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WORD=STAR^{T.M.}

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WordStar
USER'S GUIDE

For WordStar Release 1.00

revised 03/01/80

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References are made throughout this manual to the Control Program Monitor, commonly known as CP/M. CP/M is a trademark of Digital Research of Pacific Grove, California.

INTRODUCTION

WordStar represents a significant advance in providing extremely comprehensive yet easy to learn and use facilities for text transcription, manipulation and composition. Although WordStar has a wide range of functions and commands, usage is simplified with variable level menu presentations for early and advanced learners. DO NOT BE MISLED BY THE SIZE OF THIS MANUAL into thinking that WordStar is overly complex and difficult to learn. WordStar is a visual experience which we can only impart to you in the "cockpit," i.e., seated at your terminal. Nevertheless, every operational facet of WordStar has been meticulously documented along with recommended procedures for combining the available functions into sophisticated word processing operations.

To begin your WordStar experience, sit at a terminal and look at the menus and the convenient keyboard layout. Look at the range of functions and play with some entered text by changing margins substituting and inserting. Read the manual, and try the operations on your terminal as you read. We hope you will enjoy WordStar as much as we've enjoyed putting it together.

INSTRUCTIONS FOR RUNNING INSTALL ON TRS80/HEATH 89

The version of WordStar for the TRS80 and the HEATH 89 are prepared with the terminal preinstalled. This means that if you wish to install a specific printer for WordStar, the following procedure should be executed:

1. FORMAT a blank diskette with the Format program and generate a CP/M Operating System through either the SYSGEN or SYSMOV programs. (The HEATH 89 uses SYSGEN, the TRS80 uses SYSMOV.)
2. USE PIP (TRS80) or FILECOPY (HEATH) to copy WS.COM, WSMGS.COM and INSTALL.COM from the distribution diskette to the newly formatted diskette.
3. RUN the INSTALL.COM program and make the appropriate printer selection.

TRS80 NOTES

Some minor modifications were made in this version of WordStar for the TRS80 due to the limitations of the keyboard and RAM. The function of the LEFT ARROW key, normally used to backspace or delete, has been moved to the BREAK key.

The DOWN ARROW key located directly to the left of the "A" key has been renamed CTRL key in this manual. This key is used for entering special CTRL characters in WordStar and is represented by the "^" character in this manual. Whenever a CTRL character is indicated, it is entered by pressing and holding the DOWN ARROW key while typing the associated letter key.

The UP ARROW key has been renamed ESC for "escape". This key must be used in conjunction with the CTRL key. To use the ESC key, first press and hold the DOWN ARROW (CTRL) and then press the UP ARROW (ESC).

The CLEAR key on the TRS80 keyboard is interpreted by WordStar as a "SHIFT LOCK" key in order to allow data to be entered in uppercase letters only.

*****IMPORTANT***** If for any reason it is necessary to patch and save WordStar, use the following CPM intrinsic command:

SAVE 129 WSXX.COM

where XX represents the version, if any, to be saved.

HEATH 89

The note above is the same for the HEATH except that the command is:

SAVE 128 WSXX.COM

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SECTION 1. HOW TO USE THIS MANUAL

Readers wishing to get an overview of WordStar's features should turn to Section 2.

Readers wishing to choose a computer system on which to use WordStar and readers wishing to determine whether their present system is adequate to run WordStar should turn to Section 13, "System Requirements".

Readers who have just received WordStar and who wish to make it operable with their equipment should turn to Section 14, "Installation".

Readers who have an operable WordStar and who wish to begin learning to use it should read Sections 2 through 6, skimming over some of the more detailed Sections as suggested in the paragraphs preceding them, and start using WordStar. Hands-on experience is essential to learning any powerful software tool; WordStar is particularly easy to learn by using because the Help System eliminates the need to memorize specific commands. Read Sections 7, 8, 10, and 11 to increase your proficiency with WordStar. Find detailed explanations of groups of commands in Section 8 as required; find explanations of error messages in Section 12. Look at Section 9; read portions of that Section as they become pertinent to your work.

WordStar has a "rich" collection of commands; there are many that are conveniences for functions that can be accomplished more slowly with basic commands. Thus, you can begin use with a small set of its functions, as introduced in Section 6.

Reference Use: first, make use of the help system when operating WordStar: the menus give one or two word descriptions of all commands, and information on a number of topics can be called onto the screen. If you need more detail, or usage hints, refer to this manual. While the sections are organized to facilitate initial reading, much information within sections is tabulated for easy reference. Inside the back cover is an alphabetic table of commands and other topics with section number references.

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SECTION 2. AN OVERVIEW OF WordStar

WordStar is a CP/M compatible, screen oriented word processing system with integrated printing. Both initial entry of text and alteration of previously entered text are displayed directly on the screen. Most formatting functions take place immediately, resulting in the display of a true print image; additional enhancements are performed during printout.

WordStar's **EDIT FUNCTION** is used to create and alter documents stored on diskette. Features of the edit function include the following:

Video Editing: a portion of the document being entered or corrected is always shown on the CRT screen; additions and corrections are immediately displayed. Text entry is accomplished merely by typing the desired text; command functions such as cursor motion or deletion of text are quickly accomplished with visual feedback.

Automatic Disk Buffering: the size of a document is not limited by the amount of RAM memory in your computer, but by disk capacity. Text is brought into RAM as required, with no operator intervention or concern.

On-screen Text Formatting: text is displayed on the screen as it will appear when printed, thereby facilitating review and correction of printed copy appearance before actually printing. On-screen text formatting is accomplished with the aid of the following three features:

Word Wrap: paragraphs may be entered at high speed without striking Carriage Return. When a word exceeds the right margin, WordStar automatically moves the word being entered to the next line and justifies and redisplays the line just completed. The RETURN key is used only to indicate the end of a paragraph, blank line, or other point where a permanent line break is desired. The typist need not break rhythm due to concern for the end of the line, nor feel the necessity of looking up from the material being entered.

Automatic Margination, Justification, Line Spacing, Centering: with word wrap in effect, each completed line is automatically adjusted to fit the left and right margins, justified (right-aligned) unless the user has selected ragged-right format, and, optionally, double-spaced or triple spaced. A line of text can be centered between the current left and right margins with a keystroke command.

Reform Paragraph Command: text from the cursor position to the end of the paragraph may be "reformed" on command to change the margins or line spacing, to change from ragged right to justified or vice versa, or to clean up after alterations.

Powerful Editing Commands: in addition to the basic functions - cursor motion, scrolling, text deletion by character, word, or line, and selection of insertion or overtyping - WordStar's editing commands include set/clear variable tab stop, block move, block copy, block delete, find, replace, write to and read from additional files, and set/return to place markers.

Flexible Find and Replace Commands: searching operations and substitution operations can be done once, n times, globally (on the entire document), on whole words only, ignoring case (upper or lower), and/or selectively (the operator is asked whether replacement is to be performed in each instance).

Help System: a menu of enterable commands appears at the top of the screen during editing, or may be suppressed for additional text display area. When the first character of a two-character command is entered, after a short pause, the menu automatically changes to show all commands that begin with the key just entered. Additional explanations of various topics can be called up at will, by selecting from the **Help Commands Menu**.

Dynamic Page Break Display: within certain limitations, the page breaks that will occur at printout are indicated on the screen during editing, and change appropriately in response to every insertion or deletion. Thus printing is unnecessary to review page layout or page break positions.

Precise User Control of Text Format: WordStar always remembers which spaces and carriage returns were typed by the operator and which were inserted by the word wrap or paragraph reform operation. Operator-typed spaces and carriage returns are never deleted either during text entry or text reforming, providing precise control of appearance. For example, if text is entered with two spaces after periods, the spaces will remain through the initial word wrap and any later reforming, even if they fall initially at end of line and later in mid-line. Anything produced by the automatic formatting features can be altered by explicit editing commands afterwards. All automatic features can be individually disabled.

WordStar's **PRINT FUNCTION** is used to print documents which have been entered and saved on diskette with the edit function. The print function features concurrent printing -- one document may be printed while another is being edited. Print formatting features include the following:

Page Formatting: each page is vertically formatted with top margin, optional, user-settable, variable heading and footing texts, page number, and bottom margin. The page size and margins may be specified with "dot command" directives inserted in the document; defaults make such specification unnecessary for typical cases. The heading and footing may be changed as many times as desired throughout the document.

The page number appears by default at bottom center, but may be placed at top, bottom, left, center, right, or alternating left and right via specifications in the heading and/or footing texts. The page number may set to any number desired, or suppressed completely.

Pagination Control: page breaks occur whenever the page is full, or in response to "Page" or "Conditional Page" directives in the document. The latter allow specifying that a group of lines is to print together, at the top of the next page if they will not fit the current page. Use of these commands will prevent inappropriate page breaks without the necessity of explicitly readjusting page ends every time changes are made in the document. Page breaks are shown on the screen during editing.

Print Enhancements: Underline, **Double Strike**, **Boldface**, and **Strikeout** are generated at print time, in response to special characters imbedded in the document. WordStar can print these enhancements on regular printers as well as on Daisy-wheel printers. During editing, the special characters used to invoke the enhancements are displayed at the beginning and end of the affected text, allowing most standard CRT terminals to be used.

Subscripts, Superscripts, Variable Character Pitch (pica, elite, or your choice of number of characters per inch), **Variable Line Height** (6, 8, or your choice of lines per inch) and **Alternate Ribbon Color** are fully supported on Daisy-wheel and other incremental printers, and within limitations on Teletype-like printers.

Underline, double strike, boldface, and strikeout may be used freely in mid paragraph as well as in separate lines such as titles; use of these features is completely compatible with word wrap and paragraph reform. Print enhancements many be used in all combinations. For example, underlined and boldfaced subscripts are supported.

Microspace Justification: when printing justified text on a daisy wheel printer, the white space in each line is evenly distributed between the words and characters for superior appearance. On printers not capable of incremental spacing, and, in any case on the CRT display while editing, justification is accomplished by varying the number of blanks between words.

You are now reading an example of a document prepared entirely with WordStar. This manual was entered and revised using the edit function; camera-ready copy was printed on a daisy-wheel printer.

Operator Options: when invoking the print function, the operator may specify a starting page number, use of "form feed" characters, pausing between pages for single-sheet (e.g. letterhead) paper loading, printing exact file contents without page formatting, and outputting to a disk file instead of the printer. Print operation can be suspended or aborted at any time, whether or not a document is being edited, while the printing is being performed.

Additional WordStar features include:

Keyboard Buffering: if the operator types faster than the screen display can respond, the keystrokes are caught and saved until they can be processed. Further, screen updating is usually suspended until WordStar catches up with processing all the keystrokes. Thus, the operator can enter text or type commands at high speed, then pause when he/she wishes to see the latest screen display. The only exception to this is during disk I/O, which is indicated by a message at the top of the screen as well as the usual noise from the disk drive.

Convenient Defaults: while WordStar has many options and user-settable quantities, all are set to generally useful values at startup. For example, the left margin is at column 1, the right margin is at column 65 and there are tab stops every 5 columns. The page paper length defaults to 66 lines long for normal 11 inch forms, with margins at the top and bottom. Thus, WordStar can be used initially without even knowing how to change these variables, and there will rarely be need to change more than a few of them for a typical document.

WordStar is compatible with a wide variety of hardware, and can share files with other software:

File Compatibility: the disk files used by WordStar for documents are standard CP/M text files, with very minor additions; a "non-document" edit mode is available to suppress even the minor differences. All formatting features such as word wrap, justification, and settable tabs can be individually enabled and disabled. The formatting performed by the print command can be suppressed. Thus, WordStar is useful as a general purpose text editor / print despooler as well as as a self-contained word processing system. It may be used to edit program source files, input files for other text formatters, data entry, etc. The print function may be used to print output written to disk by other applications or programs (even while you use the edit function to prepare the input for the next run!).

CRT Compatibility: WordStar's video edit function will operate, after suitable installation, on any CRT or video board 16 x 64 or larger that has clear screen and cursor positioning functions and that is accessible as a console device under CP/M. If the CRT has line insert and line delete functions, these will be used for split screen update after changes in the text. If the CRT has a highlighting method such as inverse video or bright/dim, the highlighting method will be used to distinguish menus and other prompts from the text being edited, as well as for distinguishing blocks of text "marked" in preparation for block copy, move, or delete. Certain memory-mapped video boards meeting requirements detailed in Section 14 can alternately be operated in direct memory access mode for extra fast and smooth screen update.

Printer Compatibility: WordStar will drive almost any printer, whether it is Teletype-like or Daisy wheel, and whether it is accessed via CP/M's "list output" logical device or via direct hardware I/O instructions issued by WordStar. For Daisy Wheel and similar incremental printers, variable line spacing (1 to 127 forty-eighths of an inch), variable character pitch (1 to 127 one-hundred-twentieths of an inch), and automatic microspace justification are supported. For other printers, selection of two character widths is supported (when supported by the printer) and limited user-definable access to other special control sequences is provided. Subscripts, superscripts, and boldface text each print in an alternate manner on non-incremental printers. It is possible to use a fast printer for drafts and a daisy wheel for finished copy with no special considerations other than creating two versions of WordStar installed for different printers.

Installation: the INSTALL program supplied with WordStar allows easy menu selection of any of about a dozen common CRT types and selection of one of the following printers: **Diablo 1610/1620/1640/1650**, **Qume Sprint 5**, **NEC Spinwriter 5510/5520**, or a Teletype-like printer. Installation for unusual terminals, video boards, and printers is handled by "patching" the program. Extensive provisions have been made for user patching to accomodate various console and printer devices, as well as to customize other features. Installation is detailed in Section 14.

SECTION 3. THE COMPUTER, THE OPERATING SYSTEM, AND FILES

This section presents general background on the computer system, data file storage on diskettes, backup practices, works specific WordStar-related information on diskette space requirements, setting up diskettes, diskette changing, and the file changes which occur when a document is edited.

While the first few pages of this section will be largely familiar to experienced microcomputer users, the latter subsections are important for all readers.

3.01 The Terminal

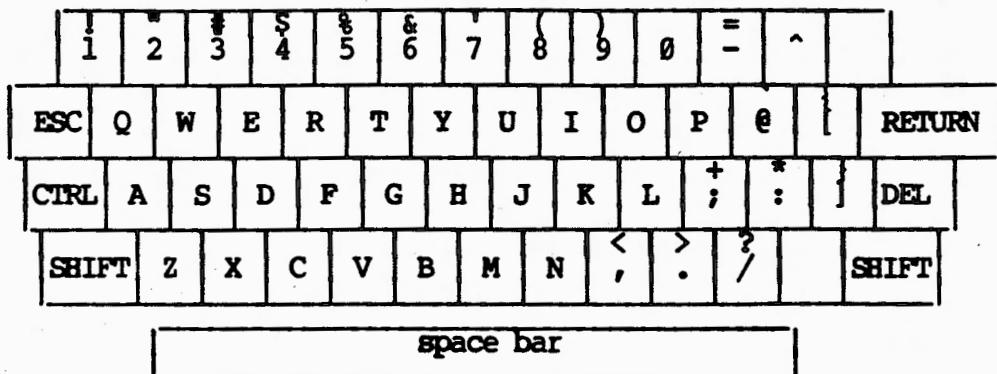
The screen is capable of displaying at least 16 lines of 64 characters; 24 lines of 80 characters is a common size. We will refer to the leftmost character position on each line as "column 1", and the rightmost character position as "the right-most column" since the actual number of columns on the screen varies from terminal to terminal.

The Cursor is your terminal's indicator on the screen of where the next character will appear. Depending on the terminal, the cursor may appear as a rectangle, triangle or underline; the cursor may or may not blink.

Highlighting: many terminals have one or another means of making certain text stand out on the screen. One common method is to use bright and dim display; another is inverse video, whereby the characters to be differentiated are black on a white background instead of white on a black background. If your CRT has one of these highlighting methods and WordStar is properly installed to use it, WordStar will use the highlighting method to distinguish the menus and error messages from the document being edited, and to indicate text in the document that has been "marked" in preparation for moving or some other operation.

Insert and Delete Line: Many CRT's have special control codes to permit deleting or inserting a line of text on the screen, automatically moving the lines below up or down. If such codes are available and WordStar is correctly installed to use them, WordStar will use split screen upward and downward scrolling to achieve rapid screen update as text is edited or scanned.

The Keyboard: Most computer keyboards are roughly like that of a typewriter, but with a number of additional keys. Placement and labelling of keys varies from keyboard to keyboard. A picture of a typical keyboard showing all keys that are essential to use of a standardly installed WordStar is displayed below:



The CIRL key is used like a shift key to send the **CONTROL CHARACTERS**. (control-A through control-Z). To type a control character, hold the CIRL key down while typing the letter. In this manual, "control" is abbreviated "^"; that is, ^A means control-A, typed by holding down CIRL and typing an A; ^B means control-B, etc. Control characters are used for **COMMANDS** to WordStar, to tell WordStar to do something; other keys enter document characters.

Your DEL key may be labelled **DELETE**, **RUB** or **RUBOUT** and may or may not be shared with the underscore key and may or may not require **SHIFT** to activate.

Your **ESC** key may be labelled **ESCAPE**.

The **RETURN** key may be labelled **CARRIAGE RETURN** or **ENTER**.

Note that the space bar is for entering spaces. Unlike on a typewriter, you cannot use the space bar to move over characters already on the screen.

A number of additional keys may be present, including:

BACKSPACE: same as ^H; use with WordStar for backspacing.

TAB: same as ^I; use with WordStar for tabbing.

LINE FEED: same as ^J.

Some terminal keyboards have four cursor motion keys with arrows pointing in four directions; these can be enabled for WordStar through special installation procedures (Section 15).

Many terminals have a **REPEAT** key which may be held down along with another key to send that character continuously; other terminals auto-repeat any character whose key is held down.

3.02 The Disk Drives

In addition to the terminal, a computer suitable for WordStar use has one or two (or more) **disk drives** into which **diskettes** may be inserted for file storage. To use WordStar, you should know how to load diskettes into your particular drives. Before beginning extensive entry of documents, you should have a supply of blank diskettes. Also, remember that you cannot change diskettes indiscriminately while using WordStar — the appropriate times for changing the diskette in a drive will be described in Section 3.11.

3.03 The Rest of The Computer

The remainder of the computer need not be understood to make effective use of WordStar. We will occasionally refer to parts of the computer such as "RAM memory" for the better understanding of those familiar with such terms; if such words are all Greek to you, don't worry about it.

3.04 The Operating System

WordStar operates under an **Operating System** such as CP/M or a compatible equivalent. The operating system is used by WordStar to maintain files (we will describe files in the next section) of data on diskette, and by the user for a number of utility functions. After turning your computer on, you must start ("boot") your operating system before you can invoke WordStar. Refer to your computer or operating system instruction manuals for "booting" directions.

When you turn on your computer and boot CP/M (or your compatible variant), the system's "Console Command Processor" (probably referred to as the CCP in your system manuals) is invoked. It prompts with "A>" and waits for you to enter a command.

WordStar can then be invoked, by typing "WS" and a carriage return, as detailed later (Section 5.1).

There are also a number of CP/M commands ("console commands") which can be given at this point. Functions performed by CP/M commands needed in conjunction with WordStar use include:

1. Determining the amount of space left on a diskette (STAT command in most systems).
2. Determining the size of a particular file (STAT filename).
3. Making a copy of a file on another diskette (PIP command in most systems). Use this to make backup copies of documents, as well as in initializing diskettes (Section 3.10).

3.05 Files

Understanding the nature of a file is important to understanding the operation of WordStar. Since we will refer to files frequently, we will discuss them and related concepts before proceeding.

What is a file? A file is a collection of characters stored, in order, under a name, on a diskette. CP/M commands are used to get a list of files on a diskette, to determine the size of a file, and to change the names of and erase files. In setting up diskettes, you will need to move "files" containing "programs" from diskette to diskette.

Text files: files containing text are used to store documents, such as letters, books, grocery lists, or whatever, on diskette. When you enter a document into the computer with WordStar, you are using WordStar to create a file containing the text of the document. When you make corrections in a document, you are creating an altered file.

Documents and Files: generally, we will use the words "file" and "document" interchangeably to refer to the textual material being entered or altered with WordStar. Occasionally, of course, what you think of as a "document" may not correspond to a "file". For example, a book (a large document!) might have each chapter stored as a separate file, or a commonly used paragraph (less than a document) might be stored on a separate file for later retrieval for inclusion in future documents.

Structure of a Text File: The characters are stored in a file containing text in exactly the order you would type them on a typewriter. Every place you would hit the space bar, a "space" character is stored in the file. At the end of each line, where you would return the carriage, there is a "carriage return" character stored in the file.

Please note: there really is a "character" for "carriage return" that is stored between lines in the file. You can take advantage of this knowledge when editing a document. For example, if you want to join two lines together, you delete the "carriage return" at the end of the first line. If you command the cursor to back up from the beginning of a line, the cursor goes to the end of the preceding line.

(Technically, there are two characters, called "carriage return" and "line feed", between lines of a text file. Since WordStar automatically manipulates the line feed along with the carriage return, the user need not be aware of the second character except in a few specific contexts which will be mentioned later.)

The importance of saving: a file is the only non-ephemeral storage in the computer. Text entered into WordStar (or changes made in previously entered text) is permanently filed only when the operator gives one of WordStar's several SAVE commands. For example, if you enter text then turn off your computer without saving, the text will be gone when you turn the computer on again. **SAVE YOUR DOCUMENT!**

3.06 File Naming

A file is identified by a "name"; this name is typed whenever the file is referred to, (eg. to determine its size, edit it, or print it). A name is chosen for a file when it is created. The name may be changed with a CP/M command (see your operating system documentation).

As described in detail in your operating system documentation, a file name contains up to three parts: the primary part is a **name** consisting of one to eight letters and/or digits. (Most punctuation characters can also be used). Lower case letters may be typed in, but they are taken as equivalent to upper case letters. This name can optionally be followed by a period and one to three more characters called the **"type"** or **"extension"**. Commonly, type DOC is used for documents to distinguish them from other files, but blank (omitted) file types also work. Examples of valid file names as described so far:

ABC.XYZ
X

LETTER.DOC
GROCERY.LST

CHAPTER1.DOC
XX5-8-79.DOC

The third part of a file name is optional. It is a **drive letter**, and it is entered **FIRST** and separated from the rest of the name with a **COLON**. This letter, A or B (or C or D if you have more drives) specifies the drive (A or B) containing the diskette for the file. Examples:

A:ABC.D

B:FOO

B:ABRACADA.BRA

When no letter is included in the file name, the file name is assumed to be on the current logged drive.

A file name as we have just described it may be referred to as an **"unambiguous file name"** or **"ufn"** in your system documentation.

Choosing file names: File names may be chosen any way you wish, provided the same name and type are not already in use for another file on the same diskette, except that you should not use type BAK. We suggest choosing something that helps you remember the file contents.

3.07 The Logged Disk Drive

The **"Logged Drive"** (or current logged drive or current drive) is the disk drive used for any file for which no drive letter is entered when the file name is entered. The logged drive is drive A when the operating system (CP/M) is started. The logged drive may be changed with a CP/M command (by typing drive letter followed by a colon to the console command processor), or with WordStar commands (described later). For example, if you are going to be working with files on a diskette in drive B, you might find it convenient to change the logged drive to B to eliminate the need to type B: before each file name.

WordStar displays the file directory (i.e. the names of all files on the diskette) of the logged drive. Thus, to view the file directory of drive B, you must change the logged drive to drive B.

3.08 Diskette Capacity and File Sizes

A diskette has a fixed capacity in characters (bytes). This is the total for all files on the diskette, including non-text files such as the WordStar program or PIP or STAT as well as your documents. The exact number of characters varies with the diskette type and system; an ordinary 8 inch single density IBM compatible diskette will hold a total of 241K (about 241,000) characters on most systems.

The total number of files is also limited (sometimes to 64), but unless you use very short files, the total number of characters is the limiting factor.

