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- (1) Program Number (to be filled in by SPLA) . . . . . 360D-06.0.007
- (2) System Type (machine) . . . . . S/360, S/370
- (3) Search Key . . . . . FORMAT, TEXT-PROCESSING, TEXT-FORMATTING  
DOCUMENT PRODUCTION, AUTOMATIC JUSTIFICATION
- (4) Programming Language . . . . . Fortran
- (5) Author's Name and Address . . . . . Gerald M. Berns, John R. Ehrman
- (6) Direct Inquiries to Name and Address . . . . .  
(if different than Author) Dr. John R. Ehrman  
SLAC Computing Services  
Mail Bin 97  
P.O. Box 4349  
Stanford, CA 94305
- (7) Title of Program . . . . . FORMAT, a Text-Processing Program
- (8) Submitter's Installation Membership Code . . . . . S SIA
- (9) Submitter's Own Program Identification and Suffix (optional). . . . .
- (10) Primary Subject Code . . . . . 06 0
- (11) Operating or Monitor System Required OS/360
- (12) New or Revision Code (if revision, show prior Program Number in Item 1). . . . . N
- (13) Year Completed . . . . . 71
- (14) Date of Submittal . . . . . 6-29-71
- (15) Documentation (number of original pages submitted) . . . . . 68
- (16) Abstract (should contain sufficient information for a reader to determine the value of the program). Listed on the reverse side of this form are subjects which may serve as a guide for a descriptive abstract.

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# SHARE PROGRAM LIBRARY SUBMITTAL FORM

## Subject Guide:

- a. Purpose
- b. Programming Language used
- c. Version and modification level or release number
- d. Field of application
- e. Type of routine (main program, subroutine, etc.)
- f. Specific description of machine requirements

ABSTRACT FORMAT is a program for S/360 and S/370 designed to meet the need for a rapid method of editing and producing papers, reports, and other finished and reproducible documents directly on the system printer, using upper/lower case and special characters. It has facilities which simplify the task of index construction. Input to the program is free-form card-image text. The document is formatted and controlled according to control cards and Command Words interspersed throughout the input. FORMAT is a single program requiring no auxiliary programs for its operation. FORMAT requires a minimum memory size of 64K in a standard S/360. No additional devices are required beyond those necessary to operate OS/360. However, the availability of magnetic tape drives to the program greatly enhance its usefulness. FORMAT is written entirely in full Fortran IV and requires the full Fortran Library. Normal output mode is upper and lower case. Means are provided to allow the user to specify upper case only and special characters. FORMAT produces its normal output for the TN print train, and has facilities to print all of the 120 possible characters. Note that no subscripts are provided by the TN print train, nor, therefore, by FORMAT.

(Please attach additional pages if necessary). . . . . Total pages attached \_\_\_\_\_

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(17) Signature of Submitter and Date John R. Ehlman 6-27-71

(18) Signature of Installation Addressee R.W. Johnson 7/13/71

MODIFICATIONS AND CORRECTIONS TO FORMAT RELEASE 5

OCTOBER 18, 1971

1. IN SUBROUTINE DRDR, AT SEQUENCE NUMBER 02234000, (JUST BEFORE THE STATEMENT LABELED 927), CHANGE  
 GO TO (908, 929), NULLSW  
 TO READ  
 GO TO (908, 920), NULLSW  
 THIS WILL ALLOW WORDS CONSISTING ENTIRELY OF NON-TRIVIAL  
 BLANKS TO APPEAR AT THE END OF A LINE WITHOUT BEING  
 IGNORED.
2. IN SUBROUTINE DRDR, BEFORE SEQUENCE NUMBER 02630000, (JUST AFTER THE COMMENT 'REQUIRES (BLNKLN+SPACNG) LINES TO FIT'),  
 INSERT STATEMENT NUMBER 02629500, AS FOLLOWS --  
 IF (JUNK .NE. 0) JUNK = SPACNG  
 THEN, CHANGE STATEMENT 02630000 FROM  
 JUNK = LN + BLNKLN + SPACNG  
 TO READ  
 JUNK = JUNK + LN + BLNKLN + 1  
 THIS WILL CORRECT ERRORS CAUSED WHEN THE 'P' COMMAND  
 OPERAND IS USED WITH LINE SPACING AND PARAGRAPH SEPARATIONS  
 NOT EQUAL TO 1, WITHOUT INTRODUCING SPURIOUS LINES.

AUGUST 29, 1972

3. REMOVE STATEMENTS 01071000, 01073000, 01075000, 01077000, AND  
 01079000 (ALL COMMENTS STARTING WITH C....). NEW VERSIONS OF  
 THE FORTRAN COMPILERS CANNOT TOLERATE COMMENTS INTERSPERSED  
 AMONG THE CONTINUATION CARDS OF A STATEMENT.
4. IN SUBROUTINE VRDR, AFTER THE STATEMENT NUMBERED 01859000,  
 (NAMELY 'START = LINSZ/2 - (CWIDTH + 1)/2 + 1'),  
 INSERT STATEMENTS NUMBERED 01859200 AND 01859400, AS FOLLOWS:  
 IF (START .GT. 0) GO TO 264  
 START = 1  
 THIS WILL PREVENT A LOOP THAT CAN OCCUR WHEN CWIDTH = 133 OR  
 134, AND START = 0 (THE DEFAULT INITIAL VALUE).
5. IN SUBROUTINE DRDR, FOLLOWING STATEMENT NUMBERED 02140000  
 (NAMELY, '329 IF (JUNK .GT. LINEW + PDUM) GO TO 333'),  
 INSERT A STATEMENT NUMBERED 02140500, AS FOLLOWS --  
 IF (CENTER .NE. 0) GO TO 333  
 THIS WILL CAUSE A DIAGNOSTIC TO BE ISSUED IF A TAB IS USED  
 IN A CENTERED REGION. PREVIOUSLY, NO DIAGNOSTIC WAS GIVEN,  
 AND APPARENTLY CORRECT INPUT COULD PRODUCE ODD-LOOKING OUTPUT.
6. IN SUBROUTINE DRDR, DELETE THE STATEMENT NUMBERED 02293000  
 (NAMELY, 'IF (INPUT(FIELD2) .EQ. BL) GO TO 925'), AND THEN  
 REMOVE THE 'C' IN COLUMN 1 OF THE PRECEDING STATEMENT,  
 NUMBERED 02292000, WHICH SHOULD THEN READ  
 IF (CARDIC .EQ. BLANK) GO TO 925  
 THE DELETED STATEMENT PERFORMED ARITHMETIC WITH LOGICAL  
 VARIABLES.
7. IN SUBROUTINE LISTER, MODIFY CARDS 03033000 AND 03035000 TO  
 READ  
 LOGICAL\*1 TEXT1(116),DG1,DG2,BUFFR(81),SVMSK,LJUNK

AND

\* ZERO,NINE,HJUNK  
RESPECTIVELY. (THAT IS, DECLARE THE LOGICAL\*1 AND INTEGER\*2  
SCRATCH VARIABLES LJUNK AND HJUNK.) THEN, MODIFY THE CARD  
NUMBERED 03063000 TO EQUIVALENCE THEM, AS FOLLOWS --

\* (TITLEX,ARRAY1(3)),(HJUNK,LJUNK)  
FINALLY, REPLACE THE STATEMENTS NUMBERED 03115000 AND 03117000  
AS FOLLOWS -- REPLACE 03115000, WHICH READS

    BUFFR(XJ) = DG1 - SVMASK  
BY THE TWO STATEMENTS

    HJUNK = DIG1 - SAVMSK  
    BUFFR(XJ) = LJUNK  
AND REPLACE 03117000, WHICH READS  
711 BUFFR(XJ) = DG2 - SVMASK

BY THE TWO STATEMENTS

711 HJUNK = DIG2 - SAVMSK  
    BUFFR(XJ) = LJUNK

THESE MODIFICATIONS ELIMINATE A DIAGNOSTIC FOR ARITHMETIC USE  
OF LOGICAL VARIABLES.

The data deck generating this manual will produce it in upper and lower case if the first card, the FORMAT control card "SPECIAL PRINT TRAIN", is removed.

# The FOEMAT Manual

Gerald M. Berns

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Release 5

Modifications and Additions by

John R. Ehrman  
Computation Group  
Stanford Linear Accelerator Center  
Stanford, California 94305

July 1971

# FORMAT --- A Text Processing Program

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## I. Summary of Facilities

FORMAT is a program for System/360 and System/370 designed to meet the need for a rapid method of editing and producing papers, reports, and other finished and reproducible documents directly on the system printer, using upper and lower case and special characters. It has facilities which simplify the task of index construction. Input to the program is free-form card-image text. The document is formatted and controlled according to control cards and Command Words interspersed throughout the input. FORMAT is a single program requiring no auxiliary programs for its operation.

Via entirely free-form control cards the user may specify:

- Automatic capitalization of all sentences
- Number of text columns per page
- Width of text columns
- Number of lines per page
- Number of print positions between text columns
- Page numbering and first page number (or no numbering)
- Location of page number on the right, the left, or alternating
- Number of print positions for paragraph indentation
- Number of print positions for column indentation
- Line spacing (single spacing, double spacing, etc.)
- Number of lines between paragraphs
- Right-justification of text (or not)
- Tab settings
- Extent of card field from which input is to be read
- Printing of title on every page (or not)
- Position of the title
- Position of the text
- Position of the footer
- Sentences separated by a minimum of 1 or 2 blanks
- Kind of keypunch used
- Upper and lower case output (or all upper case)
- Number of copies of document
- Creation of condensed input tape from card deck
- Editing of input master tape
- Listing and/or punching of input dataset
- Tape input
- Tape output
- Printing of output master tape
- Merging and/or joining of input tapes
- Production of an alphabetized list of all significant words in the document, with a count of each

- That certain words, phrases, or strings be located
- That specific characters are to be left in the spaces skipped over when tabulating to new column positions
- That a particular special character should be recognized as requesting overprinting
- That a page should be made darker by printing each line more than once, on top of itself
- That a particular special character should be recognized as a non-eliminatable blank
- That underlining should or should not begin and end under punctuation characters
- That non-eliminatable blanks should or should not be considered when centering and underlining text

FORMAT does not provide facilities for automatic hyphenation, for automatic production of a table of contents, or for footnotes; page numbers appear only at the top of the page.

Commands embedded within the text (called Command Words) provide the capability to start a new line, paragraph, column, and page; to tabulate leaving blanks, dots, or any other character in the spaces skipped over; to underline (and to stop); to read groups of control cards; to center text within a column-line (and to stop); to print text "as is" (and to stop); to print text in upper case (and to stop); to print text with each word capitalized (and to stop); to indent (immediate or delayed) either or both column margins (and to restore the column format); to keep the next *n* lines in the same text column; and to keep text of unspecified length in the same text column.

FORMAT requires a minimum memory size of 64K in a standard System/360. No additional devices are required beyond those necessary to operate OS/360; however, the availability to the program of magnetic tape drives greatly enhances its usefulness, especially if the Editor facility is to be used with any regularity. FORMAT is written entirely in full Fortran IV and requires the full Fortran library. The System Input dataset (from which FORMAT reads its card input), the System Output dataset (on which FORMAT prints the document and other materials), and the System Punch dataset (which is used for punching a condensed form of the input deck), are defined as Fortran dataset reference numbers 5, 6, and 7, respectively.

The normal output mode is upper and lower case. Means are provided to allow the user to specify upper case only, and special characters. FORMAT produces its normal output for the TN print train, and has facilities for printing all of the 120

possible characters. Note that no subscripts are provided by the TN print train, nor, therefore, by FORMAT.

## II. Introduction

Before discussing how FORMAT produces a document, we will define and illustrate some terms and notation. The figure below represents a typical page of text; we will refer to it throughout this introduction.

12	Title
This is the beginning of a paragraph; the size of the indent at the start of the paragraph may be specified on a control card.	
Now, this material begins a new column-line: that is, it starts a new line within the current column of text material.	
This text material illustrates the use of an indent: the right margin has been indented an additional 10 spaces.	
This text material illustrates the use of a hanging, or delayed, indent: the text is not indented until the line following the first line of text.	
This text material is centered!	
Footer	

In the above example page, the page number is at the upper left corner; the title (which may occupy more than one line) is at the top of the page; the footer (or footing title, or running foot) is at the bottom of the page; the text material consists

of a single column 52 print positions wide; the hanging text was indented 7 spaces on the left and 8 spaces on the right; the title is separated from the text by 3 blank lines; the footer is separated from the last text line by 3 blank lines; and the indent at the start of a paragraph is 5 spaces.

