IND. = 4	DOCUMENT NUMBER	DESCRIPTOR 1 (OR 4)	DESCRIPTOR 2 (OR 5)	DESCRIPTOR 3 (OR 8)																																																																												
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80	A 7 6 2 9 8 6 2 1	HEAT TREATMENT	STRESS-RELIEVING	FERROUS METALS																																																																												

NOTE: In this case, a continuation card is needed, so a 1 is punched in column 80 of the first card.

I.C.T.1900 SERIES NIC 1/1938 (1.67)																																																																															
TYPE IND. = 4	DOCUMENT NUMBER	DESCRIPTOR 1 (OR 4)	DESCRIPTOR 2 (OR 5)	DESCRIPTOR 3 (OR 8)																																																																											
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80	A 7 6 2 9 8 6 2 1	STEEL-BASED ALLOYS	NICKEL CHROME																																																																												

These cards represent the input for one document only. A normal monthly run might include some 200 such documents, so the size of the month-end input pack would be approximately from 1,200 to 1,500 cards. The final pack is closed with two terminator cards, the first of which has a zero punched in column 1, and the second of which is blank.

**COMPUTER PROCESSING**

In run 1, the card pack is read into the computer, checked for format, and valid records written to a magnetic tape file. This file is then sorted into document number sequence. The file is checked for duplications, both within itself and with the cumulation file. After this, the file is processed to create the required subfiles, which in this example are information, author, and chain index files. In run 2, the cumulation file is updated and printed out. Finally, the file of this month's accessions, containing the subfiles, is edited and printed out.

Throughout, an error commentary is given on the console typewriter.

**PRINTED OUTPUT**

In this example, the article described will be listed in the bibliography and author lists and in the chain index from the accessions and cumulation file and, from the accessions file only, in the card catalogue.

*Bibliography*

Here bibliographic details concerning the article will appear in accession number sequence.

76298621	FURNESS, B.A. THE HEAT TREATMENT OF METALS ENGINEER'S WEEKLY VOL 10 NO 8 AUG 66
----------	---

*Author Index*

The author's name will appear in its alphabetical sequence.

FURNESS, B.A.	76298621
---------------	----------

*Chain Index*

The five chain entries generated from the five descriptors will be printed in alphabetical sequence.

FERROUS METALS	STEEL-BASED ALLOYS	NICKEL CHROME		
	76298621			
HEAT TREATMENT	STRESS RELIEVING	FERROUS METALS	STEEL-BASED ALLOYS	NICKEL CHROME
	76298621			
NICKEL CHROME				
	76298621			
STEEL-BASED ALLOYS	NICKEL CHROME			
	76298621			
STRESS RELIEVING	FERROUS METALS	STEEL-BASED ALLOYS	NICKEL CHROME	
	76298621			

*Card Catalogue*

A card will be produced for each descriptor, in alphabetical sequence.

FERROUS METALS	76298621
FURNESS, B.A.	
THE HEAT TREATMENT OF METALS	
ENGINEER'S WEEKLY VOL 10 NO 8 AUG 66	
HEAT TREATMENT	STRESS RELIEVING
FERROUS METALS	STEEL-BASED ALLOYS
NICKEL CHROME	

## 8 Use of NIC in Library Cataloguing

NIC has been designed so that as far as possible it adheres to the standard cataloguing conventions. However, there are some special points that the NIC user must bear in mind, and these are dealt with in this chapter. One point that is common to all the NIC printouts is that, like all other computer-printed output, letters of the alphabet can appear in upper case only.

### THE SEQUENCE OF ITEMS

The alphanumeric sequence that is followed in listing items in the NIC printouts is the standard 1900 sort order. The important point for the user is that numerals and *most* of the symbols precede the letters of the alphabet. The exact order is as follows (reading left to right):

0	1	2	3	4	5	6	7
8	9	:	;	<	=	>	?
∇	!	"	#	£	%	&	'
(	)	*	+	,	-	.	/
@	A	B	C	D	E	F	G
H	I	J	K	L	M	N	⊖
P	Q	R	S	T	U	V	W
X	Y	Z	[	\$	]	↑	←

Note: ∇ = space

This means, for instance, that

- A.B precedes A/B
- A∇B precedes A-B
- A/B precedes A[B

Also, note that

JONES, A.B.

will appear after

JONES R.L.

A surname may be followed by either space or comma, but whichever is chosen must be used consistently.

