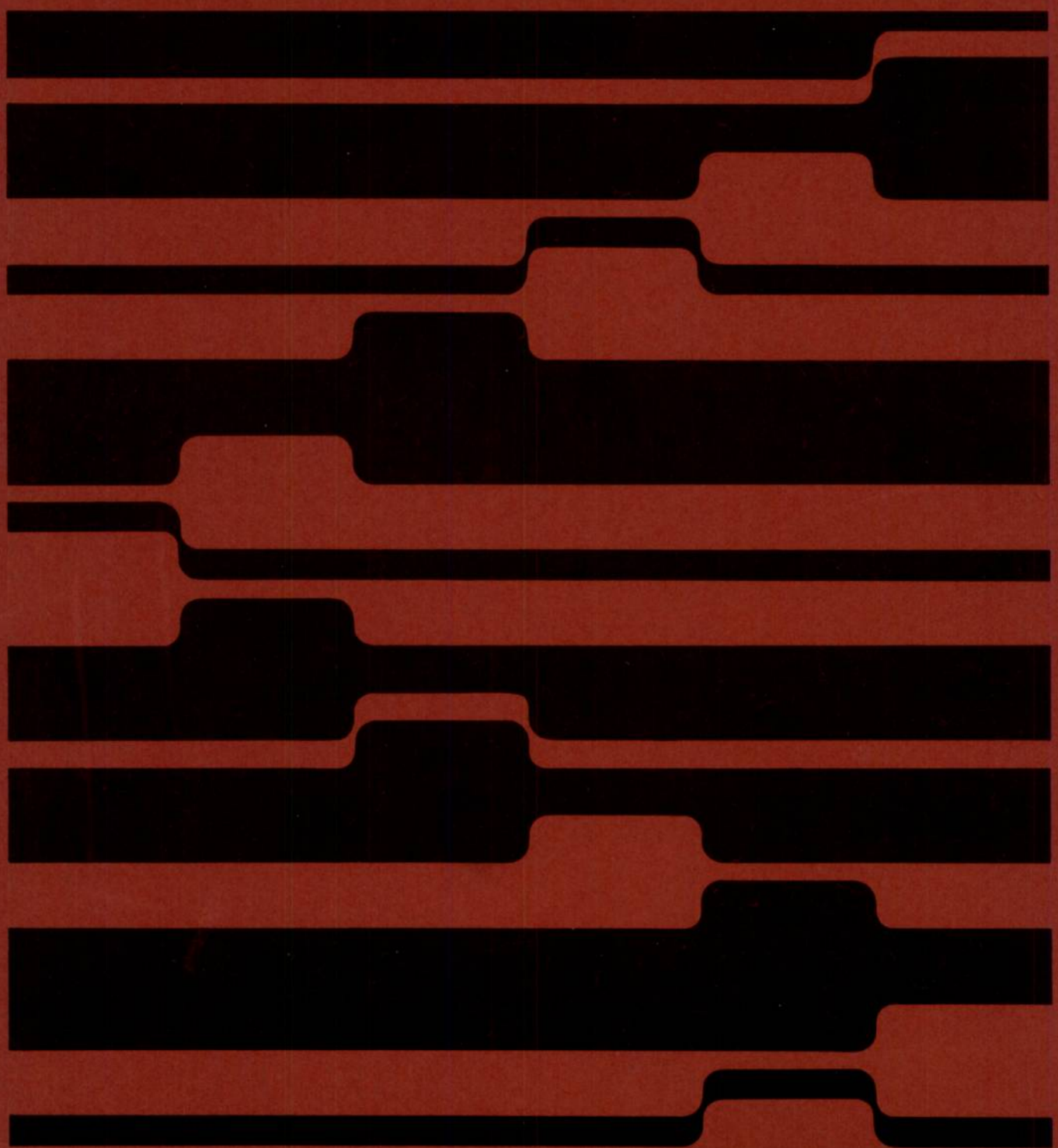
ICL

FIND

1900 Series



ICL FIND 1900 Series

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User notice

MANUAL (NOTICE NO.)

4/9/68

4051 FIND (1)

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File one copy of this notice with each of the manuals indicated.

FIND (FILE INTERROGATION OF NINETEEN HUNDRED DATA)

Modifications to Program

#X631/8, #X633/8, #X635/8 — The errors reported in Software Notice FIND/16 have been corrected.

FORM 1/230/965(8.68)

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ICL International Computers Limited

User notice

MANUAL (NOTICE NO.)

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4051 FIND (4)

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FORM 1/230/45(3.69)

FIND (FILE INTERROGATION OF NINETEEN HUNDRED DATA)

Modified programs

The following programs have been modified:

#X632/12
#X634/12
#X636/12

The changes are described in the next two sections.

SOFTWARE ERRORS

The errors reported in the FIND software error notice FIND/20 have been corrected.

FRACTION TOTALLING MODIFICATION

The programs have been modified to allow fraction only fields to be totalled. It should be noted that when specifying the position of the field on the #FORM parameter, space must also be allocated for an integer result. For example, if the total is not expected to reach 100, '3x.4F' could be defined(that is, one position for the sign and two positions for the integral part of the total).

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User notice

MANUAL (NOTICE NO.) 6/5/70

4051 FIND (5)

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FORM 1/230/45(3.69)

FIND-1 (FILE INTERROGATION ON NINETEEN HUNDRED DATA)

The following programs have been modified:

#X631/9	#X632/13
#X633/9	#X634/13
#X635/9	#X636/13

Software errors

The error reported in FIND Software Notice FIND/22 has been corrected.

Modifications

X631, 3, 5 have been modified so that the programs HALT-LP if a line printer is not available for the printing of hit-counts at the end of the interrogation.

X632, 4, 6 have been modified so that if an odd number of heading cards occurs after a #HEAD or #PAGE directive, the right-hand half of the last line of heading is automatically space filled.

FIND-1 withdrawal

As from 1st July 1970 the FIND-1 programs X631, X632, X633, X634, X635 and X636 will be withdrawn from the software library and will no longer be supported.

FIND-1 has been replaced by the FIND-2 Single and Multiple Enquiry Systems which are already available.

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Introduction

1900 FIND (File Interrogation of Nineteen Hundred Data) is designed to meet the needs of the user who has to make frequent searches of his magnetic tape file in order to select information on the basis of pre-determined criteria. Such needs arise either regularly, as with periodic reports or listings, or occasionally as with random enquiries originating, for example, with top management or customers. It would be possible, but highly uneconomical, for a user to write special purpose programs to deal with all of these requirements. 1900 FIND is a general purpose system able to cope with each situation without the necessity of programming effort by the user. To use FIND, it is necessary for the parameters of the various enquiries to be specified and related to the file being interrogated. While this is an exacting task, it is much less so than programming, and calls for no specialised programming knowledge on the part of the user. This manual sets out the procedures to be followed for FIND to be implemented.

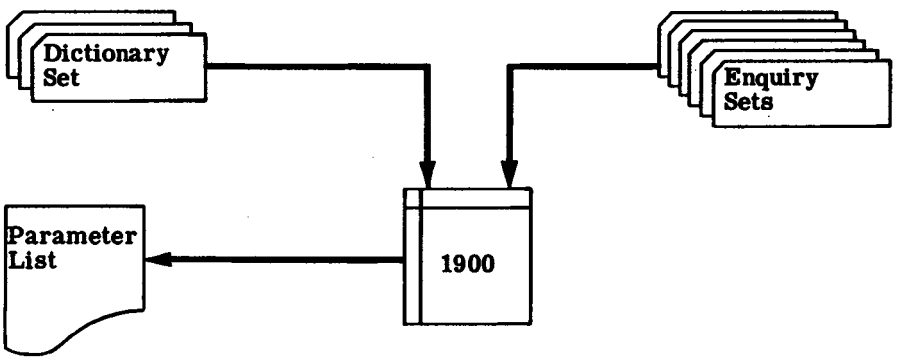
The FIND method is as follows. The system is provided with details of enquiries; it uses these to examine a master file of data and to decide which records on the master file are relevant to the enquiries (these records are known as *hits*). Hit records are written to a subsidiary tape file called the hit file. This file can then be processed in a number of ways to produce the required answers.

The FIND system is flexible because enquiries peculiar to specific user's requirements are presented as parameters. These are input on cards or paper tape prepared by the user and are not an integral part of the program.

1 An Outline of the FIND System

The FIND system is divided into four separate runs to provide flexibility in use.

RUN 1: MAIN FILE IDENTIFICATION AND INTERPRETATION OF ENQUIRIES



This run reads a set of parameters called the Dictionary, which identifies the fields in the master records to be processed, by means of a field name, the starting position of the field relative to the start of the record and the field length. Any fields in the master records which are of fixed length, which are organized in multiples of six bits, and which always appear in the same position relative to the start of the record may be the subject of an enquiry.

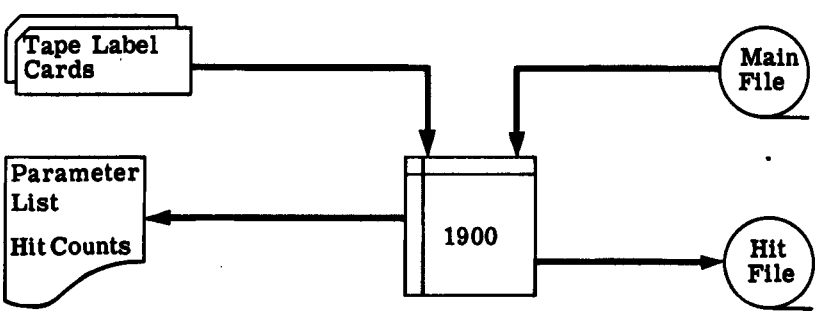
The Enquiry sets are then read, defining the logical operations to be performed and the relations between fields in the master file record and other fields or specified constants.

The logical operators which may be used are AND and OR. The depth of the logic is controlled by means of brackets, whereby the power of the AND/OR operators is restricted to only those relations which appear within their brackets.

For any individual record to satisfy an enquiry and thus become a *hit, all* relations within an AND operator's brackets must be satisfied and *any one* of the relations within an OR operator's brackets must be satisfied.

The relations which may be used are *equal to, greater than, less than, not equal to, greater than or equal to,* and *less than or equal to.* These relations may connect a defined field of the record with a fixed constant, or with another defined field in the record.

RUN 2: MAIN FILE INTERROGATION



This run reads the tape label cards and uses them to check that the correct master file has been loaded and to write the file name to the hit file if required. The program will provide a label for the hit file if the user has not done so.

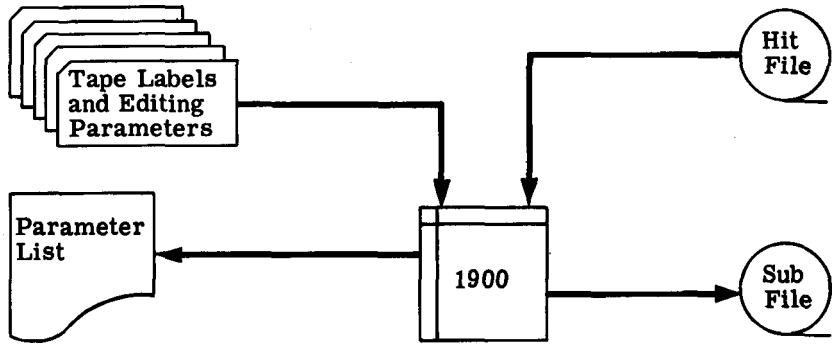
When the parameters for Run 2 have been read and listed, the appropriate slow input device (card reader or paper tape reader) and the line printer are released from the system.

Any record on the master file which satisfies the conditions of an enquiry may be written to the hit file. At the same time a hit register word is attached to the record. A bit is set to 1 in the notational position in this register corresponding to the number of the enquiry that the record satisfies. Thus hit records are cross-referenced to enquiries. If the user is not interested in the actual content of the records, but only needs to know how many records satisfy his enquiry, no hit file is produced and the hits are just counted.

For either type of enquiry, at the end of the interrogation the line printer is re-allocated and a list of the enquiries, with the corresponding hit-counts, is printed.

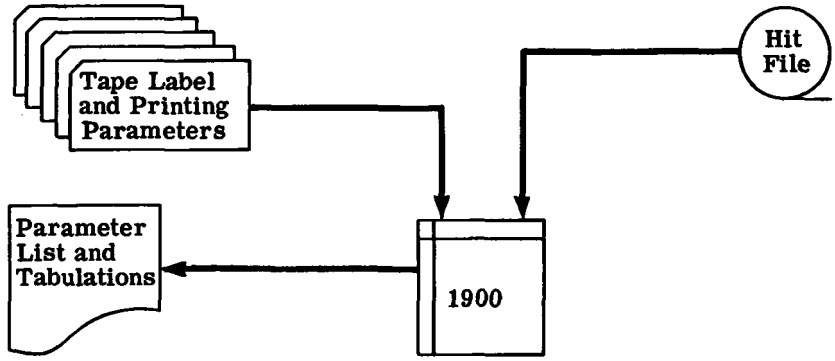
Run 2 follows consecutively from Run 1. Thereafter the user has the choice of entering either Run 3 or Run 4.

RUN 3: SUB-FILE CREATION



This run gives the user the facility of breaking down the hit file into any number of sub-files, based on one or all or any combination of the enquiries used. Tape Labels must be provided as in Run 2 to check that the correct hit file has been loaded and to label the sub-file. Option parameters determine which records from the hit file are to be written to the sub-file. Index information, which relates the enquiries to the bits in the hit register word, must be input if it has been lost through the hit file being sorted. An optional Edit parameter provides for only certain fields within records to be written to the sub-file.

RUN 4: TABULATIONS



This run enables the user to obtain the results of his enquiries in the form of tabulations. Each tabulation may be formed from records on the hit file which satisfied any one or any combination of enquiries. Three types of tabulation can be obtained:

1 A list of details from the records, without totals.

2 A list of details from the records, with totals on changes in specified control fields.

3 Totals only, with no detailed listing.

A tape label is used to check that the correct hit file is being used. Option parameters determine whether a list of specified records is required, or totals only. Control parameters determine the levels at which totals are to be taken. Main headings and page headings may be provided by parameters. The format of the print line and the fields from the records which make up the line are also determined by parameters. The end of a set of tabulations run is signalled by the presence of a Stop parameter.

When a detailed listing is specified, the user has the option of a single or double spaced report.

Special Features and Limitations

While the exacting nature of defining the enquiries should not be underestimated, it is a simple task compared to writing a program for every application. Once the master file and the Dictionary parameters defining the organization of the information in it have been created, no special programming knowledge is required to define and perform enquiries. For maximum speed, the Dictionary and tape labels for any one file could be pre-punched as a once only operation.

Three versions of the FIND system are available. Versions 1 and 2 are for machines with an 8K store. Version 1 gives single 512 word buffering, while Version 2 provides double 256 word buffering. Version 3 is for 16K machines, giving double 1024 word buffering in Run 2 and double 512 word buffering in Runs 3 and 4.

MINIMUM 1900 CONFIGURATION

8K Store

1 Card Reader or 1 Paper Tape Reader

1 Line Printer - 96 or 120 or 160 print positions

3 Magnetic Tape Decks

The amount of core store used by the package is approximately 5,632 words for the 8K versions and 10,688 words for the larger version.

LIMITATIONS

The master file must be in 1900 M.T.H. format

The maximum block size must not exceed 512 words for Version 1, 256 words for Version 2, and 1024 words for Version 3.

For the 8K Versions the Executive size must not exceed 2,560 words.

2 Input and Output Files

The FIND system utilizes three types of input/output files, which are held on magnetic tape. These are:

1 The master file

2 The hit file

3 The sub-file

and all are required to have standard tape labels.

THE MASTER FILE

The master file is used for input in Run 2 and is interrogated by an enquiry program generated by FIND. The master file may contain any sort of information, held in the I.C.T. 64-character code.

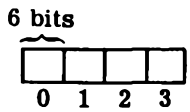
The master file must be in 1900 M.T.H. format. The maximum block size is 512 words for Version 1, 256 words for Version 2 and 1024 words for Version 3. The maximum record size for Versions 1 and 3 is 512 words, and 256 words for Version 2. When a record is of maximum length, the hit register overwrites the last word of the record, instead of being added to the end of it.

When blocks of data are separated by *User Tape Sentinels*, FIND will ignore these sentinels and jump over them to read the next block of data.

Within the above limitations, records may be of any length. Fields referenced by the enquiries must be of fixed length and appear in the same position relative to the start of each record.

In M.T.H. format the first word of each record contains the number of words in each record and is known as word 0.

The records are broken down into four-character 24-bit words.



The start address of a field is written as XXX.Y where XXX is the number of 1900 words from the start of the record and Y is the character position.

Multi-reel files may be accepted as input.

THE HIT FILE

The hit file is produced by interrogation of the master file in Run 2, and is used as input for Runs 3 and 4. Each master record in turn is examined to see if it satisfies the conditions of any enquiries. Any record which qualifies as a hit is written to the hit file. An extra word, known as the hit register word, is attached to each hit record to identify which enquiries it has satisfied.

The hit file will be in 1900 M.T.H. format. The first record will be a 256- or 512-word block (depending on the version) containing a word count and the *Index* This is a table, produced by Run 1 of the FIND system, containing enquiry identifiers related to the 24 possible enquiries. Following the Index block, separated by a User Tape Sentinel are the *data* blocks. These are blocks of hit records from the master file, each record having the extra hit register word. Multi-reel hit files may be created.

It may be required to sort the hit file before using it as input to Runs 3 or 4. The Sort/Merge Generator program can be used and the First Pass Own Coding given in Appendix 2 should be incorporated. This has the effect of by-passing the index block to prevent it being written to the sorted file. Alternatively,

the standard sort programs such as XSMA or XSMC can be used. These programs will treat the index block as a data record and sort it with them. In Runs 3 or 4, the FIND program will always skip over this index record because the last word contains zero. When using XSMA or XSMC the block sizes specified in the sort parameters must be equivalent to the buffer sizes of the version of FIND being used, i.e. either 256 or 512.

THE SUB-FILE

The sub-file produced by Run 3 of the FIND system is either a duplicate hit file or a selective hit file. In both cases, the Index block and hit register words are removed. Not only may certain records be selected from the hit file, but also, by use of the Edit facility, words and characters within records may be selected. Thus, when using the Edit facility, sub-file records or any length up to the maximum permitted block size can be created. The size of the sub-file record is determined by the position of the last word to which a field is specifically moved.

Any number of sub-files may be created either one at a time from one hit file, or different hit files may be processed in turn to create sub-files. The sub-files will also be in 1900 M.T.H. format.

STANDARD TAPE LABELS

All input/output files in the FIND system must have standard 1900 tape labels. These have the following format:

FILE NAME - Twelve characters

The file name of each magnetic tape file within an installation must be unique.

REEL SEQUENCE NUMBER - One binary word

This indicates the sequence number of each reel within a file. A single-reel file would have a *reel sequence* number of zero.

FILE GENERATION NUMBER - One binary word

This number is used to identify successive updatings of a particular file. The checking of the number ensures that the correct generation of an input file is being read.