FORMAT produces a document by reading control cards and text. The text is arranged on the output page in a format determined by the control cards. FORMAT reads its input in one of two phases: an edit phase and a document phase. (There may be either (1) only a document phase, or (2) an edit phase followed by a document phase. We will discuss the edit phase in Section VI.) In each of these phases, FORMAT reads its input in different modes. In the document phase, FORMAT reads its input cards in one of three modes: control card mode, normal text mode, and "as-is" text mode. (As-is text mode will be discussed in Section IV.)

To start the document phase, FORMAT begins by reading its input in control card mode. Because most of the page layout control variables have been preset to "average" values (such as 59 lines per page, 64 characters per line in a single column, etc.), the only control card needed initially is the one that signals the end of a group of control cards, and causes FORMAT to switch to normal text mode: the "GC" control card.

In text mode, FORMAT reads the input text and arranges it in the desired layout on an internal "image" of the page to be printed. As each page image is filled, it is sent to the printer. If any errors are detected, FORMAT makes a note of each, and will print a list of diagnostic messages describing the error at the end of the job. For most errors, FORMAT will assign default values to the erroneous variables, or take default actions for erroneous commands.

While in normal text mode, the user will normally wish to specify actions such as "begin a new paragraph", "skip to a new line", "indent the margins", and so forth. These actions are requested with Command Words, which may appear anywhere in the input text. They are not printed by FORMAT, but cause it to take the specified actions instead (unless they are incorrectly given and therefore cause an error).

FORMAT detects the start of a Command Word by finding an escape character: a right parenthesis which is preceded by one or more blanks (spaces), and followed by one or more non-blank characters. The characters which follow the right parenthesis are called Command Operands, and they specify what actions FORMAT should take. A Command Word is ended by one or more

blanks. (Even though it is very unlikely that the input text will contain a string of characters starting with a right parenthesis, FORMAT provides the Special Operands (described in Section V) which allow us to print such a string if it is desired. Thus the choice of the right parenthesis as the "escape character" is not a limitation on the user.)

To illustrate, the Command Operand which requests the start of a new paragraph is the letter "P". Thus, if the input text contained the Command Word " )P ", the following text material would begin a new paragraph. Another commonly used Command Operand is "L", which has an effect similar to the action caused by striking the "return" key on a typewriter: the end of the current line is signaled, and the carriage is positioned at the start of the following line. Thus, the Command Word " )LL " would cause the line of text in which it appears to terminate, and the following line to be skipped. This example of a command word contains two Command Operands, "L" and "L"; this shows how Command Operands are grouped to form Command Words.

We will now look at a simple example of FORMAT input: suppose we wish to print the first part of the text material shown in the figure. The input text could be prepared as follows:

```
)P THIS IS           THE BEGINNING OF A PARAGRAPH; THE
                  SIZE OF THE INDENT AT THE START        OF THE
PARAGRAPH MAY BE SPECIFIED ON A CONTECI CARD. )L NOW,    )L
THIS
MATERIAL BEGINS A NEW COLUMN-LINE: THAT IS, IT        STARTS
A NEW LINE WITHIN THE CURRENT COLUMN OF TEXT MATERIAL. )LL
```

Several important points are illustrated in this example. First, the input to FORMAT is entirely free-form: the user may leave as many spaces between input words as he likes, and FORMAT will ignore the excess blanks as it collects words to be placed in the page image. Second, there is no need to start a new input line when a new output line is desired; the "L" Command Operand will start a new line on the output page.

As the input cards are read by FORMAT, it may be necessary to change some of the control variables which determine the arrangement of the text on the page. For example, the user may want to change from one column per page to two (as was done to produce the index for this manual). To go from normal text mode

back to control card mode, a Command Word is placed in the input stream which ends with the Command Operand "V". The rest of the card following the "V" is ignored, and FORMAT begins reading control cards with the next input card. Thus, the user can dynamically modify the layout of the text on the page, and can change the values of the control variables. As before, the end of the control card group is signaled by a "GC" control card.

To illustrate, suppose we wish to set the margin indents to be zero spaces at the left and ten spaces at the right, as in the second portion of the figure above. The necessary input could be prepared as follows:

```

)V
INDENTATION OF THE COLUMN IS (0,10) POSITIONS
GO
)I @THIS TEXT MATERIAL ILLUSTRATES
THE USE OF AN INDENT: THE RIGHT MARGIN HAS BEEN INDENTED AN
ADDITIONAL 10 SPACES. )ILLI

```

In this example, the "I" Command Operand was used to control indentation of the margins. Its operation is like that of an "on-off" switch: each appearance of the "I" Command Operand causes indentation to begin (if it was not already in effect) or to end (if it was in effect). It is not like the "L" Command Operand, which causes a new line each time it appears; "I" does not cause additional indentation each time it appears, but turns the indentation on or off. The "@" sign preceding the word "THIS" is called a Special Operand. It causes the immediately following letter (the "T") to be capitalized in the printed output. Special Operands will be discussed in Section V.

We observe that the next segment of text material in the figure also requires an indentation. The control card which allows us to set the amount of indentation (the "INDENTATION OF THE COLUMN" control card) can specify up to seven different indentations. Thus, rather than prepare another control card, we will go back and change the previous input material so that it will control both of the indented segments of text in the figure. The use of the "H" Command Operand will be explained shortly.

```

)V
INDENTATION OF THE COLUMN IS (0,10),(7,8) POSITIONS
GO
)I @THIS TEXT MATERIAL ILLUSTRATES
THE USE OF AN INDENT: THE RIGHT MARGIN HAS BEEN INDENTED AN

```

ADDITIONAL 10 SPACES.       )ILLLH2 THIS TEXT MATERIAL  
 ILLUSTRATES THE USE OF A HANGING, OF DELAYED, INDENT: THE  
 TEXT IS NOT INDENTED UNTIL THE LINE FOLLOWING THE FIRST  
 LINE OF TEXT. )H2ILL

As noted above for "I", the "H" Command Operand works like an on-off switch. An additional feature illustrated in the above example is the "2" following the "H" Command Operand, which means that the second pair of column indentations is to be used in determining the number of positions to indent. Several other Command Operands may be followed by a number; they are discussed in Section IV.

The last text segment in the figure could be prepared as follows:

)M THIS TEXT )L MATERIAL )L IS )L       CENTERED! )M

The "M" Command Operand causes centering of the printed text to begin or end. It is like the "I" and "H" Command Operands in being like an on-off switch, but "M" does not depend on a control card to determine the amounts of spacing to be performed.

FORMAT determines that the end of the input has been reached when it detects a Command Word ending with the Command Operand "E". (This means, of course, that the end of the input should occur in normal text mode, not in "as-is" text mode or in control card mode.) FORMAT then prints the final text page, followed by a list of all control cards read, and the diagnostics (if any). At this point, FORMAT will re-initialize itself to read a fresh job, starting to read in control card mode just as it did at the very beginning. Thus, multiple documents may be produced in a single computer run.

To illustrate a complete FORMAT job, we will now give a complete set of input "card images" that could be used to produce the figure at the start of this section. The reader is not expected to understand all of the FORMAT techniques used, although most of them will be familiar.

CAPITALIZE AUTOMATICALLY  
 WIDTH OF COLUMN IS 52 PRINT POSITIONS  
 LINES PER PAGE ARE 32  
 TEXT STARTS ON LINE 5, IN PRINT POSITION 1



```

COLUMNS PER PAGE = 1
LEFT TOP POSITION FOR PAGE NUMBER
PAGE NUMBER STARTING AT 12
TITLE STARTS ON LINE 1, IN PRINT POSITION 24
)P TITLE )PE
FOOTER STARTS ON LINE 32, IN PRINT POSITION 23
)P FOOTER )PE
GO
)P THIS IS          THE BEGINNING OF A PARAGRAPH; THE
                     SIZE OF THE INDENT AT THE START    OF THE
PARAGRAPH MAY BE SPECIFIED ON A CONTROL CARD. )L NOW,    )L
THIS
MATERIAL BEGINS A NEW COLUMN-LINE: THAT IS, IT          STARTS
A NEW LINE WITHIN THE CURRENT COLUMN OF TEXT MATERIAL. )LLLV
INDENTATION OF THE COLUMN IS (0,10), (7,8) POSITIONS
GO
)I #THIS TEXT MATERIAL ILLUSTRATES
THE USE OF AN INDENT: THE RIGHT MARGIN HAS BEEN INDENTED AN
ADDITIONAL 10 SPACES.    )ILLIH2 THIS TEXT MATERIAL
ILLUSTRATES THE USE OF A HANGING, OR DELAYED, INDENT: THE
TEXT IS NOT INDENTED UNTIL THE LINE FOLLOWING THE FIRST
LINE OF TEXT. )H2ILL
)M THIS TEXT )L MATERIAL )L IS )L    CENTERED! )ME

```

This example shows the three levels of control provided by FORMAT. Control cards provide global controls; Command Words provide controls at the word level; and Special Operands provide controls at the character level.

FORMAT provides a number of other powerful capabilities such as the DICTIONARY, \$LOCATE, and EDITOR facilities. The beginner should experiment with simple text input until some familiarity with FORMAT has been attained. As a start, study the input which produced the examples above. Then punch the above FORMAT job on cards, add the necessary Job Control cards (see Section X; an experienced programmer can help prepare them), and run the job on the computer. Then generate some simple input text, and experiment with other FORMAT features.

A suggested sequence for reading this manual is to skim Sections III through V, and the hints and suggestions given in Section XI. Then, after studying the above input and running a few simple problems, go back and study those sections more carefully. As more experience is gained, the other parts of the manual may be consulted as needed.

### III. Control Cards

Every FORMAT job must begin with a control card group, which is defined as a group of control cards ending with the "GO" control card (all other control cards are optional). The position of a control card within a control card group is not significant, unless specified in its description. A control card group may appear at any point in the input text stream (see the "V" Command Operand in Section IV). Default values for each option are assumed if no control card pertaining to that particular option has been supplied in any control card group in the job. The default values are summarized in Section VIII. The values of most of the options can be varied as needed during the reading of the input and the formatting of the document. However, some of the options cannot be reset once they have been set, as noted in their descriptions.

The format of each control card is entirely free-form, as long as the first 3 non-blank characters of each control card are as specified by the suggested control card name, and the control card is on one card image. (FORMAT scans control cards by saving the first three non-blank characters, and then searching for the numbers that give the values of the parameters.) At the conclusion of each job, the control cards used for that job are listed by group on the System Output dataset.

We will now give the specifications for each of the control cards in turn. In some of the descriptions, it is stated that some option may or may not be used in a title; in all such cases, the statement applies to footers also. Examples of correct and faulty control cards will be given at the end of this section. In some of the control cards, numeric operands may be required. These are represented by lower-case letters such as x, y, z, or nn; an operand such as x is not limited to a single digit.

#### BACKSPACE CHARACTER IS SPECIAL CHARACTER NUMBER nn

To simulate the action of the backspace key on a typewriter, one of the special characters (described in Section V) may be designated as the "backspace" character, except for special characters numbered 43 (!) and 51 (!). The action of the

backspace character is as follows: the character to be printed over and the overprint character are separated by the backspace character, with a few minor exceptions. If the backspace character is followed by a blank, then it is assumed that no overprint was desired, and the backspace character will print normally. Multiple backspaces are ignored, and have no more effect than a single one; they all cause only a single backspace, and the only character which will overprint the character preceding the first backspace will be the character following the last backspace.

The number nn given on the control card must lie between 10 and 50; if it does not, backspacing will be turned off and no character will be recognized as a backspace. Note that the backspace character, when used in the input text, may be in its actual (character) form or in its special (!nn) form. The default action is that no backspaces are recognized.

To give some examples: suppose the backspace character is number 50, the question mark (?). Then the input characters O?- would produce 0, /?o would produce o, and lett?-er would produce letter. Note that special characters may be used for overprinting, so that =!50!33 would produce \$. The figure below makes use of backspacing to print the dividers at the inside edges of the boxes: the characters -? produce  $\tau$ , and the characters -? produce  $\perp$ .

base	displacement
------	--------------

At most 99 backspaces are allowed on a single page. Any backspaces following the 99th will be ignored, and the backspace character will print normally. An error message will flag the location of the 100th backspace on the page.