If a diskette gets full, it may be impossible to save a document that has just been entered or corrected. It is not permissible to change diskettes after entry or correction of a file has begun, so check your disk space (STAT command in most systems) before commencing entry or correction. If the diskette you are using doesn't have lots of extra space on it, start another. WATCH YOUR DISKETTE SPACE!

Commonly, a printed page of text will contain two or three thousand characters; the exact size of course depends on the line length, number of lines, and number of blank lines. A system console command is available (STAT filename in most systems) to display the current size of a given file.

While you are learning WordStar, you will probably work with files of moderate size - several pages only. With such files, it is prudent to keep empty space on the diskette equal to twice the size of your largest document. When the space gets less than this, start a new diskette; if you are going to be adding to existing files, move some of them to the new diskette.

For large files, of course, it may not be practical to keep this much space as the file may be bigger than a third the capacity of a diskette. We recommend that, when practical, large documents be divided into several files of moderate size. For example, each chapter of a book might be a separate file. We will discuss large file considerations further in Section 9.2.

3.09 File Backup

Prudent data processing practice includes keeping additional copies of all data. This permits recovery if a file is destroyed by any unforeseen circumstances such as computer breakdown, power failure, accidentally deleting the wrong file, spilling a cup of coffee on the diskette, etc.

In microcomputer word processing, the best method of backup is to make a copy of the file ON A DIFFERENT DISKETTE, then remove this diskette and store it safely. Any time you have invested considerable effort in correcting or updating a file, exit from WordStar and make another backup. Be sure to label your backup diskettes carefully - next time you go to use the document, you will want to be sure you can identify the latest version!.

Files are copied in most systems with a command called "PIP"; refer to your system documentation. Some systems have a command with a name such as DISKCOPY that makes and verifies a copy of an entire diskette; if this is available, it is the best method due to the verification, but it uses more diskettes due to the full copy. (A diskette that is used only for backup files copied as individual files needn't contain extra space, as a working diskette must.)

Orderly and regular backup procedures take little effort and will save much grief should a file loss or diskette loss ever occur. **BACK UP YOUR FILES!**

3.10 Diskette Initialization

Initializing diskettes requires greater understanding of the operating system commands than other aspects of WordStar use. In some installations, a single individual may learn this process, and make a supply of initialized diskettes for a number of typists to use, who then will only need to understand the operation of WordStar proper. Be sure, however, to keep extra initialized diskettes at hand and make sure all operators know how to monitor the empty space on their diskettes.

WordStar Installation: if you don't already have a copy of WordStar installed to work with your terminal and printer, refer to Section 14 before attempting to initialize a diskette or use WordStar.

WordStar Files: The WordStar program consists of two files:

WS.COM (or other name chosen at installation time, Section 14):

The WordStar program loaded when WordStar is invoked. In order to invoke WordStar, you must have this file on the diskette in whichever drive you invoke it from (normally A).

WSMSG.S.COM: The WordStar messages and menus text file. This file should always be on-line when WordStar is in use. WSMGS.COM may be on the diskette in drive A, or in the diskette in the logged drive (if other than A) — WordStar will find it either place.

Initially, we suggest you put WS.COM and WSMGS.COM on all diskettes used with WordStar. However, as your documents get larger, you may not want these files on all diskettes because of the space they occupy. WS.COM needn't ever be on the same diskette as your documents — you may invoke WordStar, then remove the diskette containing WS.COM and replace it with another containing your document files. A diskette used for documents need not contain WSMGS.COM, provided you have a diskette containing WSMGS.COM in drive A whenever the diskette without WSMGS.COM is in use (if the logged drive is not drive A, the diskette containing WSMGS.COM may be in either the logged drive or drive A).

Setting Up a WordStar System Diskette: You will normally want to put the following on each WordStar working diskette:

1. The "system image": the portion of the operating system read into RAM whenever the system boots or warm-restarts (this includes when WordStar exits to the system). This is not a file, but is on a reserved area of the diskette; it is copied from diskette to diskette with a special, system-dependent program sometimes called SYSGEN.
2. The files required by WordStar:
 - a. WS.COM, the WS program (as produced by the "Installation" procedure, Section 14).
 - b. WSMGS.COM, the WordStar message text file. This file should always be on the diskette in the logged drive, or on the diskette in drive A (or both — extra copies do no harm).
3. The files for any "transient" CP/M commands you wish. We recommend PIP.COM and STAT.COM for all diskettes.

Files (items 2 and 3) are moved, in most systems, with PIP; refer to your operating system documentation.

Files-only Diskettes: a diskette in drive B can be used for document file storage only. It need have none of the above items on it (provided WSMGS.COM is on the diskette in drive A), making its entire capacity available for document storage.

A modification of the files-only diskette is to put only the system image and WSMGS.COM on it. This diskette may then be inserted in drive A (following the diskette changing cautions in the next Section!) after invoking WordStar from a different diskette; most of its capacity will be available for documents.

Note: For WordStar to operate, there must always be a diskette in drive A, and also in the logged drive if other than A.

3.11 When Diskettes May Be Changed

The Simple and Safe rule: change diskettes only when the system is ready to accept a command (A> or B> prompt), and after changing diskettes TYPE A CONTROL-C (^C). Don't forget the ^C! Changing diskettes at the wrong time, such as when WordStar is editing or printing a file, or forgetting the control-C results in errors under some versions, and DESTROYS EXISTING FILES under other versions. Under certain systems, ^C is unnecessary, but it does no harm.

The WordStar exception: when WordStar is running, diskettes MAY be changed if WordStar is NEITHER EDITING A FILE NOR PRINTING. The no-file menu (described later) must be on the screen, and the print function must be inactive. ^C is not used in this case.

Used with caution, this exception is a convenience: it makes it unnecessary to re-invoke WordStar to edit a file on a different diskette, and eliminates the need to have WS.COM take up diskette space when working with large files.

There is no general provision for changing diskettes in the midst of an edit. Make sure you have plenty of working space on your diskette before invoking WordStar.

CAUTION:

DO NOT CHANGE DISKETTES WHILE EDITING OR PRINTING!

3.12 File Changes when a Document is Edited

When initiating editing with WordStar, the operator enters a file name (with a command described in Section 5.2). This may be the name of an existing file to be altered, or the name of a new file into which text is to be entered — the processes of altering an existing document and entering a new document are the same in WordStar, except of course the new document starts out empty.

When an existing document is edited, the changes are entered temporarily into an ephemeral Working Document; no change is made in the permanent diskette storage until one of WordStar's SAVE commands (described later) is given. Upon saving, the original file's type is changed to BAK, and the contents of the Working Document are filed under the original file name.

For example: if you edit a previously entered file named LETTER.DOC, after saving the new version will be on the original file name. (LETTER.DOC) and the version of the document that existed before the edit will now be called LETTER.BAK.

When a new document is entered the text goes into the Working Document as it is entered, and is permanently recorded on diskette only when a SAVE command is given. After saving the first time, the entered text will be on the specified file name. There will be no BAK file since there was no prior version.

To review, the Working Document is the version of the document containing changes and additions made during editing. The original file is not altered until you give a SAVE command (and even then the original version is kept, with type BAK). If the edit is interrupted for any reason — operator command, power failure, etc — the Working Document is lost and the file is unchanged (non-existent for a new file).

The most important point about the Working Document is its transitory nature: Working Document text is not permanently recorded on diskette until you SAVE it. **SAVE YOUR DOCUMENT!** For convenience, WordStar contains a "save and re-edit" command which does a complete save, then initiates editing of the file just saved. Use of this command periodically during long edit sessions is highly recommended.

Alternately, if you make changes in a document then decide before saving that you want the original kept, you may use WordStar's ABANDON command as described later. This command discards the Working Document, leaving the original file unchanged.

One prior version of each document is kept on a file with the same name, but type BAK. Thus, if you discover after saving that you made drastic errors while editing file LETTER.DOC, you may recover the prior version by using operating system commands to copy or rename LETTER.BAK to LETTER.DOC, or by using WordStar's "read additional file" command (described later).

Note that only ONE prior version is kept. If you want to keep a version indefinitely, make a copy on another file name - say LETTER.OLD or LETTER.001. If the "save and re-edit" command is used during an edit, the BAK file upon completion will be the version at the last "save and reedit".

We have made three important points in the above paragraphs:

1. The files aren't changed at all until a SAVE command is given, and any work not saved will be lost.
2. When an existing file is edited, after saving the new version is filed under the original primary name and type.
3. When an existing file is edited, after saving the original version is filed under the original primary name and type BAK.

We will now describe the implementation of the Working Document and the file changes which occur when a file is edited in a more precise and technical manner, and point out implications for large documents. (New and non-technical readers may skip the rest of this section).

During an edit, the Working Document is stored in RAM and, for large documents, on temporary disk files that are created and erased automatically. Initially, the beginning of the original (input) document is read from disk into RAM memory for display and possible modification. As you proceed through the document, additional text is automatically read as required. If and when the capacity of your RAM is reached, some of the text from the BEGINNING of what is in RAM is automatically written to a temporary output file.

Upon saving, the rest of the text is copied to this temporary file. Then, any existing BAK file is deleted, the input file is renamed to type BAK, and the temporary file is renamed to the file name being edited, thus becoming the output file.

If you move the cursor backwards through the file over more characters than are contained in RAM (the number of characters RAM will hold depends on how much RAM you have), text is read back from this temporary output file, and, if necessary, text from the END of that in RAM is written to another temporary file. This backing up operation is logically transparent, but it is slow and uses extra diskette space for the additional working file.

Thus, large files can be edited most rapidly and with minimum diskette space requirements by working forward through the file, from the beginning to the end. When it is desired to move from near the end to near the beginning, use a "save and reedit" command (^KS) as described later. Saving is a relatively quick operation because, if the cursor is near the end of the document when the save command is given, much of the text is already in the temporary file which is renamed to become the output file.

We will begin to describe the actual use of WordStar after the next section, which introduces a number of document formatting concepts and terms which are referred to frequently in following portions of this manual.

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SECTION 4. INTRODUCTION TO DOCUMENT FORMATTING

This section introduces the concepts and terminology relating to WordStar's on-screen and print time formatting as background for the following sections on WordStar operation. Descriptions of the specific editing commands and print directives are deferred to Sections 8 and 10 respectively.

4.1 Line Forming and Related Concepts

Here we will introduce WordStar's on-screen line formating features, word wrap and paragraph reform, and define a number of terms used throughout this manual.

Margins: WordStar uses left and right margins that determine where on the page the text appears and how long the lines are. Like a typewriter, the left margin and right margin are set to the desired columns; the difference between them determines the line length. By default, the left margin is column 1 and the right margin is column 65; commands for changing the margins will be described later.

Line Spacing: WordStar allows you to set single, double, triple, or greater line spacing; the default is single.

Justified vs Ragged Right: "Justified" text has additional spaces inserted between the words to make the right end of each line in a paragraph come out exactly at the right margin; "ragged right" text does not have these spaces. The bulk of this manual is an example of "justified" text; this particular paragraph is ragged right to provide an example of the difference. WordStar's justification is on by default, but may be turned off to produce ragged right text. Some users prefer ragged right, e.g. for correspondence which they wish to appear hand-typed.

Note: justified text is always displayed on the screen with whole spaces inserted to achieve justification; this leads to uneven word spacing. However, if you have a daisy wheel printer capable of incremental spacing and WordStar is properly installed for it, the printed copy will be "microspace justified" with the white space added evenly throughout the line.

Margins, line spacing, and justification are all applied automatically by WordStar to text as it is entered, or upon command to previously entered text. We will refer to this process as forming the text; and will describe the process in more detail.

Forming a line: Given a collection of words, a "line" in the document is formed as follows:

1. Establish left margin: insert the necessary number of spaces to move from column 1 to left margin column.
2. Place as many words as fit on the line. If all the words fit, then this is a partial line. Stop here. Otherwise, save the excess words for later lines and do steps 3 and 4.
3. If justification is on, add spaces between words to align right margin.
4. Add a carriage return to the end of the line - or two for double spacing, three for triple spacing, and so on.

Word Wrap: When word wrap is on (as it is by default), lines are automatically formed as text is entered by the operator. The operator types words, without using the return key within a paragraph. On the first keystroke, indentation to the left margin occurs; whenever text is typed beyond the right margin, a line is "formed" as described, and the partly-typed word that did not fit on the line is moved down to the next screen line and over to the left margin. This all happens automatically; the operator just keeps typing, and the lines form on the screen as they will print.

The need for reform: a document is a changing entity. After entry, one usually makes revisions and corrections. During entry, one can pause in typing, read the screen, and immediately start rewriting. Or, one might want to change the margins or line spacing of text already entered, or change text from justified to ragged right or vice versa. Thus, WordStar must be able to "reform" text already entered.

Reforming: text is reformed by applying the line forming procedure described above repeatedly until all words to the end of the paragraph have been formed into lines. First, of course, all the spaces and carriage returns added by previous forming are removed.

This brings us to a very important point. WordStar must know where the paragraph ends. When reforming, the words in a paragraph are regrouped, frequently changing the line break points. However, the reforming process must not continue across the end of paragraph - the next paragraph must begin on a new line, even if the last line of the preceding paragraph was not full of words. The same situation occurs with tables, columnar lists, etc: the user wants the text in these divided into lines as originally entered; WordStar should never remove the carriage returns between the lines of a table or list. Similarly, user-entered blank lines should not be removed from the document.

Thus, there is the need to record in the file permanent, user-entered line breaks that WordStar will not alter when reforming, as distinct from the line breaks between lines in a paragraph, which are supplied by WordStar and which may be moved or removed as necessary during the reforming of the paragraph. This distinction is handled via "hard" and "soft" carriage returns.

"Hard" carriage return: a carriage return used at a point in the file where the user wants a line break, as at the end of a paragraph or between lines of a table. All hard carriage returns are explicitly entered by the user, usually with the RETURN key. Hard carriage returns are never moved or removed by WordStar's reforming process. The presence of a "hard" carriage return at the end of a document line is indicated on the screen by a "<" in the rightmost column of the screen.

"Soft" carriage return: a carriage return supplied by WordStar in the process of forming lines, either under word wrap during text entry or during paragraph reform upon user command. Soft carriage returns will be moved or removed freely by WordStar upon later reformation of the text; thus, they should be present only between lines of a paragraph or at other points where the user does not want a fixed line break. The presence of a "soft" carriage return at the end of a line is indicated on the screen by a blank rightmost column.

To review, all carriage returns supplied by WordStar in the process of automatically forming lines are "soft" carriage returns and may be moved or removed by WordStar if the text is later reformed; all carriage returns entered by the user are "hard" carriage returns (indicated by < in the rightmost screen column) and will not be moved or removed except by explicit editing command.

When entering text under word wrap, do not use the RETURN key between lines of a paragraph, but do USE THE RETURN KEY WHEREVER YOU WANT A FIXED LINE BREAK: (eg. the end of a paragraph, between lines of a table, after headings and titles, etc.). To make a blank line (as between block paragraphs) press the RETURN key a second time.

WordStar makes a similar distinction between the spaces entered by the user and those it supplies in the process of indenting to the left margin and justifying lines:

"Hard" space: a space entered into the file by the user, by pressing the space bar. Hard spaces are never deleted by WordStar.

"Soft" space: a space supplied by WordStar in the process of forming lines: the spaces to the left of the left margin, and the spaces added between words to achieve justification (when justification is on). All existing soft spaces are deleted before a line is reformed, as an insertion or margin change may reduce the number of spaces needed.

WordStar never forgets spaces typed by the user. Spaces that fall at the end of a line are not visible, but they will reappear if later reforming makes them fall in mid line. User-entered spaces at the beginning of a paragraph (after a hard carriage return) are forced to the right of the left margin, like any other character.

When entering text under word wrap, wherever you want a space; TYPE A SPACE. For example, indented paragraphs can be formed by pressing the space bar five (or whatever number you want) times at the beginning of each, just after pressing the RETURN key to end the previous paragraph. This will cause the first line of the paragraph to be indented five spaces from the left margin, i.e. five columns more than the rest of the paragraph.

If you like two spaces after periods, type that way, and WordStar will never print the sentences closer than that. The spaces may fall at the end of the line when initially entered, but they will be remembered. (The sentences may also print farther apart, due to justification.)

Reforming recapped: text that has been entered with the RETURN key used only at paragraph ends, blank lines, and other fixed line breaks can be partially or wholly reformed at will to change the margins, line spacing, or to change between justified and ragged right format. There is nothing done by word wrap as text is entered that cannot be redone as often as desired by the paragraph reform command. Thus, one can initially concentrate on entering the text of a document without regard to format; subsequently, one can manipulate the margins, spacing, and justification to achieve the desired appearance.

4.2 Print Formatting

The previous section described line forming, which is done as text is entered and altered and is recorded in the file and visible on the screen. This section introduces the additional formatting operations done as text is being printed by the print function, under the control of optional print directives entered in the file.

Pagination: the print function divides the text into pages, and can add headings and page numbers. Page breaks (both conditional and unconditional) can be specified by the user where desired; otherwise the print function starts a new page whenever a page is full.

Since the appropriate places for page breaks can change as text is added, deleted, or moved; the page breaks are not recorded in the file. However, the places where they will fall are displayed on the screen by the Dynamic Page Break Display feature, described in Section 4.5.

Subscripts, Superscripts, Boldface, Underline, and other print enhancements: these features are invoked by special characters entered into the file surrounding the affected text. During editing, these characters display as control characters; during printout, the print function responds appropriately to produce the desired effect. These features may thus be used freely in mid-paragraph — they fall through word wrap and paragraph reform with no special user consideration; there is no need to manually align the underline with the text to be underlined, or to align the subscript with the space it prints in.

Other Printer Features: Changes in line height, character width, and ribbon color, insofar as supported by your particular printer, can also be performed by the print function in response to directives imbedded in the file.

Print Directives: user control of print formatting is accomplished via Print Directives imbedded in the file. WordStar has two types of print directives, Print Control Characters and Dot Commands.

The **Print Control Characters** are single-control-character directives for functions such as begin/end underline or change ribbon color; print control characters can be used freely in mid-word, mid-line and mid-paragraph.

The **Dot Commands** are special lines entered into the file for functions such as setting the paper length, or specifying a page heading, or causing a new page to be begun. All dot commands have defaults suitable for normal use.

4.3 Print Control Characters

The print control characters are single-control-character commands entered into the file to specify functions including begin/end underline, begin/end strikeout or change ribbon color.

For example, a control-S character in the file turns underlining on if off, or off if on. To print:

The word underline is underlined.

One would enter into the file, and see on the screen, the following:

The word ^SunderlineS is underlined.

(Where ^S represents a control-S character - not a caret and an S!)

As we will describe in more detail later, print control characters are entered into the file by typing a special prefix, ^P, then the desired character. If typed without the prefix, control characters perform editing command functions.

As another example, a control-H character in the file causes the character after the control-H to print in the same position as the character before the control-H. This facility is useful for printing accent marks over letters, as used in a number of European languages. To print:

s ance

One would enter into the file, and see on the screen, the following:

se^H`ance

All of the print control characters are described in Section 10.1.

Print control characters can be used freely in mid-line and in mid-paragraph; they are treated as other file characters and fall through word wrap and paragraph reform with no special operator consideration. When a paragraph is reformed, the underlines, etc. move with the words; a phrase can be underlined with two ^S's, one at the beginning and one at the end. It doesn't matter if the end is on a different line than the beginning.

4.4 Dot Commands

The dot commands are special lines entered into the file for purposes such as positioning the text on the paper, setting the page number, or starting a new page. Dot commands do not in themselves print, but control the printing. The dot commands have defaults suitable for normal use; you can begin using WordStar without using dot commands at all.

The general form of a dot command begins with a period (hence the name), in column 1 (i.e. immediately after a carriage return), followed immediately by a 2-letter code in upper or lower case identifying the function, optionally followed by a number, text, or other argument depending on the particular command. A number, if used, may be separated from the code by nothing, 1 space, or several spaces. any additional text on the same line (up to and including the next carriage return) is assumed to be a comment and is not printed. Examples:

- | | |
|----------------|---|
| .MT 5 | (indicates that a 5-line margin is to be used at top of each page) |
| .HE Section II | (indicates that "Section II" is to be printed at top of each page until another .HE command is given) |
| .CP 12 | (starts a new page if less than 15 lines remain on current page) |

Full descriptions of all the individual dot commands will be deferred until Section 10.2, as it is not important to learn to use them before getting accustomed to using WordStar with its default page format. The general characteristics of dot commands are being introduced here because they will be referred to frequently in subsequent sections. Dot commands are normally used in conjunction with documents rather than programs. Since dot commands invoke print functions, they do not appear in the printout unless print formatting is suppressed.

Dot commands are entered into the file like any other text, using the edit function as will be described in the following sections. Dot command lines are not counted as lines in the page for page break determination, since they do not print unless print formatting is suppressed.

The print function has no error messages for dot commands. Unrecognized dot command lines have no effect, and are not printed: they are assumed to be comments. However, unrecognized or incomplete dot commands are brought to your attention during editing with a "?" in the rightmost column of the screen line.

Caution must be exercised to avoid document lines intended for printout that begin with a period in column 1, as they will be taken as dot commands and not printed. For example, be sure that a space or other character appears before any ellipsis you use.

4.5 Dynamic Page Break Display

Dynamic Page Break Display is the ability to continually determine and display, while the document is being changed, where the page breaks will fall at printout. The pagination information is displayed in two ways: the page and line on the page of the cursor position are displayed on the top line of the screen, and a line of _____ 's terminated with a "P" displays across the screen at each page boundary.

A page break is displayed wherever a full page would occur on printout, and wherever a page break is caused by a "page" (.PA) or "conditional page" (.CP) dot command (the individual dot commands will be described in Section 10.2).

Dynamic Page Break Display responds to those dot commands which influence the number of lines printed on a page: .LH (line height), .PL (paper length), .MT (top margin), and .MB (bottom margin). However, response is limited to these commands at the very beginning of the file only, as documents are handled with a constant number of lines on a page. (The print function will handle arbitrary changes in vertical page format; the dynamic paging limitation relates only to display of page breaks while editing.)

If one of those dot commands appears in the file in a position where Dynamic Page Break Display cannot handle it, a warning message (Section 12) appears next to it on the screen and the command is ignored for page break display purposes.

Dynamic page break display can be turned off (Section 8.06) and is always disabled in the non-document edit mode (Section 9.5).

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SECTION 5. WordStar INVOCATION AND NO-FILE COMMANDS

This section describes starting WordStar, the commands available when the edit function is not in use, and the "help levels", thus completing coverage of everything needed before starting to enter documents with the edit function, which is the subject of the next section.

5.1 Starting WordStar

In order to invoke WordStar, you must:

1. Have a diskette containing a copy of WordStar "Installed" to work with your terminal and printer. The installed WordStar consists of two files, WS.COM (or other name chosen during installation), and WSMGS.COM, as described in Section 3.10. If you or another person have not yet installed WordStar to work on your system, see Section 14.
2. Know how to turn on your computer and "boot" (cold-start) your CP/M or CP/M compatible operating system. These procedures depend on the computer and the version of CP/M, so you must refer to the appropriate manuals for information.

WordStar is invoked with an operating system (CP/M) command; the operating system must be ready to accept a console command before WS can be invoked. The operating system indicates this readiness with the prompt "A>" (or B> if you have changed the logged drive to B); the prompt is given after "booting" at system turn-on, after exiting from WordStar, and after completion of an operating system command. The first step in starting WS after system turnon is to boot your operating system.

Invoking WordStar: once the system prompt "A>" has been obtained, there are three methods of invoking WordStar:

1. **Basic Method:** at the prompt "A>" type:

WS@

where @ indicates pressing the RETURN key. This starts WordStar with no file being edited; a copyright message appears for several seconds, then the no-file menu (as described in the next subsection) is displayed. Example (underlined text typed by computer):

A>WS@

This basic method is sufficient for initial use; you may defer reading about methods 2 and 3.