RETENTION PERIOD - One binary word

The *retention period* of a tape is the number of days for which the information contained upon it must be retained. By adding the retention period to the *date written*, I.C.T.'s Executive software establishes a *purge date* before which the information on the tape cannot be overwritten.

DATE WRITTEN - One binary word

The date on which the tape was written is provided by Executive.

Users of the FIND system have to provide parameters to check the labels of input files and to write labels to output files with the exception of the hit file. The program will automatically label this if the user omits the parameter. The formats of these parameters are made clear in Chapter 4.

TAPE FORMATS

The Master File

HDDR	TM	SDS	Data blocks, and maybe User Tape Sentinels	TM	EOF or EOR

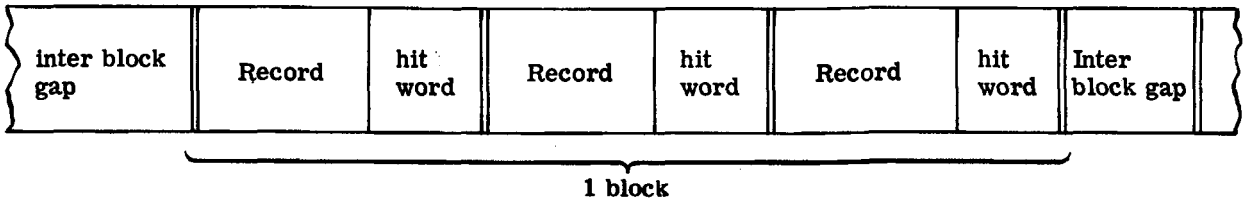
The data blocks may be separated by User Tape Sentinels. In Run 2 the program will ignore these.

Multi-reel files may be accepted as input, the format of continuation reels being identical to the first reel except for the End-of-File Label.

The Hit File

HDDR	TM	SDS	TM	UTS	Index block (256 or 512 words)	TM	UTS	Data blocks - hit records	TM	EOF or EOR

A block may consist of one or more records, up to a maximum of 256 or 512 words:



Multi-reel hit files may be created.

The Sub-file

HDDR	TM	SDS	Data blocks of edited or unedited hit records	TM	EOR or EOF

Abbreviations used:

HDDR - Header block

TM - Tape Mark

SDS - Start-of-Data Sentinel

UTS - User Tape Sentinel

EOF - End-of-File

EOR - End-of-Reel

3 Enquiry Definition

The definition of enquiries referred to in Chapter 1, Run 1, is a most important feature of using the FIND system. Enquiries must be phrased in a logical sentence before coding them for input. The actual coding format of the parameters is shown in Chapter 4.

To show the breakdown of an enquiry into a form suitable for coding it is convenient to follow an example.

The personnel records of a company, in which defined fields include job, age, marital status, typewriting and dictation speeds, are held on magnetic tape. The Personnel Officer wishes to know if there is anyone suitable to be the Managing Director's Secretary. First the criteria involved must be assessed.

> 'She must be a secretary, who is less than 30 years old or unmarried, and can type at more than 50 w.p.m. and take dictation at 120 w.p.m.'

Take note of all the ANDs and ORs in the sentence. Then write out the sentence in the following form, remembering that with AND *all* conditions must be satisfied and that with OR any *one* condition must be satisfied.

> 'She must be a secretary AND be less than 30 years old OR unmarried AND type at 50 w.p.m. AND take dictation at 120 w.p.m.'

Then bring in brackets to show how far the power of the ANDs and ORs extends.

> 'AND (Secretary OR (Less than 30 years old, unmarried) typing greater than 50 w.p.m., dictation greater than 120 w.p.m.).'

Note that the power of the AND extends over the whole enquiry, whilst that of the OR extends only over the age and marital status.

The enquiry must also be given a four character identifying name, say DSEC.

The final form before coding would be as follows:

Enquiry Name DSEC

AND (	open influence of AND
Job equals Secretary	
OR (	open influence of OR
Age less than 30	
Marital Status equal to Single	
)	close influence of OR
Typing speed greater than 50 w.p.m.	
Dictation speed greater than 120 w.p.m.	
)	close influence of AND

In practice, the experienced user of FIND will be able to go from the first criteria stage straight to the pre-coding stage, as long as the enquiry is written in a logical form.

This can be shown by the following example:

> 'Is there anyone who is suitable for training as a computer programmer, who has a university degree, or five A-level passes including Mathematics and English and has passed an aptitude test.'

This may be written as:

```
Enquiry name  PROG
        AND (                                   open influence of 1st AND
            Aptitude equals PASS
         OR (                                   open influence of OR
            Degree equals YES
        AND (                                   open influence of 2nd AND
            No. of A-levels greater or equal to 5
            A-level equal to English
            A-level equal to Maths
            )                                   close influence of 2nd AND
            )                                   close influence of OR
            )                                   close influence of 1st AND
```

It can be seen that to satisfy the enquiry, both the aptitude test and the OR condition must be satisfied. To satisfy the OR condition, the person must either have a degree or the A-level requirements.

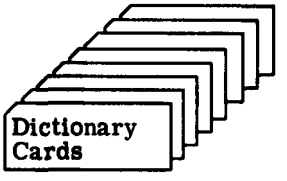
4 Input Parameters

This chapter describes the formats for input parameters. The parameters for each run are dealt with in turn, in the sequence in which they will be presented. Formats are described in terms of card input. Notes on paper tape formats are provided under each parameter heading.

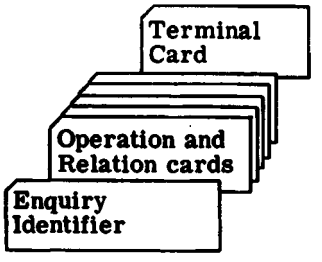
For convenience, parameter heading forms are available for use with standard I.C.T. Master File/Test Schedule sheets.

RUN 1

The parameters for this run describe the layout of the master file and the enquiries with which to interrogate the file.



The file dictionary containing the names and locations of all fields referenced by the enquiries.



An enquiry set consisting of an enquiry identifier followed by a variable combination of operation, relation and terminal cards.

The Dictionary

Each definition in the Dictionary identifies a field in the master record and is composed of the name of the field, its length and its start address in relation to the start of the record; see Chapter 2. It is necessary to define only those fields to which the enquiries make reference and not the whole of the record. However, users will probably find it convenient to define the whole record once, thus making every field eligible for each future FIND interrogation. Note, however, that no one Dictionary may define more than 80 fields.

Columns 1 to 8	=	Field Name (First character must be alphabetic)
Column 9	=	Blank
Columns 10 and 11	=	Field length in number of characters or words
Column 12	=	H if field length is in characters
	=	Blank if field length is in words
Column 13	=	Blank
Columns 14 to 16	=	Start address of field (word address)
Column 17	=	Decimal point
Column 18	=	Start address of field (character position)
Column 19	=	Blank

The 19 columns of each definition are repeated across the card. This means that up to four field definitions can be included on one card.

If an attempt is made to input more than 80 definitions (20 cards), the program will halt with a message to this effect.

Binary fields must start in character position 0 of a word and must occupy either one or two whole words.

CARD FORMAT

I.C.T. 1900 SERIES FIND 1/1936 (11.66) DICTIONARY PARAMETERS

FIELD TAG	NO. OF CHARS. OR WORDS	H OR V	START ADDRESS: WORD POS	.	CHAR	N/L OR V
GROSSPAY	04	H	222	.	2	
NETT PAY	01		240	.	0	

Where GROSSPAY is a four character field starting at the third character (character position 2) of the 222nd word of each record and NETT PAY is a one word binary field starting at the 240th word of each record.

PAPER TAPE FORMAT

I.C.T. 1900 SERIES FIND 1/1936 (11.66) DICTIONARY PARAMETERS

FIELD TAG	NO. OF CHARS. OR WORDS	H OR V	START ADDRESS: WORD POS	.	CHAR	N/L OR V
MARITALS	03	H	001	.	1	
INCOMES	06		005	.	0	%

The newline should be punched after 75 characters and/or at the end of the Dictionary.

The Enquiry Set

Each enquiry consists of an Enquiry Identifier followed by a combination of AND/OR operators, relations and terminals. These comprise the Enquiry set. Not more than 24 Enquiry sets may be specified in one run.

Not more than 29 AND/OR operators may be specified in each enquiry.

In the 8K versions of FIND, not more than 150 AND/OR operators and not more than 200 relations may be specified in one run.

In the larger version of FIND, not more than 600 AND/OR operators and not more than 1,000 relations may be specified in one run.

A card sequence code is used throughout each enquiry set to ensure that the cards within each set are in order. The card sequence code is in alphanumeric form.

Enquiry Identifier

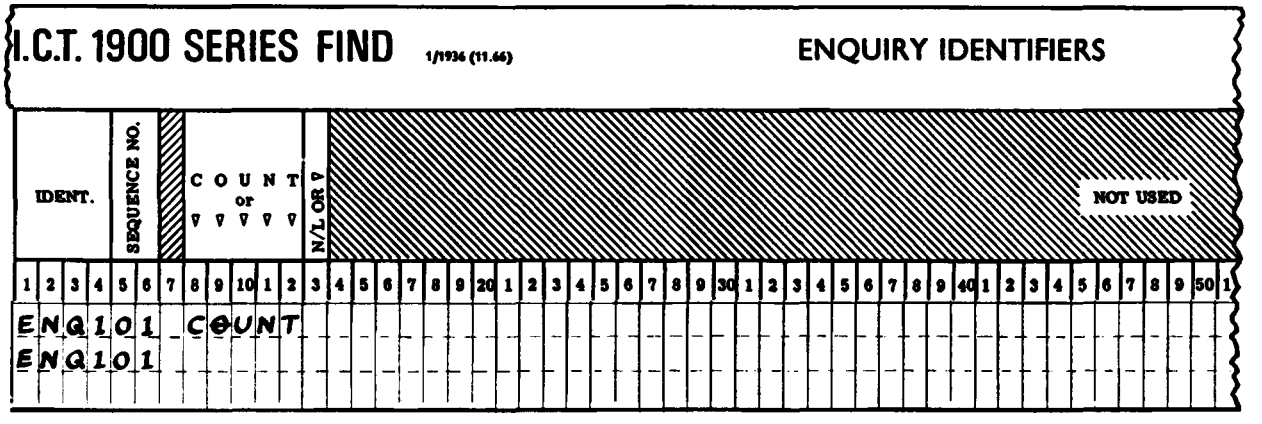
Each enquiry is identified by a 4-digit reference, known as the Identifier, the first character of which must be alphabetical and the other three alphanumeric. Thus each enquiry is uniquely referenced.

All enquiries are checked by Run 1 and a list of the correct enquiries is printed at the end of the run. This is known as the Index.

The Enquiry Identifier parameter also establishes whether the records which satisfy the enquiry are to be written to the hit file or just counted. If the hits are to be counted only, then the word COUNT must follow the Identifier, but if the hits are required to be written to the hit file the field should be left blank. When the records are written to the hit file, they are also counted. All the hit counts are printed at the end of Run 2.

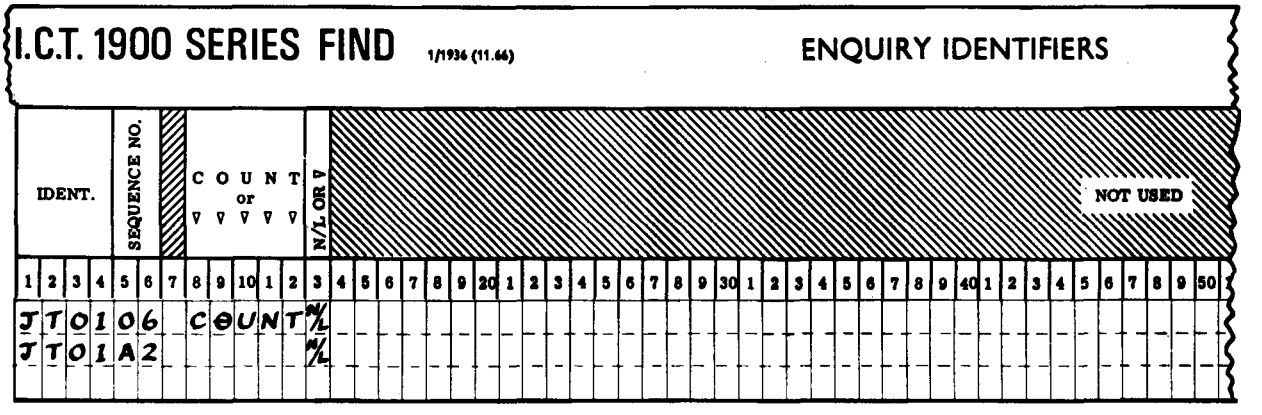
Columns 1 to 4	=	Identifier
Columns 5 and 6	=	Card sequence code
Column 7	=	Blank
Columns 8 to 12	=	COUNT (if count only required)
	=	Blank (if hit file required)

CARD FORMAT



PAPER TAPE FORMAT

The newline symbol must follow COUNT. If COUNT is not punched, six spaces must be inserted followed by newline.



Operation

There are two types of logical operation possible, AND and OR, the influence of which is denoted by brackets as explained in Chapter 3.

AND specifies that *all* the conditions within the brackets must be satisfied; OR specifies that only *one* of the conditions must be satisfied. The closed bracket symbol, to limit the influence of the operator, will be punched in the Terminal parameter.

Columns 1 to 4 = Identifier

Columns 5 and 6 = Card sequence code

Column 7 = Blank

Columns 8 to 10 = AND

= OR∇

Column 11 = (open bracket

CARD FORMAT

I.C.T. 1900 SERIES FIND 1/1936 (11.66) OPERATION PARAMETERS

IDENT.	SEQUENCE NO.		AND or OR ∇	(	N/L OR ∇	NOT USED
1 2 3 4	5 6	7	8 9 10	1	2	3 4 5 6 7 8 9 20 1 2 3 4 5 6 7 8 9 30 1 2 3 4 5 6 7 8 9 40 1 2 3 4 5 6 7 8 9 50
ENQ1	02		AND	(		
ENQ1	A2		OR	(		

PAPER TAPE FORMATS

The newline symbol follows the open bracket symbol.

I.C.T. 1900 SERIES FIND 1/1936 (11.66) OPERATION PARAMETERS

IDENT.	SEQUENCE NO.		AND or OR ∇	(	N/L OR ∇	NOT USED
1 2 3 4	5 6	7	8 9 10	1	2	3 4 5 6 7 8 9 20 1 2 3 4 5 6 7 8 9 30 1 2 3 4 5 6 7 8 9 40 1 2 3 4 5 6 7 8 9 50
JT01	04		AND	(	%	
JT01	09		OR	(	%	

Relation

There are six possible logical statements, which establish the relationship between a master record field and a constant or another master record field. These are:

EQL - equal to

GTR - greater than

LSS - less than

NEQ - not equal to

GEQ - greater than or equal to

LEQ - less than or equal to

The constant may consist of

(a) a sterling constant - positive or negative

e.g. (£XXSXXDXX)

(-£XXSXXDXX)

(b) a decimal constant - positive or negative

e.g. (510 or 1.5 or .6)

(-510 or - 1.5 or -.6)

} These are used where data is held in binary form in single or double length.

For mixed integers and fractions, double length working is assumed where the constant is expressed as integer and fraction (e.g. 0.6) and single length is assumed where the constant comprises only the fractional part (e.g. .6). Therefore, for the purpose of interrogation, fractional fields may be held in one word in negative or positive form.

(c) A character constant e.g. (03HABC) - used when data are held in character form. It is important to note that two positions are used for the number of characters. Insignificant zeros must be shown. The length of the character constant should be the same as the dictionary field with which it is being compared. The maximum size is 57 characters.

The normal rules with respect to the comparison of character fields and constants are followed with one exception. The exception is that a field in which the most significant character is alphabetic or one of [$] ↑ ← @ is assumed to be 'less than' a field in which the most significant character is not one of these. Apart from this, the inequality is determined by the normal internal code sequence:

e.g. BBC > ABC > AB2

#AB > ABC > AB#

32A > ABC > A4C

4AB > 3AB > 32B

O > A > B

(d) An eight-character field name specified in the Dictionary.

The formats for constants must be in accordance with the above conventions.

Columns 1 to 4	=	Identifier
Columns 5 and 6	=	Card sequence code
Column 7	=	Blank
Columns 8 to 15	=	Field Name (specified in Dictionary)
Column 16	=	Blank
Columns 17 to 19	=	Logical relation (EQL, GTR, GEQ, LSS, NEQ, LEQ)
Column 20	=	Blank
Column 21 onwards	=	Constant

CARD FORMAT

I.C.T. 1900 SERIES FIND 1/1936 (11.46) RELATION PARAMETERS

IDENT.	SEQUENCE NO.		DICTIONARY FIELD TAG		RELATION		CONSTANT OR DICTIONARY FIELD TAG	
1 2 3 4	5 6	7	8 9 10 1 2 3 4 5	6	7 8 9	20	1 2 3 4 5 6 7 8 9 30	1 2 3 4 5 6 7 8 9 40	1 2 3 4 5 6 7 8 9 50
ENQ	10	3	GROSSPAY		EQL		04H2943		

PAPER TAPE FORMAT

The newline follows the constant.

I.C.T. 1900 SERIES FIND 1/1936 (11.66) RELATION PARAMETERS

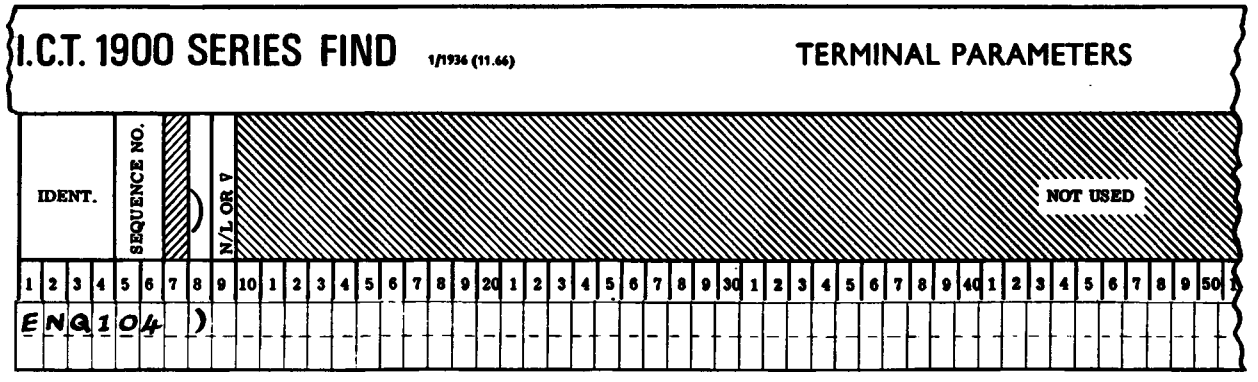
IDENT.	SEQUENCE NO.	DICTIONARY FIELD TAG	RELATION	CONSTANT OR DICTIONARY FIELD TAG
JT01A4		MARITALS	EQL	03HSGL%
JTA6ZE		MARITETS	EQL	1134%
JT8E41		PAY	LEQ	MARITETS%
JT9B03		STERLING	GTR	£10S10D06%
JT	05	NEGS	EQL	-0.5%

Terminal

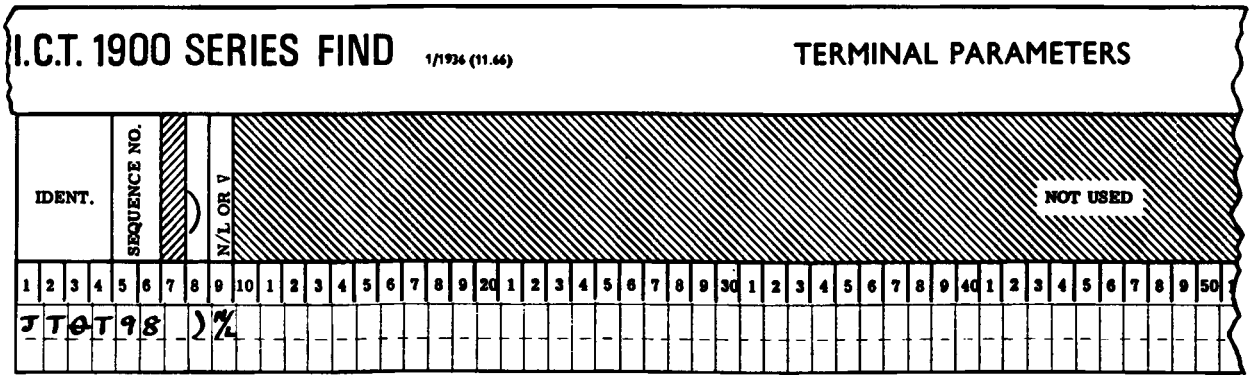
A terminal contains a closed bracket which is used to limit the influence of an operator. There must be a terminal parameter for each operator. The next Enquiry set cannot start until each open bracket in an operator has been closed by a corresponding closed bracket in a Terminal parameter.