Backspaces will not work correctly inside a "keep" (a region of text delimited by )K's; see Section IV for a description of a "keep"). The backspace character itself may not be used for overprinting. Backspacing does not apply in titles and footers.

#### BETWEEN COLUMNS LEAVE x BLANKS

The number of print positions separating text columns is x. The default number is 2.

## CAPITALIZE AUTOMATICALLY

When this control card is in effect, FORMAT will automatically capitalize the first word of the document, the first word following Command Operands "P" and "S", and each letter which follows .b !b ?b ."b !"b ?"b .)b !b and ?)b (where b = one or more blanks) in text and titles. The default action is that this option is not used. (See the "NO CAPITALIZATION AUTOMATICALLY" control card.)

CARD FIELD IS x THRU y  
 or  
 CARD FIELD EXTENDS THRU y

This control card (in either form) specifies the columns of the input data cards to be used for reading normal text (in text mode), and text for titles and footers (which is read in control card mode). The first column of the card field is x, and the last column of the card field is y. If the second form of the control card is used, the card field extends from column 1 through column y. This control card does not affect control cards (which may be limited by the "CONTROL CARDS END IN" control card; see below), but all other card input to FORMAT, including titles, is read from the field specified. The field must be at least 3 columns wide, and at most 80 columns wide. The default card field is columns 1 through 80.

CENTER TEXT ON LINE x

The first line of the text is printer line x, and the document is centered, if possible, within the print line of 132 characters. The default is line 5 and centering of the document on the printer page. (See the "LINES PER PAGE" and "TEXT STARTS ON" control cards also.)

COLUMNS PER PAGE = x

The number of text columns per document page is x. The maximum allowable number of text columns per page is eight. The default number is 1.

CONTROL CARDS END IN COLUMN x

This control card allows the user to control the position of the right-hand margin of a control card in the same way as

can be done for text input with the "CARD FIELD" control card. If the value of x is less than 7 or greater than 80, it will be set to 80. This control card takes effect starting with the following control card. The default value of x is 80. Note that even though the text for titles and footers is part of a control card group, the card field from which it is taken is set by the "CARD FIELD" control card.

COPIES = x

x specifies the number of copies of the document which are to be produced during the run. The default value is 1. If x is 2 or more, the output dataset from the program is written onto dataset reference number 8 (see Section IX). At the conclusion of the last FORMAT job, dataset reference number 8 is copied onto the System Output dataset x times, where x is the operand field from the last "COPIES = x" control card read. If x is zero it is treated as one, unless the "OUTPUT IS TAPE" control card is specified.

#### CREATE A TAPE FROM CARD INPUT

If the input dataset is currently the System Input dataset (which is the normal situation), then the entire input dataset following this control card is copied and condensed onto dataset reference number 2. Dataset reference number 2 is then rewound and becomes the input dataset. Printed in the upper far right corner of each document page produced are the first and last card image numbers (from the condensed deck) that were used in producing that page.

FORMAT's condensing function squeezes out unneeded blanks, and responds to but prevents the following three control cards from being copied into the condensed dataset: "029 KEYPUNCH", "026 KEYPUNCH", and "CARD FIELD IS... ". The result is a compact card image dataset (80 characters per record, all of which are used) on which all right parentheses (except those within "as is" regions) are in the 029 (EBCDIC) mode, regardless of their mode in the original card input dataset.

At the conclusion of the run the input dataset on dataset reference number 2 (the condensed input) is listed, with card image numbers and numbered text and title words, onto the System Output dataset. If the listing is printed in upper case only (due either to errors or to the presence of the "SPECIAL PRINT TRAIN" control card), then an asterisk will replace each character for which no graphic is likely to be associated. The

Command Operands contained in each card image are listed again alongside each card image.

The primary use of this control card is to produce a card image input dataset that can be saved for later editing; see Section VI for a description of the Editor facility.

#### CYCLE THE PAGE NUMBER

If page numbering has been requested (by the "LEFT TOP POSITION" or "RIGHT TOP POSITION" control card), then the page number will be alternated between the left and right top corners on successive document pages. The page number appears on line 1 aligned with the appropriate border of the text. The default action is that the first page number is aligned with the right text border. (See the "LEFT TOP POSITION", "RIGHT TOP POSITION", and "PAGE NUMBER" control cards.) Once cycling of the page number has been requested, it stays in effect for the remainder of that job.

#### DARK PRINT EACH PAGE $x$ TIMES

Normally, each line on the output page will be printed once. If  $x$  has a value of 2 or 3, each line will be printed successively on top of itself until it has been printed a total of  $x$  times. This allows darker printing of the page, and if the printer is well-adjusted and the printer ribbon is neither too new nor too old, the text is printed without the normal blur and grain from the ribbon. If  $x$  is 0, it is set to 1, and if it is greater than 3, it is set to 3. The number of times each line is printed is determined by the value of  $x$  in effect at the time the entire page is printed, so it is not possible to print portions of a page in "boldface". The default is single printing.

#### DICTIONARY OF WORDS USED

An alphabetized list, 6 columns per page, of all significant words in the input stream, with a count of the occurrences of each, is written onto the System Output dataset at the conclusion of the last FORMAT job. This dictionary, in upper case, is formed according to the following rules:

- no word of fewer than 3 letters is listed
- all non-letters are treated as word delimiters, except for "z" which is ignored

- Command Words are ignored
- case of the printed text is ignored, but the input must be in upper case (see the "SPECIAL KEYPUNCH" control card)
- text, titles, and control cards alike are scanned
- words longer than 40 letters are broken up into 40 letter segments
- 94 common words (such as "though", "also", and "where") are suppressed

The dictionary is useful for determining a rough list of candidates for an index, and for a spelling check. The "\$LOCATE" Editor control card can be used (in the edit phase) to find the location of "index candidates" in context.

The DICTIONARY facility uses dataset reference numbers 2 and 3 (see Section IX for details).

DROP CHARACTER FOR 'D' COMMAND IS x

When a tab command is used to skip over blank positions in a column line, the spaces can optically be filled with a character such as a dot. This character is called the "drop" character, since it may be thought of as being "dropped behind" as the line position moves to the right. Normally, the character dropped by the "I" Command Operand (see Section IV) will be a period. This control card may be used to change that character, as follows: if x is a number between 10 and 51, then the drop character will be the corresponding special character; if x lies between 64 and 255, the drop character will be the EBCDIC character whose representation has that value; if it is zero or omitted, then the drop character will be reset to a period. The default character is a period. As an example, the control card "DROP 30" would drop "bullets" (•) when the 'D' command operand is used.

EDITOR

This control card invokes the FORMAT Editor, which is described in Section VI. If used, this control card must be the first of the job and must be part of the System Input dataset.

FOOTER ON LINE x PRINT POSITION y PRECEDED BY z BLANK LINES

The footer is placed into the print page beginning on line x at print position y, and is separated from the last line of text by at least z blank lines. This control card, if used, must

be followed immediately by the footer text. The text of the footer must be ended by the "E" Command Operand. After the footer text, the only allowable control card is the "TITLE" or the "GO" control card. The footer appears on every document page until it is replaced (through the use of another "FOOTER" control card.) The default value for x is the last line of the document page, the default value for y is the print position of the left text border of the document, and the default value for z is 2.

## GO

This is the only control card required by FORMAT. GO signals the end of a control card group, and initiates processing in normal text mode.

## INDENTATION OF THE COLUMN IS (x1,y1).....(x7,y7) POSITIONS

This control card, when used with the "R" and "I" Command Operands, enables the user to reduce the width of text columns by x positions on the left and y positions on the right. Seven pairs of column indentations may be specified. The default action is that all x's and y's are zero.

## JUSTIFICATION

Text in the document body is right-justified within column-lines, except when a column-line is terminated by a Command Word, or when the line contains tabs. After reading the input and eliminating all extra blanks, FORMAT then performs right-justification by introducing the necessary number of extra blanks, one to each word delimiter, working alternately from the right end of the line leftward and the left end of the line rightward on successive lines. The number of blanks between input text words is ignored. FORMAT does no hyphenation, which means that column-lines containing long words may have large gaps between words. The default action is right-justification. (See the "NO JUSTIFICATION" control card.)

## LEFT TOP POSITION FOR PAGE NUMBER

The page number (if any) is placed on line 1 aligned with the left text border. The default action is that it is aligned with the right text border. (See the "CYCLE PAGE NUMBER", "PAGE NUMBER", and "RIGHT TOP POSITION" control cards.)



LINES PER PAGE ARE x

The number of lines of all kinds (including text lines, paragraph separation lines, title lines, and blank lines) which are allowed on a document page is x. The operand may be any number in the range 5 through 1000. The default number is 59.

## LIST THE INPUT DATASET

This control card is identical in effect to the "CREATE A TAPE" control card.

## NO CAPITALIZATION AUTOMATICALLY

No capitals are automatically produced. This is also the default. (See the "CAPITALIZE AUTOMATICALLY" control card.)

## NO JUSTIFICATION

The text is not right-justified (as illustrated in this paragraph, which will have an uneven right margin.) The number of blanks between input text words is ignored. The default action is right-justification of text.

NONTRIVIAL BLANK IS REPRESENTED BY SPECIAL CHARACTER nn

To facilitate the use of the non-trivial (or non-eliminatable) blank from devices (such as IEM 2741 terminals) which do not allow it to be entered in the source stream, the user may make the appearance of one of the special characters be equivalent to the presence of a non-trivial blank. The number nn must be between 10 and 51; otherwise no character will be replaced by the non-trivial blank when it is encountered. Note that the actual special character must be present to be replaced, and not the "special character representation" !nn, which will be treated normally. For example, if the nontrivial blank is represented by special character number 46 (@), then the text "here@@@@@there" would be printed as "here        there", and the non-trivial blanks are not eliminated as ordinary blanks would be. This equivalence also takes effect in titles and footers. The default is that no such equivalence is made.

NULL CHARACTER SWITCH SET TO x

Non-trivial blanks (or null characters) are normally ignored for centering or underlining purposes when they are at the end of a word. If x has the value 2, they will not be ignored when centering and underlining (under control of the "M" and "U" Command Operands, respectively). If x has any other value, it will be set to 1, which implies that null characters will be treated normally. The default setting is 1. The effect of this card does not apply in Titles or Footers.

## OUTPUT MEDIUM IS TAPE

The output from FORMAT is written onto dataset reference number 8 from the point at which this control card is read. At the conclusion of the job(s) the tape is copied onto the System Output dataset the number of times specified on the last read "COPIES = x" control card; or once, if multiple copies are not specified. The tape can then be listed at some other time, using the "PRINT OUTPUT TAPE" control card.

PAGE NUMBER STARTING AT x

The page number starts at x (if non-blank and non-zero) and is placed on line 1 of each document page. If x is zero or blank, page numbering is suppressed. The default page number is 1. (See the "CYCLE PAGE NUMBER", "LEFT TOP POSITION", and "RIGHT TOP POSITION" control cards.) If page numbering is requested (by the "RIGHT TOP POSITION" or "LEFT TOP POSITION" control cards), then enough character positions must be reserved at both the top left and top right corners of the page for the digits of the page number, whether or not the number will actually appear in both positions.

PARAGRAPH INDENT IS x

The number of print positions skipped at the start of a paragraph is x. The default indentation is 5 print positions.

## PRINT OUTPUT TAPE

The presence of this control card means that the user has placed a FORMAT-generated output dataset (usually a tape) onto dataset reference number 8, and that he wishes to list it onto the System Output dataset the number of times specified on the

most recent "COPIES = x" control card; or, if none, once. This action is immediate, no document is formed from an input dataset, and no control cards or error diagnostics relating to the current input are written. It is suggested that the tape be file-protected.

#### PUNCH THE INPUT DATASET

The effect of this control card is identical to that of the "CREATE A TAPE" control card, and in addition, the newly created condensed input deck is punched (i.e., written onto the System Punch dataset) as well as listed at the conclusion of the run.

#### REPEAT TITLE ON EVERY PAGE

The title (if any) is printed on every page of the document. The default action limits the appearance of the title to the next page produced. (See the "STOP PRINTING TITLE" control card.) Note that the title and footer printed for a given page of text are those in effect when the end of the current page is reached. This means that changing the title or footer when text is being accumulated in mid-page will place the new title or footer on the current page, replacing the old one (possibly before it was expected to).

#### RIGHT TOP POSITION FOR PAGE NUMBER

The page number (if any) is placed on line 1 aligned with the right text border. The default action is the same as the action of this control card. (See the "CYCLE PAGE NUMBER", "LEFT TOP POSITION", and "PAGE NUMBER" control cards.)

