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RUNOFF V.6

Author: Thomas W. McIntyre

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Operating System: OS/8 or OS/12

Memory Required: 8K

Source Language: PAL-8/PAL-111

RUNOFF is a program which runs under PS/8, OS/8, or DECSYSTEM-8 to facilitate the preparation of typed or printed manuscripts, such as memorandums, manuals, theses, etc. The user prepares his material on any terminal, and writes it onto a file using TECO, EDII, SCROLL, or any other editor available to the user. The user includes not only textual material, but also case and formatting information. RUNOFF then takes the file and reproduces it onto the line printer, teletype or other file to produce a final copy or final file image. It performs the formatting and case shifting as directed, and will also perform line justification, page numbering and titling, etc. as desired.

The principal benefit of such a program is that files prepared for use with it may be edited and corrected easily. Small or large amounts of material may be added or deleted, and unchanged material need not be retyped. After a set of changes, the program may be operated to produce a new copy which is properly paged and formatted. Documentation may thus be updated as necessary without requiring extensive retyping.

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PREFACE

This document describes RUNOFF, version 6. The document is an accurate description of RUNOFF as of June 1977. This program has been extensively revised (by TMC) from the program PRINTR. There has been an attempt to bring the program into close alignment with the DECsystem-10 version of RUNOFF and the name has been changed to reflect that effort. OS/8 RUNOFF is not, however, a proper subset of the DECsystem-10 version. There are some commands in this version not found in the DECsystem-10 version and some of the implemented commands have a slightly different interpretation. These differences and major commands not yet implemented in this version are discussed in APPENDIX A.

If there is anything unclear or questionable in this document or the program it describes, please inform the author so that revisions and corrections may be made.

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June 1977

RUNOFF

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Document Version 6

1.1 Running RUNOFF - RUNOFF may be invoked by the "R" or "RUN" command or may be chained to if the version of CCL provides the equivalent RUNOFF command. If invoked by the "R" or "RUN" commands RUNOFF requests an I/O specification line of the standard form.

ODEV:OUTPUT<INPUTS(OPTIONS)

1.2 Default Extensions - The default input extension is .RO and the default output extension is .WU for writeup. Options which may be specified on the command line are listed and described below. If the command line is ended with the altmode or escape key, control is returned to the monitor on completion of output. If the command line is ended with the carriage return, RUNOFF is recalled on completion of output. To use this feature the RUNOFF save image must be on the system device. If RUNOFF.SV is not on the system device control is always returned to the monitor.

1.3 Command Line Options - It is frequently convenient to reformat the document slightly or adjust the output for different devices. This facility is provided by the command line switches. These single character switches generally select the second alternative to some internal default. For example /U changes the underline mode to "backspace" from "line" which is assumed. Some of the switches also accept a numeric argument encoded into the "=" option. Since these are in octal they can be somewhat confusing. We intend to implement an extended option decoding scheme in a future release which will be similar to the DECsystem-10 standard. In addition to the command line switches it is frequently convenient to make ITY: the first input file and specify a few commands at run time by this means. The currently recognized command switches and their interpretations are listed below.

- /A Assume AUTOPARAGRAPH. (NOAUTOPARAGRAPH assumed)
- /B Use alternate backspace character. (37 Instead of 10)
- /C Set initial case mode to upper case. (Lower case assumed)
- /D Accept a "down" parameter to move the output down on the page. See the numeric option for encoding. This does not affect the page line count.
- /E Accept extended form options from the terminal. This feature is not yet implemented.
- /F Do not form pages. The output will appear to be all on one page. This is equivalent to the command NOPAGING.

- /H Do not use current line spacing on BREAK's. Normally the current line spacing is used for any command which causes a break such as .BLANK or .INDENT.
- /I Place sequence numbers (edit page and count within page) in the left margin. If no "over" parameter is given the output is moved over 6 columns. If an "over" command is given the margin generated is used for the sequence numbers.
- /J Do not mark page breaks on simulated form feeds. (Normally a line of "-----" is output to mark the page break.)
- /K Do not list errors in the output file. (Normally errors appear interrupting the line on which they are found.)
- /L Select alternate page length. (64 Instead of 66)
- /M Accept a multiple copy count in the numeric parameter. See the numeric parameter for encoding.
- /N Note errors on the console terminal. Normally errors appear only in the output file.
- /O Accept an "over" parameter. See the numeric option for encoding.
- /P Pause at the end of each output page and ring the terminal bell. The operator must strike CTRL/P to continue. This allows the loading of single sheets of paper or multilith masters for output.
- /Q Select alternate character for underline. (55 Instead of 137)
- /S Select alternate assumed spacing. (Double space instead of single space.)
- /T Select normal rather than quoted spaces (#) for tab expansion. Normally tabs are expanded with forced spaces to avoid padding.
- /U Select backspace rather than line mode for underlining. Normally the line is overstruck with spaces and underlines. If the output device provides backspaces and not line overstrikes then backspace mode should be used.

- /V Simulate form feeds. An equivalent number of carriage return line feed combinations is output instead of a form feed. This should be used only with devices which do not have form feeds.
- /W Select alternate page width. (60 Columns instead of 70)
- /X Only send upper case alphabetic codes to the output device. This option is provided for printers which can not properly interpret or convert lower case codes.
- = The numeric option carries information for the /D, /M, and /O options. The parameters are encoded as DDOOEEMM. Where DD is an octal number representing the DOWN parameter with a range of 0-37. If no other options are provided it must be followed by 6 zeros. OO represents an octal number in the range of 0-77 to be used for the OVER parameter. If the EE digits are nonzero the over parameter is OO for odd pages and EE for even numbered pages. This allows for two sided copy binding margins. (See the OVER command.) MM represents an octal number in the range of 0-77 representing the number of copies requested. All of the options may be simultaneously active. The various option switches must be present in order for the numeric option to be used.
- \$ If the altmode character ends the line, control returns to the monitor level on the completion of output. If the line ends with the carriage return, RUNOFF is reloaded from the system device on the completion of output. If RUNOFF.SV is not on the system device, control is returned to the monitor level in either case.

2.1 Source File - The source file contains the textual material which will appear on the final copy, plus information to specify formatting. Upper and lower case information may also be supplied so that copy can be prepared on the teletype or any other such device which can normally input only upper case letters. All command information consists of regular ASCII printing characters so that a listing of the source file may be examined if the final copy is not exactly as desired. A command line option is available to include input sequence information in the output. Any errors which RUNOFF recognizes are also identified by input sequence information to allow the offending input line to be easily found.

2.1.1 Command Lines - All material in the source file is taken to be source text except those lines beginning with a period. A line beginning with a period is assumed to be a command, and must match one of those listed in Chapter 4. The commands provide the formatting information, and control various optional modes of operation.

2.1.2 Filling - Usually the text is FILLED and JUSTIFIED as it is processed. That is, the program FILLS a line by adding successive words from the source text until one more word would cause the right margin to be exceeded. The line is then JUSTIFIED by making the word spacings larger until the last word in the line exactly meets the right margin. An optional hyphenation mode is supported for circumstances where filling results in abnormally large spaces on the line when justified. When the FILL mode is on, spaces and carriage returns occurring in the source text are treated only as word separators. Multiple separators are ignored unless the .AUTOPARAGRAPH option is active.

2.1.2.1 Special Effects - The user may occasionally wish to reproduce the source text exactly which is done by disabling FILLING and JUSTIFICATION. The program may be set to FILL but not JUSTIFY, in which case the output will be normal except that lines will not be justified to the right margin. The program may also be set to JUSTIFY but not FILL, this may be used to generate specially formatted output when combined with forced spaces and "hand filling".