2. **To go directly to editing a document:** type WS, a space, and the name of the file, including disk drive and type as appropriate. WordStar will proceed to editing this file, as though the "edit a document" command had been given from the no-file menu as described below. Examples (underlined text typed by computer, @ indicates carriage return entered by user):

A>WS LETTER.DOC@

A>WS B:ABC.XYX@

3. **To go directly to editing a document file with the new file on a different disk drive.** This method is for revising extremely long files, where the new file must be placed on a different diskette because of diskette space limitations. Type WS, a space, the name of the file to be edited, another space, and the DRIVE NAME and colon only of the disk drive to receive the edited version of the document. Don't type anything after the destination drive name and colon. Example:

A>WS A:BOOK.DOC B:

The above example says to edit file BOOK.DOC on the diskette in drive A and place the new version on file BOOK.DOC on drive B. When the save is completed, the file on drive A will have been renamed to BOOK.BAK. If a "save and continue edit" command is given, the continuing edit will edit BOOK.DOC from drive B onto drive A; each successive "save and continue edit" will alternate drives.

Note: If, when you invoke WordStar, you get the following message:

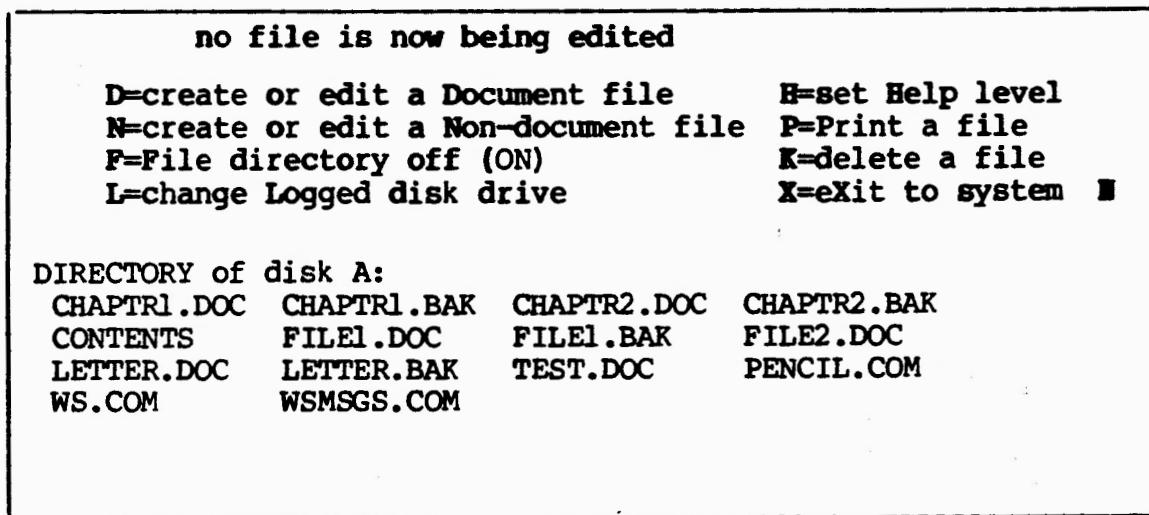
You are trying to run an unINSTALLED WordStar.
Please run INSTALL first.

then your WordStar has not yet been installed to work with your terminal and printer. Refer to Section 14 for information on installation.

5.2 No-File Commands

When started without a file name, or whenever editing of a file is terminated, WordStar displays the "no-file menu": the words "no file is now being edited" are displayed at the top of the screen, and a "menu" of commands that may be entered is shown. Below the menu, WordStar displays the directory (the names of all files on the diskette) of the logged drive. Figure 5-1 shows a typical screen display with the no-file menu:

Figure 5-1: Screen Showing No-file Menu
(The symbol █ represents the cursor position)



To invoke one of the functions shown on the no-file menu, enter the single letter shown for that function. The letter may be entered in upper or lower case, or with the CTRL key depressed. Unrecognized characters are ignored. No RETURN or other key is used after the command letter. When a command is entered, the letter is displayed in the upper left hand corner of the screen and further action is taken depending on the command.

The following table briefly describes each command; the illustrative examples after the table give further explanation.

Table 5-2: No-File Commands

command letter	function	description
D	EDIT A DOCUMENT	Asks for file name, then initiates editing of the specified file. The file specified may be an existing file or a new file. <u>To place the new version of the file on a different drive:</u> enter the file name, a space, and the destination drive name followed by a colon.
N	EDIT A NON-DOCUMENT	Same as D except file is edited as a "nondocument", without dynamic pagination and with different defaults. normal WordStar word processing; see Section 9.5).
X	EXIT TO SYSTEM	Exit to CP/M or whatever operating system you are using. Use when you are through with WS and wish to use a system command. The system prompt "A>" will appear next.
H	SET HELP LEVEL	Asks for the new "help level" (0 to 3) which determines the degree of menu display and other prompting supplied by WordStar as will be detailed shortly. Unless the help level is already 0, an explanation of the help levels is displayed.
K	DELETE A FILE	Asks for file name, then erases file. Performs the same function as the CP/M ERASE console command.
L	CHANGE LOGGED DISK DRIVE	Displays the name of the current logged disk drive (Section 3.07) and allows selection of a new logged disk drive. Use to allow display of directory of a different drive, or for convenience before working with files on a different drive.
F	FILE DIRECTORY DISPLAY OFF/ON	Controls display of file directory (names of all files on diskette in logged disk drive). First F command turns directory display off, second F turns directory display on again, etc. To display directory of a different drive, change logged disk with L command.
P	PRINT A FILE	The P command has three possible effects depending on whether printing is inactive, a file is being printed, or printing is suspended. The P line in the menu changes as appropriate. Detailed descriptions of the three functions of the P command are given in Section 11, "The Print Function".
P	STOP PRINT	
P	CONTINUE PRINT	

Illustrative Examples of No-File Commands

Example 1. D Command: With the no-file menu on the screen as shown above in figure 5-1, type a "D" (or a d or ^D) to invoke editing of a file. WordStar then displays an explanation and a request to enter the file name as follows:

Figure 5-3: D Command Display

(The symbol █ represents the cursor position)

```
D      no file is now being edited

Use this command to create a new document file,
or to initiate alteration of an existing document file.

A file name is 1 to 8 letters/digits, a period,
and an optional 1-3 character type.
File name may be preceded by disk drive letter A-D
and colon, otherwise current logged disk is used.

^S=delete character   ^Y=delete entry   ^P=File directory
^D=restore character  ^R=Restore entry  ^U=cancel

NAME OF FILE TO EDIT? █

partial DIRECTORY of disk A: ^Z=scroll up
CHAPTR1.DOC  CHAPTR1.BAK  CHAPTR2.DOC  CHAPTR2.BAK
CONTENTS     FILE1.DOC    FILE1.BAK    FILE2.DOC
```

You may then type the desired file name, terminated with a carriage return. File names were explained in Section 3.06; the form of a file name is summarized on the screen as a reminder. For example, you might type

LETTER.DOC@

to edit file LETTER.DOC on the logged drive, or

B:LETTER.DOC@

to edit the file LETTER.DOC on the diskette in drive B.

To edit file BOOK.DOC on drive A and place the new version of BOOK.DOC on drive B, type:

A:BOOK.DOC B:@

After the carriage return, WordStar proceeds to editing the file, as we will describe in Section 6; you may then proceed to enter text into the document and/or use WordStar's editing commands. If the file does not exist, NEW FILE is displayed for several seconds. If the NEW FILE message appears when you intended to edit an existing file, you probably typed the name wrong or have the wrong diskette in the drive. Abandon the edit (^KQ) to get back to the no-file menu.

In figure 5-3 above (and also in the screen display of many other WordStar commands), the two lines

`^S=delete character ^Y=delete entry ^F=File directory
^D=restore character ^R=Restore entry ^U=cancel`

remind you of the control characters which may be used to correct typing errors and for other purposes while entering the file name (or other answer). These characters may be used at any time while typing the answer before RETURN is hit. The two display lines appear only at "help levels" (next section) 2 and 3, and do not appear until about two seconds have elapsed without a keystroke (this delay is so WordStar will respond faster to fast typists).

To correct a typing error, use control-S (or control-H, DELETE, or BACKSPACE) to delete (erase) characters one at a time. After retying the desired characters, the control-D key may be used to restore (un-erase) following characters one at a time. For convenience, control-Y erases the entire answer entered, and control-R restores the entire answer or previous answer. For example, if control-R is the first key hit, the name of the last file edited, if any, will appear; it may then be revised (control-S's, retype characters, control-R) if you wish to edit another file with a similar name.

Control-F may be used to invoke file directory display; it does nothing if the file directory is already on the screen. Control-U may be used to cancel (or abort or interrupt) the D command and return to the no-file menu. Section 9.1 details these and additional special characters which may be entered while answering questions asked by WordStar.

Note: If the "help level" (next Section) is zero, the explanatory material shown in figure 5-3 is omitted from the screen display; only the question "NAME OF FILE TO EDIT" will appear. If you start typing the file name before display of the explanatory material, WordStar will omit some or all of the explanation.

Partial Directory Display: notice that in the above example (figure 5-3) the screen shows only part of the disk directory, as indicated by the word "partial". Partial directory display occurs whenever there are more file names than will fit on your screen. To view additional file names, use control-Z to move (scroll) the file directory display up a line, and/or control-W to move the file directory display down a line. Reminders about these control characters -- "`^Z=scroll up`" and/or "`^W=scroll down`" -- appear in the line above the directory whenever these characters can be entered and will bring more file names onto the screen.

Example 2. K Command: With the No-file menu (figure 5-1) on the screen, type a K (mnemonic: Kill) to initiate deletion of a file. The screen display then changes to the following (at help level 3):

Figure 5-4: K Command Display

(The symbol █ represents the cursor position)

```
K      no file is now being edited
^S=delete character  ^Y=delete entry  ^F=File directory
^D=restore character  ^R=Restore entry  ^U=cancel

NAME OF FILE TO DELETE? █

DIRECTORY of disk A:
CHAPTR1.DOC  CHAPTR1.BAK  CHAPTR2.DOC  CHAPTR2.BAK
CONTENTS      FILE1.DOC    FILE1.BAK    FILE2.DOC
LETTER.DOC    LETTER.BAK   TEST.DOC     PENCIL.COM
WS.COM        WSMGS.COM
```

Enter the name of the file to delete, followed by RETURN. The form of a file name and usage of control characters to correct typing errors, etc. is the same as for the D command (previous example).

After the file is erased, the no-file menu reappears on the screen and another command may be entered. If you enter a K, then decide not to delete a file, you may cancel the command with ^U, or by hitting RETURN only.

Example 3. X Command: The X command is used to exit to the operating system (CP/M). When an X is typed at the no-file menu, the CP/M prompt (A>) appears at the bottom of the screen; you may then proceed to use CP/M commands.

Example 4. F Command: The F command turns file directory display on and off. The first F entered removes the directory display, the next F restores it, etc. No additional information need be entered, and no screen changes take place except that when directory display is off, the no-file menu item for F changes to read

F=File directory on (OFF)

To display the directory of the diskette in a different disk drive, change the logged drive with the L command (next example). To cause the directory on the screen to be updated after putting a new diskette in a drive, re-log the same drive with the L command.

Example 5. L Command: The L command allows changing the logged disk drive. (The "logged disk drive" was explained in Section 3.07). Typing an L at the no-file menu changes the screen display to the following:

Figure 5-5: L Command Display

L no file is now being edited

The LOGGED DISK (or Current Disk or Default Disk) is the disk drive used for files except those files for which you enter a disk drive name as part of the file name. WordStar displays the File Directory of the Logged Disk.

THE LOGGED DISK DRIVE IS NOW A:

NEW LOGGED DISK DRIVE (letter, colon, RETURN)? ■

DIRECTORY of disk A:

CHAPTR1.DOC	CHAPTR1.BAK	CHAPTR2.DOC	CHAPTR2.BAK
CONTENTS	FILE1.DOC	FILE1.BAK	FILE2.DOC
LETTER.DOC	LETTER.BAK	TEST.DOC	PENCIL.COM
WS.COM	WSMSGGS.COM		

To log a different drive, type the letter (A or B; C, D, etc. also acceptable if you have that many drives), a colon, and RETURN. To leave the logged drive unchanged, type control-U, or just hit RETURN.

5.3 Help Levels

The Help Level setting controls the amount of explanatory material automatically displayed by WordStar, and determines whether and when part of the screen is used while editing to display a "menu" of command keys which may be entered.

The help level is initially set to 3, the most helpful level. As you gain experience with WordStar, you will want to reduce it in order to have more of the screen used for file display.

The help level is changed with the H command on the no-file menu (above), or with the ^JH command (Section 8.11) while editing a file. Either command displays an explanation of help levels and current help level, and requests a new help level, as shown in figure 5-6:

Figure 5-6: Help Level Command Display

```

H      no file is now being edited

HELP LEVELS
 3 all menus and explanations displayed
 2 main editing menu (1-control-char commands) suppressed
 1 prefix menus (2-character commands) also suppressed
 0 command explanations (including this) also suppressed

CURRENT HELP LEVEL IS 3

ENTER Space OR NEW HELP LEVEL (0, 1, 2, OR 3): ■

partial DIRECTORY of disk A: ^Z=scroll up
CHAPTR1.DOC  CHAPTR1.BAK  CHAPTR2.DOC  CHAPTR2.BAK
CONTENTS      FILE1.DOC    FILE1.BAK    FILE2.DOC
LETTER.DOC    LETTER.BAK   TEST.DOC    PENCIL.COM

```

Unlike the "FILE NAME?" questions asked by the D and K commands, this question takes a single-key response; no RETURN is needed. Any key other than 0, 1, 2, or 3 leaves the help level unchanged.

Note: if you enter the digit (or hit any key) before the explanation displays, some or all of the explanation will be omitted. This provides rapid response for the user that knows what he wants and types, for example, "H2".

The differences between help levels 3, 2, and 1 are manifest primarily when editing a file; we will describe these differences in Section 6. Level 0 differs from the higher levels in that extra explanations associated with several commands are skipped. The explanations omitted at help level 0 include, for example, the explanation of the help levels (figure 5-6), the explanations displayed by the D command (figure 5-4), and the explanation of the logged disk drive for the L command (figure 5-5).

The two lines which remind you of the control characters which may be used while answering any question whose prompt ends in a question mark,

[^] S=delete character	[^] Y=delete entry	[^] F=File directory
[^] D=restore character	[^] R=Restore entry	[^] U=cancel

are displayed above such questions only at help level 2 or 3; the control characters nevertheless work at all help levels.

In addition to the automatically displayed information affected by the help level, WordStar has explicit commands that can be invoked while editing which display information on various subjects. For example, the command [^]JD (entered while editing as described later) invokes a sequence of screen displays describing the print directives.

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SECTION 6. GETTING STARTED WITH THE EDIT FUNCTION

This section introduces all aspects of document editing, producing an overview which will facilitate reading the following narrowly focused sections on specific topics. Sufficient commands and general background are given in this Section to allow basic entry and alteration of text.

We recommend that you turn on your computer, start Word Star, enter a D and a filename command to initiate editing of a file, then try each command as we describe them here. A little experience will go a long way in familiarizing you with WordStar's power.

When document editing is initiated, for example with the D command from the no-file menu (section 5.2), WordStar first displays the message **NEW FILE** for several seconds if the file did not already exist on the diskette; if this message does not appear, then the file already existed.

WordStar then enters its file-editing state. For a new file and help level 3, the screen appears as follows:

The top line is the STATUS LINE. A:TEST.DOC is the name of the file being edited; the page, line, and column are those of the cursor position, and will change as you enter text or move the cursor.

The **MAIN MENU** occupies the next several screen lines, assuming you have not changed the help level to a value other than 3. The menu provides a brief functional reminder of the various command keys. We will describe some of the functions in this section, and provide complete coverage in section 8. In the menu, as in this manual, the ^ symbol means to hold down the CTRL key while typing the following letter.

The line below the menu is the RULER line:

The L indicates the current left margin setting; R indicates the right margin, and !'s indicate where tab stops are set.

The menu and ruler line are "highlighted" on terminals with bright/dim or inverse video (black on white) capability to distinguish them from the document being edited.

The portion of the screen below the ruler line is the **FILE DISPLAY AREA**, where text from the document being edited is displayed. The file area is initially blank for a new file, or shows the first several lines of an old file.

To enter text, just type. Any non-control character typed is entered into the text of your document. If the cursor is over existing text, the new character(s) will replace the old. Errors may be corrected by backspacing and overtyping. Backspacing may be accomplished with the "cursor left character" command shown on the menu, ^S, or with the backspace key or ^H.

If you type beyond the right margin, notice that WordStar takes the word that wouldn't fit inside the margin and moves it to the next line, and positions the cursor after it. This is WORD WRAP. You will also notice that WordStar adds spaces between words to make the right margin line up. This is JUSTIFICATION.

When entering text within a paragraph, don't use the RETURN key - let word wrap do the work. Section 8.06 will describe commands to set the margins, disable justification, specify double spacing, etc., to allow you to control the appearance of text entered under word wrap.

To make a correction or addition at a place other than where the cursor already is, move the cursor there first. The cursor up, down, left, and right commands shown on the menu may be used for this purpose; you will find cursor left word and cursor right word faster than cursor left/right character when you wish to move more than a few characters. ^H and the BACKSPACE key, if your terminal has one, also work for moving the cursor left.

To make an insertion, type ^V. INSERT ON will appear in the status line. Characters typed will then be inserted at the cursor position, moving any following characters already on the line to the right. If you press the RETURN key when insert is on, a carriage return will be inserted, pushing down the following lines and any text right of the cursor on the same line.

If you want to go back to overtyping, type another ^V. The INSERT ON phrase will disappear. Many experienced users prefer to turn insert on at the beginning of an edit and leave it on for all normal editing.

Making blank lines: If you want to insert a new paragraph, you will find it convenient to first make one or more blank lines after the cursor with ^N. Then type the desired text. When you use the RETURN key for line endings, insert should be on, so that each RETURN pushes down the following portion of the document; if you are letting word wrap form your lines, the following text will push down whether or not insert is on.

To delete characters without replacing them with others, use ^G or the **DELETE** key (**RUBOUT** on some keyboards). Additional commands for deleting larger units of text can be found on the menus or in section 8.04.

After you have made changes in a paragraph, you may notice that the right margin is no longer lined up. Some lines may be too short, others may be too long; there may be one line in the document which is so long it is displayed on two screen lines (indicated by a + in the rightmost column).

To realign the right margin of a paragraph entered under word wrap, use the "reform to end paragraph" (^B) command: place the cursor in or above the first "messy" line and type ^B. WordStar will "reform" all the lines to the next place where you hit the **RETURN** key (indicated by a < in the rightmost screen column).

Reforming a long paragraph takes several seconds, during which "**^B**" appears in the upper left corner of the screen. The reformed text is displayed only after the reforming operation is complete.

As you fill up the screen with text, the screen will start to scroll (roll) upward each time the cursor goes to a new line. If you type fast, the screen may not keep up, but when you pause, the display will be updated to reflect all keys hit.

Occasionally the word **WAIT** may appear in the status line, usually accompanied by an audible click from your disk drive. When this happens, it is advisable to stop typing, or type slowly only, until **WAIT** disappears.

When you have entered more text than will print on a (default size) page, a line of dashes appears across the screen, with a P in the rightmost column, to show you where the page break will fall at printout:

P

This is **DYNAMIC PAGE BREAK DISPLAY**. In section 10 we will discuss the use of "dot commands" to specify places where you want a new page to begin even though the current page isn't full, and to specify formatting items such as the number of lines printed on a page.

To look at text which is currently not on the screen, use the "scroll up line", "scroll down line", "scroll up screenful", and "scroll down screenful" commands shown on the menu to bring the desired text into view. Also, cursor down with the cursor already at the bottom of the screen scrolls the screen up a line, and cursor up at the top scrolls it down.

Depending on the type of terminal you have, commands such as "scroll down line" may immediately move the screen down, or may redisplay all the text on the screen, taking a second or two. It is not necessary to wait for the previous command to complete to enter the next one. If you know you want to move the file display down five lines on the screen, type five ^Z's rapidly. Each one will interrupt the redisplay started by the previous one; when the screen stops changing, text on the screen will have moved down five lines, with five lines gone off the bottom and five previously not visible lines displayed at the top.

You will notice that the behavior of the editing commands reflects the way characters are stored in the file. For example, if you keep moving the cursor "right", after getting to the end of the line it will move to the left end of

the next line down on the screen. This is because the file contains the characters of a line, in left-to-right order, then a "carriage return" character, then the characters of the next line; the carriage return is between the rightmost character of one line and the leftmost character of the next line.

If you move the cursor as far right as it will go without moving to the next line, then give a "delete character right" (^G) command, the carriage return will be deleted, joining the next screen line onto the end of this one. In general, carriage returns can be edited like other characters.

Prefixes: WordStar has far more commands than there are control keys. Hence, many commands are 2-character sequences. The first character is referred to as the **PREFIX** key. All two-character commands begin with ^Q, ^J, ^K, ^O or ^P; these five prefix keys are listed at the bottom of the main menu for ready reference.

Prefix Menus: If you type a prefix key then wait about a second, a new menu will appear, showing all the commands that begin with that prefix. The delay is so that if you know the command you want, you may type the two keys rapidly, in which case the menu display won't change.

If you type a prefix then don't want any of the commands on its menu, type a space, or some other key not defined on the menu. The main menu will reappear. You can look at a menu by typing the prefix, reading as desired and then pressing the space bar to "cancel" the prefix. You can search for a command by calling up all of the menus in succession in this manner.

The second character of the 2-key command may be typed with or without the CTRL key, with the same effect; letters may also be typed in upper or lower case.

For example, the ^Q key brings up the ^Q Prefix Menu (the exact appearance of the menus on your screen may be slightly different, because of revisions and because the menus display differently for 64-column wide screens than for 80 column or wider screens):

You can see additional cursor motion commands, such as top of screen and end of file, commands for deleting the left and right portions of a line, commands for finding and substituting, and additional commands that are probably not self-explanatory. All of these will be detailed in section 8; you do not need to know all of them to begin using WordStar.

The **^K Prefix Menu** includes some very important commands, those for saving and for printing:

^K PREFIX					
(to cancel prefix, hit SPACE bar)					
END EDIT/SAVE:	D=Done edit	X=done, exit	S=Save, reedit	Q=abandon	
MARK BLOCK:	B=mark start	K=mark end	H=Hide/display		
BLOCK OPERATIONS:	V=mOVe block	C=Copy block	Y=delete block	W=Write	
ADDITIONAL FILES:	R=Read file	W=Write block	J=delete file		
DISK & DIRECTORY:	L=change logged disk		F=File directory on (OFF)		
PRINTING:	P=Print a file				
PLACE MARKERS:	0-9 = set/hide place marker	0-9			

(The status line, ruler line, and file display are omitted from the above diagram.)

Saving: As we said in section 3.11, text entered and altered during editing is in a transitory "working document" only. You must issue a "save" command if you want your document available for later use. The basic "save" command is **^KD**, which saves the working document under the file name chosen when the edit was initiated, then returns to the no-file menu as described in section 5.2.

Also on the **^K** menu is the print command, **^KP**, which is used when editing is in process to initiate, stop, and continue printing. (When editing is not in process, the **P** command on the no-file menu performs exactly the same functions.) Since only saved documents (as opposed to the working document you are in the midst of editing) can be printed, you will normally print a different file than the one being edited.

Printing a document: The print function will be described in detail in section 11; basic printing can be accomplished as follows: First, if you have just entered the material you wish to print, save it (**^KD**). Make sure your printer is ready (turned on, loaded with paper, etc.) and that the paper is positioned as desired. Then type a **P** command (at the no-file menu; type **^KP** if you are editing). WordStar will ask:

NAME OF FILE TO PRINT? ■

Type the name of the file, and press RETURN. Several more questions will be asked. Press a carriage return for all of them. Printing will commence and the no-file menu (or the file being edited) will come back onto the screen. Other commands may be given while printing is in progress.

You can edit one document while another document is printing. However, keyboard response is slower, so we suggest editing while printing mainly for reviewing text on the screen and making occasional slowly-typed corrections.