#### SENTENCES SEPARATED BY AT LEAST x SPACES

Text sentences are separated on the same column-line (when not in an "as is" region; see Section IV) by x blanks with "NO JUSTIFICATION" in effect, and by a minimum of x blanks with "JUSTIFICATION" in effect. The value of x may be 1 or 2; if it is not 2, it will be set to 1. The default value for x is 1. Note that FORMAT will insert a minimum of x blanks, so that extra blanks might appear. If an exact number of spaces is needed, use the non-trivial blank.

SEPARATION LINES BETWEEN PARAGRAPHS ARE x

The number of blank printer lines between paragraphs is x. The default number is 1.

## SIDE BY SIDE COPIES

Two copies of the document are produced simultaneously, side by side. The default action is not to print side by side copies. There must be enough space to fit two copies of the printed text, and at least one separating space, into a 132-character print line.

SPACING OF TEXT LINES IS x

The spacing for the document is x (e.g., x = 1 means single spacing, x = 2 means double spacing, etc.). The default assumption is single spacing.

## SPECIAL KEYPUNCH

SPECIAL KEYPUNCH IS A 2741

This control card specifies that the text input originated on an upper and lower case keypunch, or on any device producing the specific EBCDIC code for each character desired. Case is not altered by the program, and (for the first form of this control card) the Special Operand "Z" does not produce superscripts. The default action is the usual case and superscript conversion. The "SPECIAL KEYPUNCH" control card allows the user to prepare upper and lower case input from a terminal, but still be able to obtain superscripts through the use of the "ZN" Special Operand technique. If there is any other numeric quantity on this control card, the normal "SPECIAL KEYPUNCH" will be assumed. Note that the effect of this card can be changed from 2741 mode to normal SPECIAL KEYPUNCH mode and back, but there is no way to return from either to the normal mode, where upper-case-only input is assumed.

## SPECIAL PRINTER TRAIL

This control card implies that the ultimate printer of the document cannot print lower case or superscript characters. Therefore, no translation to lower case or superscripts is made. The default action is that the translation is made.

## STOP PRINTING TITLE ON EVERY PAGE

The title (if any) is only printed on the next page produced. The default action is the same as the action of this control card. (See the "REPEAT TITLE" control card.)

TABS ARE SET AT X1.....X14

The operand fields of this control card specify the positions of up to 14 tab stops. These are given as relative character positions within the text column-line (e.g., a tab set at 10 means that the tab field begins in character position 10 in each column-line; the first word following a tab from any position in the column-line before position 10 will be placed in the line starting in character position 10). Tabs must be set in ascending order, and no tab may be set at a position greater than the column width. The action of this control card is analogous to the action of the "tab set" key on a typewriter. The default action is that no tabs are set.

## TAPE INPUT DATASET

The presence of this control card means that the user has placed a tape input dataset onto dataset reference number 2. It is suggested that the tape be file-protected. If this control card is used it must be the first control card of the job and must be part of the System Input dataset. This control card calls the FORMAT Editor; therefore, Editor control cards may follow it (see Section VI). It is identical in effect to the "EDITOR" control card, except that no listing of the edited tape is requested.

TEXT STARTS ON LINE x IN PRINT POSITION y  
OR  
START TEXT ON LINE x IN PRINT POSITION y

The first line of the text is printer line x, and the first print position is y. The default is line 5 and the document is centered on the printer. These control cards are entirely equivalent, and the two forms are provided as a convenience.

TITLE STARTS ON LINE x IN PRINT POSITION y

The first printer line of the title is x, and the first print position of the title is y. This control card, if used,

must be followed immediately by the card images containing the title and the "GO" or "FOOTER" control card. (Remember that the title text must end with the "E" Command Operand.) The title must be positioned above the body of the document. Conflicts of the title with the page number are resolved in favor of the page number, at both of the top corners of the page. The default title line is printer line 2, and the default print position is that of the left text border.

#### UNDERLINE SWITCH SET TO x

If x is not zero, the underlining algorithm of FORMAT is modified so that the leading and trailing characters of an underlined string will not be underlined if they are any of the following ten punctuation or special characters: period, comma, colon, semicolon, question mark, exclamation point, quotation mark, apostrophe, and left or right parenthesis. If x is zero or blank, all characters in the string are underlined. The default value of x is zero. To give an example, suppose the input text requires that ((X)) be underlined. Then

((X)) and ((X))

would be produced by setting the underline switch to zero or nonzero respectively.

#### WIDTH OF COLUMNS IS x PRINT POSITIONS

The width in print positions of each text column is x. The default width is 64 print positions. If a single column per page is specified, and the width is chosen to be 132 characters (the maximum), then the maximum number of lines is 59. FORMAT allots 59\*132, or 7788, characters for each page of the text. The maximum allowable column width, w, is computed as follows:

$$w = \frac{[\min(7788/L, 132)]/c - s + 1 - b * (n - 1)}{n}$$

where:

L = lines per page (from "LINES PER PAGE" control card)  
 c = 2 if "SIDE BY SIDE" control card is in effect;  
     = 1 otherwise  
 s = starting print position (from "TEXT STARTS ON" control card)  
 b = spaces between columns (from "BETWEEN COLUMNS" control card)  
 n = number of text columns (from "COLUMNS/PAGE" control card)

## 026 KEYPUNCH

This control card specifies that the Command Words used in the input cards have been punched on an IBM 026 Keypunch, or any keypunching device which punches 12-8-4 for the character used to begin Command Words [nominally ")"]. The default action assumes the IBM 029 configuration for the ")", which is 11-8-5.

## 029 KEYPUNCH

This control card specifies that the Command Words used in the input cards have been punched on an IBM 029 Keypunch, or any keypunching device which punches 11-8-5 for the character used to begin Command Words [nominally ")"]. The default action is the same as the action produced by this control card.

Examples of Correct Control Cards

[1] . . . . .Card Columns. . . . .[80]

TAB SET 5 10 15 20

TABS ARE SET AT PRINT POSITIONS 5, 10, 15 AND 20

TABULATE TO 5 10 15 20

TAB5 10\* 15 20

START THE TEXT ON LINE 10, PRINT POSITION 20

START THE TEXT ON LINE 10 PRINT POSITION 20

START DOCUMENT: LINE = 10, P. POSITION = 20

STA 10 20

TEXT STARTS ON LINE 10, PRINT POSITION 20

TEXT STARTS IN DEFAULT POSITION

START TEXT 0 10

START TEXT 0 10

TEXT STARTS ON LINE 5 IN PRINT POSITION 10

TITLE

TITLE STARTS ON LINE 5 ABOVE LEFT TEXT ECIDEF

BACKSPACE CHARACTER IS NUMBER 50 (THE QUESTION MARK)

BACK 50 (?)

DAR 2

NO J MEANS DON'T JUSTIFY

Examples of Faulty Control Cards

GO NOW

BEGIN TEXT

(An unrecognizable control card is treated as a "GO" card)

START TEXT: ,7

(Text starts on line 7 in the default print position)

TABS = 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

(The 15th tab stop is ignored)

LINES/PAGE = 5 7

(The number of lines per page will be 5, not 57)

COLUMNS/PAGE = TWO

(The number of columns/page will be the default value)

BACKSPACE CHARACTER IS NUMBER 43 (Z)

(Z cannot be used as the backspace character)



#### IV. Command Operands and Command Words

A Command Operand is an imperative order to perform an immediate text-control function. Command Operands can be interspersed as desired throughout the text input in the form of Command Words. A Command Word is a string of one or more Command Operands in the order of desired execution, prefixed by the character ")", and followed by a blank. (See the "026 KEYPUNCH" and "029 KEYPUNCH" control cards in Section III).

Some Command Operands may be used in titles (including footers), as noted in the following paragraphs. In addition, some of the Command Operands ("L", "H", "I", "T", and "X") may be followed by a numeric quantity, as in ")T4".

The functions of the Command Operands are described below. Wherever a single letter appears in quotation marks (like "L"), its use as a Command Operand (like ")L") is implied; otherwise, that letter may appear freely in the text material. It is important to remember that all Command Operands are recognized by FORMAT only if they are in upper case.

A -- Enter the "as is" text mode. In this mode, each card image is an integral unit and is printed on a separate column-line without change to the spacing of text, except that the Special Operands, and certain of the Command Operands, take no print positions. Both of the Special Operands, and the Command Operands "Z" and "F", are effective in this mode. The content of a card image beyond the effective column width is not printed. The "as is" text mode is ended when ")b" (where b = blank) occurs in the first two positions of the card image; FORMAT then resumes reading in normal text mode. (The Command Operand "A" is not recognized in "as-is" text mode, so ")A" cannot be used to terminate "as-is" mode.) The Command Operand "I" is not valid in titles.

C -- Begin the next text column. The Command Operand "C" is not valid in titles or footers.

Dn -- Tab, like "T", leaving a string of dots (periods) instead of blanks. The string of dots is prefaced by one blank. The

character to be "dropped" may be changed from a dot to any other character with the "DROP CHARACTER" control card. For a detailed description of the "D" Command Operand, see the description of the "T" Command Operand below. The Command Operand "D" is not valid in titles or footers.

E -- End the job, or end the footer or title; the next card will be read in control card mode. As many PCFMT jobs as desired may be stacked one behind the other. Jobs on cards must precede jobs which are tape resident.

F -- Begin capitalizing each word, continuing until another "F", "P", "S", or "V" Command Operand occurs. The Command Operand "F" is valid in titles and footers, and in "as-is" text mode.

Hn -- Reduce the column width starting with the next column-line. If no "hanging" (delayed) indent is currently in use, then n refers to the nth pair of arguments on the "INDENT COLUMN" control card; if n is blank, zero, or one, the first pair is referenced. If a hanging indent is currently in use, the nth pair of column indents replaces the pair in use, unless the nth pair is the one being used, in which case the hanging indent is turned off. If any hanging indent is in effect, a blank or zero value for n turns it off, as does the Command Operand "S". The Command Operands "H" and "I" may be used independently of each other. The Command Operand "H" is not valid in titles or footers.

In -- Reduce the column width immediately, and terminate the current column-line. If no immediate indent is currently in use, then n refers to the nth pair of arguments on the "INDENT COLUMN" control card; if n is blank, zero, or one, the first pair is referenced. If an immediate indent is currently in use, the nth pair of column indents replaces the pair in use, unless the nth pair is the one being used, in which case the immediate indent is turned off. If any immediate indent is in effect, a blank or zero value for n turns it off, as does the Command Operand "S". The Command Operands "I" and "H" may be used independently of each other. The Command Operand "I" is not valid in titles or footers.

J -- Start the next column-line. The action of this Command Operand is identical to the action of "I", except that it is not valid in titles and is effective at any line in the text. Unlike

"L", it is not ignored at the top of a column.

K -- Keep the following text, until the next occurrence of "K", in the current text column, if possible. (A segment of text delimited by "K" Command Operands is called "kept text" or a "keep".) Otherwise, start this block of text in the next text column. The Command Operand "K" is not valid in titles and footers, and terminates the column-line on which it occurs. If this Command Operand is used, the program requires dataset reference number 2. Backspaces do not work properly inside "kept" text. See the description of the "W" Command Operand also.

L -- Start the next column-line, if not at the first line of a text column. The action of this Command Operand is similar to the action produced by striking the "return" button on an electric typewriter. "L" is valid in titles. If "L" is used in a title, the next printer line is begun; if "L" is used in the body of the document the next column-line is begun, leaving ("SPACING" - 1) blank lines between. If "L" is used at the top of a text column, it is ignored.

M -- Begin centering text within the column-line, and continue doing so for successive lines until another "M", "P", or "S" occurs. The Command Operand "M" is not valid in titles or footers; if centering is required in a title or footer, the appropriate number of non-trivial blanks may be used (see Section V).

P -- Begin a new paragraph, leaving the number of printer lines specified by the "SEPARATION LINES" control card (or its default) between paragraphs and indenting the number of print positions specified by the "PARAGRAPH INDENT" control card (or its default). A new column is begun if at least two column-lines of the present column are not available for the new paragraph. "P" stops the action initiated by Command Operands "P", "M", "U", and "Z". If "CAPITALIZE AUTOMATICALLY" is in effect, the next text word is capitalized. "P" is not valid in titles.