2.1.2.2 Line Breaks - Some of the commands cause a BREAK in the output. A BREAK means that the current line is output without JUSTIFICATION, and the next word goes at the beginning of the next line. This occurs mostly at the end of paragraphs.

2.1.3 Pages - The program will advance to new pages as necessary, placing the title and subtitle (if given) at the top of each page, and the page number at the bottom of each page after the first (the so-called title) page. If the even or odd page header information is given it replaces the

title line on the page. The user may explicitly call for a page advance where desired, and may inhibit the occurrence of a page advance within specified material.

2.2 UPPER AND LOWER CASE INFORMATION

2.2.1 Case Control - Specification of case for files prepared on the teletype is done with two characters, uparrow* (^, shift/N), and backslash (\, shift/L). The appearance of an uparrow causes the letter immediately following to be transmitted in upper case. The appearance of a backslash causes the letter to be converted to lower case. Any letter not preceded by one of these characters is transmitted in the current mode. The mode is initially lower case, and is changed by the occurrence of two successive case control characters.

2.2.2 Case Lock - Two uparrows (^ ^) cause the mode to be set to upper case; Two backslashes (\ \) cause the mode to be set to lower case. In addition the commands .UPPER CASE and .LOWER CASE cause the mode to be set to upper case (^ ^) or lower case (\ \), respectively. The use of the above corresponds to the use of the shift and shift/lock keys on a typewriter. Usually, typing appears in lower case. To type one letter in upper case, the shift key is used. The shift/lock is set to type a series of upper case letters, after which it is released. For example:

```
^HERE IS A ^SAMPLE ^SENTENCE IN ^^UPPER CASE\ AND LOWER CASE.
```

Becomes:

Here is a Sample Sentence in UPPER CASE and lower case.

2.2.3 Case Logic - For those I/O devices which produce letters of the proper case, i.e. allows both upper and lower case keyboard characters, the mode should be set to UPPER CASE at the beginning of the file and left unchanged for the remainder. This is because code conversion occurs only on the ASCII codes 301 to 332 octal (only the upper case letters). Any actual lower case characters in the text (codes 341 to 372 octal) appearing in the source will be transmitted unchanged.

* In this document, the character for uparrow (shift/N on teletypes) is a circumflex (^) as on the more recent terminals and printers. Also, the character for leftarrow (shift/O on teletypes) appears as an underline character (_).

2.3 Special Characters - RUNOFF allows the use of various characters in the text to have a special meaning in addition to those used to specify case information. These characters are referred to as Flag Characters and may be specified or switched on or off by the .FLAG commands (see 4.7). The action of these characters is described below.

2.3.1 UNDERSCORING - The character ampersand (&, shift/6) is used to specify underscoring. The ampersand will cause the character following it to be underscored. For example, &b&o&o&k becomes book. Underlining of a string of characters can also be specified similarly to the use of the shift lock operations described above. An appearance of ampersand preceded by uparrow (^&) will cause underlining of all following characters except space. An appearance of ampersand preceded by backslash (\&) disables underscoring. The underscore flag is initially enabled.

2.3.2 FORCED SPACE - It is occasionally necessary to include spaces in the text which should not be treated as word separators. For this purpose, RUNOFF treats numbersign (#) as a quoted space, i.e. it will print as exactly one space in the output and will never be expanded nor changed to a carriage return. This flag is initially active.

2.3.3 QUOTE - To allow the appearance of the special characters in the output file the character leftarrow (←, shift/0) is used as a quote character. The character immediately following a leftarrow will be transmitted to the output file with no formatting effect. Control characters may be passed in this fashion also. RUNOFF does no processing on any character that is preceded by the Quote Flag. The Quote flag is initially assumed to be on.

2.3.4 HYPHENATION - In cases where the margin settings are narrow and long words appear there may be an excessive number of spaces between words in order to justify the line. To alleviate this problem the Hyphen Flag is provided. If the hyphen character "-" appears followed by an alphabetic character the word may be optionally broken at that point. If the word is not broken the hyphen is removed. If the character following the hyphen is not an alphabetic the hyphen is treated as a normal input character. Therefore, it is not necessary to quote it in numeric expressions. The Hyphen Flag is normally assumed to be off.

2.3.5 CAPITALIZE - When entering text from the teletype it frequently occurs that an entire word should be capitalized. The optional flag Capitalize is provided for this purpose. If the flag character "<" appears before a word all letters are capitalized until the occurrence of a word separator or of a second "<". If this action is desired it must be requested with the .FLAG CAPITALIZE command.

Chapter 2
General Features

2.3.6 FIRSTCAPITALIZE - In entering bibliographic and similar material it frequently occurs that the first character of most of the words should be capitalized. The flag character "'" is provided for this purpose. If the flag appears by itself the following character is capitalized. However, the flag may be locked on in which case the first character of each word is capitalized. To make individual words begin with a lower case character the backslash "\" may be used.

2.3.7 INDEX - Index generation has not yet been implemented, but for compatibility with other versions the index flag may be recognized. The index flag character is ">" and if the command .FLAG INDEX is given the character will be stripped from the input.

2.3.8 Long Lines - A special usage of the \ character allows long lines to be input on terminals which force returns. If the end of line is preceded by \ it is ignored. This is very useful when building special graphics using backspaces on such terminals.

3.1 Using this Manual - An attempt has been made to group the command descriptions in Chapter 4 into logical sets. Thus, if you want to change the running header information, all the commands which affect running heads are found in section 4.5. It is suggested that the new user skim through the manual at least once and then prepare a small document, such as a letter, using the features described in this chapter. Once you have become thoroughly familiar with RUNOFF, APPENDIX C, which lists the commands, will likely be the only reference needed.

3.2 Document Setup - RUNOFF's default assumptions have been chosen to reduce setup time for standard documents. For a simple letter no page formatting is required. If a smaller than usual page is desired the .PAGE SIZE command should be used. For example:

```
.PAGE SIZE 60,60
```

will make the page 60 lines long by 60 columns wide. The desired right margin can be obtained by using the command line "over" option. Typically the output should be moved over about 1.5 inches so the option is:

```
/O=110000
```

this is assuming 6 characters per inch. If output is always to the same device the .OVER command may be used instead.

3.3 Convenience Commands - Most users will find that the use of the .AUTOPARAGRAPH feature is very convenient. If your document is straight text this may be all the formatting required. If tabulated data is required it is convenient to introduce the tabulated material as a list using the .LIST and .END LIST commands. These commands temporarily set in the left margin. They do not disable filling but they do remember the current fill mode. If more than one column of data is required the columns are separated by tabs. The standard tab stops are 1,9,17,25 etc. At the end of the tabular information the .END LIST command restores normal formatting.

3.4 Letter Example - The elements required to format a letter are:

```
Letterhead
Address and Salutation
Body
Closing and Signature
```

The following commands generate a letterhead for a mythical company:

```
.c;Historical Oil Company
```

```
.c;Volcano, West Virginia
.s 2;.r;March 31, 1976
.s 2
```

The address and salutation are most easily generated by disabling line filling as below:

```
.nf
J. P. Getty
The Tower
London, WC1 England
.s 2
Dear Mr. Getty,
.f
```

The closing is usually handled with the .INDENT command as in the following example:

```
.s 2;.i 30;Sincerely,
.s 6;.i 30;Jay Rockefeller
```

The completed letter is printed below.