The **^O Prefix Menu** contains commands that allow you to invoke double spacing, change margins and tab stops, disable word wrap, and perform other functions related to on-screen document formatting:

^O PREFIX: on-screen formatting commands

S=set line Spacing	C=Center cursor line	F=Margins/tabs from File line
L=set Left margin	X=Margin release	P=Page break display off (ON)
R=set Right margin	W=Word wrap off (ON)	D=Dot command display off (ON)
I=set tab stop	J=Justification on (OFF)	T=ruler display off (ON)
M=clear tab stop	V=Variable tabs off (ON)	SPACE=cancel prefix

In addition, the **^O** menu shows, in parentheses after the pertinent command, whether word wrap, justification, and other features are currently ON or OFF. In the above example, justification is OFF and all others are ON.

The **^P Prefix** is used for entering print control characters (described in sections 4.3 and 10.1):

^P PREFIX: Put Control Character in File

V=subscript begin/end	T=superscript begin/end	Y=ribbon color change
S=underScore begin/end	B=Boldface begin/end	D=Double strike begin/end
A=Alternate pitch	N=standard pitch	X=strikeout begin/end
O=non-break space	F=phantom space	G=ph. rubout (see manual)
C=pause when printing	H=overprint next character	RETURN=overprint next line
Q, W, E, R = user printer controls		SPACE=cancel prefix

To complete the menu presentations, the **^J Prefix Menu** shows commands for controlling help levels and displaying reference information and learning aids:

^J PREFIX: help commands

H = display and set Help level	M = Margins and tabs
F = Flags in right screen column	S = Status line
I = command Index; entering text	R = Ruler line
B = paragraph reform (^B command)	V = moVing text
D = Dot commands, print controls	P = Place markers
	SPACE=cancel prefix

^JH displays, explains, and sets the help level, in the same manner as the H command on the no-file menu, section 5.3 and figure 5-4. The rest of the commands display explanations. For example, **^JV** explains how to move a block of text, **^JI** helps find commands for various functions, and **^JD** summarizes the print directives. Some of these help commands display several screen of information; WordStar awaits a keystroke between screens.

Help Levels: As you gain experience using WordStar, you will learn the commands, and you will want to see more of your document on the screen instead of the menus. If you change the help level (discussed in section 5.3) from 3 to 2 with the ^JH command, the main menu will not display. The prefix menus will appear whenever you type a prefix key if you pause before hitting another key. If you change the help level to 1, the prefix menus will also be completely eliminated. Further changing it to 0 eliminates explanations displayed by various individual commands, such as the no-file D command (figure 5-3) or the help level command (figure 5-4).

All of the WordStar editing commands will be described in detail and tabulated for reference in Section 8, "Editing Commands". The next section, Section 7, is devoted to a detailed description of the screen display. Commands will be mentioned in passing as pertinent, but all will be repeated in Section 8.

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SECTION 7. THE SCREEN DISPLAY

The screen display during editing consists of the status line, the menu, the file directory (if enabled), the ruler line, and the file display area. The file display area shows text from the file being edited plus "flag" characters in the rightmost column. The file display is updated only when WordStar has completed all commands which have been entered.

7.1 The Status Line

While editing, the status line on the top line of the screen usually shows:

The command being entered or executed, if any
The name of the file being edited
PAGE number
LINE number
COLUMN number
INSERT ON (if insertion is on)
plus other phrases as applicable

The file name will disappear if necessary in order to allow all of the additional status line information to fit on the screen line.

The command in progress, if any, is shown in the upper left corner as the characters typed to invoke the function. If only the first (prefix) key of a two-key command has been entered, this character will display. If you type several commands ahead, they will display in sequence as executed. Exception: fast single-key commands, such as "cursor down line", do not display.

The next three status line items are normally:

PAGE LINE COL

These are the print page number, print line number on the page, and print column number of the character at the cursor. They are continuously updated as the cursor is moved.

The **PAGE** is the printout page number, assuming that the document is printed with page numbers running up from 1. If different printout page numbers are specified (by "dot commands" described later), these numbers will not be reflected in the status line.

The LINE is the printout line; and does not count dot command lines (which control printout) nor continuation screen lines of document lines that are longer than the screen is wide.

The PAGE and LINE will not correspond exactly to the printout in certain cases of dot command use (eg. if the paper length (.PL dot command) is changed in mid-document). See Section 4.5, "Dynamic Page Break Display".

The COLUMN is the PRINTOUT column, not the screen column. The printout column differs from the screen column when the line contains a non-printing character such as print control character (e.g. ^S to invoke underlining), or when a file line that is longer than screen width is displayed on two or more screen lines, or when a marker (described later in Section 8.08) is shown in the display line.

If the edit was initiated with the "edit a non-document" command (N described later in Section 9.5), or when page break display is suppressed (^OP command, Section 8.06), then the page and line are replaced with:

FC=nnnnn FL=nnnn

FL=nnnn gives the file line number, or the number of file lines (including dot command lines) between the cursor and the beginning of the file, plus 1.

FC=nnnnn gives the file character number, or the number of characters between the cursor and the beginning of the file, plus 1. This counts all characters (bytes) stored in the file, including carriage returns, line feeds, etc.

Thus, when this type of status line is displayed, you can determine the size of the file in characters by moving the cursor to the end of file (^QC) and reading the FC=nnnn item.

The remaining items in the status line are phrases which display under the conditions indicated:

WAIT shows when WordStar is reading or writing to floppy disk. When this appears, stop typing, or type very slowly; otherwise characters you type may be missed.

MAR REL shows when margins are released (^OX command).

INSERT ON shows when insertion is on, that is, when typed characters are INSERTED in the file rather than OVERTYPING characters in the file. Insertion is turned on and off by typing ^V.

LINE SPACING n shows except when single-spacing is in effect. The line spacing can be set with the ^OS command, Section 8.06.

PRINT PAUSED shows when printing of a file is suspended —after being stopped by user command, when stopped at a "pause for typewheel change" print control character (Section 10.1), or when a page has been completed under the PAUSE BETWEEN PAGES option (Section 11).

REPLACE (Y/N): This question is displayed in the status line by the replace command, Section 8.07.

Note: When several of the above phrases appear at once, it is normal for the LINE SPACING item to disappear off the right edge of the screen.

7.2 The Menu

A menu of editing commands may appear below the status line as described and illustrated in Section 6.

The main menu, showing single-control-character (non-prefix) editing commands, displays at the default help level (Section 5.3), level 3. When the help level is 2 or 3 and a prefix key (as shown on the main menu) is pressed, after a short pause, the command menu for that prefix is displayed. The menus, as well as the status line and ruler line, are displayed highlighted (in inverse video or dim display, when available) for differentiation from file text. When no menu is on display, more of the screen is available for file text display.

Miscellaneous messages: a number of explanatory and warning messages display above or below the menu under certain conditions. For example:

TYPE ^KP TO CONTINUE PRINT

(explanation; appears during print pause)

***** WARNING: WORD TOO LONG TO FIT MARGINS**

(warning; occurs when an overlong line with no spaces or other possible word wrap points is entered or reformed)

Most such messages are cleared at the next keystroke. Messages and the conditions which cause them are described in Section 12.

7.3 The File Directory

Normally, the file directory is not displayed during editing. However, the ^KF command, may be used to invoke directory display during editing if desired. (Also, a temporary file directory display may be invoked by typing control-F while entering a file name). When enabled during editing, the directory appears between the menu and the ruler.

Usually while a file is being edited, WordStar will only display a partial directory to leave more screen space for file display. The ^Z and ^W commands on the main editing menu will scroll the directory up and down in order to allow viewing of all file names. (When the directory is not displayed, or when there are no more directory lines to scroll onto the screen, these commands scroll the file display.)

The file directory is normally displayed in alphabetical order, with .BAK files after the corresponding non-.BAK file, and with non-text files such as .COM and .INT files at the end. Temporary files (.\$\$\$) are also shown at the end of the directory. However, if the directory is unusually long (more than about 64 filenames of average length), it is normal for it to display unsorted. Long directories also display and scroll more slowly than those of moderate size.

The file directory (and occasionally also the ruler) will disappear temporarily when the menu, or questions evoked by various commands, and/or other messages use too many screen lines. Users with 16-line screens will observe this disappearance most often. The directory will reappear as soon as screen space permits.

7.4 The Ruler Line

Below the menu and file directory (when present), the highlighted ruler line

shows the current left margin (L), right margin (R), and variable tab stops (!). The ruler line responds to each change in margin and tab stop columns. Non-tab columns between the margins display as a dash - . If the L or R setting occurs at a tab column, the ! will be shown.

Tab stops set outside the margins are active, (and show as !'s), only when the margins are released (^OX command, Section 8.06) or word wrap is off (^OW, Section 8.06). If the right margin is set wider than the screen, then a two (or more) line ruler displays. The ruler display can be eliminated and restored with the ^OT command, Section 8.06. If ruler display is turned off while file directory display is turned on, WordStar uses a highlighted line of ='s to separate the directory display from the file display.

7.5 The File Display Area

The remainder of the screen is used to display lines of text from the document being edited. The portion of the document displayed always includes the cursor position in the file, so that the screen cursor and the file cursor can correspond.

All columns of the screen except the rightmost one are used for text display. For example, on an 80-column screen, at most 79 columns of text will appear on a line. The rightmost column of the screen is blank or displays a "flag" character to indicate a special type of line or a "hard" carriage return, as explained in the following paragraphs.

Each line in the file display area shows what will usually print on one line of the document; exceptions include the following:

Continuation lines: If a line in the document is too long to display on one screen line (79 columns for an 80-column screen), it is continued on the next screen line. When this occurs, the first line is "flagged" with a + in the rightmost column. If the line is very long, it may display on three, four, or more screen lines; all but the last will have a + flag.

When the cursor is in one of the continuation lines on the screen, the COLUMN number shown in the status line reflects the printout column; that is, the first continuation line (on an 80 column screen) usually contains columns 80 through 158.

Overprint lines: For special effects, it is possible to have two or more lines in the file which print out, one after another, on the same line, so that two different characters can be printed in the same position to form a special graphic. On the screen, a - in the rightmost column (i.e. the "flag" column) indicates that the FOLLOWING screen line will print over the line with the -. The carriage return without line feed that ends the line to be overprinted is entered by typing ^P and RETURN as described in Section 8.06.

Page break lines: the dynamic page break display feature shows a line of '-'s, with a P in the rightmost column, at places where a page break will fall during printout:

-P

This line is ADDED for display purposes; there is no such line in the document. (If the page break is caused by a "form feed" (^L) character in the file, then the form feed (and the characters preceding it, if any) are shown on the screen line, with '-'s to their right.) The display of page break lines can be turned off, and back on, with the ^OP command.

End of file lines: When the document ends before the bottom of the screen, the remainder of the screen is filled out with blank lines with periods in the rightmost (flag) column. For a new file, the screen is initially filled with such lines.

Beginning of file lines: If the file display is moved down on the screen until the beginning of the file is below the top of the display area, the portion of the screen above the beginning of the file is filled with blank lines with colons in the rightmost column.

ORDINARY LINES in the file display area show lines of text from the file that are not longer than the screen line and are not overprinted by the next line. Such lines can end in a "hard" or a "soft" carriage return, as described in Section 4.1; the hard carriage return is indicated with a < flag, and the soft carriage return with a blank flag.

The following example shows the screen's appearance after entering two paragraphs and a list, illustrating the display of hard and soft carriage returns. No menu is shown, as though the help level is set to 2 or less. The symbol █ represents the cursor.

A:FILE1.DOC PAGE 1 LINE 13 COL 1

This is a paragraph of text entered without using the RETURN key; word wrap formed the lines. The line breaks will be moved if the user invokes reformation. Note that the flag character column is blank, except on the last line, where a < indicates that RETURN key was used to end the paragraph.

The following list was entered using the RETURN key between lines, because the line breaks were desired in these positions. Note the <'s in the rightmost column:

bread
hamburger
orange juice
yogurt

The following example shows the screen's appearance after entry of some text used for illustrative purposes. Note that the status line reflects the fact that the cursor is in column 98 of the first line (at printout) of the document; since this line is longer than the screen width, a continuation line is used on the screen. Beginning of file lines, one page break line, and end of file lines are also shown.

A:FILE2.DOC PAGE 1 LINE 1 COL 98 INSERT ON
L—!—!—!—!—!—!—!—!—!—!—R :

This is the first line of a short file. It is a very long line intended to be printed on a wide printer. █
This is the 2nd line. It is short enough to fit 1 screen line.
.PA go to a new page here

This is the last line of the file.

File character display: files edited by WordStar may contain all ASCII characters (hexadecimal code values 0 - 7F) except control-Z (1A hex). Most terminals display only the printing characters (codes 20 - 7E hex). WordStar uses combinations of characters to display other codes:

Table 7-5: Display of Non-displayable Characters

character	displays as
Tab (control-I; 09 hex)	enough spaces to move to next multiple of 8 columns. Note: this character is common in non-documents such as program source files, but it is not used for WordStar's variable stop tabs. See Section 9.5.
Other control characters	^ and letter or punctuation character.
Delete (7F hex)	~ (tilde; 7E hex). Occurrence of this character in a file is unlikely.

Control-letters are common in document files as they are used to control print enhancements such as underlining. They display as ^ and a letter, just as they are printed in this manual. Although two characters appear on the screen only one character is in the file and is edited as a single character. For example, a "delete character" command will result in the disappearance of both the ^ and the letter from the screen.

7.6 Flag Characters

Most of the "flag" characters which can appear in the rightmost column of the file display area were introduced in Section 7.5; table 7-6 summarizes all of them for reference.

Table 7-6: Flag Characters

character	meaning
(blank)	line ends in "soft" (mid-paragraph) carriage return, and may be changed by subsequent word wrap or paragraph reform operations.
<	line ends in "hard" carriage return, and will not change in subsequent word wrap or reform operations.
+	next screen line is continuation of this document line.
-	next line will overprint this line.
.	this screen line is after (below) the end of the document. Also appears on last line of document if there is no carriage return after the text.
:	this screen line is before (above or prior to) the beginning of the document.
P	new page begins with following screen line. Appears only when page break display is on (^OP).
?	line contains an unrecognized and possibly erroneous "dot command" (Sections 4.4 and 10). Also appears while a dot command line is being typed in; disregard until entry is complete. Does not appear when editing a "non-document" (Section 9.5).
J	line ends in "line feed" character without "carriage return" character. This is a non-standard file format never created in normal WordStar use.

Note: The flag character is not displayed on the last line of most CRT's. Due to normal hardware limitations, this position is left blank. Scroll the display up a line (^Z) to see the flag column character for the last line.

7.7 Screen Updating

The file display area of the screen is updated at the end of each command, or after each character of text entered, provided no further keys have been struck. Only the changed portions of the screen are redisplayed.

The file display is not updated until the command has been executed completely. For example, the cursor to end of file command (^QC) can take several seconds or longer; during this time, the screen remains unchanged except that ^QC displays in the upper left hand corner, and DISK WAIT appears if necessary.

Screen update is further deferred until all characters typed have been processed, allowing WordStar to process commands and text entry typed at a much higher burst rate than the CRT display can keep up with. For example, if several "scroll up screenful" commands (^C) are typed quickly, the file display area remains unchanged until all of them have been processed. This allows rapid motion through the file.

If a character is typed while WordStar is in the midst of updating the screen, the update will be suspended until that character is processed, momentarily (or longer, if a slow command was entered) leaving the screen in a partially updated state.

Exception: the scroll up line (^Z) and scroll down line (^W) commands always display the new line scrolled onto the screen immediately. This makes rapid upward scrolling with all lines displayed possible by holding down repeatcontrol-Z. (On some keyboards, any key which is held down repeats; on others, there is a separate REPEAT key which should be held for repetitive transmission.) Similarly, repeat-control-W will scroll the text downward continuously on terminals capable of downward scrolling.

Note: all terminals are capable of "scrolling" the text upward, but on those without the "line delete" code, WordStar will scroll instead of redisplay only if there is no menu above the file display area. Thus, users of "dumb" terminals will obtain faster upward scrolling (for example, with the ^Z command) if they suppress the menu by reducing the help level.

SECTION 8: EDITING COMMANDS

This section describes all of the commands that are available while editing a file. The descriptions are organized into categories, to facilitate reference. The categories are organized in the approximate order a new user will need to learn commands - but this is not intended to indicate that all commands in a category should be learned before progressing to the next.

Each subsection includes a concise table of commands and most sections include additional description. In particular, section 8.06 contains extensive description of the use of WordStar's on-screen text formatting features.

The commands that are available when not editing a file (at the no-file menu) are described in section 5.2.

The categories are as follows. Many commands fit multiple categories, and are mentioned in two or three places.

Cursor Motion	section 8.01
Scrolling	section 8.02
Text Entry	section 8.03
Text Deletion	section 8.04
Saving and Abandoning	section 8.05
On-Screen Text Formatting	section 8.06
Find and Replace	section 8.07
Place Markers	section 8.08
Block Commands	section 8.09
Additional Files	section 8.10
Help Commands	section 8.11
Miscellaneous	section 8.12

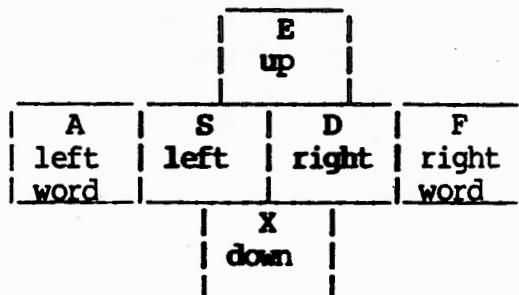
8.01 Cursor Motion

Cursor motion commands are used to place the cursor at the desired point in the text before making a correction or addition. All cursor motion commands move the display of the document up or down on the screen, or display an entirely different screen of text as necessary to bring the cursor destination into view.

As detailed at the end of this section, the cursor will not go to places on the screen that do not represent characters in the file.

The table beginning on the next page describes all of the commands relating to cursor motion. The second character of a 2-key command is shown as an upper case letter, but it may also be entered as a lower case letter or a control character.

Note that the basic cursor motion keys - ^S, ^E, ^D, and ^X, are arranged in a diamond on your keyboard. The position of the keys corresponds to the direction of cursor motion:



The adjacent keys to each side of the diamond, ^A and ^F, move the cursor farther in the same direction - to the next word instead of the next character. Furthermore, prefixing any of the four basic diamond keys with ^Q moves the cursor as far as it will go on the screen in that direction.

New users please note: you do NOT need to learn all 29 ways to move the cursor before proceeding to additional commands.

Table 8-1: Cursor Motion Commands

<u>Command</u>	<u>Function</u>	<u>Description</u>
Z ^S or ^H or BACKSPACE	cursor left character	Moves cursor to previous character in file, going to end of preceding line if at beginning of current line. One common use of this command is to backspace over characters just entered to make a correction.
^D	cursor right character	Moves cursor to next character in file, going to beginning of next line if at end of current line.
^E	cursor up line	Moves cursor up to preceding screen line. Cursor remains as nearly as possible in same printout column; moves left if necessary to avoid landing beyond end of a file line.
^X	cursor down line	Moves cursor down to next screen line. Cursor remains as nearly as possible in same printout column; moves left if necessary to avoid landing beyond end of a file line.
Note that the next four commands are the same keys as the preceding four, prefixed with ^Q:		
^QE	cursor top screen	Moves cursor to top line of file display, remaining as nearly as possible in the same column.
^QX	cursor bottom screen	Moves cursor to bottom line of file display on screen, similarly.
^QS	cursor left edge of screen	Moves cursor to leftmost column of current screen line.
^QD	cursor right end of line	Moves cursor right to position after last document character displayed on current screen line; usually this is NOT the right edge of the screen.
^A	cursor left word	Moves cursor back to beginning of a word. See exact definition of "word" after table.
^F	cursor right word	Moves cursor forward to beginning of next word. This is a fast way to get the cursor to the desired position in a line.

<u>Command</u>	<u>Function</u>	<u>Description</u>
^QR	cursor beginning or file	Moves cursor to beginning of document. For a long document, doing a save (^KS) is faster and uses less diskette temporary file space if the cursor is currently near the end of the document.
^QC	cursor end of file	Moves cursor to position after last character of document.
^Q0 thru ^Q9	cursor to place marker	Moves cursor to position of the indicated one of the ten "place markers". The "place markers" are set by the operator with the commands ^K0 through ^K9 and are further described in section 8.08, "Place Markers".
^QB	cursor to block beginning	Moves cursor to beginning of marked block, and displays the marker if undisplayed. Blocks are described in section 8.09.
^QK	cursor to block end	Moves cursor to end of currently marked block, similarly.
^QP	cursor to position before previous command	Moves cursor to its position before preceding command. Particularly useful after saves, to get back to where you were editing, and after ^B (paragraph reform), to get back to the point where you were making changes.
^QV	cursor to start of last find or source of last block	Moves cursor to its position before last Find or Replace command (section 8.07), or to position of source of last block of text block moved, block copied, or block deleted (section 8.08), whichever has been used most recently. ^QV is used to get back to the starting point after a Find or Replace that resulted in a NOT FOUND error, or to return to a place text was block-moved from.
^QF	find	Asks for text to find, moves cursor to it. Fully described in section 8.07.
^I	tab	Moves cursor over existing text to tab stop, or enters spaces into file, depending. (Described in TAB section 8.03).
RETURN	"harden" carriage return and cursor next line.	IF INSERTION IS OFF, the RETURN key makes the end of the current line a permanent line break (if it isn't one already) and moves the cursor down and to the left to land at the beginning of the next document line. (See RETURN key item in table 8-03).

Definition of a "Word"

For the purposes of the cursor motion by word commands (^A and ^F) and the delete word command (^T), a word is defined to include one punctuation character (. , : ; ! or ?) at the end, if present, and any number of following spaces and tabs. Words may be separated by commas (for example) without spaces, and the cursor will come to rest after each comma. A carriage return is also treated as though it were a word, that is, the cursor will stop at the end of each line as well as at the beginning of each word in each line.

"File" Characters

For ease of reference, the body of text you work on. (Some or all of which may be shown on the screen) is frequently referred to as the "Working document", or, the "file".

Where the Cursor Won't Go and What to Do About It

1. The cursor will only move onto characters present in the file, or to the position immediately after the last character of a file line. This latter position corresponds to being "on" the carriage return between lines. Recall that lines in the file are stored in variable length, with "carriage return" characters separating them. There is usually blank space on the screen to the right of each line for which the file contains no characters. The cursor cannot be moved into this space with the cursor motion commands.

To get the cursor to go beyond the actual characters at the right of the end of a line, the line must be extended. Put the cursor at the end of the line (^QD), then space or tab over to the desired column. If insertion is off, you can tab over without bothering with the ^QD. The tab key (^I) acts like a cursor motion command when the cursor is over existing characters, but extends the line with spaces upon reaching its end.

Usually you will find that the cursor can be moved one or two more columns to the right after the right of the last character visible on a line. This just means that there are one or two "space" characters in the file between the last visible character and the carriage return.

The cursor will not move beyond the position after the last character in the file, nor move to a position before the beginning of the file.

The cursor will not come to rest in "markers" (described later in section 8.08), nor in page break display lines (-----P), as these are display items that do not represent file characters.

2. The cursor will come to rest only on the first display character of a file character displayed with multiple characters (table 7-4, section 7.4). This occurs with respect to print control characters entered into the file to control enhancements such as underline, and with the (non-document) fixed "tab" characters, if you use them (section 9.6).

How the Cursor Moves

"Horizontal" cursor motion follows the characters in the working document, wrapping to beginning (left) of the next line when moved to the right from the end of a line, or to the end (right) of the preceding line when moved to the left from the beginning of a line. For example, successive "cursor right" (^D) commands move the cursor to the right until the end of the line is reached, then the next ^D moves the cursor to the BEGINNING of the next screen line, at the left edge of the screen.

Horizontal cursor motion moves extra positions as necessary in order to avoid landing in a place the cursor won't go, such as on the letter of a control character displayed as ^-letter, or on a display item that does not represent a file character. Such as a marker or a page break line.