Columns 1 to 4	=	Identifier
Columns 5 and 6	=	Card sequence code
Column 7	=	Blank
Column 8	=	) close bracket

CARD FORMAT



PAPER TAPE FORMAT

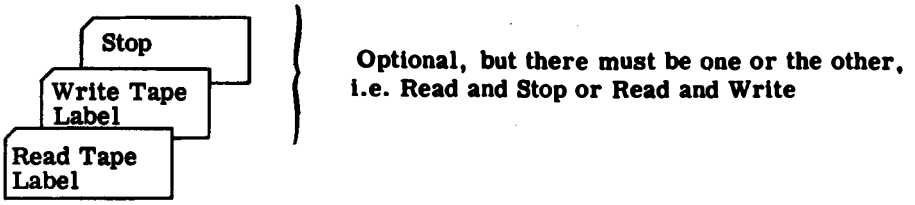


A complete example of the use of the parameters will be found in Chapter 5.

RUN 2

The parameters for this run define the labels of the master record file and the hit file to be written; see Chapter 2. These are called the Read Tape Label and Write Tape Label respectively. The Write Tape Label may be omitted if the Stop parameter is present, in which case the program will label the hit tape.

File name	HIT TAPE ONE
Reel sequence number	0000
File generation number	0000
Retention period	0002
Date written	generated by Executive.

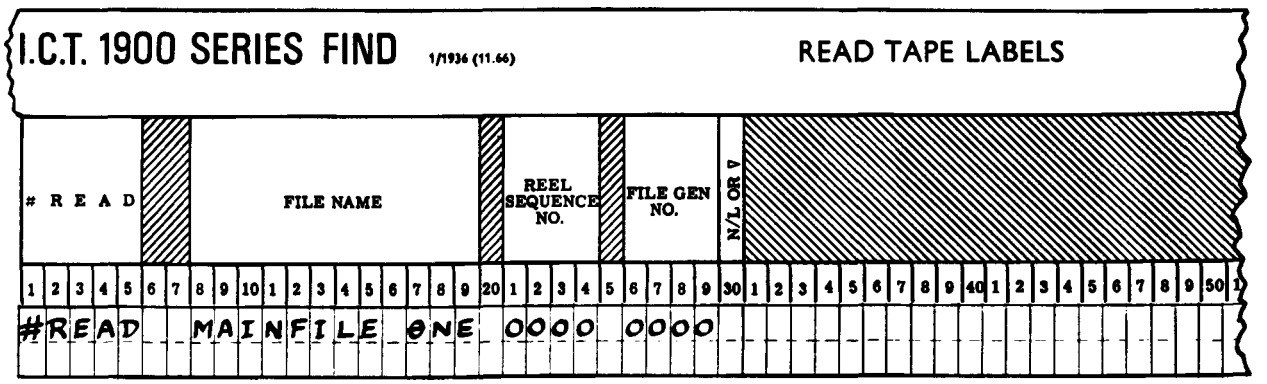


Read Tape Label

The program uses this parameter to ensure that the correct master record file has been loaded. If the correct file has not been loaded, the program will ask for it. The File Generation Number will not be checked if it is specified as zero.

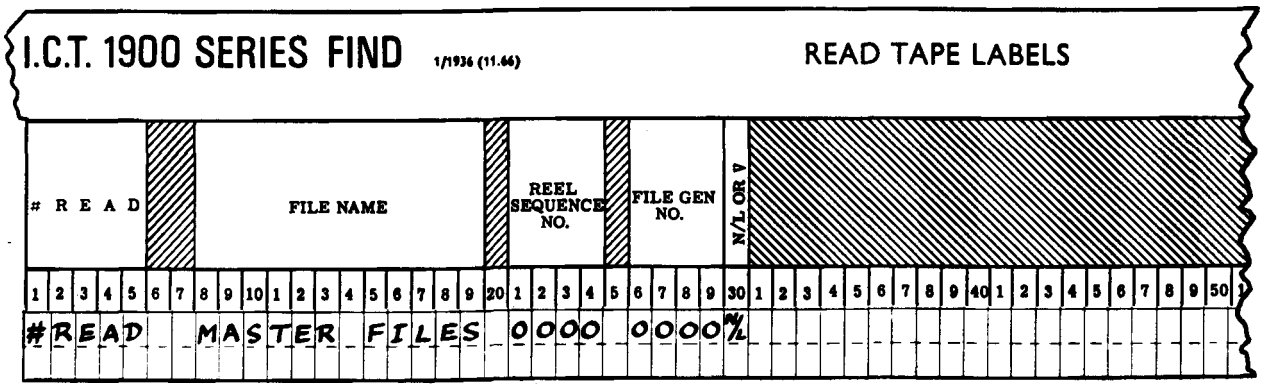
Columns 1 to 5	=	#READ
Columns 6 and 7	=	Blank
Columns 8 to 19	=	File name
Column 20	=	Blank
Column 21 to 24	=	Reel Sequence Number
Column 25	=	Blank
Columns 26 to 29	=	File Generation Number

CARD FORMAT



PAPER TAPE FORMAT

The newline symbol follows immediatly after the File Generation Number.

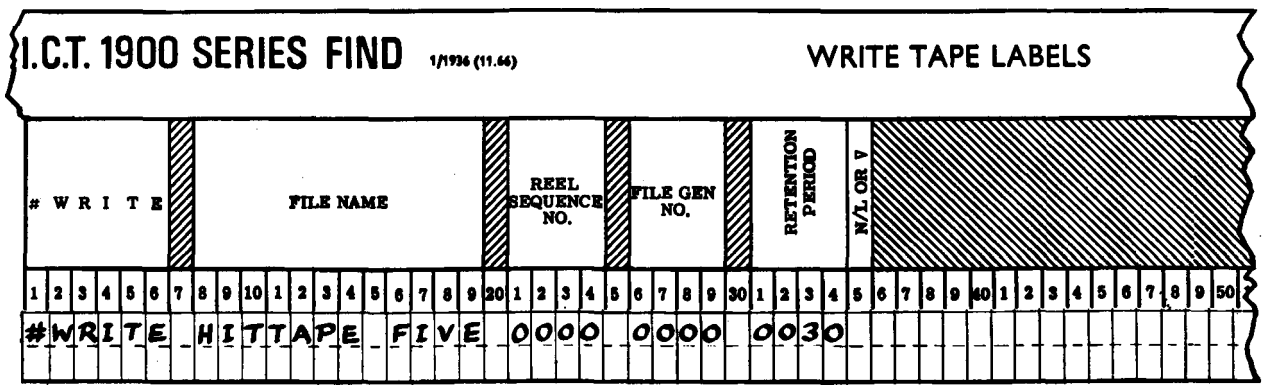


Write Tape Label

The user has the option of using the label supplied by the program or of writing his own label to the hit file. When specifying a Write Tape Label it is also necessary to specify the retention period. If all the enquiries are COUNT, a hit tape will not be required, and a Write Tape Label is therefore unnecessary.

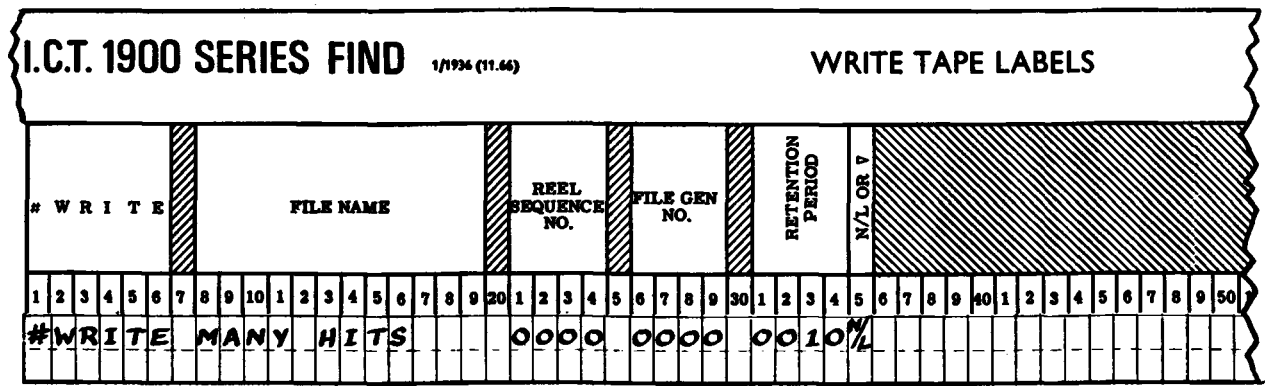
Columns 1 to 6	=	#WRITE
Column 7	=	Blank
Columns 8 to 19	=	File name
Column 20	=	Blank
Columns 21 to 24	=	Reel Sequence Number
Column 25	=	Blank
Columns 26 to 29	=	File Generation Number
Column 30	=	Blank
Columns 31 to 34	=	Retention period

CARD FORMAT



PAPER TAPE FORMAT

The newline symbol follows immediately after the retention period.

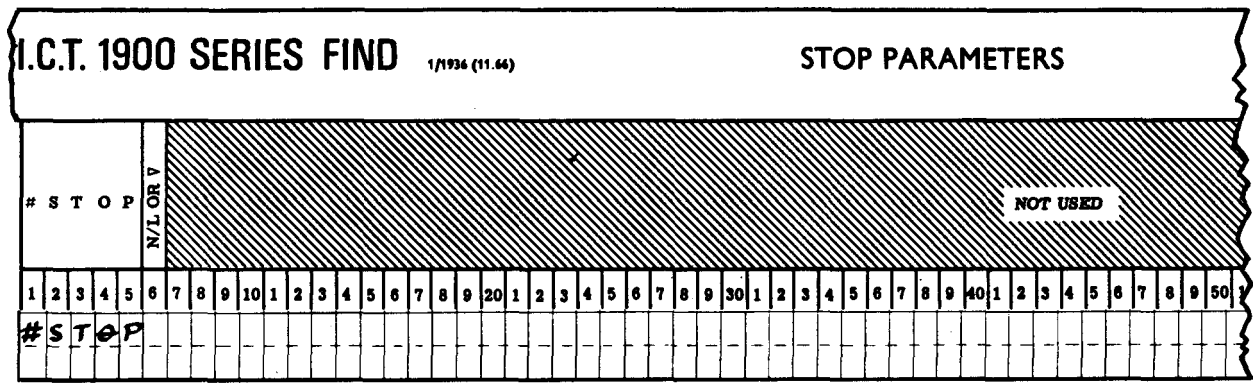


Stop

If all the enquiries are COUNT only, no hit file will be produced and a STOP card must be present as Runs 3 or 4 cannot be entered.

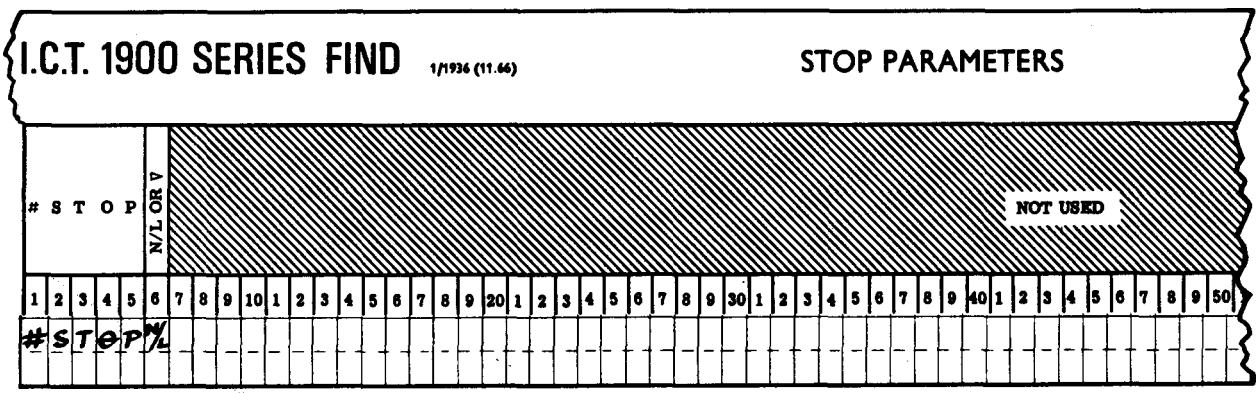
Columns 1 to 5 = #STOP

CARD FORMAT



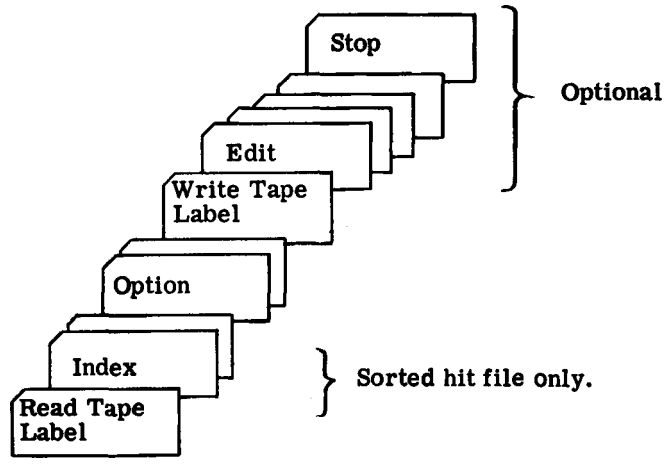
PAPER TAPE FORMAT

The newline symbol follows immediately after the fifth character.



RUN 3

Run 3 creates sub-files from the hit file created by Run 2. Only one sub-file may be created at a time but the program will continue automatically to create more sub-files if the Option and Write Tape Labels are repeated.



Read Tape Label

The Read Tape Label is used to ensure that the correct hit file has been loaded; if it has not then the program will ask for it. The format of the Read Tape Label is identical to that of the same parameter in Run 2.

Index

The *Index* is a list of the Enquiry Identifiers in the order in which they were presented in Run 1. The Index is written to the hit file in Run 2, but if the hit file has subsequently been sorted the Index will have been lost. A sorted hit file must therefore be provided with an Index by parameter. This parameter should never be provided if the Index block is intact on the hit file.

It should be noted that the Index parameter must be provided when the input file is other than a hit file, that is, when it is a subfile produced by a previous Run 3, or when it is a user file.

Columns 1 to 6 = #INDEX

Columns 7 and 8 = Blank

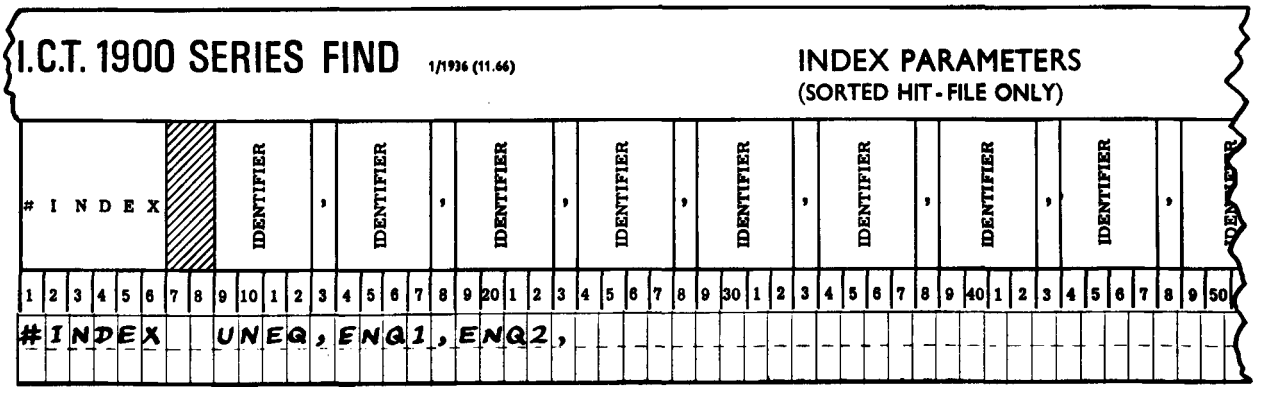
Columns 9 to 12 = Identifier (each Identifier corresponds to a bit position in the hit register word)

Column 13 = Comma

Thereafter, the last five columns are repeatable up to the end of the parameter. If more than 14 identifiers are to be specified they may go on to a second parameter with identical format to the first, that is, #INDEX in columns 1 to 6. If any more than 24 identifiers are present the first 24 only are input and the rest are lost.

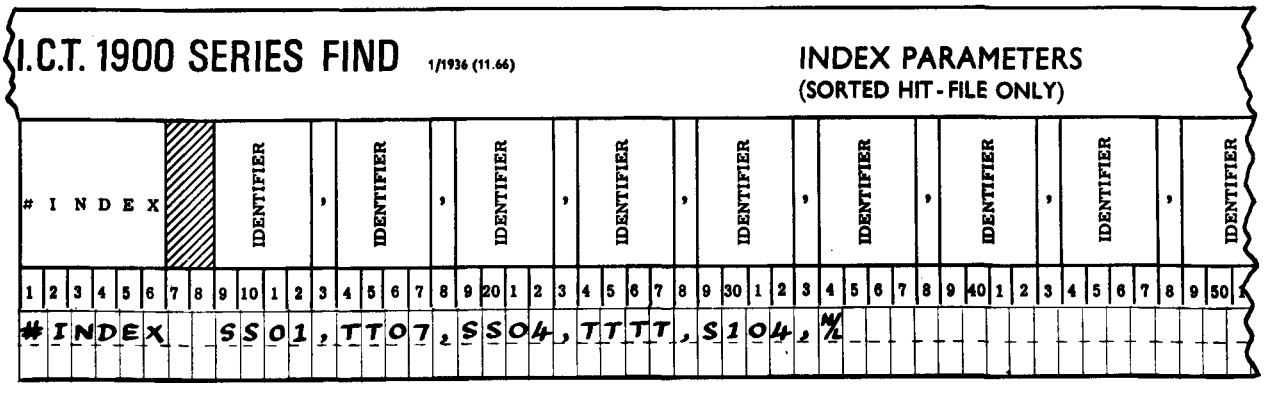
CARD FORMAT

Each card must start #INDEX▽▽



PAPER TAPE FORMAT

The whole of the Index must be punched as one record ending with newline. Each Identifier must be four digits and a comma must follow.