Historical Oil Company
Volcano, West Virginia

March 31, 1976

J. P. Getty
The Tower
London, WC1 England

Dear Mr. Getty,

We have available, for a limited time, six barrels of 1847 crude oil at \$147 per barrel. If you are interested, please contact me before July 1st.

Sincerely,

Jay Rockefeller

3.5 Large Documents - For larger documents, such as this manual, the running head is an important consideration. For dissertation work the usual requirement is that the page number appear in the upper right corner, set out slightly from the body of the text. This effect can be created by setting the right margin with a command such as:

```
.RM -6
```

this will cause the page number to be right justified 1 inch outside the body of the text. The default .HEADER command accomplishes the rest. If the word PAGE is not desired, the command .HEADER NUMBER should be used. The .TITLE command is very effective in tying together material that is related in the document. Whenever the .TITLE command appears the remaining text on the line becomes the running title until changed. For more details on running heads see section 4.5.

3.6 Error Correction - It is assumed that a general purpose editor is used to prepare the RUNOFF input file. Most such editors allow one to locate the edit position to a given line on a given page (defined by form feeds) in the input file. To take advantage of this feature RUNOFF reports with all errors the input file number (1-9), the input page (0-2047) and the input line relative to the start of the page (0-2047). These are all decimal numbers. If you are using the SCROLL editor, the following command will locate to the erroneous line:

```
$5P$74
```

assuming that the page number was 5 and the relative line was 74. If you are having a great deal of difficulty relating the output from RUNOFF to your input file you may optionally have the input page and line numbers printed in the left margin of the output. This is done by using the /I option on the command line. This also requires that the physical output device be at least 1 inch wider than the output generated.

3.7 False Errors - Since various implementations of RUNOFF have different features, you may generate errors from commands not yet implemented or unrecognized by this version. If you have the errors listed on the terminal device rather than in the output file they will have no action on the output. (i.e. they will be ignored.)

4.1 Command Syntax - the following commands will be recognized if they are on a command line. A command line is a line which begins with a period. Multiple commands may appear on a command line by separating them with a semi-colon or the period. Comments are allowed on the command line. They begin with the character ! and end with a semicolon or end of line. The sequence .! or .; also begins a comment at the beginning of a command line; This comment also ends with a semicolon or end of line. In addition, the command .COMMENT ignores the rest of the line. The only commands which cannot have comments are the .TITLE, .SUBTITLE, and .CHAPTER commands. In any case, either text or another command (starting with .) may be given. Thus, for example, the following line changes the margins, skips 3 lines, and centers "HELLO" in one command line.

```
.MARGINS 10,70;.BLANK 3;.CENTER;HELLO
```

4.1.1 Negated Commands - those commands of the form .NOxxx may also be given as .NO xxx. For example: .NONUMBER is equivalent to .NO NUMBER.

4.1.2 Command Arguments - some commands take one or more decimal numbers following. These are separated from the command by a space. Multiple tabs and spaces are allowed between arguments, if so desired. Consecutive numeric arguments may be separated by spaces or one comma. If the character is a comma, then no spaces or tabs must precede it. In multiple argument commands (.TAB STOP, .PARAGRAPH, .MARGINS, etc.), null values are allowed by consecutive commas; null arguments cause the previous value to be left unchanged.

4.1.2.1 Relative Arguments - some commands may allow relative specifications as arguments. When the argument is preceded by a + or -, the argument is taken as relative. For most commands, this raises or lowers the previous setting by the specified amount.

4.1.2.2 Excess Arguments - if there are too many arguments for a command or if excess characters are on the command line, these characters are ignored. In addition, an error diagnostic is printed.

4.1.3 Command Abbreviations - all commands can be abbreviated. The full spelling will be checked. Any command word may be shortened to its initial distinct set of characters. In cases where two commands have the same initially spelling, they are scanned in alphabetical order. The standard command abbreviations appear in the command lists also and are subject to the same rules as the full spellings. The legal abbreviations and synonyms allowed by RUNOFF follow the commands.

4.1.4 Illegal Commands - if an illegal command is recognized, an error diagnostic will be typed and the rest of the command will be ignored.

4.2 Formatting Commands

4.2.1 BREAK - causes a BREAK, i.e. the current line will be output with no justification, and the next word of the source text will be placed at the beginning of the next line.

.BREAK

.BR

. (followed by space and semi-colon, or end of line)

4.2.2 SKIP - causes a BREAK after which n *(line spacing) lines are left blank. If the skip would leave room for less than two printed lines on the page (i.e. if there are less than $n+2$ *(line spacing) lines left), the output is advanced to the top of the next page. If n is negative, this specifies to move to n lines from the bottom of the page. Thus a .SKIP -5 or a .BLANK -5 means to move to the fifth line from the bottom of the page.

.SKIP n

.S n

4.2.3 BLANK - causes a BREAK after which n (rather than n *(line spacing) lines are left blank. BLANK is used where space is to be left independent of the line spacing; SKIP is used where the space should be relative to the size of the line space. If n is negative, it works like .SKIP.

.BLANK n

.B n

4.2.4 FIGURE - causes a BREAK. Leave room for an n -line figure (i.e., n lines are left blank). If less than n lines remain on the current page, the page will be advanced, and n blank lines will be left at the top of the new page. This command is principally used where it is desired to leave room for a figure to be drawn in manually.

.FIGURE n

.FG n

4.2.4.1 FIGURE DEFERRED - if the user specifies .FIGURE DEFERRED n , a BREAK occurs, then if the figure does not fit on the current page, it is deferred to the next page, but text is continued on the current page. If more than one deferred figure is seen, the result is cumulative (i.e., enough space is reserved for all deferred figures).

.FIGURE DEFERRED n

.FG DEFERRED n

4.2.5 INDENT - causes a BREAK and sets the next line to begin n spaces to the right of the left margin. n may be

negative to cause the line to begin to the left of the left margin (useful for numbered paragraphs).

```
.INDENT n
.I n
```

4.2.6 PARAGRAPH - accept three optional numeric arguments. The first number (i) sets the number of spaces which paragraphs are to be indented. The initial setting is 5. This value may be negative to give a hanging paragraph indent, however care should be taken to avoid negative margin settings as a result. The second number (v) is the vertical spacing between paragraphs. This number must be in the range -1 to 5. If it is -1, then $(\text{line spacing} + 1) / 2$ blank lines are left between paragraphs. The third number (t) indicates an argument to use for .TEST PAGE before starting the paragraph. This argument is multiplied by the line spacing and used after the inter-paragraph spacing. The initial value is 2, so that paragraphs will not normally have less than two lines at the bottom of a page. If this feature is not desired, then an argument of 0 should be given; this will result in no special test.

```
.PARAGRAPH i,v,t
.P i,v,t
```

4.2.6.1 AUTOPARAGRAPH - causes any line which starts with a space or tab or is preceded by two end of line combinations to signal the start of a new paragraph. This allows normally typed text to be justified without any special commands. RUNOFF will still recognize the .PARAGRAPH command as beginning a new paragraph, also. The auto-paragraphing which RUNOFF performs occurs only in FILL mode. NOAUTOPARAGRAPH disables the AUTOPARAGRAPH mode.

```
.AUTOPARAGRAPH
.AP
.NO AUTOPARAGRAPH
.NAP
```

4.2.7 PAGE - causes a BREAK and an advance to a new page. If the current page is empty, then no page advance is made. The number n, if present becomes the new page number. Titling and numbering are the same as for automatic page advance. If a blank page is needed, it can be included by giving a .FIGURE command.

```
.PAGE n
.PG n
```

4.2.7.1 TEST PAGE - causes a BREAK followed by a conditional page advance. If there are n or more lines remaining on the current page, no advance is made and no lines are skipped. Otherwise, the page is advanced as for PAGE. This command

should be used to insure that the following n lines are all output on the same page. n cannot be negative.

