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ROFF - A MANUSCRIPT PRINTING PROGRAM: USER'S MANUAL

Clifford E. Rhoades, Jr.

Air Force Weapons Laboratory
Kirtland Air Force Base, New Mexico

November 1972

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13 ABSTRACT

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This report is intended primarily as a user's manual for the ROFF manuscript printing system. ROFF is a computer program which produces esthetically pleasing manuscripts from punched card source texts. Both microfilm output and the generation of magnetic tape for off line printing on a Magnetic Tape/Selectric Typewriter (MT/ST) are supported. One of the important advantages of the ROFF system is the great ease with which revisions, additions and corrections can be made to draft memorandums and technical papers. This report is itself an example of a ROFF generated manuscript.

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TECHNICAL REPORT NO. AFWL-TR-72-139

FOREWORD

This research was performed under Program Element 61101F, Project 8809CF, Task 006003.

Inclusive dates of research were December 1971 through March 1972. This report was submitted 1 August 1972 by Air Force Weapons Laboratory Project Officer Lt Clifford E. Rhoades, Jr., AFWL(DYS).

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This technical report has been reviewed and is approved.

Clifford E. Rhoades, Jr

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ABSTRACT

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This report is intended primarily as a user's manual for the ROFF manuscript printing system. ROFF is a computer program which produces esthetically pleasing manuscripts from punched card source texts. Both microfilm output and the generation of magnetic tape for off line printing on a Magnetic Tape/ Selectric Typewriter (MT/ST) are supported. One of the important advantages of the ROFF system is the great ease with which revisions, additions and corrections can be made to draft memorandums and technical papers. This report is itself an example of a ROFF generated manuscript.

CONTENTS

SECTION I

MANUSCRIPT PRINTING

Introduction

ROFF is a Fortran program for producing high quality printed documents with the computer. ROFF operates on an input deck of alphabetic text, produced on an ordinary 029 keypunch, and produces a printed copy in manuscript form. Since the 029 keypunches do not have any direct provision for entering lower case letters, all input to ROFF is upper case; ROFF changes upper case letters into lower case when appropriate. For example, all the letters in any sentence are converted to lower case, with the exception of the first one. The conversion may be overridden by means of special "escape" characters which control the mapping, but do not appear in the output. These are discussed below.

The output is formatted as the user wishes. He is able to start pages or paragraphs at will, produce blank lines, cause margins to be placed on the right side of the page, change the line length and indenting, and other functions of this sort. Footnotes may be indicated, entered, and automatically numbered; they are printed at the bottom of the current page.

These operations are all handled by "control words" which the user inserts in his output deck at the appropriate points.

Description

ROFF is a program which generates microfilm and 7-track binary magnetic tape for off line processing on an IBM Magnetic Tape / Selectric Typewriter (MT/ST) of arbitrary text in manuscript format. By the use of control words placed in the input text data set, the user may control the format of the document produced. Text data sets are card decks punched in EBCDIC as described below. Provisions are included for automatic lowercase letters, right margins on pages, page numbering (if desired) and numerous other formatting features.

Character mapping

Input to ROFF is a card deck, generally of upper case letters and punctuation. The contents of the input deck are converted to lower case as follows:

1. The first letter on each sentence is left in upper case. All other letters are set to lower case. A sentence is defined to be a set of characters ending in an end-of-sentence mark (., !, ?, :, followed by an optional),], ", ', footnote indicator (0-8-2), or reference indicator (9-1)) and the end of a card or two blanks.

2. Upper case can be forced for the next alphabetic character encountered (A-Z only) by inserting a cent sign (¢) anywhere before the letter. Thus to capitalize a proper name in the middle of a sentence:

```
INPUT: IT IS A NICE DAY IN ¢PRINCETON
OUTPUT: It is a nice day in Princeton
```

The cent sign evaporates leaving no space in the output. The cent sign carries over all non-alphabetic characters.

3. Lower case may be forced at the beginning of a sentence by using a dollar sign ($).

4. An entire string of characters can be capitalized by preceding it with a circumflex (ˆ). The effect of the circumflex is terminated by the next blank character in the input or by another circumflex.

5. Any string of characters can be underlined by preceding it with an underscore (_). The effect of the underscore is terminated by the next blank character in the input or by another underscore.

6. Arbitrary strikeovers may be created by using the at-sign (@); the at is roughly equivalent to the backspace key on a regular typewriter. For example to make a not equal sign, use =@/ to produce ≠. If a sequence is to be overstruck, place all the at-signs together. No mapping of the overstriking characters occurs; control characters except for @ and ¬ are printed in this instance.

7. Any percent sign (%) in the input is treated as a non-blank character, but vanishes on output. This is often useful as a place holder: if the space between two words is filled with percent signs, the program will not insert or delete any extra blanks between the words in the output. The percent signs can be used to reserve space for later insertion of special symbols.

8. Mistyped characters on the input cards may be 'erased' by using the ¬ (numeric G) after the offending character. n ¬'s cause the last N characters to be replaced by the next N characters of input (control characters count towards N). Regular mapping occurs unless otherwise controlled.

9. An 0-8-2 punch (numeric T) indicates the position of a footnote reference number in the text; it will appear in the printout as [n], where n, the number of footnotes on the current page, is determined at execution time. The procedure for entering the footnote textual material is described in the section dealing with control words.

10. A 1-9 multipunch indicates the position of a deferred reference number in the text; it will appear in the printout as (n), where n is the number of references since the last set of references were printed. n is determined at execution time. The procedure for entering deferred reference text is described in the section dealing with control words. The deferred reference number is independent of the footnote reference number. (See 9. above)

11. A 2-9 multipunch followed by a digit n produces a footnote number which is n less than the most recent footnote number. e.g. If three footnotes have been indicated on the present page, a (2-9)1 will produce [2] in the output.

12. A 3-9 multipunch followed by a digit n produces a deferred reference number which is n less than the most recent deferred reference number. e.g. if twenty-five deferred references have been indicated, a (3-9)6 will produce (19) in the output, i.e. a citation to reference number 19, six less than the last reference number.

Special characters

The following printer characters are not available on the 029 keypunch but may be created by multipunching (hold down the MULT PCH key while striking several eetters). The MULT PCH key also gives numeric shift.

SYMBOL	MULTIPUNCHES
{	&0
}	-0
[	$&0
]	(-0
~	-01
|	&-084
^	+-0
`	81

Control words

The format of the output may be controlled by control cards. To distinguish control cards from the rest of the text, they have a unique format -- period in column 1, two letter abbreviation for the control word in columns 2 and 3, and sometimes an operand in columns 4-80. No other text may appear on the control card. Control words affect the printed format but are never printed themselves.

In this discussion, the word "break" associated with a control word will indicate that two input cards separated by the control card will not be run together, as they normally would in FILL mode. Thus at a break, all input text read so far will be printed out, and all following input text will appear on a new line of output.

"Default" means the value of the parameter that ROFF assumes if not otherwise specified.

.PL n page length
set output page length to n lines. Default and initial values are set to 48.

.LL n line length
break, set output line length to n characters. Default and initial values are set to 60.

.SS single space
break, enter single space mode. ROFF starts in single space mode.

.DS double space
break, print succeeding output double spaced.

.NS no spacing
break, do not space the carriage when printing output lines.

.CO copy
enter mode in which all text (excepting control words) is printed in upper case (no mapping to lower case) and escape characters have no effect.

.MA map
enter character mapping mode, the inverse of copy. ROFF starts in map mode.

.FI fill
break, move words from the following cards as necessary to place as many words as possible on each line of output. ROFF starts in fill mode.

.NF no fill
break, turn off fill mode. only mapping takes place (if desired); no words are moved.

.AD adjust
break, turn on mode in which all text is right justified by inserting blanks and moving input words when necessary. ROFF starts in adjust mode. When adjust is turned on, so is fill.

.NJ no justification
break, turn off right justification of margins. Nojust also turns off fill.

.IN n indent
break, print the following text with the left margin indented n spaces from the normal position. Default is n=0, which restores the non-indenting.

.UN n undent
start the next line (only) n spaces to the left of the current margin. Undent does not change the current value of the indentation

nor will it move the print to the left of the natural margin.

.PP n paragraph
break, start a new paragraph with initial indentation n spaces relative to current indent value. If n is defaulted, use previous value for paragraph indenting. Initially n is 5. Capitalization is set on.

.BR break
break, set capital switch; the next input line is started on a new line.

.SP n space
break, insert n blank lines. Default: n=1. if the request cannot be satisfied on the current page, a skip to a new page executed first.

.NE n need
if n lines are left on the current page, no action is taken. Otherwise, break, and skip to a new page. Default: n=0.

.PM n paging mode
if n=1, print page numbers at the top of each page in arabic numerals. If n=2, print page numbers in lower case roman numerals. If n=0, don't print page numbers, but continue computing them. A change from roman to arabic and vice versa resets page number to 1. ROFF starts with n=1.

.BP begin page
break, start next line on new page. Capitalize first letter on new page.

.PA n page
break,start next line on a new page numbered n. Default: n=1. capitalize first letter on new page.

.SK n skip
at the first opportunity, skip n blank pages. Default: n=1. If further skips are encountered before previous ones are executed, the values of n are added, and all

executed at the first opportunity.

.CE center

break, center the input from the next card in the output line. The center switch turns itself off after the execution of one input card.

.RA right adjust

break, slide the text from the next input card over against the right margin. The right adjust switch turns itself off after the execution of one input card.

.TRac translate

henceforth, when the character a is encountered as the output is about to be printed, convert it to the character c. The characters are arbitrary and may be placed anywhere in the operand field. a may not be a blank. ROFF starts with '.TR % '.

.RT revert

return the transformation table set up by the .TR command to an identity transform with % going to blank.

.CH /string1/string2/ change command

change every occurrence of character string 'string1' to the character string 'string2'. String1 and string2 need not be the same length. Blanks within a string are significant[1]. If '/' appears within the character strings its role as a delimiter must be taken by any character not appearing in the strings. ROFF services twenty or less change commands simultaneously with the restriction that a string cannot exceed ten characters. If no operands are used, only previously entered changes are performed. The change command is rather time consuming when turned on.

[1] The character operands in the .CH and .TR commands are not mapped. To enter lower case letters an additional punch must be made on each letter: 0 for A-I, & for J-R, and - for S-Z.

.NC no change
turns off the change command. All changes entered are remembered and reinstituted by the next .CH command.

.FN begin footnote text
process the input cards to follow as the text for the m th footnote, where m is the number of footnote texts entered along with the current output page. The footnotes are stored on disk and printed at the lower portion of the page when the main body of text has printed. The first letter of the footnote text is capitalized unless otherwise controlled. The footnote is printed with no indentation in adjust mode and map mode unless controlled by control words entered within the footnote text itself. Output text is single spaced unless changed by the .FS command (see below).

.FE end footnote text
on the next card return to producing main text and return the program controls to their state before the .FN command[1].

.FS footnote spacing
set the footnote carriage control to provide the spacing currently in use, either single or double spacing. ROFF starts in single space mode.

.CT continuous footnote numbering
number the footnotes continuously from 1 throughout the text rather than resetting the number to 1 each page.

.RF begin deferred reference text
process the input cards to follow as text for

[1] The footnote indicator 0-8-2 and the footnote texts are numbered separately so many footnotes may be indicated before any footnote texts are entered. To enter several footnotes at one time, preface each by a .FN card and use only one .FE card after the last footnote text. If the footnotes will not fit on the current page, they carry over to the bottom of the next page.

the m th deferred reference, where m is the number of deferred references entered since the last .RP card (see below). The references are stored on disk and printed upon command (.RP). The first letter of the reference is capitalized unless otherwise controlled. The reference is printed with no indentation in adjust mode or map mode unless controlled by control words entered within the reference text itself. Output text is single spaced unless changed by the .RS command (see below).

.RE end deferred reference text
on the next card return to producing main text and return the program controls to their state before the .RF command.[1]

.RP print deferred references
space to new page, write heading <u>REFERENCES</u> and print all reference texts entered since the last call to .RP. Reset deferred reference number counter to 1.

.RS reference spacing
set the reference carriage control to provide the spacing currently in use, either single or double spacing. ROFF starts in single space mode.

.EF end of file
break, skip to the next page, terminate job. This should be the last card in the input deck.

.HE heading
causes the characters "xxx . . ." punched in columns 5-58 to appear (without mapping) at the top of each page (on the line with the page number, left justified) until cancelled

[1] The deferred reference indicator multipunch 1-9 and the reference texts are numbered separately and independently of footnote numbers, so that many references may be indicated before any reference texts are entered. To enter several references at one time, preface each by a .RF card and use only one .RE card after the last reference text.

by another .HE command (for which the character string may be blank).

.SF n set footnote counter
set the footnote counter to n. (The first footnote will then be numbered n + 1.)

.FR change footnotes to references
treat the footnotes as references. This allows the footnotes to be transferred from the bottom of the page to the end of the manuscript without repunching.

Suggestions and Warnings

1. As a general rule, place each sentence on a separate card if running in fill mode. This makes editing the deck significantly easier.

2. A word cannot be run off the end of a card and onto the next input card. Also the @ and ¬ features do not operate across a card boundary.

3. Only one overstrike is made for a given character.

4. The percent sign is very useful for controlling spaces when in fill or adjust mode. Its use can prevent the insertion of blanks and stop the elimination of blanks in the output line.

5. Only enter .RF and .FN text from the normal mode. Although footnotes may contain references and vice versa, the texts must be entered as .RF ... .RE ... .FN ... .FE, i.e. no overlapping of footnote and reference texts.

General use of ROFF

To use ROFF, create the input deck as described in this manual, using control words and escape characters as needed. Remember to reset any parameters you desire that differ from the default values. The first page of output is not numbered and the second page is numbered as 1.

The load module for this program is stored on disk and available for general use. To run from this, submit the following deck:

```
JOBNAME,CM60000, ETC.
TASK CARD
COMMON,DYSROFF.
SWITCH,1.   ONLY FOR MT/ST OUTPUT
REQUEST TAPE9,HI,,L.  ETC. NEEDED FOR MT/ST ONLY
SWITCH,2.   ONLY FOR MICROFILM OUTPUT
DYSROFF.
7/8/9
12/11/0/1/2/3/4/5/6/7/8/9 IN COLUMNS 1 AND 2

    input deck

12/11/0/1/2/3/4/5/6/7/8/9 IN COLUMNS 1 AND 2
6/7/8/9
```

ROFF produces one single spaced page for every 50 cards of input. In two minutes 8000 cards of input can be processed to give 125 single spaced pages of output, of both microfilm and magnetic tape.

References

The major effort in divising the scheme for this program is due to Mr. J. Saltzer at MIT, who is responsible for specifying most of the basic commands used in ROFF. This particular version of ROFF is a modified form of an IBM OS/360 program written by Dr. Peter Crean as revised to incorporate equation writing by Dr. Stephen Fulling at Princeton.

SECTION II

EQUATION GENERATION

Introduction

EQROFF is a ROFF Fortran subprogram which formats equations and other material requiring alignment of several consecutive lines of print. From instructions punched sequentially on input cards it positions superscripts and subscripts, constructs fractions, and overlines expressions.

Mathematical equations

From instructions punched sequentially on the input cards EQROFF positions superscripts and subscripts in the output lines above and below the main line of the mathematical expression, constructs fractions, and draws lines over expressions.

1. Input cards for each line of an equation (or sequence of equations) must be preceded by the control card ".EQ" (equation). The last line must be followed by a control card (for example, ".PP" if a new paragraph is to begin). If no control statement is needed, use the dummy statement ".EE" (end of equation); the capital switch is then turned off. If the next line should begin with a capital letter, use .BR instead of .EE.

2. The following commands may make the testing of punched input less time-consuming in some circumstances:

.EO (equations only)	Process only equations, no text.
.NQ (no equations)	Process only text, no equations.
.AL (all input)	Cancel .EO or .NQ command.

3. Use of EQROFF inside a footnote is risky, as the subscripts or superscripts may appear on a different page from the rest of the equation.

4. The processing of equations is rather slow.

Control characters within an equation

1) EQROFF accepts and processes unchanged the following ROFF control characters:

a) ¢ This causes the next letter to be capitalized.

b) $ This causes the next letter to be lower case.

c) ^ This causes the next string of letters to be capitalized.

d) _ This causes the next string of characters to be underlined.

e) @ This causes the character following @ to overstrike the character preceding @. Any character (except - and @) may follow an @. This is useful for generating approximations to Greek letters, etc.[1] In particular, a ROFF or EQROFF control character may be used as the character following @; i.e., a@_ to underline a single character a . In addition, if a single EQROFF control character is needed as part of an equation, & for example, it should be punched as %@&.

f) % This forces a blank [see 3) below].

2) ¬ (numeric G) causes the erasure of the previous character punched, thus permitting the correction of a mispunched character. Like ROFF, in EQROFF the ¬ can erase control characters as well.

3) Blanks are always ignored. Thus the input card to EQROFF may have the various terms of an equation widely separated for ease of reading and editing. If a true blank is desired in the final output, a % sign should be used.

[1] To enter lower case letters following @ an additional punch must be made on each letter: 0 for A-I, & for J-R, and - for S-Z.

4) Normally an equation will consist of a centered or left justified expression followed by an optional right justified expression. This positioning is controlled as follows:

a) expression If an expression is not enclosed in control characters, it is written on the main equation line, starting two spaces in from the left margin.

b) (12-11)expression(12-11) This causes the expression within the (12-11)'s to be centered on the output line. This feature is useful for short expressions which look better when centered. Note that (12-11) is a multipunch (&-) on the keypunch.

c) `expression` This causes the expression within the `'s (grave accents) to be right justified at the end of the manuscript line. This feature is useful for writing equation numbers.[1] Note that the ` is a multipunch (8-1) on the keypunch.

5) Superscripts, subscripts, and the numerators and denominators of fractions will appear on the lines above and below the main line. They are punched on the input cards at their natural locations in an expression as follows:

a) ?expression? This causes the expression enclosed within the ?'s to be written as a superscript (i.e., in the line above the main equation line.) Overlining is permitted within a superscript, but subscripts, superscripts, and fractions are not.

b) "expression" This causes the expression enclosed within the "'s to be written as a subscript (i.e., in the line below the main equation line). Overlining is permitted within a subscript, but subscripts, superscripts, and fractions are not.

[1] The deferred reference option in ROFF can be used to insert sequential equation numbers of the form (n) by punching `(9-1)%%%` at the end of the EQROFF input card.

c) (0-8-2)superscript(0-8-2)subscript(0-8-2) This causes simultaneous super- and subscripting of expressions. The two expressions are left justified within the super/subscript expression. This feature is useful for limits of summations and integrals. Overlining is permitted within either term, but subscripts, superscripts, and fractions are not. Exception: The subscript control (") can be used within the superscript half of an (0-8-2) expression in order to write on the main and subscript lines simultaneously; similarly, ?'s may appear in the subscript term. Note that the multipunch (0-8-2) is the numeric T on the keypunch.

d) &numerator&denominator& This causes the first expression to be written as the numerator of a fraction, the second as the denominator. A bar is also written and the shorter term is centered within the fraction. Overlining is permitted within either term of a fraction, but subscripts, superscripts, and fractions are not.

6) #expression# This causes the expression enclosed within the #'s to be overlined. (Overlining is done by underlining the appropriate characters in the line above.) This feature is useful for writing square roots, e.g., √#term#, and also for indicating complex conjugates, etc. Subscripts are permitted within the #'s, but superscripts and fractions are not.

Note that (12-11)'s and `'s should not appear within the expressions described in 5) and 6).

Suggestions and warnings

1) Remember to leave space (by using %'s) for characters which must be added by hand, including superscripts inside fractions, etc.

2) If the last character of an expression to be underlined is also to be overstruck, type the overstrike (@x) before the (_) which turns off the underlining.

3) If, in the output, the equation is scrambled or part of it is missing, check the entire input card

carefully to make sure that all the required control characters are present (e.g., three ampersands to every fraction). The relation of the error to the result may not be obvious. The program signals certain control character errors by placing a # in the line above the superscripts.

An example

1)ROFF input cards:

```
.EQ
   ∫a∞%aαa %    &   √#X%+%Y#  %-%|Y|  &    √#X%+%Y#   &  %E?-αX?
  %DX %=%          Ψ"P"(X?2?   %-%Y?2?)  `(IF%X%>@_%Y)%%c%%   `
.EQ
 ba        "%LI ¬M"aX---@>0  a%F(Y-X)  %=%   ¢D"1" (X)  b`c%%`
.EE
```

Here the lower case letters stand for the following multipunches:

a for (0-8-2) b for (12-11) c for (9-1).

2)ROFF treatment of these cards:

last line of text above

```
 ∞   √x + y - |y|  -αx            2    2
∫   ------------ e    dx = Ψ (x   - y )     (if x ≥ y)  (1)
 α     √x + y                p-


                  lim  f(x) = D (x)                     (2)
                 x-->0         1
```

first line of text below

SECTION III

ROFF CHARACTER SET

GRAPHIC	CARD CODE	GRAPHIC	CARD CODE	GRAPHIC	CARD CODE
∇	12-9-8-7	∞	12-9-2	Ψ	12-9-3
Φ	12-9-4	TAB	12-9-5	¶	12-9-6
Λ	12-9-7	↑	12-9-8-1	Π	12-9-8-2
π	12-9-8-3	†	12-9-8-4	CR	12-9-8-5
ι	12-9-8-6	∿	11-9-1	§	11-9-2
Ω	11-9-3	∂	11-9-4	BS	11-9-6
ℓ	11-9-7	Γ	11-9-8	Θ	11-9-8-1
ȷ	11-9-8-2	∠	11-9-8-3	∫	11-9-8-4
↓	11-9-8-5	Σ	0-9-2	→	0-9-3
Ξ	0-9-4	∝	0-9-5	Δ	0-9-6
≡	0-9-7	T	0-9-8	≃	0-9-8-1
α	12-0-9-1	β	12-0-9-2	ψ	12-0-9-3
ϕ	12-0-9-4	ε	12-0-9-5	ι	12-0-9-6
λ	12-0-9-7	η	12-0-9-8	ı	12-8-1
¢	12-8-2	.	12-8-3	<	12-8-4
(	12-8-5	+	12-8-6	|	12-8-7
&	12	ȷ	12-11-9-1	κ	12-11-9-2
ω	12-11-9-3	μ	12-11-9-4	ν	12-11-9-5
ο	12-11-9-6	ρ	12-11-9-7	γ	12-11-9-8
θ	11-8-1	!	11-8-2	$	11-8-3

*	11-8-4	)	11-8-5	;	11-8-6
¬	11-8-7	-	11	/	0-1
σ	11-0-9-2	τ	11-0-9-3	ξ	11-0-9-4
×	11-0-9-5	δ	11-0-9-6	χ	11-0-9-7
υ	11-0-9-8	ζ	0-8-1	,	0-8-3
%	0-8-4		0-8-5	>	0-8-6
?	0-8-7	∫	12-11-0	√	12-11-0-9-1
_	12-11-0-9-2	‗	12-11-0-9-3	⎞	12-11-0-9-4
±	12-11-0-9-5	ˁ	12-11-0-9-6	⎛	12-11-0-9-7
⎛	12-11-0-9-8	`	8-1	:	8-2
#	8-3	@	8-4	'	8-5
=	8-6	"	8-7	÷	12-0-8-1
a	12-0-1	b	12-0-2	c	12-0-3
d	12-0-4	e	12-0-5	f	12-0-6
g	12-0-7	h	12-0-8	i	12-0-9
•	12-11-8-1	j	12-11-1	k	12-11-2
l	12-11-3	m	12-11-4	n	12-11-5
o	12-11-6	p	12-11-7	q	12-11-8
r	12-11-9	~	11-0-1	s	11-0-2
t	11-0-3	u	11-0-4	v	11-0-5
w	11-0-6	x	11-0-7	y	11-0-8
z	11-0-9	0	12-11-0-8-1	1	12-11-0-1
2	12-11-0-2	3	12-11-0-3	4	12-11-0-4
5	12-11-0-5	6	12-11-0-6	7	12-11-0-7

^{8}	12-11-0-8	^{9}	12-11-0-9	´	12-11-0-8-2
[	12-11-0-8-3	\	12-11-0-8-4	]	12-11-0-8-5
^	12-11-0-8-6	←	12-11-0-8-7	{	12-0
A	12-1	B	12-2	C	12-3
D	12-4	E	12-5	F	12-6
G	12-7	H	12-8	I	12-9
}	11-0	J	11-1	K	11-2
L	11-3	M	11-4	N	11-5
O	11-6	P	11-7	Q	11-8
R	11-9	¨	11-0-9-1	S	0-2
T	0-3	U	0-4	V	0-5
W	0-6	X	0-7	Y	0-8
Z	0-9	0	0	1	1
2	2	3	3	4	4
5	5	6	6	7	7
8	8	9	9		

SECTION IV

CONVERSION OF TAPE TO MT/ST CARTRIDGES

Initial

1. Obtain permission of operator of LITTON converter.

2. Turn the power switch to the "on" position. Switch is under cover.

Loading

1. Load file protected tape by hand making sure it is secure.

2. Reel tape to other holder making sure the tape follows the arrows.

3. Load cartridge by hand and make sure it is on firmly.

4. Press load button.

5. Select data file.

6. Press data file button.

7. Press transfer button.

8. If copying more than one file replace cartridge after it is rewound and then select next file.

9. Repeat steps 6, 7 and 8.

Unloading

1. To remove tape, hit rewind button.

2. Remove tape by hand

3. Remove cartridge.

4. Turn the power switch to the off position.

SECTION V

OFF LINE PRINTING ON A MT/ST MACHINE

Initial

1. Obtain permission of MT/ST secretary.

2. Remove light gray cover from machine if on.

3. Turn power switch on. Set spacing mode to single space.

4. Set paper guide at 0, right margin at 10, and left margin at 130.

Loading Cartridges

1. Set right control knob to L (or R) play and the left knob to auto.

2. Press unload to open plastic door.

3. Insert cartridge on L (or R) hub firmly.

4. Press load firmly.

5. Set reference number to 01.

6. Press search.

7. Press skip.

8. After loading paper, press start to run off the page.

Next Page

1. End of page is signaled by 5 carriage returns followed by a stop.

2. Change paper.

3. Advance reference number by one.

4. Press search.

5. Press start.

Unloading Cartridge

1. End of cartridge signaled immediately after a page change by a feed code followed by a stop. (Pressing start again will yield zzzzz followed by an error light).