Option

The Option parameter determines which hit records are to be written to the sub file by listing the appropriate Enquiry Identifiers. It is thus possible to obtain sub-files containing those records which satisfy one or a combination of particular enquiries.

Columns 1 to 5 = #TAPE

Column 6 = Blank

Columns 7 to 10 = Identifier

Column 11 = Plus (+) or comma (,)

Thereafter, the last five columns are repeated until all the Identifiers required are specified.

Plusses (+) and commas (,) relate to the Identifiers immediately preceding and not to the following Identifiers.

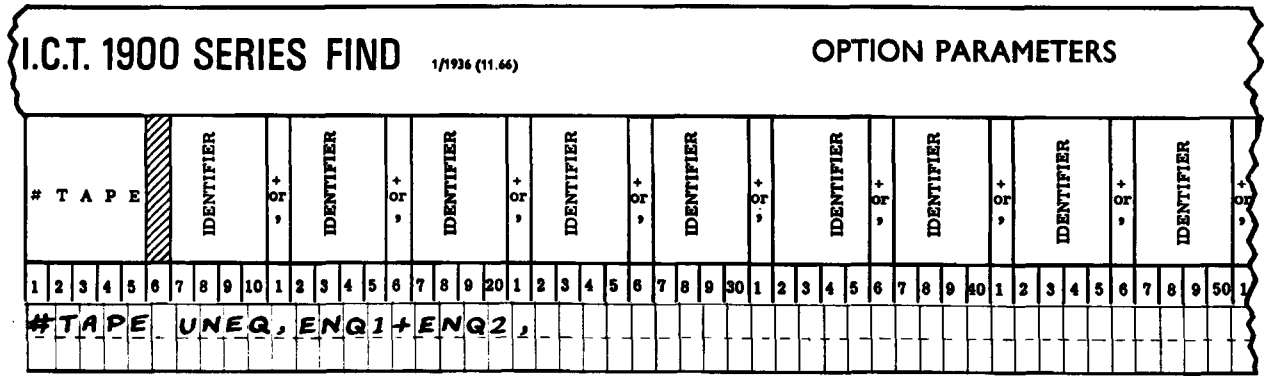
A plus in Column 11 means that the bit in the hit word corresponding to that Identifier must be present, whilst a comma means that the bit corresponding to that Identifier or to any other Identifier followed by a comma must be present. Therefore, in order that a record should satisfy the option it must have:

(a) a bit set in the hit word for each Identifier followed by a plus;

(b) at least one bit set for one of the Identifiers followed by a comma.

If #TAPE alone is present on the Option parameter, all the hit records from the hit file will be written to the sub-file tape.

CARD FORMAT



In this example, for a record to be written to the sub-file it must have satisfied enquiry ENQ1 and either UNEQ or ENQ2.

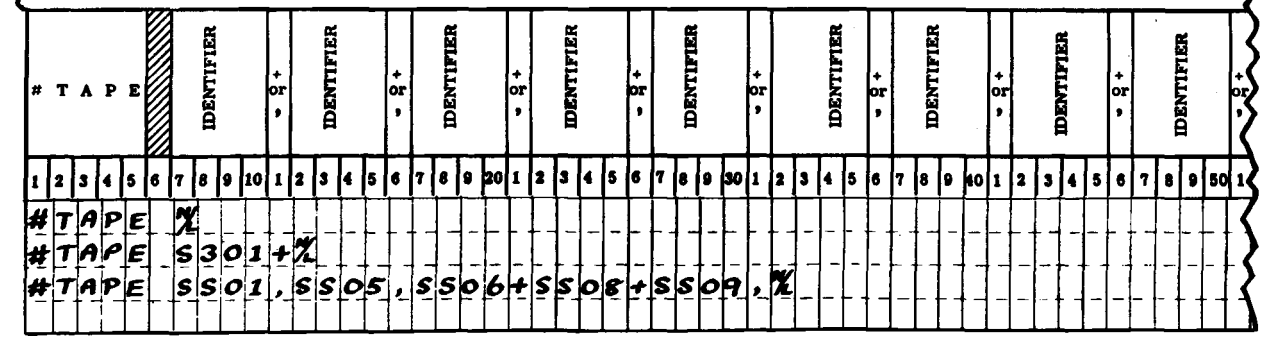
The parameter may be more than one card long, but each card must start with #TAPE$_{\nabla}$. If a continuation card is used, the first card must be completely filled with Identifiers. Therefore it must be punched up to column 76 and an asterisk (*) must be punched in Column 80. If the card has spaces other than the one after #TAPE or columns 77, 78, 79, the card will be assumed to be complete up to that space.

PAPER TAPE FORMAT

The whole of the Option must be punched as one record. The newline symbol will follow the plus or comma after the last Identifier. The plus or comma must not be omitted.

If no Identifiers are included, the record must be punched #TAPE▽N/L.

I.C.T. 1900 SERIES FIND 1/1936 (11.66) OPTION PARAMETERS



Write Tape Label

This parameter is used to label the sub-file. The format is exactly the same as the Write Tape Label in Run 2, but its provision is obligatory.

Edit

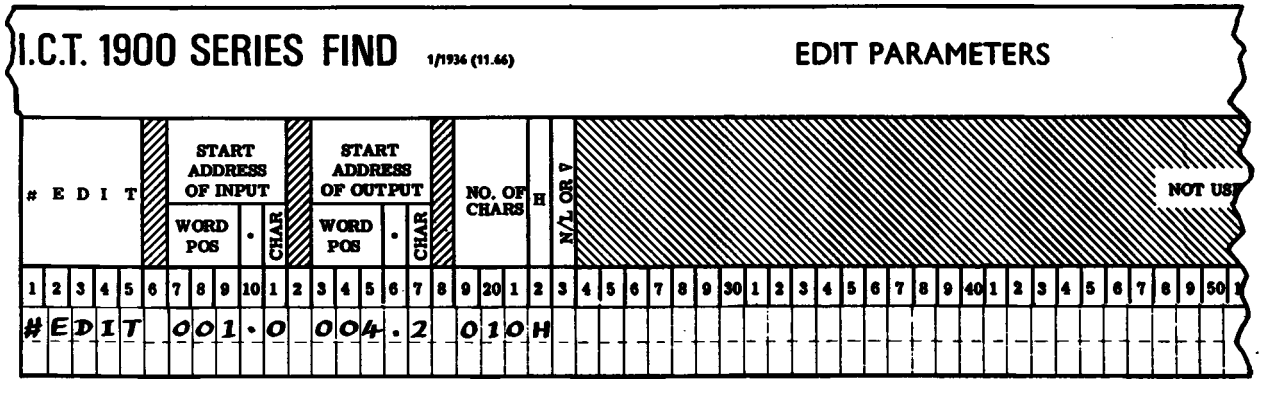
The editing of the hit record to be written to the sub-file is an optional facility. When it is used, fields from the hit record may be addressed and their position in the sub-file record specified. Fields can be moved to any position in the sub-file record except Word 0 where they would be overwritten by the word count. The record length is calculated from the position of the field with the largest address in the subfile record and the program will write the correct word count in Word 0. The length of the sub-file record may therefore be longer or shorter than the original hit file record, the maximum length being limited by the buffer size i.e. 256 or 512 words. Any part of the sub-file record to which a field has not be moved will be space filled.

If no Edit parameters appear, the whole of the hit record, less the hit word, will be transferred to the sub-file.

Not more than 25 Edit parameters may be presented.

Columns 1 to 5	=	#EDIT
Column 6	=	Blank
Columns 7 to 9	=	Start Address of field in hit file record (word address)
Column 10	=	Decimal point
Column 11	=	Start Address of field in hit file record (character position)
Column 12	=	Blank
Columns 13 to 15	=	Start Address of field in sub-file record (word address)
Column 16	=	Decimal point
Column 17	=	Start Address of field in sub-file record (character position)
Column 18	=	Blank
Columns 19 to 21	=	Number of characters to be transferred. If more than 127 characters are to be transferred as one field, two Edit parameters must be used.
Column 22	=	H

CARD FORMAT



PAPER TAPE FORMAT

The newline symbol always follows the 22nd character 'H'.

I.C.T. 1900 SERIES FIND 1/1936 (11.66) EDIT PARAMETERS

# E D I T	START ADDRESS OF INPUT			START ADDRESS OF OUTPUT			NO. OF CHARS	H	N/L OR ▽	NOT USE
	WORD POS	.	CHAR	WORD POS	.	CHAR				

1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1	2	3	4	5	6	7	8	9	40	1	2	3	4	5	6	7	8	9	50
#	E	D	I	T		0	2	4	.	1		0	1	1	.	3		0	0	4	H	N/L																													

Stop

If it is not required to create any more sub-files or to enter Run 4 to obtain listings from the hit file, a #STOP parameter must be presented to bring the program to a halt. A message will be printed on the console typewriter 'END OF COMPLETE PROGRAM'.

If it is desired to produce more sub-files from the same hit file, then the same parameters as above must be presented, excluding the Read Tape Label and Index which need not be repeated. The program will continue automatically calling for scratch tapes when required.

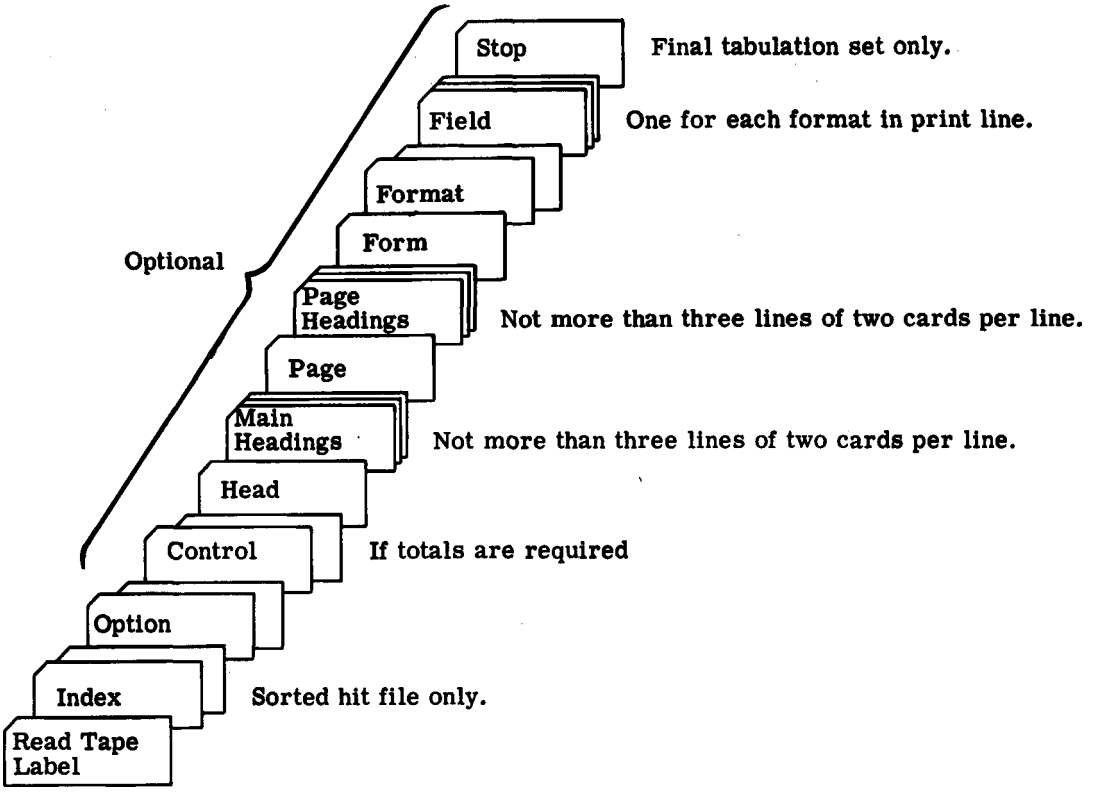
If it is desired to produce more sub-files from different hit files, then the whole set of parameters for Run 3 must be repeated. The program will continue automatically calling for hit files and scratch tapes when required.

If it is desired to enter Run 4 for listings, the program will automatically do so if the parameters for that run (which must commence with a Read Tape Label) are presented.

The format of the #STOP parameter is the same as that used in Run 2.

RUN 4

This run gives the facility of printing all or part of the hit file created by Run 2 and to total binary fields in the record. It cannot print from sub-files produced by Run 3, since these will not contain hit register words. The following is a map of the parameters for one tabulation set. Any number of sets may be included.



Read Tape Label.

The *Read Tape Label* is used to ensure that the correct hit file has been loaded; if it has not, then the program will ask for it. The format of the Read Tape Label is identical to that of the same parameter in Run 2.

Index

As in Run 3, if the hit file has been sorted since it was originally written, the Index block will have been lost. If this is the case an Index parameter must be provided. The format of the parameter is identical with that in Run 3.

Option

The *Option* parameter specifies whether a listing of records or totalling only is required. If TOTAL is specified then only the totals will be printed. If LIST is specified then a print of the record content may be obtained as well as totalling.

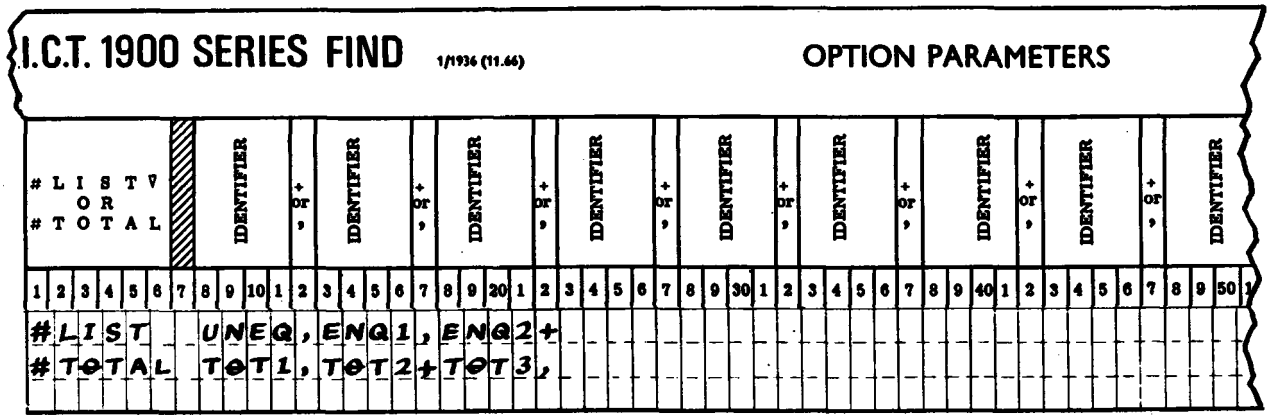
Columns 1 to 6	=	#LIST$_{\nabla}$ or #TOTAL
Column 7	=	Blank
Columns 8 to 11	=	Identifier
Column 12	=	Plus or comma

The plusses or commas select which records are to be listed and/or totalled in the same way as the Option parameter in Run 3. The last five columns are repeated until all the Identifiers required are specified.

If no Identifiers are present, all records will be either listed or totalled. If the Identifiers do not appear in the Index, an error will be flagged.

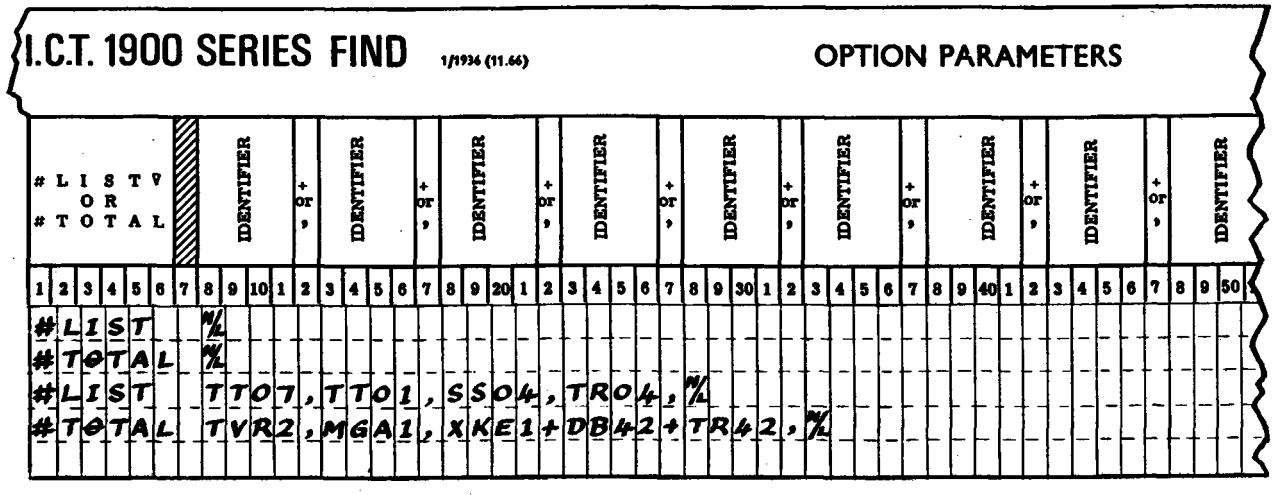
CARD FORMAT

The parameter may be more than one card long, but each card must start with #LIST$_{\nabla\nabla}$ or #TOTAL$_{\nabla}$. When a continuation card is used, the first card must be completely filled with Identifiers, i.e. it must be punched up to Column 77 and an asterisk (*) must be punched in Column 80. Partly filled cards must terminate with either a comma or a plus.



PAPER TAPE FORMAT

The newline symbol will follow the plus or comma after the last Identifier. The plus or comma must not be omitted. If no Identifiers are present, the newline symbol must be the eighth character.



Control

The printing of sub-totals is controlled by specifying certain control fields in each record and whenever they change sub-totals are printed. Up to three control fields may be specified. The parameters define the address and length of the control field which may be up to 20 characters. The fields are each given a priority level, so that if the level 3 control field changes, then sub-totals at levels 2 and 1 will also be printed; if the level 2 control field changes then sub-totals at level 1 will also be printed. At the end of the file grand totals are printed for all fields being totalled, together with sub-totals for all three levels.

At a control change, the program will automatically output certain control information immediately before the sub-total line. This consists of the old value of the control field which has just changed (in character format) and, on the next line, the number of records processed since this control field last changed.

At the end of the listing the total number of records processed is printed.

All this information is printed on separate lines on the extreme left side of the output listing. An example is given in Appendix 3e.