.TEST PAGE n
.IP n

4.2.7.2 Conditional page skips. If the copy is to be printed on both sides of the paper it is often desired to begin some text on the next even or odd numbered page. The conditional page skips PAGE EVEN and PAGE ODD furnish this control. These commands skip a page if and only if it is necessary to make the next actual text page either even or odd.

.PAGE EVEN
.PAGE ODD

4.3 Mode Setting

4.3.1 JUSTIFY - causes a BREAK and sets subsequent output lines to be JUSTIFIED (initial setting). Nojustify causes a BREAK and prevents JUSTIFICATION of subsequent output lines.

```
.JUSTIFY
.J
.NOJUSTIFY
.NJ
```

4.3.2 FILL - causes a BREAK and specifies that subsequent output lines be FILLED (initial setting). Also sets JUSTIFICATION to that specified by the last .JUSTIFY or .NOJUSTIFY command. NOFILL causes a BREAK and prevents FILLING and JUSTIFICATION of subsequent output lines.

```
.FILL
.F
.NOFILL
.NF
```

4.3.3 Normal Usage - normally .FILL and .NOFILL are used to turn both FILLING and JUSTIFICATION on and off. This is because it is usually desirable to do both. A subsequent .JUSTIFY or .NOJUSTIFY command will override the .FILL command, however. Because of the action of .FILL, a single occurrence of .NOJUSTIFY will cause the remainder of the file to be UNJUSTIFIED with FILLING as specified.

4.3.4 Justify Only - in order to JUSTIFY but not FILL a JUSTIFY command must follow every NOFILL. JUSTIFY without filling may be used to create special effects such as margin notes. The general procedure is to use forced spaces or tabs to format the fixed material and fill the remainder of the line by hand. This may require two passes to get correct appearing output.

4.3.5 NOFILL and BREAK - the NOFILL-NOJUSTIFY mode need be used only where there are several lines of material to be copied exactly or as-is. A single line example will not require using these commands if a BREAK immediately precedes and follows the single line.

4.4 Sentence Recognition

4.4.1 End of Sentence Spacing - Under normal circumstances, the characters period (.), colon (:), semicolon (;), exclamation point (!), and question mark (?) all end a sentence. On output, this means that they will have two spaces after them. The ways to indicate to RUNOFF that this is to be done upon recognition of these characters are:

- 1) The punctuation is immediately followed by a carriage return in the input file.
- 2) The punctuation is followed by two spaces.

4.4.2 PERIOD - This action is controlled by the .PERIOD command which is assumed. Of course, punctuation such as this is not always desirable. If it is not, then the period, colon, semicolon, exclamation point, or question mark should be quoted with `'`. And if there is some case when the double space is needed, but neither of the above rules apply, the punctuation should be followed by a # to force a space in the output. The command .NOPERIOD will disable this automatic punctuation altogether the behavior of the characters (. : ; ! ?) is suppressed as explained above. Also, .NO AUTOCAPITALIZE is set. The .PERIOD command also sets AUTOCAPITALIZATION mode to the last .AUTOCAPITALIZE or .NO AUTOCAPITALIZE command given. .PERIOD is assumed.

```
.PERIOD
.PR
.NO PERIOD
.NPR
```

4.4.3 Automatic Sentence Capitalization - Another feature of RUNOFF which makes the job easier for the user is the auto-capitalization which RUNOFF performs. RUNOFF will automatically capitalize the first character of a paragraph and the first character of a sentence, if all of the following rules apply:

- 1) .AUTOCAPITALIZE is in effect. The user either explicitly gave the command or it is in effect because RUNOFF initially assumes it.
- 2) .PERIOD is in effect. Again, either the user explicitly gave the .PERIOD command or it is in effect because RUNOFF initially assumes it.
- 3) The first character of a sentence will be capitalized only if the end of sentence punctuation was recognized (i.e., two spaces followed . : ; ! ? on output).

Again, automatic capitalization is not always desired. To override the automatic capitalization at the beginning of a particular sentence, use the `\` character before the character to inhibit capitalization.

4.4.4 AUTOCAPITALIZE - Set autocapitalization mode. The above described features become active. The command .NO AUTOCAPITALIZE will disable the automatic capitalization.

```
.AUTOCAPITALIZE  
.AC  
.NO AUTOCAPITALIZE  
.NAC
```

NOTE: Capitalization only occurs on the upper case alphabetic characters. Any lower case codes i.e. above 140 OCTAL are unchanged by RUNOFF.

4.5 Running Heads

4.5.1 General - The running head information consists of line spacing information for the top and bottom of the page and text buffers defining the information to be placed on these lines. There are a total of three lines with printed information and a variable number of blank lines depending on parameter settings. The information lines consist of one of TITLE, EVEN or ODD followed on the next line by SUBTITLE, and the Header line which has variable placement. The commands which control these features are described below.

4.5.2 Header Line - The Header Line is a line which can appear in either the header or the footer. The Header Line consists of, in its simplest form, just the current page number. It may also have the word "PAGE" and the current contents of the Chapter Buffer. The .HEADER command informs RUNOFF where to put the Header Line and how to place it on the page. When the Header Line is printed JUSTIFY is on so spaces appearing in the chapter information will be padded. If this action is not desired, quoted spaces should be used (#).

4.5.2.1 Header Groups - the Header options are divided into 5 groups of which only 1 member may be active. Any groups not specified are unaltered by the Header command.

TOP The Header Line is to be placed in the header at the second line from the top of the page.

BOTTOM The Header Line is to be placed in the footer the third line up from the bottom of the page.

LEFT The Header Line is to appear against the absolute left margin of the paper (left margin = 1).

RIGHT The Header Line is to appear against the right margin of the paper (right margin = page width).

CENTER The Header Line is to be centered using the page width as the width of the line.

ALTER The Header Line is to appear alternatively against the left margin and the right margin of the paper. For even pages, the Header Line will appear against the left margin; for odd pages, the Header Line will appear against the right margin.

SPLIT The Header Line will be split and placed against the left and right page bounds. The left and right options will refer to the location of the page number, the chapter will appear opposite.

SOLID The CHAPTER buffer and page number will be together.

UPPER The word "PAGE" will appear as "PAGE".

LOWER The word "PAGE" will appear as "page".

MIXED The word "PAGE" will appear as "Page".

NUMBER The word "PAGE" will not appear on the Header Line.

ARABIC The page number will be printed in arabic numerals (the default value).

ROMAN The page number will be printed in roman numerals.

NO The "NO" option is equivalent to .NOHEADER.

The assumed header command is:

.HEADER TOP SOLID RIGHT UPPER ARABIC

4.5.2.2 Header Contents - The Header Line consists of the following:

- 1) The contents of the Chapter buffer, and a "-" if there is a Chapter buffer, unless SPLIT was specified in which case the "-" is replaced by a blank.
- 2) Either "PAGE ", "page ", or "Page " unless "NUMBER" was an option.
- 3) The current page number.
- 4) The subpage letter if the .SUBPAGE command was given.