2. To unload cartridge, press rewind.

3. Hold down unload and open the plastic door.

4. Gontly remove cartridge from hub.

ERRORS

1. Error is signaled by lighting the error indicator light.

2. To recover, place right control knob in record L (or R).

3. Type the correct character.

4. Return right switch to play L (or R).

5. Press start to continue running off the page.

Greek Letters

1. Greek letters are signaled by a stop.

2. To continue, remove current selectric (roman) ball.

3. Replace with greek symbol ball.

4. Press start.

5. After stop, replace previous roman selectric ball.

Finish

1. Turn power off after removing cartridge.

2. Recover machine (if previously covered).

3. Record time and number of pages used (including spoiled) on log.

APPENDIX

LISTING OF ROFF CODE

```
      OVERLAY(SYSROFF,0,0)                                          ROFF       2
      SUBROUTINE PRE (JOUT,ISART,INLENG,IEJ)                        ROFF       3
      COMMON /CARDS/ NC,MES(5)                                      ROFF       4
      LOGICAL SECOND                                                ROFF       5
      INTEGER GET                                                   ROFF       6
      DIMENSION JOJT(80),IDATA(17)                                  ROFF       7
      DIMENSION ITRANS(4.96)                                        ROFF       8
      DATA NC/0/                                                    ROFF       9
      DATA MES/3.H NUMBER OF CARDS READ BY ROFF /                   ROFF      10
      DATA MES(5)/0/                                                ROFF      11
      DATA SECONU/.FALSE./                                          ROFF      12
      DATA ITRANS/4.96*0/                                           ROFF      13
      DATA ITRANS(2520)/0/                                          ROFF      14
      DATA ITRANS(2306)/1/                                          ROFF      15
      DATA ITRANS(2178)/2/                                          ROFF      16
      DATA ITRANS(2114)/3/                                          ROFF      17
      DATA ITRANS(2:82)/4/                                          ROFF      18
      DATA ITRANS(2:66)/5/                                          ROFF      19
      DATA ITRANS(2.58)/6/                                          ROFF      20
      DATA ITRANS(2.54)/7/                                          ROFF      21
      DATA ITRANS(2.52)/8/                                          ROFF      22
      DATA ITRANS(2308)/9/                                          ROFF      23
      DATA ITRANS(2180)/10/                                         ROFF      24
      DATA ITRANS(2116)/11/                                         ROFF      25
      DATA ITRANS(2.84)/12/                                         ROFF      26
      DATA ITRANS(2:68)/13/                                         ROFF      27
      DATA ITRANS(2:60)/14/                                         ROFF      28
      DATA ITRANS(2:56)/15/                                         ROFF      29
      DATA ITRANS(3332)/16/                                         ROFF      30
      DATA ITRANS(1282)/17/                                         ROFF      31
      DATA ITRANS(1154)/18/                                         ROFF      32
      DATA ITRANS(1:90)/19/                                         ROFF      33
      DATA ITRANS(1:58)/20/                                         ROFF      34
      DATA ITRANS(1.42)/21/                                         ROFF      35
      DATA ITRANS(1:34)/22/                                         ROFF      36
      DATA ITRANS(1:30)/23/                                         ROFF      37
      DATA ITRANS(1:28)/24/                                         ROFF      38
      DATA ITRANS(1284)/25/                                         ROFF      39
      DATA ITRANS(1156)/26/                                         ROFF      40
      DATA ITRANS(1.92)/2                                           ROFF      41
      DATA ITRANS(1:60)/28/                                         ROFF      42
      DATA ITRANS(1.44)/29/                                         ROFF      43
      DATA ITRANS(1:36)/30/                                         ROFF      44
      DATA ITRANS(1:32)/31/                                         ROFF      45
      DATA ITRANS(1796)/32/                                         ROFF      46
      DATA ITRANS(770)/33/                                          ROFF      47
      DATA ITRANS(5.2)/34/                                          ROFF      48
      DATA ITRANS(5,8)/35/                                          ROFF      49
      DATA ITRANS(5.6)/36/                                          ROFF      50
      DATA ITRANS(530)/37/                                          ROFF      51
      DATA ITRANS(522)/38/                                          ROFF      52
      DATA ITRANS(518)/39/                                          ROFF      53
      DATA ITRANS(516)/40/                                          ROFF      54
      DATA ITRANS(772)/41/                                          ROFF      55
      DATA ITRANS(644)/42/                                          ROFF      56
      SUBROUTINE  PRE
      DATA ITRANS(590)/43/                                              ROFF      57
      DATA ITRANS(548)/44/                                              ROFF      58
      DATA ITRANS(532)/45/                                              ROFF      59
      DATA ITRANS(524)/46/                                              ROFF      60
      DATA ITRANS(520)/47/                                              ROFF      61
      DATA ITRANS(3844)/48/                                             ROFF      62
      DATA ITRANS(258)/49/                                              ROFF      63
      DATA ITRANS(130)/50/                                              ROFF      64
      DATA ITRANS(66)/51/                                               ROFF      65
      DATA ITRANS(34)/52/                                               ROFF      66
      DATA ITRANS(16)/53/                                               ROFF      67
      DATA ITRANS(10)/54/                                               ROFF      68
      DATA ITRANS(6)/55/                                                ROFF      69
      DATA ITRANS(4)/56/                                                ROFF      70
      DATA ITRANS(250)/57/                                              ROFF      71
      DATA ITRANS(132)/58/                                              ROFF      72
      DATA ITRANS(68)/59/                                               ROFF      73
      DATA ITRANS(36)/60/                                               ROFF      74
      DATA ITRANS(20)/61/                                               ROFF      75
      DATA ITRANS(12)/62/                                               ROFF      76
      DATA ITRANS(8)/63/                                                ROFF      77
      DATA ITRANS(1)/64/                                                ROFF      78
      DATA ITRANS(2518)/65/                                             ROFF      79
      DATA ITRANS(2590)/66/                                             ROFF      80
      DATA ITRANS(2526)/67/                                             ROFF      81
      DATA ITRANS(2594)/68/                                             ROFF      82
      DATA ITRANS(2578)/69/                                             ROFF      83
      DATA ITRANS(2570)/70/                                             ROFF      84
      DATA ITRANS(2566)/71/                                             ROFF      85
      DATA ITRANS(2564)/72/                                             ROFF      86
      DATA ITRANS(2307)/73/                                             ROFF      87
      DATA ITRANS(2179)/74/                                             ROFF      88
      DATA ITRANS(2115)/75/                                             ROFF      89
      DATA ITRANS(2083)/76/                                             ROFF      90
      DATA ITRANS(2067)//7/                                             ROFF      91
      DATA ITRANS(2059)/78/                                             ROFF      92
      DATA ITRANS(2055)/79/                                             ROFF      93
      DATA ITRANS(2049)/80/                                             ROFF      94
      DATA ITRANS(3530)/81/                                             ROFF      95
      DATA ITRANS(3202)/82/                                             ROFF      96
      DATA ITRANS(3138)/83/                                             ROFF      97
      DATA ITRANS(3106)/84/                                             ROFF      98
      DATA ITRANS(3090)/85/                                             ROFF      99
      DATA ITRANS(3082)/86/                                             ROFF     100
      DATA ITRANS(3078)/87/                                             ROFF     101
      DATA ITRANS(3076)/88/                                             ROFF     102
      DATA ITRANS(1283)/89/                                             ROFF     103
      DATA ITRANS(1155)/90/                                             ROFF     104
      DATA ITRANS(1091)/91/                                             ROFF     105
      DATA ITRANS(1059)/92/                                             ROFF     106
      DATA ITRANS(1043)/93/                                             ROFF     107
      DATA ITRANS(1035)/94/                                             ROFF     108
      DATA ITRANS(1031)/95/                                             ROFF     109
      DATA ITRANS(1025)/96/                                             ROFF     110
      DATA ITRANS(759)/97/                                              ROFF     111
      SUBROUTINE  PRE
      DATA ITRANS(1566)/98/                                      ROFF     112
      DATA ITRANS(1502)/99/                                      ROFF     113
      DATA ITRANS(1570)/100/                                     ROFF     114
      DATA ITRANS(1554)/101/                                     ROFF     115
      DATA ITRANS(1546)/102/                                     ROFF     116
      DATA ITRANS(1542)/103/                                     ROFF     117
      DATA ITRANS(1540)/104/                                     ROFF     118
      DATA ITRANS(771)/105/                                      ROFF     119
      DATA ITRANS(3573)/106/                                     ROFF     120
      DATA ITRANS(579)/107/                                      ROFF     121
      DATA ITRANS(547)/108/                                      ROFF     122
      DATA ITRANS(531)/109/                                      ROFF     123
      DATA ITRANS(523)/110/                                      ROFF     124
      DATA ITRANS(519)/111/                                      ROFF     125
      DATA ITRANS(3585)/112/                                     ROFF     126
      DATA ITRANS(3542)/113/                                     ROFF     127
      DATA ITRANS(3514)/114/                                     ROFF     128
      DATA ITRANS(3550)/115/                                     ROFF     129
      DATA ITRANS(3518)/116/                                     ROFF     130
      DATA ITRANS(3502)/117/                                     ROFF     131
      DATA ITRANS(3594)/118/                                     ROFF     132
      DATA ITRANS(3590)/119/                                     ROFF     133
      DATA ITRANS(3588)/120/                                     ROFF     134
      DATA ITRANS(259)/121/                                      ROFF     135
      DATA ITRANS(131)/122/                                      ROFF     136
      DATA ITRANS(57)/123/                                       ROFF     137
      DATA ITRANS(35)/124/                                       ROFF     138
      DATA ITRANS(13)/125/                                       ROFF     139
      DATA ITRANS(11)/126/                                       ROFF     140
      DATA ITRANS(7)/127/                                        ROFF     141
      DATA ITRANS(2519)/128/                                     ROFF     142
      DATA ITRANS(2517)/129/                                     ROFF     143
      DATA ITRANS(2589)/130/                                     ROFF     144
      DATA ITRANS(2525)/131/                                     ROFF     145
      DATA ITRANS(2593)/132/                                     ROFF     146
      DATA ITRANS(2577)/133/                                     ROFF     147
      DATA ITRANS(2569)/134/                                     ROFF     148
      DATA ITRANS(2565)/135/                                     ROFF     149
      DATA ITRANS(2563)/136/                                     ROFF     150
      DATA ITRANS(2562)/137/                                     ROFF     151
      DATA ITRANS(2591)/138/                                     ROFF     152
      DATA ITRANS(2527)/139/                                     ROFF     153
      DATA ITRANS(2595)/140/                                     ROFF     154
      DATA ITRANS(2579)/141/                                     ROFF     155
      DATA ITRANS(2571)/142/                                     ROFF     156
      DATA ITRANS(2567)/143/                                     ROFF     157
      DATA ITRANS(3531)/144/                                     ROFF     158
      DATA ITRANS(3329)/145/                                     ROFF     159
      DATA ITRANS(3261)/146/                                     ROFF     160
      DATA ITRANS(3137)/147/                                     ROFF     161
      DATA ITRANS(3105)/148/                                     ROFF     162
      DATA ITRANS(3589)/149/                                     ROFF     163
      DATA ITRANS(3581)/150/                                     ROFF     164
      DATA ITRANS(3577)/151/                                     ROFF     165
      DATA ITRANS(3575)/152/                                     ROFF     166
      SUBROUTINE  PRE

      DATA ITRANS(3374)/153/                                          ROFF 167
      DATA ITRANS(3203)/154/                                          ROFF 168
      DATA ITRANS(3139)/155/                                          ROFF 169
      DATA ITRANS(3107)/156/                                          ROFF 170
      DATA ITRANS(3391)/157/                                          ROFF 171
      DATA ITRANS(3383)/158/                                          ROFF 172
      DATA ITRANS(3379)/159/                                          ROFF 173
      DATA ITRANS(1795)/160/                                          ROFF 174
      DATA ITRANS(1793)/161/                                          ROFF 175
      DATA ITRANS(1565)/162/                                          ROFF 176
      DATA ITRANS(1561)/163/                                          ROFF 177
      DATA ITRANS(1569)/164/                                          ROFF 178
      DATA ITRANS(1553)/165/                                          ROFF 179
      DATA ITRANS(1545)/166/                                          ROFF 180
      DATA ITRANS(1541)/167/                                          ROFF 181
      DATA ITRANS(1539)/168/                                          ROFF 182
      DATA ITRANS(1538)/169/                                          ROFF 183
      DATA ITRANS(1567)/170/                                          ROFF 184
      DATA ITRANS(1563)/171/                                          ROFF 185
      DATA ITRANS(1571)/172/                                          ROFF 186
      DATA ITRANS(1555)/173/                                          ROFF 187
      DATA ITRANS(1547)/174/                                          ROFF 188
      DATA ITRANS(1543)/175/                                          ROFF 189
      DATA ITRANS(3843)/176/                                          ROFF 190
      DATA ITRANS(3841)/177/                                          ROFF 191
      DATA ITRANS(3713)/178/                                          ROFF 192
      DATA ITRANS(3549)/179/                                          ROFF 193
      DATA ITRANS(3517)/180/                                          ROFF 194
      DATA ITRANS(3561)/181/                                          ROFF 195
      DATA ITRANS(3593)/182/                                          ROFF 196
      DATA ITRANS(3589)/183/                                          ROFF 197
      DATA ITRANS(3587)/184/                                          ROFF 198
      DATA ITRANS(3586)/185/                                          ROFF 199
      DATA ITRANS(3715)/186/                                          ROFF 200
      DATA ITRANS(3551)/187/                                          ROFF 201
      DATA ITRANS(3519)/188/                                          ROFF 202
      DATA ITRANS(3563)/189/                                          ROFF 203
      DATA ITRANS(3595)/190/                                          ROFF 204
      DATA ITRANS(3591)/191/                                          ROFF 205
      DATA ITRANS(2561)/192/                                          ROFF 206
      DATA ITRANS(2365)/193/                                          ROFF 207
      DATA ITRANS(2177)/194/                                          ROFF 208
      DATA ITRANS(2113)/195/                                          ROFF 209
      DATA ITRANS(2081)/196/                                          ROFF 210
      DATA ITRANS(2065)/197/                                          ROFF 211
      DATA ITRANS(2057)/198/                                          ROFF 212
      DATA ITRANS(2053)/199/                                          ROFF 213
      DATA ITRANS(2051)/200/                                          ROFF 214
      DATA ITRANS(2050)/201/                                          ROFF 215
      DATA ITRANS(2592)/202/                                          ROFF 216
      DATA ITRANS(2528)/203/                                          ROFF 217
      DATA ITRANS(2596)/204/                                          ROFF 218
      DATA ITRANS(2580)/205/                                          ROFF 219
      DATA ITRANS(2572)/206/                                          ROFF 220
      DATA ITRANS(2568)/207/                                          ROFF 221
      SUBROUTINE   PRE

      DATA ITRANS(1537)/208/                                            ROFF     222
      DATA ITRANS(1281)/209/                                            ROFF     223
      DATA ITRANS(1153)/210/                                            ROFF     224
      DATA ITRANS(1089)/211/                                            ROFF     225
      DATA ITRANS(1057)/212/                                            ROFF     226
      DATA ITRANS(1041)/213/                                            ROFF     227
      DATA ITRANS(1033)/214/                                            ROFF     228
      DATA ITRANS(1029)/215/                                            ROFF     229
      DATA ITRANS(1027)/216/                                            ROFF     230
      DATA ITRANS(1026)/217/                                            ROFF     231
      DATA ITRANS(3264)/218/                                            ROFF     232
      DATA ITRANS(3140)/219/                                            ROFF     233
      DATA ITRANS(3108)/220/                                            ROFF     234
      DATA ITRANS(3092)/221/                                            ROFF     235
      DATA ITRANS(3084)/222/                                            ROFF     236
      DATA ITRANS(3080)/223/                                            ROFF     237
      DATA ITRANS(643)/224/                                             ROFF     238
      DATA ITRANS(1794)/225/                                            ROFF     239
      DATA ITRANS(541)/226/                                             ROFF     240
      DATA ITRANS(577)/227/                                             ROFF     241
      DATA ITRANS(545)/228/                                             ROFF     242
      DATA ITRANS(529)/229/                                             ROFF     243
      DATA ITRANS(521)/230/                                             ROFF     244
      DATA ITRANS(517)/231/                                             ROFF     245
      DATA ITRANS(515)/232/                                             ROFF     246
      DATA ITRANS(514)/233/                                             ROFF     247
      DATA ITRANS(1568)/234/                                            ROFF     248
      DATA ITRANS(1504)/235/                                            ROFF     249
      DATA ITRANS(1572)/236/                                            ROFF     250
      DATA ITRANS(1556)/237/                                            ROFF     251
      DATA ITRANS(1548)/238/                                            ROFF     252
      DATA ITRANS(1544)/239/                                            ROFF     253
      DATA ITRANS(513)/240/                                             ROFF     254
      DATA ITRANS(257)/241/                                             ROFF     255
      DATA ITRANS(129)/242/                                             ROFF     256
      DATA ITRANS(65)/243/                                              ROFF     257
      DATA ITRANS(33)/244/                                              ROFF     258
      DATA ITRANS(17)/245/                                              ROFF     259
      DATA ITRANS(9)/246/                                               ROFF     260
      DATA ITRANS(5)/247/                                               ROFF     261
      DATA ITRANS(3)/248/                                               ROFF     262
      DATA ITRANS(2)/249/                                               ROFF     263
      DATA ITRANS(3716)/250/                                            ROFF     264
      DATA ITRANS(3552)/251/                                            ROFF     265
      DATA ITRANS(3520)/252/                                            ROFF     266
      DATA ITRANS(3504)/253/                                            ROFF     267
      DATA ITRANS(3496)/254/                                            ROFF     268
      DATA ITRANS(3492)/255/                                            ROFF     269
C                                                                       ROFF     270
      IF (SECOND) GO TO 5                                               ROFF     271
      SECOND=.TRUE.                                                     ROFF     272
      IFET=GET(5LINPUT)                                                 ROFF     273
5     CONTINUE                                                          ROFF     274
      CALL PIN(IDATA,16,IFET,IEO)                                       ROFF     275
      IF(IEO.EQ.1) RETURN                                               ROFF     276
      SUBROUTINE  PRE
      IS=ISART-1                                                        ROFF      277
      NC=NC+1                                                           ROFF      278
      DO 8 N=1,16                                                       ROFF      279
      IWD=IDATA(N)                                                      ROFF      280
      DO 7 K=1,5                                                        ROFF      281
      IN=SHIFT(IWD,12*K).AND.7777B                                      ROFF      282
      IS=IS+1                                                           ROFF      283
      JOUT(IS)=ITRANS(IN+1)                                             ROFF      284
      IF (IS.EQ.IN.ENG) RETURN                                          ROFF      285
 7    CONTINUE                                                          ROFF      286
 8    CONTINUE                                                          ROFF      287
      END                                                               ROFF      288
```

```
          IDENT     GETBA$                                                   ROFF      289
PROGRAM LENGTH

BLOCKS

PROGRAM*   LOCAL

ENTRY POINTS

   000000 GET

EXTERNAL SYMBOLS

GETBA

          ENTRY     GET                                                      ROFF      290
          EXT       GETBA                                                    ROFF      291
 GET      BSS       1                                                        ROFF      292
*         FUNCTION GET(7LFILENAME)                                           ROFF      293
*         GET = FET ADDRESSS                                                 ROFF      294
          SA1       A1                                                       ROFF      295
          SB2       X1        PICK UP ADDRESS                                ROFF      296
          SB2       B0-B2     NEGATE SAME                                    ROFF      297
          RJ        GETBA                                                    ROFF      298
          SX6       B2                                                       ROFF      299
          LT        B0,B2,GET1          IF B2 GT B0 OK                       ROFF      300
          SX6       B0        FILE NOT FOUND                                 ROFF      301
 GET1     EQ        GET                                                      ROFF      302
          END                                                                ROFF      303

 UNUSED STORAGE            15 STATEMENTS        3  SYMBOLS
```

```
          IDENT     PIN$                                                  ROFF      304
PROGRAM LENGTH

BLOCKS

PROGRAM*   LOCAL

ENTRY POINTS

   000000 PIN

          ENTRY     PIN                                                   ROFF      305
*     THIS ROUTINE READS N WORDS FROM INPUT FILE BUFFER AND STARTS        ROFF      306
*     I/O IF EMPTY     RETURNS FLAG IF EOR                                ROFF      307
 PIN      BSS       1                                                     ROFF      308
*         SUBROUTINE PIN(DATA,NUMBER ,FETADD,IEO)                         ROFF      309
*        IEO=1      END OF LOGICAL RECORD                                 ROFF      310
*       IEO=2       NORMAL END                                            ROFF      311
          SB7       1                                                     ROFF      312
          SA1       A1                                                    ROFF      313
          SB1       X1          PICK UP DATA WORD ADDRESS                 ROFF      314
          SA1       A1+B7                                                 ROFF      315
          SA5       X1          LOAD NUMBER OF WORDS DESIRED              ROFF      316
          SB2       X5          B2 IS THE NUMBER                          ROFF      317
          SX0       B7          X0=1                                      ROFF      318
          SA1       A1+B7         FET ADDRESS                             ROFF      319
          SA2       A1+B7                                                 ROFF      320
          SB4       X2          IEO ADDRRESS                              ROFF      321
          SA1                  X1    PICK IT UP                           ROFF      322
          SB6       X1          SAVE FET ADDRESS FOR READ                 ROFF      323
          SA3       X1+3         READ OUT                                 ROFF      324
          IX7       X5-X0       THIS ELIMINATES ZERO CHECK LATER          ROFF      325
          SA4       A3-B7        READ IN                                  ROFF      326
          SA5       A3+B7       READ  LIMIT                               ROFF      327
          SX5       X5          MASK OUT ALL BUT LIMIT SET X5=LIMIT       ROFF      328
 PIN1     BSS      0                                                      ROFF      329
          IX1       X5-X3                                                 ROFF      330
          NZ        X1,PIN2       SENSE OUT NOT LIMIT                     ROFF      331
          SA1       A4-B7        READ  FIRST                              ROFF      332
          SX3       X1          OUT=FIRST                                 ROFF      333
 PIN2     IX1       X4-X3       LOOK FOR OUT=IN                           ROFF      334.
          ZR        X1,READ                                               ROFF      335
 PIN3     IX7       X7-X0        DECREMENT DATA COUNT                     ROFF      336
          SA2       X3          READ DATA WORD AT OUT                     ROFF      337
          SX3       X3+B7       INCREMENT OUT                             ROFF      338
*                 OUT MUST BE SET TO ONE MORE THAN THE ADDRESS OF         ROFF      339
*                       OF WORD LAST TRANSMITTED                          ROFF      340
          BX6       X2                                                    ROFF      341
          SA6       B1          STORE AS REQUESTED                        ROFF      342
          NG        X7,PINEND       SENS END OF TRANSFER                  ROFF      343
          SB1       B1+B7        INCREMENT TEMP LOCATION                  ROFF      344
          EQ        PIN1        LOOP UNTIL NO MORE DATA                   ROFF      345
 PINEND   BX5       X3          STORE UPDATE OUT                          ROFF      346
          SA6       A3          DONE                                      ROFF      347
          SX7       2                                                     ROFF      348
          SA7       B4          STORE 2 IN IEO                            ROFF      349
          EQ        PIN         EXIT                                      ROFF      350
```

```
*        THIS ROUTINE CALLS CIO WITH RECALL FOR BINARY READ                 ROFF       351
READ     BX6       X3                                                       ROFF       352
         SX1       B6         GET BACK FET ADDRESS                          ROFF       353
         SX3       3RCIO*10B+2                                              ROFF       354
         SA6       A3         STORE OUT                                     ROFF       355
         LX3       39         4LCIOP                                        ROFF       356
         SA2       X1         FET FWA                                       ROFF       357
*        CHECK IF PREVIOUS OPERATION LEAD TO EOR                            ROFF       358
         BX1       X3+X1       24/4LCIOP,36/FET                             ROFF       359
         MX3       42                                                       ROFF       360
         BX6       -X3*X2     GET STATUS                                    ROFF       361
         AX6       4          RIGHT SHIFT                                   ROFF       362
         ZR        X6,NO          NO END OF RECORD                          ROFF       363
         EQ        EOF          SORRY                                       ROFF       364
READB    EQU       12B                                                      ROFF       365
NO       BSS       0                                                        ROFF       366
         BX6       X3*X2      MASK OUT STATUS                               ROFF       367
         SX3       READB        BINARY READ                                 ROFF       368
         BX6       X6+X3         42/LFN,18/READB                            ROFF       369
         SA6       A2         STORE IN FET                                  ROFF       370
         BX6       X1         PREPATE CALL                                  ROFF       371
+        SA1       B7         CALL                                          ROFF       372
         NZ        X1,*                                                     ROFF       373
         SA6       B7         CALL CIO                                      ROFF       374
+        SA1       B7                                                       ROFF       375
         NZ        X1,*       WAIT FOR MTR TO AWAKE                         ROFF       376
         SA4       A4         GET NEW  IN                                   ROFF       377
       SA3         A3         GET NE W OUT                                  ROFF       378
         EQ        PIN3       CHECK FOR MORE                                ROFF       379
EOF      SX7       X0                                                       ROFF       380
         SA7       B4                                                       ROFF       381
         EQ        PIN                                                      ROFF       382
         END                                                                ROFF       383

UNUSED STORAGE            80 STATEMENTS        9  SYMBOLS
```

PROGRAM   ROFF

```
      PROGRAM ROFF(INPUT=03108,TAPE9=0,FILMPL=03108,TAPE3=0,TAPE4=0)    ROFF       384
C                                                                       ROFF       385
C        A F W L ( S Y S )          VERSION OF 6 APRIL 1972             ROFF       386
C                                                                       ROFF       387
C      IMPLICIT INTEGER (A-Z)                                           ROFF       388
      INTEGER ADDFT,ADDREF,ATCTR,ATSIGN,BADCTR,BLANK,BH1,BUFFL,CC,      ROFF       389
     1CCC,CCHOLD,CCSV,CEN,CENT,CFLEX,COLON,COLUMN,CSAVE,D,DOLLAR,DUM,EQU ROFF       390
     2,EQU,EXCLAM,FCC,FLIN,FPCC,FTLINZ,FTOVER,FTREC,HEAD,HZERO,OLENG,OUT ROFF       391
     3,OVLINE,O82,PAGEL,PAGEN,PAGENO,PAGES,PCC,PCCSV,PERCEN,PERIOD,PLUS, ROFF       392
     4PM,POS,PP,PPTEMP,QM,QUOTE1,QUOTE2,RBRACE,RBRACT,RCC,REFREC,RPAREN, ROFF       393
     5RPCC,SAVE,SAVED,STATE,U,ULINE,USCORE,X,Z,ZERO,Z4                  ROFF       394
      COMMON /INBUF/ IN(99),ULINE(99),PRJ,INLENG,INL1                   ROFF       395
      COMMON /OUTBUF/ OUT(130),OVLINE(130),BUFFL,OVERSW,NWORD,OLENG,PSW, ROFF       396
     1LENMAX                                                            ROFF       397
      COMMON /EQBUF/ EQU(200,4),LMIN,LMAX,EQSW                          ROFF       398
      COMMON /OPARM/ CC,PCC,INDENT,PAGENO,LINECT,PAGEL,PHONSW,RNUMSW    ROFF       399
      COMMON /FEET/ U,NREC,NFOOT,FTREC,FTNOTE,NFOOTP,FTOVER,FTLINZ,CTFN ROFF       400
      COMMON /SWITCH/ ADSW,FILLSW                                       ROFF       401
      COMMON /SR/ COLUMN,INL2                                           ROFF       402
      COMMON /SR3/ ITAB(256)                                            ROFF       403
      COMMON /SR4/ SPELSW                                               ROFF       404
      COMMON /SPP/ SP                                                   ROFF       405
      COMMON /CARDS/NC                                                  ROFF       406
      LOGICAL EQSW,OVERSW,PSW,PRU,PHONSW,RNUMSW,CTFN,FTNOTE             ROFF       407
      LOGICAL FTINS,FLAGSV(9),PRMORE,ASV,FSV                            ROFF       408
      DIMENSION SAVE(264), SAVED(264), CSAVE(4), INFAKE(130), INHOLD(81) ROFF       409
      EQUIVALENCE (SAVE(1),OUT(1)), (IN(1),INFAKE(1))                   ROFF       410
      COMMON /FLINK/ FLIN(131),HEAD(54),IDUM(6)                         ROFF       411
      COMMON /SKIPL/ PAGES                                              ROFF       412
C                                                                       ROFF       413
C     CENTER INPUT LINE STARTS OFF                                      ROFF       414
C                                                                       ROFF       415
C                                                                       ROFF       416
C     SETTINGS FOR PARAMETERS                                           ROFF       417
C     SWITCHES FOR DEFAULTS, ETC.                                       ROFF       418
C                                                                       ROFF       419
C     SET UP THE INITIAL VALUES OF FOOTNOTE AND REFERENCE CARRIAGE CONTR ROFF       420
C     INPUT LINE LENGTH                                                 ROFF       421
C     CARRIAGE CONTROL INDICATOR                                        ROFF       422
C     1 = SINGLE SPACE,  2 = DOUBLE SPACE                               ROFF       423
C     DEFAULT  LINE SPACING IS SINGLE                                   ROFF       424
C     INITIAL PARAGRAPH INDENT VALUE                                    ROFF       425
C     INITIALIZE REFERENCE COUNTER                                      ROFF       426
C     PAGING MODE ON TO START                                           ROFF       427
C     RIGHT-ADJUST SW ON TO START                                       ROFF       428
C     SWITCH FOR FILL MODE                                              ROFF       429
C     UNDERSCORE OFF TO START                                           ROFF       430
C     PRINT UNDERSCORE LINE OFF TO  START                               ROFF       431
C     OUTPUT OVERSTRIKE LINE OFF TO START                               ROFF       432
C     CAPATILIZE FIRST WORD                                             ROFF       433
C     SWITCH FOR CAPITILIZING A WHOLE WORD                              ROFF       434
C     COPY DIRECTLY, DEFAULT IS NO                                      ROFF       435
      LOGICAL RIGHT,CENTER,SPELSW,REFING,ADSW,FILLSW,USW,COPYSW,HOLDSW,N ROFF       436
     1QSW,CCSW,EOSW,CAPSW,ALLCAP,ADSA,FISA,PSA,FRSW,SP                  ROFF       437
      DIMENSION IIOUT(24)                                               ROFF       438
      PROGRAM     ROFF

      DATA HZERO/0/                                                     ROFF       439
      DATA DUM/0/,REFREC/0/,FCC/1/,RCC/1/,PP/5/,NREF/0/,NREFP/0/,LZ/0/  ROFF       440
      DATA ATCTR/0/,BADCTR/0/                                           ROFF       441
      DATA RIGHT,CENTER,REFING,USW,CAPSW,ALLCAP/.F.,.F.,.F.,.F.,.T.,.F./ ROFF      442
      DATA COPYSW,HOLDSW,NQSW,CCSW,EOSW,PSW,FRSW/.F.,.F.,.F.,.F.,.F.,.F. ROFF      443
     1,.F./                                                             ROFF       444
C                                                                       ROFF       445
C     TABLE OF NUMERICAL VALUES FOR GRAPHICS                            ROFF       446
C                                                                       ROFF       447
      DATA LREF/49/                                                     ROFF       448
      DATA LPAREN/77/                                                   ROFF       449
      DATA RBRACT/189/                                                  ROFF       450
      DATA LBRACT/187/                                                  ROFF       451
      DATA 082/224/                                                     ROFF       452
      DATA LNOT/95/                                                     ROFF       453
      DATA LETTRZ/233/                                                  ROFF       454
      DATA LETTRY/232/                                                  ROFF       455
      DATA LETTRX/231/                                                  ROFF       456
      DATA LETTRW/230/                                                  ROFF       457
      DATA LETTRV/229/                                                  ROFF       458
      DATA LETTRU/228/                                                  ROFF       459
      DATA LETTRT/227/                                                  ROFF       460
      DATA LETTRS/226/                                                  ROFF       461
      DATA LETTRR/217/                                                  ROFF       462
      DATA LETTRQ/216/                                                  ROFF       463
      DATA LETTRP/215/                                                  ROFF       464
      DATA LETTRO/214/                                                  ROFF       465
      DATA LETTRN/213/                                                  ROFF       466
      DATA LETTRM/212/                                                  ROFF       467
      DATA LETTRL/211/                                                  ROFF       468
      DATA LETTRK/210/                                                  ROFF       469
      DATA LETTRJ/209/                                                  ROFF       470
      DATA LETTRI/201/                                                  ROFF       471
      DATA LETTRH/200/                                                  ROFF       472
      DATA LETTRG/199/                                                  ROFF       473
      DATA LETTRF/198/                                                  ROFF       474
      DATA LETTRE/197/                                                  ROFF       475
      DATA LETTRD/196/                                                  ROFF       476
      DATA LETTRC/195/                                                  ROFF       477
      DATA LETTRB/194/                                                  ROFF       478
      DATA LETTRA/193/                                                  ROFF       479
      DATA USCORE/109/                                                  ROFF       480
      DATA QUOTE2/127/                                                  ROFF       481
      DATA QUOTE1/125/                                                  ROFF       482
      DATA QM/111/                                                      ROFF       483
      DATA PERIOD/75/                                                   ROFF       484
      DATA PERCEN/108/                                                  ROFF       485
      DATA RPAREN/93/                                                   ROFF       486
      DATA EXCLAM/90/                                                   ROFF       487
      DATA DOLLAR/91/                                                   ROFF       488
      DATA COLON/122/                                                   ROFF       489
      DATA CFLEX/190/                                                   ROFF       490
      DATA CENT/74/                                                     ROFF       491
      DATA BLANK/64/                                                    ROFF       492
      DATA ATSIGN/124/                                                  ROFF       493
      PROGRAM     ROFF

      DATA RBRACE/208/,LBRACE/192/
      DATA ADDFT/50/,ADDREF/51/
      DATA LBLANK,PLUS,ZERO/1H ,1H+,1H0/
      DATA FTING/.FALSE./
C     INITIALIZE THE SPELLING CHANGE COUNTER
      SPELSW=.FALSE.
      SP=.FALSE.
      FPCC=LBLANK
      RPCC=LBLANK
      PCC=LBLANK
      COLUMN=0
      ADSW=.TRUE.
      FILLSW=.TRUE.
C
C
C     INITIALIZE TRANSLATE TABLE FOR FINAL OUTPUT STAGE
C     TO START WITH , ALL CHARACTERS GO TO THEMSELVES
C     EXCEPT FOR DOL SIGN, WHICH GOES BLANK
C
C
      CALL INITTR (INFAKE)
C
C     HERE WE GO
C
C     SET CHARACTERS
C
      DO 1 I=1,256
1     ITAB(I)=I
C
C     LETTERS
      DO 2 I=193,201
2     ITAB(I)=I-64
      DO 3 I=209,217
3     ITAB(I)=I-64
      DO 4 I=226,233
4     ITAB(I)=I-64
      DO 5 I=1,54
5     HEAD(I)=BLANK
C
C
C     THIS IS THE START OF THE MAIN LOOP.
C     THE INPUT LINE IS READ HERE
C
6     CONTINUE
      CALL PRE (IN,1,INLENG,IEO)
      GO TO (130,7), IEO
7     CONTINUE
8     INL=INLENG+1
C     CHECK OF CONTROL WORD
      IF (IN(1).EQ.PERIOD) GO TO 55
      IF (EOSW.AND..NOT.EQSW) GO TO 6
      IF (NQSW.AND.EQSW) GO TO 6
C     IF IN DIRECT COPY MODE, SKIP CONVERSION, GO TO OUTPUT
      J=80
      IF (COPYSW) GO TO 26
      PROGRAM     ROFF

C
C
C     CONVERT THE LINE
C
C     HANDLE CAPITALIZATION AND OTHER SPECIAL PROBLEMS
      IF (.NOT.EQSW) CALL CRRECT
      I=1
      J=1
9     IF (I.GE.INLL) GO TO 28
      ITEMP=IN(I)
      IF (ATCTR.GT.0) GO TO 13
      JTEMP=IN(I+1)
      IF (ITEMP.LT.129.OR.ITEMP.GE.240) GO TO 10
C     SEE IF SPECIAL CHARS OR NUMBERS
      IF (ITEMP.GT.169.AND.ITEMP.LT.193) GO TO 10
C     NO, SO CONVERT IF NECESSARY
      IF (ITEMP.EQ.082) GO TO 18
      IN(J)=IN(I)
      IF (.NOT.CAPSW.AND..NOT.ALLCAP) IN(J)=ITAB(ITEMP)
C     ARE WE (NOT) ING
      IF (USW) ULINE(J)=USCORE
      CAPSW=.FALSE.
      I=I+1
      J=J+1
      GO TO 9
C
C      SPECIAL CHARACTERS COME HERE.
C
10    CONTINUE
C
C
      IF (ITEMP.EQ.LREF) GO TO 23
      IF (ITEMP.EQ.ADDFT) GO TO 24
      IF (ITEMP.EQ.ADDREF) GO TO 25
      IF (ITEMP.NE.BLANK) GO TO 11
C
C     TURN OF  UNDERSCORE SW IF BLANK
      USW=.FALSE.
C     TURN OFF ALLCAP
      ALLCAP=.FALSE.
      GO TO 12
11    CONTINUE
C     NOT MEANS BACKSPACE FOR ERASURE
C     END SENTANCE PUNCTUATION
      IF (ITEMP.EQ.QM.OR.ITEMP.EQ.EXCLAM.OR.ITEMP.EQ.PERIOD.OR.ITEMP.EQ.
     1COLON) GO TO 14
C     AT SIGN MEANS BACKSPACE
      IF (ITEMP.EQ.ATSIGN) GO TO 22
C     CENTS MENAS CAPITALIZE NEXT CHAR, AND BLANK SELF
      IF (ITEMP.EQ.CENT) GO TO 17
C     IS IT TO UNDERSCORE
      IF (ITEMP.EQ.USCORE) GO TO 19
C     CFX MEANS CAPITALIZE NEXT WORD AND BLANK SELF
      IF (ITEMP.EQ.CFLEX) GO TO 21
C     IS IT $ TO FORCE LOWER CASE
```