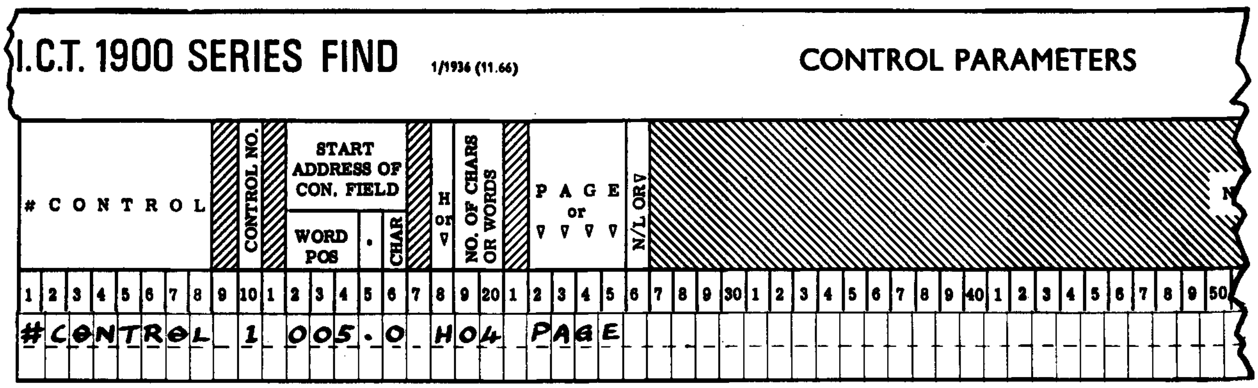
Only one control field may be specified at each level, so that there is a maximum of three Control parameters.

If it is desired that the printing should start on a new page after sub-totals are printed for any particular level, then the addition of the word PAGE to the parameter of that level will cause this to occur.

Where a page throw is required at more than one level, PAGE should be specified at the lower level only.

Columns 1 to 8	=	#CONTROL
Column 9	=	Blank
Column 10	=	Level of Control (1, 2 or 3)
Column 11	=	Blank
Columns 12 to 14	=	Start Address of control field (word address)
Column 15	=	Decimal Point
Column 16	=	Start Address of control field (character position)
Column 17	=	Blank
Column 18	=	H (if field length in number of characters)
	=	Blank (if field length in number of words)
Columns 19 and 20	=	Control field length (maximum 20 characters or five words
Column 21	=	Blank
Columns 22 to 25	=	PAGE (optional)

CARD FORMAT



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PAPER TAPE FORMAT

The newline symbol will follow the last character in the parameter whether PAGE is present or not.

I.C.T. 1900 SERIES FIND 1/1936 (11.66) CONTROL PARAMETERS

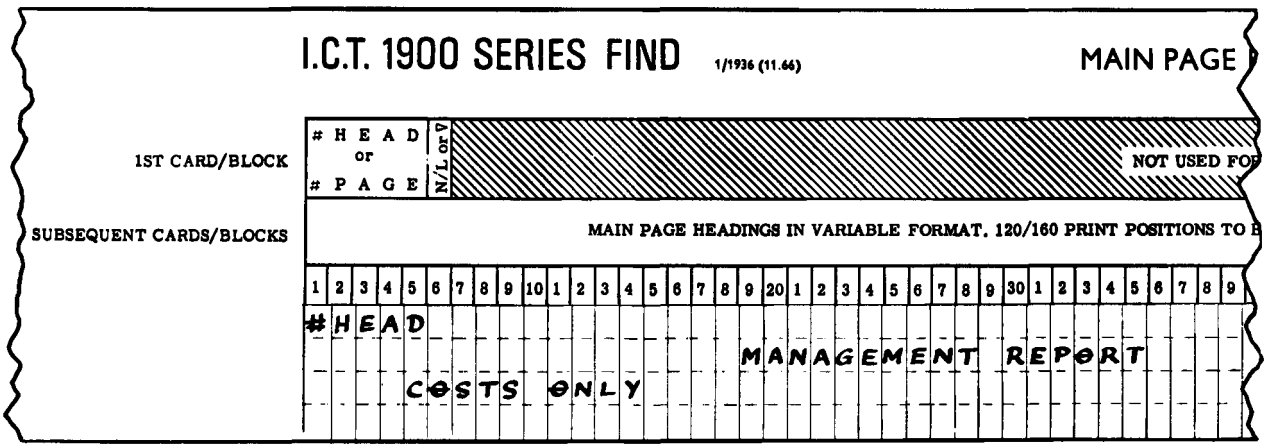
# CONTROL	CONTROL NO.	START ADDRESS OF CON. FIELD: WORD POS	.	CHAR	H or ▽	NO. OF CHARS OR WORDS	PAGE or ▽ ▽ ▽ ▽	N/L OR ▽
1 2 3 4 5 6 7 8	9 10	1 2 3 4	5	6	7 8	9 20	1 2 3 4 5	6
#CONTROL	2	002	.	1	H	03		%
#CONTROL	3	010	.	0		02	PAGE	%

Main Heading

Headings to the printed output are achieved by use of the Main Heading parameters. The first must be punched #HEAD. There may be up to three lines of heading each of 96 or 120 or 160 characters according to the size of the printer specified on the Format parameter (see page 35). If no Format parameter is used, headings should be restricted to 96 print positions. The headings may take any form according to the user's need.

CARD FORMAT

Each line of heading must occupy two cards, giving a maximum of six cards following the #HEAD card.



PAPER TAPE FORMAT

The newline symbol follows immediately after #HEAD. On the heading blocks, the newline comes after the last letters of heading or after 80 characters, whichever is the least. This means that spaces at the end of the heading need not be punched as they will be inserted by the program. However, for each line of heading, two blocks must always be punched, so that if spaces only are required after print position 80, only a newline may be punched.

Page Heading

Headings may be printed at the top of each page of printing if Page Heading parameters are provided. These take a similar form to the Main Heading parameters. The first must be punched #PAGE and there may be up to three lines of heading.

CARD FORMAT

Each line of heading must occupy two cards, giving a maximum of six cards following the #PAGE card.

PAPER TAPE FORMAT

The newline symbol follows immediately after #PAGE and after the end of the specified heading or after 80 characters, as for main headings. There must be two blocks for each line of heading as for the main headings.

It is sufficient to punch a newline character after the last non-space character in each block. If the record block is to be entirely composed of spaces, the newline character may be punched in the first character position, but it cannot be omitted.

Format

If this parameter set is not present, the first 24 words of each hit record is printed unedited.

This parameter set consists of up to three cards, the first being #FORM, followed by the size of the line printer (i.e. 096 or 120 or 160). If the size is not specified, a 96 print position line printer will be assumed. The other parameters in the format set define the layout of the print line by means of code letters referring to different types of fields. Not more than 40 fields per record may be specified and only one line may be printed for each record. Where more than one card is required to define the format line, the specification of fields or spaces etc. should not be split between two cards.

Each field must be enclosed in apostrophes and the following are valid:

A	=	Alphanumeric data (up to 127 characters may be specified as one field)	
D	=	Pence digits (2D should be specified)	
F	=	Fractional digits (between 4F and 7F may be specified)	
S	=	Shillings digits (2S should be specified)	
L	=	Pound sterling digits	see following notes on sterling, decimal currency and numeric fields
X	=	Decimal digits to left of decimal point, i.e. integers	
C	=	Decimal currency digits	

e.g. '4A' = four character alphanumeric field

'2X4F' = six character numeric field with four decimal places.

INSERTING SPACES IN THE PRINT LINE

Blanks or spaces may be left between fields and are specified by using the code B. A maximum of 127 spaces can be specified as one field. The blanks appear outside the apostrophes of the fields taken from the record.

e.g. '4A'6B'2X4F' the two fields shown above are separated by six blanks.

Note: All code letters, including B, must always be preceded by a number, e.g. 1B not B.

INSERTING CHARACTERS IN THE PRINT LINE

Characters may also be inserted in the print line, with the exception of apostrophes and numerics. These will generally appear outside the apostrophes but must appear between the LSD of sterling fields and may appear between the XF of numeric fields.

e.g. '4A' * '2X.4F' 4B '2L/2S/2D' resulting in, say, CASH* 5.0075 8/18/11

STERLING FIELDS

A character must always be inserted in sterling fields between the L and S and between the S and D. This character may be any the user desires but if a character is not required a space must be inserted.

e.g. '3L/2S/2D' resulting in, say, 19/12/11

'3L∇2S∇2D' resulting in, say, 19 12 11

'3L2S2D' is incorrect and will result in 19012011

DECIMAL CURRENCY

When it is required to output fields as decimal currency, the user must specify the number of print positions required for the major and minor units (e.g. Dollars and Cents) and a character to be inserted between the units:

e.g. $'4C,2C' resulting in, say, $ 539,50

The insertion character may be any the user wishes except an apostrophe or a numeric but if a character is not required, a space must be inserted. The number of positions specified for the minor unit may be between 1 and 7.

Where numeric, sterling or decimal currency fields are being output, the size of the field specified must allow for the maximum value to be printed, including the size of any Grand Total or fields which are being totalled. If the size of field specified in the format line is too small to accommodate the result, asterisks will be printed in that field and in any associated totals.

SIGNING OF FIELDS

The most significant print position of a numeric, sterling or decimal currency field is reserved to sign the result, i.e. space if positive and minus (-) if negative. This must be allowed for when determining the length of field specified in the format line; for example, a field specified as 6X will hold a maximum value of 99999.

When listing or totalling mixed integers and fractions, 4F must be specified for the fractional part. If fewer positions are specified, the result will be indeterminate.

Note: Where it is required to list or total negative values, the following minimum field lengths must be observed when specifying the format line:

X - Decimal digits to the left of the decimal point - at least 8X must be specified.

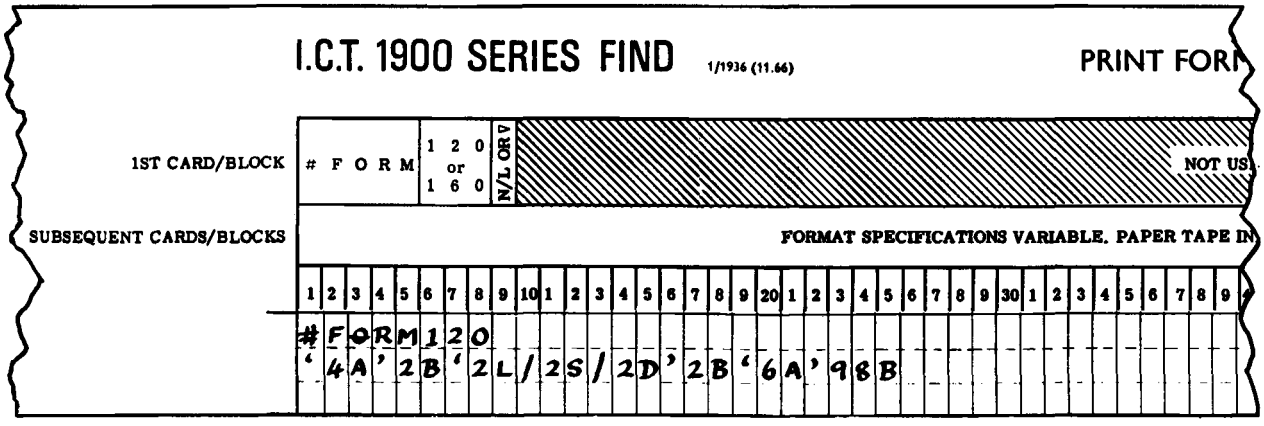
L - Pound sterling digits - at least 4L must be specified.

F - Fractional digits - at least 4F must be specified.

C - Decimal currency - at least 5 output positions must be specified, excluding the insertion character, e.g. 3C.2C.

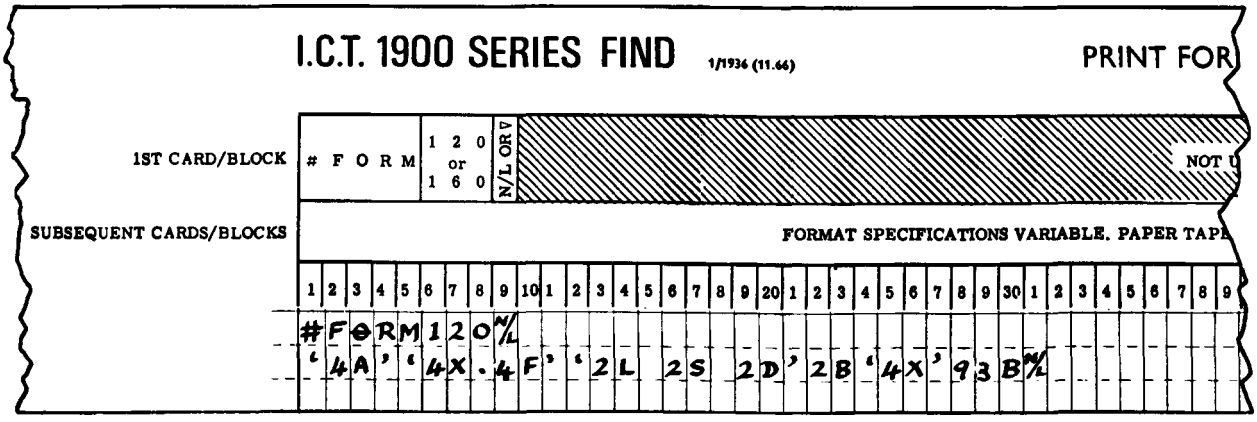
All 96 or 120 or 160 print positions must be specified, any position not being used must be specified as blank. An error will be flagged if the number of print positions does not equal 96 or 120 or 160. No space characters may occur in the punching of the parameter (except inside sterling fields) because they will be taken as the end of the format line. But where more than one card is necessary to specify all the print positions, spaces may be left at the end of the card and the formats continued on a second card.

CARD FORMAT



PAPER TAPE FORMAT

The newline symbol follows immediately after the 80th character of each block or the last field specified.



Field

There must be a Field parameter for each field inside apostrophes specified in the format set, up to a maximum of 40. The field parameter specifies which fields from the hit records are to be put to the print line. The Field parameters must be in the same order as the fields are specified in the format set, that is from left to right across the print line. A card sequence code is punched in each parameter to check this.

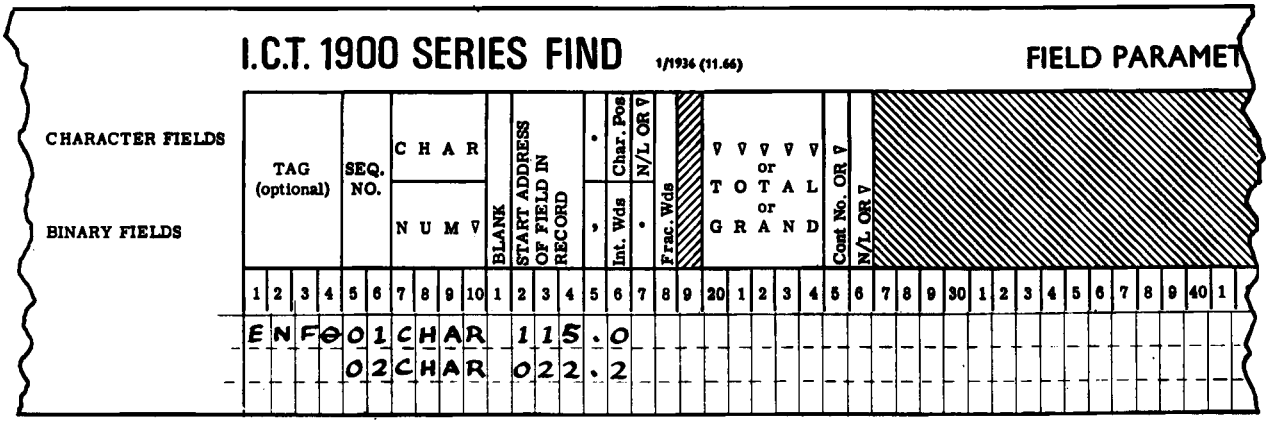
There are two types of parameter, one for character fields and the other for binary fields. To enable totals to be taken on the binary fields, the word TOTAL followed by the Control number at the end of the parameter will cause a total of that field to be printed at the change of that particular control. A total may be printed at the end of the run only by specifying GRAND.

Binary fields which are to be totalled or listed must be contained on the hit file in an integral number of words. For decimal numbers held in binary, the whole number (specified as X) must be contained in one or two words and the fractional part (F) in one further word. Sterling fields held in binary pence may be contained in one or two words, with one more word for fractional pence where required. The fractional part of negative numbers must be stored in positive form. Decimal currency must be held as an integral number of the smallest unit, in binary, in one or two words.

CHARACTER FIELDS

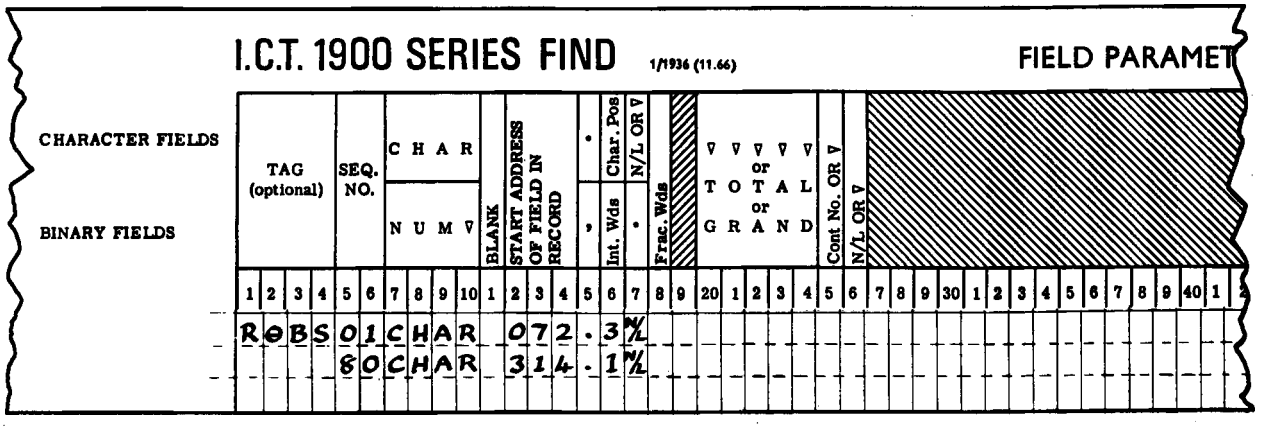
Columns 1 to 4	=	Tag (optional)
Columns 5 and 6	=	Card sequence code
Columns 7 to 10	=	CHAR
Column 11	=	Blank
Columns 12 to 14	=	Start Address in record (word address)
Column 15	=	Decimal Point
Column 16	=	Start Address in record (character position)

CARD FORMAT



PAPER TAPE FORMAT

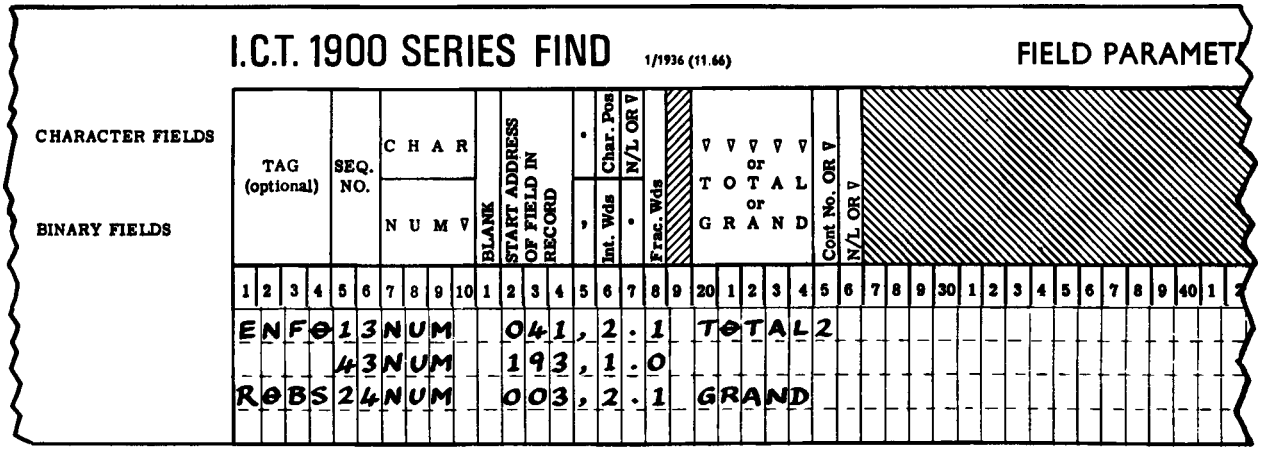
The newline symbol follows the last character of the parameter.