4.5.2.3 HEADER - The HEADER command allows printing of the header and footer. The header consists of 1 blank line, a line reserved for the top Header Line, a line reserved for the centered title, a line reserved for the centered subtitle, and 2 blank lines to the body of the page. The footer consists of 3 blank lines from the body of the page to the line reserved for the bottom Header Line and 2 blank lines to the bottom of the page. Any options which may appear on this command line are set for control of the Header Line. If no options appear on the command line, then the previous set of options specified by the prior .HEADER command will take effect. The NO HEADER command suppresses the title, subtitle, Header Line, and spacing at the top and bottom of each page.

.HEADER options
 .HD options
 .NOHEADER
 .NHD

4.5.3 Vertical Formatting - Two commands are available to modify the spacing of the running header and footer information on the page.

4.5.3.1 PAGE TOP - Sets the number of lines from the top of the page to the Header Line to m (initially 1), and sets the number of lines from the subtitle line to the body of the page to n (initially 2).

.PAGE TOP m,n
.PG TOP m,n

4.5.3.2 PAGE BOTTOM - Sets the number of lines from the body of the page to the footer's Header Line to m (initially 3), and sets the number of lines from the footer's Header Line to the bottom of the page to n (initially 2).

.PAGE BOTTOM m,n
.PG BOTTOM m,n

4.5.4 Text Buffers - The buffers for the running information are loaded by the following commands. The printing and placement of these text buffers is controlled by the preceding header commands. Normally space is reserved for the text buffers on the page whether they are printed or not. This makes the vertical page formatting uniform. If you wish to recover the text reserved for the TITLE and SUBTITLE lines the command .NOTITLE may be used. If you want the space reserved but no information printed use the command .ITITLE etc. followed immediately by a carriage return. All of these commands take the remaining text on the line as the buffer contents. The title and subtitle line contents cannot be longer than 64 character ignoring leading spaces or tabs.

4.5.4.1 Title Line - The contents of either the ITITLE or EVEN or ODD buffers is nominally placed on the third line of the page. If the even or odd page buffers are non-empty they are used. If the title buffer is used the text is centered. If either the even or odd buffers is used the left margin is temporarily column 1 and the text is printed justified. This allows split titles which can be alternated left and right. It is the responsibility of the user to use quoted spaces (#) and formal blanks to achieve the desired formatting effect. The title line is initially blank. If any of these commands appear immediately after a .PAGE command, they will take effect on that page.

.ITITLE tttt ... tttt
.I tttt ... tttt
.EVEN tttt ... tttt
.ODD tttt ... tttt

4.5.4.2 SUBTITLE - This command takes the remaining text on the line as the subtitle. The subtitle must not be longer than 64 characters (similar to the .ITITLE command). This text will appear on the line immediately following the title line. The subtitle line is always centered. The subtitle is initially blank. If the .SUBTITLE command appears after a .PAGE command, then it will take effect on the new page.

```
.SUBTITLE ssss ... ssss
.SUBTTL ssss ... ssss
.ST ssss ... ssss
```

4.5.4.3 CHAPTER - This command takes the remaining text on the line as the Chapter name. It can be no longer than 16 characters. This text will appear in the Header Line preceding a "-" and the page number unless the SPLIT option was specified to the HEADER command. If SPLIT is in effect the chapter name is opposite the page number. For example if .HEADER LEFT SPLIT were specified, the page number would be printed at the left and the chapter name at the right. The right and alter functions behave similarly. If the chapter name is two or more words the spaces must be quoted (#). If this command appears after a .PAGE command, then it will take effect on the new page.

```
.CHAPTER cccc ... cccc
.CH cccc ... cccc
```

4.5.5 Numbering - Several odd cases arise where it is not desirable to have the Header Line appear but the remainder of the running head information is desired. In these cases the line containing the page number may be inhibited from printing by using the .NO NUMBER command. This command does not affect the page format or the intrinsic page numbering. The .NUMBER command may be used to reenale the printing of the header line. The optional numeric argument may also be used to advantage to skip a page for later insertion of a figure when the blank page generated by the .FIGURE command is not desired. This requires some caution since the particular number skipped depends on whether the number is printed at the top or bottom. Pages may be lettered in addition to the number, to conveniently handle inserted material, by the .SUBPAGE commands. Finally all paging information may be suppressed by the .NO PAGING command. These commands are described individually below.

4.5.5.1 NUMBER - Turns on page numbering (normal) and if n is present, sets the current page number to n. n cannot be negative. .NO NUMBER disables printing of the Header Line but continues to count pages. If numbering is restored the normal page number will appear.

```
.NUMBER n
.NM n
.NONUMBER
.NNM
```

4.5.5.2 SUBPAGE - Instead of incrementing the page number as usual, a letter A-Z is appended to the page number. This is useful for inserting new material into a manuscript without changing the page numbers of the original. If more than 26 pages are counted an error will be reported. At the end of the inserted material the .END SUBPAGE command should be used to revert to normal page numbering.

```
.SUBPAGE  
.SPG  
.END SUBPAGE  
.ES
```

4.5.5.3 PAGING - form pages with page breaks and headers and footers. This is the normal setting for RUNOFF. For HELP files and similar documents pages are not desired. The command .NO PAGING will disable page formation and all running head information.

```
.PAGING  
.PA  
.NOPAGING  
.NPA
```


4.6 Parameter Settings

4.6.1 Margins - Several commands are available to alter the position of the left and right margins. The width of the printed output also affects the effective margin as does the Over option on the command line. It is most convenient to think of the margins as the offset of the body of the text from the running header information which is always located at column 1 and paper width. The true left margin depends of course on the physical arrangement of the paper in the printer and the value of the Over option. In general it is good practice to restrict margin commands within the document to the relative forms (+ or -) to allow easy reformatting for various output devices (i.e. Teletype or Line Printer).

4.6.1.1 LEFT MARGIN - Causes a BREAK after which the left margin is set to n. n must be less than the right margin, but not less than 0. The initial setting is 1. The amount of any indent plus the left margin must not be less than 0.

```
.LEFT MARGIN n
.LM n
```

4.6.1.2 RIGHT MARGIN - Causes a BREAK after which the right margin is set to n. n must be greater than the left margin. The initial setting is 70.

```
.RIGHT MARGIN n
.RM n
```

4.6.1.3 MARGINS - Causes a BREAK after which the left and the right margins are set to m and n respectively. The left margin must not be less than 0 and the right margin must not be greater than the page width. The initial settings for the left and right margins are 1 and 70. The number of characters on a line will be equal to or less than the right margins minus the left margin minus any indenting which may be specified. Even if FILLING has been disabled, lines will not be extended past the right margin.

```
.MARGINS m,n
.M m,n
```

4.6.1.4 PAPER SIZE - Causes a BREAK and sets the number of lines per page to m. m must be greater than 17. The initial setting is 66. m includes the top margin of 6 lines and the bottom margin of 6 lines. The second argument n, is optional. If it is present, it sets the paper width in columns (initially 80). It must be greater than the left margin, and it is set into the right margin as if a .RIGHT MARGIN n command had also been typed. This command is usually used only at the beginning of a file, but may be

used throughout if needed.

```
.PAPER SIZE m,n  
.PAGE SIZE m,n  
.PG SIZE m,n  
.PS m,n
```

4.6.1.5 The location of the printing left edge of the paper may be relocated by the use of the OVER command. The OVER command takes two arguments which are used to adjust the binding margins on even and odd numbered pages. If only one argument is given it is used for both even and odd pages. The effect of this command is identical to the command line /O command and may appear only once in the document. If it appears in the command line, any OVER commands in the document are ignored.

```
.OVER n,m
```

4.6.1.6 The DOWN command is included for completeness. It is equivalent to the DOWN option on the command line. It moves the output down on the page without modifying the line count. It may only appear once in either the text or the command line.