Vertical cursor motion keeps the cursor in the same PRINT column, or as near to it as possible. When the destination line is long enough, the cursor will usually move straight up or down, but it may jog left or right according to the "same print column" rule if one of the lines contains one or more print control characters. The print control characters, detailed in section 10.1, display as an ^ and a letter (two columns), but don't print or print in one column only).

If the cursor is moved up (^E) or down (^X) and the destination line is shorter, the cursor will move left as necessary to avoid landing beyond the end of the line. The cursor also moves sidewise, if necessary, to avoid landing in any of the other forbidden places previously described. It will move vertically an additional line if necessary to skip over a page break line.

Attempt to move the cursor off the screen: When a command moves the cursor to a character not displayed on the screen, the screen display is scrolled to bring the cursor destination onto the screen. For example, if the cursor is already on the top display line, a "cursor up" (^E) will move the file display down a line in order to give the cursor a place to go.

Commands that scroll the file display up or down also move the cursor to a different line if necessary to keep it on the screen.

The cursor is also kept out of the bottom line of the screen by scrolling the file display or moving the cursor up when necessary. This makes the next line always visible when text is being altered, reducing the chance of inadvertently typing over it.

Attempt to move cursor out of file: any attempt to move the cursor beyond the end of the file or before the beginning of the file leaves the cursor unmoved. Add lines to the file if you wish to move above the beginning or below the end.

8.02 Scrolling

The scrolling commands change the text displayed on the screen, without necessarily moving the cursor; these commands are commonly used to bring the desired text into view.

The cursor motion commands (previous section) also move the document on the screen, but only when necessary to keep the cursor destination in the display area.

Table 8-2: Scrolling Commands

<u>Command</u>	<u>Function</u>	<u>Description</u>
<code>^Z</code>	scroll up line	Scrolls file display up one line: a line disappears off the top of the screen up and a line is added at bottom. The cursor line is moved down only if already in top line of file display area; otherwise the cursor remains on the same character. However, if the <u>File Directory</u> (see <code>^KF</code> , Section 8.12) is displayed and there are additional lines of file names below the portion of the directory shown on the screen, <code>^Z</code> will scroll the directory up one line and leave the document display unchanged.
<code>^W</code>	scroll down line	Scrolls file display (or directory) down one line.
<code>^C</code>	scroll up "screenful"	Moves display up by a "screenful", showing additional lines toward end of file. Cursor remains in same screen line, as nearly as possible to the same column. Actual motion is about 3/4 the number of displayed lines, so that there is some overlap between successive "screenfuls".
<code>^R</code>	scroll down "screenful"	Moves the display down a "screenful"

Continuous scrolling may be accomplished by with repeat-control-Z or E (hold down the REPEAT key along with CTRL and Z or W if your keyboard does not automatically repeat keys that are continuously depressed), or with the `^QQ` command followed by `^Z` or `^W`. The `^QQ` command causes the NEXT command entered to be repeated continuously, as described in section 8.12.

8.03 Text Entry

Generally, text entry is accomplished simply by typing the text. However, related commands are used to control whether the text inserts or overtypes existing text, to control the forming of text into lines by word wrap, to indicate paragraph endings, or to "tab" to preset tab stops, etc.

The basic commands relating to text entry are given here. Additional commands and extensive discussion of on-screen text formatting for word processing purposes are given in section 8.06, after presentation of deletion and saving commands.

Notes on using tabs, the RETURN key, and the ^N command are given after the following table.

Table 8-3: Basic Commands Relating To Text Entry

Command	Function	Description
^V	insertion on/off	Determines whether characters typed are inserted into current line, or replace characters already in line. Use once to turn insertion on and again to turn it off. When on, INSERT ON shows in status line.
return end paragraph / "hard" carriage return		<p>With insertion on, RETURN inserts a hard carriage return in the file; with insertion off, RETURN makes the carriage return at the end of the line "hard" if it is "soft", then moves the cursor to the beginning of the next file line. If the line spacing is set to 2, two returns are inserted or two lines moved down over, etc.</p> <p>RETURN with insertion on will split a line into two if the cursor is in mid-line, or produce a blank line if the cursor is at the beginning or the end of a line.</p> <p>RETURN with insertion off may be used to change a soft carriage return to hard; for example after deleting the last line or lines of a paragraph.</p> <p>RETURN should not normally be used between the lines of a paragraph; let word wrap form the lines instead.</p>
^N	insert "hard" carriage return	<p>A "hard" carriage return is inserted at the cursor position and the cursor is left BEFORE it, that is, the cursor is not moved; text to the right of or below the cursor moves down.</p> <p>Depending on the cursor position, ^N will create a blank line (cursor at beginning or end of line) or split a line into two lines (cursor in mid-line).</p>

<u>Command</u>	<u>Function</u>	<u>Description</u>
^{^I} tab		Advance to next tab stop. If there are no more tab stops on current line, goes to next line. Only tab stops set within the margins are used unless word wrap is off or margins are released. <u>Insertion off</u> : tab moves cursor over existing text; line is extended with spaces, or file is extended with additional line ("hard" carriage return) as necessary to reach next stop. <u>Insertion on</u> : tab inserts spaces, and possibly a "hard" carriage return, to reach next tab stop. Text after cursor moves ahead. See section 9.6 for tab operation with variable tabbing turned off (^OT command).
^{^O} I	set variable tab stop	detailed in section 8.06.
^{^O} N	clear variable tab	detailed in section 8.06.
^{^O} F	set tabs and margins from "ruler" line in file	see section 8.06.
^{^P} x	enter control character into file	^{^P} followed by a letter (x) enters the corresponding control character into the file; any other character except space is entered exactly as typed. This permits entering control characters that normally have command functions. For example, ^{^P} S or ^{^P} PS will enter a control-S into the document. ^{^P} is used to enter "print control characters" for underlining, boldface, subscripting, etc. into the document. These characters are described in detail in section 10.1 and are summarized in the ^{^P} prefix menu. ^{^P} may also be used to key in any code (1-127 hex) for special (non-document) purposes. The character entered with ^{^P} will insert or overtype, depending on whether insertion is on or off.

Many other commands influence on-screen formatting of document text. Read section 8.06 for full descriptions; refer to the ^{^O} prefix menu for a brief summary.

Comparison of RETURN and ^N

1. ^N makes an INSERTION whether or not insertion is on.
2. ^N leaves the cursor before, not after, the inserted carriage return.
3. ^N always single spaces; RETURN will insert multiple returns (or move multiple lines) if the line spacing (^OS) is set greater than 1.

Generally, RETURN is the more convenient key to use when paragraph ends or blank lines are needed in the course of continuous text entry. ^N is a convenient way to make a blank line or lines into which to type a paragraph to be inserted. Using ^N first makes sure the new line or paragraph ends in a "hard" carriage return even if you forget to type RETURN at the end; only a single ^N is necessary before entering a paragraph of any length under word wrap. Experienced users find ^N extremely useful in correcting already-entered text.

Tabbing Enters Spaces

Note that the tab key (insertion on, or cursor beyond end of line; variable tabbing on) enters regular space characters into the file. These will subsequently edit just as if they had been entered with the space bar.

Hint for Entering Columnar tables

Set a tab stop for each desired column and clear all other tab stops. Then press the tab key after each field. Tabbing after the last item on each line will automatically take you to the first field on the next line. If the table is not at end of file at the time it is being entered, have insertion on (^V), or make a number of blank lines first with repeat ^N. See also "Setting tabs and Margins" in section 8.06.

8.04 Text Deletion

These commands are used to remove text from the document.

Table 8-4: Deletion Commands

<u>Command</u>	<u>Function</u>	<u>Description</u>
^G	delete character right	Deletes character at cursor position. If cursor is at end of document line, deletes carriage return, joining two lines.
delete, rubout, or ^_	delete character left	Deletes character immediately to left of cursor. If cursor is at beginning of document line, deletes carriage return, joining line onto preceding line.
		DELETE, DEL, RUB and RUBOUT are alternate labelings of the same key; the code "^_" (1F hex) is generated by some keyboards if the CTRL key is held while DELETE is pressed. The latter code is accepted to make it unnecessary to release the CTRL key or (on some keyboards) move to the SHIFT key before rubbing out characters.
^T	delete word right	Deletes word containing cursor, and following spaces. If cursor is in mid-word, deletes only portion of word at and to right of cursor. If cursor is between words, deletes only the spaces up to the next word. If cursor is at the end of a line, deletes the carriage return and any following spaces. See "Definition of a Word" in section 8.01.
^Y	delete line	Deletes the entire document line containing cursor. Note that this includes all screen continuation lines of the same file line, and any associated overprint lines. The following lines move up on the screen.
^QY	delete to end of line	Deletes from the cursor position rightward in the document line containing cursor. Does not delete carriage return at end line, nor overprint lines.
^Qdelete, ^Qrubout, or ^Q^_	delete to beginning of line	Deletes leftward to beginning of line similarly.
^KY	delete block	Deletes the currently marked block of text. See "Block Operations", section 8.08.

8.05 Saving and Abandoning

A newly-entered or altered document is not permanently stored until "saved" on diskette. Furthermore, only a disk-saved document can be printed.

Every editing session whose results you want to keep must be ended with one of the "save" commands; a save must be issued during editing if you want to print what you have done so far; saving frequently during long sessions is advisable to guard against power failures, computer breakdown, or catastrophic command errors.

WordStar provides a "save and re-edit" (^KS) command to save your work so far, then continue editing. This eliminates the need to enter a "D" command after saving, and is a convenience for saving periodically during long sessions or saving to permit printing the text entered so far. After this save is used, WordStar displays (unless the help level is 0) a message reminding you that the ^QP command may be used to return the cursor to its position before the save.

REMINDER. Until saved, all changes made are temporary, and will be lost in the case of a power failure, computer crash, full diskette, etc. The ^KS command provides a convenient way to file and continue editing. Save early and save often!

After saving is completed, the original file (the one named in the "D" command or after "WS" in the system console command that invoked WordStar) will contain the updated document, and a file with the same primary name but type BAK will contain the previous version of the document. Note that only ONE .BAK file is kept. Multiple saves, including ^KS's, will lose the original input file. Section 3.11 describes file changes due to a "save."

After saving with the ^KD command, the no-file menu is displayed. You may then edit another file, print a file, or perform other commands. It is thus possible to edit several files in succession without re-invoking WS for each one.

The commands in this section relate to saving (filing) the document being edited under the file name it came from. The ADDITIONAL FILE COMMANDS, described later in section 8.10, permit other file-related operations such as writing part or all of the document on a file with a different name, merging files, and splitting a file into several files.

Table 8-5: Saving and Abandoning Commands

<u>Command</u>	<u>Function</u>	<u>Description</u>
^KD	done editing this file	Saves document and goes to no-file menu.
^KX	done editing	Saves document and exits from WordStar to operating system (CP/M).
^KS	save and	Saves document and initiates re-edit: short for ^KD re-edit followed by another D (or N) command for same file. Cursor is left at beginning of file; to restore cursor to previous position, enter ^QP as the next command. Use ^KS frequently to save your work so far, then continue editing the same document. Also, this command is the fastest way to get the cursor from the end to the beginning of extremely long files.
^KQ	abandon edit	Terminates editing of this file WITHOUT SAVING NEW VERSION. Asks for yes-no confirmation if changes have been made; goes to no-file menu after termination. Use when you do not want the changes saved; also useful when no changes have been made, as after "editing" a file to inspect the document on the screen.

8.06 On-Screen Text Formatting

The commands shown in the following table relate to formatting text on the screen and to controlling the forming of text into lines by word wrap and the reform paragraph (^B) command.

Descriptions of word wrap, ^B, and techniques for entering and editing formatted text follow the table.

Table 8-06: On-Screen Text Formatting and Related Commands

Command	Function	Description
^OC	center line	Document line containing cursor is centered between current margins. Blanks at beginning and end of line are ignored.
^OL	set left	Asks for left margin. Enter a number 1-240 and press RETURN, or press ESCAPE to use cursor column number margin (as shown in COL item in status line).
^OR	set right margin	Asks for right margin; enter column number of rightmost column to use for text, or press ESCAPE key to use cursor column.
z.lh 3		The left and right margins should be set to the desired values whenever text is being entered (unless word wrap is turned off), and whenever the reform paragraph command (^B) is used.
^OF	set margins and tab stops from file line	Sets left margin to position of leftmost non-blank character in line containing tabs cursor, and right margin to rightmost non-blank character. This is a convenient way to reset the margins to match those used in a particular paragraph. ^OF also sets tab stops at any columns containing an !, and clears tab stops at columns containing a -. Thus a "ruler" (template) for tab stops and margins may be entered into the file, as discussed further after this table.
^OS	set line spacing	Asks for a number and sets line spacing. Enter 2 for double spacing, 3 for triple spacing, etc. This spacing is used whenever word wrap wraps a line, by ^B, and when the RETURN key is pressed. Note: if you press the RETURN key and get more blank lines than desired due to the line spacing, it is easy to rub out the excess with the DELETE key.

<u>Command</u>	<u>Function</u>	<u>Description</u>
[~] B	re-form paragraph	<p>"Forms" existing text, in the same manner formed during entry by word wrap, to end of paragraph. Starting point is left margin of line containing cursor, or cursor position if to left of left margin. Ending point is next hard carriage return encountered, or form feed or end of file.</p> <p>The [~]B command may be used to reform text After making insertions or deletions; it may also be used to change margins, line spacing, and to justify or unjustify the text. Set the desired parameters, position the cursor in the first line to be altered, and type [~]B.</p> <p>The cursor is left after the hard carriage return (paragraph end) that terminated the reform operation. Successive [~]B's will reform successive paragraphs. An [~]B given in a blank line (between paragraphs) merely moves the cursor down a line.</p> <p>Additional description of the [~]B command and its usage follows this table.</p>
[~] QP	cursor to position before previous command	One use of this command is immediately after [~] B, to restore the cursor to its starting point. See "Cursor Motion", Section 8.01, for other uses of this command.
[~] OX	margin release / unrelease	Margins are released until cursor has gone outside of margins then returned to between margins. MAR REL appears in status line while in effect. If margin release is already in effect, another [~] OX unreleases. Margin release has the same effect as turning word wrap off except that margin release terminates automatically.
[~] OW	word wrap off / on	Turns word wrap off if currently on; turns word wrap on if currently off. Turning word wrap off also activates any tab stops outside the current margins. Word wrap is described in detail after this table.
[~] OJ	justify off / on	When on, "soft" spaces are inserted in each line formed by word wrap or [~] B to bring the right end of each line out to the exact margin; when off, no "soft" spaces are inserted (and any already present are removed), leaving text "ragged right".
[~] OI or [~] OTAB	set tab stop	Asks for column number at which to set a (variable) tab stop. An ! will appear in the ruler line to show the new tab stop.
[~] ON	clear tab stop(s)	Asks for column at which to clear tab stop; type "A" and RETURN to clear all tab stops.

<u>Command</u>	<u>Function</u>	<u>Description</u>
^{^I} or TAB	tab	Moves cursor or inserts spaces to next tab stop on line; if none, goes to first tab stop on next line. Unless word wrap is off or margins are released, only tab stops between the margins are used. Fully described in preceding Section 8.03 for the variable (normal) mode.
^{^OV}	variable tabbing off / on	When on, WordStar's variable tab stops are in effect, and spaces are entered into file for tabs. When off, the description in Section 9.6 below applies. Should normally be left on for word processing use. Note: when turned off, the ruler line continues to show the variable tab stops.
^{^OT}	ruler off / on	Turns display of the "ruler" line showing margins and tab stops off and on.
^{^OP}	page display off / on	Controls display of page break lines —————P in file display area of screen and PAGE and LINE items in status line. When page break display is off, FC=nnnnn and FL=nnn display in status line as described in Section 7.1. By moving the cursor to the end of file and reading the FC= item file size may be determined.
^{^PO}	enter non-break space	Enter a control-O into the file at points where you want a space to print but you do not want the line wrapped or spaces inserted for justification.
^{^PRETURN} or ^{^PM}	enter overprint line	Enters "carriage return" code without "line feed" code into file, causing the line entered immediately after ^{^P} , RETURN to OVERPRINT the preceding line. A - appears in rightmost column of screen to indicate that next line overprints line with -. Overprint lines may be used to produce special effects, by printing multiple characters in the same column position. See discussion at end section. The ^{^P} command is fully described in section 8.03.
^{^O}	(menu shows status)	The ^{^O} menu shows whether the following feature are currently on or off: word wrap justification variable tabbing ruler display page break display dot command display Section 6 contains an example.

Table 8-6A**Defaults for On-Screen Formatting Parameters**

item	default for normal WordStar document editing	"non-document" (N command; Section 9.5)
left margin	column 1	same
right margin	64-wide screen: col 60 80-wide screen: col 65	same
variable tab stops	every 5th col to col 56	(same)
variable tabbing	ON	OFF
word wrap	ON	OFF
justify	ON	OFF
ruler display	ON	OFF
display page breaks	ON	inoperative
display dot commands	ON	ON

Any changes made in the margins, tab stops, and other items shown in the above table remain in effect as successive files are edited except that word wrap, justify, and variable tabbing, and ruler display are re-defaulted if an N edit follows a D edit or vice versa.

Entering Text With Word Wrap On

Set the margins (^OL and ^OR, or ^OF) if you don't want to use the defaults. Turn justification off (^OJ) if you want ragged right, set the line spacing (^OS) for double or triple spacing if desired.

On the first keystroke, indentation to the left margin (if not at column 1) will occur.

Each time you type beyond the right margin, the partial word that didn't fit on the line is moved down to the left margin on the next line, and the preceding line is justified (unless you selected ragged right). Within a paragraph, type without using the RETURN key, letting WordStar form the text into lines. Avoiding use of the return key in mid-paragraph is important: if you do use the RETURN key, the resulting "hard" carriage return will interfere with later paragraph reforming after corrections.

At the end of a paragraph, press the RETURN key. This will record a "hard" carriage return (fixed line break) in the file, indicated on the screen by a < in the rightmost column. If you want a blank line between paragraphs, press RETURN twice. Two RETURNS are all you need enter between block paragraphs.

Anywhere else you want a fixed line break, as between lines of a list or a table, press the RETURN key.

Any spaces you type are permanently kept in the file; they are termed "hard" spaces. To form indented paragraphs, type the desired number of spaces at the beginning of each. The first time you press the space bar, WordStar will indent to the left margin before entering your space, so that your space is in addition to those supplied by WordStar to get to the margin. The TAB (^I) key may also be used to begin indented paragraphs (with a stop set at the desired column (^OI), of course).

If you like two spaces after all periods, type that way. Your spaces will be kept. When a period falls at the end of a line, your spaces won't show on the screen (they are right of the margin; you can observe their presence via cursor motion commands), but they will come back if later reforming makes the period fall in the middle of a line.

The space added to your text by indentation to the left margin, and those added to the line during justification, are termed "soft" spaces. Soft spaces appear the same on the screen as hard spaces, but they are distinct to WordStar. If the line is later rejustified, or reformed to a new left margin, "soft" spaces will be selectively removed, but all spaces you entered (including with the TAB key) will be kept.

Any time you want to enter something outside the margins, you may release the margin (^OX), move the cursor to the desired position, and enter the desired text.

You don't need to release the margins in order to get the dot of a dot command line in column 1. Word wrap automatically disables whenever you are entering a period in column 1, or whenever the current line already contains a period in that column.

A formed line containing print control characters will appear to extend beyond the right margin on the screen. This is because the print controls use no character positions on the printed page; when printed, the line will be the correct length. (The print control characters, such as control-S to turn underlining on and off, are described in Section 10.1.)

Centering Lines

To center a line of text between the current margins, place the cursor anywhere in the line and type ^OC. This command deletes spaces and tabs at the beginning of the line and enters the appropriate number of hard spaces to center the line. In determining centering, spaces at the beginning and end of the text on the line are ignored.

Hints for Editing Formatted Text

To Correct Text within a Paragraph, first set the margins, line spacing, and justification to match the paragraph to be altered - if they are not already so set. The most convenient way to set the margins is to place the cursor in any full-length line in the paragraph, then type ^OF.

Use the cursor motion commands, deletion commands, overtype new text, and/or turn insertion on (^V) to permit typing in new characters without losing any of the old as appropriate.

After you have the desired words in the paragraph, position the cursor in the first changed line (or the first line that is messy looking), and type the paragraph reform command, ^B. The paragraph will be fixed up to look the same as if it had just been typed in with word wrap on, and the cursor will be left on the first line following the paragraph.

If you insert near the beginning of a line, the end of the line will move right, possibly even overflowing to the next screen line. This is OK. ^B will fix the overlong line. When a line gets long enough to overflow onto the next screen line, a + appears in the rightmost column to indicate that the next screen line is part of the same document line.

Of course, all of the foregoing can be intermixed with text entry as desired. For example, if you notice a misspelled word two lines back, cursor up to it, correct it, and type ^B to make sure that line and the following lines are correctly formed. A backspace (^D) after the ^B will usually replace the cursor at the end of the paragraph, where you were entering text.

Point to watch while altering a paragraph: make sure it ends up with a hard carriage return at the end. Sometimes deleting text at the end of a paragraph will leave it without one (no < in the rightmost column of the screen). To correct this, "harden" the carriage return by placing the cursor at the end of the line (^QD) and, with insertion off (^V), hit RETURN. Alternate methods of inserting hard returns include RETURN with insertion on, and ^N; after one of these in this situation you will probably find there is an excess soft return (evidenced by a blank line on the screen) which you must delete (^G).

To Insert a Paragraph between two existing paragraphs. Position cursor at left margin of the first line of the paragraph you wish to insert above. Type ^N. ^N inserts a "hard" carriage return and leaves the cursor BEFORE it. Thus, the return needed to terminate the paragraph is now in the file and after the cursor; the cursor is on a blank line. Type the body of the paragraph. As word wrap forms lines, the following paragraph is pushed down. Type additional ^N's (or RETURNS with insertion on) if necessary to get the desired number of blank lines between paragraphs.

To Split a Paragraph into Two: Position cursor at desired division point. Type ^N. This splits the line and supplies a hard carriage return to terminate the first paragraph, leaving the cursor in the last line of the first paragraph. Type ^B now, to remove any justification spaces from the last line of the first paragraph (the last line of a paragraph is never justified). Type additional ^N's (or RETURNS with insertion on) if blank line(s) are desired between paragraphs. The second paragraph now begins with a partial line that is probably not indented correctly. Place the cursor at the beginning of this line, correct the number of spaces present (add spaces if you are using indented paragraphs; delete any leftover spaces for block paragraphs), then type ^B to reform the second paragraph.

To Join Two Paragraphs into One: Place the cursor at the end of the last line of the first paragraph. Type ^G's to eliminate all carriage returns between the paragraphs, joining the first line of the next paragraph onto the current line. The cursor will now be in the middle of an overlong line. Establish the correct number of spaces as desired at this point (presumably one, or two after a period. To avoid confusion between soft and hard spaces, the surest procedure is to delete all spaces adjacent to the cursor, then insert the one or two desired. Now type ^B, to fix the overlong line and reform to the end of the paragraph.

Note: we stated earlier that the forming operation removed all "soft" spaces from the text at the start. There is an exception to this: whenever removing a soft space or soft carriage return would result in running two words together with no space or "-" between them, the forming operation inserts a hard space in order to avoid running words together. This simplifies editing by making it unnecessary to type a space after words added to the end of a line.

Changing Margins, Justification, or Line Spacing

Summary: ^B.

^B works just as well for applying new margins etc. to existing text as it does for applying the old margins, etc. to modified text. Of course, it will also apply new margins, etc. to modified text. Just set the desired margins, justification, and line spacing, put the cursor at the beginning of the paragraph, and type ^B. The text will be reformed as specified, even unjustified if previously justified, without the need to reenter a single character.

For example, if you were to change the left margin to column 5, turn justification off, set the line spacing to 2, place the cursor at the beginning of preceding paragraph, and type ^B, you would end up with the following example of ragged right text:

^B works just as well for applying new margins etc. to existing text as it does for applying the old margins, etc. to modified text. Of course, it will also apply new margins, etc. to modified text. Just set the desired margins, justification, and line spacing, put the cursor at the beginning of the paragraph, and type ^B. The text will be reformed as specified, even unjustified if previously justified, without the need to reenter a single character!