BINARY FIELDS

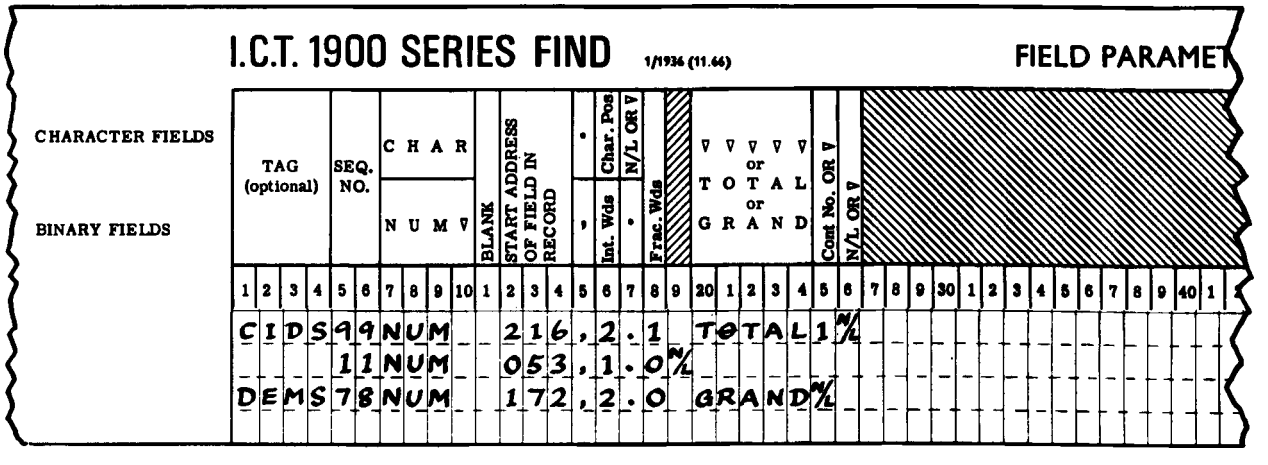
Columns 1 to 4	=	Tag (optional)
Columns 5 and 6	=	Card Sequence Code
Columns 7 to 9	=	NUM
Columns 10 and 11	=	Blank
Columns 12 to 14	=	Start Address in record
Column 15	=	Comma
Column 16	=	Number of words containing the integral number
Column 17	=	Full Stop
Column 18	=	Number of words containing the fractional part of the number.
Column 19	=	Blank
Columns 20 to 24	=	TOTAL or GRAND (optional)
Column 25	=	Control Number (TOTAL only)

CARD FORMAT



PAPER TAPE FORMAT

The newline symbol follows the last character of the parameter.



Stop

At the end of a printing run, the program will automatically commence with another run if more parameters are present. There must be a Read Tape Label parameter if it is desired to enter Run 3 or to have a print from another hit file, or another Option parameter if it is desired to have a different set of tabulations from the same hit file.

When no more tabulations are required a #STOP parameter will bring the program to a halt.

The format of this parameter is the same as that used in Run 2.

5 Examples of the Use of Parameters

EXAMPLE 1

To see how all the parameters are used, an example enquiry run is given below (card input is shown).

The file to be used is from the sphere of university administration, holding particulars of students.

The information required is as follows:

1 A count of all students within the Faculty of Arts.

2 A count of all foreign female students

3 A list of all foreign female students within the Faculties of Arts and Science.

The format of each record in the file is shown by the Student Record Format Sheet on page 43. The set of Dictionary parameters required for the enquiries need only contain those fields to which the enquiries refer. e.g.

1 Faculty

2 Nationality and Sex

3 Nationality, Sex and Faculty

Therefore the Dictionary parameters will appear as follows:

```
FACULTY  01H 028.2 NATION  02H 008.3 SEX  01H 009.1
```

Next the Enquiry Sets must be coded.

1 A COUNT OF ALL STUDENTS WITHIN THE FACULTY OF ARTS

The Faculty of Arts has a code number of 2. The formation of this enquiry is very simple as all that is required is a count of all students whose Faculty number equals 2. The enquiry will be identified as ARTS.

```
ARTS01 COUNT
ARTS02 AND(
ARTS03 FACULTY  EQL  01H2
ARTS04 )
```

2 A COUNT OF ALL FOREIGN FEMALE STUDENTS

There are two factors, both of which must be satisfied. Nationality must not equal British and sex must equal female. This enquiry will be identified as FEFO.

```
FEF001 COUNT
FEF002 AND(
FEF003 NATION  NEQ  02HBR
FEF004 SEX     EQL  01HF
FEF005 )
```

3 A LIST OF ALL FOREIGN FEMALE STUDENTS WITHIN THE FACULTIES OF ARTS AND SCIENCE

The Faculty of Science has a code number of 4.

Here there are two factors both of which must be satisfied, and two other factors, one of which must be satisfied. A listing is required, so records that satisfy this enquiry must be written to tape. This enquiry will be identified as FFAS.

```
FFAS01
FFAS02  AND(
FFAS03  NATION      NEQ  02HBR
FFAS04  SEX         EQL  01HF
FFAS05  OR  (
FFAS06  FACULTY     EQL  01H2
FFAS07  FACULTY     EQL  01H4
FFAS08  )
FFAS09  )
```

This is all that is necessary to enable Run 1 to set up the program of enquiries.

Next to be specified are the labels for the master tape which Run 2 searches with the enquiries, and for the hit tape which will be produced by enquiry 3.

```
#READ   STUDENT RECS  0000  0000
#WRITE  STUDENT HITS  0000  0000  0010
```

At the end of Run 2, counts are printed of the number of hits for each enquiry.

Prior to entering Run 4 to produce a listing from the hit tape, the label of this hit tape must be specified.

```
#READ   STUDENT HITS  0000  0000
```

Then the enquiry to be listed is specified.

```
#LIST   FFAS+
```

Next the Headings

```
#HEAD
        FEMALE FOREIGN STUDENTS IN ARTS AND SCIENCE FACULTIES
#PAGE
        STUDENTS NAME          REGISTRATION NUMBER          FACULTY
```

Having specified the headings, the format of the successive print line must be defined.

```
#FORM120
6B'25A'8B'5A'8B'1A'67B
```

For each field inside apostrophes, i.e. not blanks or constants, there must now be given the address in the record from which it comes and whether it is in character or binary form.

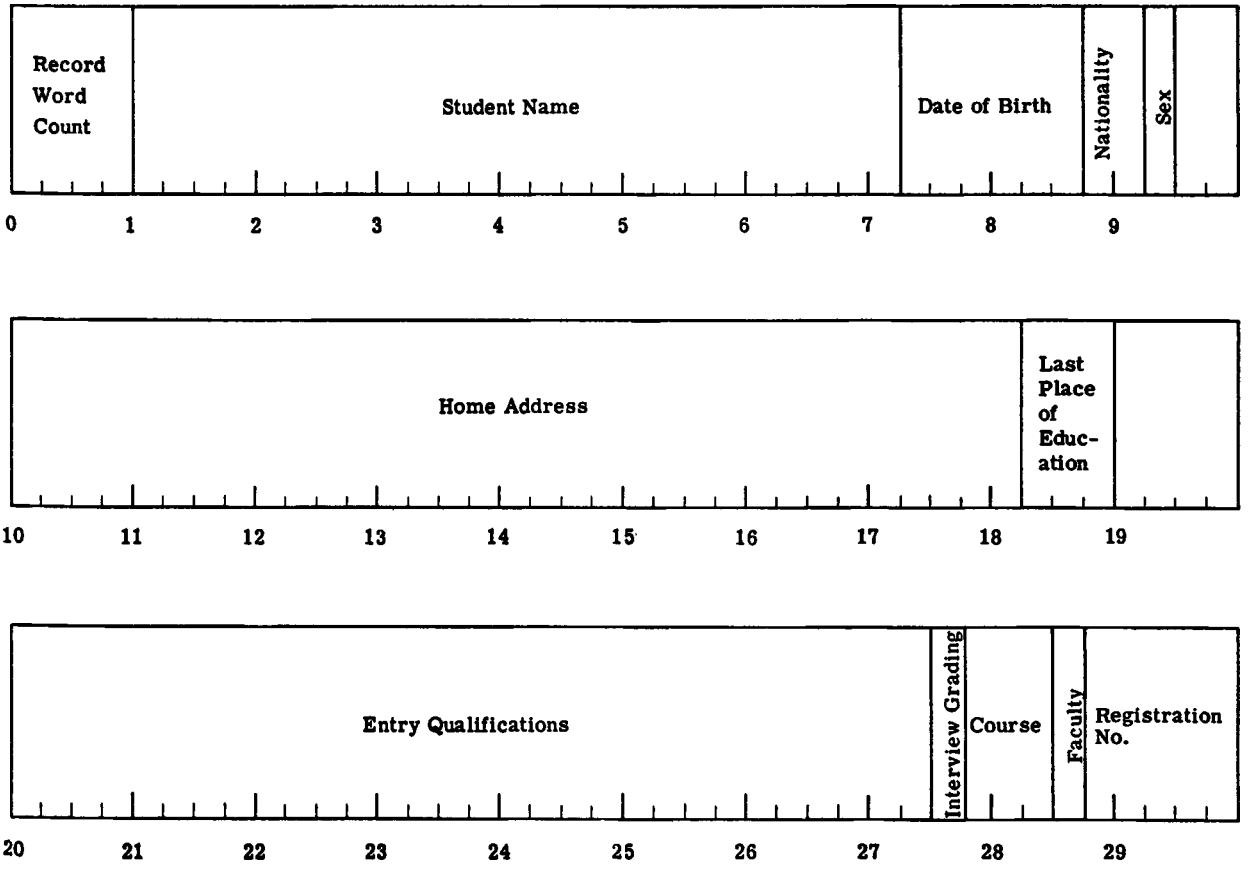
```
01CHAR 001.0
02CHAR 028.3
03CHAR 028.2
```

Thus the print line consists of: six blanks; the 25 character student's name starting at word 1 of each record; eight blanks; the five character registration number starting at word 28, character position 3 of each record; eight blanks; the one character faculty number of the student starting at word 28, character position 2 of each record; and 67 blanks to fill the rest of the 120 character print line.

To end the run a STOP card must be present.

```
#STOP
```

STUDENT RECORD FORMAT



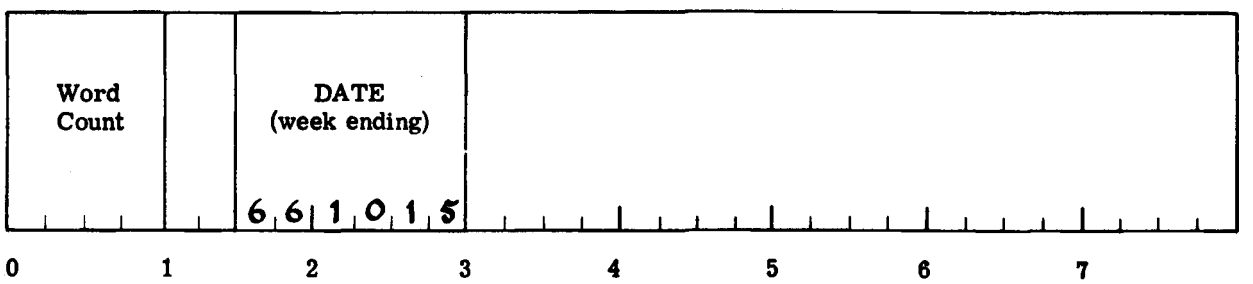
EXAMPLE 2

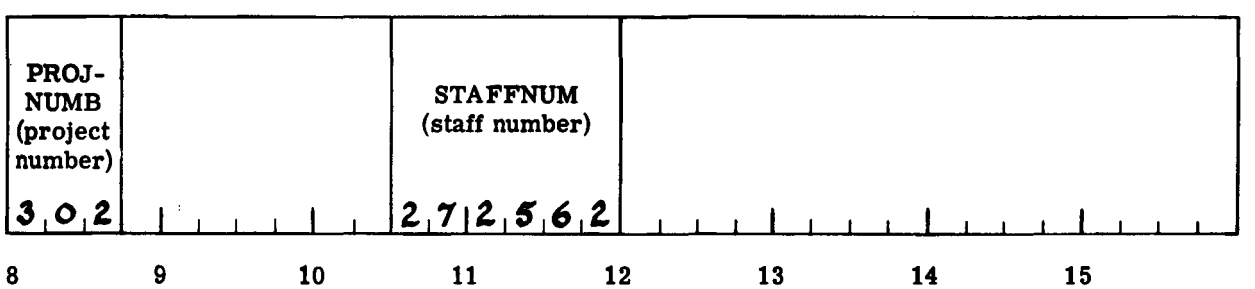
In this example a file containing details of hours worked per person per week on specified projects will be used. The format is shown below.

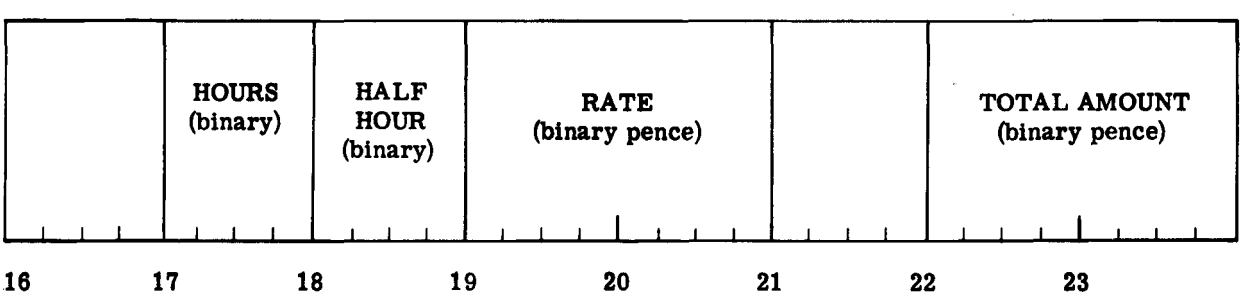
Project Time Analysis File

Filename: PROJ FILE

Records in this file are held in date order, within project







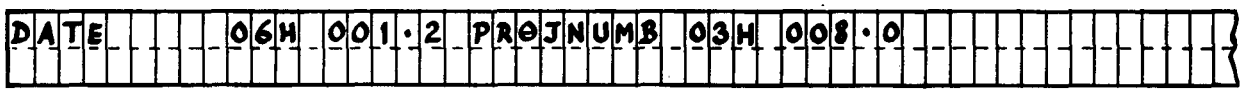
The information required from the file is as follows:

1 A count of all the records on the file dated 1966.

2 A tabulation with weekly totals, showing the total cost of project 302, up to 15th November 1966.

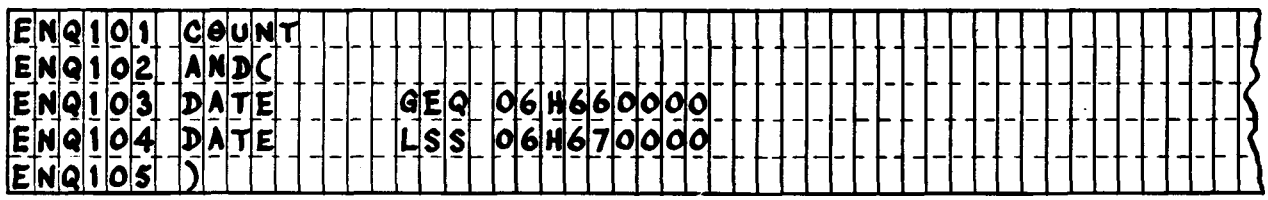
3 'How many hours have employees on projects 302 and 305 worked in the quarter 1st July to 30th September 1966?' The detailed requirements here are to produce a sub-file containing the relevant records (slightly edited) and to print a tabulation giving totals for each project.

The first set of parameters required is the Dictionary. For the above problems the only fields in the record which are to be interrogated in these enquiries are the date and the project number. Therefore, the Dictionary need only consist of the following two definitions:



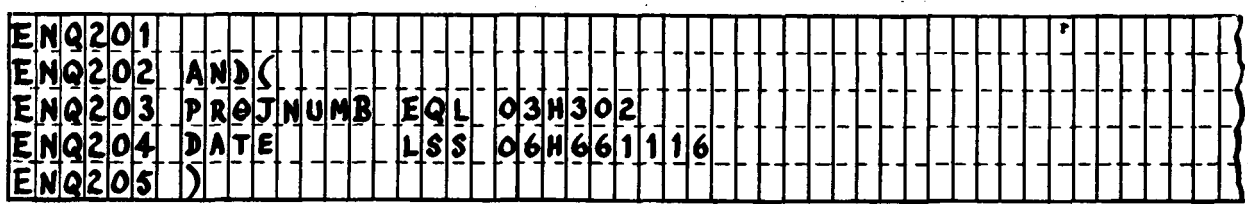
followed by the parameters for each enquiry. These are shown separately for each problem. They could, however, be combined for processing as one job.

1 For the first problem, which only requires a count of the records which satisfy the enquiry, the records must fall within two dates to be *hits*. The name or identifier given to the enquiry is ENQ1. The operator used is AND, because *both* relationships *must* be satisfied:

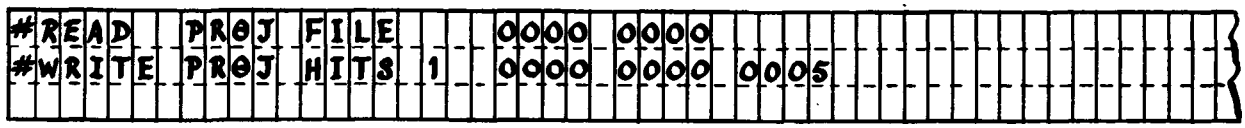


The above parameters and a Read Tape Label and a Stop parameter are all that is required for the first problem.