S -- Begin a new page. "S" stops the action initiated by Command Operands "P", "M", "L", "M", "U", and "Z". If "CAPITALIZE AUTOMATICALLY" is in effect, the next text word is capitalized. "S" is not valid in titles.

Tn -- If n is blank or zero, tab to the next set tab position beyond the present position in the column-line. The action of "T" corresponds to the action produced by striking the tabulate key on a typewriter. Right-justification, if in effect when "T" is used, will not be performed for the column-line on which the tab occurs. The "D" and "T" Command Operands may be followed by a number which specifies the tab stop to be used. That is, "T4" will cause a tabulation to the fourth tab position on the current column-line. If the command operand is used incorrectly, it will be ignored, and a diagnostic message will be printed. "T" is not valid in titles.

U -- Begin underlining, continuing until another "U", "P", or "S" occurs. At most 99 column-lines, or portions, may be underlined per page. Underlines neither begin nor end under the spaces skipped over by tabbing (produced by "T" and "D"). Underlines may or may not begin and end with non-trivial blanks, depending on the "NULL CHARACTER SWITCH" setting in effect (see the "NULL CHARACTER SWITCH" control card description in Section III). Underlines may or may not begin under punctuation characters, depending on the "UNDERLINE SWITCH" setting in effect (see the description of the "UNDERLINE SWITCH" control card in Section III). Individual characters within a word cannot be underlined except by backspacing (see the "BACKSPACE" control card description in Section III). The Command Operand "U" is not valid in titles or footers.

V -- Leave normal text mode, and begin to read in the next group of control cards. A control card group must immediately follow the card image containing the "V". All characters following "V" on the same card image are ignored. "V" stops the action initiated by the Command Operands "F" and "Z". If "CAPITALIZE AUTOMATICALLY" is in effect, the next text word is capitalized. The Command Operand "V" is not valid in titles or footers.

Wn -- Keep the next n column-lines in the same text column. If n column-lines do not remain in the current text column, start the next text column. "W" terminates the column-line on which it occurs. It is not valid in titles. Note that the "W" Command Operand is similar in effect to "K", but does not require the use of an additional dataset. "W" can be used to prevent "widows", which are small segments of text left alone at the bottom of a column.

z -- Begin printing all letters in upper case, continuing until another "z", "p", "s", or "v" occurs. The action of "z" is equivalent to locking a typewriter keyboard in upper case, and then unlocking it. "z" is valid in titles. "z" does not cause numbers to be printed as superscripts, it is not affected by punctuation characters, nor does it cause letters punched in lower case (as indicated by a "SPECIAL KEYPUNCH" control card) to be printed as capitals. (See the description of the "z" Special Operand in Section V also.)

#### Summary of Command Operands

1. Command Operands allowed in titles and footers are: "F", "P", "L", and "z".
2. Command Operands whose effect is ended by "F" are: "F", "M", "U", and "z".
3. Command Operands whose effect is ended by "S" are: "F", "H", "I", "M", "U", and "z".
4. Command Operands which terminate the column-line in which they appear are: "A", "C", "E", "I", "J", "K", "L", "M", "P", "S", "V", and "W".
5. Command Operands which cause capitalization of the next text letter (if "CAPITALIZE AUTOMATICALLY" is in effect) are: "p", "s", and "v".
6. Command Operands valid in "as-is" regions are: "F" and "z".
7. Command Operands which terminate the effect of "U" are: "p", "s", and "U".
8. Command Operands which terminate the effect of "z" are: "p", "s", "v", and "z".
9. Command Operands which terminate centering (initiated by "M") are: "M", "p", and "S".
10. Command Operands which terminate the effect of "F" are: "F", "p", "s", and "v".
11. Command Operands which may be followed by a numeric quantity are: "Dn", "Hn", "In", "Tn", and "Wn".

12. Command Operands whose effect is turned on or off by alternate occurrences of the Command Operand are: "F", "H", "I", "K", "M", "U", and "Z".

### Examples of Command Words

1. MEN ARE SLOW )L TO GRASP NEW IDEAS;

"to grasp" begins a new column-line.

2. )LTTU\$ NOW )U\$ IS THE TIME.

A new line is begun, and beginning at the third tab position is printed: NCW is the time.

3. Note that ")CP" (meaning "begin next text column" followed by "start a new paragraph") does not produce the same effect as ")PC", which is effectively the same as ")C". This is because the "p" begins a paragraph, but the following "C" immediately starts a new column. Because "C" ends the column-line on which it occurs, the indent (if any) at the start of the paragraph was lost.

4. )M \* )L \*\*\* )I \*\*\*\*\* )L \*\*\*\*\* )I \*\*\*\*\* )L \*\*\* )L \* )M

This produces:

```

      *
      ***
      *****
      *****
      *****
      ***
      *
    
```

5. The text "blank ) blank" is valid, and is not interpreted as the beginning of a command word. Thus, "( A+B ) \* C" produces: "( a+b ) \* c", but "( A+B ) \* C" produces "( a+b ) \* c" and an error diagnostic (code 700) for an undefined Command Operand [the "\*"]. (The diagnostic listing at the end of this manual shows how the above error was diagnosed.)

6. The text ")\$ FORMAT, )\$" produces: "FCFORMAT," but the text ")\$ FORMAT )\$," produces: "FORMAT ," and a diagnostic

message for an undefined Command Operand, the comma. Thus, punctuation characters such as commas and periods should be placed immediately after the text word they would normally follow, and any Command Words should then follow the blank after the punctuation character.

7. )H2 TEXT ... TEXT )H

This text material illustrates delayed column indentation, produced by Command Operand "H". Note that either one of the margins, or both margins (as in this example), can be drawn in, as the user desires. In this example, the second pair of column indentations was "(5,5)", so that both margins were indented 5 spaces. Note also that the final "H" could have been "H2".

8. )I3 TEXT ... TEXT )I3

This text material illustrates immediate column indentation, produced by Command Operand "I". In this example, the third pair of column indentations was "(5,0)", so that only the left margin was indented 5 spaces. The extra indent of the first line occurred because a paragraph was started by a "P" Command Operand.

9. )W10JJJJJJJJJJ

A block of 10 blank column-lines is left in the same text column (assuming of course that the "SPACING OF TEXT LINES" is 1). This is useful for the later insertion of a photograph, for example.



#### V. Special Operands for Capitalization and Special Characters, and the Non-Trivial Blank

FORMAT can produce upper and lower case and special characters in two ways. If the text input is punched with the Hollerith codes representing the characters desired (such as are produced by a terminal or by an upper and lower case keypunch, for example), the proper character representations on output are supplied directly by the hardware of the computer system. If, however, an upper and lower case keypunch or terminal is not used (or approximated by multi-punching on a standard keypunch), then upper and lower case and special characters can be produced using the Special Operands.

There are two Special Operands for use with standard IBM 029 and 026 type keypunches. "z" is used for capitalization and numeric superscripts, and "!" is used to produce special characters. Both Special Operands are valid in "as-is" text mode. It is important to remember that neither of the Special Operands needs to be preceded by the ")" escape character.

##### The "z" Special Operand:

A letter preceded immediately by "z" is printed in upper case, a number so preceded is printed in superscript form, and any other symbol so preceded is printed preceded by the graphic "z". If one of the "SPECIAL" control cards is in effect the translation of a number to a superscript is not made, unless only the "SPECIAL KEYPUNCH IS A 2741" has appeared. The "z" Special Operand may be preceded by any character. The "z" character must be multi-punched on an IBM 026 type keypunch. (Note that the "z" Command Operand causes all following letters to be capitalized, whereas the "z" Special Operand causes only the single, immediately following, letter to be capitalized. Refer back to the sample input in Section II for an example.)

##### The "!" Special Operand

A special character is defined as one which is neither a letter nor a number (normal or superscript) nor one of the following: \*\$. - , / . A special character is produced whenever the string of characters "!nn" is used, where nn is any number from

10 to 51: for example, !28 produces "n". If nn is not in the range from 10 to 51, then "!nn" is printed.

The correspondence between the values for nn, the TN Print Train graphics, the EBCDIC hexadecimal character codes, and the punched card codes is shown below.

Nn	TN	hex	Card Code
10	(	8D	12-0-8-5
11	)	9D	12-11-8-5
12	+	8E	12-0-8-6
13	-	A0	11-0-8-1
14	{	8B	12-0-8-3
15	}	9B	12-11-8-3
16	[	AD	11-0-8-5
17	]	BD	12-11-0-8-5
18	≤	8C	12-0-8-4
19	≥	AE	11-0-8-6
20	±	9E	12-11-8-6
21	*	BE	12-11-0-8-6
22	^	AB	11-0-8-3
23	^	BB	12-11-0-8-3
24	^	AC	11-0-8-4
25	^	BC	12-11-0-8-4
26	+	8F	12-0-8-7
27	-	BF	12-11-0-8-7
28	□	9C	12-11-8-4
29	■	9F	12-11-8-7
30	•	AF	11-0-8-7
31	°	A1	11-0-1
32	8	50	12
33		4F	12-8-7
34	~	5F	11-8-7
35	<	4C	12-8-4
36	=	7E	8-6
37	>	6E	0-8-6
38	+	4E	12-8-6
39	(	4D	12-8-5
40	)	5D	11-8-5
41	"	7F	8-7
42	'	7D	8-5
43	ø	4A	12-8-2
44	#	7B	8-3
45	%	6C	0-8-4
46	@	7C	8-4
47	_	6D	0-8-5
48	;	5E	11-8-6

49	:	7A	8-2
50	?	6F	0-8-7
51	!	5A	11-8-2

It should be noted that the special characters from nn = 32 through nn = 51 can be punched directly on the standard IBM 029 Keypunch, that the "!" character itself must be multi-punched on an IBM 026 type keypunch, and that !43 is not equivalent to either the "z" Special Operand or the "Z" Command Operand.

### The Non-Trivial Blank

The character produced by punches in the 0, 8, and 2 rows of a single card column (which has EBCDIC representation E0) is replaced by a "non-trivial" blank; i.e., one which is never eliminated by the program. The IBM 029 Keypunch has a key which provides this configuration of punches directly. The non-trivial blank is treated in all respects as if it were a non-blank character except that it may or may not be the first or last character underlined, and it may or may not be considered for centering purposes, both depending on the "NULL CHARACTER SWITCH" setting.

When using an input device such as a 2741 terminal which has no provision for entering the non-trivial blank, a special technique is available, through the use of the "NONTRIVIAL BLANK" control card. For example, if the input text contains no "&" characters, then the control card

NONTRIVIAL BLANK REPRESENTED BY 32 (8)

would cause subsequent appearances of 8's to be changed to non-trivial blanks, until the next "NONTRIVIAL BLANK" control card. Thus, if the "NULL CHARACTER SWITCH" is set to 1, the input text

)LLM <---|88888|L 88888|--->)LLM

would cause the printed result to appear as shown below.

```
<---|
|--->
```

If the "NULL CHARACTER SWITCH" had been set to 2, then the result would have appeared as follows:

```
<---|
|--->
```

since the non-trivial blanks at the end of the first group of characters would not be ignored for centering.

Examples of the Usage of Special Operands

For these examples, it is assumed that "SPECIAL KEYPUNCH" and "SPECIAL PRINT TRAIN" are not in effect. Thus the input is in upper case, and the results will be in lower case unless a Command Operand or a Special Operand forces capitalization.

1.  $\#1$  produces: 1
2.  $\#PI*\#R\#2$  produces:  $PI*r^2$
3.  $)\# PI*R2 )\#$  produces:  $PI*R^2$
4.  $)\# PI*\#R\#2 )\#$  produces:  $PI*R^2$
5.  $)F TEXT1 ... TEXTN )F$  produces: Text1 ... Textn
6.  $)F TEXT\#1 ... T\#EXTN )F$  produces: Text1 ... Textn
7.  $D\#X\#2/D\#2\#Y$  produces:  $dx^2/d^2y$
8.  $\#E!10\#2!12\#3!11$  produces:  $E^{(2+3)}$
9.  $6!$  produces: 6!
10.  $6!51$  produces: 6!
11.  $\#I WISH \#I HAD 53\#!$  produces: I wish I had 53#!
12.  $\#ONCE \#I HAD 25!43!48 \#NOW IT!42S GCNE.$   
produces: Once I had 25#; Now it's gcne.
13.  $!52$  produces: !52
14.  $!6$  produces: !6
15.  $!24!27!25 )L |\#X| )L !22!27!23$  produces:  

$$\left[ \begin{array}{c} X \\ X \end{array} \right]$$
16.  $!14x|x!210!15$  produces:  $\{x|x\neq 0\}$

## VI. The Editor Facility

The Editor facility can be used to change, override, copy, combine, list, and punch card image data sets; it can also locate words, phrases, and character strings within the text. The card image datasets read and written by the Editor will be called "tape datasets"; these will usually have been created initially by use of the "CREATE A TAPE", "LIST THE INPUT DATASET", or "PUNCH THE INPUT DATASET" control cards. The tape datasets may contain portions of jobs, whole jobs, or multiple jobs. We will refer to the input dataset to be edited as the "old master", and to the resulting output dataset as the "new master". The new master is constructed with all unneeded blanks removed, in the same "condensed" form as a dataset created by the "CREATE A TAPE" control card.