4.6.2 Tabs - This group of commands allows the setting of the actual values of the tab stops and the various parameters for tab insertion. The assumption is that tabs should be expanded with quoted spaces (#) in order that they not be padded on output. In general tabs should not be used on lines that are to be justified, but if they are then any formal blanks preceding the tab should be quoted. It is sometimes convenient to use such constructions for special effects.

4.6.2.1 TAB STOPS - Sets new tab stops as specified. The several n (maximum of 32 tab settings) must be greater than zero and in increasing order. They are absolute positions of tab stops. Tabs are initially set to 9, 17, 25, ... The appearance of a tab in the source text will be translated to one or more spaces or quoted spaces (#), the amount necessary to advance to the next tab stop. If a tab appears at a point where no further tab stops have been set on a line, the tab will be treated as though it had been a space.

```
.TAB STOPS n1,n2,...,n32  
.TS n1,n2,...,n32
```

4.6.2.2 TABS QUOTE - Expand tabs with quoted spaces (#). This is the assumed condition. On a line that is not justified it does not matter which mode of expansion is used, but on a justified line quoted tabs will prevent padding of the format. The command .NOTABS QUOTE disables

this feature.

```
.TABS QUOTE  
.TQ  
.NO TABS QUOTE  
.NTQ
```

4.6.2.3 Tab Reference - RUNOFF assumes that tab stops are set such that each tab stop is relative to the absolute left margin setting of 1, no matter what the left margin setting is. This assumption may be changed to be relative to the current left margin. If the command .TABS RELATIVE is given RUNOFF will assume that tab stops are set relative to the current left margin setting. .TABS ABSOLUTE restores the original assumption. In no case may a tab stop have a negative value, even if relative tabs are used. If desired such an effect may be achieved through a negative indent.

```
.TABS ABSOLUTE  
.TA  
.TABS RELATIVE  
.TR
```

4.6.3 Indented Text - Two commands are available to set in a block of text either as a list or note. Both commands save the current margin and fill and justify modes. The commands can be nested to an aggregate depth of 5 and use a common unnesting routine. (I.e. the END LIST and END NOTE commands are equivalent)

4.6.3.1 LIST - Set the left margin in by 9 for the first occurrence and 4 for each subsequent occurrence. The command saves the status of FILL and JUSTIFY as well as the left and right margin settings. The END LIST command unnests the last LIST (or NOTE) command and leaves 1 blank line.

```
.LIST  
.LS  
.END LIST  
.ELS
```

4.6.3.2 NOTE - The NOTE command sets the left and right margins in by 9 for the first occurrence and 4 for each additional occurrence. Each occurrence causes one line to be skipped. In addition the rest of the command line or the next line is centered. The END NOTE command unnests the margins (and FILL and JUSTIFY) at each occurrence and leaves a blank line following the inset note.

```
.NOTE  
.NT  
.END NOTE  
.EN
```

4.6.4 SPACING - The spacing command causes a BREAK after which the line spacing will be set to n. n must be within the range 1 to 5. Single spacing is 1, double spacing is 2, etc. Single spacing is initially assumed.

```
.SPACING n  
.SP n
```

4.7 Flag Characters

4.7.1 General - The special characters recognized by RUNOFF may be controlled by this group of commands. Commands are available to enable or disable individual flag characters or all of the flag characters. The various flags have names which are used as arguments to the .FLAG commands. These names and the associated flag characters are listed below:

KEYWORD	CHARACTER	ACTION
CONTROL	(.)	column 1 command flag
ENDFOOTNOTE	(!)	column 1 end of footnote
LOWERCASE	(\)	lower case and unlock
QUOTE	()	quoting character
SPACE	(#)	quoted space
UNDERLINE	(&)	underlining
UPPERCASE	(^)	upper case and lock
CAPITALIZE	(<)	capitalize entire word
FIRSTCAPITALIZE	(')	capitalize first character of word
HYPHEN	(-)	optionally hyphenate the word at this point
INDEX	(>)	create an index entry using this word. Index is not yet implemented.

4.7.2 FLAG - The flag command takes one of the noun arguments above and an optional character argument. If the character is present it becomes the flag character associated with the keyword function. If the character is an existing flag character (strongly discouraged) or "!" or ";" which have special meaning on command lines it must be quoted using the "\"" character. The action of the flag character may be suppressed by the .NO FLAG form of the command in which case the character argument is ignored.

```
.FLAG X
.FLAG X c
.NOFLAG X
.NFL X
```

4.7.3 FLAGS ALL - The FLAGS ALL command will restore the group of flags active at the time of occurrence of the last .NO FLAGS ALL command. Any flags activated between the last .NO FLAGS ALL and the following .FLAGS ALL are disabled by the command. When the .NO FLAGS ALL command is given the recognition of all flags will be suppressed, except for the CONTROL (normally '.') and the ENDFOOTNOTE (normally '!') flag characters, which will always remain active. In addition the current flag settings will be saved.

.FLAGS ALL
.FLAGS
.NOFLAGS ALL
.NOFLAGS
.NFL ALL
.NFL

4.8 Text Placement

4.8.1 General - The following commands allow text to be placed in various positions on the page with respect to either the margins or width or page bottom.

4.8.2 Centering - These commands cause a BREAK after which they center the next line following in the source file. The centering is over the column $n/2$, independent of the setting of the left and right margins. If n is missing, n is assumed to be the paper width, which is initially 80. (See .PAPER SIZE command). Centered lines will be kept within the page size. Thus centering cannot be used to exceed the width of a page. Tabs are converted to spaces on a line which is being centered. The CENTER WIDTH command is exactly the same as a .CENTER n command where n is the page width. The .CENTER MARGINS command centers the next line using the current margins as bounds. If m and/or n are specified, then the following line will be centered as if the left margin and the right margin had been reset to m and n , respectively. This command does not modify the margin settings. The British spelling .CENTRE may be used anywhere .CENTER is used.

```
.CENTER n
.CENTRE n
.C n
.CENTER MARGINS m,n
.C MARGINS m,n
.CM m,n
.CENTER WIDTH
.C WIDTH
.CW
```

4.8.3 LEFT - Causes a break and justifies the next line against the left margin. If n is specified, it is assumed to be the left margin used for justifying the next line only.

```
.LEFT n
.L n
```

4.8.4 RIGHT - Causes a break and justifies the next line against the right margin. If n is specified, it is assumed to be the right margin used for justifying the next line only.

```
.RIGHT n
.R n
```

4.8.5 FOOTNOTE - Allocates n *line spacing lines at the bottom of the current page for a footnote (1). If insufficient room remains on the current page, space will be allocated at the bottom of the following page. The text for

the footnote begins on the line following the command, and it may contain any appropriate commands (e.g. .CENTER, .SKIP) necessary to format the footnote. The footnote is terminated by a line beginning with an exclamation point (the remainder of the line is ignored). The lines delimited by this line and the .FOOTNOTE command are put into an internal buffer to be processed when the output moves to within the stated distance of the bottom of the page. If a page has multiple footnotes, the allocated space is the sum of the allocations for all footnotes assigned to the page. The user must include his choice of footnote-designating symbols within his text.

Before actually outputting a footnote, the left and right margins, line spacing, paragraph indentation, case lock (upper or lower), and justify and fill modes are saved. The footnote can therefore contain commands to change these parameters and the effect will be limited to only the footnote text. Just before the footnote is output, justify and fill modes are set and line spacing is set to single spacing. The left margin is set to 1 and the right margin to the page width, thus relative margin commands may be given to modify the margins from these settings. In addition, paragraph indentation is cleared, and the case lock is set to the case at the time the .FOOTNOTE command was given. At the completion of the footnote, the parameters are restored.