The comma is recommended if full forenames are likely to be entered, since it will clarify the situation where 'reversible' names occur, e.g. Kingsley Martin/Martin Kingsley.

Descriptors for each document in a SLIC index must be input in this same sequence.

### AUTHORS

Documents may have up to six joint authors, each of whom is allotted a separate entry in the author index. The number of characters in the names of authors must not exceed twenty (including spaces). Individual authors are entered, surname first, followed by initials, style, etc.

For authors whose names can be spelt in different ways or who are known by pseudonyms, both names can be entered as joint authors so as to generate a record under each of them, as in the cases of:

SANDEGREN, MAGNUS

SVEN AXEL MAGWIS

TWAIN, MARK

CLEMENS, SAMUEL

Illustrators, translators, etc. can also be allotted an entry in the author index by treating them as joint authors. Their functions can be indicated by abbreviations in parentheses after their names. For instance, an author card for 'Alice in Wonderland' could have the following entries:

CARROLL, LEWIS (PSEU) DODGSON, C.H. TENNIEL, SIR J. (ILL)

A list of suggested abbreviations for the functions of 'joint authors' is as follows:

ARCH	:	architect
CART	:	cartographer
CDR	:	concordancer
COMP	:	compiler
CTR	:	commentator
ED	:	editor
ENG	:	engraver
ILL	:	illustrator
JT. AUTH	:	joint author
LIB	:	librettist
PSEU	:	pseudonym
RESP	:	respondent
REV	:	reviser
SOB	:	sobriquet
TR	:	translator

The user will doubtless be able to add further abbreviations that can suit his own special needs. The author index will distinguish between, for instance, BROWN J., BROWN J. (ED) and BROWN J. (RESP).

If an author is entered as ANON, then this results in that name appearing in the author index. The index will be without an author entry only if the author input is blank.

Both the maiden and married names of women can be entered as *joint authors*, for example:

ROBINSON, MARY DARMESTER, MRS.

The titles *Mrs.*, *Mme.*, *Frau*, etc. can serve to imply that the entry in question is a secondary one.

One plan for dealing with the problem of alternative names is to enter the secondary names in square brackets so that they are all collected together at the end of the author index. For instance,

TINTORETTO, (SOB)	[ROBUSTI, JACOBI]	76489
BRONTE, CHARLOTTE	[NICHOLLS, MRS.]	76490
GROTIUS, HUGO	[GROOT, H. VAN]	76491

would result in these entries:

BRONTE, CHARLOTTE	76490
GROTIUS, HUGO	76491
TINTORETTO, (SOB)	76489
[GROOT, H. VAN]	76491
[NICHOLLS, MRS.]	76490
[ROBUSTI, JACOBI]	76489

The user must bear in mind that names will appear in the author index in alphabetical order exactly according to the way they are input. This means that SMITH, SIR CHARLES will come after SMITH, PETER; in the case of titles of this nature it is suggested that names be input in the form SMITH, CHARLES (SIR). Similarly, names prefixed by M, Mac and Mc will be printed in that order: for instance, MACFADYEN will come before MCALISTER.

### **CORPORATE AUTHORS**

Corporate authors have already been mentioned. The names of corporate authors may contain up to 120 characters, but they are not allowed joint authors. The latter restriction means also that only one entry can be generated for a corporate author: for example, the author index cannot contain (for the same document) both UNITED STATES HYDROGRAPHIC OFFICE and UNITED STATES NAVY DEPARTMENT, HYDROGRAPHIC OFFICE. Of course, a corporate author with up to 20 characters can always be entered as if it were an ordinary author. (Conversely, a personal author whose name contains more than 20 characters can be entered as a corporate author.) The list of corporate authors appears at the end of the author index in a separate section from the personal authors. This problem of the corporate author can be overcome by the use of *dummy entries*; this requires, however, that the user should have available only seven characters for document number and should reserve the least significant for the dummy entry. The main entry could be, for example,

16509990 U.S. Air Force, Research Library Branch, Technical Services Division, Air Force Cambridge Laboratories, Office of Aerospace Research.

Defense Documentation Centre: Monograph Cataloguing Manual.

U.S. Nat. Bureau of Standards, Report AD 613337.

This is recognized as a main entry by its terminal zero. Dummy entries would perhaps be as follows:

16509991 U.S. Air Force Cambridge Laboratories

16509992 Office of Aerospace Research

16509993 Research Library Branch, U.S. Air Force

16509994 Cambridge Laboratories, U.S. Air Force

For these entries only the corporate author would be input: title, source and descriptors would be left blank. Each would have an entry in the author index; but in looking up the document in the bibliography print, the user would ignore the terminal digit and go straight to 16509990. Each of the dummy entries would appear in the bibliography print exactly as written above.