The functions provided by the Editor are requested by using a single Editor control card group, which must be the first and only control card group of the job, and which must be read from the System Input dataset. (See Section VII.) This Editor control card group must begin with the "EDITOR" or "TAPE INPUT" control card, which is then followed by the desired Editor control cards and modifications to the old master (if any), and it must end with the "GO" control card. FORMAT determines from the presence of the "EDITOR" or "TAPE INPUT" control card that an edit phase is to precede the document phase of the run. If the user requests an edit phase, then the subsequent document phase will use the result of the edit phase as its input; in addition, there can be no further document or edit phases. When the end of the Editor control card group is reached, no further reference will be made to the System Input dataset.

An error detected by the Editor means that the newly edited document will not be produced; however, the edit continues in order to detect as many errors as possible. It is clear that user errors make it impossible to know the intention of the user, and FORMAT therefore makes assumptions wherever necessary so that it can continue the edit. Thus, errors detected after the first error may be due to the assumptions made by the program, and not due to the user. Whether or not errors occurred during the edit, FORMAT always gives a listing of all the control card groups used, and a set of diagnostics if any were generated.

At the conclusion of an error-free edit, the document is produced from the new master, unless otherwise specified (see the "\$NO DOCUMENT" Editor control card), and the Editor control

card group will appear first when the control card groups are printed following the document. In the upper far right corner of each page of the document, FORMAT will print the first and last card image numbers from the new master that were used in producing that page. A listing of the latest tape input dataset (as described in the discussion of the "CREATE A TAPE" control card in Section III) is produced after a successful edit if the Editor control card group is begun by the "EDITOR" control card.

The Editor control cards are completely free-form, as described at the beginning of Section III. All Editor control cards (except "GO") begin with a "\$", which distinguishes them from ordinary control cards. During the edit phase, ordinary control cards are simply data to be edited from the old master, or added to the new master. Thus, the "EDITOR" and "TAPE INPUT" control cards are ordinary control cards; they simply initiate the edit phase. Due to a machine-dependent internal storage limitation, no Editor control card operand may exceed 32,767. The Editor control cards are described in the following paragraphs, and some examples of Editor control card groups will be given at the end of this section.

### Editing the Old Master

Three Editor control cards are used to modify the tape input dataset (the old master) and produce a new tape input dataset (the new master): they are "\$INSERT", "\$DELETE", and "\$END CHANGES". Before describing the function of each control card in detail, we will give a brief description of the editing process itself.

To perform these functions, FORMAT first reads an Editor control card from the System Input dataset to determine the editing function desired. Material is then copied from the old master to the new master until the Editor finds the position on the old master where the insertion or deletion is to occur; this position is called the "edit point". After deleting material from the old master (if requested), FORMAT inserts new material (if provided) into the new master, until it encounters the next Editor control card.

In this way, FORMAT obeys each of the Editor control cards in turn, reading card images from the old master and writing card images on the new master. Since the old master contains data which can be used in the document phase, it can be read by

the Editor in two ways: normal text, which runs freely from card image to card image, and single card images (ordinary control cards, and "as-is" text cards). Thus, whereas the document phase reads its input in three modes (ordinary text, as-is text, and control card), the edit phase reads the old master and writes the new master in only two modes. These will be called word mode (containing the text of titles and footers, and ordinary text), and card mode (containing as-is text and ordinary control cards). Diagnostic 806 or 814 (see Section XII) is issued if a mode error occurs.

The old master (preferably file-protected) is read from dataset reference number 2, and the new master is written on dataset reference number 4. It is important to remember that the edit phase, unlike the document phase, reads from two sources: from the System Input dataset, which contains Editor control cards and changes to the old master; and from the old master, which is to be edited according to the instructions in the Editor control card group.

We will now describe the three Editor control cards used to perform the editing functions.

#### \$INSERT BEFORE CARD IMAGE a WORD b

The contents of the cards (if any) between this Editor control card and the next Editor control card are inserted into the new master at the specified edit point, which is determined as follows:

1. If the insertion refers to text or titles (the old master is being read in word mode), then the edit point is just before word b on card image a of the old master (where b is a count of only those words begun on card image a, and must be other than blank or zero).
2. If the insertion refers to "as-is" text or control cards (the old master is being read in card mode), then the edit point is just before card image a, and b must be blank or zero. (In card mode, insertions are made one card image at a time, and do not depend on the words on the card.)

The values of a (card image numbers) and b (numbers of text and title words begun on that card) to be used with the old master are found in the listing produced when the old master was created or last edited.



The cards containing the material to be inserted should be prepared in the same way as ordinary text, title, "as is", or control cards, as though the "CARD FIELD THRU 80" and "029 KEYPUNCH" control cards are in effect. These two control cards also pertain to the new master, because the "026 KEYPUNCH", "029 KEYPUNCH", and "CARD FIELD" control cards will be ignored as insertions. The "CONTROL CARD ENDS IN" control card may be inserted, and it will take effect during the edit.

\$DELETE CARD IMAGE a WORD b

or

\$DELETE CARD IMAGE a WORD b THRU CARD IMAGE c WORD d

The contents of the cards (if any) between this Editor control card and the next Editor control card are inserted into the new master at the edit point. Then, the material in the old master from a,b through and including c,d (if specified) is skipped over, and it will not appear in the new master. The description of the \$INSERT card applies, with the remarks concerning the value of b also applying to the value of d. If it is desired to delete from a,b to the end of the old master, the value 32767 may be given to c to reduce run time (no operand is required for d).

With a single exception, each \$INSERT and \$DELETE Editor control card must refer to an edit point in the old master beyond the last point referenced. The one exception to this rule is that multiple successive \$INSERT references to the same a and b are allowed; the insertions will appear in the same order in the new master.

No \$INSERT or \$DELETE control card can be allowed following a \$DUPLICATE or \$END CHANGES control card, because each of these places the edit point at the end of the old master, beyond which there is no legitimate point. No \$INSERT or \$DELETE control card is allowed in the same Editor control card group with \$MERGE or \$JOIN control cards; that is, changes and merges must be accomplished in separate runs.

\$END CHANGES

This control card is required following the last \$INSERT or \$DELETE control card, unless the end of the old master has been reached. It completes the new master by adding to it the unreferenced last portion of the old master. This control card is ignored when not required (that is, when the end of the old master has been reached).

### Combining Data Sets

To combine tape input datasets into a single new tape input dataset (the "new master"):

#### **\$MERGE TAPE INPUT DATASETS ON x1.....x8**

The new master is produced at dataset reference number 2 and is an unchanged concatenation of the tape input datasets at the dataset reference numbers given in the operand field, in the order in which they are given. Up to eight dataset reference numbers may be specified in any order, and any may be specified more than once for multiple copies of particular tape input datasets. The valid dataset reference numbers are 9 and higher, and 4. The user must determine that all dataset reference numbers used have been generated into the operating system being used.

As many \$MERGE and \$JOIN control cards as desired may be used. No \$MERGE or \$JOIN control card is allowed in the same Editor control card group with \$INSERT, \$DELETE or \$DUPLICATE control cards; that is, merges must be accomplished in a separate run from changes and duplication.

It is good practice that the tape input datasets be file-protected.

#### **\$JOIN TAPE INPUT DATASETS ON x1.....x8**

This control card produces a resultant new master like the one produced by the \$MERGE control card, with one difference: all document-ending "E" Command Operands encountered on the tape input datasets referenced are changed to "V" Command Operands, except for those on the last dataset referenced. The effect of this is to combine the input for many jobs into input for one new job.

The remainder of the description of the \$MERGE control card applies to this control card.

Other Editor Control Cards**\$DUPLICATE OLD MASTER**

The old master is copied from the position at which the last \$INSERT or \$DELETE control card has left it; or, if no position was specified, from the beginning. The old master (preferably file-protected) is mounted at dataset reference number 2, and the copy is written at dataset reference number 4. This control card may be used to complete a new master begun by \$INSERT and \$DELETE control cards.

The \$DUPLICATE control card is not allowed in the same Editor control card group with \$MERGE or \$JCIN control cards.

**\$NO DOCUMENT**

This control card prevents production of the edited document, which otherwise follows a successful edit run. Any listing, punching, overriding, locating, and dictionary functions that may have been requested concerning the latest tape input dataset are unaffected.

**\$OVERRIDE FIRST CONTROL CARD GROUP**

The following cards (up to the next Editor or "GO" control card) are control cards which will override the first control card group on the tape input dataset when it is used to produce the document. No "TITLE" or "FOOTER" control card may override. No physical change is made to either master. FORMAT saves the overriding control card group, and uses it as part of the first group read from the just-completed new master at the start of the document phase. The overriding control cards will be inserted just before the first "TITLE", "FOOTER", or "GO" control card in the overridden group.

**\$PUNCH**

At the conclusion of the successful edit run and after the edited document is produced or bypassed, this control card results in the latest tape input dataset being copied onto the System Punch dataset.

## \$LIST

This control card forces a listing of the new master (if any) at the conclusion of an edit run, successful or not. Following an unsuccessful edit, the listing is in upper case. In the listing, the Command Operands that appear on each card image are reiterated alongside the card images, in the right-hand portion of the page. This allows one to find Command Words rapidly, and to locate desired areas of the input text. Those symbols for which no graphics are expected are printed as asterisks in the listing.

## \$OMIT LISTING OF NEW MASTER

The presence of this control card in the group of Editor control cards will suppress the listing of the new master following a successful edit. The default action is to produce the listing.

The production of a listing depends on a number of factors. If the Editor control card group was begun with the EDITOR control card, then a listing will be produced only if the edit was successful (in the absence of a \$LIST Editor control card). If the Editor control card group was begun with the TAPE INPUT control card, then a listing is provided only if the \$LIST Editor control card is included in the Editor control card group. The \$OMIT LISTING Editor control card always deletes the listing.

FORMAT will usually diagnose editing errors so that the cause of the error can be identified readily. If errors are expected, it is sometimes helpful to include the \$LIST Editor control card in the Editor control card group; the listing can then be scanned to see what actions were taken by FORMAT in handling the errors.

## \$LOCATE THE FOLLOWING WORDS/PHRASES/STRINGS

This facility is intended primarily to assist in the task of index production; see the "DICTIONARY" control card also. The following cards (up to the next Editor or "GO" control card) contain arguments to be located (by card image number) in the latest input stream, according to the following rules:

- one search argument per card
- non-alphanumerics not b+/\*\$ (b = blank) are ignored both in search arguments and in the text stream

- blanks are word delimiters only, both in search arguments and in the text stream
- a final non-blank character of "+" in a search argument means that all strings consisting of the preceding characters are to be located
- all blank search arguments, duplicate search arguments, and arguments consisting of a single "+" are ignored; a "+" in a search argument is ignored if the preceding string consists solely of a single character
- search arguments may be in any order
- a non-trivial blank in the input stream is treated as an ordinary blank, but a non-trivial blank in a search argument is not changed; thus, no strings can be located that match a search argument containing a non-trivial blank
- only ordinary and "as-is" text are searched on the input stream; Command Words, control cards, and titles are not
- comparisons are made on an upper case basis; if text or search arguments contain lower case letters, they are converted to upper case for the comparison
- dataset reference number 3 is required (see Section IX)

FORMAT scans the input text for words and strings that match a search argument, and accumulates as much data as it can hold before writing any output. When its tables are full (or when all the input text has been scanned), the program writes the results on the System Output dataset in alphabetic order, for that section of the input text, with the locations of the matching strings in ascending order of input card image number. The scan of the input text then begins again, if necessary.

A search argument with a non-letter as one of the first two characters is positioned at the beginning of the entries for the letter of the first two characters. Thus, the located strings which match "A\*" and "\*A" would both be found at the start of the list of search arguments beginning with the letter "A". A search argument which cannot be found is so annotated.