PROGRAM   ROFF

```
      IF (ITEMP.EQ.DOLLAR) GO TO 20
C     DO WE NEED  AN UNDERSCORE
      IF (USW) ULINE(J)=USCORE
      IF (ITEMP.GT.256.OR.ITEMP.LE.0) ITEMP=124
C     ANY THING ELSE IS MAPPED
12    IN(J)=ITAB(ITEMP)
      J=J+1
      I=I+1
      GO TO 9
C
C     INSERT AT SIGN HANDLER HERE
C
13    JAT=J-ATCTR
      ULINE(JAT)=ITEMP
      ATCTR=ATCTR-1
      I=I+1
      GO TO 9
C
C     .*, HERE. NOCONV, SET CAPSW, KILL UNDERSCORE
14    I=I+1
      IN(J)=ITEMP
      IF (USW) ULINE(J)=USCORE
      J=J+1
C
C     IS THIS THE END OF THE SENTENCE
      IF (JTEMP.EQ.BLANK) GO TO 15
      IF (JTEMP.EQ.O82.OR.JTEMP.EQ.LREF.OR.JTEMP.EQ.ADDFT.OR.JTEMP.EQ.AD
     1DREF) GO TO 16
      IF (JTEMP.NE.RPAREN.AND.JTEMP.NE.QUOTE1.AND.JTEMP.NE.QUOTE2.AND.JT
     1EMP.NE.RBRACT) GO TO 9
      IN(J)=IN(I)
      I=I+1
      J=J+1
15    CONTINUE
      IF (IN(I).NE.BLANK.OR.IN(I+1).NE.BLANK) GO TO 9
      IN(J)=1
      IN(J+1)=BLANK
      I=I+2
      J=J+2
      INL1=MAX0(INL1,J)
16    CAPSW=.TRUE.
      USW=.FALSE.
      ALLCAP=.FALSE.
      IF ((IN(I).EQ.O82.OR.IN(I).EQ.LREF).AND.IN(I+1).EQ.BLANK) SP=.TRUE
     1.
      IF ((IN(I).EQ.ADDFT.OR.IN(I).EQ.ADDREF).AND.IN(I+2).EQ.BLANK) SP=.
     1TRUE.
      GO TO 9
C     CENTS HERE
17    CONTINUE
      CAPSW=.TRUE.
      ALLCAP=.FALSE.
      I=I+1
      GO TO 9
C     FOOTNOTE STUFF HERE
```

```
      PROGRAM    ROFF
18    IF (FRSW) GO TO 23
      NFOOT=NFOOT+1
      CALL NUMBER (LBRACT,NFOOT,RBRACT,INFAKE,I,J,.NOT.FILLSW)
      GO TO 9
C     UNDERSCORE COMES HERE
19    USW=.NOT.USW
      PRU=.TRUE.
      I=I+1
      GO TO 9
C     $ FORCE SMALL LETTER
20    CAPSW=.FALSE.
      ALLCAP=.FALSE.
      I=I+1
      GO TO 9
21    ALLCAP=.NOT.ALLCAP
      I=I+1
      GO TO 9
C
C     AT BACKSPACE AND OVERSTRIKE. ATCTR IS NUMBER SEEN IN THIS STRING
22    ATCTR=ATCTR+1
      PRU=.TRUE.
      I=I+1
      IF (IN(I).EQ.ATSIGN) GO TO 22
C     NOT BACKSPACE AND SUBSTITUE
C     NOTCTR IS THE NUBBER OF NOT S IN THE STRING
C     INSERT REFERENCE NUMBER
C     CODE IN PREVIOUS  FOOTENOTE NUMBER
      GO TO 9
C     INSERT REFERENCE NUMBER
23    NREF=NREF+1
      CALL NUMBER (LPAREN,NREF,RPAREN,INFAKE,I,J,.NOT.FILLSW)
      GO TO 9
C     CODE IN PREVIOUS FOOTNOTE.
24    IF (FRSW) GO TO 25
      CALL NUMBER (LBRACT,NFOOT-JTEMP+240,RBRACT,INFAKE,I,J,.NOT.FILLSW)
      I=I+1
      GO TO 9
C      CODE IN PREVIOUSLY DEFERED F REFERENCE NUMBER
25    CALL NUMBER (LPAREN,NREF-JTEMP+240,RPAREN,INFAKE,I,J,.NOT.FILLSW)
      I=I+1
      GO TO 9
C
C
C       GET HERE AFTER MAPPING IS DONE.
C
C
26    IF (.NOT.CCSW) GO TO 28
      CC=IN(1)
      IF (CC.GT.2) GO TO 27
      IF (CC.EQ.0) PCC=PLUS
      IF (CC.EQ.1) PCC=LBLANK
      IF (CC.EQ.2) PCC=ZERO
      Z=8
      ILENG=LENMAX+1
      GO TO 35
```

```
 27     IF (CC.EQ.BLANK) CALL WRBLNK (1)
        GO TO 6
 C      WIPE OUT REMANENTS OF ORIGINAL LINE.
 28     DO 29 K=J,INL1
 29     IN(K)=BLANK
        Z=4
        ILENG=J
        IF (FILLSW.AND.CENTER) GO TO 41
        IF (RIGHT.AND.FILLSW) GO TO 46
        IF (FILLSW) GO TO 40
        IF (LINECT.GT.PAGEL) CALL EJECT
 C      IF IN NOFILL MODE, COPY THE LINE OUT INTACT
        LINECT=LINECT+CC
        IF (.NOT.SPELSW) GO TO 30
        CALL SPELL (INFAKE,ILENG)
        ILENG=INL2
 30     CALL TRANS (INFAKE,ILENG)
 C      CHECK FOR CENTER MODE OR RIGHT MODE
        IF (.NOT.CENTER.AND..NOT.RIGHT) GO TO 35
        J=OLENG
        NBLANK=0
 31     IF (IN(J).NE.BLANK) GO TO 32
        J=J-1
        NBLANK=NBLANK+1
        IF (J) 35,35,31
 32     IF (CENTER) NBLANK=NBLANK/2
        IF (NBLANK.LE.0) GO TO 35
        NEND=OLENG-NBLANK
        DO 33 IJ=1,NEND
        POS=OLENG-IJ+1
        IPP1=POS-NBLANK
 33     IN(POS)=IN(IPP1)
        DO 34 IJ=1,NBLANK
 34     IN(IJ)=BLANK
        RIGHT=.FALSE.
        CENTER=.FALSE.
 35     CONTINUE
        IF (.NOT.CCSW) GO TO 36
        IF (LINECT.GT.PAGEL.AND.CC.NE.0) CALL EJECT
 C      PATCH UP OVERSHOOTS OF INPUT BUFFER
        LINECT=LINECT+CC
 36     ILEN4=4*ILENG
        IF (U.NE.6) ILEN4=MAX0(ILEN4,4*LENMAX)
        ILEN1=ILEN4/4
        Z4=Z/4
        IF (U.NE.6) WRITE (U) PCC,(IN(I),I=Z4,ILEN1)
        IF (U.EQ.6) CALL MICRO (PCC,IN(Z4),ILEN1-Z4+1)
        NREC=NREC+1
        IF (ILENG.LT.81) GO TO 38
        DO 37 I=81,ILENG
 37     IN(I)=BLANK
 38     IF (.NOT.PRU) GO TO 49
        IF (U.NE.6) WRITE (U) PLUS,(ULINE(I),I=Z4,ILEN1)
        IF (U.EQ.6) CALL MICRO (PLUS,ULINE(Z4),ILEN1-Z4+1)
        NREC=NREC+1
```

```
       PROGRAM     ROFF

      DO 39 I=1,ILENG
      ULINE(I)=BLANK
 39   CONTINUE
      PRU=.FALSE.
      GO TO 49
C
C     COME HERE IF IN FILL MODE
C
 40   CONTINUE
      CALL FILL
      GO TO 6
C
C
C     COME HERE IF IN CENTER MODE.
C
C
 41   CALL FILL
      CENTER=.FALSE.
      BM1=BUFFL-1
      CEN=(OLENG-BM1)/2
 42   CONTINUE
      DO 43 KK=1,BM1
      K=BUFFL-KK
      KCEN=K+CEN
      OUT(KCEN)=OUT(K)
      IF (OVERSW) OVLINE(KCEN)=OVLINE(K)
 43   CONTINUE
      IF (CEN.EQ.0) GO TO 45
      DO 44 K=1,CEN
      OUT(K)=BLANK
      IF (OVERSW) OVLINE(K)=BLANK
 44   CONTINUE
      BUFFL=BUFFL+CEN-1
 45   CALL FLUSH
      GO TO 6
C
C     COME HERE IF IN RIGHT ADJUST MODE FOR THE LINE
C
C
 46   CALL FILL
      RIGHT=.FALSE.
      BM1=BUFFL-1
      CEN=OLENG-BM1
      GO TO 42
C     C
C     CONTROL WORD DECODER
C
C
 47   LZ=LMIN
      ASV=ADSW
      FSV=FILLSW
      CCSV=CC
      PCCSV=PCC
      CC=1
      PCC=LBLANK
      PROGRAM     ROFF

      ADSW=.FALSE.
      FILLSW=.FALSE.
      LINS=LMAX-LMIN+1
      IF (LINECT+LINS.GT.PAGEL) CALL EJECT
      IHOLD=IN(2)
      JHOLD=IN(3)
      IF (IN(4).EQ.BLANK.AND.IN(5).EQ.BLANK.AND.IN(6).EQ.BLANK.AND.IN(7)
     1.EQ.BLANK) GO TO 50
      DO 48 I=4,80
48    INHOLD(I)=IN(I)
      HOLDSW=.TRUE.
      GO TO 53
49    IF (.NOT.EQSW) GO TO 6
      IF (LZ.GE.LMAX) GO TO 52
      LZ=LZ+1
50    DO 51 I=1,INLENG
51    IN(I)=EQU(I,LZ)
      GO TO 8
52    INLENG=80
      LMAX=3
      LMIN=3
      EQSW=.FALSE.
      ADSW=ASV
      FILLSW=FSV
      CC=CCSV
      PCC=PCCSV
      ITEMP=IHOLD
      JTEMP=JHOLD
      IF (ITEMP.EQ.LETTRE.AND.JTEMP.EQ.LETTRQ) GO TO 53
      J=3-CC
      CALL WRBLNK (J)
53    IF (.NOT.HOLDSW) GO TO 56
      DO 54 I=4,80
54    IN(I)=INHOLD(I)
      HOLDSW=.FALSE.
      GO TO 56
C
C
55    ITEMP=IN(2)
      JTEMP=IN(3)
56    IF (ITEMP.EQ.LETTRE.AND.JTEMP.EQ.LETTRQ.AND.NQSW) GO TO 117
      IF (ITEMP.EQ.LETTRE.AND.JTEMP.EQ.LETTRQ) CALL EQROFF
      IF (EQSW.AND..NOT.NQSW) GO TO 47
      EQSW=.FALSE.
C
      IF (ITEMP.EQ.LETTRE.AND.JTEMP.EQ.LETTRE) GO TO 6
C     .BR
      IF (ITEMP.EQ.LETTRB.AND.JTEMP.EQ.LETTRR) GO TO 60
C     .PP
      IF (ITEMP.EQ.LETTRP.AND.JTEMP.EQ.LETTRP) GO TO 79
C     .SP
      IF (ITEMP.EQ.LETTRS.AND.JTEMP.EQ.LETTRP) GO TO 58
C     .BP
      IF (ITEMP.EQ.LETTRB.AND.JTEMP.EQ.LETTRP) GO TO 59
C     .FI
```

```
      PROGRAM     ROFF

      IF (ITEMP.EQ.LETTRF.AND.JTEMP.EQ.LETTRI) GO TO 67                 ROFF       879
C     .NF                                                               ROFF       880
      IF (ITEMP.EQ.LETTRN.AND.JTEMP.EQ.LETTRF) GO TO 68                 ROFF       881
C     .AD                                                               ROFF       882
      IF (ITEMP.EQ.LETTRA.AND.JTEMP.EQ.LETTRD) GO TO 69                 ROFF       883
C     .NJ                                                               ROFF       884
      IF (ITEMP.EQ.LETTRN.AND.JTEMP.EQ.LETTRJ) GO TO 70                 ROFF       885
C     .LL                                                               ROFF       886
      IF (ITEMP.EQ.LETTRL.AND.JTEMP.EQ.LETTRL) GO TO 71                 ROFF       887
C     .CO                                                               ROFF       888
      IF (ITEMP.EQ.LETTRC.AND.JTEMP.EQ.LETTRO) GO TO 61                 ROFF       889
C     .MA                                                               ROFF       890
      IF (ITEMP.EQ.LETTRM.AND.JTEMP.EQ.LETTRA) GO TO 62                 ROFF       891
C     .DS                                                               ROFF       892
      IF (ITEMP.EQ.LETTRD.AND.JTEMP.EQ.LETTRS) GO TO 63                 ROFF       893
C     .SS                                                               ROFF       894
      IF (ITEMP.EQ.LETTRS.AND.JTEMP.EQ.LETTRS) GO TO 64                 ROFF       895
C     .SK                                                               ROFF       896
      IF (ITEMP.EQ.LETTRS.AND.JTEMP.EQ.LETTRK) GO TO 72                 ROFF       897
C     .NE                                                               ROFF       898
      IF (ITEMP.EQ.LETTRN.AND.JTEMP.EQ.LETTRE) GO TO 73                 ROFF       899
C     .RF                                                               ROFF       900
      IF (ITEMP.EQ.LETTRR.AND.JTEMP.EQ.LETTRF) GO TO 102                ROFF       901
C     .RE                                                               ROFF       902
      IF (ITEMP.EQ.LETTRR.AND.JTEMP.EQ.LETTRE) GO TO 104                ROFF       903
C      .RP                                                              ROFF       904
      IF (ITEMP.EQ.LETTRR.AND.JTEMP.EQ.LETTRP) GO TO 106                ROFF       905
C     PA                                                                ROFF       906
      IF (ITEMP.EQ.LETTRP.AND.JTEMP.EQ.LETTRA) GO TO 74                 ROFF       907
C     .PM                                                               ROFF       908
      IF (ITEMP.EQ.LETTRP.AND.JTEMP.EQ.LETTRM) GO TO 76                 ROFF       909
C     .FN                                                               ROFF       910
      IF (ITEMP.EQ.LETTRF.AND.JTEMP.EQ.LETTRN) GO TO 90                 ROFF       911
C     .FE                                                               ROFF       912
      IF (ITEMP.EQ.LETTRF.AND.JTEMP.EQ.LETTRE) GO TO 94                 ROFF       913
C     .IN                                                               ROFF       914
      IF (ITEMP.EQ.LETTRI.AND.JTEMP.EQ.LETTRN) GO TO 77                 ROFF       915
C     .TR                                                               ROFF       916
      IF (ITEMP.EQ.LETTRT.AND.JTEMP.EQ.LETTRR) GO TO 83                 ROFF       917
C     .CE                                                               ROFF       918
      IF (ITEMP.EQ.LETTRC.AND.JTEMP.EQ.LETTRE) GO TO 84                 ROFF       919
C     .RT                                                               ROFF       920
      IF (ITEMP.EQ.LETTRR.AND.JTEMP.EQ.LETTRT) GO TO 85                 ROFF       921
C     .CH                                                               ROFF       922
      IF (ITEMP.EQ.LETTRC.AND.JTEMP.EQ.LETTRH) GO TO 86                 ROFF       923
C     .UN UNDENT                                                        ROFF       924
      IF (ITEMP.EQ.LETTRU.AND.JTEMP.EQ.LETTRN) GO TO 98                 ROFF       925
C     .NC                                                               ROFF       926
      IF (ITEMP.EQ.LETTRN.AND.JTEMP.EQ.LETTRC) GO TO 87                 ROFF       927
C     .NS                                                               ROFF       928
      IF (ITEMP.EQ.LETTRN.AND.JTEMP.EQ.LETTRS) GO TO 88                 ROFF       929
C     .ME                                                               ROFF       930
      IF (ITEMP.EQ.LETTRM.AND.JTEMP.EQ.LETTRE) GO TO 123                ROFF       931
C     .PU                                                               ROFF       932
      IF (ITEMP.EQ.LETTRP.AND.JTEMP.EQ.LETTRU) GO TO 118                ROFF       933
      PROGRAM     ROFF
C     .NP                                                               ROFF   934
      IF (ITEMP.EQ.LETTRN.AND.JTEMP.EQ.LETTRP) GO TO 119                ROFF   935
C     .CC                                                               ROFF   936
      IF (ITEMP.EQ.LETTRC.AND.JTEMP.EQ.LETTRC) GO TO 120                ROFF   937
C     .CX                                                               ROFF   938
      IF (ITEMP.EQ.LETTRC.AND.JTEMP.EQ.LETTRX) GO TO 121                ROFF   939
C     .RA                                                               ROFF   940
      IF (ITEMP.EQ.LETTRR.AND.JTEMP.EQ.LETTRA) GO TO 89                 ROFF   941
      IF (ITEMP.EQ.LETTRE.AND.JTEMP.EQ.LETTRO) GO TO 114                ROFF   942
      IF (ITEMP.EQ.LETTRN.AND.JTEMP.EQ.LETTRQ) GO TO 115                ROFF   943
C     .FS SET FOOTNOTE SPACING TO CURRENT VALUE                         ROFF   944
      IF (ITEMP.EQ.LETTRF.AND.JTEMP.EQ.LETTRS) GO TO 99                 ROFF   945
C     .RS SET REFERENCE SPACING TO CURRENT VALUE                        ROFF   946
      IF (ITEMP.EQ.LETTRR.AND.JTEMP.EQ.LETTRS) GO TO 101                ROFF   947
C     .SF                                                               ROFF   948
      IF (ITEMP.EQ.LETTRS.AND.JTEMP.EQ.LETTRF) GO TO 113                ROFF   949
C     .PL SET PAGE LENGTH DEFAULT 48 LINES                              ROFF   950
      IF (ITEMP.EQ.LETTRP.AND.JTEMP.EQ.LETTRL) GO TO 100                ROFF   951
C     .CT   NUMBER FFOTNOTES AND CONTINUOUSLY                           ROFF   952
      IF (ITEMP.EQ.LETTRC.AND.JTEMP.EQ.LETTRT) GO TO 112                ROFF   953
C     .AL                                                               ROFF   954
      IF (ITEMP.EQ.LETTRA.AND.JTEMP.EQ.LETTRL) GO TO 116                ROFF   955
C     .FR                                                               ROFF   956
      IF (ITEMP.EQ.LETTRF.AND.JTEMP.EQ.LETTRR) GO TO 122                ROFF   957
C     .EF END OU FILE                                                   ROFF   958
      IF (ITEMP.EQ.LETTRE.AND.JTEMP.EQ.LETTRF) GO TO 130                ROFF   959
C     .≠  TURN UNDERSCORE SW ON                                         ROFF   960
      IF (ITEMP.EQ.USCORE) GO TO 55                                     ROFF   961
C     .UFX  TURN ALL CAP ON                                             ROFF   962
      IF (ITEMP.EQ.UFLEX) GO TO 65                                      ROFF   963
C     UNKNOWN CONTROL WORD. REMEMBER                                    ROFF   964
57    BADCTR=BADCTR+1                                                   ROFF   965
      CALL DISPLA(10H**ERROR AT ,NC)                                    ROFF   966
      GO TO 6                                                           ROFF   967
C     .SP N   N BLANK LINES INSERTED                                    ROFF   968
58    IF (FILLSW) CALL FLUSH                                            ROFF   969
      CALL WRBLNK (INTEG(IN,4,1))                                       ROFF   970
      GO TO 6                                                           ROFF   971
C     .BP    BEGIN A NEW PAGE                                           ROFF   972
59    IF (FILLSW) CALL FLUSH                                            ROFF   973
      CALL EJECT                                                        ROFF   974
      CAPSW=.TRUE.                                                      ROFF   975
      GO TO 6                                                           ROFF   976
C     .BR BREAK AND START A NEW LINE                                    ROFF   977
C     FOR NOW , SET  CAPSW                                              ROFF   978
60    CAPSW=.TRUE.                                                      ROFF   979
      IF (FILLSW) CALL FLUSH                                            ROFF   980
      GO TO 6                                                           ROFF   981
C     .CO   SET COPY SWITCH ON. COPY INPUT,  NO MAPPING                 ROFF   982
61    COPYSW=.TRUE.                                                     ROFF   983
      IF (FILLSW) CALL FLUSH                                            ROFF   984
      J=81                                                              ROFF   985
      GO TO 6                                                           ROFF   986
C     .MA  MAP, SO SWITCH OFF                                           ROFF   987
62    COPYSW=.FALSE.                                                    ROFF   988
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      PROGRAM     ROFF

      GO TO 6                                                           ROFF     989
C     .DS    DOUBLE SPACE                                               ROFF     990
63    IF (FILLSW) CALL FLUSH                                            ROFF     991
      CC=2                                                              ROFF     992
      PCC=ZERO                                                          ROFF     993
      GO TO 6                                                           ROFF     994
C     .SS   SINGLE SPACE MODE                                           ROFF     995
64    IF (FILLSW) CALL FLUSH                                            ROFF     996
      CC=1                                                              ROFF     997
      PCC=LBLANK                                                        ROFF     998
      GO TO 6                                                           ROFF     999
65    USW=.TRUE.                                                        ROFF    1000
      PRU=.TRUE.                                                        ROFF    1001
      GO TO 6                                                           ROFF    1002
C     .CFX  TURN ON FOR NEXT LINE                                       ROFF    1003
66    ALLCAP=.TRUE.                                                     ROFF    1004
      GO TO 6                                                           ROFF    1005
C     .FI   ENTER FILL MODE                                             ROFF    1006
67    FILLSW=.TRUE.                                                     ROFF    1007
C     ADSW = .TRIE.                                                     ROFF    1008
      GO TO 6                                                           ROFF    1009
C     .NF     ENTER NOFILL                                              ROFF    1010
68    FILLSW=.FALSE.                                                    ROFF    1011
      ADSW=.FALSE.                                                      ROFF    1012
      CALL FLUSH                                                        ROFF    1013
      GO TO 6                                                           ROFF    1014
C     .AD   TURN ON RIGHT ADJUST MODE                                   ROFF    1015
69    IF (FILLSW) CALL FLUSH                                            ROFF    1016
      ADSW=.TRUE.                                                       ROFF    1017
      FILLSW=.TRUE.                                                     ROFF    1018
      GO TO 6                                                           ROFF    1019
C     .NJ   TURN OFF RIGHT ADJUST MODE                                  ROFF    1020
70    IF (FILLSW) CALL FLUSH                                            ROFF    1021
      ADSW=.FALSE.                                                      ROFF    1022
      FILLSW=.FALSE.                                                    ROFF    1023
      GO TO 6                                                           ROFF    1024
C     .LL SET LINE LENGHT                                               ROFF    1025
71    IF (FILLSW) CALL FLUSH                                            ROFF    1026
      OLENG=INTEG(IN,4,60)                                              ROFF    1027
      LENMAX=MAX0(LENMAX,OLENG)                                         ROFF    1028
      GO TO 6                                                           ROFF    1029
C     .SK N LEAVE N BLANK PAGES AT THE NEXT OPPORTUNITY                 ROFF    1030
C     ADDITIVE ON N UNTIL EXECUTED.                                     ROFF    1031
72    PAGES=INTEG(IN,4,1)                                               ROFF    1032
      CALL SKIP                                                         ROFF    1033
      GO TO 6                                                           ROFF    1034
C     .NE N SKIP TO PAGE IF THER ARNN T AT LEAST N LINES                ROFF    1035
C     ON CURRENT PAGE.                                                  ROFF    1036
73    LINS=INTEG(IN,4,0)                                                ROFF    1037
      IF (LINECT+LINS.LE.PAGEL) GO TO 75                                ROFF    1038
      IF (FILLSW) CALL FLUSH                                            ROFF    1039
      CALL EJECT                                                        ROFF    1040
      GO TO 6                                                           ROFF    1041
C     .PA START A NEW PAGE WITH GIVEN NUMBER. DFLT IS 1                 ROFF    1042
74    IF (FILLSW) CALL FLUSH                                            ROFF    1043
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      PROGRAM    ROFF

      PAGENO=INTEG(IN,4,1)                                              ROFF    1044
      CALL EJECT                                                        ROFF    1045
   75 CONTINUE                                                          ROFF    1046
      GO TO 6                                                           ROFF    1047
C     .PM  SET PAGING MODE.                                             ROFF    1048
   76 PM=INTEG(IN,4,1)                                                  ROFF    1049
      IF (PM.GT.2) GO TO 57                                             ROFF    1050
      PMONSW=.FALSE.                                                    ROFF    1051
      IF (PM.EQ.0) GO TO 6                                              ROFF    1052
      PMONSW=.TRUE.                                                     ROFF    1053
      IF (PM.EQ.1.AND.RNUMSW.OR.PM.EQ.2.AND..NOT.RNUMSW) PAGENO=1       ROFF    1054
      RNUMSW=.FALSE.                                                    ROFF    1055
      IF (PM.EQ.1) GO TO 6                                              ROFF    1056
      RNUMSW=.TRUE.                                                     ROFF    1057
      GO TO 6                                                           ROFF    1058
C     .IN N INDENT N SPACESS. DOFLT OS 3                                ROFF    1059
C     MOVES OUTPUT TO B + 1 PRINT POSITOON                              ROFF    1060
   77 IF (FILLSW) CALL FLUSH                                            ROFF    1061
      INDENT=INTEG(IN,4,3)                                              ROFF    1062
      BUFFL=INDENT                                                      ROFF    1063
      IF (INDENT.EQ.0) GO TO 6                                          ROFF    1064
      IF (INDENT.GT.129.OR.INDENT.LT.0) BADCTR=BADCTR+1                 ROFF    1065
      IF (INDENT.GT.129.OR.INDENT.LT.0) GO TO 6                         ROFF    1066
      DO 78 I=1,INDENT                                                  ROFF    1067
   78 OUT(I)=PERCEN                                                     ROFF    1068
      GO TO 6                                                           ROFF    1069
C     .PP N NEW PARAGRAPH, WITH INDENTING                               ROFF    1070
C      START FIRST LINE OF PARAGRAPH AT PP+INDENT                       ROFF    1071
C     IF N IS NULL USE PRECIOUS VALUE.  OTHERWISE, CONPUTE A NEW ONE    ROFF    1072
C     SET CAPSW ON, AS IN BREAK, .BR                                    ROFF    1073
   79 IF (FILLSW) CALL FLUSH                                            ROFF    1074
C     WHAT IS N                                                         ROFF    1075
      PPTEMP=INTEG(IN,4,-1)                                             ROFF    1076
C     IF NEG , WAS DEFAULTED                                            ROFF    1077
      IF (PPTEMP.LT.0) GO TO 80                                         ROFF    1078
C     OTHERWISE RECOMPUTE                                               ROFF    1079
      PP=PPTEMP                                                         ROFF    1080
C     INSERT BLANKS                                                     ROFF    1081
   80 PPTEMP=PP+INDENT                                                  ROFF    1082
      IF (PPTEMP.LE.0) GO TO 82                                         ROFF    1083
      DO 81 I=1,PPTEMP                                                  ROFF    1084
   81 OUT(I)=PERCEN                                                     ROFF    1085
   82 BUFFL=PPTEMP                                                      ROFF    1086
      CAPSW=.TRUE.                                                      ROFF    1087
      GO TO 6                                                           ROFF    1088
C                                                                       ROFF    1089
C     .TR C1 TO C2                                                      ROFF    1090
C     ON OUTPUT , CONVERT ALL INSTANCES OF C1 TO C2                     ROFF    1091
C                                                                       ROFF    1092
   83 CALL TR (IN,4)                                                    ROFF    1093
      GO TO 6                                                           ROFF    1094
C     .CE CENTER THE LINE                                               ROFF    1095
   84 CENTER=.TRUE.                                                     ROFF    1096
      IF (FILLSW) CALL FLUSH                                            ROFF    1097
      CAPSW=.TRUE.                                                      ROFF    1098
      PROGRAM     ROFF
      GO TO 6
C     .RT   REVERT THE TRANSLATE COMMOND
85    CALL INITTR (INFAKE)
      GO TO 6
C     .CH   SPELLING MODE .  LOOK FOR SPELLING ERRORS
86    SPELSW=.TRUE.
      CALL SEARCH (IN,4,INIJ)
      IF (INIJ.EQ.2) GO TO 57
      GO TO 6
C     .NE    REVERT SPELLING CHANGES
87    SPELSW=.FALSE.
      GO TO 6
C     .NS DO NOT SPACE THE PRINTER CARRIAGE ON OUTPUT
88    IF (FILLSW) CALL FLUSH
      PCC=PLUS
      CC=0
      GO TO 6
C     .RA  RIGHT ADJUST THE NEXT CARD
89    RIGHT=.TRUE.
      IF (FILLSW) CALL FLUSH
      GO TO 6
C     START FOOTNOTE -- SAVE THE BUFFERS
90    IF (FRSW) GO TO 102
C      ARE WE ALREADY IN THE FOOTNOTE MODE
      IF (FTING) GO TO 91
      ASSIGN 92 TO STATE
      GO TO 125
91    CALL FLUSH
      GO TO 93
92    FTING=.TRUE.
      LINECT=0
      NREC=0
      U=4
      IF (.NOT.FTNOTE) LINECT=2
      FTNOTE=.TRUE.
C     SET NEW VALUES
93    ADSW=.TRUE.
      CAPSW=.TRUE.
      FILLSW=.TRUE.
      COPYSW=.FALSE.
      CCSW=.FALSE.
      PSW=PSA
      CC=FCC
      PCC=FPCC
      INDENT=0
C     SETUP FOOTNOTE STUFF IN OUTPUT BUFFER
      OUT(1)=LBRACT
      NFOOTP=NFOOTP+1
      BUFFL=1
      CALL NUMBF (LBRACT,NFOOTP,RBRACT,OUT,OJN,BUFFL,.TRUE.)
      OUT(BUFFL)=PERCEN
      NWORD=0
      GO TO 6
C     END FOOT NOTE HERE
94    IF (FRSW) GO TO 104
```

```
      PROGRAM     ROFF

      CALL FLUSH                                                         ROFF
      X=LINECT+CSAVE(1)                                                  ROFF
C     DO WE HAVE SOMETING IN THE SAVED BUFFER TO PRINT                   ROFF
      PRMORE=.FALSE.                                                     ROFF
      IF (FLAGSV(2).AND.SAVED(263).GT.0) PRMORE=.TRUE.                   ROFF
      IF (PRMORE) X=X+CSAVE(2)                                           ROFF
C     WHERE WILL THE FOOTNOTE PUT US ON THE PAGE                         ROFF
      IF (X.LE.PAGEL) GO TO 95                                           ROFF
C     IF THEI IS THE FIRST FOOTNOTE AND ARE WE AT BOTTOM - FORGET IT     ROFF
      IF (PRMORE.AND.NFOOT.EQ.1.AND.X.GT.PAGEL-4) GO TO 97               ROFF
      X=MAX0(X-PAGEL,0)                                                  ROFF
      FTOVER=FTOVER+X                                                    ROFF
      LINECT=LINECT-X                                                    ROFF
      IF (PRMORE) CSAVE(1)=CSAVE(1)+CSAVE(2)                             ROFF
C     UPDATE FOOTNOTE COUNTERS AND RESTORE OLD BUFFERS                   ROFF
95    FTLINZ=FTLINZ+LINECT                                               ROFF
      FTREC=FTREC+NREC                                                   ROFF
      LINECT=LINECT+CSAVE(1)                                             ROFF
      ASSIGN 96 TO STATE                                                 ROFF
      GO TO 128                                                          ROFF
96    CONTINUE                                                           ROFF
      FTING=.FALSE.                                                      ROFF
      GO TO 6                                                            ROFF
97    FTNOTE=.FALSE.                                                     ROFF
      FTLINZ=LINECT                                                      ROFF
      LINECT=CSAVE(1)                                                    ROFF
      CSAVE(1)=FTLINZ                                                    ROFF
      CALL EJECT                                                         ROFF
      FTNOTE=.TRUE.                                                      ROFF
      LINECT=0                                                           ROFF
      GO TO 95                                                           ROFF
98    IF (FILLSW) CALL FLUSH                                             ROFF
      BUFFL=MAX0(0,INDENT-INTEG(IN,4,INDENT))                            ROFF
      GO TO 6                                                            ROFF
99    FCC=CC                                                             ROFF
      FPCC=PCC                                                           ROFF
      GO TO 6                                                            ROFF
100   PAGEL=INTEG(IN,4,48)                                               ROFF
      GO TO 6                                                            ROFF
101   RCC=CC                                                             ROFF
      RPCC=PCC                                                           ROFF
      GO TO 6                                                            ROFF
C                                                                        ROFF
C     START REFERENCE                                                    ROFF
102   IF (REFING) CALL FLUSH                                             ROFF
      IF (.NOT.REFING) NREC=0                                            ROFF
      ASSIGN 103 TO STATE                                                ROFF
      IF (.NOT.REFING) GO TO 125                                         ROFF
103   CONTINUE                                                           ROFF
      CAPSW=.TRUE.                                                       ROFF
      COPYSW=.FALSE.                                                     ROFF
      CCSW=.FALSE.                                                       ROFF
      PSW=PSA                                                            ROFF
      ADSW=.TRUE.                                                        ROFF
      FILLSW=.TRUE.                                                      ROFF
      PROGRAM     ROFF

      INDENT=0
      REFING=.TRUE.
      CC=RCC
      PCC=RPCC
      U=3
      BUFFL=1
      NREFP=NREFP+1
      CALL NUMBER (LPAREN,NREFP,RPAREN,OUT,DUM,BUFFL,.TRUE.)
      OUT(BUFFL)=PERCEN
      NWORD=0
      GO TO 6
C
C     END REFERENCE
C
104   ASSIGN 105 TO STATE
      IF (FILLSW) CALL FLUSH
      REFREC=REFREC+NREC
      GO TO 128
105   LINECT=CSAVE(1)
      REFING=.FALSE.
      GO TO 6
C     PRINT FOOTNOTES
106   IF (REFREC.LE.0) GO TO 6
      DO 107 K=1,REFREC
107   BACKSPACE 3
      IF (FILLSW) CALL FLUSH
      CALL EJECT
C     OUTPUT 1H ,*REFERENCES*
      IIOUT(1)=LBLANK
      IIOUT(2)=LETTRR
      IIOUT(3)=LETTRE
      IIOUT(4)=LETTRF
      IIOUT(5)=LETTRE
      IIOUT(6)=LETTRR
      IIOUT(7)=LETTRE
      IIOUT(8)=LETTRN
      IIOUT(9)=LETTRC
      IIOUT(10)=LETTRE
      IIOUT(11)=LETTRS
      CALL MICRO (IIOUT(1),IIOUT(2),10)
C     OUTPUT 1H+, WITH UNDERSCORES
      IIOUT(1)=PLUS
      DO 108 I=2,11
108   IIOUT(I)=USCORE
      CALL MICRO (IIOUT(1),IIOUT(2),10)
      LINECT=LINECT+2
      LR=LENMAX+1
      DO 110 K=1,REFREC
C     1031 FORMAT(131A1)
C     READ(3,1031)          (FLIN(I),I=1,LR)
      READ (3) (FLIN(I),I=1,LR)
      IF (EOF(3)) 111,109
109   CONTINUE
      CCC=FLIN(1)
      IF (LINECT.GT.PAGEL.AND.CCC.NE.PLUS) CALL EJECT
```

```
          PROGRAM     ROFF

          CALL MICRO (FLIN(1),FLIN(2),LR-1)                                ROFF      1264
          LINECT=LINECT+1                                                  ROFF      1265
          IF (CCC.EQ.ZERO) LINECT=LINECT+1                                 ROFF      1266
    110   IF (CCC.EQ.PLUS) LINECT=LINECT-1                                 ROFF      1267
    111   CALL EJECT                                                       ROFF      1268
          REFREC=0                                                         ROFF      1269
          NREF=0                                                           ROFF      1270
          NREFP=0                                                          ROFF      1271
          GO TO 6                                                          ROFF      1272
C                                                                          ROFF      1273
C         SET THE FOOT NUMBER TO A SPECIFIED VALUE                         ROFF      1274
    112   CTFN=.TRUE.                                                      ROFF      1275
          GO TO 6                                                          ROFF      1276
    113   NFOOT=INTEG(IN,4,1)                                              ROFF      1277
          NFOOTP=NFOOT                                                     ROFF      1278
          GO TO 6                                                          ROFF      1279
    114   EOSW=.TRUE.                                                      ROFF      1280
          GO TO 6                                                          ROFF      1281
    115   NQSW=.TRUE.                                                      ROFF      1282
          GO TO 6                                                          ROFF      1283
    116   EOSW=.FALSE.                                                     ROFF      1284
          NQSW=.FALSE.                                                     ROFF      1285
          GO TO 6                                                          ROFF      1286
    117   IF (FILLSW) CALL FLUSH                                           ROFF      1287
          EQSW=.TRUE.                                                      ROFF      1288
          CALL WRBLNK (4)                                                  ROFF      1289
          GO TO 6                                                          ROFF      1290
    118   PSW=.TRUE.                                                       ROFF      1291
          PSA=.TRUE.                                                       ROFF      1292
          PAGEN=PAGENO-1                                                   ROFF      1293
          GO TO 6                                                          ROFF      1294
    119   PSW=.FALSE.                                                      ROFF      1295
          PSA=.FALSE.                                                      ROFF      1296
          GO TO 6                                                          ROFF      1297
    120   IF (FILLSW) CALL FLUSH                                           ROFF      1298
          IF (CCSW) GO TO 6                                                ROFF      1299
          ADSA=ADSW                                                        ROFF      1300
          FISA=FILLSW                                                      ROFF      1301
          PSA=PSW                                                          ROFF      1302
          CCHOLD=CC                                                        ROFF      1303
          CCSW=.TRUE.                                                      ROFF      1304
          PSW=.FALSE.                                                      ROFF      1305
          COPYSW=.TRUE.                                                    ROFF      1306
          ADSW=.FALSE.                                                     ROFF      1307
          FILLSW=.FALSE.                                                   ROFF      1308
          GO TO 6                                                          ROFF      1309
    121   CCSW=.FALSE.                                                     ROFF      1310
          ADSW=ADSA                                                        ROFF      1311
          FILLSW=FISA                                                      ROFF      1312
          PSW=PSA                                                          ROFF      1313
          COPYSW=.FALSE.                                                   ROFF      1314
          CAPSW=.FALSE.                                                    ROFF      1315
          CC=CCHOLD                                                        ROFF      1316
          PCC=LBLANK                                                       ROFF      1317
          IF (CC.EQ.2) PCC=ZERO                                            ROFF      1318
```

```
       PROGRAM     ROFF

      IF (CC.EQ.0) PCC=PLUS
      PAGEN=PAGENO-1
      GO TO 6
  122 CONTINUE
      FRSW=.TRUE.
      GO TO 6
  123 DO 124 I=1,54
  124 HEAD(I)=IN(I+4)
      GO TO 6
C
C
  125 CONTINUE
C     SAVE ALL THE CURRENT STUFF IN  THE SAVE BUFFER
      DO 126 I=1,254
  126 SAVED(I)=SAVE(I)
      FLAGSV(1)=ADSW
      FLAGSV(2)=FILLSW
      FLAGSV(3)=CAPSW
      FLAGSV(4)=USW
      FLAGSV(5)=PRJ
      FLAGSV(6)=ALLCAP
      FLAGSV(7)=COPYSW
      FLAGSV(8)=CCSW
      FLAGSV(9)=PSW
      CSAVE(1)=LINECT
      CSAVE(2)=CC
      CSAVE(3)=PCC
      CSAVE(4)=INDENT
      IF (.NOT.OVERSW) GO TO STATE, (92,103)
      DO 127 I=1,13.
  127 OVLINE(I)=LBLANK
      OVERSW=.FALSE.
      GO TO STATE, (92,103)
C     RESTORE SAVED BUFFERS
  128 CONTINUE
      CC=CSAVE(2)
      PCC=CSAVE(3)
      INDENT=CSAVE(4)
      ADSW=FLAGSV(1)
      FILLSW=FLAGSV(2)
      CAPSW=FLAGSV(3)
      USW=FLAGSV(4)
      PRJ=FLAGSV(5)
      ALLCAP=FLAGSV(6)
      COPYSW=FLAGSV(7)
      CCSW=FLAGSV(8)
      PSW=FLAGSV(9)
      U=0
      DO 129 I=1,254
  129 SAVE(I)=SAVED(I)
      GO TO STATE, (96,105)
C     .EF
C
C
  130 IF (FILLSW) CALL FLUSH
```

```
       PROGRAM     ROFF

 131   CONTINUE
       CALL EJECT
       IF (FTNOTE) GO TO 131
       IF(BADCTR.GT.0) CALL DISPLA(20HNO OF CONTROL ERRORS ,BADCTR)
       CALL QUIT (0)
       END
```