2 In the second problem, the total cost of project 302 up to 15th November 1966 is required. So the enquiry must select all records for that project up to the specified date. The enquiry is identified as ENQ2:

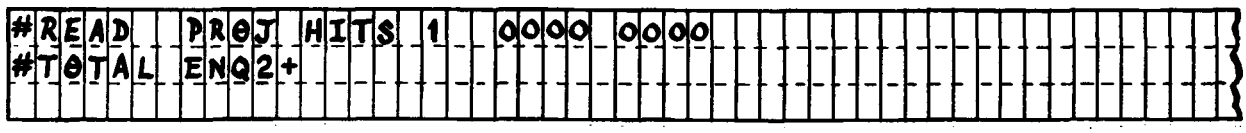


The next parameters are the tape labels for Run 2, specifying the name of the master file to be read and the hit file to be produced:



Then, to produce a listing of the records which are on the hit file and which satisfy the enquiry, a set of Run 4 parameters must be given.

Firstly, the Read Tape Label specifying the hit file and an option parameter specifying printing of totals from all records satisfying ENQ2:



then, if totals of hours are to be printed for each week, the date must be specified as the control:

```
#CONTROL 1 001·2 H06
```

next, main headings and page headings:.

```
#HEAD    TOTAL COST OF PROJECT 302 UP TO 15/11/66
#PAGE    COST PER WEEK
```

and lastly, the format and field parameters specifying the format of the print line and the fields from the record which are to be totalled. The last parameter - to terminate a run - will be STOP:

```
#FORM120
20B'4L/2S/2D'90B
COSTO1NUM   022,2·0 TOTAL1
#STOP
```

3 The third problem is to find an answer to the query: 'How many hours have employees on projects 302 and 305 worked in the quarter, 1st July to 30th September 1966?' This enquiry will use an AND operator because the date condition must be satisfied and, within this, an OR operator because either of the project numbers may be present:

```
ENQ301
ENQ302  AND(
ENQ303  DATE      GTR  06H660700
ENQ304  DATE      LEQ  06H660930
ENQ305  OR (
ENQ306  PROJNUMB  EQL  03H302
ENQ307  PROJNUMB  EQL  03H305
ENQ308  )
ENQ309  )
```

Then Run 2 parameters are the same as in the previous enquiry:

```
#READ  PROJ FILE      0000 0000
#WRITE PROJ HITS 2    0000 0000 0005
```

In order to create a sub-file, Run 3 parameters are needed. Firstly, a Read Tape Label specifying the hit file. Then an Option parameter, specifying magnetic tape output and giving the name of the relevant enquiry which must have been satisfied. A Write Tape Label gives a name to the sub-file.

```
#READ  PROJ HITS 2    0000 0000
#TAPE  ENQ3+
#WRITE PROJ 302 SUB   0000 0000 0020
```

Where it is required to alter the format of the record before writing it to the sub-file, edit parameters are used. In this case, assuming that word 21 is not required and a 24-word record with the hit word still in the last word is to be written to the sub-file, two edit parameters are needed:

```
#EDIT  001.0  001.0  080H
#EDIT  022.0  021.0  012H
```

To produce a listing from each record and totals for each project per week, the following Run 4 parameters are required:

```
#READ    PROJ  HITS 2   0000  0000
#LIST    ENQ3+
#CONTROL 1  008.0  H03  PAGE
#HEAD
                        PROJECT TIME ANALYSIS - THIRD QUA
#PAGE
                                EMPLOYEE NO.                DA
#FORM120
24B'6A'17B'2A'/'2A'/'2A'14B'3X.1F'46B
EMNO01CHAR  010.2
DAY  02CHAR  002.2
MONT03CHAR  002.0
YEAR04CHAR  001.2
HRS  05NUM  017,1.1  TOTAL1
#STOP
```

6 Operating Instructions

The FIND system is available in three versions.

The following table sets out the program names used in each version:

Version 1	(single 512 word buffering)	#X631 and #X632	} 8K
Version 2	(double 256 word buffering)	#X633 and #X634	
Version 3	(double 1024 word buffering)	#X635	- 16K
	(double 512 word buffering)	#X636	- 16K

Throughout this chapter, reference to program names is for Version 1 (i.e. X631 and X632). If other versions are to be used, the appropriate program names should be substituted.

The FIND system is programmed as four runs. Each is overlaid into store as required. #X631 contains the overlays for Run 1 and 2; #X632 contains the overlays for Runs 3 and 4.

If the magnetic tapes are not loaded as required, the FIND programs will request them and halt. Once the correct tape has been loaded and put on line, the program will automatically re-start without further operator action.

The paper on the line printer should be correctly aligned with the head of the page for correct printing of the tabulations, counts and parameters.

OPERATING INSTRUCTIONS FOR COMPLETE FIND SYSTEM USING THREE TAPE DECKS

Sequence	*Operator Action*	*Effect*
1	Load FIND program tape.	
2	Load main data file.	
3	Load a scratch tape.	This will be the hit file.
4	FI #X631 #TAPE	Brings program into store and types HALTED.
5	Load parameters (cards or paper tape).	
6	GO #X631 20 (cards) or GO #X631 21 (paper tape)	The program will print out parameters, flag errors, list correct enquiries and then type OVERLAY 1 FINISHED.
7	GO #X631	Reads from main data file, creates the hit file, prints hit counts and types #X631 DELETED FI #X632 #TAPE. Brings second program into store and types HALTED.
8	Remove main data file.	
9	Load a second scratch tape (only if Run 3 required).	
10	ON #X632 0	Only used when listing is to be double spaced.
11	GO #X632 24 (cards) or GO #X632 25 (paper tape)	Will create sub-file if Run 3 or print tabulations if Run 4.

According to the parameter sets present, more hit files or scratch tapes may be requested by the program.

Note: In the event of suspected software error, give store print of first 3000 words.

OPERATING INSTRUCTIONS FOR FIND SYSTEM RUNS 1 AND 2 ONLY

Sequence	*Operator Action*	*Effect*
1	Load FIND program tape.	
2	Load main data file.	
3	Load a scratch tape.	This will be the hit file.
4	FI #X631 #TAPE	Brings program into store and types HALTED.
5	Load parameters (cards or paper tape)	
6	GO #X631 20 (cards) or GO #X631 21 (paper tape)	Program will print out parameters, flag errors, list correct enquiries and then type OVERLAY 1 FINISHED.
7	GO #X631	Reads from main data file, creates the hit file, prints hit counts and types #X631 DELETED FI #X632 #TAPE or END OF RUN.

OPERATING INSTRUCTIONS FOR FIND SYSTEM RUNS 3 AND 4 ONLY

Sequence	*Operator Action*	*Effect*
1	Load FIND program tape.	
2	Load hit file.	
3	Load a scratch tape. (only if Run 3 required)	
4	FI #X632 #TAPE	Brings program into store and types HALTED.
5	Load parameters (cards or paper tape).	
6	ON #X632 0	Only used when listing is to be double spaced.
7	GO #X632 24 (cards) or GO #X632 25 (paper tape)	Will create sub file if Run 3 or print tabulations if Run 4.

According to the parameter sets presented, more hit files or scratch tapes may be requested by the program.

Note: In the event of suspected software error, give store print of first 3000 words.

7 Error Messages and Procedures

The FIND system is available in three versions.

The following table sets out the program names used in each version:

Version 1	(single 512 word buffering)	#X631 and #X632	} 8K
Version 2	(double 256 word buffering)	#X633 and #X634	
Version 3	(double 1024 word buffering)	#X635	- 16K
	(double 512 word buffering)	#X636	- 16K

Throughout this chapter, reference to program names is for Version 1 (i.e. #X631 and #X632). If other versions are to be used, the appropriate program names should be substituted.

This chapter describes what the program does when errors are found in the input parameters or during the running of the program and what action should be taken by the operator.

RUN 1

The run includes checks on the format and content of each parameter and prints out each parameter for visual checking on the line printer. If an Enquiry parameter is mispunched, the logic of the enquiry to which it belongs is invalid and the incorrect parameter is flagged with an error code on the left-hand side of the page. The whole enquiry is rejected and the Enquiry Identifier will not appear in the list of correct enquiries which is printed at the end of the run. If more than 24 enquiries are presented, only the first 24 will be accepted, and the remainder will be ignored.

At the end of Run 1 the program halts with the message OVERLAY 1 FINISHED. The operator must then check if any errors have been flagged. If errors have occurred, the operator has the option of either continuing with Run 2 using only the correct enquiries listed, or correcting the errors and restarting Run 1.

Error Flags

Each error code has a separate meaning to help discover the error in the incorrect parameter.

F = Format incorrect

T = Field Name not found in Dictionary

V = Enquiry logic incorrect (e.g. AND following AND or OR following OR)

X = Identifier incorrect

Y = Card sequence code not in ascending order or enquiry logic not in sequence (e.g. Operator does not follow Identifier)

Z = Program area full (e.g. permissible number of parameters exceeded)

Error Messages

The error messages are printed on the console typewriter. They are given below in table form with their meanings and the appropriate operator action. It should be noted that Run 1 uses the first overlaid program #X631 and that the run is started by the instruction GO #X631 20 (card parameters) or GO #X631 21 (paper tape parameters).

Error Message	*Meaning*	*Operator Action*
PAPER LOW ON LINE PRINTER	Paper hopper almost empty	Load more paper. Type GO #X631.
GIVE PROGRAM CR (TR)	Program is calling for card or tape reader.	Type GI #X631 XX (XX = Unit number). Type GO #X631.
DICTIONARY FULL CANNOT START PROGRAM	The Dictionary is too large.	Shorten Dictionary. Reload all parameters. Type GO #X631 20 or 21.
ILLEGAL REPLY WORD ON LINE PRINTER	Error in line printer's reply word.	Consult engineer. Reload all parameters. Type GO #X631 20 or 21.
ERROR IN DICTIONARY RESTART OR GO	One of the Dictionary definitions has an error	Correct definition. Reload all parameters. Type GO #X631 20 or 21 or type GO #X631 (the program will use the incorrect definition).

RUN 2

The run checks the format of the parameters, prints them and flags them with an error code if they are invalid or incorrectly punched. The run will halt with an error message if it is not able to continue. The operator must then correct the faulty parameter and restart. At the end of the run, the program will halt with the message END OF RUN, but if parameters for Runs 3 or 4 are present it will automatically delete the first overlaid program #X631 and type the instruction FI #X632.

After the parameters have been read and printed and before the interrogation, the slow peripherals (i.e. card or paper tape reader and the line printer) are released by the program. The line printer will be allotted at the end of the run to print out the hit counts for each enquiry.

Error Flags

Each error code has a separate meaning to help discover the error in the incorrect parameter.

J = Read Tape Label wrong format

K = Write Tape Label wrong format

L = Stop card not present when all enquiries are COUNT.

M = Write Tape Label not required when all enquiries are COUNT.

Error Messages

The error messages are printed on the console typewriter. They are given below in table form with their meanings and the appropriate operator action. It should be noted that Run 2 uses the first overlaid program #X631 and that the run is restarted by the instruction GO #X631 22 (card parameters) or GO #X631 23 (paper tape parameters).

Error Message	*Meaning*	*Operator Action*
NO READ TAPE LABEL	Read parameter is missing.	Put in Read Tape Label. Type GO #X631 22 or 23.
READ TAPE LABEL WRONG FORMAT	Read parameter incorrectly punched.	Correct. Type GO #X631 22 or 23.
WRITE TAPE LABEL WRONG FORMAT	Write parameter incorrectly punched.	Correct. Reload all parameters. Type GO #X631 22 or 23.
STOP CARD NOT PRESENT	Stop card missing on COUNT only run.	Put in stop card. Reload all parameters. Type GO #X631 22 or 23.
LONG BLOCK READ DELETE OR GO	Long block encountered on input tape.	Skip over the long block by typing GO #X631 or delete program and investigate error.

RUN 3

The run checks the format of the parameters, prints them and flags them with an error code if they are invalid or mispunched. All the parameters are checked and if any error has occurred the program halts with an error message so that corrections may be made before restarting. At the end of the run, if no more parameters are present, the program will halt with the message END OF COMPLETE PROGRAM. If more parameters are present, it will automatically continue with the next run.

Error Flags

Each error code has a separate meaning to help discover the error in the incorrect parameter.

A = Too many Identifiers on #TAPE parameter

B = Comma missing after Identifier on #INDEX parameter

C = Parameter does not belong to this run

F = Format incorrect

T = Parameter should be #TAPE

U = Identifier on #TAPE parameter not in Index

W = Parameter should be #WRITE

Error Messages

The error messages are printed on the console typewriter. They are given below in table form with their meanings and the appropriate operator action. It should be noted that Run 3 uses the second overlaid program #X632 and that it is started by the instruction GO #X632 24 (card parameters) or GO #X632 25 (paper tape parameters).

Error Message	*Meaning*	*Operator Action*
READ TAPE LABEL WRONG FORMAT	The Read Tape Label is punched incorrectly.	Correct Read Tape Label. Reload the program. Type GO #X632 24 or 25.
ERRORS ON RUN PLEASE RESTART	Errors flagged in parameters.	Correct parameters, reload, type GO #X632 24 or 25.
PARAMETER INCORRECT FOR NEXT RUN	Parameter should be Read Tape Label or Option.	Correct parameters, reload, type GO #X632 24 or 25.
LONG BLOCK ON INPUT	Long block on input file.	No recovery.

RUN 4

The run checks the format of each parameter, prints them, and flags them with an error code if they are invalid or incorrectly punched. All the parameters are checked and if any error has occurred the program halts with an error message so that corrections may be made before restarting the run. At the end of the run, if no more parameters are present, the program will halt with the message STOP CARD END OF RUN. If more parameters are present, it will automatically continue with the next run.

Error Flags

F = Format incorrect.

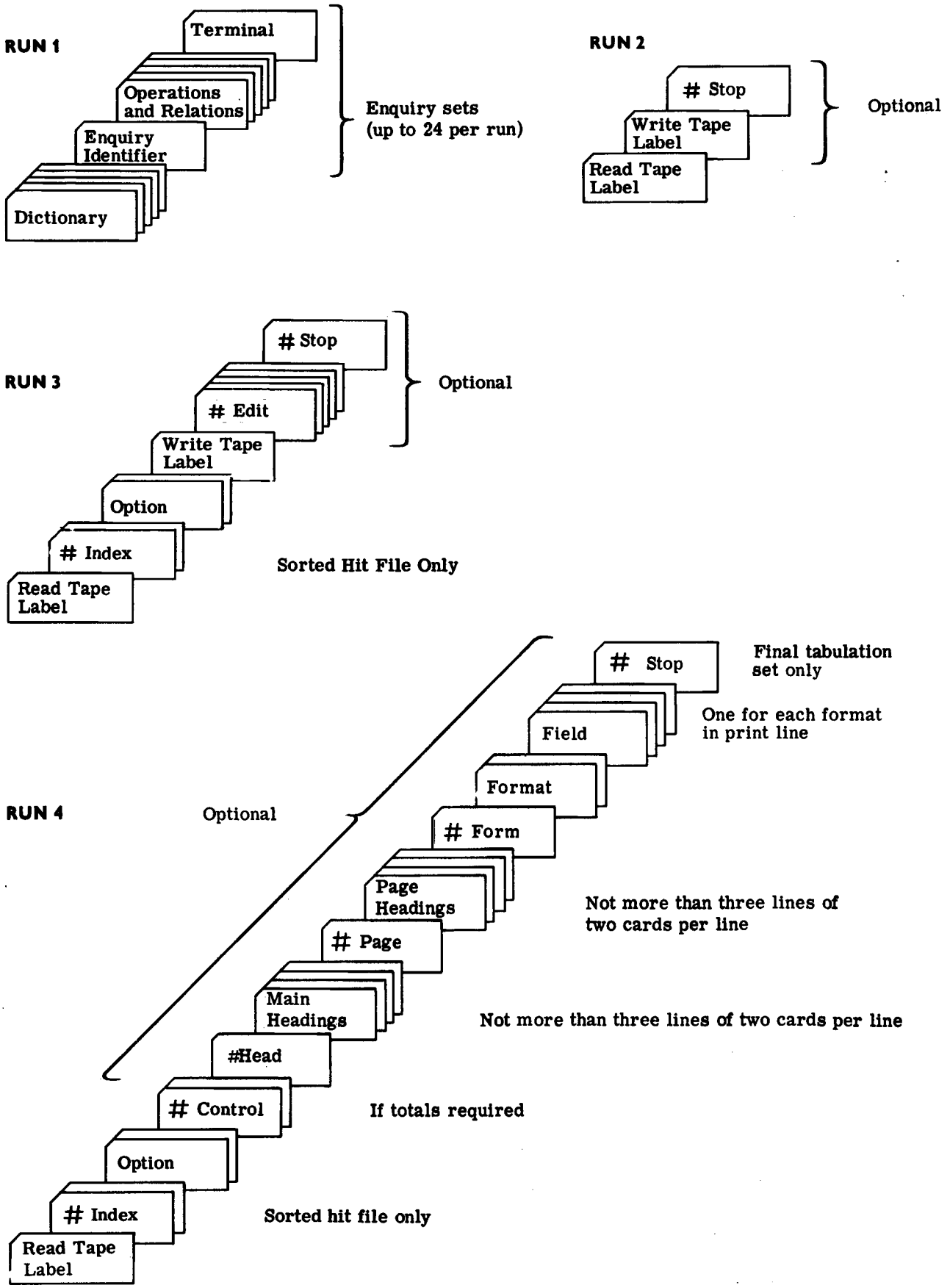
Error Messages

The error messages are printed on the console typewriter. They are given below in table form with their meanings and the appropriate operator action. It should be noted than Run 4 uses the second overlaid program #X632 and that it is started by the instruction GO #X632 24 (card parameters) or GO #X632 25 (paper tape parameters).

Error Message	*Meaning*	*Operator Action*
READ TAPE LABEL WRONG FORMAT	The Read Tape Label is punched incorrectly.	Correct Read Tape Label. Type GO #X632 24 or 25.
ERRORS: CORRECT BEFORE RESTARTING	Errors have been flagged in parameters.	Correct parameters. Reload all parameters. Type GO #X632 24 or 25.
PAPER LOW ON LP	Paper hopper almost empty.	Load more paper and GO #X632.
LONG BLOCK ON INPUT	Long block on input file.	No recovery.

Note: If the size of field specified in the format line is too small to accommodate the result, asterisks (****) will be printed on the output tabulation in that field and in any associated totals.

Appendix I FIND Parameter Map



Appendix 2 Sorting the Hit Tape

If it is desired to sort the hit tape before input to Runs 3 or 4, the Sort/Merge generator should be used and the following First Pass own coding incorporated.