If the number of \$LOCATE arguments is too large, FORMAT will print a message on the System Output dataset, giving the number of the \$LOCATE argument which caused the table overflow. It and the remaining arguments can then be located in a subsequent computer run.

Examples of Editor Control Card Groups

```

EDITOR
$DELETE 10 5          (delete a single text or title word)
      ZTHE COMPUTER  (inserted text)
$INSERT 15            (insert before control card)
      LINES/PAGE = 70 (inserted control card)
$DE 16 0 18 6         (delete control cards and text)
      GC              (inserted control card)
      )P ZTHE DATA  (inserted text)
$END CHANGES
$PUNCH
$LIST                  (force listing of new master)
GO

```

(This group will produce only a dictionary)

```

EDITOR
$DUPLICATE OLD MASTER
$NO DOCUMENT
$OVERRIDE AND PROVIDE A
      DICTIONARY      (override is just this one card)
GO

```

```

TAPE INPUT DATASET
$OVERRIDE CONTROL CARDS
      COLUMNS/PAGE = 2
      SPECIAL PRINT TRAIN
      LIST THE TAPE
$LOCATE THE FOLLOWING:
      TAPE+              (locates "tape", "tapestry", etc.)
      CONTROL CARD+
      OLD MASTER
      CARD IMAGE+
      COLUMN-LINE
      RIGHT JUSTIFICATION
      TEXT PROCESSING PROG+
GO

```

(This group combines 3 tapes and punches the result)

```

EDITOR
$PUNCH
$OMIT THE LISTING OF THE NEW MASTER
$JOIN TAPE DATASETS 4, 10, AND 9
GO

```

## VII. Rules for Using FORMAT

### A. General:

1. Each FORMAT job must begin with a control card group (the minimum control card group consists of the "GO" control card).

2. Title, footer, and text input must appear in the field specified on the "CARD FIELD" control card, or, if not used, in the default card field (card columns 1 through 80).

3. A FORMAT job is ended by the appearance of the "E" Command Operand. Multiple FORMAT jobs may be stacked one behind the other. If mixed card and tape resident jobs are to be run, the card jobs must precede the tape jobs (including an edit job); the card jobs must not use dataset reference number 2, however.

4. Command words may appear freely interspersed throughout text and titles. Although no text or title word may begin with a ")" character [nor the appropriate "!nn" configuration for ")"], the ")" may be used textually when followed by a blank.

### B. Titles and Footers:

1. The card images containing the title must immediately follow the "TITLE STARTS ON" control card and must be immediately followed by either the "FOOTER" or the "GO" control card.

2. The card images containing the footing title must immediately follow the "FOOTER" control card and must be immediately followed by either the "TITLE" or "GO" control card.

3. The "L", "P", "Z", and "E" Command Operands may be used in titles.

4. The text of a title or footer must be ended by the Command Operand "E".

5. The "L" Command Operand always acts as if single spacing were in effect, regardless of the operand field on the "SPACING OF TEXT LINES" control card (or its default). The "E" Command Operand, in addition to ending the title, also single spaces. Thus:

TITLE LINE 1 )LL TITLE LINE 2

results in exactly one blank line between title lines, while

LAST TITLE LINE )ILE

results in a minimum of two blank lines separating the last title line from the body of the document.

6. Each title line begins in the print position specified (or the default, position 1) and ends when a Command Word containing either the "L" or "E" Command Operand is encountered, or else when the title line attempts to exceed the last printer position allowed to the line.

7. No right-justification is accorded to titles, since no right-most title limit is defined.

8. All hyphens appearing in titles are printed. Excess blanks are ignored. Special spacing may be achieved with non-trivial blanks.

9. The Special Operands may be used in titles.

### C. Body of the Document:

1. Input blanks between words serve only as word delimiters (unless operating in the "as is" mode). Words are separated by a single blank, plus the number of blanks required to accomplish right-justification, if in effect (see the "JUSTIFICATION" control card for details).

2. Hyphens are not automatically introduced by FORMAT. A hyphen in the input stream is printed, and may be selected to be the last character on a column-line.



# VIII. Summary of FORMAT Control Cards and Command Operands

The control cards are grouped below by the options to which they refer. Thus, the "JUSTIFICATION" and "NO JUSTIFICATION" control cards are paired because each refers to the right-justification option. Within each group certain default values will be assumed if no control card from that group is used.

## Control Cards

## If Omitted

BACKSPACE CHARACTER IS SPECIAL CHARACTER nn .....no backspaces

BETWEEN COLUMNS LEAVE x BLANKS .....x=2

CAPITALIZE AUTOMATICALLY

NO CAPITALIZATION AUTOMATICALLY .....assumed

CONTROL CARDS END IN COLUMN x .....x=80

CARD FIELD IS x THRU y .....x=1, y=80

CARD FIELD EXTENDS THRU y

CENTER TEXT ON LINE x .....x=5

START TEXT ON LINE x IN PRINT POSITION y

TEXT STARTS ON LINE x IN PRINT POSITION y

COLUMNS PER PAGE = x .....x=1

COPIES = x .....x=1

DARK PRINT EACH PAGE x TIMES .....x=1

OUTPUT MEDIUM IS TAPE

PRINT OUTPUT TAPE

CREATE A TAPE FROM CARD INPUT

LIST THE INPUT DATASET

PUNCH THE INPUT DATASET

CYCLE THE PAGE NUMBER

LEFT TOP POSITION FOR PAGE NUMBER

PAGE NUMBER STARTING AT x .....x=1

RIGHT TOP POSITION FOR PAGE NUMBER .....assumed

DICTIONARY OF WORDS USED

DROP CHARACTER FOR 'D' COMMAND IS x .....x=75 (dots)

TAPE INPUT DATASET

EDITOR

\$INSERT

\$DELETE

\$END CHANGES

\$MERGE TAPES

\$JOIN TAPES

\$DUPLICATE OLD MASTER

\$NO DOCUMENT

\$OMIT LISTING OF NEW MASTER

\$OVERRIDE

\$PUNCH

\$LIST

\$LOCATE

FOOTER ON LINE x POS'N y AFTER z BLANK LINES

TITLE STARTS ON LINE x IN PRINT POSITION y

GO .....error

INDENT COLUMN (x1,y1).....(x7,y7) POSITIONS .....x's,y's = 0

JUSTIFICATION .....assumed

NO JUSTIFICATION

LINES PER PAGE ARE x .....x=59

NONTRIVIAL BLANK REE'D BY SPECIAL CHAR de .....dn=0

NULL CHARACTER SWITCH SET TO x .....x=1

PARAGRAPH INDENT IS x PRINT POSITIONS .....x=5

REPEAT TITLE ON EVERY PAGE

STOP PRINTING TITLE .....assumed

SENTENCES SEPARATED BY AT LEAST x SPACES .....x=1

SEPARATION LINES BETWEEN PARAGRAPHS ARE x .....x=1

SIDE BY SIDE COPIES

SPACING OF TEXT LINES IS x .....x=1

SPECIAL KEYPUNCH

SPECIAL KEYPUNCH IS A 2741

SPECIAL PRINTER TRAIN

TABS ARE SET AT x1.....x14 .....tabs set to 0

UNDERLINE SWITCH SET TO x .....x=0

WIDTH OF COLUMNS IS x PRINT POSITIONS .....x=64

026 KEYPUNCH

029 KEYPUNCH .....assumed

Command Operands [Format of Command Words is " )X...Y "]

A -- enter "as is" mode  
 C -- begin a new column  
 D -- tab to next tab stop, dropping dots  
 Dn-- tab to n-th tab stop, dropping dots  
 E -- end the title or the footer, or end the job  
 F -- capitalize first letters of words / stop  
 Hn-- indent (delayed) column using nth pair / restore  
 In-- indent (now) column using nth pair / restore  
 J -- always begin a new column-line  
 K -- keep the enclosed text in one text column  
 L -- begin a new column-line when not at top of column  
 M -- center text within the column-line / stop  
 P -- begin a new paragraph  
 S -- begin a new page  
 T -- tab to next tab stop  
 Tn-- tab to n-th tab stop  
 U -- underline / stop underlining  
 V -- read in the next group of control cards  
 Wn-- keep the next n lines in the same column  
 Z -- print in upper case only / stop

! Special Operand Values [Format is "!nn"]  
 (TN Print Train graphics shown)

n 111111111122222222223333333333444444444455  
 n 012345678901234567890123456789012345678901

( ) + - { } [ ] < > = < > + ( ) " ' % # @ \_ . : ; ? !

The EBCDIC card code for "Z" is: 12-8-2  
 The EBCDIC card code for "!" is: 11-8-2

## IX. Datasets Used by FORMAT

The correspondence between dataset reference numbers (DRN) and system dataset names (which are used in the name field of system control cards) is as follows:

<u>DRN</u>	<u>OS/360</u>
1	FT01F001
2	FT02F001
3	FT03F001
4	FT04F001
5	FT05F001
6	FT06F001
7	FT07F001
8	FT08F001
above	FTxxF001

Dataset reference numbers 5, 6, and 7 are assumed to apply respectively to the System Input dataset, the System Output dataset, and the System Punch dataset.

The user must verify that the dataset reference numbers he uses are in fact available; i.e., that they have been generated into the operating system in use at his installation.

All datasets created and used by FORMAT are formatted, sequential, and fixed length, and may be defined as blocked, if operating under Release 18 or later releases. This restriction in earlier releases is due to Data Management's inability to backspace a blocked dataset and not to the logic of this program. If blocked datasets are used with releases prior to 18 the results will be unpredictable.

Labeled tapes can be used by the program providing that they are acceptable to the operating system used. Labeling of tapes, if desired, is the responsibility of the user.

Before a file-protected tape can be read by OS/360, the message "xx IEC103D F" is typed on the console. The operator must respond with "reply xx,'U'", where xx is the on-line message number.

Under OS/360 the number of I/O buffers may be 1 or 2. The higher number is always preferable unless there is difficulty fitting the program into memory, in which case the number 1

should be specified where necessary; however, performance may be somewhat degraded.

All datasets created by FORMAT are ended by an "end-of-file" mark.

The following describes the datasets created and used by FORMAT:

Dataset Reference Number 1:

This dataset records control cards, user errors, and other information, and is always required. It may be direct access device or tape resident. Its record length is 97 bytes.

Dataset Reference Number 2:

This dataset is required only if one or both of the following apply:

1. "EDITOR", "TAPE INPUT", "CREATE A TAPE", "DICTIONARY", "LIST", and/or "PUNCH" has been specified
2. The Command Operand "K" has been used

This dataset is a card image set which may be resident either on tape or on a direct access device. If the Editor facility is being used, tape is preferable since the user may wish to keep this dataset, file-protect it, and use it again as an input dataset master.

Dataset Reference Number 3:

This dataset is required only if "DICTIONARY" or "\$LOCATE" has been specified. It contains 80 bytes per record and may be tape resident or (preferably) on a direct access device.

Dataset Reference Number 4:

This dataset is only required when producing a "new master" input dataset (or a duplicate of the "old master") in an edit run. It may also be (but not in the same run) an input dataset to be \$MERGED or \$JOINED in an edit run. Its specifications are identical to those for dataset reference number 2.

**Dataset Reference Number 5:**

This is the System Input dataset and is always required by the program. Its record length is always 80 bytes.

**Dataset Reference Number 6:**

This is the System Output dataset and is always required by the program. Its record length is 133 bytes, and ASA standard control characters are used.

**Dataset Reference Number 7:**

This is the System Punch dataset, and is only required if punched output has been requested. Its record length is always 80 bytes.

**Dataset Reference Number 8:**

This dataset is only required by FCFMAT if any of the following control cards is specified:

```
OUTPUT IS TAPE  
COPIES = 2 (or more)  
PRINT OUTPUT TAPE
```

This dataset is a printer image (133 bytes per record) set which can be tape or direct access device resident.

**Dataset Reference Numbers Above 8:**

These may be used as input datasets to be \$MERGED or \$JOINED in an edit run. The specifications for these datasets are identical to those for dataset reference number 2.

# X. Description of FORMAT for OS/360 and Suggested Control Cards

The distributed System/360 FORMAT object deck (produced by the Fortran H compiler) is set up to run as an OS/360 overlay job (the OVERLAY cards are included in the deck, but may be removed to run FCRMAT in-line). As an overlay job it requires 48,648 (hex BE08) bytes of memory, including the subroutines from the full Fortran library of OS/360 Release 18 with the Fortran Extended Error Handling facility (but not including I/O buffers). FORMAT requires a minimum 64K System/360 or System/370 computer. In non-overlay form FORMAT requires a minimum of 79,272 (hex 135A8) bytes; it will run somewhat faster because fewer I/O operations will be required.