BLOCK DATA

```
      BLOCK DATA                                                        ROFF      1380
      IMPLICIT INTEGER(A-Z)                                             ROFF      1381
      INTEGER BUFFL,CC,EQU,FTLINZ,FTOVER,FTREC,OLENG,OUT,OVLINE,PAGEL,PA ROFF      1382
     1GENO,U,ULINE                                                      ROFF      1383
      INTEGER PCC                                                       ROFF      1384
      COMMON /EQBUF/ EQU(200,4),LMIN,LMAX,EQSW                          ROFF      1385
      COMMON /OUTBUF/ OUT(130),OVLINE(130),BUFFL,OVERSW,NWORD,OLENG,PSW, ROFF      1386
     1LENMAX                                                            ROFF      1387
      COMMON /INBUF/ IN(99),ULINE(99),PRU,INLENG,INL1                   ROFF      1388
      COMMON /OPARM/ CC,PCC,INDENT,PAGENO,LINECT,PAGEL,PHONSW,RNUMSW    ROFF      1389
      COMMON /FEET/ U,NREC,NFOOT,FTREC,FTNOTE,NFOOTP,FTOVER,FTLINZ,CTFN ROFF      1390
      LOGICAL EQSW,OVERSW,PSW,PRU,PHONSW,RNUMSW,CTFN,FTNOTE             ROFF      1391
      DATA OUT/130*64/,OVLINE/130*64/,IN/99*64/,ULINE/99*64/            ROFF      1392
      DATA LMAX/3/,LMIN/3/,EQSW/.FALSE./,INLENG/80/,PRU/.FALSE./        ROFF      1393
      DATA PSW/.FALSE./,OLENG/60/,LENMAX/60/,BUFFL/0/,NWORD/0/          ROFF      1394
      DATA PAGENO/1/,CC/1/,INDENT/0/,PAGEL/42/,LINECT/1/,PHONSW/.TRUE./, ROFF      1395
     1RNUMSW/.FALSE./,OVERSW/.FALSE./                                   ROFF      1396
      DATA NFOOT/0/,NFOOTP/0/,NREC/0/,FTLINZ/0/,FTOVER/0/,FTREC/0/,CTFN/ ROFF      1397
     1.FALSE./,U/6/,FTNOTE/.FALSE./                                     ROFF      1398
      DATA PAGEL/48/                                                    ROFF      1399
      END                                                               ROFF      1400
```

SUBROUTINE EJECT

```
      SUBROUTINE EJECT                                                  ROFF    1401
C      SUBROUTINE EJECT                                                 ROFF    1402
      INTEGER ONE                                                       ROFF    1403
      INTEGER USCORE,NUMBER(10),IDATA2(42)                              ROFF    1404
      INTEGER FTLINZ,FTOVER,FLIN,C,FTREC,PAGENO,FTOVER,TSKIP            ROFF    1405
      INTEGER BUFFL,CC,HEAD,OLENG,OUT,OVLINE,PAGEL,PCC,U                ROFF    1406
      LOGICAL OVERSW,PSW                                                ROFF    1407
       IMPLICIT INTEGER (A-Z)                                           ROFF    1408
      COMMON /OPARM/ CC,PCC,INDENT,PAGENO,LINECT,PAGEL,PHONSW,RNUMSW    ROFF    1409
      COMMON /FEET/ U,NREC,NFOOT,FTREC,FTNOTE,NFOOTP,FTOVER,FTLINZ,CTFN ROFF    1410
      DIMENSION IPGO(6)                                                 ROFF    1411
      COMMON /OUTBUF/ OUT(130),OVLINE(130),BUFFL,OVERSW,NWORD,OLENG,PSW,ROFF    1412
     1LENMAX                                                            ROFF    1413
      COMMON /FLINK/ FLIN(131),HEAD(54),IPGO                            ROFF    1414
      COMMON /SKIPL/ NSKIP                                              ROFF    1415
      LOGICAL CTFN                                                      ROFF    1416
      LOGICAL FTNOTE                                                    ROFF    1417
      LOGICAL RNUMSW                                                    ROFF    1418
      LOGICAL PHONSW                                                    ROFF    1419
      INTEGER ZERO,BLANK,PLUS                                           ROFF    1420
      INTEGER TT,TOPSP                                                  ROFF    1421
      INTEGER Z                                                         ROFF    1422
      DATA ZERO,BLANK,PLUS/1H0,1H ,1H+/                                 ROFF    1423
      DATA USCORE/109/                                                  ROFF    1424
      DATA IBLNK/64/                                                    ROFF    1425
      DATA NUMBER/240,241,242,243,244,245,246,247,248,249/              ROFF    1426
      DATA ONE/1H1/,TOPSP/3/,TSKIP/1/                                   ROFF    1427
      DATA LETTR1/137/,LETTRV/165/,LETTRX/167/                          ROFF    1428
      IF (.NOT.FTNOTE) GO TO 11                                         ROFF    1429
C     ARE WE ALREADY AT THE BOTTOM OF THE PAGE                          ROFF    1430
      LL=PAGEL-LINECT+1                                                 ROFF    1431
      IF (LL.LE.0) GO TO 2                                              ROFF    1432
      DO 1 I=1,LL                                                       ROFF    1433
      CALL MICRO (BLANK,0,0)                                            ROFF    1434
1     CONTINUE                                                          ROFF    1435
2     CONTINUE                                                          ROFF    1436
      DO 3 I=1,FTREC                                                    ROFF    1437
3     BACKSPACE 4                                                       ROFF    1438
      IDATA2(1)=BLANK                                                   ROFF    1439
      DO 4 I=2,42                                                       ROFF    1440
4     IDATA2(I)=USCORE                                                  ROFF    1441
      CALL MICRO (IDATA2(1),IDATA2(2),41)                               ROFF    1442
      FTLINZ=FTLINZ-2                                                   ROFF    1443
      LR=LENMAX+1                                                       ROFF    1444
      IF (FTOVER.LE.0) GO TO 8                                          ROFF    1445
5     READ (4) (FLIN(I),I=1,LR)                                         ROFF    1446
C     WRITE OUT AS  MUCH OF FOOTNOTES AS WILL FIT                       ROFF    1447
      C=FLIN(1)                                                         ROFF    1448
6     FTREC=FTREC-1                                                     ROFF    1449
      IF (C.EQ.ZERO) FTLINZ=FTLINZ-2                                    ROFF    1450
      IF (C.EQ.BLANK) FTLINZ=FTLINZ-1                                   ROFF    1451
C     WRITE(6,2000)(FLIN(I),I=1,LR)                                     ROFF    1452
      CALL MICRO (FLIN(1),FLIN(2),LR-1)                                 ROFF    1453
      IF (FTLINZ.GT.0) GO TO 5                                          ROFF    1454
C     HAVE WE PRINTED THE LAST LINE                                     ROFF    1455
```

```
      SUBROUTINE  EJECT
      IF (FTREC.EQ.0) GO TO 10                                          ROFF     1456
C     MOVE TO THE END OF THE DATA SET                                   ROFF     1457
      DO 7 Z=1,FTREC                                                    ROFF     1458
      READ (4) (FLIN(I),I=1,LR)                                         ROFF     1459
      C=FLIN(1)                                                         ROFF     1460
      IF (C.EQ.PLUS.AND.Z.EQ.1) GO TO 6                                 ROFF     1461
7     CONTINUE                                                          ROFF     1462
C     WRITE OUT ALL THE FOOTNOTES AND RESET ALL THE POINTERS            ROFF     1463
      GO TO 11                                                          ROFF     1464
6     DO 9 Z=1,FTREC                                                    ROFF     1465
      READ (4) (FLIN(I),I=1,LR)                                         ROFF     1466
      CALL MICRO (FLIN(1),FLIN(2),LR-1)                                 ROFF     1467
9     CONTINUE                                                          ROFF     1468
10    REWIND 4                                                          ROFF     1469
      FTLINZ=0                                                          ROFF     1470
      FTNOTE=.FALSE.                                                    ROFF     1471
      FTREC=0                                                           ROFF     1472
C     ARE WE NUMBERING CONTINUOUSLY                                     ROFF     1473
      IF (CTFN) GO TO 11                                                ROFF     1474
      NFOOTP=0                                                          ROFF     1475
      NFOOT=0                                                           ROFF     1476
11    CONTINUE                                                          ROFF     1477
C     IF PM OFF, SKIP, PRINT TOPSP+1 LINES                              ROFF     1478
C     IF PM ON, SKIP, PRINT PABEND, TOPSP LINES                         ROFF     1479
      DO 25 J=1,TSKIP                                                   ROFF     1480
      CALL MICRO (ONE,0,L)                                              ROFF     1481
      IF (PMONSW) GO TO 12                                              ROFF     1482
      TT=TOPSP+1                                                        ROFF     1483
      GO TO 23                                                          ROFF     1484
12    CONTINUE                                                          ROFF     1485
C     BLANK OUT OUTPUT                                                  ROFF     1486
      DO 13 I=1,5                                                       ROFF     1487
13    IPGO(I)=IBLNK                                                     ROFF     1488
      IF (RNUMSW) GO TO 15                                              ROFF     1489
      DO 14 L=1,6                                                       ROFF     1490
      N=MOD(PAGENO/10**(L-1),10)+1                                      ROFF     1491
      IPGO(7-L)=NUMBER(N)                                               ROFF     1492
      IF (PAGENO.LT.10**L) GO TO 22                                     ROFF     1493
14    CONTINUE                                                          ROFF     1494
C     ROMAN NUMER                                                       ROFF     1495
15    IP6=MIN0(PAGENO,20)                                               ROFF     1496
      N=MOD(IP6,5)                                                      ROFF     1497
      IF (N.EQ.0) GO TO 20                                              ROFF     1498
      GO TO (18,17,16,19), N                                            ROFF     1499
16    IPGO(4)=LETTRI                                                    ROFF     1500
17    IPGO(5)=LETTRI                                                    ROFF     1501
18    IPGO(6)=LETTRI                                                    ROFF     1502
      NEXT=6-N                                                          ROFF     1503
      GO TO 21                                                          ROFF     1504
19    IPGO(5)=LETTRI                                                    ROFF     1505
      IPGO(6)=LETTRX                                                    ROFF     1506
      IF (((IP6/5)/2)*2.EQ.(IP6/5)) IPGO(6)=LETTRV                      ROFF     1507
      NEXT=4                                                            ROFF     1508
      GO TO 21                                                          ROFF     1509
20    IPGO(6)=LETTRV                                                    ROFF     1510
```

```
      SUBROUTINE  EJECT

      IF (((IP6/5)/2)*2.EQ.(IP6/5)) IPGO(6)=LETTRX                     ROFF      1511
      NEXT=5                                                           ROFF      1512
 21   IF (IP6.GT.10) IPGO(NEXT)=LETTRX                                 ROFF      1513
 22   CONTINUE                                                         ROFF      1514
      CALL MICRO (BLANK,HEAD,63)                                       ROFF      1515
      TT=TOPSP                                                         ROFF      1516
C                                                                      ROFF      1517
 23   IF (CC.EQ.2) TT=TT-1                                             ROFF      1518
      DO 24 I=1,TT                                                     ROFF      1519
 24   CALL MICRO (BLANK,0,0)                                           ROFF      1520
      PAGENO=PAGENO+1                                                  ROFF      1521
 25   CONTINUE                                                         ROFF      1522
      TSKIP=1                                                          ROFF      1523
      LINECT=1                                                         ROFF      1524
      IF (.NOT.FTNOTE) RETURN                                          ROFF      1525
C     SETUP THE OVERFLOW OF THE FOOTNOTE                               ROFF      1526
C     DID WE RUN PAST THE LAST PAGE BOTTOM BY ONE LINE                 ROFF      1527
      FTOVER=FTOVER+FTLINZ                                             ROFF      1528
      LINECT=MOD(3+FTOVER,PAGEL)                                       ROFF      1529
      FTOVER=MAX0(0,FTOVER-LINECT+3)                                   ROFF      1530
      FTLINZ=LINECT-1                                                  ROFF      1531
      RETURN                                                           ROFF      1532
C                                                                      ROFF      1533
C      ENTRY SKIP(NSKIP)                                               ROFF      1534
      ENTRY SKIP                                                       ROFF      1535
      TSKIP=TSKIP+NSKIP                                                ROFF      1536
      RETURN                                                           ROFF      1537
      END                                                              ROFF      1538
```

SUBROUTINE FLUSH

```
      SUBROUTINE FLUSH                                                  ROFF      1539
       INTEGER BB,BLANK,BUFFL,CC,OUT,OVLINE,PAGEL,PCC,PERCEN,PLUS,U     ROFF      1540
      INTEGER CTFN,FTLINZ,FTOVER,FTREC,OLENG,PAGENO                     ROFF      1541
      LOGICAL RNUMSW                                                    ROFF      1542
C      IMPLICIT INTEGER (A-Z)                                           ROFF      1543
      COMMON /OPARM/ CC,PCC,INDENT,PAGENO,LINECT,PAGEL,PHONSW,RNUMSW    ROFF      1544
      COMMON /FEET/ U,NREC,NFOOT,FTREC,FTNOTE,NFOOTP,FTOVER,FTLINZ,CTFN ROFF      1545
      LOGICAL FTNOTE                                                    ROFF      1546
      LOGICAL PHONSW                                                    ROFF      1547
      COMMON /OUTBUF/ OUT(130),OVLINE(130),BUFFL,OVERSW,NWORD,OLENG,PSW, ROFF     1548
     1LENMAX                                                            ROFF      1549
C     WRITE OUTPUT BUFFER                                               ROFF      1550
      LOGICAL OVERSW                                                    ROFF      1551
      LOGICAL PSW                                                       ROFF      1552
      DATA PLUS/1H+/                                                    ROFF      1553
      DATA PERCEN/138/                                                  ROFF      1554
      DATA BLANK/64/                                                    ROFF      1555
      IF (BUFFL.EQ.INDENT.AND.NWORD.EQ.0) RETURN                        ROFF      1556
      IF (LINECT.GT.PAGEL.AND.CC.GT.0.AND.U.EQ.6) CALL EJECT            ROFF      1557
      CALL TRANS (OUT,BUFFL)                                            ROFF      1558
      IF (U.EQ.6.OR.BUFFL.GE.LENMAX) GO TO 2                            ROFF      1559
      BB=BUFFL+1                                                        ROFF      1560
      DO 1 JJ=BB,LENMAX                                                 ROFF      1561
1     OUT(JJ)=BLANK                                                     ROFF      1562
      BUFFL=LENMAX                                                      ROFF      1563
2     CONTINUE                                                          ROFF      1564
      IF (U.NE.6) WRITE (U) PCC,(OUT(I),I=1,BUFFL)                      ROFF      1565
      IF (U.EQ.6) CALL MICRO (PCC,OUT,BUFFL)                            ROFF      1566
      NREC=NREC+1                                                       ROFF      1567
      IF (.NOT.OVERSW) GO TO 4                                          ROFF      1568
      OVERSW=.FALSE.                                                    ROFF      1569
      IF (U.NE.6) WRITE (U) PLUS,(OVLINE(I),I=1,BUFFL)                  ROFF      1570
      IF (U.EQ.6) CALL MICRO (PLUS,OVLINE,BUFFL)                        ROFF      1571
      NREC=NREC+1                                                       ROFF      1572
      DO 3 I=1,BUFFL                                                    ROFF      1573
3     OVLINE(I)=BLANK                                                   ROFF      1574
4     CONTINUE                                                          ROFF      1575
      BUFFL=INDENT                                                      ROFF      1576
      LINECT=LINECT+CC                                                  ROFF      1577
      NWORD=0                                                           ROFF      1578
      IF (INDENT.LE.0) RETURN                                           ROFF      1579
      DO 5 I=1,INDENT                                                   ROFF      1580
5     OUT(I)=PERCEN                                                     ROFF      1581
      RETURN                                                            ROFF      1582
      END                                                               ROFF      1583
```

SUBROUTINE WRBLNK

```
      SUBROUTINE WRBLNK (N)
      INTEGER OUT,OVLINE,PAGEL,U,WHERE
      INTEGER BUFFL,CC,CTFN,FTLINZ,FTOVER,FTREC,OLENG,PAGENO,PCC
      LOGICAL OVERSW,RNUMSW
C      IMPLICIT INTEGER (A-Z)
      COMMON /OPARM/ CC,PCC,INDENT,PAGENO,LINECT,PAGEL,PHONSW,RNUMSW
      COMMON /FEET/ U,NREC,NFOOT,FTREC,FTNOTE,NFOOTP,FTOVER,FTLINZ,CTFN
      COMMON /OUTBUF/ OUT(130),OVLINE(130),BUFFL,OVERSW,NWORD,OLENG,PSW,
     1LENMAX
      INTEGER BLANK
      LOGICAL PSW
      LOGICAL FTNOTE
      LOGICAL PHONSW
      DATA BLANK/1H /
C     OPERATES IN NEED MODE -- IF ASK FOR N SPACES, WILL SKIP
C     TO NEW PAGE TO GET THEM IF NECESSARY
C      SAVE PTR
      WHERE=LINECT+N-1
C     DOES IT FIT ON CURRENT PAGE
      IF (WHERE.LE.PAGEL.OR.U.NE.5) GO TO 1
C     NO, SKIP TO NEW PAGE
      CALL EJECT
C     WERE THERE REALLY ENOUGH SPACES
      IF (WHERE.LE.PAGEL+5.AND..NOT.FTNOTE) RETURN
C     NO, SO MAKE THEM
    1 CONTINUE
      LINECT=LINECT+N
      DO 2 I=1,N
      IF (U.EQ.6) CALL MICRO (BLANK,0,0)
      IF (U.NE.6) WRITE (U) BLANK
      NREC=NREC+1
    2 CONTINUE
      RETURN
      END
```

SUBROUTINE ADJUST

```
      SUBROUTINE ADJUST                                                 ROFF     1618
      INTEGER BLANK,BUFFL,HOLES,OLENG,OUT,OVLINE,PSW,RSPACE,SUMSIZ      ROFF     1619
C      IMPLICIT INTEGER (A-Z)                                           ROFF     1620
      COMMON /OUTBUF/ OUT(130),OVLINE(130),BUFFL,OVERSW,NWORD,OLENG,PSW, ROFF     1621
     1LENMAX                                                            ROFF     1622
      LOGICAL OVERSW                                                    ROFF     1623
      DATA BLANK/64/                                                    ROFF     1524
C     IF ONE WORD ,  LEAVE                                              ROFF     1625
      IF (NWORD.LE.1) RETURN                                            ROFF     1626
C     WHEN ENTER, BUFFL POINTS TO LAST BLANK IN BUFFER.                 ROFF     1627
C     WHEN LEAVE, WILL EQUAL OLENG , AND POINTS TO LAST ACTIVE CHARACTER ROFF     1628
C     NWORD = NUMBER OF ACTUAL WORDS IN LINE                            ROFF     1629
C     SUMSIZ = TOTAL SIZE OF ACTIVE WORDS                               ROFF     1630
      SUMSIZ=BUFFL-NWORD                                                ROFF     1631
C     J IS LAST ACTIVE CHAR IN BUFF                                     ROFF     1632
      J=BUFFL-1                                                         ROFF     1633
      HOLES=NWORD-1                                                     ROFF     1634
C     RSPACE IS NUMBER OF SPACES TO BE INSERTED IN TOTAL                ROFF     1635
      RSPACE=OLENG-(SUMSIZ+HOLES)                                       ROFF     1636
      IF (RSPACE.LE.0) GO TO 5                                          ROFF     1637
C     BLANK OUT BUFFER                                                  ROFF     1638
      DO 1 I=BUFFL,OLENG                                                ROFF     1639
      OVLINE(I)=BLANK                                                   ROFF     1640
    1 OUT(I)=BLANK                                                      ROFF     1641
C     K IS POINTER IN TARGET                                            ROFF     1642
      K=OLENG                                                           ROFF     1643
C     MOVE THE CHARS                                                    ROFF     1644
    2 IF (OUT(J).EQ.BLANK) GO TO 4                                      ROFF     1645
      OUT(K)=OUT(J)                                                     ROFF     1646
      OUT(J)=BLANK                                                      ROFF     1647
      IF (.NOT.OVERSW) GO TO 3                                          ROFF     1648
      OVLINE(K)=OVLINE(J)                                               ROFF     1649
      OVLINE(J)=BLANK                                                   ROFF     1650
    3 CONTINUE                                                          ROFF     1651
      K=K-1                                                             ROFF     1652
      J=J-1                                                             ROFF     1653
      GO TO 2                                                           ROFF     1654
C     WORD IS MOVED.  RESET POINTERS TO INSERT BLANKS                   ROFF     1655
C     IF SPACES GO EVENLY AMONG HOLES, NO PROB. OTHERWISE, ADD EXTRAS   ROFF     1656
C     NBL IS NUMBER OF EXTRA BLANKS                                     ROFF     1657
    4 NBL=RSPACE/HOLES                                                  ROFF     1658
      IF (RSPACE.NE.NBL*HOLES) NBL=NBL+IRV(1)                           ROFF     1659
C     REMAINING SPACES                                                  ROFF     1660
      RSPACE=RSPACE-NBL                                                 ROFF     1661
      IF (RSPACE.LE.0) GO TO 5                                          ROFF     1662
      HOLES=HOLES-1                                                     ROFF     1663
      K=K-NBL-1                                                         ROFF     1664
      J=J-1                                                             ROFF     1665
      GO TO 2                                                           ROFF     1666
C                                                                       ROFF     1667
    5 NWORD=0                                                           ROFF     1668
      BUFFL=OLENG                                                       ROFF     1669
      RETURN                                                            ROFF     1670
      END                                                               ROFF     1671
```

SUBROUTINE NUMBER

```
      SUBROUTINE NUMBER (LEFT,N,RIGHT,IN,I,J,COPYSW)                    ROFF      1672
C     SUBROUTINE TO INSERT THE NUMBER IN LITERALS SPECIFIED BY N        ROFF      1673
C     SURROUNDED BY THE CHARACTERS SPECIFIED BY LEFT AND RIGHT          ROFF      1674
C     STARTING AT POSITION J AND MOVING THE INPUT LINE TO THE RIGHT     ROFF      1675
C     TO ELIMINATE OVERWRITING.                                         ROFF      1676
C     IMPLICIT INTEGER (A-Z)                                            ROFF      1677
      INTEGER ULINE                                                     ROFF      1678
      INTEGER PRU,RIGHT,POW10                                           ROFF      1679
      COMMON /INBUF/ INN(99),ULINE(99),PRU,INLENG,INL1                  ROFF      1680
      COMMON /SPP/ SP                                                   ROFF      1681
      DIMENSION IN(130)                                                 ROFF      1682
C     FINE OUT HOW MANY DIGITS TO WRITE                                 ROFF      1683
      LOGICAL COPYSW,SP                                                 ROFF      1684
      POW10=0                                                           ROFF      1685
    1 POW10=POW10+1                                                     ROFF      1686
      IF (N.GE.10**POW10) GO TO 1                                       ROFF      1687
C     DO WE HAVE TO MOVE THE INPUT CARD OVER                            ROFF      1688
      IMOVE=POW10+1-I+J                                                 ROFF      1689
      IF (SP) IMOVE=IMOVE+1                                             ROFF      1690
      IF (COPYSW.OR.IMOVE.LE.0) GO TO 4                                 ROFF      1691
      IF (I.EQ.INL1-1) GO TO 3                                          ROFF      1692
C     HOW MANY COLUMNS DO WE MOVE                                       ROFF      1693
      NMOVE=INL1-I-1                                                    ROFF      1694
      DO 2 K=1,NMOVE                                                    ROFF      1695
    2 IN(INL1+IMOVE-K)=IN(INL1-K)                                       ROFF      1696
    3 INL1=INL1+IMOVE                                                   ROFF      1697
C     PUT IN THE NUMBERS                                                ROFF      1698
    4 I2=0                                                              ROFF      1699
      DO 5 K=1,POW10                                                    ROFF      1700
      I1=N/10**(POW10-K)                                                ROFF      1701
      IN(J+K)=240+I1-10*I2                                              ROFF      1702
    5 I2=I1                                                             ROFF      1703
C     PUT IN THE BRACKETS ETC.                                          ROFF      1704
      IN(J)=LEFT                                                        ROFF      1705
      IN(J+POW10+1)=RIGHT                                               ROFF      1706
C     UPDATE THE POINTERS                                               ROFF      1707
      IF (SP) IN(J+POW10+2)=1                                           ROFF      1708
      I=I+1+MAX0(IMOVE,0)                                               ROFF      1709
      J=J+POW10+2                                                       ROFF      1710
      IF (SP) J=J+1                                                     ROFF      1711
      SP=.FALSE.                                                        ROFF      1712
      RETURN                                                            ROFF      1713
      END                                                               ROFF      1714
```

```
       FUNCTION     INTEG

       INTEGER FUNCTIONINTEG(IN,START,DEFLT)                           ROFF      1715
C      PICK UP AN INTEGER IN IN(START) ... IN(82).  IF BLANK, RETURN DFL ROFF     1716
C       IMPLICIT INTEGER(A-Z)                                          ROFF      1717
       INTEGER BLANK,START,DEFLT                                       ROFF      1718
       DIMENSION IN(82)                                                ROFF      1719
       DATA BLANK/64/                                                  ROFF      1720
       DO 1 I=START,81                                                 ROFF      1721
       IF (IN(I).NE.BLANK) GO TO 2                                     ROFF      1722
1      CONTINUE                                                        ROFF      1723
C      FALL OUT, BLANK, GIVE DEFAULT VALUE                             ROFF      1724
       INTEG=DEFLT                                                     ROFF      1725
       RETURN                                                          ROFF      1726
C                                                                      ROFF      1727
C      NORMAL PATH                                                     ROFF      1728
2      INTEG=IN(I)-240                                                 ROFF      1729
3      I=I+1                                                           ROFF      1730
       JTEMP=IN(I)                                                     ROFF      1731
       IF (JTEMP.EQ.BLANK) RETURN                                      ROFF      1732
       INTEG=10*INTEG+(JTEMP-240)                                      ROFF      1733
       GO TO 3                                                         ROFF      1734
       END                                                             ROFF      1735
```

SUBROUTINE TRANS

```
      SUBROUTINE TRANS (BUF,LEN)
C      IMPLICIT INTEGER (A-Z)
C
C     TRANSLATE THE CHARACTERS IN THE OUTPUT BUFFER TO FINAL PRINT FORM
C     ACCORDING TO TRTAB
C
      DIMENSION IN(81)
      INTEGER TRTAB,BLANK,PERCEN,C1,C2,START
      INTEGER BUF(130)
      COMMON /SR2/ TRTAB(256)
      DATA BLANK,INBLNK,PERCEN/64,1,108/
C
      DO 1 I=1,LEN
      IBUF=BUF(I)
      BUF(I)=TRTAB(IBUF)
1     CONTINUE
      RETURN
C
C
      ENTRY TR
C
C
C      ENTRY TR(IN,START)
C
      DO 2 I=1,81
2     IN(I)=BUF(I)
      START=LEN
C     EXTRACT C1 AND C2 FROM THE INPUT CONTROL CARD AND PLACE INTO TABL
      DO 3 I=START,80
      IF (IN(I).NE.BLANK) GO TO 4
3     CONTINUE
C     IF NO CHARACTERS ON CARD, RETURN
      RETURN
C     WE NOW HAVE C1
4     C1=IN(I)
      I=I+1
      DO 5 J=I,81
      IF (IN(J).NE.BLANK) GO TO 6
5     CONTINUE
C
C     C2 WILL BE BLANK IF NOT SPECIFIED
      C2=BLANK
      GO TO 7
6     C2=IN(J)
7     TRTAB(C1)=C2
      RETURN
C
      ENTRY INITTR
C     INITIALIZE THE TABLE
C
      DO 8 I=1,255
      TRTAB(I)=I
8     CONTINUE
      TRTAB(PERCEN)=BLANK
      TRTAB(INBLNK)=BLANK
```

```
SUBROUTINE  TRANS

RETURN                                                          ROFF      1791
END                                                             ROFF      1792
```