Since ^B starts with the line containing the cursor, it may be used to change margins (or justification or line spacing, in mid-paragraph. For example, you might want the text to get narrower in mid-paragraph in order to leave a space for a diagram on one side of the page.

To produce such a space, first form the entire paragraph to the margins you desire for the first portion. Then set the new margins, position the cursor in the first line to have the new margins, and type ^B again. That line and succeeding lines will be reformed while the part above the cursor will remain unchanged. Additional margin changes may be made by applying ^B as many times as desired, each time starting farther down in the paragraph.

Cursor Position before Reform

^{^B}B does not move any text on the first line that is to the left of the cursor position and also to the left of the currently set left margin. This behavior is intended to allow section numbers, etc. to remain left of the margin when the paragraph is reformed, as discussed under the next sub-heading.

When you wish to move a paragraph's left margin to the right, the cursor must be placed to the left of all text on the first line before ^{^B}B is entered, otherwise the text to the left of the cursor will not be moved rightward. That is, if the left margin of the paragraph as displayed on the screen is to the left of the current left margin setting, be sure to place the cursor to the left of all text on the first line (including any hard spaces used for paragraph indentation) before typing ^{^B}B.

When the left margin is now set the same as or to the left of the left margin of the paragraph to reform, the cursor need not be positioned to the left of the text on the first line.

Unless there is a section number or word outside the left margin, placing the cursor at the beginning of the first line to be reformed before typing ^{^B}B always works, and placing the cursor anywhere in the first line works unless the left margin is now set to the right of the left margin of the text as displayed.

Text to the Left of the Left Margin

A little extra attention is required during entry and reforming when there is a word or section number to the left of the left margin.

1. Item to Left of Left Margin in First Line of Paragraph Only: This paragraph was entered by setting the left margin to 5, typing ^{^O}X to release the margin, typing "1. " and then continuing to type the body of the paragraph. After the second space in "1. ", the margin release terminated, since the cursor was no longer outside of the margins; word wrap then formed the lines as usual manner.

Note that word wrap does not alter any text to the left of the left margin.

Alternate methods of entering such section numbers or other "hanging indents" include:

- a. Releasing the margin, typing the number (no following spaces needed), unreleasing the margin (^{^O}X), and proceeding to type the body of the paragraph; and
- b. Typing the body, then releasing the margin and going back and overtyping the section number.

When reforming a paragraph with a section number or word outside the margin, be sure to place the cursor to the right (i. e. between the section number, etc. and the text) before typing ^B. If the cursor is to the left of the number or word, the number will be pushed in to the margin. If the cursor is in the middle of a word outside the margin, part of the word will be pushed in.

If you are moving the left margin leftward, you may find you need to delete some of the spaces after the section number in order to get the first line to move over. This will occur whenever the spaces in question are hard spaces.

2. Items to Left of Two or More Lines: Look at any of the command tables in this "Editing Commands" section, such as table 8-06. You will notice that the rightmost column contains justified descriptions, and that two columns to the left of this column contain smaller amounts of text, but usually on two or more lines for each entry. To enter these tables, the margins were set for the rightmost column, and the other columns were entered with the margins released and insertion off. Information on the second and following lines of the left two columns was entered only after the "description" beside it had been entered using word wrap, and proofread.

Setting Tab Stops and Margins; Using "Rulers" in Your Document

The commands for setting the margins (^OL, ^OR) and for setting (^OI) and clearing (^ON) tab stops all ask for the column number.

For example, ^OL asks:

LEFT MARGIN COLUMN NUMBER (ESCAPE for cursor column)? ■

To set the left margin (in our example) by column number, type the desired column number and RETURN. To use the cursor column (as shown in the status line), just press the ESCAPE key. To not set the margin (i.e. to cancel an unintended command), just press RETURN. ^U, the WordStar "interrupt" character, will also cancel the command.

To set the margins to match an existing line of text, position the cursor anywhere in this line and type ^OF. This is the most convenient method of setting the margins to match an existing (justified) paragraph, before making changes in the paragraph; it may also alter the tab stops if there happen to be any !'s or -'s in the line.

To set and clear individual tab stops, ^OI and ^ON are convenient. To set the desired tab stops and clear all others, as before entering a multi-column table, type a "ruler" line into the file with:

- ! at each column where a tab is to be set
- in all other columns between left and right margin

Leaving the cursor anywhere in this line, type ^OF. The desired tabs and margins will be set, and all other tab stops cleared. To keep the ruler line from appearing in the printed document, delete it (^Y) after use, or turn it into a "comment" dot command (a line beginning with two periods).

For example, to set tabs at columns 10, 20, and 30, set the left margin to 5, the right margin to 50, and clear any other tabs between columns 5 and 50, enter the following into the file, then use ^OF:

-----!-----!-----!

To keep the ruler in usable but non-printing form in the file, so that the tabs can be reset to these values whenever you wish to edit the table (etc.) to which they apply, make the ruler an OVERPRINT line in a comment dot command line: position the cursor at the beginning of the line, turn insertion on, insert two periods, then type ^P and RETURN (^PM also works).

For the above example, such a ruler should appear on the screen as follows. Note the "--" in the rightmost column of the line beginning with "...":

|.. -----!-----!-----!-----|
|-----|-----|-----|-----|

This gets the .. out of the ruler while still suppressing printout of the ruler. To use the ruler, position the cursor in the ruler (not in the .. line), and type ^OF.

Ruler lines are usually unnecessary for non-tabular text, since the ^OF command responds to any non-blank characters and the tab stops usually don't matter.

To recap:

To Enter a Non-printing, Reusable Ruler Line: Position the cursor at the beginning of a line. Type ^N if necessary, to make a blank line ending in a RETURN. Type two periods, ^P, RETURN, space over to the desired left margin, then type '-'s to the desired right margin, except !'s at columns where tab stops are desired. Type ^OF to make the tabs and margins specified by the ruler take effect.

Text Wider Than Screen

WordStar is not limited to the screen width in forming text. Users with wide printers, narrow screens, or who are preparing copy for photo-reduction can format text to widths up to 240 columns.

Lines of text formed to such a wide right margin will display on two or more screen lines, with + in the rightmost column indicating each continuation.

Although the maximum column for the margins and tab stops is 240, there is no length limit for a manually formed line. However, the COL counter in the status line may display ? instead of a valid number beyond column 500 or so.

Hyphens

You will observe that word wrap and ^B will wrap to the next line after the - in a hyphenated word, as well as at the space between words. If you wish to format meticulously, you can take advantage of this fact to hyphenate words between syllables. When you notice that a line contains a large number of justification spaces, and the next line begins with a long word, insert a - at a suitable place in the long word, move the cursor up a line, and type ^B. If it will fit, the portion of the long word up to and including the - will move up. Of course, you must be careful to look for and remove excess -'s between syllables after later reforming operations, as they will print whether or not they fall at a line break.

Overprint Lines

One or more lines which print ON THE SAME line can be used for special effects. For example, the cursor blobs ■ in this manual were made by printing an H, an I, an N, and a Z in the same character position.

When an overprint line follows a dot command, it is considered part of the dot command and is not printed. This fact can be exploited to keep "rulers" for setting tabs and/or margins with the ^OF command in the file in a form that will not print, but may be used with ^OF.

Overprint lines are entered by typing the first line, then typing an ^P before the RETURN at the end of the line, then typing the line that is to print over. To overprint a third line, type ^P RETURN again and type another line. The ^P RETURN sequence enters a carriage return without line feed into the file. Each screen line that will be overprinted by the following screen line will show a - flag in its rightmost column.

8.07 Find and Replace

The following paragraphs introduce Find and Replace and describe them in detail. A tabular reference summary is given at the end of the section.

Introduction

Find (^QF) is a convenient way to move the cursor to a desired place in the file, without inspecting the entire file on the screen. Used in conjunction with the "Find/Replace Again command" (^L), it is also a convenient way to find all occurrences of a given word, phrase, or other string of characters. Use "Find" to find the first occurrence; observe it on the screen, and make changes if desired; then press ^L to advance the cursor to the next occurrence.

Replace (^QA) is a convenient way to replace one word, phrase, or other string of characters with another word, phrase, etc., without explicitly positioning the cursor, deleting the old text, and typing in the new. By specifying the "global" option, you can replace all occurrences in the entire file with a single "Replace" command. Before actually making the substitution, Replace displays the text found and asks whether to replace in this instance. This permits selective replacement. The asking can be suppressed for rapid substitution if desired.

The "Find/Replace Again" command (^L) may also be used to repeat a "Replace" command, allowing other editing commands to be used between replace's without reentering the entire Replace command each time.

Replace has a number of convenient additional uses, such as inserting a commonly used string with a keystroke; several of these are described under the heading "Find and Replace Use Hints" below.

Basic Use of Find

Find is initiated by typing ^QF. WordStar then asks:
FIND? ■

This question appears below the menu, moving the top of the file display area down one line. Respond by entering any sequence of characters you wish to locate, followed by a carriage return. We will refer to your answer to this question as the **find string**. The find string may be a word, a phrase, a partial word, or whatever, up to 30 characters. WordStar then asks:

OPTIONS? (? FOR INFO) ■

For now, just press return and we will discuss this question shortly.

WordStar then searches forward through the file FROM THE CURRENT CURSOR POSITION to the next occurrence of your find string. Upon finding it, the cursor is left after its last character, the screen is redisplayed, and the command is complete. If the find string is not found, the cursor is left at the end of the document and an error message appears:

*** NOT FOUND *** <your find string>

For example, suppose you have just started editing a document (cursor is at beginning of file) and you wish to move the cursor to the first place where the words "Section II" appear. Enter ^QF, then answer the questions thus (computer typing under-lined; @ means hit return key):

FIND? Section II@ OPTIONS? (? FOR INFO) @

Note that the basic Find command looks only for an EXACT MATCH for the characters you enter as the find string: the above example would not find "Section II" (two spaces between words) or "section II" (lower case S).

It will also find the search string even if imbedded in other words: the above example would also find "Section III" if it occurred before "Section II"; an attempt to find "age" would also find the "age" in "page" or "agent" if such a word occurred first. Handling such an unwanted match is simple: just type ^L, and WordStar will repeat the Find, starting from the current cursor position and thus finding the next match.

Options described shortly can modify the exact match rule.

Find ignores the distinction between hard and soft spaces and carriage returns.

If the find string is null (RETURN only entered), the cursor will not be moved. This lets you cancel an unwanted Find command by hitting RETURN in response to each question.

Basic Use of Replace

"Replace" does a "Find", then substitutes another string of characters specified by the user for the find string.

Replace is initiated by typing ^QA. WordStar asks "FIND?" as for the Find command; after you have entered the find string, it asks:

REPLACE WITH? ■

Respond with whatever you want substituted for the find string. WordStar then asks "OPTIONS? " as described above; respond with carriage return only for now.

WordStar then searches for the find string, as described above. If it is not found, a NOT FOUND error occurs and the cursor will be at the end of the document. If found, text in the vicinity of the find is displayed on the screen and

REPLACE (Y/N):

appears in the status line. The cursor flashes back and forth between the found string and the question in the status line. If you want the substitution performed, type Y (y and ^Y also work). If not, hit any other key.

To repeat the Replace command from the new cursor position with the same answers to all three questions, type ^L.

For example, to replace the next occurrence after the cursor of "Jones" with "Smith", you would type ^QA and answer the questions as follows:

FIND? Jones@ REPLACE WITH? Smith@ OPTIONS? @

Find and Replace Options

The "OPTIONS?" question asked by Find and by Replace can be answered with one or more of the letters G, N, W, U, or B (in upper or lower case) and/or a number between 1 and 65535; or, a ? can be entered to evoke a menu summarizing the options, followed by reasking OPTIONS?. Terminate your answer with the RETURN key.

The effect of each of these options is as follows:

- number do the Find or Replace that many times, for example, to find the fourth occurrence of the find string, or replace the next 99 occurrences. NOT FOUND error occurs if command cannot be performed that many times; as many Finds or Replaces as possible will have been done.
- G do Replace on entire file: move Cursor to beginning of file, then replace repeatedly (asking each time) until no more occurrences found. NOT FOUND error occurs only if no occurrences at all found. Cursor is left at end of file. If used with Find, finds LAST occurrence in file.
- N do Replaces without asking: convenient with G if you are sure there will be no undesired matches.
- B search BACKWARD instead of forward from current cursor position. If NOT FOUND error occurs, cursor will be at beginning of file. If used with G, Finding or Replacing starts at end of file and proceeds to beginning.
- U ignore the distinction between upper and lower case in the find string: makes "age" also match "Age" or "AGE", etc. May be used with either Find or Replace.
- W match on whole words only: Find or Replace only those occurrences of the find string that have a non-letter, non-digit character before and after them. Makes "age" NOT match "page" or "agent".
Note: W will not find occurrences of the Find string at the very beginning and end of the file: there must be at least one character (any character, including space, carriage return, etc) before and after the string.

One more point about the OPTIONS? question: if you end your entry to the preceding question (FIND? for the Find command, REPLACE? for the Replace command) with the ESCAPE key instead of the RETURN key, the options question will not be asked.

In the following usage examples of Find and Replace options, computer typing is underlined and @ indicates places where the user hit the RETURN key:

FIND? Jones@ OPTIONS? (? FOR INFO) 13@

Finds the 13th occurrence of "Jones" after the present cursor position.

FIND? section@ OPTIONS? (? FOR INFO) wub@

Finds previous (b) occurrence of "section" as a separate word (w), in either upper or lower case (u). Will find "section" or "Section" or "SECTION", but not "disection" or "sectional" or "sub-section".

FIND? John Jones@ REPLACE WITH? James D. Smith@

OPTIONS? (? FOR INFO) gn@

Changes all (g) "John Jones"'s in the document to "James D. Smith", without asking the operator whether to perform each substitution (n).

FIND? carriage@ REPLACE WITH? carriage@

OPTIONS? (? FOR INFO) gnf@

Similarly correct the misspelled word "carriage" throughout the document.

Special Characters in the Find String

The following control characters may be used in your response to the FIND? question (in either the Find or the Replace command) to match classes of characters as follows:

[^]A Matches ANY single character

[^]S Matches any character not a letter or digit. (Note: Since [^]S normally deletes a character from the string being entered, it must be preceded by [^]P to be included in the find string.)

[^]Ox Matches any character OTHER THAN x, where x is any character entered immediately after the [^]O.

[^]N Matches the sequence carriage return, line feed (which is what is normally stored in the file between lines). The distinction between hard and soft carriage returns is ignored.

[^]N also works in the answer to the REPLACE WITH? question. When used in the latter case, it produces a "hard" carriage return.

In addition, the question-response special characters described in Section 9.1 may be used - [^]S, [^]D, and [^]Y to correct typing errors, [^]P to escape a special character into the string, [^]R to restore the previous answer, etc.

Examples showing use of the above special characters:

FIND? ^NSection II@ OPTIONS? (? FOR INFO) @
Finds "Section II" at the beginning of a line only.

FIND? ^N@ OPTIONS? (? FOR INFO) 50@
Finds the 50th carriage return after the cursor line, that is, moves forward 50 lines in the file. If cursor is at beginning of file when this command is given, then it finds the 51st line.

FIND? ^N^N@ OPTIONS? (? FOR INFO) @
Finds the next blank line (two adjacent carriage returns) and leaves cursor on following line.

FIND? X^A^AX@ OPTIONS? (? FOR INFO) @
Finds the next occurrence of two X's with any two characters between them, for example "XABX", "Xl,X", "X +X", etc.

FIND? ^N@ REPLACE WITH? !^N!@ OPTIONS? (? FOR INFO) 13n@
Without asking, change the next 13 carriage returns to !, carriage return, !; that is, add a ! to the end of the current line and the next 12 lines, and insert a ! at the beginning of the next 13 lines. This form of command was used in forming the boxes around the screen display examples in this manual.

Caution: in using the special find string characters, you must be aware of the fact that what is normally thought of as a "carriage return" between lines is actually TWO characters, a "carriage return" and a line feed; this fact impacts the use of ^A and ^S in the middle of a find string.

Find and Replace Use Hints

Finding a Long String: Usually it is handiest to type only part of the string (maybe 5 or 10 characters) in response to the FIND? question; if this results in finding the wrong thing, hit ^L to proceed to the next occurrence.

Restoring Cursor to Start Point after NOT FOUND Error: type ^QV.

Two Approaches to Global Replace: 1. use the G option, with N if selective replace not desired. 2. put cursor at beginning of document (^QR) and enter a Replace command for a single replacement only. This will do the first occurrence. Type ^L to proceed to next occurrence. The latter method lets you use other editing commands as desired between replaces, yet initiate the next Replace with a single keystroke.

Caution re Large Files: As detailed elsewhere (Section 9.2), commands that move the cursor a long way backwards should be used with caution in large files because of long processing time, and because they can lead to a DISK FULL error due to the temporary file space used. Instead, saving with ^KS is recommended, to move the cursor to the beginning of the file. This applies to the G option: in a large file, if the cursor is not near the beginning of the file, do a ^KS before doing a global replace. Similarly, type ^KS before using the ^QV command in a large file if the cursor is currently far beyond the starting point.

Replacing All Occurrences from Present Cursor Position to End of File: Respond to the OPTIONS question with a large repeat count, such as 9999. All occurrences forward from the cursor will be changed, then a NOT FOUND error will occur. Using a large repeat count differs from using the G option in that the cursor is not moved to the beginning of the file first.

Cancelling an Unwanted Find or Replace Command: Either of the following works:
1. enter RETURN only for each question. 2. type ^U, the interrupt command.

Stopping a Find or Replace in Progress: type ^U, the interrupt character. An INTERRUPTED error will occur; the cursor will have been advanced to a random position. This is most useful after a typing error in the find string prevented finding something you thought was nearby, e.g. on the screen. With a long file, such an error will be indicated by the fact that instead of completing in a second or two, the command continues processing and DISK WAIT appears in the status line. Stopping the command before it searches to the end of the file reduces the time to get the cursor back to the starting point.

Accelerating Global Replace: Normally, Replace displays each substitution, even if the N option in conjunction with the G option or a repeat count is in use. This screen updating accounts for most of the Replace command's execution time. If you hit any key while such a command is executing (choose a harmless key, such as "cursor up"), WordStar's normal suppression of screen updating when another key has been entered will take effect, and the Replace will complete MUCH faster.

Caution re Stopping Global Replace: As we just said, a key hit during a global Replace or a Replace with a repeat count will suppress display of the ongoing changes while ACCELERATING execution. Thus, if you have such a command in progress and you notice it is having an undesired effect on your document, USE ONLY THE INTERRUPT KEY (^U) to stop it.

Single Keystroke for Commonly Used Insertion: use the Replace command with null (RETURN only) find string, desired string as the replace string, and N option. This will insert the Replace string at the cursor position. Each time you hit ^L, the string will be inserted again at the current cursor position.

Finding and Deleting a String: use the Replace command with null (RETURN only) replace string. This will advance the cursor to the next occurrence of the find string, and replace it with nothing (i.e. delete it). Strike ^L to repeat.

Converting a Non-WordStar Document so Paragraph Reform Can be Used: To convert a file from a non-WordStar source so its paragraphs can be reformed, you must change all carriage returns (they will all be "hard") within each paragraph to spaces, then reform. Position the cursor at the beginning of the first paragraph to be converted. Enter ^QA and (computer typing underlined):

FIND? ^N@ REPLACE WITH @ OPTIONS? N@

Note that a space was entered for REPLACE WITH?. The above will change the first carriage return to a space, joining the first and second lines, and leave the cursor at the beginning of what was the second line. Type ^L's until all carriage returns in the paragraph BUT THE LAST one are removed. At this point, the paragraph is all one document line, displayed on multiple screen lines with + in the rightmost column indicating the continuations. Move the cursor to the beginning of the paragraph (no cursor motion is necessary if right margin is set to 1, since paragraph is now all one line), type ^B and presto! A marginated and justified paragraph, with the cursor at the end!

Cursor down to the next paragraph (the cursor will already be in the correct place if there are no intervening blank lines) and repeat the process, using the single keystroke ^L to remove each undesired carriage return, ^B to form each paragraph and cursor down to pass those carriage returns you want to keep.

Doing the same Find or Replace Again: as we have said before, just type ^L.

Using the Previous Answer to One of the Questions: Suppose you want to repeat the previous Find command, but with different options. Suppose the find string was long and tedious to type. Type ^QF, then respond to FIND? with a ^R. The previous find string will be displayed. Hit RETURN to keep the old answer; OPTIONS? will then be asked as usual. Minor changes may be made in the answer by backspacing (with ^D, ^H, or BACKSPACE), retying the desired characters, then using forward cursor (^D) or ^R to restore the rest of the string before hitting RETURN.

This method of resurrecting the old answer to the same question also works with the REPLACE? question, the OPTIONS? question, and other WordStar questions whose prompt ends in ?. Section 9.1 gives more description of question-response control characters.

Table 8-7: Find and Replace and Related Commands

<u>Command</u>	<u>Function</u>	<u>Description</u>
^QF	find string	Asks for string to find and for Find options. If no options given, moves cursor forward to after next occurrence of string. Operation of options is described above in this section; option ? evokes a summary. Special characters usable in find string are described above and in Section 9.1.
^QA	find and replace	Asks for string to find, string to replace it with, and options. If no options given, next occurrence of find string after present cursor position is displayed and user is asked REPLACE (Y/N); if response is Y, replacement is performed. Operation of options is described above in this section; option ? evokes a summary. Special characters usable in find string are described above and in Section 9.1.
^L	find/replace again	The last Find command, or the Replace command (whichever was more recently used) is repeated as though entered again with the identical response to all questions.
^QV	cursor to starting point (see text)	After a Find, Replace, or ^L command, moves cursor to its position before this command, or to the starting point of the last iteration if a repeat count or the G option was included in the command. Particularly useful after NOT FOUND errors. Caution: if certain other commands have been entered, ^QV has a different meaning - see description above in Section 8.01.

8.08 Place Markers

Place markers provide a convenient means of remembering one or more positions in the document and for moving the cursor back to any one of these positions later. Place markers are not stored in the file and are remembered only for the duration of an edit. Previously entered place markers are not known if the file is again edited later, although they do last through ^KS.

There are ten place markers, numbered 0 through 9. Initially, all are "unset." Any attempt to move the cursor to an unset place marker will produce an error message.

A place marker can be SET to the current cursor position by typing ^K followed by one of the digits 0 through 9. The marker will then be displayed as <n> highlighted, at the set position, where n is the appropriate digit. The marker display <n> is not actually in the file; cursor motion commands will skip over it.

The cursor can be MOVED TO any set place marker whenever desired, by typing ^Q followed by the desired digit. The usual caution (Section 9.2) about long backward moves in extremely long documents applies.

A place marker can be HIDDEN (removed from the screen display) by typing ^K followed by the appropriate digit when the cursor is already at the place marker. The position of the marker will still be remembered; if it is subsequently accessed with ^Q digit, it will display again.

The beginning of block marker, and the end-of-block marker, <E> can be set, hidden, and moved to in a similar manner (typing B or E instead of a digit); these markers will be discussed further in the next section.

Table 8-8: Place Marker Commands

Command	Function	Description
^K0 thru ^K9	Set/ hide place marker	The marker indicated (0-9) is set to the cursor position. If the marker was already set to this position and displayed, it will be undisplaced (but not unset); otherwise it will be displayed as <n>.
^Q0 thru ^Q9	Cursor to place marker	The cursor is moved to the specified place marker (0-9). If marker is hidden, it will be displayed; if the marker has not been set, an error message will occur.

8.09 Block Operations

The block move, block copy, and block delete commands give WordStar a powerful and easy-to-use "electronic cut and paste" ability. We will introduce these block commands via two examples.