### **UNION LISTING: DUPLICATE COPIES**

This same technique of using dummy entries can also be used to let the last digit

- (a) represent the code of a branch library also holding this document,
- (b) represent the existence of one or more duplicate copies.

In these cases, document number only need be input - author, title, source and descriptors can all be left blank, being quoted only in the main entry.

### **TITLES**

Titles may be up to 400 characters in length, and the user may include any information that he wishes. Documents are not listed according to title in any of the NIC printouts.

All 400 characters of a title can be printed in the Bibliography, but catalogue cards can accommodate only 230 title characters.

## **SOURCES**

Source data may be up to 200 characters in length, and here also the user may include all kinds of information - series notes, pagination, imprints, etc.

All source data is printed in the Bibliography, but the catalogue cards have room for only the first 132 characters.

## 9 Non - library Usage of NIC

While NIC was primarily conceived as a library application, there is no reason why it should not be used in technology and in commerce to produce listings and references. In such cases the 'document' may be anything from a drug to an engineering listing or a rival product; the author may be component, a source of material, or a rival company; and the descriptor may be a drug's side-effect, the size of a screw, or the difference between two products.

In order to make use of NIC in such a manner, it is essential to understand the use to which the so-called 'author' and 'descriptor' fields are put. The other fields on the document may be used to give whatever general description of the 'document' is necessary on the 'bibliography' index, which should be used as a reference in 'document' number order to the actual articles being listed. The 'author' and 'descriptor' fields give rise to indexes by properties of the articles listed in the 'bibliography'.

The 'author' index gives listings by independent properties. If two 'authors' are given for one article, then two independent entries, one under each 'author', are made in that index. Thus if an article can be made of two materials, putting each material into an 'author' position would give a listing of items by basic materials.

The 'descriptor' indexes (either SLIC or chain) give listings by dependent properties. Thus, if in the example quoted in the last paragraph, the article were made of two basic materials together, then an entry in the descriptor field would produce a listing giving articles under those combinations of basic materials from which they were derived.

An example of a non-library use of NIC is the listing of medical drugs. The 'author' field is used to hold the names of complaints for which the drug is used generally, while the 'descriptor' field gives the properties of the drug. Thus the author index will provide a list of diseases with those drugs applicable to each disease. The chain index might then be used to give a list of effects and the drugs producing those effects. The 'source' and the 'title' fields could be used in the bibliography index to give any other general information required on the drug.

Other applications might use the various fields in the manner indicated in the following table.

APPLICATION	FIELD				
Libraries	Document No.	Author	Descriptors	Title	Source
Engineering parts listing	Part number	Description	Raw Materials Assemblies Sub-assemblies	Manufacturing Centre	Prices, etc.
Name and address lists	Code or account number	Name	Town, County Country Occupation	Address	
Company directory	Level code	Name Status Dept., Tel. No.	Areas of activity	Address	
Personnel lists	Staff number	Name	Qualifications Languages Hobbies, etc.	Address	Age Sex etc.
Drug lists	Code number	Description	Properties	Method of use	
Customer lists	Customer number	Name	Products taken	Address	Terms of business, etc.

Table 3



# 10 Information Retrieval from NIC Files

The option whereby all the input records may be cumulated and printed out periodically for retrospective searching purposes has been already mentioned (page 2). It is also possible to search the cumulated file by means of the I.C.T. FIND program, which can test specified fields in a fixed-length record and extract and print out those records in which given conditions are met.

The cumulated file will contain one or more subfiles (see page 7); it will be necessary to search only the bibliography subfile, since this contains full details of each input record. This may be effected by specifying a word count (word 0) equal to 209 words as the first condition of the FIND search; thus, any other records will not be searched unnecessarily.

For example, an enquiry might be for three characteristics:

author: KENT, A and PERRY, J.W.  
source: American Documentation  
descriptors: Metallurgy or metals but not Role Relations

Each search characteristic must be correctly defined according to its

- 1 place in the record,
- 2 value,
- 3 logical relationship to the other characteristics.