SUBROUTINE SEARCH

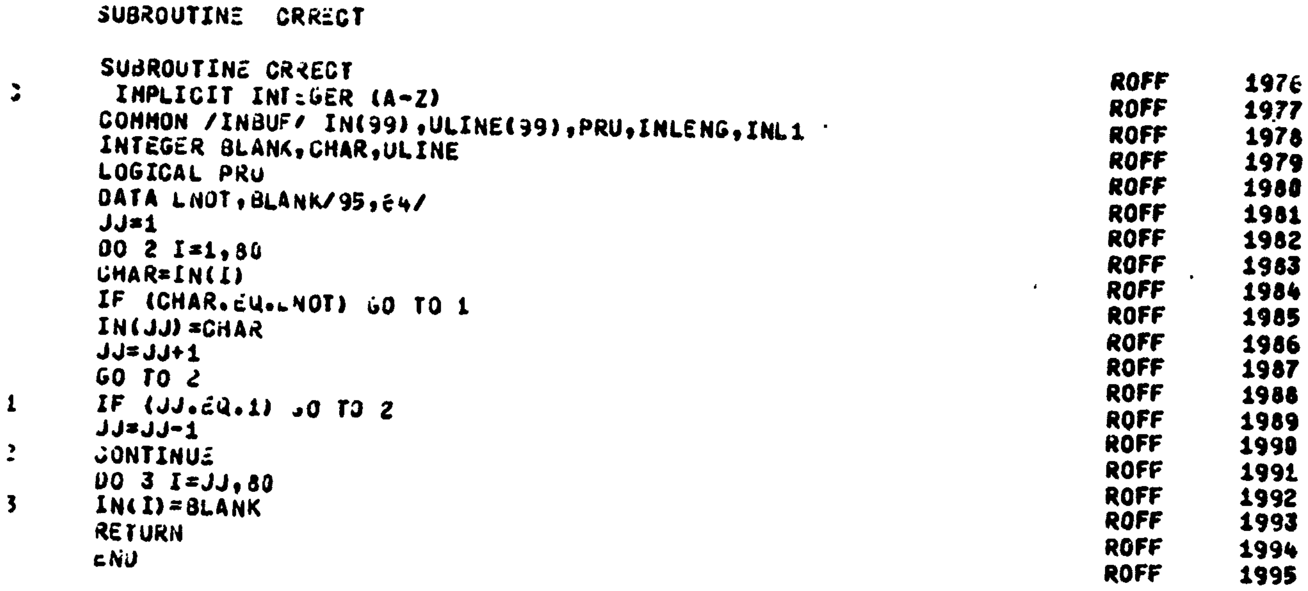
```
      SUBROUTINE SEARCH (IN,START1,INIJ)                                 ROFF  1793
C      SUBROUTINE SEARCH (IN,START1,*)                                   ROFF  1794
C      IMPLICIT INTEGER(A-Z)                                             ROFF  1795
      INTEGER START1                                                     ROFF  1796
      INTEGER ADD,BLANK,COLUMN,COR,CORECT,COR1,COR2,END,SIGNAL,START     ROFF  1797
      COMMON /SR3/ ITAB(256)                                             ROFF  1798
      DIMENSION CORECT(22,20), IN(1)                                     ROFF  1799
      COMMON /SR/ COLUMN,INL2                                            ROFF  1800
      DATA BLANK/6+/                                                     ROFF  1801
      INIJ=0                                                             ROFF  1802
      IF (COLUMN.GE.20) INIJ=2                                           ROFF  1803
      IF (COLUMN.GE.20) RETURN                                           ROFF  1804
C     IF(COLUMN.GE.20)RETURN1                                            ROFF  1805
      START=START1                                                       ROFF  1806
      DO 1 I=START,80                                                    ROFF  1807
      IF (IN(I).NE.BLANK) GO TO 2                                        ROFF  1808
    1 CONTINUE                                                           ROFF  1809
C                                                                        ROFF  1810
C     NO STRINGS WERE LOCATED                                            ROFF  1811
C                                                                        ROFF  1812
      RETURN                                                             ROFF  1813
    2 SIGNAL=IN(I)                                                       ROFF  1814
      START=I+1                                                          ROFF  1815
      IF (START.GE.80) RETURN                                            ROFF  1816
C     INITIALIZE WORD LENGTHS                                            ROFF  1817
      LENG1=0                                                            ROFF  1818
      LENG2=0                                                            ROFF  1819
      END=START+10                                                       ROFF  1820
      DO 3 I=START,END                                                   ROFF  1821
      IF (IN(I).EQ.SIGNAL) GO TO 4                                       ROFF  1822
      LENG1=LENG1+1                                                      ROFF  1823
    3 CORECT(LENG1+2,COLUMN+1)=IN(I)                                     ROFF  1824
      INIJ=2                                                             ROFF  1825
      RETURN                                                             ROFF  1826
C     RETURN1                                                            ROFF  1827
    4 CORECT(1,COLUMN+1)=LENG1                                           ROFF  1828
      START=I+1                                                          ROFF  1829
      END=START+9                                                        ROFF  1830
      DO 5 I=START,END                                                   ROFF  1831
      LENG2=LENG2+1                                                      ROFF  1832
      IF (IN(I).EQ.SIGNAL) GO TO 5                                       ROFF  1833
    5 CORECT(LENG2+12,COLUMN+1)=IN(I)                                    ROFF  1834
      IF (IN(END+1).EQ.SIGNAL) GO TO 6                                   ROFF  1835
      INIJ=2                                                             ROFF  1836
      RETURN                                                             ROFF  1837
C     RETURN1                                                            ROFF  1838
    6 CORECT(2,COLUMN+1)=LENG2                                           ROFF  1839
      COLUMN=COLUMN+1                                                    ROFF  1840
      RETURN                                                             ROFF  1841
C     **********************                                             ROFF  1842
      ENTRY SPELL                                                        ROFF  1843
C     **********************                                             ROFF  1844
      INL1=START1                                                        ROFF  1845
C      ENTRY SPELL (IN,INL1)                                             ROFF  1846
      IF (COLUMN.EQ.0) RETURN                                            ROFF  1847
      SUBROUTINE  SEARCH
      INL2=INL1                                                          ROFF      1848
C     LOOP FOR EACH WORD TO BE CHECKED                                   ROFF      1849
      DO 15 I=1,COLUMN                                                   ROFF      1850
      END=INL2+1-CORECT(1,I)                                             ROFF      1851
      J=0                                                                ROFF      1852
C     LOOK FOR FIRST LETTER                                              ROFF      1853
7     J=J+1                                                              ROFF      1854
      IF (J.GT.END)  GO TO 15                                            ROFF      1855
      IF (IN(J).NE.CORECT(3,I))  GO TO 7                                 ROFF      1856
C     CHECK FOR REST OF WORD                                             ROFF      1857
      COR=CORECT(1,I)+J-1                                                ROFF      1858
      DO 8 K=J,COR                                                       ROFF      1859
      IF (IN(K).NE.CORECT(K+3-J,I))  GO TO 7                             ROFF      1860
8     CONTINUE                                                           ROFF      1861
C     WHICH WAY DO WE MOVE THE REST OF THE CARD                          ROFF      1862
      ADD=CORECT(2,I)-CORECT(1,I)                                        ROFF      1863
      IF (ADD.EQ.0)  GO TO 13                                            ROFF      1864
C     MOVE LEFT                                                          ROFF      1865
      COR1=COR+1                                                         ROFF      1866
      IF (ADD.GT.0)  GO TO 10                                            ROFF      1867
      DO 9 K=COR1,INL2                                                   ROFF      1868
      KADD=K+ADD                                                         ROFF      1869
9     IN(KADD)=IN(K)                                                     ROFF      1870
C     114  IN(K+ADD)=IN(K)                                               ROFF      1871
      GO TO 12                                                           ROFF      1872
C     MOVE RIGHT                                                         ROFF      1873
10    CONTINUE                                                           ROFF      1874
      DO 11 K=COR1,INL2                                                  ROFF      1875
      KK=INL2+COR1-K                                                     ROFF      1876
11    IN(KKADD)=IN(KK)                                                   ROFF      1877
      KKADD=KK+ADD                                                       ROFF      1878
C     116  IN(KK+ADD)=IN(KK)                                             ROFF      1879
12    CONTINUE                                                           ROFF      1880
      INL2=INL2+ADD                                                      ROFF      1881
      END=END+ADD                                                        ROFF      1882
C     PUT IN CHANGE WORD                                                 ROFF      1883
      IF (CORECT(2,I).EQ.0)  GO TO 15                                    ROFF      1884
13    COR2=COR+ADD                                                       ROFF      1885
      DO 14 K=J,COR2                                                     ROFF      1886
14    IN(K)=CORECT(13+K-J,I)                                             ROFF      1887
15    CONTINUE                                                           ROFF      1888
      RETURN                                                             ROFF      1889
      END                                                                ROFF      1890
```

SUBROUTINE FILL

```
      SUBROUTINE FILL
C      IMPLICIT INTEGER(A-Z)
      INTEGER BLANK,BUFFL,B1,CC,OLENG,OUT,OVLINE,PAGEL,PAGENO,PCC,PSW,RN
     1UMSW,SB,START,ULINE
      INTEGER COLUMN
      COMMON /INBUF/ IN(99),ULINE(99),PRU,INLENG,INL1
      COMMON /OPARM/ CC,PCC,INDENT,PAGENO,LINECT,PAGEL,PHONSW,RNUMSW
      LOGICAL PHONSW
      COMMON /OUTBUF/ OUT(130),OVLINE(130),BUFFL,OVERSW,NWORD,OLENG,PSW,
     1LENMAX
      COMMON /SWITCH/ ADSW,FILLSW
      LOGICAL PRU,OVERSW,ADSW
      LOGICAL FILLSW,SPELSW
      COMMON /SR4/ SPELSW
      COMMON /SR/ COLUMN,INL2
      DATA BLANK/64/
      INL2=INL1
      IF (.NOT.SPELSW) GO TO 1
      CALL SPELL (IN,INL1)
C     FIND FIRST NON-BLANK IN THE LINE
 1    DO 2 I=1,INL2
      IF (IN(I).NE.BLANK) GO TO 3
 2    CONTINUE
C     GET HERE IF INPUT IS A BLANK LINE
      RETURN
C     FOUND NON-BLANK. LOOK FOR BLANK
 3    START=I
      DO 4 I=START,INL2
      IF (IN(I).EQ.BLANK) GO TO 5
 4    CONTINUE
C     GET HERE FOR BLAN
 5    LWORD=I-START
C     TOO BIG FOR BUFFER
C     BUFFL IS LAST BLANK IN OUTPUT BUFFER
 6    IF (LWORD+BUFFL.GT.OLENG) GO TO 12
C     NO, SO PUT WORD INTO BUFFER
 7    NWORD=NWORD+1
      SB=START-BUFFL-1
      B1=BUFFL+1
      BUFFL=BUFFL+LWORD+1
      DO 8 J=B1,BUFFL
      OUT(J)=IN(SB+J)
 8    CONTINUE
C     PUT IN OVERSTRICKE LINE IF NEEDED
      IF (.NOT.PRU) GO TO 10
C     SET OVERSTRIKE SW TO REMEMBER FOR OUTPUT
      OVERSW=.TRUE.
      DO 9 J=B1,BUFFL
 9    OVLINE(J)=ULINE(SB+J)
C
C     LOOK FOR NEXT NON-BLANK. CAREFUL ABOUT FALLING OFF END
 10   START=I
      DO 11 I=START,INL1
      IF (IN(I).NE.BLANK) GO TO 3
 11   CONTINUE
```

```
      SUBROUTINE  FILL

C     END OF LINE READING BLANKS, IF GET HERE.  QUIT                     ROFF     1946
      IF (PRU) GO TO 14                                                  ROFF     1947
      RETURN                                                             ROFF     1948
C                                                                        ROFF     1949
C     COME HERE TO CHECK FOR RJUST.                                      ROFF     1950
12    CONTINUE                                                           ROFF     1951
      IF (IN(I-1).EQ.1.AND.LWORD-1+BUFFL.EQ.OLENG) GO TO 16              ROFF     1952
      IF (OUT(BUFFL-1).NE.1) GO TO 13                                    ROFF     1953
C     KNOCK OUT EXTRA SPACE AFTER PERIOD IF AT LINE END                  ROFF     1954
      BUFFL=BUFFL-1                                                      ROFF     1955
      OUT(BUFFL)=BLANK                                                   ROFF     1956
13    IF (ADSW) CALL ADJUST                                              ROFF     1957
C     FLUSH THE OUTPUT BUFFER                                            ROFF     1958
      CALL FLUSH                                                         ROFF     1959
C     AND TRY THE LAST WORD AGAIN                                        ROFF     1960
      IF(LWORD+BUFFL.LE.OLENG) GO TO 7                                   ROFF     1961
C     WORD IS TOO BIG FOR LINE -- BREAK IT UP                            ROFF     1962
      LWORD=OLENG-BUFFL                                                  ROFF     1963
      I=START+OLENG                                                      ROFF     1964
      GO TO 6                                                            ROFF     1965
C     BLANK OUT UNDERLINE                                                ROFF     1966
14    PRU=.FALSE.                                                        ROFF     1967
      DO 15 I=1,INLENG                                                   ROFF     1968
15    ULINE(I)=BLANK                                                     ROFF     1969
      RETURN                                                             ROFF     1970
C     PERIOD COMES RIGHT TO LINE END - KILL EXTRA SPACE                  ROFF     1971
16    LWORD=LWORD-1                                                      ROFF     1972
      IN(I-1)=BLANK                                                      ROFF     1973
      GO TO 7                                                            ROFF     1974
      END                                                                ROFF     1975
```



```
        SUBROUTINE  CRRECT

        SUBROUTINE CRRECT                                                    ROFF     1976
         IMPLICIT INTEGER (A-Z)                                              ROFF     1977
        COMMON /INBUF/ IN(99),ULINE(99),PRU,INLENG,INL1                      ROFF     1978
        INTEGER BLANK,CHAR,ULINE                                             ROFF     1979
        LOGICAL PRU                                                          ROFF     1980
        DATA LNOT,BLANK/95,64/                                               ROFF     1981
        JJ=1                                                                 ROFF     1982
        DO 2 I=1,80                                                          ROFF     1983
        CHAR=IN(I)                                                           ROFF     1984
        IF (CHAR.EQ.LNOT) GO TO 1                                            ROFF     1985
        IN(JJ)=CHAR                                                          ROFF     1986
        JJ=JJ+1                                                              ROFF     1987
        GO TO 2                                                              ROFF     1988
1       IF (JJ.EQ.1) GO TO 2                                                 ROFF     1989
        JJ=JJ-1                                                              ROFF     1990
2       CONTINUE                                                             ROFF     1991
        DO 3 I=JJ,80                                                         ROFF     1992
3       IN(I)=BLANK                                                          ROFF     1993
        RETURN                                                               ROFF     1994
        END                                                                  ROFF     1995
```

```
      FUNCTION    IRV

      INTEGER FUNCTIONIRV(DUMMY)                                        ROFF    1996
      INTEGER DUMMY                                                     ROFF    1997
      X=RANF(0)                                                         ROFF    1998
C     X IS UNIFORM ON 0,1 SO IRV IS EITHER 0 OR 1                       ROFF    1999
      IRV=X+0.5                                                         ROFF    2000
      RETURN                                                            ROFF    2001
      END                                                               ROFF    2002
```