A suggested FORMAT run setup is as follows (note that the asterisks along the right margin are supposed to appear in column 72 of the JCL statements). The block sizes for Dataset Reference Numbers 1, 3, and 8 were chosen to optimize storage space usage on a 2314 Direct Access Storage Facility.

```
//FORMAT JOB _____
//LKED EXEC PGM=IEWL,PARM='OVLY,XREF,LIST'
//SYSPRINT DD SYSOUT=A
//SYSLIB DD DSN=SYS1.FORTLIB,DISP=OLD
//SYSUT1 DD DISP=(,DELETE),UNIT=2314,SPACE=(CYL,(3,2))
//SYSLMOD DD DSN=GOSET(MAIN),DISP=(NEW,PASS),UNIT=2314,      *
//          SPACE=(TRK,(12,2,2)),VOLUME=SER=_____
//SYSLIN DD *
```

Distributed OS/360 FORMAT object deck
--

```
/*
//GO EXEC PGM=*.LKED.SYSLMOD
//FT06P001 DD SYSOUT=A
//FT07P001 DD UNIT=SYSCP
//FT01P001 DD UNIT=SYSDA,DISP=(,DELETE),SPACE=(CYL,(3,1)),      *
// DCB=(RECFM=FB,LRECL=97,BLKSIZE=7275,BUFNO=2)
//FT03P001 DD UNIT=2314,DISP=(,DELETE),SPACE=(CYL,(6,1)),      *
//          DCB=(BUFNO=2,RECFM=FB,LRECL=80,BLKSIZE=7280)
//FT02P001 DD UNIT=(_____,DEFER),LABEL=(,NL),                  *
//          VOLUME=(,RETAIN,,,SER=CLIMAS),                      *
//          DCB=(BUFNO=2,RECFM=FB,LRECL=80,BLKSIZE=8000)
```



```

//FT04F001 DD UNIT=(____,DEFER),LABEL=(,NI),          *
//              VOLUME=(,RETAIN,,,SER=NEWBAS),          *
//              DCE=(BUFNO=2,RECFM=FB,LRECL=80,BLKSIZE=8000)
//FT08F001 DD UNIT=(____,DEFER),LABEL=(,NI),          *
//              VOLUME=(,RETAIN,,,SER=OUTPUT),          *
//              DCE=(BUFNO=2,RECFM=FBA,LRECL=133,BLKSIZE=3458)
//FT05F001 DD DATA

```

FORMAT job(s)
---------------

```

/*

```

Of the datasets defined above, only FT01F001, FT05F001, and FT06F001 are always required. See Section IX for more information.

The FORMAT distribution tape consists of three files written at a recording density of 800 BPI on a 9-track tape, with no labels. All logical records are 80 bytes long, and each physical record is 1600 bytes long. The first file contains the object deck (including Linkage Editor control statements); the second file contains the FORMAT job which produces this manual; the third file contains the Fortran source statements from which the object deck was produced.

## XI. Hints and Suggestions

### A. Document Phase

1. The TITLE and FOOTER control cards, along with their following title and footer texts, must be the last control cards to appear in a control card group before the GC control card.

2. If the text for a title or footer is not ended with the ")E" Command Operand, FORMAT will search for it by including as much of the following material as possible into the "title". This naturally leads to a document of unusual proportions.

3. When ending an "as-is" region (initiated by the "A" Command Operand), the card containing the ") " in the initial columns should contain no other text.

4. If an erroneous control card is found, it is treated by FORMAT as a "GO" card. This means that any following control cards will be read in text mode; in particular, if a "TITLE" card follows the bad control card, the ")E" that ends the title (or footer, of course) will appear to be the ")E" that ends the text input.

5. When setting up tab stops and column indents, remember that a tab stop in (say) column 10 is equivalent to an indent of 9 spaces -- that is, the line position where the text will begin after indenting is 1 larger than the number of spaces indented.

### B. Edit Phase

1. A successful edit does not imply a successful document, since conflicting information may have been edited into the new master.

2. Control cards written onto the new master are under control of the

CONTROL CARD ENDS IN COLUMN nn

card currently in effect.

3. During an edit, the method used to search for Editor control cards can occasionally cause a non-control card to be mistaken for an Editor control card. (During an edit, each card in the Editor control card group must be checked to see if it is an Editor control card, or text to be inserted into the new master.) The valid Editor control card characters are shown in the leftmost column of the table below; the invalid combinations that will be mistaken for the valid combinations are shown in the right columns.

<u>Valid</u>	<u>Invalid</u>
\$ME	\$J5 \$KV \$IN
\$OV	\$N5 \$EN \$QE
\$DE	\$A5 \$CN \$EV
\$IN	\$G5 \$HV
\$EN	\$C5 \$FE \$DV
\$DU	\$C4 \$EM \$ED
\$PU	\$O4 \$QM \$EC
\$NO	\$L6 \$MW \$CE
\$LI	\$KR \$JZ
\$LO	\$KW \$J6
\$JO	\$KP
\$OM	\$M4 \$NU \$EC

#### Editor Control Card Equivalences

To avoid such errors, (1) arrange the text to be inserted so that the first nonblank character on the input card is not a "\$", or (2) be sure that the first three characters are not one of the invalid combinations.

4. The DICTIONARY feature requires that the source text be in upper case; text entered with the "SPECIAL KEYPUNCH" control card in effect may not be processable by this facility.

## XII. Error Handling and Diagnostic Messages

With the exception of errors made during an edit run, user errors do not abrogate the document. When a user error is found, the program notes the error, assumes appropriate values for the erroneous data, and continues. The Editor does not allow a document to be produced unless the edit was error-free; however, the edit itself continues to completion regardless of user errors.

The error diagnostics (if any) are written onto the System Output dataset at the conclusion of each job. Each diagnostic consists of a textual description of the error and the page number, column number, and line number being produced when it occurred. If the error was in the input text, the character number within the line where the error occurred is given; if the error occurred within a control card group, then the group number is given; and if the error can be localized to a particular control card or Editor insertion card, then the card number is given. Also listed for each error is a code number that refers to a paragraph below, which gives additional information about the error and describes action taken by the program when it occurs.

### 212. CONTROL CARD OPERAND IN ERROR

An operand on the control card specified is outside the legal range or is otherwise in error. If the error occurs on an Editor control card, the control card is ignored. Otherwise, the previous value of the parameters involved or, if none, the default values are used.

### 218. UNRECOGNIZED CONTROL CARD

The specified control card is unrecognizable. It is treated as if it were the "SPECIAL PRINTER" and the "GO" control cards. If the input stream is not on the System Input dataset, it is backspaced and the unrecognizable control card is reread as text.

### 219. NUMBER OF PRINT POSITIONS REQUIRED NOT AVAILABLE

The number of print positions required by this control card group exceeds the number available. The document is forced leftward, the width of the text columns may be redefined to be the largest value possible, and the number of print positions between columns may be set to 2.

**220. TITLE/FOOTER TOO LONG**

The title or footer is not ended after the last line allotted to the page is filled. The title or footer is ended and the program looks for a control card. If issued for a title, the "STOP TITLE" control card is simulated.

**237. TABS NOT IN ASCENDING ORDER**

The tabs set in the specified control card group are not in ascending order. Starting with the first tab set out of order, the tabs are set to the last position on the column-line.

**249. CONTROL CARD NOT FIRST, OR ON DATASET OTHER THAN 5**

The "EDITOR" or "TAPE INPUT DATASET" control card specified is either not the first card of the job, or else it has been read from a dataset which is not the System Input dataset (dataset reference number 5). It is ignored, and any following Editor control cards or insertions will not be properly interpreted.

**267. TAB IMPROPERLY SET**

In the specified control card group a tab is set at a position beyond the end of the column-line. The erroneously set tab and the tabs which follow it are set to the last position on the column-line.

**269. IMPROPER STARTING LINE FOR DOCUMENT TEXT**

The body of the document is positioned improperly by the specified control card group. The corrective action taken is to begin the text immediately following the title (but not above line 5), and the text is extended through the last line on the page.

**289. IMPROPER CONTROL CARD ORDER**

The referenced control card is neither the "TITLE", "FOOTER", nor "GO" control card. An attempt is made to allow the present control card order.

**300. INDENTS TOO LARGE**

The cumulative indents in effect have reduced the effective column-line width to zero or less. All column indents are turned off at the indicated character position.

**304. CHARACTER STRING LENGTH EXCEEDS COLUMN WIDTH**

A string of non-blank, unhyphenated characters at the indicated character position is longer than the column-line. It is printed without hyphenation over as many lines as are required to contain it.

**327. TAB COMMAND OPERAND IMPROPERLY USED**

The Command Operand "T" or "D" at the indicated character position is beyond the position of any tab set, or is not to the right of the current character position, or is in a centered region of text, or is in an indented portion of the column-line, or an unset tab has been used. The Command Operand is ignored.

**513. NUMBER OF UNDERLINE SEGMENTS ON PAGE EXCEEDS 99**

At the indicated character position more than 99 column-lines, or portions of column-lines, have been underlined on this document page. Those in excess of 99 are ignored.

**700. UNDEFINED COMMAND OPERAND**

A Command Word at the indicated character position (before the line is justified) contains an undefined Command Operand. It, and the rest of the Command Word, are treated as text. The ")" is also printed if the undefined Command Operand is the first in the Command Word. If the error was detected during an edit, the number given for the erroneous control card will be that of the last one read before the error was detected. If the invalid Command Operand is a ")", then FORMAT will treat it as the start of a new Command Word if it is not followed by a blank.

**800. UNEXPECTED END OF INPUT**

An unexpected end of the input stream has occurred, caused by an omitted "GO" or "\$END CHANGES" control card, or by an omitted "E" Command Operand. Some output may be lost.

**802. NEW MASTER ALREADY FINISHED**

An attempt has been made by the specified control card to continue the new master after the end of the old master has been reached. For example, a "\$DFIETE" control card may have occurred after a "\$DUPLICATE" control card. The edit continues.

**804. EDIT FAILED BECAUSE OF ABOVE ERROR(S) OR BECAUSE NEW MASTER NOT FINISHED**

Errors already noted have occurred during the edit ended by the referenced card, or else the new master has not been ended because the end of the old master has not been reached or referenced. The job is terminated.

**805. REFERENCED WORD NOT LOCATED**

The word referenced on the specified "\$INSERT" control card, or the first word referenced on the specified "\$DELETE" control card cannot be located. The edit continues.

806. INPUT/OPERAND MODE ERROR  
The mode of the operand on the specified "\$INSERT" or "\$DELETE" control card differs from the present mode of the new input dataset (new master). That is, a word number is specified and the new master is in an "as is" or control card region (card mode), or no word number is specified and the new master is in a text region (word mode). The edit continues.
807. END OF \$DELETE FIELD NOT FOUND  
The end of the field to be deleted, referenced on the specified "\$DELETE" control card, cannot be located. The edit continues.
814. NON-TEXT MODE NOT ENDED  
An "as is" or control card region edited into the middle of a text card image has not been ended before the specified control card. The edit continues in "text" (word) mode.
847. \$INSERT/DELETE/DUPLICATE AND \$MERGE/JOIN NOT ALLOWED IN SAME RUN  
Editor control cards "\$INSERT", "\$DELETE", and "\$DUPLICATE" may not appear in the same run with "\$MERGE" and "\$JOIN" control cards. That is, merges must be accomplished in a separate run from changes and duplication. The indicated control card is in violation of this rule. The edit continues.
857. NOT ALLOWED  
The "TITLE" or "FOOTER" control card indicated is not permitted as an overriding control card. The edit continues.
922. NO TEXT AFTER TAB(S)  
The last tab on the indicated line is not followed by text.
997. TOO MANY BACKSPACES ON ONE PAGE  
Too many backspaces have been specified on the current page. The first 99 have been handled, but any after the 100th will be treated as normal text characters.

### XIII. Appendix

The following pages were produced at the conclusion of the computer run producing this manual. The "COLUMNS PER PAGE = 9" control card, the first control card in the first control card group, is intentionally faulty, and produces the first diagnostic. The fifth example of Command Words (at the end of Section IV) produces the second.



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