## 1 ITS PLACE IN THE RECORD

Each document record has the same format, and the locations on which search can be made are in the same 1900 word positions in every record:

Corporate Author - words 4 to 33  
Individual Author - words 4 to 8, or 9 to 13, or 14 to 18, or 19 to 23, or 24 to 28, or 29 to 33  
(i.e. 5 words - 1 author)  
Title - words 59 to 158  
Source - words 159 to 208  
Descriptor - words 34 to 38, or 39 to 43, or 44 to 48, or 49 to 53, or 54 to 58  
(i.e. 5 words - 1 descriptor)

When in character form (as in NIC), the 1900 word holds 4 characters: so PERRY, J.W. occupies 2 words + 3 characters. The enquiry must define the length and position of the characteristic in the record in characters, so PERRY, J.W. must be defined as 11 characters. In fact the search will be to examine 11 characters, starting at word 4 or word 9 or word 14 or word 19 or word 24 or word 29.

'American Documentation' comprises 22 characters and the search will be to examine 22 characters beginning at word 159. But if it were required to limit the search to, say, issues up to and including Vol. 63 No. 4, the search would be for 'American Documentation' (22 characters) and for Vol. 63.4 (9 characters) assuming, that is, that volume and issue number are always quoted thus in the input data and the search requirement is for 22 characters starting at word 159 and for 10 characters starting at word 164, character position 2.

'Metallurgy' and 'Metals' both start with METAL, so to simplify matters here we could merely specify 5 characters starting at word 34 or word 39 or word 44 or word 54. (The same technique could be used if the enquirer was not sure whether Perry has invariably been entered as PERRY, J.W. - the search could be merely for PERRY, J).

## 2 ITS VALUE

Each characteristic may be required to be

equal to	}	the searcher's specification.
less than or equal to		
greater than or equal to		
less than		
greater than		
not equal to		

In the examples quoted for American Documentation, in the first case the specification would be 'equal to AMERICAN DOCUMENTATION' but in the second it would be 'equal to AMERICAN DOCUMENTATION and equal to or less than Vol. 63.4'.

## 3 ITS LOGICAL RELATIONSHIPS

The two relationships are 'AND' and 'OR', and brackets are used to show how far the power of the ANDs and ORs extends:

```
AND (
  Author equal to KENT, A
  Author equal to PERRY, J.W.
  Source equal to AMERICAN DOCUMENTATION
  Descriptor not equal to ROLE RELATIONS
OR (
  Descriptor equal to METALLURGY
  Descriptor equal to METALS
) close influence of OR
) close influence of AND
```

Multi-level combinations of AND and OR can be used.

Several searches can be made simultaneously. The immediate result is the production of a 'hit' tape - a magnetic tape containing all the records which satisfy each enquiry. These can be sorted into enquiry order and the results can be printed out - either the complete document record, or only selected portions of it, for example, document number and all descriptors.

The FIND program and a manual describing its use (the above is only a very general description) are obtainable from I.C.T.

# Appendix I Estimates of Input and Output Volumes

The figures given in this appendix regarding the volumes of input and output from the NIC system can only be taken as rough guides. Each NIC user will face a unique situation which may differ appreciably from that envisaged here. Where differences do occur, however, this appendix will generally have exceeded rather than underestimated the volumes encountered.

Table 4 gives a breakdown, by field, of the input data volumes, assuming two hundred documents to be input to the system.

FIELD	PUNCHED CARDS TO BE READ PER 200 DOCUMENTS	CHARACTERS TO BE READ PER 200 DOCUMENTS
Descriptor	380	20,000
Author	210	4,000
Title	280	12,000
Source	280	12,000
Document No.	0	1,600
<b>TOTAL</b>	<b>1150</b>	<b>49,600</b>

*Table 4 Volumes of input to the NIC system*

Table 5 gives a breakdown of the output volumes from the system by index chosen, figures being given for both 120 and 160 character position printers.

INDEX	NUMBER OF LINES PRINTED PER 200 DOCUMENTS	
	120 CHAR. LINE PRINTER	160 CHAR. LINE PRINTER
Bibliography	450	370
Author	70	50
SLIC	1500	1500
Chain	480	480
Card Catalogue	8250	5500

*Table 5 Volumes of output from the NIC system*

## Appendix 2 Timing Estimates

The time taken to generate the user's programs will depend on the options chosen; it is unlikely that it will exceed ten minutes. The two user programs will then have to be compiled and this should take approximately ten minutes.

The time taken to run any pair of user programs will depend on the options chosen, the peripherals in use, and the amount of core store available. Obviously, no single set of times can be given. Examples will be given of timings for some selected systems. All timings given in this appendix will be for 200 accession documents.