SUBROUTINE EQROFF

```
      SUBROUTINE EQROFF                                                 ROFF    2003
C      IMPLICIT INTEGER (A-Z)                                           ROFF    2004
      INTEGER BOTH,CPLACE,DIFF,EX,EXC,FINAL,FO,OB,OVLINE,PLACE,PL5,RP,RP ROFF   2005
     1LACE,TOP,ULINE,UUT                                                ROFF    2006
      INTEGER BUFFL,ZMOVE                                               ROFF    2007
      LOGICAL PSW                                                       ROFF    2008
      COMMON /INBUF/ IN(99),ULINE(99),PRU,INLENG,INL1                   ROFF    2009
      COMMON /EQBUF/ FINAL(200,4),LMIN,LMAX,EQSW                        ROFF    2010
      COMMON /OUTBUF/ UUT(130),OVLINE(130),BUFFL,OVERSW,NWORD,LL,PSW,LEN ROFF   2011
     1MAX                                                               ROFF    2012
      LOGICAL OVERSW,PRU                                                ROFF    2013
      LOGICAL ADSW,FILLSW                                               ROFF    2014
      COMMON /SWITCH/ ADSW,FILLSW                                       ROFF    2015
      LOGICAL EQSW                                                      ROFF    2016
      DIMENSION LENGTH(4)                                               ROFF    2017
      INTEGER POS,OLIN,OP5,FRAC,Q2,Q4,Z,PP,OEND,P5,Y,UP                 ROFF    2018
      INTEGER FRACO(2,50,2),OUT(10,500)                                 ROFF    2019
      LOGICAL CRASH,SUPSW,SUBSW,RJSW,CESW,DIOGEN,OVLSW,ATSW,OVCK        ROFF    2020
      INTEGER AMPER,ATSIGN,BLANK,CENT,CFLEX,COLON,DASH,DOLLAR,EXCLAM,GRA ROFF   2021
     1VE,PERIOD,QM,QUOTE2,SHARP,LNOT,MP1211,082,PERCEN,USCORE           ROFF    2022
      DATA MC/0/,FRAC/0/,BOTH/0/,LINE/3/                                ROFF    2023
      DATA FRACO/200*0/,OUT/5000*0/                                     ROFF    2024
      DATA CRASH/.FALSE./                                               ROFF    2025
      DATA SUPSW/.FALSE./,SUBSW/.FALSE./,RJSW/.FALSE./,CESW/.FALSE./,DIO ROFF   2026
     1GEN/.FALSE./,OVLSW/.FALSE./,ATSW/.FALSE./,OVCK/.FALSE./           ROFF    2027
      DATA AMPER/80/,ATSIGN/124/,BLANK/64/,CENT/74/,CFLEX/190/,COLON/122 ROFF   2028
     1/,DASH/96/,DOLLAR/91/,EXCLAM/90/,GRAVE/121/,LNOT/95/,MP1211/106/,0 ROFF   2029
     282/224/,PERCEN/108/,PERIOD/75/,QM/111/,QUOTE2/127/,SHARP/123/,USCO ROFF   2030
     3RE/109/                                                           ROFF    2031
      IF (FILLSW) CALL FLUSH                                            ROFF    2032
      CALL WRBLNK (2)                                                   ROFF    2033
      EQSW=.TRUE.                                                       ROFF    2034
      DO 3 J=1,200                                                      ROFF    2035
      DO 3 I=1,4                                                        ROFF    2036
3     FINAL(J,I)=BLANK                                                  ROFF    2037
      DO 4 K=1,10                                                       ROFF    2038
      DO 4 I=5,500,5                                                    ROFF    2039
4     OUT(K,I)=BLANK                                                    ROFF    2040
      DO 5 I=1,80                                                       ROFF    2041
5     IN(I)=BLANK                                                       ROFF    2042
6     CALL PRE (IN,1,INLENG,IEO)                                        ROFF    2043
      CALL CRRECT                                                       ROFF    2044
      IF (IN(1).EQ.PERIOD) GO TO 49                                     ROFF    2045
C                                                                       ROFF    2046
C                                                                       ROFF    2047
      DO 48 II=1,80                                                     ROFF    2048
      INIIII=IN(II)                                                     ROFF    2049
      IF (INIIII.EQ.BLANK) GO TO 48                                     ROFF    2050
      IF (ATSW) GO TO 7                                                 ROFF    2051
      IF (INIIII.EQ.QM) GO TO 12                                        ROFF    2052
      IF (INIIII.EQ.QUOTE2) GO TO 13                                    ROFF    2053
      IF (INIIII.EQ.AMPER) GO TO 26                                     ROFF    2054
      IF (INIIII.EQ.MP1211) GO TO 44                                    ROFF    2055
      IF (INIIII.EQ.SHARP) GO TO 18                                     ROFF    2056
      IF (INIIII.EQ.GRAVE) GO TO 38                                     ROFF    2057
      SUBROUTINE  EQROFF

      IF (INIIII.EQ.OB2) GO TO 14                                       ROFF      2058
      IF (INIIII.EQ.CENT) GO TO 9                                       ROFF      2059
      IF (INIIII.EQ.USCORE) GO TO 10                                    ROFF      2060
      IF (INIIII.EQ.ATSIGN) GO TO 11                                    ROFF      2061
      IF (INIIII.EQ.DOLLAR) GO TO 9                                     ROFF      2062
      IF (INIIII.EQ.CFLEX) GO TO 9                                      ROFF      2063
      MC=MIN0(MC+1,99)                                                  ROFF      2064
      POS=5*MC                                                          ROFF      2065
      IF (INIIII.EQ.PERIOD.OR.INIIII.EQ.EXCLAM.OR.INIIII.EQ.COLON) OUT(L ROFF      2066
     1INE,POS+4)=DOLLAR                                                 ROFF      2067
      GO TO 8                                                           ROFF      2068
7     POS=5*MC+2                                                        ROFF      2069
      ATSW=.FALSE.                                                      ROFF      2070
8     OUT(LINE,POS)=INIIII                                              ROFF      2071
      GO TO 48                                                          ROFF      2072
9     POS=5*MC+4                                                        ROFF      2073
      GO TO 8                                                           ROFF      2074
10    POS=5*MC+3                                                        ROFF      2075
      GO TO 8                                                           ROFF      2076
11    POS=5*MC+1                                                        ROFF      2077
      ATSW=.TRUE.                                                       ROFF      2078
      GO TO 8                                                           ROFF      2079
C                                                                       ROFF      2080
C                                                                       ROFF      2081
12    IF (FRAC.NE.0.OR.BOTH.EQ.1) GO TO 48                              ROFF      2082
      SUPSW=.NOT.SUPSW                                                  ROFF      2083
      IF (SUPSW) LINE=LINE-1                                            ROFF      2084
      IF (.NOT.SUPSW) LINE=LINE+1                                       ROFF      2085
      GO TO 48                                                          ROFF      2086
13    IF (FRAC.NE.0.OR.BOTH.EQ.2) GO TO 48                              ROFF      2087
      SUBSW=.NOT.SUBSW                                                  ROFF      2088
      IF (SUBSW) LINE=LINE+1                                            ROFF      2089
      IF (.NOT.SUBSW) LINE=LINE-1                                       ROFF      2090
      GO TO 48                                                          ROFF      2091
14    IF (FRAC.NE.0) GO TO 48                                           ROFF      2092
      OVLSW=.FALSE.                                                     ROFF      2093
      BOTH=BOTH+1                                                       ROFF      2094
      IF (BOTH-2) 15,16,17                                              ROFF      2095
15    PLACE=MC                                                          ROFF      2096
      IF (SUPSW.OR.SUBSW) GO TO 48                                      ROFF      2097
      LINE=LINE-1                                                       ROFF      2098
      SUPSW=.TRUE.                                                      ROFF      2099
      GO TO 48                                                          ROFF      2100
16    TOP=MC                                                            ROFF      2101
      MC=PLACE                                                          ROFF      2102
      IF (SUBSW.OR..NOT.SUPSW) GO TO 48                                 ROFF      2103
      LINE=LINE+2                                                       ROFF      2104
      SUPSW=.FALSE.                                                     ROFF      2105
      SUBSW=.TRUE.                                                      ROFF      2106
      GO TO 48                                                          ROFF      2107
17    SUBSW=.FALSE.                                                     ROFF      2108
      SUPSW=.FALSE.                                                     ROFF      2109
      BOTH=0                                                            ROFF      2110
      MC=MIN0(MAX0(MC,TOP),99)                                          ROFF      2111
      LINE=3                                                            ROFF      2112
      SUBROUTINE  EQROFF

      IF (RJSW.OR.CESW) LINE=9                                          ROFF     2113
      GO TO 48                                                          ROFF     2114
   18 OVLSW=.NOT.OVLSW                                                  ROFF     2115
      IF (.NOT.OVLSW) GO TO 19                                          ROFF     2116
      OP5=5*(MC+1)                                                      ROFF     2117
      GO TO 48                                                          ROFF     2118
   19 IF (FRAC.NE.0) GO TO 25                                           ROFF     2119
      OLIN=LINE-1                                                       ROFF     2120
      OP5=MIN0(OP5,495)                                                 ROFF     2121
      OUT(OLIN,OP5-2)=USCORE                                            ROFF     2122
      MC5=MAX0(5*MC,OP5)                                                ROFF     2123
      IF (BOTH.EQ.2) GO TO 22                                           ROFF     2124
      DO 20 I=OP5,MC5,5                                                 ROFF     2125
   20 OUT(OLIN,I)=PERCEN                                                ROFF     2126
   21 OUT(OLIN,MC5+1)=USCORE                                            ROFF     2127
      GO TO 48                                                          ROFF     2128
   22 DO 23 I=OP5,MC5,5                                                 ROFF     2129
      IF (OUT(OLIN,I).EQ.BLANK) OUT(OLIN,I)=PERCEN                      ROFF     2130
   23 CONTINUE                                                          ROFF     2131
      IF (OUT(OLIN,MC5+1).EQ.ATSIGN) GO TO 24                           ROFF     2132
      GO TO 21                                                          ROFF     2133
   24 OUT(OLIN,MC5+1)=O82                                               ROFF     2134
      GO TO 48                                                          ROFF     2135
   25 JF=JF+1                                                           ROFF     2136
      FRACO(FRAC,JF,1)=OP5                                              ROFF     2137
      FRACO(FRAC,JF,2)=MAX0(5*MC,OP5)                                   ROFF     2138
      GO TO 48                                                          ROFF     2139
   26 FRAC=FRAC+1                                                       ROFF     2140
      IF (FRAC-2) 27,28,29                                              ROFF     2141
   27 BOTH=0                                                            ROFF     2142
      SUPSW=.FALSE.                                                     ROFF     2143
      SUBSW=.FALSE.                                                     ROFF     2144
      OVLSW=.FALSE.                                                     ROFF     2145
      PLACE=MC                                                          ROFF     2146
      MC=0                                                              ROFF     2147
      LINE=5                                                            ROFF     2148
      JF=0                                                              ROFF     2149
      GO TO 48                                                          ROFF     2150
   28 TOP=MC                                                            ROFF     2151
      MC=0                                                              ROFF     2152
      LINE=6                                                            ROFF     2153
      JF=0                                                              ROFF     2154
      GO TO 48                                                          ROFF     2155
   29 FRAC=0                                                            ROFF     2156
      ZMOVE=0                                                           ROFF     2157
      LINE=3                                                            ROFF     2158
      IF (RJSW.OR.CESW) LINE=9                                          ROFF     2159
      Q2=5*PLACE                                                        ROFF     2160
      Q4=Q2                                                             ROFF     2161
      DIFF=MC-TOP                                                       ROFF     2162
      EX=((IABS(DIFF)+1)/2)*5                                           ROFF     2163
      IF (DIFF) 30,32,31                                                ROFF     2164
   30 Q4=Q4+EX                                                          ROFF     2165
      ZMOVE=2                                                           ROFF     2166
      MC=TOP                                                            ROFF     2167
      SUBROUTINE  EQROFF

      GO TO 32                                                          ROFF    2168
31    Q2=Q2+EX                                                          ROFF    2169
      ZMOVE=1                                                           ROFF    2170
32    MD=MIN0(5*MC+4,500-MAX0(Q2,Q4))                                   ROFF    2171
      DO 33 J=3,MD                                                      ROFF    2172
      OUT(LINE-1,J+Q2)=OUT(5,J)                                         ROFF    2173
      OUT(LINE+1,J+Q4)=OUT(6,J)                                         ROFF    2174
      DO 33 Z=5,6                                                       ROFF    2175
      OUT(Z,J)=0                                                        ROFF    2176
      IF (MOD(J,5).EQ.0) OUT(Z,J)=BLANK                                 ROFF    2177
33    CONTINUE                                                          ROFF    2178
      MC=MIN0(MC+PLACE,99)                                              ROFF    2179
      MC5=5*MC                                                          ROFF    2180
      PL5=5*PLACE                                                       ROFF    2181
      PP=MIN0(PL5+5,495)                                                ROFF    2182
      MC5=MAX0(MC5,PP)                                                  ROFF    2183
      DO 34 I=PP,MC5,5                                                  ROFF    2184
34    OUT(LINE,I)=DASH                                                  ROFF    2185
      DO 37 Z=1,2                                                       ROFF    2186
      OLIN=LINE+2*Z-4                                                   ROFF    2187
      DO 36 JE=1,50                                                     ROFF    2188
      FO=FRACO(Z,JE,1)                                                  ROFF    2189
      IF (FO.EQ.0) GO TO 37                                             ROFF    2190
      MOVE=PL5                                                          ROFF    2191
      IF (Z.EQ.ZMOVE) MOVE=MOVE+EX                                      ROFF    2192
      OP5=MIN0(FO+MOVE,495)                                             ROFF    2193
      OEND=MIN0(FRACO(Z,JE,2)+MOVE,495)                                 ROFF    2194
      FRACO(Z,JE,1)=0                                                   ROFF    2195
      FRACO(Z,JE,2)=0                                                   ROFF    2196
      OUT(OLIN,OP5-1)=USCORE                                            ROFF    2197
      OUT(OLIN,OEND+1)=USCORE                                           ROFF    2198
      IF (Z.EQ.2) GO TO 36                                              ROFF    2199
      DO 35 Y=OP5,OEND,5                                                ROFF    2200
35    OUT(OLIN,Y)=PERCEN                                                ROFF    2201
36    CONTINUE                                                          ROFF    2202
37    CONTINUE                                                          ROFF    2203
      GO TO 48                                                          ROFF    2204
38    IF (CESW.OR.FRAC.NE.0) GO TO 47                                   ROFF    2205
      OVLSW=.FALSE.                                                     ROFF    2206
      RJSW=.NOT.RJSW                                                    ROFF    2207
      IF (.NOT.RJSW) GO TO 39                                           ROFF    2208
      RPLACE=40                                                         ROFF    2209
      MC=0                                                              ROFF    2210
      LINE=9                                                            ROFF    2211
      GO TO 48                                                          ROFF    2212
39    PLACE=LL-2-MC                                                     ROFF    2213
      RP=MIN0(RPLACE+2,99)                                              ROFF    2214
      IF (PLACE.GE.RP) GO TO 42                                         ROFF    2215
      IF (DIOCEN.AND.CPLACE.NE.0) GO TO 40                              ROFF    2216
      PLACE=RP                                                          ROFF    2217
      GO TO 42                                                          ROFF    2218
40    EXC=MIN0(RP-PLACE,CPLACE)                                         ROFF    2219
      NUCP=CPLACE-EXC                                                   ROFF    2220
      N5=5*NUCP                                                         ROFF    2221
      DO 41 I=1,4                                                       ROFF    2222
      SUBROUTINE  EQROFF

      DO 41 J=3,MD
      JS=J+P5                                                   ROFF    2223
      OUT(I,J+P5)=OUT(I,JS)                                     ROFF    2224
      OUT(I,JS)=0                                               ROFF    2225
      IF (MOD(JS,5).EQ.0) OUT(I,JS)=BLANK                       ROFF    2226
41    CONTINUE                                                  ROFF    2227
      PLACE=MAX0(PLACE,RP-EXC)                                  ROFF    2228
42    MD=5*MC+4                                                 ROFF    2229
      MC=MIN0(MC+PLACE,99)                                      ROFF    2230
      P5=5*PLACE                                                ROFF    2231
      MD=MIN0(MD,500-P5)                                        ROFF    2232
      DO 43 I=1,4                                               ROFF    2233
      I6=I+6                                                    ROFF    2234
      DO 43 J=3,MD                                              ROFF    2235
      OUT(I,J+P5)=OUT(I6,J)                                     ROFF    2236
      OUT(I6,J)=0                                               ROFF    2237
      IF (MOD(J,5).EQ.0) OUT(I6,J)=BLANK                        ROFF    2238
43    CONTINUE                                                  ROFF    2239
      LINE=3                                                    ROFF    2240
      GO TO 48                                                  ROFF    2241
44    IF (RJSW.OR.FRAC.NE.0) GO TO 47                           ROFF    2242
      OVLSW=.FALSE.                                             ROFF    2243
      CESW=.NOT.CESW                                            ROFF    2244
      IF (.NOT.CESW) GO TO 45                                   ROFF    2245
      LPLACE=MC                                                 ROFF    2246
      MC=0                                                      ROFF    2247
      LINE=9                                                    ROFF    2248
      GO TO 48                                                  ROFF    2249
45    CPLACE=(LL-MC)/2-2                                        ROFF    2250
      CPLACE=MAX0(CPLACE,LPLACE+2)                              ROFF    2251
      MD=5*MC+4                                                 ROFF    2252
      MC=MIN0(MC+CPLACE,99)                                     ROFF    2253
      P5=5*CPLACE                                               ROFF    2254
      MD=MIN0(MD,500-P5)                                        ROFF    2255
      DO 46 I=1,4                                               ROFF    2256
      I6=I+6                                                    ROFF    2257
      DO 46 J=3,MD                                              ROFF    2258
      OUT(I,J+P5)=OUT(I6,J)                                     ROFF    2259
      OUT(I6,J)=0                                               ROFF    2260
      IF (MOD(J,5).EQ.0) OUT(I6,J)=BLANK                        ROFF    2261
46    CONTINUE                                                  ROFF    2262
      DIOCEN=.TRUE.                                             ROFF    2263
      LINE=3                                                    ROFF    2264
      GO TO 48                                                  ROFF    2265
47    CRASH=.TRUE.                                              ROFF    2266
      MC=MAX0(MC,1)                                             ROFF    2267
      OUT(1,5*MC)=SHARP                                         ROFF    2268
48    CONTINUE                                                  ROFF    2269
      GO TO 6                                                   ROFF    2270
C                                                               ROFF    2271
C                                                               ROFF    2272
49    CONTINUE                                                  ROFF    2273
      DO 53 K=1,4                                               ROFF    2274
      FINAL(1,K)=DOLLAR                                         ROFF    2275
      L=4                                                       ROFF    2276
                                                                ROFF    2277
      SUBROUTINE  EQROFF
      LEN=5*MC+4                                                        ROFF      2278
      DO 50 J=3,LEN                                                     ROFF      2279
      OB=OUT(K,J)                                                       ROFF      2280
      IF (OB.EQ.0) GO TO 50                                             ROFF      2281
      FINAL(L,K)=OB                                                     ROFF      2282
      L=L+1                                                             ROFF      2283
50    CONTINUE                                                          ROFF      2284
      L1=L-1                                                            ROFF      2285
      LENGTH(K)=L1                                                      ROFF      2286
      DO 51 J=1,L1                                                      ROFF      2287
      IF (FINAL(L-J,K).NE.BLANK) GO TO 52                               ROFF      2288
51    LENGTH(K)=LENGTH(K)-1                                             ROFF      2289
52    IF (LENGTH(K).EQ.1) GO TO 53                                      ROFF      2290
      INLENG=MAX0(INLENG,LENGTH(K))                                     ROFF      2291
      IF (K.GT.LMAX) LMAX=K                                             ROFF      2292
      IF (K.LT.LMIN) LMIN=K                                             ROFF      2293
53    CONTINUE                                                          ROFF      2294
      UP=4                                                              ROFF      2295
      IF (CRASH) UP=10                                                  ROFF      2296
      DO 54 K=1,UP                                                      ROFF      2297
      DO 54 J=1,500                                                     ROFF      2298
      OUT(K,J)=0                                                        ROFF      2299
      IF (MOD(J,5).EQ.0) OUT(K,J)=BLANK                                 ROFF      2300
54    CONTINUE                                                          ROFF      2301
      FRAC=0                                                            ROFF      2302
      BOTH=0                                                            ROFF      2303
      SUPSW=.FALSE.                                                     ROFF      2304
      SUBSW=.FALSE.                                                     ROFF      2305
      OVLSW=.FALSE.                                                     ROFF      2306
      RJSW=.FALSE.                                                      ROFF      2307
      CESW=.FALSE.                                                      ROFF      2308
      ATSW=.FALSE.                                                      ROFF      2309
      DIDCEN=.FALSE.                                                    ROFF      2310
      CRASH=.FALSE.                                                     ROFF      2311
      MC=0                                                              ROFF      2312
      LINE=3                                                            ROFF      2313
      RETURN                                                            ROFF      2314
      END                                                               ROFF      2315
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SUBROUTINE MICRO

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      SUBROUTINE MICRO (ICC,ID,IJ)                                   ROFF  2316
      LOGICAL SECOND                                                 ROFF  2317
      DIMENSION IDATA(256), ID(132), IT(132)                         ROFF  2318
      DIMENSION IITBL(256)                                           ROFF  2319
      INTEGER PLUS,ONE,ZERO                                          ROFF  2320
      COMMON /FRAME/ IFRAME                                          ROFF  2321
      COMMON /TAPE/ ITAPE                                            ROFF  2322
      DATA PLUS,ONE,ZERO/1H+,1H1,1H0/                                ROFF  2323
      DATA IREC/0/                                                   ROFF  2324
      DATA IFRAME/0/                                                 ROFF  2325
      DATA SECOND/.FALSE./                                           ROFF  2326
      DATA IITBL(1)/133B/                                            ROFF  2327
      DATA IITBL(2)/055B/                                            ROFF  2328
      DATA IITBL(3)/055B/                                            ROFF  2329
      DATA IITBL(4)/055B/                                            ROFF  2330
      DATA IITBL(5)/055B/                                            ROFF  2331
      DATA IITBL(6)/055B/                                            ROFF  2332
      DATA IITBL(7)/055B/                                            ROFF  2333
      DATA IITBL(8)/055B/                                            ROFF  2334
      DATA IITBL(9)/071B/                                            ROFF  2335
      DATA IITBL(10)/055B/                                           ROFF  2336
      DATA IITBL(11)/163B/                                           ROFF  2337
      DATA IITBL(12)/055B/                                           ROFF  2338
      DATA IITBL(13)/055B/                                           ROFF  2339
      DATA IITBL(14)/55B/                                            ROFF  2340
      DATA IITBL(15)/133B/                                           ROFF  2341
      DATA IITBL(16)/055B/                                           ROFF  2342
      DATA IITBL(17)/055B/                                           ROFF  2343
      DATA IITBL(18)/055B/                                           ROFF  2344
      DATA IITBL(19)/055B/                                           ROFF  2345
      DATA IITBL(20)/172B/                                           ROFF  2346
      DATA IITBL(21)/055B/                                           ROFF  2347
      DATA IITBL(22)/055B/                                           ROFF  2348
      DATA IITBL(23)/055B/                                           ROFF  2349
      DATA IITBL(24)/055B/                                           ROFF  2350
      DATA IITBL(25)/055B/                                           ROFF  2351
      DATA IITBL(26)/055B/                                           ROFF  2352
      DATA IITBL(27)/055B/                                           ROFF  2353
      DATA IITBL(28)/055B/                                           ROFF  2354
      DATA IITBL(29)/055B/                                           ROFF  2355
      DATA IITBL(30)/055B/                                           ROFF  2356
      DATA IITBL(31)/055B/                                           ROFF  2357
      DATA IITBL(32)/055B/                                           ROFF  2358
      DATA IITBL(33)/055B/                                           ROFF  2359
      DATA IITBL(34)/166B/                                           ROFF  2360
      DATA IITBL(35)/065B/                                           ROFF  2361
      DATA IITBL(36)/055B/                                           ROFF  2362
      DATA IITBL(37)/055B/                                           ROFF  2363
      DATA IITBL(38)/165B/                                           ROFF  2364
      DATA IITBL(39)/055B/                                           ROFF  2365
      DATA IITBL(40)/055B/                                           ROFF  2366
      DATA IITBL(41)/176B/                                           ROFF  2367
      DATA IITBL(42)/055B/                                           ROFF  2368
      DATA IITBL(43)/055B/                                           ROFF  2369
      DATA IITBL(44)/055B/                                           ROFF  2370
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SUBROUTINE  MICRO

DATA IITBL(45)/055B/                                                    ROFF      2371
DATA IITBL(46)/055B/                                                    ROFF      2372
DATA IITBL(47)/055B/                                                    ROFF      2373
DATA IITBL(48)/055B/                                                    ROFF      2374
DATA IITBL(49)/055B/                                                    ROFF      2375
DATA IITBL(50)/055B/                                                    ROFF      2376
DATA IITBL(51)/055B/                                                    ROFF      2377
DATA IITBL(52)/055B/                                                    ROFF      2378
DATA IITBL(53)/055B/                                                    ROFF      2379
DATA IITBL(54)/055B/                                                    ROFF      2380
DATA IITBL(55)/055B/                                                    ROFF      2381
DATA IITBL(56)/055B/                                                    ROFF      2382
DATA IITBL(57)/055B/                                                    ROFF      2383
DATA IITBL(58)/055B/                                                    ROFF      2384
DATA IITBL(59)/055B/                                                    ROFF      2385
DATA IITBL(60)/055B/                                                    ROFF      2386
DATA IITBL(61)/055B/                                                    ROFF      2387
DATA IITBL(62)/055B/                                                    ROFF      2388
DATA IITBL(63)/055B/                                                    ROFF      2389
DATA IITBL(64)/055B/                                                    ROFF      2390
DATA IITBL(65)/144B/                                                    ROFF      2391
DATA IITBL(66)/160B/                                                    ROFF      2392
DATA IITBL(67)/137B/                                                    ROFF      2393
DATA IITBL(68)/142B/                                                    ROFF      2394
DATA IITBL(69)/055B/                                                    ROFF      2395
DATA IITBL(70)/055B/                                                    ROFF      2396
DATA IITBL(71)/055B/                                                    ROFF      2397
DATA IITBL(72)/055B/                                                    ROFF      2398
DATA IITBL(73)/055B/                                                    ROFF      2399
DATA IITBL(74)/055B/                                                    ROFF      2400
DATA IITBL(75)/057B/                                                    ROFF      2401
DATA IITBL(76)/074B/                                                    ROFF      2402
DATA IITBL(77)/051B/                                                    ROFF      2403
DATA IITBL(78)/045B/                                                    ROFF      2404
DATA IITBL(79)/055B/                                                    ROFF      2405
DATA IITBL(80)/055B/                                                    ROFF      2406
DATA IITBL(81)/055B/                                                    ROFF      2407
DATA IITBL(82)/055B/                                                    ROFF      2408
DATA IITBL(83)/143B/                                                    ROFF      2409
DATA IITBL(84)/162B/                                                    ROFF      2410
DATA IITBL(85)/055B/                                                    ROFF      2411
DATA IITBL(86)/055B/                                                    ROFF      2412
DATA IITBL(87)/140B/                                                    ROFF      2413
DATA IITBL(88)/141B/                                                    ROFF      2414
DATA IITBL(89)/145B/                                                    ROFF      2415
DATA IITBL(90)/037B/                                                    ROFF      2416
DATA IITBL(91)/072B/                                                    ROFF      2417
DATA IITBL(92)/047B/                                                    ROFF      2418
DATA IITBL(93)/052B/                                                    ROFF      2419
DATA IITBL(94)/077B/                                                    ROFF      2420
DATA IITBL(95)/076B/                                                    ROFF      2421
DATA IITBL(96)/046B/                                                    ROFF      2422
DATA IITBL(97)/050B/                                                    ROFF      2423
DATA IITBL(98)/161B/                                                    ROFF      2424
DATA IITBL(99)/055B/                                                    ROFF      2425
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      SUBROUTINE  MICRO

      DATA IITBL(100)/055B/                                                  ROFF    2426
      DATA IITBL(101)/055B/                                                  ROFF    2427
      DATA IITBL(102)/154B/                                                  ROFF    2428
      DATA IITBL(103)/055B/                                                  ROFF    2429
      DATA IITBL(104)/055B/                                                  ROFF    2430
      DATA IITBL(105)/055B/                                                  ROFF    2431
      DATA IITBL(106)/055B/                                                  ROFF    2432
      DATA IITBL(107)/056B/                                                  ROFF    2433
      DATA IITBL(108)/062B/                                                  ROFF    2434
      DATA IITBL(109)/000B/                                                  ROFF    2435
      DATA IITBL(110)/073B/                                                  ROFF    2436
      DATA IITBL(111)/177B/                                                  ROFF    2437
      DATA IITBL(112)/173B/                                                  ROFF    2438
      DATA IITBL(113)/173B/                                                  ROFF    2439
      DATA IITBL(114)/055B/                                                  ROFF    2440
      DATA IITBL(115)/055B/                                                  ROFF    2441
      DATA IITBL(116)/055B/                                                  ROFF    2442
      DATA IITBL(117)/146B/                                                  ROFF    2443
      DATA IITBL(118)/055B/                                                  ROFF    2444
      DATA IITBL(119)/055B/                                                  ROFF    2445
      DATA IITBL(120)/055B/                                                  ROFF    2446
      DATA IITBL(121)/055B/                                                  ROFF    2447
      DATA IITBL(122)/060B/                                                  ROFF    2448
      DATA IITBL(123)/055B/                                                  ROFF    2449
      DATA IITBL(124)/055B/                                                  ROFF    2450
      DATA IITBL(125)/175B/                                                  ROFF    2451
      DATA IITBL(126)/054B/                                                  ROFF    2452
      DATA IITBL(127)/152B/                                                  ROFF    2453
      DATA IITBL(128)/055B/                                                  ROFF    2454
      DATA IITBL(129)/101B/                                                  ROFF    2455
      DATA IITBL(130)/102B/                                                  ROFF    2456
      DATA IITBL(131)/103B/                                                  ROFF    2457
      DATA IITBL(132)/104B/                                                  ROFF    2458
      DATA IITBL(133)/105B/                                                  ROFF    2459
      DATA IITBL(134)/106B/                                                  ROFF    2460
      DATA IITBL(135)/107B/                                                  ROFF    2461
      DATA IITBL(136)/110B/                                                  ROFF    2462
      DATA IITBL(137)/111B/                                                  ROFF    2463
      DATA IITBL(138)/055B/                                                  ROFF    2464
      DATA IITBL(139)/055B/                                                  ROFF    2465
      DATA IITBL(140)/055B/                                                  ROFF    2466
      DATA IITBL(141)/055B/                                                  ROFF    2467
      DATA IITBL(142)/055B/                                                  ROFF    2468
      DATA IITBL(143)/055B/                                                  ROFF    2469
      DATA IITBL(144)/055B/                                                  ROFF    2470
      DATA IITBL(145)/112B/                                                  ROFF    2471
      DATA IITBL(146)/113B/                                                  ROFF    2472
      DATA IITBL(147)/114B/                                                  ROFF    2473
      DATA IITBL(148)/115B/                                                  ROFF    2474
      DATA IITBL(149)/116B/                                                  ROFF    2475
      DATA IITBL(150)/117B/                                                  ROFF    2476
      DATA IITBL(151)/120B/                                                  ROFF    2477
      DATA IITBL(152)/121B/                                                  ROFF    2478
      DATA IITBL(153)/122B/                                                  ROFF    2479
      DATA IITBL(154)/055B/                                                  ROFF    2480
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SUBROUTINE  MICRO

DATA IITBL(155)/055B/                                                  ROFF      2481
DATA IITBL(156)/055B/                                                  ROFF      2482
DATA IITBL(157)/055B/                                                  ROFF      2483
DATA IITBL(158)/055B/                                                  ROFF      2484
DATA IITBL(159)/055B/                                                  ROFF      2485
DATA IITBL(160)/055B/                                                  ROFF      2486
DATA IITBL(161)/164B/                                                  ROFF      2487
DATA IITBL(162)/123B/                                                  ROFF      2488
DATA IITBL(163)/124B/                                                  ROFF      2489
DATA IITBL(164)/125B/                                                  ROFF      2490
DATA IITBL(165)/126B/                                                  ROFF      2491
DATA IITBL(166)/127B/                                                  ROFF      2492
DATA IITBL(167)/130B/                                                  ROFF      2493
DATA IITBL(168)/131B/                                                  ROFF      2494
DATA IITBL(169)/132B/                                                  ROFF      2495
DATA IITBL(170)/055B/                                                  ROFF      2496
DATA IITBL(171)/055B/                                                  ROFF      2497
DATA IITBL(172)/055B/                                                  ROFF      2498
DATA IITBL(173)/055B/                                                  ROFF      2499
DATA IITBL(174)/055B/                                                  ROFF      2500
DATA IITBL(175)/055B/                                                  ROFF      2501
DATA IITBL(176)/055B/                                                  ROFF      2502
DATA IITBL(177)/134B/                                                  ROFF      2503
DATA IITBL(178)/174B/                                                  ROFF      2504
DATA IITBL(179)/157B/                                                  ROFF      2505
DATA IITBL(180)/055B/                                                  ROFF      2506
DATA IITBL(181)/055B/                                                  ROFF      2507
DATA IITBL(182)/055B/                                                  ROFF      2508
DATA IITBL(183)/055B/                                                  ROFF      2509
DATA IITBL(184)/055B/                                                  ROFF      2510
DATA IITBL(185)/055B/                                                  ROFF      2511
DATA IITBL(186)/055B/                                                  ROFF      2512
DATA IITBL(187)/063B/                                                  ROFF      2513
DATA IITBL(188)/055B/                                                  ROFF      2514
DATA IITBL(189)/064B/                                                  ROFF      2515
DATA IITBL(190)/067B/                                                  ROFF      2516
DATA IITBL(191)/150B/                                                  ROFF      2517
DATA IITBL(192)/063B/                                                  ROFF      2518
DATA IITBL(193)/001B/                                                  ROFF      2519
DATA IITBL(194)/002B/                                                  ROFF      2520
DATA IITBL(195)/003B/                                                  ROFF      2521
DATA IITBL(196)/004B/                                                  ROFF      2522
DATA IITBL(197)/005B/                                                  ROFF      2523
DATA IITBL(198)/006B/                                                  ROFF      2524
DATA IITBL(199)/007B/                                                  ROFF      2525
DATA IITBL(200)/010B/                                                  ROFF      2526
DATA IITBL(201)/011B/                                                  ROFF      2527
DATA IITBL(202)/055B/                                                  ROFF      2528
DATA IITBL(203)/055B/                                                  ROFF      2529
DATA IITBL(204)/055B/                                                  ROFF      2530
DATA IITBL(205)/055B/                                                  ROFF      2531
DATA IITBL(206)/055B/                                                  ROFF      2532
DATA IITBL(207)/055B/                                                  ROFF      2533
DATA IITBL(208)/064B/                                                  ROFF      2534
DATA IITBL(209)/012B/                                                  ROFF      2535
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      SUBROUTINE  MICRO
      DATA IITBL(210)/013B/                                             ROFF    2536
      DATA IITBL(211)/014B/                                             ROFF    2537
      DATA IITBL(212)/015B/                                             ROFF    2538
      DATA IITBL(213)/016B/                                             ROFF    2539
      DATA IITBL(214)/017B/                                             ROFF    2540
      DATA IITBL(215)/020B/                                             ROFF    2541
      DATA IITBL(216)/021B/                                             ROFF    2542
      DATA IITBL(217)/022B/                                             ROFF    2543
      DATA IITBL(218)/055B/                                             ROFF    2544
      DATA IITBL(219)/055B/                                             ROFF    2545
      DATA IITBL(220)/055B/                                             ROFF    2546
      DATA IITBL(221)/055B/                                             ROFF    2547
      DATA IITBL(222)/055B/                                             ROFF    2548
      DATA IITBL(223)/055B/                                             ROFF    2549
      DATA IITBL(224)/055B/                                             ROFF    2550
      DATA IITBL(225)/055B/                                             ROFF    2551
      DATA IITBL(226)/023B/                                             ROFF    2552
      DATA IITBL(227)/024B/                                             ROFF    2553
      DATA IITBL(228)/025B/                                             ROFF    2554
      DATA IITBL(229)/026B/                                             ROFF    2555
      DATA IITBL(230)/027B/                                             ROFF    2556
      DATA IITBL(231)/030B/                                             ROFF    2557
      DATA IITBL(232)/031B/                                             ROFF    2558
      DATA IITBL(233)/032B/                                             ROFF    2559
      DATA IITBL(234)/055B/                                             ROFF    2560
      DATA IITBL(235)/055B/                                             ROFF    2561
      DATA IITBL(236)/055B/                                             ROFF    2562
      DATA IITBL(237)/055B/                                             ROFF    2563
      DATA IITBL(238)/055B/                                             ROFF    2564
      DATA IITBL(239)/055B/                                             ROFF    2565
      DATA IITBL(240)/033B/                                             ROFF    2566
      DATA IITBL(241)/034B/                                             ROFF    2567
      DATA IITBL(242)/035B/                                             ROFF    2568
      DATA IITBL(243)/036B/                                             ROFF    2569
      DATA IITBL(244)/037B/                                             ROFF    2570
      DATA IITBL(245)/040B/                                             ROFF    2571
      DATA IITBL(246)/041B/                                             ROFF    2572
      DATA IITBL(247)/042B/                                             ROFF    2573
      DATA IITBL(248)/043B/                                             ROFF    2574
      DATA IITBL(249)/04 B/                                             ROFF    2575
      DATA IITBL(250)/055B/                                             ROFF    2576
      DATA IITBL(251)/055B/                                             ROFF    2577
      DATA IITBL(252)/055B/                                             ROFF    2578
      DATA IITBL(253)/055B/                                             ROFF    2579
      DATA IITBL(254)/055B/                                             ROFF    2580
      DATA IITBL(255)/055B/                                             ROFF    2581
      DATA IITBL(256)/055B/                                             ROFF    2582
      IF (SECOND) GO TO 1                                               ROFF    2583
      CALL SSWTCH (1,ITAPE)                                             ROFF    2584
      CALL SSWTCH (2,IMIKE)                                             ROFF    2585
      IF (IMIKE.EQ.1) CALL INIT (0)                                     ROFF    2586
      SECOND=.TRUE.                                                     ROFF    2587
    1 CONTINUE                                                          ROFF    2588
      IF (ITAPE.EQ.1) CALL WRT9209 (ICC,IG,IJ)                          ROFF    2589
      IF (IMIKE.EQ.2) RETURN                                            ROFF    2590
      SUBROUTINE  MICRO
      IF (IJ.EQ.0) GO TO 3                                             ROFF     2591
      DO 2 I=1,IJ                                                      ROFF     2592
      J=ID(I)                                                          ROFF     2593
      IF (J.GT.256.OR.J.LE.0) J=64                                     ROFF     2594
2     IT(I)=IITBL(J)                                                   ROFF     2595
3     IF (ICC.NE.PLUS) CALL ADVAN (0)                                  ROFF     2596
      IF (ICC.EQ.ONE) CALL PAGER (3)                                   ROFF     2597
      IF (ICC.EQ.ONE) IFRAME=IFRAME+1                                  ROFF     2598
      IF (ICC.EQ.ZERO) CALL ADVAN (0)                                  ROFF     2599
      IF (IJ.EQ.0) RETURN                                              ROFF     2600
      CALL WRITER (IT,IJ)                                              ROFF     2601
      RETURN                                                           ROFF     2602
      END                                                              ROFF     2603
      SUBROUTINE  WRITER

      SUBROUTINE WRITER (IDATA,N)
C     THIS SUBROUTINE TEST OUT THE MICROFILMER WITH UPPER AND LOWER CASE ROFF 2604
C     IN REPRODUCTION USE MAGNIFICATION 16                               ROFF 2605
      DIMENSION IDATA(1)                                                 ROFF 2606
C      THE DATA BYTE IN IDATA IS RIGHT JUSTIFIED                         ROFF 2607
C      UPPER CASE A-Z OR OCTAL 01-32                                     ROFF 2608
C      LOWER CASE A-Z OF OCTAL 101-132                                   ROFF 2609
C     UPPER CASE ITALICS A-Z OR OCTAL 201-232                            ROFF 2610
C      LOWER CASE ITALICS A-Z OR OCTAL 301-332                           ROFF 2611
C     ALL THE ABOVE SIZE ONE                                             ROFF 2612
C      SIZE 0 IS AS ABOVE BUT WITH BIT 4 ON                              ROFF 2613
      DATA IOCAS,IOTAL/0,0/                                              ROFF 2614
      DO 6 I=1,N                                                         ROFF 2615
      J=IDATA(I)                                                         ROFF 2616
      ICASE=SHIFT(J.AND.100B,-6)                                         ROFF 2617
      ITALIC=SHIFT(J.AND.200B,-7)                                        ROFF 2618
      ISIZE=SHIFT(J.AND.400B,-8)                                         ROFF 2619
C     SET PARAMETER FOR SYMBOL AND TAB MODE                              ROFF 2620
1     CONTINUE                                                           ROFF 2621
      IF (IOCAS.EQ.ICASE.AND.IOTAL.EQ.ITALIC) GO TO 2                    ROFF 2622
      CALL PLOTQ (ICASE,ITALIC,0,0,3)                                    ROFF 2623
      IOCAS=ICASE                                                        ROFF 2624
      IOTAL=ITALIC                                                       ROFF 2625
2     CONTINUE                                                           ROFF 2626
C     MOVE BEAM                                                          ROFF 2627
      DA=PS0X                                                            ROFF 2628
      IF (ISIZE.EQ.1) DA=PS1X                                            ROFF 2629
      A=A+DA                                                             ROFF 2630
      J=J.AND.77B                                                        ROFF 2631
      IF (J.EQ.00B) GO TO 4                                              ROFF 2632
      IF (J.EQ.55B) GO TO 5                                              ROFF 2633
      J=SHIFT(J,54)                                                      ROFF 2634
      CALL PLOTQ (B,A,0,0,2)                                             ROFF 2635
C     PLOT CHARACTER                                                     ROFF 2636
3     CONTINUE                                                           ROFF 2637
      CALL PLOTQ (J,IROT,1,ISIZE,6)                                      ROFF 2638
      GO TO 5                                                            ROFF 2639
4     CONTINUE                                                           ROFF 2640
C     POSITION FOR UNDERLINE AND THEN GO DO IT                           ROFF 2641
      CALL PLOTQ (B+DPL1/1.50,A-DA/2.,0,0,2)                             ROFF 2642
      CALL PLOTQ (B+DPL1/1.50,A+DA/2.,1,1,2)                             ROFF 2643
5     CONTINUE                                                           ROFF 2644
6     CONTINUE                                                           ROFF 2645
      A=0.                                                               ROFF 2646
      RETURN                                                             ROFF 2647
      ENTRY ADVAN                                                        ROFF 2648
      DATA IROT/1/                                                       ROFF 2649
C     FINISHED                                                           ROFF 2650
C      NOW MOVE BEAM TO NEXT LINE                                        ROFF 2651
      A=0.                                                               ROFF 2652
      B=B+PL1Y                                                           ROFF 2653
      CALL PLOTQ (A,B,0,0,2)                                             ROFF 2654
      RETURN                                                             ROFF 2655
      ENTRY PAGER                                                        ROFF 2656
      A=0.                                                               ROFF 2657
                                                                         ROFF 2658
      SUBROUTINE  WRITER

      B=DPL1                                                            ROFF  2659
      CALL PLOTQ (0,0,0,0,12)                                           ROFF  2660
      RETURN                                                            ROFF  2661
      ENTRY INIT                                                        ROFF  2662
      CALL PLOTQ (0,0,0,0,7)                                            ROFF  2663
      PS0X=1023./100.                                                   ROFF  2664
      PS1X=1023./80.                                                    ROFF  2665
      PL1Y=1023./53.                                                    ROFF  2666
      DPL1=PL1Y/2.                                                      ROFF  2667
      A=0.                                                              ROFF  2668
      B=DPL1                                                            ROFF  2669
      RETURN                                                            ROFF  2670
      END                                                               ROFF  2671
```

```
          IDENT   PLOTQ                                                        ROFF      2672
PROGRAM LENGTH

BLOCKS

PROGRAM*    LOCAL
SMAP        COMMON

ENTRY POINTS

   000001 PLOTQ

EXTERNAL SYMBOLS

XRCL        GETBA      SYSTEM     ABNORM.

 CON        MACRO  A                                                           ROFF      2673
            DATA   A                                                           ROFF      2674
            ENDM                                                               ROFF      2675
            EXT    XRCL,GETBA,SYSTEM,ABNORM.                                   ROFF      2676
            USE    /SMAP/                                                      ROFF      2677
 XMIN       BSS    1                                                           ROFF      2678
 XMAX       DATA   1                                                           ROFF      2679
 YMIN       BSS    1                                                           ROFF      2680
 YMAX       DATA   1                                                           ROFF      2681
 XMI        BSS    1                                                           ROFF      2682
 XMA        BSS    1                                                           ROFF      2683
 YMI        BSS    1                                                           ROFF      2684
 YMA        BSS    1                                                           ROFF      2685
 XSCALE     DATA   1023                                                        ROFF      2686
 YSCALE     DATA   1023                                                        ROFF      2687
            USE    *                                                           ROFF      2688
            ENTRY  PLOTQ                                                       ROFF      2689
 NAME       VFD    42/0HPLOTQ,18/0                                             ROFF      2690
 PLOTQ      BSS    1                                                           ROFF      2691
*SAVE A0 AS REQUIRED BY FTN CONVENTION                                         ROFF      2692
            SX6        A0                                                      ROFF      2693
            SA6        SAVA0                                                   ROFF      2694
*GATHER UP 5 ARGUMENTS                                                         ROFF      2695
            SB7    1                                                           ROFF      2696
            SA1        A1                                                      ROFF      2697
            SB1      X1                                                        ROFF      2698
            SA1        A1+B7                                                   ROFF      2699
            SB2        X1                                                      ROFF      2700
            SA1      A1+B7                                                     ROFF      2701
            SB3        X1                                                      ROFF      2702
            SA1      A1+B7                                                     ROFF      2703
            SB4        X1                                                      ROFF      2704
            SA1      A1+B7                                                     ROFF      2705
            SB5        X1                                                      ROFF      2706
            SA0    DATA+1                                                      ROFF      2707
            SA2    B5                                                          ROFF      2708
            SX0    B7                                                          ROFF      2709
            SX1    X2-3                                                        ROFF      2710
            NG     X1,SCP                                                      ROFF      2711
            ZR     X1,SPSM      .JUMP IF SET TAB MODE PARAMETERS K = 3         ROFF      2712
            SX1    X1-2                                                        ROFF      2713
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         NG     X1,PPM        .JUMP IF POINT MODE  K = 4                        ROFF    2714
         ZR     X1,PSYM       .JUMP IF PLOT SYMBOL ENTRY                   K=5  ROFF    2715
         SX1    X1-2                                                            ROFF    2716
         NG     X1,PC         .JUMP IF PLOT CHARACTERS ENTRY               K=6  ROFF    2717
         ZR     X1,PINT       .JUMP IF RECEIVE INITIAL X,Y,IERR            K=7  ROFF    2718
         SX1    X1-5                                                            ROFF    2719
         ZR     X1,PTER       .JUMP IF TERMINATE FRAME  K = 12                  ROFF    2720
*FALL THROJGH EXIT ILLEGAL ENTRY                                                ROFF    2721
 PLOT1   SA1       SAVA0                                                        ROFF    2722
         SA0       X1           RESTORE A0                                      ROFF    2723
         EQ        B0,B0,PLOTQ                                                  ROFF    2724
*  PLOT POINT MODE - P.OT 1  TO  7 POINTS IN POINY MODE                         ROFF    2725
 PPM     SA1    B4                                                              ROFF    2726
         SA2    B3                                                              ROFF    2727
         SX6    3020B                                                           ROFF    2728
         ZR     X1,PPM1                                                         ROFF    2729
         IX6    X6+X0         .ADD HIGN INTENSITY BIT                           ROFF    2730
 PPM1    ZR     X2,PLOT1      .EXIT IF N = 0                                    ROFF    2731
         SB4    X2                                                              ROFF    2732
         LX6    60B                                                             ROFF    2733
         SA6    A0-B7         .STORE CONTROL WORD                               ROFF    2734
         RJ     SCAL                                                            ROFF    2735
         SA3    A0-B7                                                           ROFF    2736
         LX1    30B                                                             ROFF    2737
         BX6    X1+X3                                                           ROFF    2738
         SA6    A0-B7         .STORE FIRST SET                                  ROFF    2739
         EQ     B4,B0,PPM4                                                      ROFF    2740
         RJ     SCAL                                                            ROFF    2741
         SA3    A0-B7                                                           ROFF    2742
         BX7    X1+X3                                                           ROFF    2743
         SA7    A0-B7         .STORE SECOND SET                                 ROFF    2744
         EQ     B4,B0,PPM3                                                      ROFF    2745
         RJ     SCAL                                                            ROFF    2746
         LX1    44B                                                             ROFF    2747
         BX6    X1                                                              ROFF    2748
         SA6    A0            .STORE THIRO SET                                  ROFF    2749
         EQ     B0,B4,PPM2                                                      ROFF    2750
         RJ     SCAL                                                            ROFF    2751
         SA5    A0                                                              ROFF    2752
         LX1    14B                                                             ROFF    2753
         BX7    X5+X1                                                           ROFF    2754
         SA7    A0            .STORE FOURTH SET                                 ROFF    2755
         EQ     B0,B4,PPM2                                                      ROFF    2756
         RJ     SCAL                                                            ROFF    2757
         LX1    60B                                                             ROFF    2758
         MX2    60B                                                             ROFF    2759
         SA3    A0                                                              ROFF    2760
         BX7    X1*X2                                                           ROFF    2761
         BX6    -X2*X1                                                          ROFF    2762
         IX6    X3+X6                                                           ROFF    2763
         SA7    A0+B7         .STORE FIFTH SET                                  ROFF    2764
         SA6    A3                                                              ROFF    2765
         EQ     B0,B4,PPM5                                                      ROFF    2766
         RJ     SCAL                                                            ROFF    2767
         SA3    A0+B7                                                           ROFF    2768
         LX1    30B                                                             ROFF    2769
         BX6    X1+X3                                                           ROFF    2770
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          SA6     A3              .STORE SIXTH SET                              ROFF      2771
          EQ      B0,B4,PPM5                                                    ROFF      2772
          RJ      SCAL                                                          ROFF      2773
          SA3     A0+B7                                                         ROFF      2774
          BX6     X1+X3                                                         ROFF      2775
          SA6     A3              .STORE SEVENTH SET                            ROFF      2776
          EQ      B0,B0,PPM5                                                    ROFF      2777
 PPM2     SX7     B7+B7                                                         ROFF      2778
          RJ      POUT                                                          ROFF      2779
          EQ      B0,B0,P10F                                                    ROFF      2780
 PPM3     SX7     B7                                                            ROFF      2781
          RJ      POUT                                                          ROFF      2782
          EQ      B0,B0,P10F                                                    ROFF      2783
 PPM4     SX7     B0                                                            ROFF      2784
          RJ      POUT                                                          ROFF      2785
          EQ      B0,B0,P10F                                                    ROFF      2786
 PPM5     SX7     3                                                             ROFF      2787
          RJ      POUT                                                          ROFF      2788
          EQ      B0,B0,P10F                                                    ROFF      2789
*. DO SCALED PLOTTING  A=X,B=Y,I=IPEN,J=INTEN=K=0                               ROFF      2790
 SCP      SA1     B4                                                            ROFF      2791
          SA3     B3                                                            ROFF      2792
          LX1     72B                                                           ROFF      2793
          SB4     X3                                                            ROFF      2794
          SX6     3210B                                                         ROFF      2795
          PL      X1,SCP0         .SENSE CONTINUOUS END POINTS                  ROFF      2796
          SX2     400B                                                          ROFF      2797
          LX3     73B                                                           ROFF      2798
          BX6     X6+X2                                                         ROFF      2799
          PL      X3,SCP0         .SENSE N EVEN                                 ROFF      2800
          SB4     B4-B7                                                         ROFF      2801
 SCP0     LX1     1                                                             ROFF      2802
          PL      X1,SCP1         .SENSE LOW INTENSITY                          ROFF      2803
          IX6     X6+X0                                                         ROFF      2804
 SCP1     LX6     60B                                                           ROFF      2805
          SA6     A0-B7                                                         ROFF      2806
          RJ      SCAL                                                          ROFF      2807
          SA4     B3                                                            ROFF      2808
          ZR      X4,P10F         .IPEN = 0   DO NOT DRAW                       ROFF      2809
          SA3     A0-B7                                                         ROFF      2810
          LX1     30B                                                           ROFF      2811
          BX6     X1+X3                                                         ROFF      2812
          LT      B0,B4,SCP3                                                    ROFF      2813
          SA4     IXCUR                                                         ROFF      2814
          AX6     60B                                                           ROFF      2815
          SA5     A4+B7                                                         ROFF      2816
          LX6     60B                                                           ROFF      2817
          AX1     30B                                                           ROFF      2818
          LX4     44B                                                           ROFF      2819
          BX6     X6+X1                                                         ROFF      2820
          LX5     30B                                                           ROFF      2821
          IX4     X4+X5                                                         ROFF      2822
          BX6     X4+X6                                                         ROFF      2823
          SA6     A0-B7           .OUTPUT VECTOR FROM CURRENT POSITION          ROFF      2824
 SCP2     SX7     B7                                                            ROFF      2825
          RJ      POUT                                                          ROFF      2826
          EQ      B0,B0,P10F                                                    ROFF      2827
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SCP3      SA6       A0-B7                                                                 ROFF       2828
          RJ        SCAL                                                                  ROFF       2829
          SA3       A0-B7                                                                 ROFF       2830
          BX6       X3+X1                                                                 ROFF       2831
          SA6       A0-B7          .STORE FIRST SET END POINTS                            ROFF       2832
          EQ        B0,B4,SCP2                                                            ROFF       2833
          RJ        SCAL                                                                  ROFF       2834
          LX1       44B                                                                   ROFF       2835
          BX6       X1                                                                    ROFF       2836
          SA6       A0             .STORE SECOND SET END POINTS                           ROFF       2837
          EQ        B0,B4,SCP4                                                            ROFF       2838
          RJ        SCAL                                                                  ROFF       2839
          SA4       A0                                                                    ROFF       2840
          LX1       14B                                                                   ROFF       2841
          BX6       X4+X1                                                                 ROFF       2842
          SA6       A4             .STORE THIRD SET DATA POINTS                           ROFF       2843
          EQ        B0,B4,SCP4                                                            ROFF       2844
          RJ        SCAL                                                                  ROFF       2845
          SA3       A0                                                                    ROFF       2846
          MX2       60B                                                                   ROFF       2847
          LX1       60B                                                                   ROFF       2848
          BX7       X1*X2                                                                 ROFF       2849
          BX6       -X2*X1                                                                ROFF       2850
          IX6       X3+X6                                                                 ROFF       2851
          SA7       A0+B7          .STORE FOURTH SET END POINTS                           ROFF       2852
          SA6       A3                                                                    ROFF       2853
          EQ        B0,B4,SCP5                                                            ROFF       2854
          RJ        SCAL                                                                  ROFF       2855
          SA3       A0+B7                                                                 ROFF       2856
          LX1       30B                                                                   ROFF       2857
          BX6       X1+X3                                                                 ROFF       2858
          SA6       A3             .STORE FIFTH SET END POINTS                            ROFF       2859
          EQ        B0,B4,SCP5                                                            ROFF       2860
          RJ        SCAL                                                                  ROFF       2861
          SA3       A0+B7                                                                 ROFF       2862
          BX6       X1+X3                                                                 ROFF       2863
          SA6       A3             .STORE SIXTH SET END POINTS                            ROFF       2864
          EQ        B0,B0,SCP5                                                            ROFF       2865
SCP4      SX7       B7+B7                                                                 ROFF       2866
          RJ        POUT                                                                  ROFF       2867
          EQ        B0,B0,P10F                                                            ROFF       2868
SCP5      SX7       3                                                                     ROFF       2869
          RJ        POUT                                                                  ROFF       2870
          EQ        B0,B0,P10F                                                            ROFF       2871
*         .SCALING ROUTINE                                                                ROFF       2872
SCAL      BSS       1                                                                     ROFF       2873
          SA1       B5                                                                    ROFF       2874
          ZR        X1,SCL1                                                               ROFF       2875
          IX2       X1-X0                                                                 ROFF       2876
          ZR        X2,SCL8                                                               ROFF       2877
          IX3       X2-X0                                                                 ROFF       2878
          ZR        X3,SCL9                                                               ROFF       2879
          SX1       X1-15                                                                 ROFF       2880
          ZR        X1,SCL9                                                               ROFF       2881
SCL1      SA3       XMIN           .XPOS=(A-XMIN)*XSCALE+XORIG                            ROFF       2882
          SA5       B1             .YPOS=(B-YMIN)*YSCALE+YORIG                            ROFF       2883
          RX4       X5-X3                                                                 ROFF       2884
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         SA1    XSCALE                                     ROFF    2885
         SA5    YMIN                                       ROFF    2886
         NX0    B0,X4                                      ROFF    2887
         SA2    B2                                         ROFF    2888
         RX0    X0*X1                                      ROFF    2889
         RX5    X2-X5                                      ROFF    2890
         SA3    XMI                                        ROFF    2891
         SA4    A1+B7                                      ROFF    2892
         NX5    B0,X5                                      ROFF    2893
         RX0    X0+X3                                      ROFF    2894
         SA2    YMI                                        ROFF    2895
         NX7    B0,X0                                      ROFF    2896
         RX5    X5*X4                                      ROFF    2897
         RX0    X5+X2                                      ROFF    2898
         NX6    B0.X0                                      ROFF    2899
         SX0    B7                                         ROFF    2900
SCL2     UX6    B6,X6         .IXPOS=XPOS=X7               ROFF    2901
         MX3    0                                          ROFF    2902
         LX6    B6,X6                                      ROFF    2903
         UX7    B6,X7         .IYPOS=YPOS=X6               ROFF    2904
         IX6    X6+X3                                      ROFF    2905
         LX7    B6,X7                                      ROFF    2906
         IX7    X7+X3                                      ROFF    2907
         ZR     X7,SCL4       .JUMP IXPOS=0                ROFF    2908
         PL     X7,SCL3       .JUMP IXPOS=+                ROFF    2909
         MX7    0                                          ROFF    2910
         ZR  B0,SCL4                                       ROFF    2911
SCL3     SX3    B0+1024                                    ROFF    2912
         IX4    X7-X3                                      ROFF    2913
         NG     X4,SCL4                                    ROFF    2914
         SX7    1023                                       ROFF    2915
SCL4     SA7    IXPOS         .IXPOS                       ROFF    2916
         PX3    B0,X7                                      ROFF    2917
         NX7    B0,X3                                      ROFF    2918
         SA7    XPOS          .XPOS                        ROFF    2919
         ZR     X6,SCL6       .JUMP IYPOS=0                ROFF    2920
         PL     X6,SCL5       .JUMP IYPOS=+                ROFF    2921
         MX6    0                                          ROFF    2922
         ZR  B0,SCL6                                       ROFF    2923
SCL5     SX3    1024                                       ROFF    2924
         IX4    X6-X3                                      ROFF    2925
         NG     X4,SCL6                                    ROFF    2926
         SX6    1023                                       ROFF    2927
SCL6     SA6    IYPOS         .IYPOS                       ROFF    2928
         SB1    B1+B7                                      ROFF    2929
         PX3    B0,X6                                      ROFF    2930
         SB2    B2+B7                                      ROFF    2931
         SA1    IXPOS                                      ROFF    2932
         NX6    B0,X3                                      ROFF    2933
         SA2    A1+B7                                      ROFF    2934
         SA6    YPOS          .YPOS                        ROFF    2935
         LX1    14B                                        ROFF    2936
         SB4    B4-B7                                      ROFF    2937
         BX1    X1+X2                                      ROFF    2938
         NE     B0,B4,SCAL                                 ROFF    2939
         MX5    1                                          ROFF    2940
         NZ     X2,SCAL                                    ROFF    2941
         LX5    13B                                                            ROFF    2942
         IX1    X1+X5                                                          ROFF    2943
         EQ     B0,B0,SCAL                                                     ROFF    2944
*        .DIFFERENTIAL ABSOLUTE SCALING                                        ROFF    2945
 SCL5    SA3    XCUR          .XPOS=A+XCUR                                     ROFF    2946
         SA2    B1            .YPOS=B+YCUR                                     ROFF    2947
         RX4    X2+X3                                                          ROFF    2948
         SA1    A3+B7                                                          ROFF    2949
         NX7    B0,X4                                                          ROFF    2950
         SA2    B2                                                             ROFF    2951
         RX0    X2+X1                                                          ROFF    2952
         NX6    B0,X0                                                          ROFF    2953
         ZR  B0,SCL2          .JUMP WITH X6=YPOS AND X7=XPOS                   ROFF    2954
*        .ABSOLUTE SCALING                                                     ROFF    2955
 SCL9    SA1    B1            .XPOS=X                                          ROFF    2956
         SA2    B2            .YPOS=Y                                          ROFF    2957
         BX6    X2                                                             ROFF    2958
         BX7    X1                                                             ROFF    2959
         ZR  B0,SCL2          .JUMP WITH X6=YPOS AND X7=XPOS                   ROFF    2960
*        .UPDATE CURRENT X AND Y POSITIONS                                     ROFF    2961
 PLOF    SA1    XPOS          .XCUR=XPOS                                       ROFF    2962
         SA3    IXPOS         .IXCUR=IXPOS                                     ROFF    2963
         BX6    X1                                                             ROFF    2964
         SA2    A1+B7         .YCUR=YPOS                                       ROFF    2965
         SA4    A3+B7         .IYCUR=IYPOS                                     ROFF    2966
         BX7    X2                                                             ROFF    2967
         SA6    XCUR                                                           ROFF    2968
         SA7    A6+B7                                                          ROFF    2969
         BX6    X3                                                             ROFF    2970
         BX7    X4                                                             ROFF    2971
         SA6    IXCUR                                                          ROFF    2972
         SA7    A6+B7                                                          ROFF    2973
         EQ     PLOT1         .EXIT                                            ROFF    2974
*        .CONTINUOUS PLOT SYMBOL       A,B = POINTS  I=NO OF POINTS  J=0       ROFF    2975
 PSYM    SA2    B3                                                             ROFF    2976
         SA1    B4                                                             ROFF    2977
         NG     X2,PS3                                                         ROFF    2978
         SB4    X2                                                             ROFF    2979
         SB5    B0                                                             ROFF    2980
         SX6    36B                                                            ROFF    2981
         SA6    B36B                                                           ROFF    2982
         RJ     DBCD                                                           ROFF    2983
         SX7    20B                                                            ROFF    2984
         SA7    B36B                                                           ROFF    2985
         MX1    6                                                              ROFF    2986
         BX6    X1*X6                                                          ROFF    2987
         LX6    6                                                              ROFF    2988
         SB3    X6                                                             ROFF    2989
         EQ     B0,B4,PLOT1            .EXIT N = 0                             ROFF    2990
         RJ     SCAL                                                           ROFF    2991
         SX5    2000B                                                          ROFF    2992
         SA3    WORD1                                                          ROFF    2993
         BX2    -X5*X1                                                         ROFF    2994
         SA4    WORD1+2                                                        ROFF    2995
         LX2    30B                                                            ROFF    2996
         LX3    60B                                                            ROFF    2997
         LX1    60B                                                            ROFF    2998
         BX6    X2+X3                                                    ROFF     2999
         SX4    X4+B3                                                    ROFF     3000
         LX4    14B                                                      ROFF     3001
         MX5    60B                                                      ROFF     3002
         IX6    X6+X4                                                    ROFF     3003
         BX7    X1*X5                                                    ROFF     3004
         SA7    A0                                                       ROFF     3005
         BX5    -X5*X1                                                   ROFF     3006
         IX6    X6+X5                                                    ROFF     3007
         SA6    A0-B7        .STORE FIRST SET                            ROFF     3008
         EQ     B4,B0,PS1                                                ROFF     3009
         RJ     SCAL                                                     ROFF     3010
         SA3    A0                                                       ROFF     3011
         LX1    30B                                                      ROFF     3012
         BX6    X1+X3                                                    ROFF     3013
         SA6    A0           .STORE SECOND SET                           ROFF     3014
         EQ     B4,B0,PS1                                                ROFF     3015
         RJ     SCAL                                                     ROFF     3016
         SA3    A0                                                       ROFF     3017
         BX6    X1+X3                                                    ROFF     3018
         SA6    A0           .STORE THIRD SET                            ROFF     3019
         EQ     B0,B4,PS1                                                ROFF     3020
         RJ     SCAL                                                     ROFF     3021
         LX1    44B                                                      ROFF     3022
         BX6    X1                                                       ROFF     3023
         SA6    A0+B7        .STORE FOURTH SET                           ROFF     3024
         EQ     B0,B4,PS2                                                ROFF     3025
         RJ     SCAL                                                     ROFF     3026
         SA3    A0+B7                                                    ROFF     3027
         LX1    14B                                                      ROFF     3028
         BX6    X1+X3                                                    ROFF     3029
         SA6    A0+B7        .STORE FIFTH SET                            ROFF     3030
         EQ     B0,B0,PS2                                                ROFF     3031
PS1      SX7    B7+B7                                                    ROFF     3032
         RJ     POUT                                                     ROFF     3033
         EQ     B0,B0,P10F                                               ROFF     3034
PS2      SX7    3                                                        ROFF     3035
         RJ     POUT                                                     ROFF     3036
         EQ     B0,B0,P10F                                               ROFF     3037
*        .SET SYMBOL PARAMETERS   A=0,B=ORIENT,I=-1,J=ISIZ,K=5           ROFF     3038
PS3      SA3    B2                                                       ROFF     3039
         LX1    7                                                        ROFF     3040
         SA4    WORD1                                                    ROFF     3041
         MX6    0                                                        ROFF     3042
         ZR     X3,PS4                                                   ROFF     3043
         SX6    B7+B7                                                    ROFF     3044
PS4      SA5    WORD1+2                                                  ROFF     3045
         BX6    X6+X4                                                    ROFF     3046
         IX7    X5 <1                                                    ROFF     3047
         SA6    A4                                                       ROFF     3048
         SA7    A5                                                       ROFF     3049
         EQ     PLOT1                       .EXIT                        ROFF     3050
*        .PLOT 1-20 CHARACTERS IN TAB MODE                               ROFF     3051
*        .A=ADDR OF STRING B = ORIENT  I = NO OF CHAR  J = SIZE  K =6    ROFF     3052
PC       SA1    B3           .READ N                                     ROFF     3053
         SA2    B4           .READ CHAR SIZE                             ROFF     3054
         MX3    58                                                       ROFF     3055
```

```
          BX2     -X3*X2                                              ROFF     3056
          ZR      X1,PLOT1     .EXIT N = 0                            ROFF     3057
          BX3     X2                                                  ROFF     3058
          LX2     7                                                   ROFF     3059
          BX6     X3                                                  ROFF     3060
          LX6     3                                                   ROFF     3061
          SX5     X3-2                                                ROFF     3062
          PL      X5,PC1                                              ROFF     3063
          SX6     10B                                                 ROFF     3064
          ZR      X3,PC1                                              ROFF     3065
          SX6     14B                                                 ROFF     3066
PC1       SA1     B2           .READ ORIENTATION PARAMETER            ROFF     3067
          MX7     0                                                   ROFF     3068
          ZR      X1,PC2                                              ROFF     3069
          SX1     B7+B7                                               ROFF     3070
          BX7     X6                                                  ROFF     3071
          MX6     0                                                   ROFF     3072
PC2       SA6     IX                                                  ROFF     3073
          SA3     WORD1+1                                             ROFF     3074
          SX4     1777B                                               ROFF     3075
          IX6     X1+X3                                               ROFF     3076
          SA1     IXCUR                                               ROFF     3077
          SA3     A1+B7                                               ROFF     3078
          BX6     X6+X2                                               ROFF     3079
          LX6     60B                                                 ROFF     3080
          BX1     X1*X4                                               ROFF     3081
          SA7     A6+B7                                               ROFF     3082
          LX1     44B                                                 ROFF     3083
          BX3     X3*X4                                               ROFF     3084
          LX3     30B                                                 ROFF     3085
          IX3     X1+X3                                               ROFF     3086
          BX6     X3+X6                                               ROFF     3087
          SA1     B1                                                  ROFF     3088
          SA6     A0-B7                                               ROFF     3089
          RJ      OBCD                                                ROFF     3090
          SA2     B3                                                  ROFF     3091
          SA6     TEMP                                                ROFF     3092
          SX7     X2-12B                                              ROFF     3093
          NG      X7,PC3                                              ROFF     3094
          SA1     B1+B7                                               ROFF     3095
          RJ      OBCD                                                ROFF     3096
          SA6     A6+B7                                               ROFF     3097
          SA2     B3                                                  ROFF     3098
PC3       SA5     TEMP                                                ROFF     3099
          SB5     X2           .B5=N                                  ROFF     3100
          IX2     X2+X0                                               ROFF     3101
          SA3     A0-B7                                               ROFF     3102
          AX7     B7,X2                                               ROFF     3103
          BX1     X5                                                  ROFF     3104
          SB6     X7           .B6 = N/2                              ROFF     3105
          MX4     14B          .X4 = MASK                             ROFF     3106
          SX7     B5                                                  ROFF     3107
          SB3     B7                                                  ROFF     3108
          SX5     5602B        .X5 = TAB MODE EXIT                    ROFF     3109
          BX2     X4*X1                                               ROFF     3110
          LX1     14B                                                 ROFF     3111
          LX2     30B                                                 ROFF     3112
```

```
      BX6     X3+X2                                        ROFF     3113
      SB6     B6-B7                                        ROFF     3114
      SB4     B0              .B4 = SHIFT COUNT FOR X5     ROFF     3115
      EQ      B0,B6,PC11      .JUMP N = 2                  ROFF     3116
      BX2     X1*X4                                        ROFF     3117
      SB3     B3+B7                                        ROFF     3118
      LX1     14B                                          ROFF     3119
      LX2     14B                                          ROFF     3120
      BX6     X6+X2                                        ROFF     3121
      SA6     A0-B7                                        ROFF     3122
      SB4     60B                                          ROFF     3123
      SB6     B6-B7                                        ROFF     3124
      MX6     0                                            ROFF     3125
      EQ      B6,B0,PC7       .JUMP N = 4                  ROFF     3126
      BX6     X4*X1                                        ROFF     3127
      SB6     B6-B7                                        ROFF     3128
      LX1     14B                                          ROFF     3129
      SB4     44B                                          ROFF     3130
      EQ      B0,B6,PC7       .JUMP N = 6                  ROFF     3131
      BX2     X1*X4                                        ROFF     3132
      LX1     14B                                          ROFF     3133
      LX2     60B                                          ROFF     3134
      BX6     X6+X2                                        ROFF     3135
      SB6     B6-B7                                        ROFF     3136
      SB4     30B                                          ROFF     3137
      EQ      B0,B6,PC7       .JUMP N = 8                  ROFF     3138
      BX2     X1*X4                                        ROFF     3139
      SB4     14B                                          ROFF     3140
      SB6     B6-B7                                        ROFF     3141
      LX2     44B                                          ROFF     3142
      BX6     X2+X6                                        ROFF     3143
      EQ      B0,B6,PC7       .JUMP N = 10                 ROFF     3144
      SA1     A5+B7           .READ NEXT WORD OF CHARACTERS ROFF    3145
      SB4     B0                                           ROFF     3146
      BX2     X1*X4                                        ROFF     3147
      SB6     B6-B7                                        ROFF     3148
      LX1     14B                                          ROFF     3149
      LX2     30B                                          ROFF     3150
      BX6     X6+X2                                        ROFF     3151
      EQ      B0,B6,PC7       .JUMP N = 12                 ROFF     3152
      BX2     X1*X4                                        ROFF     3153
      LX1     14B                                          ROFF     3154
      SB6     B6-B7                                        ROFF     3155
      LX2     14B                                          ROFF     3156
      SB4     60B                                          ROFF     3157
      BX6     X2+X6                                        ROFF     3158
      SA6     A0              .STORE SECOND WORD           ROFF     3159
      MX6     0                                            ROFF     3160
      EQ      B0,B6,PC10      .JUMP N = 14                 ROFF     3161
      BX6     X1*X4                                        ROFF     3162
      SB4     44B                                          ROFF     3163
      LX1     14B                                          ROFF     3164
      SB6     B6-B7                                        ROFF     3165
      EQ      B0,B6,PC10      .JUMP N = 16                 ROFF     3166
      BX2     X1*X4                                        ROFF     3167
      SB4     30B                                          ROFF     3168
      LX2     60B                                          ROFF     3169
```

```
         SB6     B6-B7                                                     ROFF      3170
         LX1     14B                                                       ROFF      3171
         BX6     X6+X2                                                     ROFF      3172
         EQ      B0,B6,PC10  .JUMP N = 18                                  ROFF      3173
         BX2     X1*X4                                                     ROFF      3174
         LX2     44B                                                       ROFF      3175
         BX6     X2+X6                                                     ROFF      3176
         SB4     14B                                                       ROFF      3177
         EQ      B0,B0,PC10  .N = 20                                       ROFF      3178
PC5      SA4     IX          .UPDATE CURRENT X,  Y  POSITIONS              ROFF      3179
         SX2     B5                                                        ROFF      3180
         PX4     B0,X4                                                     ROFF      3181
         SA3     IXCUR                                                     ROFF      3182
         PX2     B0,X2                                                     ROFF      3183
         SA1     A4+B7                                                     ROFF      3184
         DX4     X4*X2                                                     ROFF      3185
         SA5     A3+B7                                                     ROFF      3186
         UX4     B0,X4                                                     ROFF      3187
         PX1     B0,X1                                                     ROFF      3188
         IX6     X4+X3                                                     ROFF      3189
         SA6     A3                                                        ROFF      3190
         DX1     X2*X1                                                     ROFF      3191
         PX6     B0,X6                                                     ROFF      3192
         NX6     B0,X6                                                     ROFF      3193
         UX1     B0,X1                                                     ROFF      3194
         IX7     X5+X1                                                     ROFF      3195
         SA7     A6+B7                                                     ROFF      3196
         PX7     B0,X7                                                     ROFF      3197
         SA6     XCUR                                                      ROFF      3198
         NX7     B0,X7                                                     ROFF      3199
         SA7     A6+B7                                                     ROFF      3200
         EQ      PLOT1       .EXIT                                         ROFF      3201
PC7      LX5     B4,X5                                                     ROFF      3202
         SX7     B3                                                        ROFF      3203
         BX6     X6+X5                                                     ROFF      3204
         SA6     A0                                                        ROFF      3205
         SA0     DATA+1                                                    ROFF      3206
         RJ      POUT                                                      ROFF      3207
         EQ      B0,B0,PC5                                                 ROFF      3208
PC10     SA0     A0+B7       .N = 14,16,18,20                              ROFF      3209
         SB3     B3+B7                                                     ROFF      3210
         EQ      B0,B0,PC7                                                 ROFF      3211
PC11     SA0     A0-B7       .N = 2                                        ROFF      3212
         EQ      B0,B0,PC7                                                 ROFF      3213
*       .DISPLAY CODE TO EXTERNAL BCD CONVERSION                           ROFF      3214
DBCD     BSS     1                                                         ROFF      3215
         MX6     0                                                         ROFF      3216
         SX2     10                                                        ROFF      3217
         MX3     6                                                         ROFF      3218
DB1      BX4     X1*X3       .CONVERT TO EXTERNAL BCD                      ROFF      3219
         LX4     6                                                         ROFF      3220
         SA4     X4+EBCD                                                   ROFF      3221
         LX6     6                                                         ROFF      3222
         BX6     X6+X4                                                     ROFF      3223
         LX1     6                                                         ROFF      3224
         IX2     X2-X0                                                     ROFF      3225
         NZ      X2,DB1                                                    ROFF      3226
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```
          EQ      B0,B0,OBCD                                           ROFF      3227
*.RECEIVE  INITIAL X AND Y VALUES AND ERROR FLAG-INITIATE GRAPH        ROFF      3228
*         .A=XINIT, B=YINIT, I=IERR, J= , K=7                          ROFF      3229
 PINT     SA1     B1              .READ X INITIAL                      ROFF      3230
          SA2     B2              .READ Y INITIAL                      ROFF      3231
          BX6     X1                                                   ROFF      3232
          BX7     X2                                                   ROFF      3233
          SA6     XCUR                                                 ROFF      3234
          SA7     A6+B7                                                ROFF      3235
          JX6     B6,X6                                                ROFF      3236
          LX6     B6,X6                                                ROFF      3237
          JX7     B6,X7                                                ROFF      3238
          LX7     B6,X7                                                ROFF      3239
          SA6     IXCUR                                                ROFF      3240
          SB2     BUFFC                                                ROFF      3241
          SA1     BUFF                                                 ROFF      3242
          SA7     A6+B7                                                ROFF      3243
          SB2     B0-B2                                                ROFF      3244
          NZ      X1,PINTB        .JUMP BUFFER POINTER FOUND           ROFF      3245
          RJ      GETBA                                                ROFF      3246
          LT      B2,B0,PINTA                                          ROFF      3247
          SX6     B2                                                   ROFF      3248
          SA6     BUFF                                                 ROFF      3249
          EQ      B0,B0,PINTB                                          ROFF      3250
 PINTA    SB2     BUFFD                                                ROFF      3251
          SB2     B0-B2                                                ROFF      3252
          RJ      GETBA                                                ROFF      3253
          LT      B2,B0,PINTC                                          ROFF      3254
          SX6     B2                                                   ROFF      3255
          SA6     BUFF                                                 ROFF      3256
 PINTB    SA1     B3                                                   ROFF      3257
          ZR      X1,PLOT1        .EXIT NO PREAMBLE SUPPRESSION        ROFF      3258
          SX7     B7                                                   ROFF      3259
          SX6     6000B                                                ROFF      3260
          LX6     60B                                                  ROFF      3261
          SA6     A0-B7                                                ROFF      3262
          RJ      POUT            .OUTPUT PREAMBLE SUP CONTROL WORD    ROFF      3263
          EQ      PLOT1           .EXIT                                ROFF      3264
 PINTC    SX2     MSG                                                  ROFF      3265
          SX6     152307B                                              ROFF      3266
          LX6     52B                                                  ROFF      3267
 OVER     SA1     B7                                                   ROFF      3268
          NZ      X1,OVER                                              ROFF      3269
          IX6     X6+X2                                                ROFF      3270
          SA6     B7                                                   ROFF      3271
 +        RJ      ABNORM.                                              ROFF      3272
 -        LT      B0,B4,NAME                                           ROFF      3273
*.TERMINATE GRAPH-WRITE END OF RECORD                                  ROFF      3274
 PTER     SX5     26B             .X5=STATUS=26B=EOR                   ROFF      3275
          RJ      CALL            .PUT UP CIO CALL                     ROFF      3276
          EQ      PLOT1            .EXIT                               ROFF      3277
 SPSM     SA1     B1              .SET PLOT SYMBOL PARAMETERS          ROFF      3278
          SA2     B2                                                   ROFF      3279
          SX5     2003B                                                ROFF      3280
          SA3     B3                                                   ROFF      3281
          SX6     3001B                                                ROFF      3282
          SX7     3041B                                                ROFF      3283
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         ZR     X1,SPSM1     .SENSE CASE 0                                ROFF     3284
         SX4    100B                                                      ROFF     3285
         IX6    X6+X4                                                     ROFF     3286
         IX7    X7+X4                                                     ROFF     3287
         IX5    X5+X4                                                     ROFF     3288
SPSM1    ZR     X2,SPSM2     .SENSE NO ITALICS                            ROFF     3289
         SX4    4                                                         ROFF     3290
         IX6    X6+X4                                                     ROFF     3291
         IX7    X7+X4                                                     ROFF     3292
SPSM2    ZR     X3,SPSM3     .SENSE HIGH INTENSITY                        ROFF     3293
         IX6    X6-X0        .REMOVE HIGH INTENSITY BIT                   ROFF     3294
         IX7    X7-X0                                                     ROFF     3295
SPSM3    SA6    WORD1        .STORE UPDATED CONTROL WORDS                 ROFF     3296
         BX6    X5                                                        ROFF     3297
         SA7    A6+B7                                                     ROFF     3298
         SA6    A7+B7                                                     ROFF     3299
         EQ     PLOT1                  .GO HOME                           ROFF     3300
*        .STORE X6 IN FILMPL BUFFER AND ADVANCE IN                        ROFF     3301
POUT     PS                                                               ROFF     3302
         SA2    A0-B7                                                     ROFF     3303
         SA1    BUFF                                                      ROFF     3304
         LX7    46                                                        ROFF     3305
         SB6    X1                                                        ROFF     3306
         IX6    X2+X7                                                     ROFF     3307
         AX7    46                                                        ROFF     3308
PAG      SA3    B6+2         .READ IN                                     ROFF     3309
         SA6    X3           .STORE DATA WORD AT IN                       ROFF     3310
POUT1    SX3    X3+B7        .INCREMENT IN                                ROFF     3311
         SA5    B6+4         .READ LIMIT                                  ROFF     3312
         SX5    X5                                                        ROFF     3313
         IX5    X5-X3                                                     ROFF     3314
         NZ     X5,POUT2     .JUMP IN NOT LIMIT                           ROFF     3315
         SA3    B6+B7        .SET IN = FIRST                              ROFF     3316
         SX3    X3                                                        ROFF     3317
POUT2    SA5    A5-B7        .READ OUT                                    ROFF     3318
         IX5    X5-X3                                                     ROFF     3319
         ZR     X5,POUT5     .JUMP TO DUMP BUFFER (IN+1=OUT)              ROFF     3320
         BX6    X3                                                        ROFF     3321
         SA6    A5-B7        .STORE UPDATED IN                            ROFF     3322
         ZR     B0,POUT6                                                  ROFF     3323
POUT5    SX5    16B          .DUMP BUFFER (BUFFERED I/O)                  ROFF     3324
         RJ     CALL         .PUT UP CIO CALL                             ROFF     3325
         SA3    B6+2         .READ IN                                     ROFF     3326
         ZR  B0,POUT1                                                     ROFF     3327
POUT6    IX7    X7-X0                                                     ROFF     3328
         NG     X7,POUT                                                   ROFF     3329
         ZR     X7,POUT                                                   ROFF     3330
         SA2    A0                                                        ROFF     3331
         SA0    A0+B7                                                     ROFF     3332
         BX6    X2                                                        ROFF     3333
         EQ     B0,B0,PAG                                                 ROFF     3334
*        .PUT UP CIO CALL                                                 ROFF     3335
*        . X5=BUFFER OPERATION                                            ROFF     3336
CALL     PS                                                               ROFF     3337
         SA2    BUFF                                                      ROFF     3338
         SX3    031117B                                                   ROFF     3339
         MX6    42                                                        ROFF     3340
```

```
          SA1    X2                                                ROFF     3341
          LX3    52B                                               ROFF     3342
          BX6    X1*X6                                             ROFF     3343
          IX6    X6+X5                                             ROFF     3344
          IX4    X3+X2                                             ROFF     3345
          SA6    A1             .STORE BA                          ROFF     3346
          BX6    X4                                                ROFF     3347
CALL1     SA2    B7                                                ROFF     3348
          NZ     X2,CA_L1                                          ROFF     3349
          SA6    B7             .C[illegible] CALL                 ROFF     3350
CALL2     RJ     XRCL                                              ROFF     3351
          SA1    A1                                                ROFF     3352
          LX1    59                                                ROFF     3353
          [illegible] X1,CA_L                                      ROFF     3354
          [illegible] B0,B0,CALL2                                  ROFF     3355
WORD1     [illegible] 3901B                                        ROFF     3356
          [illegible] 3041B                                        ROFF     3357
          [illegible] 2003B                                        ROFF     3358
BUFFC     CO[illegible] 06[illegible]000000008                     ROFF     3359
BUFFD     CO[illegible] 15063[illegible]000000008                  ROFF     3360
MSG       CON    06111[illegible]14551617248                       ROFF     3361
          CON    55040[illegible]40122050455B                      ROFF     3362
          DATA   0                                                 ROFF     3363
*         .TABLE FOR DISPLAY TO EXTERNAL BCD CONVERSION            ROFF     3364
*         .      EXTERNAL       DISPLAY                            ROFF     3365
EBCD      CON    20B            .SPACE                             ROFF     3366
          CON    61B            .A                                 ROFF     3367
          CON    62B            .B                                 ROFF     3368
          CON    63B            .C                                 ROFF     3369
          CON    64B            .D                                 ROFF     3370
          CON    65B            .E                                 ROFF     3371
          CON    66B            .F                                 ROFF     3372
          CON    67B            .G                                 ROFF     3373
          CON    70B            .H                                 ROFF     3374
          CON    71B            .I                                 ROFF     3375
          CON    41B            .J                                 ROFF     3376
          CON    42B            .K                                 ROFF     3377
          CON    43B            .L                                 ROFF     3378
          CON    44B            .M                                 ROFF     3379
          CON    45B            .N                                 ROFF     3380
          CON    46B            .O                                 ROFF     3381
          CON    47B            .P                                 ROFF     3382
          CON    50B            .Q                                 ROFF     3383
          CON    51B            .R                                 ROFF     3384
          CON    22B            .S                                 ROFF     3385
          CON    23B            .T                                 ROFF     3386
          CON    24B            .U                                 ROFF     3387
          CON    25B            .V                                 ROFF     3388
          CON    26B            .W                                 ROFF     3389
          CON    27B            .X                                 ROFF     3390
          CON    30B            .Y                                 ROFF     3391
          CON    31B            .Z                                 ROFF     3392
          CON    12B            .ZERO                              ROFF     3393
          CON    01B            .1                                 ROFF     3394
          CON    02B            .2                                 ROFF     3395
          CON    03B            .3                                 ROFF     3396
          CON    04B            .4                                 ROFF     3397
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         CON     05B          .5
         CON     06B          .6
         CON     07B          .7
         CON      0B          .8
         CON     11B          .9
         CON     60B          .+
         CON     40B          .-
         CON     54B          .*
         CON     21B          ./
         CON     34B          .(
         CON     74B          .)
33EB     CON     20B
         CON     13B          .=
         CON     20B          .SPACE
         CON     33B          .,
         CON     73B          ..
         CON     00B          .
         CON     15B          .
         CON     16B          .
         CON     17B          .
         CON     32B          .
         CON     35B          .
         CON     14B          .
         CON     37B          .
         CON     52B          .
         CON     55B          .
         CON     53B          .
         CON     57B          .
         CON     72B          .
         CON     75B          .
         CON     76B          .
         CON     77B          .
XPOS     BSSZ    1
YPOS     BSSZ    1
XCUR     BSSZ    1
YCUR     BSSZ    1
IXPOS    BSSZ    1
IYPOS    BSSZ    1
IXCUR    BSSZ    1
IYCUR    BSSZ    1
DATA     BSSZ    3
ORIEN    BSSZ    1
IX       BSSZ    1
IY       BSSZ    1
TEMP     BSSZ    2
BUFF     BSSZ    1
SAVAD    BSSZ        1
     END
```