Suppose you wish to move a paragraph of text to a different position in the document being edited. Proceed as follows. Place the cursor at the beginning of the paragraph to be moved. Type `^KB`. This "marks" the beginning of the "block" to be moved; `` will appear on the screen to indicate the position of the beginning marker. Move the cursor to the beginning of the LINE AFTER the paragraph, and type `^KK` to "mark" the end. On a highlighting terminal, the entire marked block will now show dim or in inverse video; on other terminals, `<K>` will be displayed at the end marker position. Now move the cursor to the desired destination, and type `^KV`. The marked paragraph, including the markers, will move to this position and appear on the screen.

As a second example, suppose you wish to move a sentence from within a paragraph to a different position. Proceed in a similar manner, marking the beginning (`^KB`) and end (`^KK`) at any desired positions, whether or not in the middle of lines. Then position the cursor at the desired destination, which may also be in the middle of a line (as between two sentences), and type `^KV` to invoke the move. After moving the sentence, you will usually need to "reform" the source and destination paragraphs with the `^B` command for margin realignment. Also, depending where you set the begin/end markers, there may be too many or too few spaces before or after the moved sentence, or where the sentence came from. This can easily be corrected with a few editing commands.

The block copy command, `^KC`, is similar except the marked text is not deleted at the source; the block delete command, `^KY`, deletes the entire marked block; and the block write command, `^KW`, copies the marked text onto a SEPARATE FILE (more about this in the "Additional Files" Section). Related commands include block hide/redisplay, which eliminates and restores the display of the block markers (or the highlighting of the entire block) from the screen, and `^QV`, which, if issued after a block move or copy, moves the cursor to the place where the block came from.

For a quick summary of the basic block commands while editing, type `^K` and wait for the menu to come up; type the help command `^JV` to display a summary of the process of moving a block.

We will now describe the commands introduced above in more detail, including a table summary. If this is your first reading of this manual, you may wish to skip to the next section, and come back here when you need a better understanding of the block commands. Since the block move, copy, delete, and write commands all operate on the current marked block of text, we will detail block marking first.

Marking a Block: A block is marked by placing the cursor at the desired beginning point and typing `^KB`, and placing the cursor at the desired end point and typing `^KK`. These commands work like the place marker commands (previous section): if the cursor is already at the indicated marker and the marker is displayed, it will be hidden (removed from the screen display).

The beginning and the end can be marked in either order, with any other intervening commands, and will remain valid until reset whether used or not. For example, you can mark a block, then edit the text within the block. If the block is later block-copied, the copy will reflect all the changes.

The markers may be moved as desired. For example, if you do another "mark end" to correct the position of the end marker, it is not necessary to mark the beginning again.

If you intend to include a whole number of lines in the marked block, we recommend placing the end marker at the beginning of the line after the last line to be marked in order to include the carriage return at the end of the last line.

The beginning and/or end markers may be set in mid-line to extract a sentence from the middle of a paragraph. All lines between the lines containing the markers are always included in their entirety -- there is no way to mark and move only one column of a multi-column table. This will make sense if you recall the order in which the characters are stored in the file (Section 3.05).

To remember the block beginning and end commands, remember that the word **Block** begins with a B and ends with a K.

How the Marked Block Displays: On terminals with highlighting capabilities (inverse video or bright/dim) for which WordStar has been properly installed, the entire marked block is displayed highlighted, with no `` or `<K>` shown whenever possible. This makes it easy to see what text is marked. The spaces on the screen after the end of the last line in the block, and the flag character (< for hard carriage return) in the last line, are included in the highlighted area only if the end marker is after the carriage return at the end of that line.

When the beginning marker is after the end marker, or at the same place, or when only one of the markers is set and displayed, or if the terminal has no highlighting capability, the beginning marker displays as `` and the end marker displays as `<K>`.

Hiding and Redisplaying the Block: A command is included for convenience to hide / redisplay the marked block. `^KH` undisplays the beginning and end markers (or un-highlights the marked block, if that mode of display is in use); or, if the display is already hidden, it restores the display.

Unlike the place marker commands, (which will operate on and display a hidden marker), block operations yield an error if the marked block is currently hidden. This protects your document against inadvertent commands. If such an error occurs when you wanted the block operation to be performed, type `^KH` and repeat the command.

Block Move: the block move command (^KV) MOVES all the text in the marked block to the CURSOR POSITION, deleting the original at its old position. If no block is marked when the command is given, or if either marker is hidden, an error message occurs (Section 12).

The destination may be in the middle of a line, if desired -- for example when rearranging sentences in a paragraph -- just put the cursor where you want the block moved to. The cursor is left at the beginning of the moved text.

The beginning and end markers MOVE WITH THE BLOCK and remain displayed. After inspecting the result, we suggest typing ^KH to hide the block markers -- both to remove the distraction from the screen, and to protect against ^KV's typed by accident. If you wish to use the same block markers later, just type ^KH again.

The block move command moves EXACTLY the characters you have marked, and does no automatic reformatting. Thus, text reformatting is often required after a move. After rearranging sentences, for example, use paragraph reform (^B, Section 8.06) to re-establish the margins. You may also notice that you included too many or too few spaces or carriage returns at the beginning or end of the block. These errors are easily corrected with a few regular editing commands.

After a block move, the command ^QV will move the cursor to the place the block came from. We suggest you also inspect here after moving, as you may have left too many spaces or carriage returns behind, or you may need to reform the paragraph.

Note: any place markers 0-9 in the marked block do NOT move with it: they remain at the place the block came from.

Block Copy: the block copy command (^KC) is identical to the block move command except the text is NOT deleted at the source: a copy of it is made at the cursor position. The cursor is left at the beginning of the new copy of the text. Again, the block markers move with the text.

Several copies of a block of text may be made, one after the other, by typing ^KC several times in succession. Copies may be made in different places by moving the cursor between copy commands. Each copy is made from the previous one if you don't alter the markers; so make any desired copies of the text in its current form before altering it.

Block Delete: the block delete command (^KY) is a convenient way to remove a large quantity of text from a file. It is also dangerous; the existence of this command is one of the reasons we recommend hiding a marked block (^KH) when done with it.

Block delete leaves the beginning and end markers both hidden and set to the position the text was deleted from. The cursor is not moved; however, the ^QV command may be given after ^KY to move the cursor to the position of the deletion.

Block Write to a File: The block write command asks for a file name and writes the text in the marked block to that file. This permits extracting a piece of text from one document and saving it as though it were a different document. Uses of this command include moving sections from file to file and moving blocks within large files; block write and related commands are further discussed in the "Additional Files" Section, 8.10.

Block write does not move the cursor, and does not alter the text in the document currently being edited. Any previous contents of the destination file are, however, lost.

Block Length Limit: there is a limited amount of text that can be block-moved, block-copied, or block-deleted at a time. The limit varies from about 500 characters if your computer has the minimum amount of RAM WordStar can run in, to many thousands of characters in a 56K or 64K system. If the block is too long, the command will give a BLOCK TOO LONG error message. When this occurs, do the operation with two or more commands each operating on half (or less) of the text.

Long Document Caution: the implementations of block move, block copy, block delete, and block write all involve moving the file cursor (internally; not visible on screen) to the location of the marked block, then back to the original position. If the cursor is a long way from the marked block, the command will execute very slowly and run the risk of a DISK FULL error due to the work file space used, (as discussed in the "Long Document Considerations" Section, 9.2). For moving and copying text when the source and destination are a long way apart, we suggest using the block write command and the additional file read command (Section 8.10).

Table 8-9: Block Commands

<u>Command</u>	<u>Function</u>	<u>Description</u>
^KB	mark block beginning	Set block beginning marker to cursor location, or hide marker if already set and displayed at cursor position.
^KK	mark block end	Set or hide block end marker <K>.
^KV	move block	Currently marked block of text is moved to the cursor position. Block markers move with text.
^KC	copy block	Currently marked block of text is copied at cursor position. Original text not changed; block markers move with copy.
^KY	delete block	Entire currently marked block of text is deleted from document.
^KW	write block to additional file	Asks for a file name, and writes currently marked block of text to that file. Any previous contents of indicated file are lost; text in document being edited is not changed. See also Section 8.10.
^KH	hide / redisplay marked block	Block marking is undisplayed if currently displayed, or displayed if currently hidden.
^QB	cursor to block beginning	Cursor moves to block beginning marker; this marker is displayed if hidden.
^QK	cursor to block end	Cursor moves to block end similarly.
^QV	cursor to block source	Cursor moves to position of beginning marker BEFORE LAST block move, block copy, block delete, or block write. Use to inspect place text moved from. Caution: this command has a different meaning if a Find or Replace has been done since last block operation; see Section 8.01 for full description.

8.10 Additional File Commands

The commands described in this Section relate to use of files OTHER than the file being edited. Common applications of these commands include merging documents, extracting a section to form a separate document, assembling a document from previously prepared sections, and "cut and paste" within a document.

The files operated on by these commands and the files operated on by editing are interchangeable. You can extract a portion of one document with the block write command, then later edit the resulting file or you can merge a document previously entered by editing operations into another with the read additional file command, and so on.

After presenting the commands in tabular form, we will discuss some of their common uses.

Table 8-10: Additional File Commands

<u>Command</u>	<u>Function</u>	<u>Description</u>
^KW	block	Asks for file name, and writes marked block of text (as described in previous section) into that file. Previous contents of that file are lost; document currently being edited is not altered.
^KR	read file	Asks for file name, and inserts the entire contents of the indicated file into the current document AT THE CURSOR POSITION. The file read may have been created with the block write command, or through the normal editing process - such files are interchangeable.
^KJ	delete file	Asks for file name, then erases the file. Space occupied by file is made available for reuse. Equivalent to the operating system (CP/M) ERA command.
^KL	change logged disk	Changes disk drive for filenames entered without a drive name, and disk drive whose directory is displayed. See Sections 3.07 and 8.12.
^KF	directory on/off	Turns file directory display on and while editing off; (see Sections 7.3 and 8.12).
^KP	print file	Invokes printing of a document. (See section 11).

Entering the File Name

The block write, read additional file, and delete file commands all ask for the name of the file to which the command is applied. Type in the desired file name, terminating it with a carriage return. Control characters are available to allow editing the answer to correct typing errors, and to allow editing the previous answer to eliminate the need to retype; at help levels 2 and 3 the following reminder of the more commonly used control characters appears above the NAME OF FILE? question:

[^]S=delete character ^Y=delete entry ^F=File directory
[^]D=restore character ^R=Restore entry ^U=cancel

These characters are as previously described in Section 5.2, and as detailed in Section 9.1.

Directory Display: to view the file directory temporarily while entering a file name for an additional file command, type [^]F at the NAME OF FILE? question asked by the command. The names of the files on the logged disk drive will be displayed until RETURN is pressed; [^]Z and [^]W may be used as necessary to scroll the directory display up or down to permit viewing all file names. (To invoke a directory display that remains on the screen, rather than disappearing upon completion of the command, use the [^]KF command).

Repeating Use of Same File Name: to enter the same file name as used in the last additional file command given, just type [^]R to the NAME OF FILE? question. The previous name will appear on the screen; pressed RETURN to use it. This saves keystrokes and eliminates the need to remember the exact file name used, as from a block write command to subsequent read and delete commands for the same file. The NAME OF FILE? question of the block write, read additional file, and delete file commands differ from most questions in WordStar in that a single previous answer is stored for all three of them.

Common Uses of Additional File Commands

Boiler Plate: When you have standard paragraphs or sections that you frequently use, enter each onto a separate file. Then use the [^]KR command whenever desired to copy one of these paragraphs or sections from the separate file to the cursor position in a document you are editing.

The Replace command, Section 8.06 above, is convenient for substituting in names or other information that changes at each use.

Moving Text from One Document to Another: edit the first document, mark the desired text (put cursor at beginning of the text, type [^]KB, put cursor at end, type [^]KK), and do a Block Write ([^]KW). Terminate edit of this document (abandoning with [^]KQ is fastest if you have made no changes or deletions), edit the second document, put the cursor where you want the text, and do an [^]KR, specifying the file name used in the preceding [^]KW.

Alternate Method of Moving Text within a Document: The block move and block copy commands were described in the previous Section; an alternate method of moving or copying text is to write the desired text onto an additional file (^KW command), move the cursor to the destination, and read the file (^KR command). This method is suggested for moving text a long way within a very long document, as it is faster and requires less disk working storage.

Form Letters: enter the standard letter with blanks in place of the name, address, etc. onto a file. When you want to send a letter of that form, edit a new file name, read in the form with ^KR and enter the name, address, etc. in the blanks; then save and print.

If the form letter contains the recipient's name (etc.) in several places, you can save time by entering, say, % in the form each place the name should appear. Then, when preparing each copy, use the Replace command to change all %'s to the name. If the name (or whatever) occurs in mid-paragraph, you may want to use ^B to reestablish the margins after substitution; the easiest method will probably involve typing ^L and ^B alternately.

To send a number of letters to different people, the following method may save you time. End the form file with a ".PA" print directive (Section 10.2), to cause the printer to skip to the top of a new page. Prepare the letter first as above but don't save it. Put the cursor at the end of the file (^QC), read the form from the separate file again (^KR), and edit this copy for the second recipient. Repeat until you have a number of letters, end edit (^KD), and print (^KP). One print command will print all the letters, since they are all in the same file. The print function "Pause between pages" option (Section 11) may be used if you wish to load a letterhead into the printer for each letter.

Deleting Files: In order to conserve diskette space, we recommend deleting any file you make temporary use of (as to hold text being moved between documents) as soon as you are done with it and have checked the results. This can be done with the ^KJ command.

If you do get a DISK FULL error (Section 11), the ^KJ command may be used to delete any unnecessary files.

Choice of File Names: When using the ^KW command, be sure not to choose an existing file name containing information you want to keep. To reduce the chance of this, some users like to use distinct file types. For example, DOC for documents and LIB for boiler plate files and TMP for temporary files used only to move text around within documents.

8.11 Help Commands

The following commands control the "help level" and display learning aids and reference information on the screen.

The "help level" (0 to 3) determines the degree of prompting and menu display used by WordStar. The various help levels were described in Sections 5.3 and 6 and are summarized on the screen when a "set help level" command (^JH) is entered.

Table 8-11: Help Commands

<u>Command</u>	<u>Function</u>	<u>Description</u>
^JH	set help level	Displays current "help level" and asks for new, as detailed in Section 5.3.
^JD	print Directives: Dot commands and print controls	
^JI	command Index, entering text	
^JM	Margins, line spacing, justification, and tabs	
^JB	paragraph reform	
^JP	Place markers	
^JV	moVing text	
^JR	Ruler line	
^JS	Status line	
^JF	Flag characters	
^P	Describes "Print Control Characters".	
^O	Shows whether options such as word wrap and justification are on or off.	

The command prefix menus also show useful information in addition to commands that may be entered. The menus are illustrated in Section 6, and described in Sections 6 and 7.

^P Describes "Print Control Characters".

^O Shows whether options such as word wrap and justification are on or off.

8.12 Miscellaneous Commands

The following table describes commands not covered yet, and mentions a number of others to facilitate reference.

Table 8-12: Miscellaneous Commands

Command	Function	Description
^QQ	repeat next command	<p>The NEXT COMMAND ENTERED is repeatedly executed at a user-controllable rate. The screen is updated after each execution. While ^QQ is in effect, the digits 1-9 may be typed to vary the speed. 1 is fastest, 9 is slowest; 0 is even slower. The default speed is 3. Any other key terminates the repetition. For example:</p> <p>^QQZ scrolls the file up on the screen until stopped;</p> <p>^QQC displays successive screenfuls until stopped.</p>
^U	interrupt	<p>Stops command(s) in progress. The slower commands interrupt in the middle of execution, leaving the cursor in an unspecified place. In any case, if several commands have been typed ahead, those whose execution has not yet started will be cleared. Also may be entered at questions such as FILE NAME? or FIND? to abort the command asking the question. Unless nothing is interrupted, ^U displays</p> <p style="text-align: center;">*** INTERRUPTED ***</p> <p>and requires operator to press ESCAPE key.</p>
^Px	enter arbitrary character (next keystroke)	Enters any next character x, except space, into the document, even if it is a control character normally interpreted as a command; if the next key-stroke is a letter, the corresponding control character is entered. See Section 8.03.
^JH	set help level	Displays current "help level" and asks for new, as detailed in Sections 5.3 and 6.

<u>Command</u>	<u>Function</u>	<u>Description</u>
^KL	change	<p>Displays name of current logged disk drive, and asks for new logged disk drive. (To leave logged disk unchanged, press RETURN). Same function as no-file menu L command; see Sections 3.07 and 5.2.</p> <p>Changing the logged disk drive does not effect the disk used by edits and prints already initiated. It does change the default drive for all file names subsequently entered, as well as the drive whose directory is displayed.</p>
^KF	file directory display on/off	<p>Enables/Disables ongoing display during editing of the file directory (names of all files) of the logged disk drive. WordStar will usually display part of the directory only; ^Z and ^W may be used to scroll the directory display in order to view all file names.</p> <p>Note that ^KF causes the directory to become part of the screen display until another ^KF is given. In contrast, ^F typed while entering a file name will invoke a temporary directory display.</p>

<u>Command</u>	<u>Function</u>	<u>Description</u>
^KP	PRINT A FILE	The ^KP command has three possible effects, depending whether printing is inactive, a file is being printed, or printing is suspended. The P entry in the ^K menu changes as appropriate.
^KP	STOP PRINT	
^KP	CONTINUE PRINT	
		Note: the P command from the no-file menu (Section 5.2) performs the same three functions when a file is not being edited.
		Brief descriptions of the three meanings of ^KP follow; details are given in Section 11.
^KP	PRINT	Asks for the name of the file, then asks several A questions relating to print options (all of which FILE can be defaulted by pressing RETURN), and initiates printing of the specified file. The print function and the options questions asked are described in detail in Section 11. While printing progresses, you may continue to edit file(s) other than the one being printed.
^KP	STOP PRINT	If a file is being printed, ^KP will stop the printer and elicit the question: TYPE Y TO ABANDON PRINT, N TO CONTINUE:
		N will resume printing (you could use the pause to adjust the paper, etc); N will abandon the printout that was in progress. An ^U will leave the print suspended and change the meaning of ^KP to CONTINUE PRINT. This lets you proceed to other commands now and resume the print when desired with another ^KP command.
^KP	CONTINUE PRINT	If printing of a file is suspended, due either to an ^KP command from the operator, the PAUSE BETWEEN PAGES print option (detailed in Section 11), or an ^C (pause) print control character in the file, ^KP resumes printing, changing the meaning of ^KP back to STOP PRINT. Note: whenever printing of a file is in progress but currently suspended, the status line of the screen will show the phrase PRINT PAUSED

SECTION 9. ADDITIONAL EDIT FUNCTION TOPICS

9.1 Question Responses

Many WordStar commands ask the user questions for additional information. Some questions accept single-character answers; others accept a line of input terminated by carriage return. Each class has a number of common characteristics which we will describe here. In all cases, the "interrupt" character, ^U, may be typed to abort the command asking the question.

One-character Answers: questions that expect a one-character answer can be recognized by the fact that the prompt ends in a colon. These questions accept the next key struck as the response without waiting for RETURN to be typed. An example of such response is elicited by the "set help level" command question (Section 5.3).

Yes-No Questions: some one-character answer questions expect a yes-no answer; these have prompts of the form "... (Y/N):". These questions accept Y, y, or ^Y (control-Y) as "yes" and ANY OTHER KEY as "no". You are free to use the RETURN key, the space bar, or any handy key to indicate a "no" response. An example of such a question is the "REPLACE (Y/N):" question asked by the replace command (Section 8.07).

Line-input Questions: these questions have prompts ending in "?". They include all file name questions (as from the D, P, and ^KR commands, etc.), the margin and tab stop column questions, and several others. When answering a line-input question, typing errors can be corrected; the PREVIOUS RESPONSE TO THE SAME QUESTION, or a portion thereof, can be restored without reentry. The file directory can be displayed and scrolled at will.

The answer to a line-input question can be terminated with the RETURN, LINE FEED, or ESCAPE keys. The ESCAPE key has a special meaning in the Print (P or ^KP), Find (^QF), and Replace (^QA) questions: it suppresses following options questions; for the margin and tab stop questions (^OL, ^OR, ^OI, and ^ON) ESCAPE means to use the cursor column (as shown in the status line), whereas RETURN means to abandon the command. In other cases ESCAPE is equivalent to RETURN. LINE FEED is always equivalent to RETURN.

When answering a line input question, correction of typing errors (before the RETURN key is pressed), directory display, and other functions can be accomplished with the special characters shown in table 9-1. Note that ^x means control-x — hold the CTRL key down while typing the letter x.

At help levels 2 and 3, the following reminder of the more common special characters appears above most line-input questions; the special characters are valid at all help levels and at all questions whose prompt ends in "?".

^S=delete character ^Y=delete entry ^F=File directory
 ^D=restore character ^R=Restore entry ^U=cancel

Table 9-1: Special Characters in Line-Input Question Answers

<u>Character</u>	<u>Function</u>
<code>^X</code> or <code>^Y</code>	Erase entire answer
<code>^S</code> , <code>^H</code> , BACKSPACE, or DELETE	Erase one character
<code>^D</code>	Cursor right: return one character: one character from a previously erased answer or from the answer given the last time the specific question was asked.
<code>^R</code>	Unerase (Restore) entire erased answer or previous answer. To use the same response as last time (e.g., if you want to print a second copy of the same file), just enter <code>^R</code> and return.
<code>^F</code>	Display File directory of logged disk drive for duration of command. Does nothing if directory is already on screen.
<code>^Z</code> , <code>^W</code>	If partial file directory is displayed, scroll file directory up (<code>^Z</code>) or down (<code>^W</code>) to bring additional file names into view.
<code>^P</code>	Use the NEXT KEY HIT literally as part of the answer, even if it is a control character that normally has a special function, or one of the terminating characters.
<code>^N</code> , <code>^S</code> , <code>^A</code> , <code>^O</code>	have special meanings only in the FIND? question of the Find command (<code>^QF</code>) and the Replace command (<code>^QA</code>); see Section 8.07.
<code>^U</code>	Interrupts and terminates the command in progress; clears any typed-ahead commands or text. <code>^U</code> has this effect when answering a question, and in most other contexts.

9.2 Long Document Considerations

While WordStar can edit as large a file as can be held on a diskette, the WordStar edit function works most quickly, easily, and flexibly on files of moderate size. We recommend breaking up large documents into multiple files whenever practical. However, there are several reasons why you may not wish to divide your document into multiple files: A page break is mandatory between files; automatic page numbering works only within a file (though you can specify the starting page number of each file with a dot command); multiple print commands must be given to print multiple files.

Determining File Size: The size of a file in bytes (characters) can be determined (in most systems) with the operating system STAT command, or from within WordStar as follows: move the cursor to the end of the file (^QC command), and enter ^OP to turn off page display. When page display is off, the number of bytes (characters) in the file before the cursor displays in the status line, in the form FC=nnnnn.

How large is large? This varies over a wide range depending on the amount of RAM memory in your system. When a file can be held entirely in RAM, as indicated by the fact that the cursor will move from the END of the file to the beginning (^QR command) in a couple of seconds, the file is still small. When this operation starts taking minutes instead of seconds, the file is large. At this point you should either read the rest of this Section carefully, or divide the file in two (see the block write command, ^KW, in Section 8.10, "Additional File Commands").

Diskette Space Considerations for Large Files: When editing a file, WordStar always uses disk space to make the new copy, and also uses additional space for a temporary file whenever the cursor is moved BACKWARDS in the file from a point at which a change was made over more characters than can be held in RAM. The first limit you will reach is having insufficient disk space for the temporary file used during cursor backup. When this limit is reached, a DISK FULL error (Section 12) may occur on backwards cursor motion, but it will still be possible to move the cursor forward and to save. The impact of this limitation can be minimized by moving only forward when editing (below).

The second limit is that reached when there is insufficient diskette space for the new copy of the file. Don't let this occur! Watch your file size and diskette space available (with the operating system STAT command), and move files to separate diskettes as necessary to assure plenty of working space.