Before the examples, however, special attention should be drawn to the card catalogue option, as systems which include this option will take significantly longer than those without it. This is because one input record will produce up to five long catalogue card records. Obviously this will considerably affect the printing time in run 2 of the user system. It will have a greater effect in run 1, however, where the sorting time for this subfile is much greater than for other subfiles. For instance, run 1 of a system, with bibliography, author, SLIC and card catalogue options, on an 8K machine with 20.8 kch/s decks, will take approximately 65 minutes. This time will be reduced by a factor of two,

- (a) if a larger machine is used and an extra 4K of store made available, or
- (b) if 40 kch/s decks are used.

No examples are given of updating and printing of the cumulation file. If five minutes is added to the time of run 2, this will certainly cover the updating of the file. The time taken to print out the file will depend on the number of documents on the file, on the line printer and, to a lesser degree, on the files in use. Examples are given of run 2 times for certain configurations and a rough estimate may be obtained from these, by applying the formula:

$$T \text{ required} = T \text{ RUN2} \times \frac{\text{no. of documents on cumulate file}}{200} \times \frac{\text{quoted line printer rate}}{\text{own line printer rate}}$$

Thus if the time to print a 1,200 document cumulation file with bibliography and author subfiles is required using a 1,300 line/minute line printer, an estimate may be obtained from example 4, giving the time

$$T \text{ required} = 6 \times \frac{1,200}{200} \times \frac{300}{1,300} = 8.5 \text{ minutes (approximately)}$$

### Examples

- 1 Configuration is a 1902 with 8K of storage, four 20 kch/s tape decks, a 300 card per minute card reader and a 300 line per minute line printer. Options taken are bibliography, author, chain, and card catalogue.  
The time for run 1 is 65 minutes.  
The time for run 2 is 25 minutes.
- 2 Configuration is a 1902 with 8K of storage, four 20 kch/s tape decks, a 300 character per second paper tape reader and a 300 line per minute line printer. Options taken are bibliography, author and SLIC indexes.  
The time for run 1 is 23 minutes.  
The time for run 2 is 14 minutes.
- 3 Configuration is a 1904 with 16K of storage, four 20 kch/s tape decks, a 900 cards per minute card reader and a 1,300 line per minute line printer. Options taken are bibliography, author, SLIC and card catalogue.  
The time for run 1 (given 10K of storage) is 18 minutes.  
The time for run 2 is 11 minutes.

- 4 Configuration is a 1901 with 8K of storage, four 20 kch/s tape decks, a 300 character per second paper tape reader and a 300 line per minute line printer. Options taken are bibliography and author indexes.  
The time for run 1 is 7 minutes.  
The time for run 2 is 6 minutes.
- 5 Configuration is a 1903 with 8K of storage, four 20 kch/s tape decks, a 300 card per minute card reader and a 300 line per minute line printer. Options are bibliography and chain indexes.  
Time for run 1 is 7 minutes.  
Time for run 2 is 8 minutes.

## Appendix 3 Glossary of NIC Terminology

**ACCESSIONS:** additions to the catalogue.

**BIBLIOGRAPHY:** descriptive information, such as author, title, edition, date of publication, etc. concerning a document; sometimes called the Citation.

**CHAIN INDEX:** a file comprising series of related descriptors, each one being a subset of the one before it.

**CITATION:** see Bibliography.

**CONTROLLED VOCABULARY:** a limited list of words or expressions deliberately selected, each word or expression having a unique and definitive meaning.

**CORPORATE AUTHOR:** a body or organization to whom authorship is accredited.

**CUMULATION FILE:** a file having the cumulated entries of a number of accessions which may be updated at regular intervals.

**CURRENT AWARENESS:** a method of presenting the latest information.

**DESCRIPTOR:** a word or expression chosen to describe an item.

**FACETED CLASSIFICATION:** see Chain Index.

**GENERATOR:** the initial computer run which assembles the user-system, specified by the user, from the master program file.

**SLIC:** Selective Listing in Combination - a technique for combining descriptors in such a way that the maximum degree of catalogue accessibility is achieved with the minimum number of descriptors.

**SOURCE:** any additional information required, for example, that part of the bibliography (q.v.) related to edition and publication information.

**THESAURUS:** a controlled vocabulary (q.v.).

**UNION:** a system of cataloguing used by libraries with several branches, e.g. public libraries.