The actual space taken by the footnote may be more or less than that specified by n. The n merely allocates space and should be the user's best guess. If it is considerably off, the footnote lines may overflow the page, or extra space may be left at the bottom. The user may wish to adjust n after examining a first draft printout.

Footnotes are not allowed within footnotes. Certain other commands, such as .PAGE, .TEST page, etc. are allowed but are not processed.

.FOOTNOTE n
.FN n

(1) This is a footnote. This text and the dividing line above were specified by text and commands following a .FOOTNOTE 10 command.

4.9 Miscellaneous

4.9.1 UPPER CASE - This command sets upper case mode. It is equivalent to ^^.

```
.UPPER CASE
.UC
```

4.9.2 LOWER CASE - This command sets lower case mode. It is equivalent to \\. The initial setting is lower case mode.

```
.LOWER CASE
.LC
```

An additional feature of the lower case or off function flag character is that the character, if it appears as the last character on a line, inhibits end of line recognition. However, the maximum line size is still restricted to 132 characters.

4.9.3 CONTROL CHARACTERS - This command will allow control characters to be passed to the output file from the source text. The control characters will be treated as non-spacing characters i.e. they will not be counted in computing line length for filling and justification. In addition, the character BS (10 OCTAL) subtracts one from the current line count so if the output device can accept control characters for special functions they may be freely passed through RUNOFF. For example a printing device might use CTRL/N and CTRL/O for half shift up and half shift down. A RUNOFF monogram could be generated by the following command:

```
R^NU^NNO^OF^OF^H^OF^H^OO^HN^H^NU^N.
```

Escape sequences may also be passed by this mechanism but the characters following the escape, since they are nominally printing characters, present some difficulties. The command .NO CONTROL CHARACTERS will prevent any unquoted control characters from passing to the output file. Any control characters cause an error message to be printed and will be ignored. This is the assumed mode. Any control characters quoted with the " " will be passed unmodified as any other quoted character will. The character backspace CTRL/H is treated specially in that it reduces the physical line count when processed. This allows user developed overstrikes when output to an appropriate device which supports the backspace character. On terminals that require escape sequences for control functions the escape character will be non-spacing, but the following character will not. If the device also ignored backspaces (an unlikely occurrence) one or more backspace characters could be used to adjust the line count. In general for such devices a handler may be written to generate the appropriate escape

sequences to the device when specific control codes are trapped in the output stream. At this facility we are using ^O for half shift up (superscript) and ^N for half shift down (subscript).

.CONTROL CHARACTERS
.CC
.NO CONTROL CHARACTERS
.NCC

4.9.4 COMMENT - The COMMENT command may be used to insert a comment in the input stream. The remainder of the line is ignored including any special characters appearing on the line.

.COMMENT

4.9.5 RESET - The RESET command reinitializes all the internal variables and buffers of RUNOFF. If several small independent documents are to be processed together the RESET command should appear at the start of each document. The action of the command is the same as restarting RUNOFF following the command line input. (See APPENDIX B for settings.)

.RESET

5.1 Error Format - All error messages are output on a line by themselves and have the form.

??RNO.XX.F.PP.LL

Where "XX" is one of the error mnemonics listed below, "F" is the input file number, "PP" is the input page number, and "LL" is the line number on the page. The error message is inserted into the output stream as CR-LF error message CR-LF. The error message does not otherwise affect the formatting so that a suitable edit macro in TECO or SCROLL may be used to remove all the error messages in the output. The option switch /K may also be used to prevent error messages from appearing in the output and the option /N may be used to have error messages logged on the console terminal.

5.2 Error Codes - The following is an alphabetic list of all the OS/8 RUNOFF error codes:

- BA Bad Argument to a command
- BC Bad Command -- Illegal command given
- BL Bad Letter -- Too many subpages
- BM Bad Margins -- illegal margins settings
- DF Page overflow on Deferred Figure -- (FATAL)
- EC Extra characters on command line
- FF Footnote command inside footnote -- (FATAL)
- FG Illegal .FLAG or .FLAGS command
- FN Too many lines allocated for a footnote -- (FATAL)
- FO No more room in footnote buffer -- (FATAL)
- FX Footnote buffer exhausted -- (FATAL)
- GJ Ignoring excess Garbage characters on command line
- HD Illegal .HEADER argument
- HL Heading, Subtitle or Title buffer full
- IC Illegal Control Character
- IE Input Error reading file -- (FATAL)

LH Long Header -- A Running Head Line too long
LL Long Line for .CENTER, .LEFT, .RIGHT or Header Line
LM Left Margin error -- Margin is set to 1
ML Over 132 characters in line buffer -- (FATAL)
NM Note or List Margin error -- Margins are unchanged
NS Nest error -- over 5 nested note or list commands
NY Not Yet implemented valid RUNOFF command
OE Output line Error -- (FATAL) bug in program
OF Output File error -- (FATAL) device error
PF Page overflow on deferred figure or footnote --
(FATAL)
PG Illegal Page number -- page number less than zero
PS Page Size error -- length < 10 or width > 132
RM Right Margin error -- Right margin set to width
SM Sequence Margin error -- Sequence numbers too big
SO Stack Overflow -- (FATAL) bug in program
SU Stack Underflow -- (FATAL) bug in program
TS Tab Stops -- More than 32 stops specified

There are several implementations of RUNOFF currently available on DEC computers. As of this writing there has been no real effort to stabilize the language or exercise any control over the dialects. In the absence of such efforts, we feel that new implementations should remain as close as possible to the DECsystem-10 version. However, many commands in the DECsystem-10 version are not clear in the currently available documentation and others seem to have been added with special rather than general considerations in mind.

We feel that the addition of a Macro facility to RUNOFF might alleviate some dialect problems. In this case the Macros could be added at run time and define additional local or dialectic commands. The remainder of the document could then employ these commands as though they were standard commands. Our thoughts are still somewhat vague but the facility would be able to define new commands in the RUNOFF input document and be able to access various internal and user defined variables. We welcome any suggestions or inputs in this area.

The major differences between OS/8 and DECsystem-10 RUNOFF are listed below in three groups.

1. DECsystem-10 features not available in OS/8
2. OS/8 features not found in DECsystem-10
3. Common features that are interpreted differently with an explanation of the differences.

DECsystem-10

END FOOTNOTE	LIST ELEMENT
HEADER LEVEL	DO INDEX
STANDARD	PRINT INDEX
APPENDIX	SUBINDEX
AUTOTABLE	INDEX
BEGIN BAR	IF
ENABLE BAR	ELSE
DISABLE BAR	ENDIF
END BAR	VARIABLE
NO SPACE	IFNOT
LITERAL	SELECTION
END LITERAL	END SELECTION
NUMBER APPENDIX	NO SELECTION
NUMBER CHAPTER	NO SUBTITLE
NUMBER INDEX	
NUMBER LEVEL	
NUMBER LIST	
NUMBER PAGE	
NUMBER SUBPAGE	

OS/8	
AUTOCAPITALIZE	EVEN
TABS RELATIVE	ODD
TABS QUOTE	RESET
PAGE EVEN	OVER
PAGE ODD	DOWN

HEADER

In DECsystem-10 RUNOFF the HEADER command controls only the form of the word "page". There is not control over placement of the header line. In OS/8 RUNOFF the HEADER command has the additional functions of specifying placement of the line, format of the line, and the numbering system to be used. Consult section 4.7 for the details.