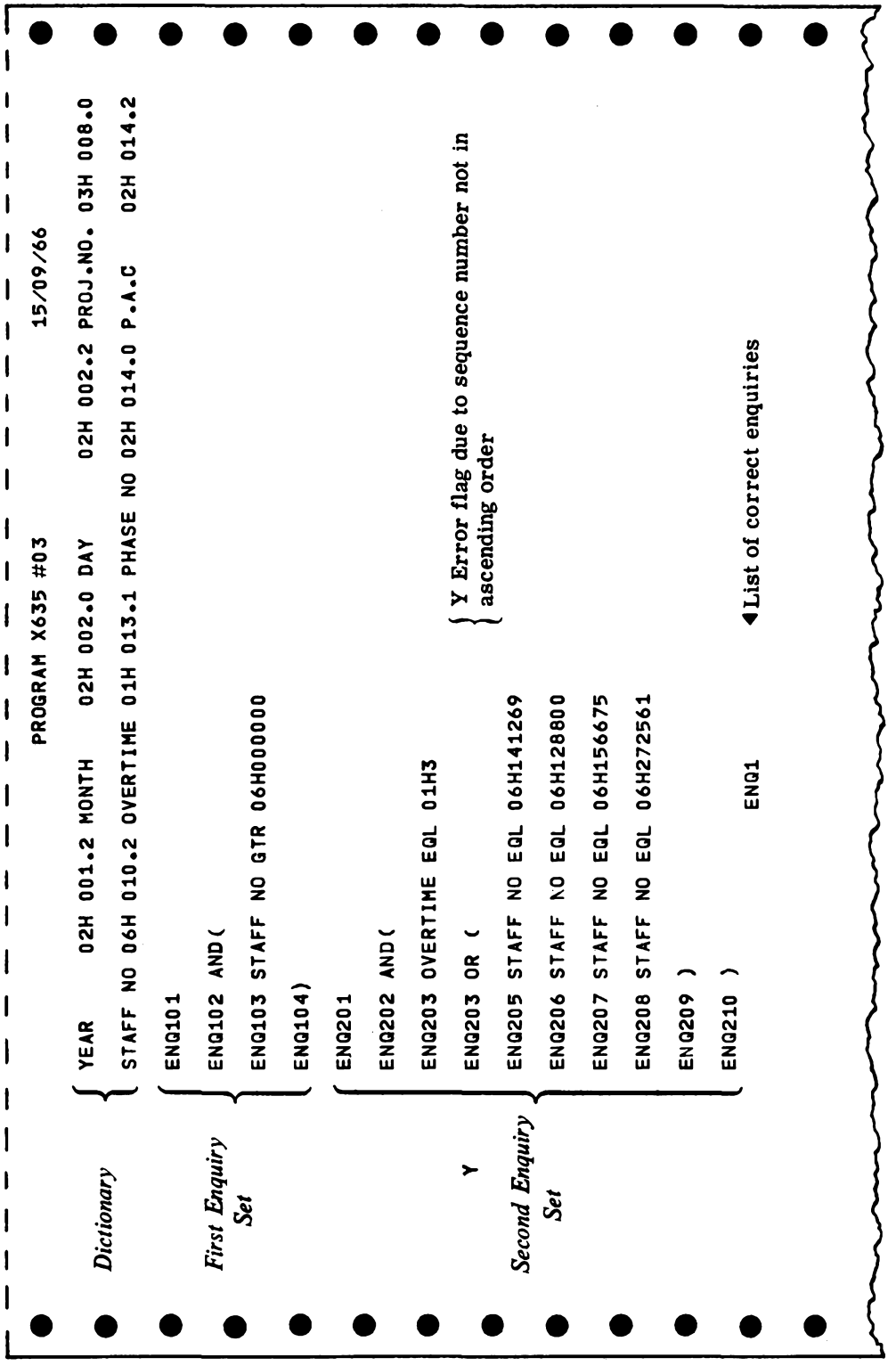
```
        OBEY        0(1)
        LDX    2    TEST
        BNZ    2    END
        STO    3    TEST
        STOZ        0(3)
END     EXIT   1    1
```

This has the effect of by-passing the Index block on the hit tape and so preventing it from being sorted with the data records. For further information on sorting, reference should be made to I.C.T. Sort/ Merge Generator Manual.

Alternatively, the I.C.T. standard library sort programs, e.g. #XSMA or #XSMC, can be used (see Chapter 2, page 6).

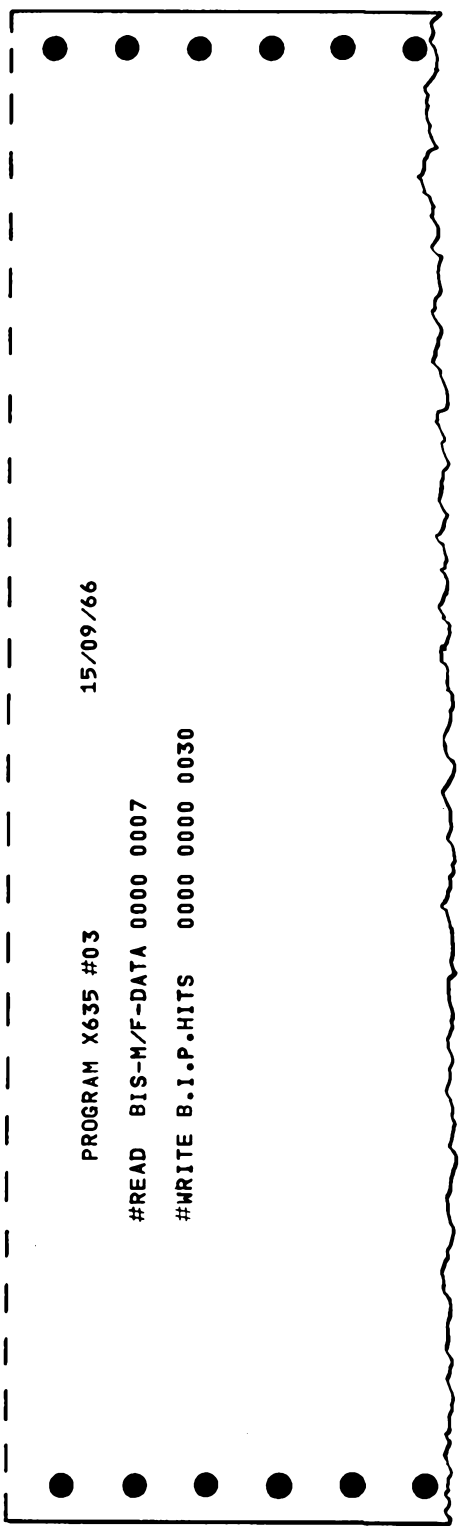
Appendix 3a Run 1 - Parameter Printout

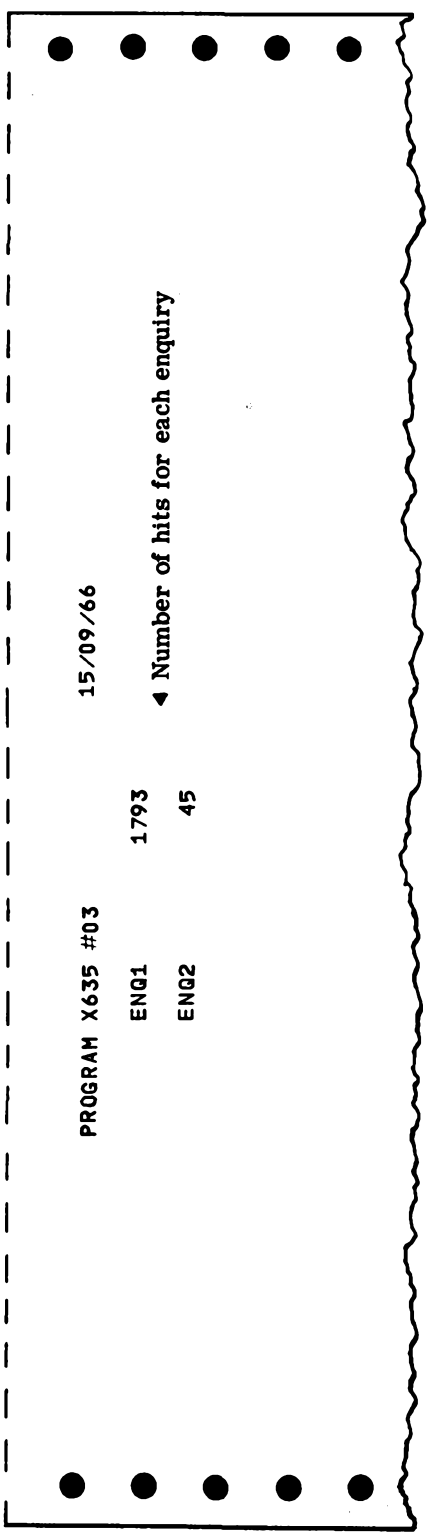
This shows the parameters processed by Run 1, comprising the Dictionary and Enquiry Sets. A list of the correctly compiled enquiries is output at the bottom of the printout.



Appendix 3b Run 2 - Parameter Printout

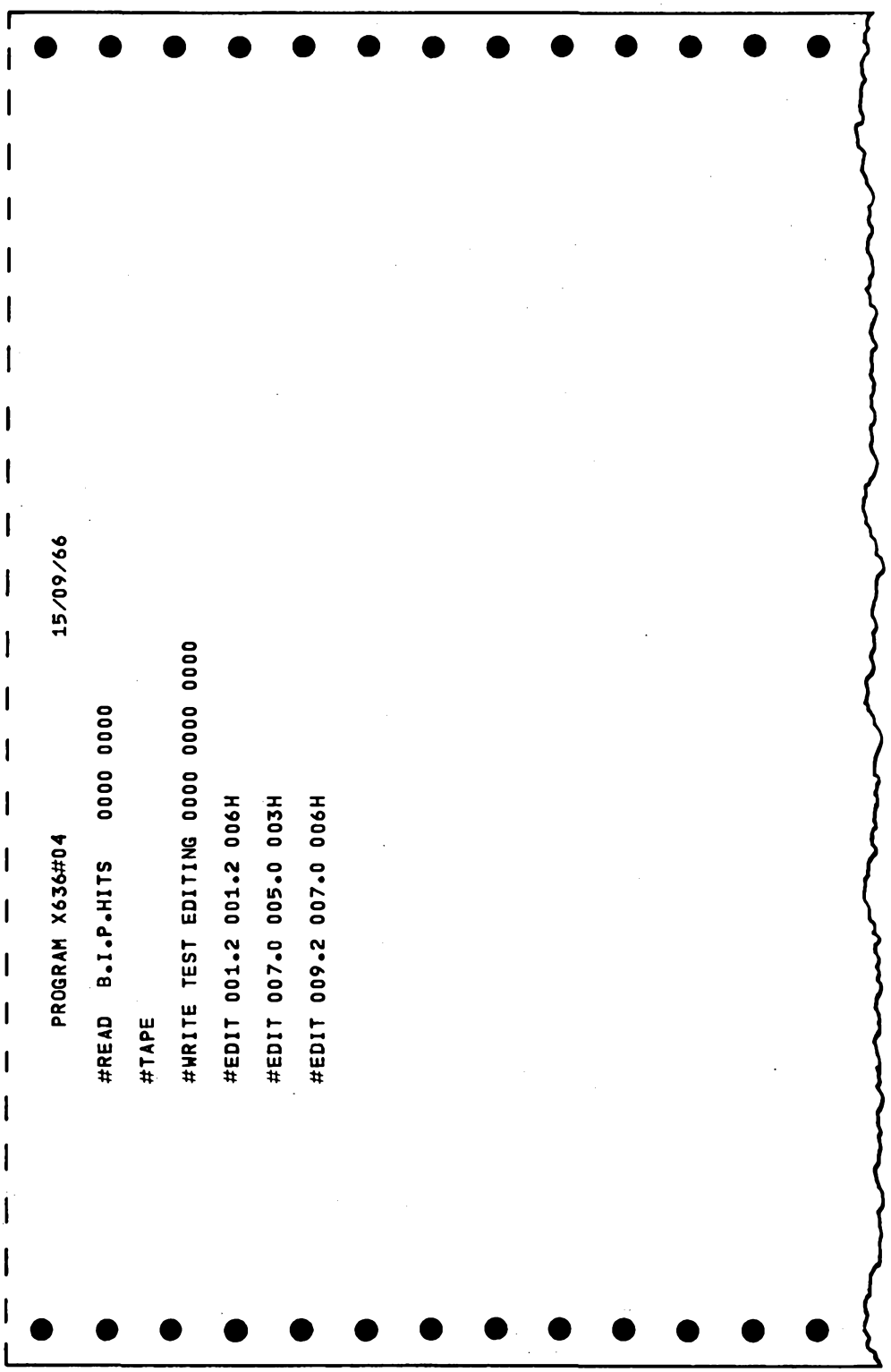
Indicates the name of the master file which is to be interrogated and the name given to the hit file to be created. The number of hits for each enquiry processed is also shown.





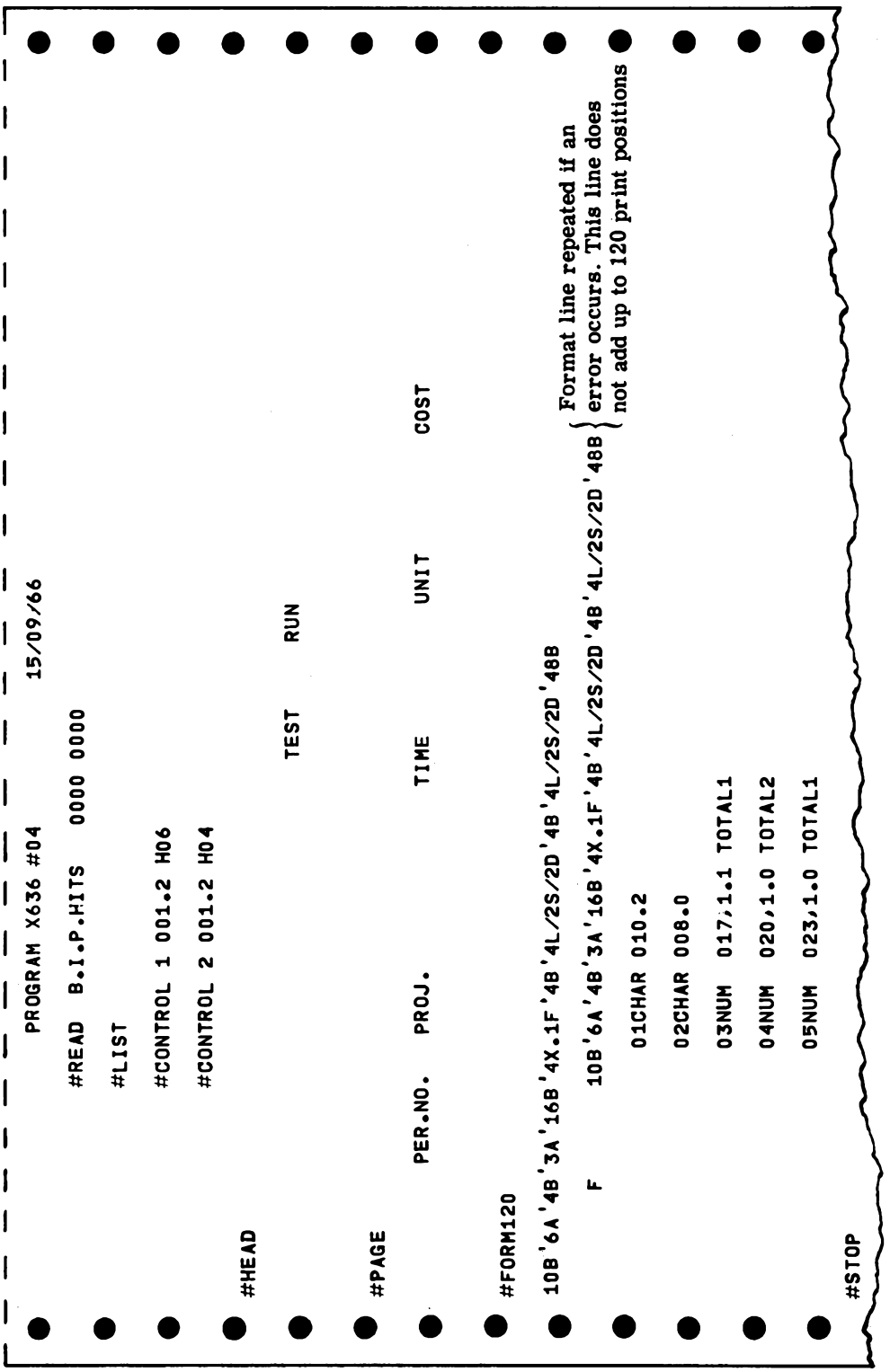
Appendix 3c Run 3 - Parameter Printout

Indicates the parameters used for the creation of a sub-file from the hit file.



Appendix 3d Run 4 - Parameter Printout

Indicates the parameters used for producing a tabulation from the hit file.



Appendix 3e Run 4 - Example Tabulation

15/09/66

PAGE 1

	PER.NO.	PROJ.	TEST TIME	RUN UNIT	COST	
	115734	009	6.0	1/ 7/ 6	8/ 5/ 0	
	115734	604	31.0	1/ 7/ 6	42/12/ 6	
	215496	101	37.0	1/ 7/ 6	50/17/ 6	
	215496	101	13.5	1/ 7/ 6	18/11/ 3	
506020 4						◂ Old control 1
						◂ No. records totalled
			87.5		120/ 6/ 3	◂ Control 1 totals
	115734	603	28.5	1/ 7/ 6	39/ 3/ 9	
	115734	603	8.5	1/ 7/ 6	11/13/ 9	
	215496	101	28.5	1/ 7/ 6	39/ 3/ 9	
	215496	101	21.0	1/ 7/ 6	28/17/ 6	
506090 4						◂ Old control 1
						◂ No. records totalled
			86.5		118/18/ 9	◂ Control 1 totals
5060 8						◂ Old control 2
						◂ No. records totalled
				11/ 0/ 0		◂ Control 2 totals
8						◂ No. records totalled
			174.0	11/ 0/ 0	239/ 5/ 0	◂ Grand totals

Glossary

This Glossary contains some of the terms used in the FIND system which have special meanings.

DICTIONARY

The Dictionary is a list of the fields in the master records which are referenced by the enquiries. Each field is given a name and its position in each record and its length are also defined.

HIT

A hit occurs when an enquiry is satisfied by a record.

HIT FILE (also HIT TAPE)

The file to which records that have at least one hit are written in Run 2.

HIT WORD

The hit word is a 1900 word attached to the end of each record in the hit file, indicating which enquiries each record has satisfied.

IDENTIFIER

Each Enquiry is uniquely referenced by a four digit alphanumeric name called the Identifier.

INDEX

The Index is a list of the Enquiry Identifiers in the sequence in which they appear. The Index is printed at the end of Run 1 and is written to the beginning of the hit file in Run 2. It must be provided by parameter in Run 3 or Run 4 if the hit file has been sorted.

OPERATOR

An Operator is either an AND or an OR, which is used to define the logic of an enquiry.

RELATION

There are six Relations, each of which defines the relationship which must exist between a field in the master record and a constant. The Relations possible are: equal to, less than, greater than, not equal to, greater than or equal to, and less than or equal to.

AMENDMENT RECORD

List Number *Item Numbers*

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Should any additions or amendments to this Manual be necessary, they will be issued in the form of Amendment Lists. When such changes have been incorporated, an appropriate entry should be made in the table on the left and the pink instruction sheet(s) should be filed behind this page.