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ROFF    3398
ROFF    3399
ROFF    3400
ROFF    3401
ROFF    3402
ROFF    3403
ROFF    3404
ROFF    3405
ROFF    3406
ROFF    3407
ROFF    3408
ROFF    3409
ROFF    3410
ROFF    3411
ROFF    3412
ROFF    3413
ROFF    3414
ROFF    3415
ROFF    3416
ROFF    3417
ROFF    3418
ROFF    3419
ROFF    3420
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ROFF    3433
ROFF    3434
ROFF    3435
ROFF    3436
ROFF    3437
ROFF    3438
ROFF    3439
ROFF    3440
ROFF    3441
ROFF    3442
ROFF    3443
ROFF    3444
ROFF    3445
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C                                                                       ROFF    3446
C     TRANSLATE TABLE EBCDIC TO LITTON CODE FOR MTST                    ROFF    3447
C                                                                       ROFF    3448
      SUBROUTINE WRT9209 (ICO,LINE,LEN)                                 ROFF    3449
C                                                                       ROFF    3450
C     WMTST READS FORTRAN OUTPUT FILE ON TAPE1 AND WRITES MTST CODES    ROFF    3451
C     ON TAPE2 FOR CONVERSION VIA THE LITTON TAPE/MTST UNIT.            ROFF    3452
C                                                                       ROFF    3453
C                                                                       ROFF    3454
C     PROGRAM BY HARRY M. MURPHY, JR.,  4 FEBRUARY 1972.                ROFF    3455
C     MODIFIED 17FEB72 TO PERMIT WRITING MULTIPLE MTST CARTRIDGES.      ROFF    3456
C     REVISED INTO SUBROUTINE                                           ROFF    3457
C     BY LT. CLIFFORD E. RHOADES, JR.  25 FEBRUARY                      ROFF    3458
C                                                                       ROFF    3459
      COMMON LWD(3700)                                                  ROFF    3460
C                                                                       ROFF    3461
      COMMON /BLK1/ LBY,LWP                                             ROFF    3462
C                                                                       ROFF    3463
      COMMON /GO/ IIRZ,ITR(255)                                         ROFF    3464
      COMMON /PAGES/ IPAGES,MES(5)                                      ROFF    3465
C                                                                       ROFF    3466
      DIMENSION KDIG(10), LINE(135)                                     ROFF    3467
C                                                                       ROFF    3468
      LOGICAL DONE,SECOND,BKSL,GREEK                                    ROFF    3469
C                                                                       ROFF    3470
      DATA KDIG/16318,16048,16408,16448,16348,16208,16608,16248,16648,16 ROFF    3471
     1703/                                                              ROFF    3472
C                                                                       ROFF    3473
      DATA DONE,SECOND,BKSL,GREEK/.FALSE.,.FALSE.,.FALSE.,.FALSE./      ROFF    3474
C                                                                       ROFF    3475
      DATA KPLS,KONE,KZRO/1H+,1H1,1H0/                                  ROFF    3476
      DATA KBL/64/                                                      ROFF    3477
C                                                                       ROFF    3478
      DATA MCRC,MFDC,MSTC,MSTX/1610B,1652B,1654B,1657B/                 ROFF    3479
      DATA MBSP,MBLK/1415B,1613B/                                       ROFF    3480
C                                                                       ROFF    3481
C                                                                       ROFF    3482
      DATA ITRZ/14511452B/                                              ROFF    3483
      DATA ITR(1)/14541465B/                                            ROFF    3484
      DATA ITR(2)/14541472B/                                            ROFF    3485
      DATA ITR(3)/14541466B/                                            ROFF    3486
      DATA ITR(4)/14541426B/                                            ROFF    3487
      DATA ITR(5)/1511B/                                                ROFF    3488
      DATA ITR(6)/14541452B/                                            ROFF    3489
      DATA ITR(7)/14541407B/                                            ROFF    3490
      DATA ITR(8)/14541413B/                                            ROFF    3491
      DATA ITR(9)/14541461B/                                            ROFF    3492
      DATA ITR(10)/14541401B/                                           ROFF    3493
      DATA ITR(11)/14541601B/                                           ROFF    3494
      DATA ITR(12)/14541441B/                                           ROFF    3495
      DATA ITR(13)/1613B/                                               ROFF    3496
      DATA ITR(14)/14541637B/                                           ROFF    3497
      DATA ITR(15)/14541465B/                                           ROFF    3498
      DATA ITR(16)/14541452B/                                           ROFF    3499
      DATA ITR(17)/14541442B/                                           ROFF    3500
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 SUBROUTINE  WRT9209