CHAPTER

In DECsystem-10 RUNOFF the CHAPTER command causes a page advance and centers the word "CHAPTER" 12 lines down on the new page followed by a number. It also increments the chapter number. The text argument is then centered 2 lines below this and the argument becomes the title on subsequent pages. In OS/8 RUNOFF the CHAPTER command only loads the chapter buffer which is printed on the page number line of each subsequent page.

TITLE SUBTITLE

The DECsystem-10 RUNOFF left justifies the title and subtitle while the OS/8 version centers these lines. In addition the OS/8 version places them further down on the page by a specified amount.

NOTE LIST

The NOTE command in DECsystem-10 RUNOFF causes the margins to be set in by 15 and centers the word "NOTE". In OS/8 the text argument, or the next line if no argument is given, is centered and the margins are set in by 9.

FLAG

The FLAG commands are interpreted the same in the two versions but the keywords INDEX and SUBINDEX are available in the DECsystem-10 version and not in OS/8. The keywords HYPHEN and FIRSTCAPITALIZE are available in the OS/8 version and not in DECsystem-10

CENTER RIGHT

In the OS/8 version the modified centering commands CENTER WIDTH and CENTER MARGINS are available. The RIGHT command argument in OS/8 is the new right margin (it can be relative) while in DECsystem-10 it is the inset from the right margin.

When loaded, assuming no command line options, the state of RUNOFF is as though the following commands had been executed.

```
.LOWER CASE
.PERIOD
.AUTOCAPITALIZE
.FLAG LOWERCASE \
.FLAG QUOTE
.FLAG SPACE #
.FLAG UNDERLINE &
.FLAG UPPERCASE ^
.NO FLAG CAPITALIZE
.NO FLAG HYPHEN
.NO FLAG INDEX
.NO FLAG FIRSTCAPITALIZE
.NO CONTROL CHARACTERS
.TABS QUOTE
.TABS ABSOLUTE
.TAB STOPS 1,9,17,25,33,41,.....,249
.PAGE SIZE 66,70
.LEFT MARGIN 1
.RIGHT MARGIN 70
.SPACING 1
.NUMBER
.PAGING
.CHAPTER
.SUBTITLE
.TITLE
.EVEN
.ODD
.PAGE BOTTOM 3,2
.PAGE TOP 1,2
.HEADER TOP SOLID RIGHT UPPER ARABIC
.FILL
.JUSTIFY
.PARAGRAPH 5,-1,2
```

Various option switches can modify the above set. If this has occurred the values derived from the option switches become the default settings for that run. The .RESET command restores the current default settings of the above list.

The following material is copied from the SPRING 1977 WVU
SOFTWARE NEWS.

Backspace Character

16602/ 0027 Alt BS - BS
16601/0010 BS

Page Length

16602/ 7773 Normal Length - Alternate Length
16603/ 0101 Alternate Length

Underline Character

17000/ 7716 Alternate Char - Underline
17001/ 0137 Underline

Alternate Width Selection

17002/ 7755 Alternate Width - Normal Width
17003/ 0117 Normal Width (79 columns)

Alternate Line Spacing

17061/ 7240 Alternate is double spaced
 7344 Change to triple space

Alternate Underline Mode

17075/ 7350 Alternately use backspace
 7240 Alternate no underline
 7201 Alternately use separate
 (Change the character too.)

To implement the above patches, first calculate the new values and then patch the save image with ODI or FUIIL. The location / syntax indicates the current value of the storage location. An effort will be made to preserve these locations in future releases.

All commands must be preceded by a period (.).

AUTOCAPITALIZE AC	Capitalize first character of paragraph and sentences
AUTOPARAGRAPH AP	Treat leading spaces as new paragraph
BLANK n B n	Skip n lines
BREAK BR	Start new output lines
CENTER n CENTRE n C n	Center next line around column n/2
CENTER MARGINS m,n C MARGINS m,n CM m,n	Center next line with margins m and n
CENTER WIDTH C WIDTH CW	Center next line around (page width)/2
CHAPTER CH	Use rest of line as Chapter buffer
COMMENT	Ignore rest of line
CONTROL CHARACTERS CC	Allow control characters
END LIST ELS	Unnest the last LIST command and leave one blank line
END NOTE EN	Unnest the last NOTE command and leave one blank line
EVEN	TITLE command for even-numbered pages
END SUBPAGE ES	Stop subpage numbering (resume pages)
FIGURE n FG n	Make space for n line figure
FIGURE DEFERRED n FG DEFERRED n	Same except maybe on next page
FILL F	Resume FILLING each line

FLAG X c FL X c	Restore X flag character (reset to c)
FLAGS ALL FLAGS	Restore all flag characters
FOOTNOTE n FN	Start an n-line footnote
HEADER HD	Resume outputting of header and footer
INDENT n I n	Indent next line
JUSTIFY J	Resume JUSTIFYING text
LEFT n L n	Left adjust following line
LEFT MARGIN n L MARGIN n LM n	Set left margin
LIST	Indent left margin by 9 and save status
LOWER CASE LC	Start text in lower case (\\)
MARGINS m,n M m,n	Set left and right margins
NO AUTOCAPITALIZE NAC	Stop autocalitalization mode
NO AUTOPARAGRAPH NAP	Stop autoparagraph mode
NO CONTROL CHARACTERS NCC	Don't allow control characters
NOFILL NF	Stop FILLING text
NOFLAG X NFL X	Disable recognition of flag character type X
NOFLACS all NOFLACS	Disable all non-column 1 flag characters

NOHEADER NHD	Suppress page headers and footers
NOJUSTIFY NJ	Stop JUSTIFYING lines
NONUMBER NNM	Stop page numbering
NOPAGING NPA	Stop splitting output into pages
NOPERIOD NPR	Stop double spacing after . : ; ! and ?
NOTABS QUOTE NTQ	Disable filling tabs with quoted spaces
NOTE NT	Indent left and right margins by 9 for first occurrence and 4 for each additional occurrence
NOTITLE	Do not leave space for a title line.
NUMBER n NM n	Resume page numbering, set page number to n
ODD	TITLE command for odd-numbered pages
OVER n,m	Sets the binding margins
PAGE n PG n	Start new page, set page number to n
PAGE EVEN	Make the next page number even.
PAGE ODD	Make the next page number odd.
PAGE TOP m,n PG TOP m,n	Change top of page margin
PAGE BOTTOM m,n PG BOTTOM m,n	Change bottom of page margins
PAGE SIZE m,n PG SIZE m,n PAPER SIZE m,n PS m,n	Paper is m lines by n columns
PAGING PA	Resume breaking into pages
PARAGRAPH i,v,t P i,v,t	Start new paragraph

PERIOD PR	Double space after . : ; ! and ?
RESET	Reinitialize all internal variables and buffers of RUNOFF
RIGHT n R n	Right adjust following line
RIGHT MARGIN n R MARGIN n RM n	Set right margin
SKIP n S n	Skip n*spacing lines
SPACING n SP n	Set spacing (default=1)
SUBPAGE SPG	Start subpage lettering
SUBTITLE SUBTTL ST	Use rest of line as subtitle line
TAB STOPS n,n,... TS n,n,...	Set tab stops
TABS ABSOLUTE TA	Tab stops are absolute
TABS QUOTE TQ	Expand tabs with quoted spaces
TABS RELATIVE TR	Tab stops are relative to left margin setting
TEST PAGE n TP n	Skip to new page if less than n lines on page
TITLE T	Use rest of line as title
UPPER CASE UC	Start text in upper case (^^)