 DATA ITR(18)/14541462B/                                              ROFF      3501
 DATA ITR(19)/14541436B/                                              ROFF      3502
 DATA ITR(20)/14541405B/                                              ROFF      3503
 DATA ITR(21)/14541452B/                                              ROFF      3504
 DATA ITR(22)/1615B/                                                  ROFF      3505
 DATA ITR(23)/14541423B/                                              ROFF      3506
 DATA ITR(24)/14541463B/                                              ROFF      3507
 DATA ITR(25)/14541425B/                                              ROFF      3508
 DATA ITR(26)/14541443B/                                              ROFF      3509
 DATA ITR(27)/14541643B/                                              ROFF      3510
 DATA ITR(28)/14541437B/                                              ROFF      3511
 DATA ITR(29)/14541435B/                                              ROFF      3512
 DATA ITR(30)/14541452B/                                              ROFF      3513
 DATA ITR(31)/14541400B/                                              ROFF      3514
 DATA ITR(32)/14541420B/                                              ROFF      3515
 DATA ITR(033)/14541422B/                                             ROFF      3516
 DATA ITR(034)/14541431B/                                             ROFF      3517
 DATA ITR(035)/14541402B/                                             ROFF      3518
 DATA ITR(036)/14541446B/                                             ROFF      3519
 DATA ITR(037)/14541445B/                                             ROFF      3520
 DATA ITR(038)/14541471B/                                             ROFF      3521
 DATA ITR(039)/14541406B/                                             ROFF      3522
 DATA ITR(040)/14541433B/                                             ROFF      3523
 DATA ITR(041)/14541400B/                                             ROFF      3524
 DATA ITR(042)/14541452B/                                             ROFF      3525
 DATA ITR(043)/14541425B/                                             ROFF      3526
 DATA ITR(044)/14541605B/                                             ROFF      3527
 DATA ITR(045)/14541452B/                                             ROFF      3528
 DATA ITR(046)/14541404B/                                             ROFF      3529
 DATA ITR(047)/14541452B/                                             ROFF      3530
 DATA ITR(048)/14541452B/                                             ROFF      3531
 DATA ITR(049)/14541452B/                                             ROFF      3532
 DATA ITR(050)/14541452B/                                             ROFF      3533
 DATA ITR(051)/14541452B/                                             ROFF      3534
 DATA ITR(052)/14541452B/                                             ROFF      3535
 DATA ITR(053)/14541452B/                                             ROFF      3536
 DATA ITR(054)/14541452B/                                             ROFF      3537
 DATA ITR(055)/14541452B/                                             ROFF      3538
 DATA ITR(056)/14541452B/                                             ROFF      3539
 DATA ITR(057)/14541452B/                                             ROFF      3540
 DATA ITR(058)/14541672B/                                             ROFF      3541
 DATA ITR(059)/14541452B/                                             ROFF      3542
 DATA ITR(060)/14541452B/                                             ROFF      3543
 DATA ITR(061)/14541452B/                                             ROFF      3544
 DATA ITR(062)/14541671B/                                             ROFF      3545
 DATA ITR(063)/14541452B/                                             ROFF      3546
 DATA ITR(064)/00001613B/                                             ROFF      3547
 DATA ITR(065)/14541665B/                                             ROFF      3548
 DATA ITR(066)/14541672B/                                             ROFF      3549
 DATA ITR(067)/14541666B/                                             ROFF      3550
 DATA ITR(068)/14541626B/                                             ROFF      3551
 DATA ITR(069)/14541622B/                                             ROFF      3552
 DATA ITR(070)/14541647B/                                             ROFF      3553
 DATA ITR(071)/14541607B/                                             ROFF      3554
 DATA ITR(072)/14541632B/                                             ROFF      3555
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      SUBROUTINE  WRT9209

      DATA ITR(073)/14541661B/                                          ROFF    3556
      DATA ITR(074)/00001460B/                                          ROFF    3557
      DATA ITR(075)/00001441B/                                          ROFF    3558
      DATA ITR(076)/14541447B/                                          ROFF    3559
      DATA ITR(077)/00001470B/                                          ROFF    3560
      DATA ITR(078)/00001443B/                                          ROFF    3561
      DATA ITR(079)/14541440B/                                          ROFF    3562
      DATA ITR(080)/00001424B/                                          ROFF    3563
      DATA ITR(081)/14541603B/                                          ROFF    3564
      DATA ITR(082)/14541662B/                                          ROFF    3565
      DATA ITR(083)/14541636B/                                          ROFF    3566
      DATA ITR(084)/14541605B/                                          ROFF    3567
      DATA ITR(085)/14541642B/                                          ROFF    3568
      DATA ITR(086)/14541635B/                                          ROFF    3569
      DATA ITR(087)/14541623B/                                          ROFF    3570
      DATA ITR(088)/14541663B/                                          ROFF    3571
      DATA ITR(089)/14541625B/                                          ROFF    3572
      DATA ITR(090)/00001601B/                                          ROFF    3573
      DATA ITR(091)/00001434B/                                          ROFF    3574
      DATA ITR(092)/00001464B/                                          ROFF    3575
      DATA ITR(093)/00001430B/                                          ROFF    3576
      DATA ITR(094)/00001627B/                                          ROFF    3577
      DATA ITR(095)/00001673B/                                          ROFF    3578
      DATA ITR(096)/00001673B/                                          ROFF    3579
      DATA ITR(097)/00001637B/                                          ROFF    3580
      DATA ITR(098)/14541631B/                                          ROFF    3581
      DATA ITR(099)/14541602B/                                          ROFF    3582
      DATA ITR(100)/14541646B/                                          ROFF    3583
      DATA ITR(101)/14541645B/                                          ROFF    3584
      DATA ITR(102)/14541671B/                                          ROFF    3585
      DATA ITR(103)/14541606B/                                          ROFF    3586
      DATA ITR(104)/14541633B/                                          ROFF    3587
      DATA ITR(105)/14541600B/                                          ROFF    3588
      DATA ITR(106)/14541452B/                                          ROFF    3589
      DATA ITR(107)/00001667B/                                          ROFF    3590
      DATA ITR(108)/00001420B/                                          ROFF    3591
      DATA ITR(109)/00001473B/                                          ROFF    3592
      DATA ITR(110)/14541403B/                                          ROFF    3593
      DATA ITR(111)/00001437B/                                          ROFF    3594
      DATA ITR(112)/14541430B/                                          ROFF    3595
      DATA ITR(113)/14541404B/                                          ROFF    3596
      DATA ITR(114)/14541473B/                                          ROFF    3597
      DATA ITR(115)/14541673B/                                          ROFF    3598
      DATA ITR(116)/14541470B/                                          ROFF    3599
      DATA ITR(117)/14541420B/                                          ROFF    3600
      DATA ITR(118)/14541460B/                                          ROFF    3601
      DATA ITR(119)/14541424B/                                          ROFF    3602
      DATA ITR(120)/14541464B/                                          ROFF    3603
      DATA ITR(121)/14541467B/                                          ROFF    3604
      DATA ITR(122)/00001427B/                                          ROFF    3605
      DATA ITR(123)/00001444B/                                          ROFF    3606
      DATA ITR(124)/00001440B/                                          ROFF    3607
      DATA ITR(125)/00001621B/                                          ROFF    3608
      DATA ITR(126)/00001643B/                                          ROFF    3609
      DATA ITR(127)/00001421B/                                          ROFF    3610
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SUBROUTINE  WRT9209

DATA ITR(128)/14541621B/                                    ROFF      3611
DATA ITR(129)/00001665B/                                    ROFF      3612
DATA ITR(130)/00001672B/                                    ROFF      3613
DATA ITR(131)/00001666B/                                    ROFF      3614
DATA ITR(132)/00001626B/                                    ROFF      3615
DATA ITR(133)/00001622B/                                    ROFF      3616
DATA ITR(134)/00001647B/                                    ROFF      3617
DATA ITR(135)/00001607B/                                    ROFF      3618
DATA ITR(136)/00001632B/                                    ROFF      3619
DATA ITR(137)/00001661B/                                    ROFF      3620
DATA ITR(138)/14541452B/                                    ROFF      3621
DATA ITR(139)/14541452B/                                    ROFF      3622
DATA ITR(140)/14541452B/                                    ROFF      3623
DATA ITR(141)/14541452B/                                    ROFF      3624
DATA ITR(142)/14541452B/                                    ROFF      3625
DATA ITR(143)/14541452B/                                    ROFF      3626
DATA ITR(144)/14541421B/                                    ROFF      3627
DATA ITR(145)/1603B/                                        ROFF      3628
DATA ITR(146)/1662B/                                        ROFF      3629
DATA ITR(147)/1636B/                                        ROFF      3630
DATA ITR(148)/1605B/                                        ROFF      3631
DATA ITR(149)/1642B/                                        ROFF      3632
DATA ITR(150)/1635B/                                        ROFF      3633
DATA ITR(151)/1623B/                                        ROFF      3634
DATA ITR(152)/1663B/                                        ROFF      3635
DATA ITR(153)/1625B/                                        ROFF      3636
DATA ITR(154)/14541452B/                                    ROFF      3637
DATA ITR(155)/14541452B/                                    ROFF      3638
DATA ITR(156)/14541452B/                                    ROFF      3639
DATA ITR(157)/14541452B/                                    ROFF      3640
DATA ITR(158)/14541452B/                                    ROFF      3641
DATA ITR(159)/14541452B/                                    ROFF      3642
DATA ITR(160)/14541452B/                                    ROFF      3643
DATA ITR(161)/14541641B/                                    ROFF      3644
DATA ITR(162)/1631B/                                        ROFF      3645
DATA ITR(163)/1602B/                                        ROFF      3646
DATA ITR(164)/1646B/                                        ROFF      3647
DATA ITR(165)/1645B/                                        ROFF      3648
DATA ITR(166)/1671B/                                        ROFF      3649
DATA ITR(167)/1606B/                                        ROFF      3650
DATA ITR(168)/1633B/                                        ROFF      3651
DATA ITR(169)/1600B/                                        ROFF      3652
DATA ITR(170)/14541452B/                                    ROFF      3653
DATA ITR(171)/14541452B/                                    ROFF      3654
DATA ITR(172)/14541452B/                                    ROFF      3655
DATA ITR(173)/14541452B/                                    ROFF      3656
DATA ITR(174)/14541452B/                                    ROFF      3657
DATA ITR(175)/14541452B/                                    ROFF      3658
DATA ITR(176)/14541630B/                                    ROFF      3659
DATA ITR(177)/14541604B/                                    ROFF      3660
DATA ITR(178)/14541640B/                                    ROFF      3661
DATA ITR(179)/14541644B/                                    ROFF      3662
DATA ITR(180)/14541634B/                                    ROFF      3663
DATA ITR(181)/14541620B/                                    ROFF      3664
DATA ITR(182)/14541660B/                                    ROFF      3665
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SUBROUTINE  WRT9209

DATA ITR(183)/14541624B/                                        ROFF     3666
DATA ITR(184)/14541664B/                                        ROFF     3667
DATA ITR(185)/14541670B/                                        ROFF     3668
DATA ITR(186)/14541667B/                                        ROFF     3669
                                                                ROFF     3670
DATA ITR(187)/00001404B/                                        ROFF     3671
DATA ITR(188)/14541637B/                                        ROFF     3672
DATA ITR(189)/00001604B/                                        ROFF     3673
DATA ITR(190)/14541427B/                                        ROFF     3674
DATA ITR(191)/14541422B/                                        ROFF     3675
DATA ITR(192)/14541444B/                                        ROFF     3676
DATA ITR(193)/C0001465B/                                        ROFF     3677
DATA ITR(194)/00001472B/                                        ROFF     3678
DATA ITR(195)/00001466B/                                        ROFF     3679
DATA ITR(196)/00001426B/                                        ROFF     3680
DATA ITR(197)/00001422B/                                        ROFF     3681
DATA ITR(198)/00001447B/                                        ROFF     3682
DATA ITR(199)/00001407B/                                        ROFF     3683
DATA ITR(200)/00001432B/                                        ROFF     3684
DATA ITR(201)/00001461B/                                        ROFF     3685
DATA ITR(202)/14541452B/                                        ROFF     3686
DATA ITR(203)/14541452B/                                        ROFF     3687
DATA ITR(204)/14541452B/                                        ROFF     3688
DATA ITR(205)/14541452B/                                        ROFF     3689
DATA ITR(206)/14541452B/                                        ROFF     3690
DATA ITR(207)/14541452B/                                        ROFF     3691
DATA ITR(208)/14541434B/                                        ROFF     3692
DATA ITR(209)/00001403B/                                        ROFF     3693
DATA ITR(210)/00001462B/                                        ROFF     3694
DATA ITR(211)/00001436B/                                        ROFF     3695
DATA ITR(212)/00001405B/                                        ROFF     3696
DATA ITR(213)/00001442B/                                        ROFF     3697
DATA ITR(214)/00001435B/                                        ROFF     3698
DATA ITR(215)/00001423B/                                        ROFF     3699
DATA ITR(216)/00001463B/                                        ROFF     3700
DATA ITR(217)/00001425B/                                        ROFF     3701
DATA ITR(218)/14541452B/                                        ROFF     3702
DATA ITR(219)/14541452B/                                        ROFF     3703
DATA ITR(220)/14541452B/                                        ROFF     3704
DATA ITR(221)/14541452B/                                        ROFF     3705
DATA ITR(222)/14541452B/                                        ROFF     3706
DATA ITR(223)/14541452B/                                        ROFF     3707
DATA ITR(224)/14541452B/                                        ROFF     3708
DATA ITR(225)/14541627B/                                        ROFF     3709
DATA ITR(226)/00001431B/                                        ROFF     3710
DATA ITR(227)/00001402B/                                        ROFF     3711
DATA ITR(228)/00001446B/                                        ROFF     3712
DATA ITR(229)/00001445B/                                        ROFF     3713
DATA ITR(230)/00001471B/                                        ROFF     3714
DATA ITR(231)/00001406B/                                        ROFF     3715
DATA ITR(232)/00001433B/                                        ROFF     3716
DATA ITR(233)/00001400B/                                        ROFF     3717
DATA ITR(234)/14541452B/                                        ROFF     3718
DATA ITR(235)/14541452B/                                        ROFF     3719
DATA ITR(236)/14541452B/                                        ROFF     3720
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      SUBROUTINE  WRT9209
      DATA ITR(237)/14541452B/
      DATA ITR(238)/14541452B/
      DATA ITR(239)/14541452B/
      DATA ITR(240)/00001630B/
      DATA ITR(241)/00001636B/
      DATA ITR(242)/00001640B/
      DATA ITR(243)/00001644B/
      DATA ITR(244)/00001634B/
      DATA ITR(245)/00001620B/
      DATA ITR(246)/00001660B/
      DATA ITR(247)/00001624B/
      DATA ITR(248)/00001664B/
      DATA ITR(249)/00001670B/
      DATA ITR(250)/14511452B/
      DATA ITR(251)/14511452B/
      DATA ITR(252)/14511452B/
      DATA ITR(253)/14511452B/
      DATA ITR(254)/14511452B/
      DATA ITR(255)/14511452B/
      DATA MES/30H NUMBER OF ROFF PAGES PRINTED /
      DATA MES(5)/0/
      DATA IPAGES/0/
      IF (SECOND) GO TO 2
C
      SECOND=.TRUE.
      REWIND 9
      END FILE 9
C
      DO 1 I=1,15
1     LWD(I)=16511651165116511651B
C
      LWD(16)=16511651165116511576B
      LWD(17)=16761676167616761675B
      LWD(18)=16761676167616761675B
      LWD(19)=16761676167616761600B
      LWD(20)=16001600160016001600B
      LWD(21)=16001600160016001600B
      LWD(22)=16001600160016001600B
      LWD(23)=16001600160016001600B
      LWD(24)=16001600160016101465B
      LWD(25)=16301630163016041657B
C
      NCART=1
      NMTST=0
      NMTSTS=0
      LBY=0
      LWP=26
C
C     MAIN LOOP STARTS HERE.
C
2     BKSL=.FALSE.
C
C     OBTAIN OUTPUT LINE AND SEARCH FOR CARRIAGE CONTROL
C
      IF (ICC.EQ.KONE) GO TO 14
      SUBROUTINE  WRT9209
      IF (ICC.EQ.KPLS) GO TO 4                                          ROFF      3776
      IF (ICC.NE.KZRO) GO TO 3                                          ROFF      3777
C                                                                       ROFF      3778
C     HAVE ZERO CARRIAGE CONTROL CHARACTER.  WRITE CR AND FEED CODES.   ROFF      3779
C                                                                       ROFF      3780
      CALL PACK (MCRC)                                                  ROFF      3781
      CALL PACK (MFDC)                                                  ROFF      3782
    3 CALL PACK (MCRC)                                                  ROFF      3783
      CALL PACK (MFDC)                                                  ROFF      3784
      GO TO 5                                                           ROFF      3785
C                                                                       ROFF      3786
C                                                                       ROFF      3787
C      BACKSPACE WHOLE LINE                                             ROFF      3788
C                                                                       ROFF      3789
    4 IOMAX=IMAX                                                        ROFF      3790
      BKSL=.TRUE.                                                       ROFF      3791
C                                                                       ROFF      3792
C     SCAN LINE FOR LAST NON BLANK CHARACTER.                           ROFF      3793
C                                                                       ROFF      3794
    5 CONTINUE                                                          ROFF      3795
      IF (LEN.LT.1) GO TO 13                                            ROFF      3796
      I=LEN+1                                                           ROFF      3797
    6 I=I-1                                                             ROFF      3798
      IF (LINE(I).NE.KBL) GO TO 7                                       ROFF      3799
      IF (1-I) 6,13,13                                                  ROFF      3800
    7 IMAX=I                                                            ROFF      3801
      IF (.NOT.BKSL) GO TO 9                                            ROFF      3802
      IF (IOMAX.LT.1) GO TO 9                                           ROFF      3803
C                                                                       ROFF      3804
      DO 8 I=1,IOMAX                                                    ROFF      3805
    8 CALL PACK (MBSP)                                                  ROFF      3806
C                                                                       ROFF      3807
C     TRANSLATE FROM EBCDIC TO MTST CODE.                               ROFF      3808
C                                                                       ROFF      3809
    9 CONTINUE                                                          ROFF      3810
      DO 12 I=1,IMAX                                                    ROFF      3811
      J=LINE(I)                                                         ROFF      3812
      J=ITR(J)                                                          ROFF      3813
      IF (J.EQ.MBLK) GO TO 11                                           ROFF      3814
      IF (GREEK.AND.J.LT.4096) GO TO 10                                 ROFF      3815
      IF (GREEK) GO TO 11                                               ROFF      3816
      IF (J.LT.4096) GO TO 11                                           ROFF      3817
      CALL PACK (MSTC)                                                  ROFF      3818
      GREEK=.TRUE.                                                      ROFF      3819
      GO TO 11                                                          ROFF      3820
   10 CALL PACK (MSTC)                                                  ROFF      3821
      GREEK=.FALSE.                                                     ROFF      3822
   11 CALL PACK (J)                                                     ROFF      3823
   12 CONTINUE                                                          ROFF      3824
   13 CONTINUE                                                          ROFF      3825
      IF (LWP.LT.3568) RETURN                                           ROFF      3826
C                                                                       ROFF      3827
C     LWD BUFFER FULL.                                                  ROFF      3828
C                                                                       ROFF      3829
      CALL PACK (MCRC)                                                  ROFF      3830
      SUBROUTINE  WRT9209
C                                                                      ROFF      3831
C     END CURRENT RECORD.                                              ROFF      3832
C                                                                      ROFF      3833
14    IF (LBY.EQ.4) GO TO 15                                           ROFF      3834
      CALL PACK (MFOC)                                                 ROFF      3835
      GO TO 14                                                         ROFF      3836
C                                                                      ROFF      3837
C     INSERT STOP CODE AND FLUSH BUFFER.                               ROFF      3838
C                                                                      ROFF      3839
15    IPAGES=IPAGES+1                                                  ROFF      3840
      DO 16 I=1,5                                                      ROFF      3841
16    CALL PACK (MCRC)                                                 ROFF      3842
      CALL PACK (MSTC)                                                 ROFF      3843
C                                                                      ROFF      3844
      BUFFER OUT (9,1) (LWD(1),LWD(LWP))                               ROFF      3845
      IF (UNIT(9)) 17,17,17                                            ROFF      3846
C                                                                      ROFF      3847
17    NMTST=NMTST+5*LWP                                                ROFF      3848
C                                                                      ROFF      3849
      LWD(24)=16001600160016001600B                                    ROFF      3850
      LWD(25)=16001600160016001610B                                    ROFF      3851
C                                                                      ROFF      3852
      LBY=0                                                            ROFF      3853
      LWP=26                                                           ROFF      3854
      IF (DONE.OR.(NMTST.GT.13312)) GO TO 18                           ROFF      3855
C                                                                      ROFF      3856
C     NOT YET DONE                                                     ROFF      3857
C                                                                      ROFF      3858
      GO TO 5                                                          ROFF      3859
C                                                                      ROFF      3860
C                                                                      ROFF      3861
C     WRITE LAST RECORD.                                               ROFF      3862
C                                                                      ROFF      3863
18    LWD(26)=16541537000000000000B                                    ROFF      3864
C                                                                      ROFF      3865
      BUFFER OUT (9,1) (LWD(1),LWD(26))                                ROFF      3866
      IF (UNIT(9)) 19,19,19                                            ROFF      3867
C                                                                      ROFF      3868
19    END FILE 9                                                       ROFF      3869
      NMTST=NMTST+150                                                  ROFF      3870
      CALL DISPLA (19HMTST CHAR WRITTEN =,NMTST)                       ROFF      3871
      IF (DONE) GO TO 20                                               ROFF      3872
C                                                                      ROFF      3873
C     NOT DONE.  PREPARE PROLOGUE FOR NEXT MTST CARTRIDGE.             ROFF      3874
C                                                                      ROFF      3875
      NMTSTS=NMTSTS+NMTST                                              ROFF      3876
      NMTST=0                                                          ROFF      3877
      NCART=NCART+1                                                    ROFF      3878
      I4=MOD(NCART,10)+1                                               ROFF      3879
      I3=MOD(NCART/10,10)+1                                            ROFF      3880
      I2=MOD(NCART/100,10)+1                                           ROFF      3881
      I1=MOD(NCART/1000,10)+1                                          ROFF      3882
      LWD(24)=16001600160016101465B                                    ROFF      3883
      LBY=0                                                            ROFF      3884
      LWP=25                                                           ROFF      3885
      SUBROUTINE  WRT9209
      CALL PACK (KDIG(I1))                                              ROFF      3886
      CALL PACK (KDIG(I2))                                              ROFF      3887
      CALL PACK (KDIG(I3))                                              ROFF      3888
      CALL PACK (KDIG(I4))                                              ROFF      3889
      CALL PACK (MSTX)                                                  ROFF      3890
C                                                                       ROFF      3891
      RETURN                                                            ROFF      3892
C                                                                       ROFF      3893
C     DONE.  WRITE SECOND ENDFILE, REWIND TAPE9 AND QUIT.               ROFF      3894
C                                                                       ROFF      3895
20    END FILE 9                                                        ROFF      3896
      REWIND 9                                                          ROFF      3897
C                                                                       ROFF      3898
      RETURN                                                            ROFF      3899
C                                                                       ROFF      3900
      ENTRY FIN                                                         ROFF      3901
      DONE=.TRUE.                                                       ROFF      3902
      IPAGES=IPAGES-1                                                   ROFF      3903
      GO TO 14                                                          ROFF      3904
C                                                                       ROFF      3905
      END                                                               ROFF      3906
```

```
          IDENT PACK                                                ROFF      3907
PROGRAM LENGTH

BLOCKS

PROGRAM*   LOCAL
//         COMMON
BLK1       COMMON

ENTRY POINTS

   000001 PACK

          ENTRY PACK                                                ROFF      3908
*                                                                   ROFF      3909
*         SUBROUTINE PACK (WORD)                                    ROFF      3910
*         PACKS 5 12-BIT BYTES IN LWD(LWP).                         ROFF      3911
*         ROUTINE BY HARRY M. MURPHY, 1 FEBRUARY 1972.              ROFF      3912
*         REVISED FOR FTN BY LT. CLIFFORD E. RHOADES, JR.           ROFF      3913
*         26 FEBRUARY 1972                                          ROFF      3914
*                                                                   ROFF      3915
          USE    //                                                 ROFF      3916
 LWD      BSS        3700                                           ROFF      3917
          USE    /BLK1/                                             ROFF      3918
 LBY      BSS    1                                                  ROFF      3919
 LWP      BSS    1                                                  ROFF      3920
          USE    0                                                  ROFF      3921
*                                                                   ROFF      3922
          VFD    42/4LPACK,18/1                                     ROFF      3923
          PS                                                        ROFF      3924
          SA1    X1            .X1 = WORD.                          ROFF      3925
          MX0    48            .FORM 48-BIT MASK IN UPPER X0.       ROFF      3926
          SA2    LBY           .X2 = LBY, THE BYTE COUNT.           ROFF      3927
          SB3    5             .B3 = 5.                             ROFF      3928
          BX1    -X0*X1        .MASK OUT POSSIBLE HIGH-ORDER BITS IN X1. ROFF 3929
          SB2    X2            .B2 = LBY.                           ROFF      3930
          SB6    LWD-1         .B6 = ADDRESS OF LWD(0).             ROFF      3931
          SB7    1             .B7 = 1.                             ROFF      3932
          LT     B2,B3,GO      .IF LESS THAN 5 BYTES SKIP ON.       ROFF      3933
          SA3    A2+B7         .OTHERWISE, GET LWP IN X3.           ROFF      3934
          SX6    X3+B7         .INCREMENT LWP IN X6.                ROFF      3935
          SA6    A3            .RE-STORE INCREMENTED LWP.           ROFF      3936
          SX2    B0            .AND SET LBY TO ZERO.                ROFF      3937
 GO       SA3    A2+B7         .X3 = LWP.                           ROFF      3938
          SA4    X3+B6         .X4 = LWD(LWP).                      ROFF      3939
          LX4    12            .LEFT SHIFT X4 1 BYTE.               ROFF      3940
          SX7    X2+B7         .INCREMENT BYTE COUNT.               ROFF      3941
          BX5    X0*X4         .MASK OUT LOWER 12 BITS OF LWD(LWP). ROFF      3942
          SA7    A2            .STORE CURRENT BYTE COUNT.           ROFF      3943
          BX6    X1+X5         .SPLICE IN WORD.                     ROFF      3944
          SA6    A4            .STORE UPDATED WORD IN LWD(LWP).     ROFF      3945
          ZR     B0,PACK       .AND LOOP TO RETURN.                 ROFF      3946
       END                                                          ROFF      3947

  UNUSED STORAGE          41 STATEMENTS        5  SYMBOLS
```

```
SUBROUTINE  QUIT

SUBROUTINE QUIT (IDUM)                                     ROFF      3948
DIMENSION MES(5)                                           ROFF      3949
COMMON /TAPE/ ITAPE                                        ROFF      3950
COMMON /FRAME/ IFRAME                                      ROFF      3951
COMMON /CARDS/ NC,MI(5)                                    ROFF      3952
COMMON /PAGES/ IPAGE,ME(5)                                 ROFF      3953
DATA MES/30H NUMBER OF FRAMES SHOT BY ROFF/                ROFF      3954
DATA ME(4)/0/                                              ROFF      3955
DATA MI(4)/0/                                              ROFF      3956
DATA MES(4)/0/                                             ROFF      3957
IF(ITAPE.EQ.1) CALL FIN(0)                                 ROFF      3958
CALL DISPLA(MI,NC)                                         ROFF      3959
CALL DISPLA(MES,IFRAME)                                    ROFF      3960
CALL DISPLA(ME,IPAGE)                                      ROFF      3961
RETURN                                                     ROFF      3962
END                                                        ROFF      3963
```