Eventually a file may get so large that it is not possible to fit two copies on a diskette. In this case, the file must be edited to a different diskette each time. As described above in Section 5, such editing is invoked by entering a space and a second drive name (with colon, but with no file name after it) after the file name in the D command, N command, or system console command line that invokes WordStar. In this mode, each "save" will alternate between drives. Whenever possible, you will find dividing such large files into multiple files more convenient.

The absolute limit on file size is the capacity of a diskette.

Editing Technique for Large Files: Avoid moving the cursor a long way backwards when you are editing a large file for two reasons: first, to minimize temporary work file disk space requirements and thereby avoiding DISK FULL errors; second, because moving the cursor a long way backwards is very slow.

To avoid moving the cursor a long way backwards, organize your changes to proceed forward through the file making all changes in approximate sequential order. To get back to the beginning from a place near the end, SAVE (^KS) instead of using ^QR. Not only is saving faster for large files; saving also protects you against disasters by saving all changes made so far.

Similarly, if you want to do a global replace, save first to get to the beginning of the file. Also avoid using the block move and block copy commands if the source and destination locations are distant from each other. Instead, use block write (^KW) to a file, move the cursor (saving if cursor destination is before source), then use additional file read (^KR).

9.3 More About Changing Diskettes

This section repeats the rules given in Section 3.10 about changing diskettes, and adds some exception conditions for changing diskettes safely.

1. You may safely change the diskette in a drive when, at the system prompt (A>), you type ^C (control-C) immediately after the change.
2. You may change diskettes when WordStar is at the no-file menu (not editing) and not printing to a disk file.
3. If there has been no diskette in a drive since it was last safe to change diskettes, you may insert one in that drive.
4. You may change the diskette in a drive if it is to be read only, as with the ^KR (additional file read, Section 8.10) or print (Section 11) command. But be SURE you issue no command that could write on the newly inserted diskette.

9.4 Document Files and File Compatibility

A WordStar document file (one edited with the D command, or in which word wrap or ^B was used) may be incompatible with some other programs or languages. This has no impact on word processing applications in which all editing and printing is done with WordStar, but if you wish to use WordStar as a general purpose editor - to prepare input for other text formatters, to enter data for application programs, or to edit program source files - read on.

The difference between a WordStar document file and a completely standard CP/M file is that in the WordStar document file, the high order bit of a byte is set in certain cases, whereas in the standard CP/M file, this bit is always clear. Many programs and languages ignore this bit; in others, it causes errors.

To generate a file that is sure to be compatible with other programs, invoke edits with the "edit a non-document" (N) command (further described in the next Section), and don't use word wrap or the "reform paragraph" (^B) command. Enter all carriage returns and format all lines as desired manually.

Alternately, use WordStar in any manner, then mask off high order bits by copying the file using the [Z] option available in some versions of PIP, or by editing the file with the CP/M EDitor or with MicroPro WordMaster. This will of course have the effects noted in the next paragraph; you may want to keep an unmasked copy for later re-edit with WordStar.

WordStar document files should not be edited with other editors if you expect to use the file later with WordStar. Doing so may change all soft spaces and soft carriage returns into hard spaces and hard carriage returns, which will frustrate any later attempts at reforming existing text with WordStar. Also, if a file is thus edited then printed with WordStar on a daisy-wheel printer, micro-justification may not occur.

9.5 The "Non-Document" Edit Command

The word processing user need not be concerned with this Section.

The "Edit a Non-Document" command (N on the no-file menu) has a dual purpose: to disable dynamic pagination for file compatibility, and to supply a different set of defaults for convenience.

We have occasionally noted differences between a regular file edit, initiated with the D command from the no-file menu or with a system command of the form "WS filename", and a "Non-document" edit initiated with the N command. Here is a complete list:

1. Dynamic pagination, which makes use of the high order bit, is suppressed. Page break display (^OP) cannot be turned on.
2. Status line shows File Character and File Line instead of Page and Line on Page (Section 7.1).
3. Dot commands are not checked during editing:
 - a. No "?" flag for invalid dot command.
 - b. The message PUT AT FILE BEGINNING FOR CORRECT PAGE BREAK DISPLAY does not appear.
4. Word wrap, justification, variable tabbing, and ruler display default OFF rather than ON. These features may be turned on with the usual commands (Section 8.06) if desired.

Note that use of word wrap or paragraph reform (^B) can put "high order bit" flags in the file, causing possible incompatibility with some external programs.

9.6 Fixed Tabbing Mode

For normal word processing uses, leave variable tabbing mode on. If you have occasion to work with existing files containing tab characters, or wish to use fixed tabs (for example, in computer program preparation), read this Section.

When variable tabbing is off, "tab" characters (^I, 09 hex) are used in the file, displayed with fixed stops every 8 columns, as opposed to the multiple spaces entered into the file by variable tabbing mode. This type of tabbing is compatible with that used by the CP/M editor and by MicroPro WordMaster; such tabs are customarily used in program development under CP/M.

Since each "tab" is a single character, fixed tabs edit differently than variable tabs. The cursor cannot be placed within the white space on the screen representing the tab, but "pops" across it; a tab deletes as a single character; a single character will overtype a tab. When inserting before a tab, the text after the tab remains in the same screen position until sufficient text is inserted to push the tab to the next stop, at which point it "pops" right to the next multiple of 8 columns.

The tabbing mode relates to the ENTRY of tabs (insertion (^V) on, or line must be extended to reach next tab stop). Tab characters already in the file will display the same (looking like spaces) and edit in the normal fixed-tab manner (not at all like spaces; previous paragraph) when variable tab mode is on. When variable tab mode is on and the tab key is used to move the cursor over existing text (insertion off), and the text contains tab characters, the cursor may come to rest beyond the next tab stop column since it can't stop in the middle of a tab character.

There is no need to set fixed tabbing in order to edit a file already containing fixed tabs unless you desire to use the ^I (tab) key and have it enter fixed tab characters into the file.

Note: the version of PIP supplied with some systems has an option for expanding tab characters into multiple spaces with tab stops every n columns; you might wish to use this to convert a file from fixed tabs to variable.

SECTION 10: THE PRINT DIRECTIVES

The two types of print directives, Dot Commands and Print Controls, were introduced in Section 4.2 through 4.4; this section adds specific details.

10.1 Print Control Characters

The PRINT CONTROLS are single control characters entered into the file (while editing) to invoke functions such as underline, boldface, and subscripting during printout.

Print controls are entered during editing by typing the ^P prefix followed by the desired letter; the letter may be typed in upper or lower case, or with the CTRL key pressed. Enhancements such as underlining and boldface, (invoked by print controls), may be used freely in mid-paragraph; the control characters fall through the word wrap and paragraph reform operations with no special consideration.

Formed lines containing print controls will appear to be too long on the screen, but will print the correct length. This is because WordStar puts extra characters in the line to compensate for the fact that the print controls use no columns at printout.

The following table describes all of the print controls; the ^P menu gives a quick reference summary.

Table 10-1: Print Control Characters

Char- acter	Function
^S	<u>UnderScore</u> toggle: enter before and after phrase to be underlined. Only non-blank characters are underlined; spaces and tabs between ^S's are not underlined. Example: the word ^S <u>underline</u> ^S is underlined. Prints: the word <u>underline</u> is underlined.
^B	<u>Boldface</u> toggle. Offsets slightly and overstrikes on Daisy Wheel and other printers capable of incremental motion; multi-strokes each character on "Teletype-like" (i.e. regular) printers.
^D	<u>Double strike</u> toggle: strikes each character twice with no offset. Produces a lighter boldface than ^B; also may be used with carbon ribbon to produce extremely sharp impression of entire document.

<u>Character</u>	<u>Function</u>
^{~X}	<u>Strikeout</u> toggle: prints -'s over characters; may be used to indicate deleted text in a revised version of a document.
^{~V}	<u>Subscript</u> toggle: enclosed characters printed as a subscript, (i.e. printed a fractional line below the rest of the text). The amount of roll-down defaults to 3/48ths of an inch and may be altered with the .SR dot command (Section 10.2). On printers without fractional line roll, subscript is printed in next line if blank (e.g. if double spacing), else in same line. Example: H^V2^VO Prints: H2O
^{~T}	<u>Superscript</u> toggle: enclosed text is printed fractional line above rest of text. Example: N^T3^T Prints: N3
^{~Y}	<u>Ribbon color</u> toggle: for daisy wheel printers and other printers with ribbon color selection, causes enclosed text to be printed in alternate color, usually red. Of course, a two-color ribbon must be installed in the printer for ^{~Y} to be effective. Special installation is required to activate this character on non-daisy printers - see Section 15. Example: The word " ^{~Y} Red ^{~Y} " will print in alternate color.
^{~C}	<u>Stop print</u> until restarted by operator. May be used to permit typewheel or ribbon change, so that multiple typefaces or printing of different colors may be intermixed within document. May be used in mid-line, and/or several times in the same line if desired. When the pause occurs, PRINT PAUSED will appear in the status line; the P command (no-file menu) or the ^{~K} P command (while editing a file) may be used by the operator to restart the printer. Example: Stop right here: ^{~C} for typewheel change Note: printers which normally print bidirectionally under WordStar will always print a line containing an ^{~C} left to right.
^{~A}	Select <u>Alternate Character Pitch</u> : for daisy wheel printers, this goes to 12 characters per inch (pica), or as modified by .CW dot command (Section 10.2). See discussion in Section 10.3. Normally has no effect on non-daisy printers.
^{~N}	Return to <u>standard Character Pitch</u> : for daisy wheel printers, selects 10 characters per inch (elite), or as altered with .CW command (Section 10.2). Normally has no effect when printing on a non-daisy printer. Note: When installing WordStar for a "Teletype-like" (non-Daisy) printer, the user may set up ^{~A} and ^{~N} to select between two character widths if the printer is capable of changing character widths upon being sent a control sequence of four or fewer characters. See "Modification", Section 15.

<u>Character</u>	<u>Function</u>
[^] K	<u>Left-Right Heading/Footing Control:</u> This character is used in heading and footing dot commands (Section 10.2) to produce headings, page numbers, etc. which print on the left side of even-numbered pages and on the right side of odd-numbered pages. When used in the text argument to a .HE or .FO dot command, its effect is to suppress printing of following spaces up to the next non-space if the page number is even. Outside of .HE and .FO commands, [^] K is ignored. See discussion of left-right page numbers in Section 10.3.
[^] F	<u>"Phantom Space":</u> print the character on daisy wheel for code 20 hex. This code, normally a space for non-daisy printers, prints a "cents sign" or other special character on many 88- and 96-character daisy wheels; the exact graphic depends on the print wheel in use.
[^] G	<u>"Phantom Rubout":</u> print character on daisy wheel for code 7F hex. This code prints a "not-sign" or "double underline" or other graphic on many 96-character daisy print wheels.
[^] O	<u>Non-break space:</u> prints as space, but not treated as a space for line break or justification purposes during line forming. Use at positions where you want a single space to appear without allowing expansion during justification or wrap to the next line.
[^] H	<u>Backspace:</u> Causes next character to overprint the preceding character on the line. Useful for putting accent marks over letters and for creating special symbols by overprinting multiple characters. May be used in "formed" text -- word wrap and paragraph reform make proper allowances for backspaces. Registration is not exactly precise in justified text. On a non-backspacing (Teletype-like) printer, do not backspace through the same column more than 8 times.

Example: a[^]H` la king

Prints: à la king

[^] O	User Printer Function 1
[^] W	User Printer Function 2
[^] E	User Printer Function 3
[^] R	User Printer Function 4

The User Printer Function control characters are intended for accessing special printer functions that WordStar does not otherwise support, such as changing type fonts or activating a sheet feeder. When installing WordStar, each of these four controls may be set up to send any desired sequence of 1 to 4 characters. Any line containing a User Printer Function control is always printed forward even if bidirectional print is in use.

Until a definition is installed, the four User Printer Function Controls do nothing. Check Appendix B to see if the standard WordStar installation for your printer activates any of these characters; see Section 15 re installing your own definitions.

Other Control Characters

Control characters not defined in the above table will print as an ^ and a letter, just as they display, with the following exceptions:

Form Feed (^L) causes a page break.

The Tab character (^I) displays and prints as enough spaces to advance to the next multiple of 8 columns. This character is not normally entered into a file by WordStar except in fixed tabbing mode, Section 9.6.

10.2 Dot Commands

The DOT COMMANDS are special lines entered into the file for purposes such as setting the paper length or specifying a page heading. All of the dot commands have defaults suitable for normal use; you can begin using WordStar without using dot commands at all. Dot commands do not in themselves print, but control the printing operation. Dynamic Page Break Display also responds to certain of the dot commands.

The general form of dot commands was described in Section 4.4. Briefly, a dot command consists of a period in column 1, a two-letter code, and, (for certain commands), a number, line of text, or other argument.

Dot commands are entered into the file during editing in the same manner as other text, and display on the screen during editing. For convenience, automatic indentation to the left margin is disabled when a period is entered into or already present in column 1.

Any valid dot command line placed anywhere in the text will be interpreted by the print function; variables such as top and bottom margin and line height may be varied at will as far as printout is concerned. However, dynamic page break display (Section 4.5) will only respond to the .LH, .PL, .MT, and .MB commands when they are placed at the beginning of the file, before all text.

Table 10-2 contains descriptions of all of the dot commands. Following that table, Table 10-3 summarizes the dot commands and their defaults. The next section, Section 10.3, contains additional discussion and use hints relating to dot commands. For quick reference while editing, the ^JD command may be entered to display a brief summary of the dot commands.

Table 10-2: Dot Commands

<u>Command</u>	<u>Function</u>	<u>Description</u>
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--- Vertical Page Layout ---

.LH n Line Height Sets line height in 1/48ths of an inch on daisy wheel printers. .LH 8 yields 6 lines per inch (the default); .LH 6 yields 8 lines per inch, .LH 12 gives the same spacing as 1 1/2 line spacing on a typewriter, etc. The .LH command provides an alternative or supplement to the single, double, trispacing that can be applied via the ^OS command (Section 8.06) to text as lines are formed. If .LH is used when printing on a printer incapable of incremental spacing, page breaks are nevertheless determined as though the command took effect.

Note: All subsequent commands taking a number of lines as an argument will be interpreted in terms of the new line height. Previously set values (top margin, paper length, etc) will remain the same in inches.

.PL n Paper Length n is the number of lines (of the last .LH set; 6 lines per inch if no .LH has been given) on an entire page, including the top and bottom margins. The paper length must match the forms in use (except that smaller values will also work if the USE FORM FEEDS option is selected when printing). The default is 66 default-height lines, or 11 inches.

.MT n Top Margin number of lines from the top of the paper to the beginning of the body of the text on the page. Note that the page heading, if in use, and the heading margin, are printed in this space. See .HM and .HE, below. Default: 3 lines. The "top of the page" for the first page printed is wherever you position the paper before starting print if the USE FORM FEEDS option is not specified when print is initiated (Section 11).

.MB n Bottom Margin number of lines at bottom of page not used for text. The page number or footing, if in use, is printed within the bottom margin. See .FM below. Default: 8 lines.

Note: The maximum number of lines on the page used for the body of the text is the paper length, minus the top margin, minus the bottom margin. If the line height (.LH, above) is changed after these commands are given, the same number of inches, not lines, of text continues to be printed. Fewer lines are of course used for particular pages where .PA or .CP commands (below) invoke page breaks. The top and bottom margin values may be adjusted to give the desired number of text lines on a page, and to vertically center the text on the page for your positioning of the paper in the printer.

Reminder: The preceding commands, .LH, .PL, .MT, and .MB will only be interpreted correctly with respect to page break display during editing if they appear at the beginning of the file. However, they may be used anywhere in the file to vary the vertical page format as desired, as far as printout is concerned.

<u>Command</u>	<u>Function</u>	<u>Description</u>
.HM n	Heading Margin	number of blank <u>lines</u> between the page heading (if used; see .HE command) and the body of the text. Note that the heading and the heading margin fall within the top margin space. If a value greater than Top Margin less 1 is specified, top margin less 1 is used. Default: 2 lines.
.FM n	Footing Margin	number of <u>lines</u> between the end of the portion of the page used for text, and the page number or footing (see .FO). Note that the footing margin and the page number or footing appear within the bottom margin space. Default: 2 lines.

--- Horizontal Page Layout ---

Most horizontal formatting, such as the margination and justification of text, is done during editing, and does not involve dot commands. The following dot commands are provided to control those aspects of horizontal formatting that are done by the print function.

.PC n	Page Number Column	<u>Column</u> at which the page number is printed when no footing (see .FO below) is in use and .OP (below) is not in effect. May be set to print page numbers at left, right, or center, etc., at the bottom of the page (additional page number positioning options are provided thru the use of # in .HE and .FO commands, as described below). The column width used is that of the character width in effect when the .PC command is given, as determined by ^A, ^N, and/or .CW commands. Default is 1/2 the edit function's default right margin, to center numbers under text of default width.
.PO n	Page Offset	number of (current width) <u>columns</u> the entire document is indented (moved right) from the printer's left margin, in addition to all indentation in the file. Allows offsetting the text from the tractor-feed holes at the left of the paper, and allows putting narrow paper near the center of wide printer carriages. Default: 8 columns.

--- Pagination ---

.PA	Page	Start new page unconditionally.
.CP n	Conditional Page	Start new page if there are less than n lines (of the current height) left on the current page. Use to keep blocks of text together, to prevent paging just after a title, in the middle of a table, etc. Using lots of .CP commands can make the document always print well paginated regardless of insertions or deletions as .CP's have no effect when not needed.

<u>Command</u>	<u>Function</u>	<u>Description</u>
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---- Page Headings, Page Footings, and Page Numbers ----

.HE text Heading All text on the rest of the line beginning with .HE is used as a page heading for FOLLOWING pages until another .HE is given. The heading may be changed as often as desired. The initial (default) heading is blank; the heading may be changed back to blank with .HE with no text. To print a heading on the first page, a .HE command must precede all text in the file.

When composing a heading (or footing) on the screen, bear in mind that the characters ".HE " do not print. Thus, the heading will appear in the printed document 4 columns to the left of where it appears on the screen.

The following special characters are interpreted in headings (.HE) and footings (.FO) only:

- * prints as current page number. May be used to position page number wherever desired at top or bottom of page.
- \ print next character without special interpretation -- use \' to print a * in heading or footing, \\ to print a \.
- ^K (control-K) ignore following spaces up to next non-space character if page number is even: may be used to cause page number or other heading or footing text to appear on corner of page farthest from binding. See Section 10.3. Note that a control-K is entered into the file by typing control-P, K, as with all print controls (Section 10.1).

.FO text Footing The rest of the line beginning with .FO is used as a page footing for the current and following pages. As many .FO's as desired may be given; the footing most recently specified will be used when the bottom of each page is encountered.

The characters *, \, and ^K are interpreted in the footing text as described for the .HE command just above.

When no .FO command, or .FO with no text after it, has been given, WordStar will print the page number in the footing line at the column specified with the .PC command (default, center), (unless suppressed with the .OP command). When a user-specified footing is in effect, no page number is automatically printed. If you wish the pages to be numbered, include a # at the desired position in the heading or footing.

<u>Command</u>	<u>Function</u>	<u>Description</u>
.OP	Omit Page numbers	suppresses the printing of page numbers in the footing line if no footing has been given. If a footing has been specified, .OP has no effect; .OP also does not effect printing of page numbers where a # appears in the heading or footing. Page numbering defaults on.
.PN	Number Pages	.PN without a number turns page numbering back on after a .OP command without setting page number. .PN has no effect if the footing line has been preempted with a .FO command.
.PN n	Page Number	.PN with a number turns page numbering on (if it has been turned off with .OP), and sets the page number to appear at the bottom of the current page and/or at a # encountered as the page heading or footing is printed. The default starting page number is 1; the page number increases by 1 each page whether or not printed. .PN effects the printout page number only; those displayed at the top of the screen during editing always run up from 1.

<u>Command</u>	<u>Function</u>	<u>Description</u>
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--- Miscellaneous Dot Commands ---

.CW n Character Width on daisy wheel printers sets character width in 1/120ths of an inch, for either the standard or alternate character pitch, whichever is currently in effect. (Standard and alternate pitch are selected by the ^N and ^A print controls). Has no effect on non-daisy printers. Allows unusual character spacings - for example, spacing characters farther apart than normal for emphasis in a title. The default standard pitch is 10 to the inch (equivalent to .CW 12); the default alternate pitch is 12 to the inch (.CW 10).

Note: Changing the character width or pitch (with .CW, ^A, or ^N) does not affect previously specified page offset (.PO) or page number column (.PC) values, nor previously specified heading (.HE) or footing (.FO) texts (except when ^A or ^N are used within the actual heading or footing texts). Subsequent .PO, .PC, .HE, and .FO commands will be interpreted in terms of the character width and pitch in effect when the .PO, .PC, .HE, or .FO is encountered.

.SR n sub/super-script roll number of 1/48ths of an inch the carriage is rolled before printing a subscript or superscript on a daisy wheel printer. Default: 3/48.

.WJ 0 Microjustification Off
.WJ 1 Microjustification On

When Microjustification is off, all spaces, including soft spaces, are printed exactly as they appear in the file. Spaces added to justify lines on the screen print as they appear on the screen rather than being evenly distributed between words in 1/120ths of an inch on daisy printers. Microjustification is normally on. Turning Microjustification off might be useful, for example, to make a columnar table print with the columns aligned as they appear on the screen even if soft spaces were inadvertently allowed to get into the table lines.

.BP 0 Bidirectional Print Off
.BP 1 Bidirectional Print On

Bidirectional Print (printing alternate lines right to left) is normally on for daisy printers. Turning bidirectional print off might in some cases produce better quality output when the printer's character registration or paper feed is a little sloppy.

.IG text IGnore Either of these specify that the rest of the line is commentary material not to be printed.
.. text

Any undefined dot command is also treated as a comment by the print function; however, the edit function displays a ? flag in the rightmost screen column for undefined dot commands.

Table 10-3: Summary of Dot Commands and Default Values

Command	Function	Units	Default
.LH	Line Height	1/48 inch	8 = 6 lines to the inch
.PL	Paper Length	lines	66 default lines = 11 inches
.MT	Margin at Top	lines	3 default lines = 1/2 inch
.MB	Margin at Bottom	lines	8 default lines = 1 1/3 inch
.HM	Heading Margin	lines	2 default lines = 1/3 inch
.FM	Footing Margin (page # margin)	lines	2 default lines = 1/3 inch
.PC	Page # Column	columns	1/2 default right margin
.PO	Page Offset	columns	8 default columns = 4/5 inch
.PA	new Page		
.CP	Conditional Page	lines	
.HE	Heading		blank
.FO	Footing		page number at .PC column
.OP	Omit Page #'s		
.PN	Page Number		1
.CW	Character Width	1/120 inch	12 for standard pitch, 10 for alternate pitch
.SR	Subscript Roll	1/48 inch	3
.UJ	Microjustify	0=off,l=on	1 (on)
.BP	Bidirect. Print	0=off,l=on	1 (on)
.IG	comment		
..	comment		

10.3 Using Dot Commands

Page Headings: use the .HE command to specify the text of a one-line heading to be printed at the top of each page. Examples:

.HE Part II

.HE 10.3

Using Dot Commands

When composing a .HE command on the screen, bear in mind that the ".HE" takes four columns that don't print, so it will display four characters to the left of where it will print. Spaces in addition to one after ".HE" are printed, so a right-adjusted heading may be produced, for example, as follows:

.HE

Section 5

If you wish the page number to be printed at the top of the page, give a .HE command with a "#" in the position where you wish the page number printed. For example, if you want the word "page" followed by the page number at the top left of each page, use the following dot command:

.HE page #

When composing a heading containing a #, bear in mind that the number of columns occupied by the page number will depend on the number of digits in the page number. When printing the page number at the top of the page but not using a footing (no .FO command), it is necessary to give a .OP command to prevent WordStar from printing the page number again at the bottom of the page.

The heading may be changed as often as desired; to revert to no heading, give a blank heading:

.HE

Each .HE takes effect at the NEXT page top encountered; if it occurs before any text has been printed on the current page (for example, immediately after a .PA command), it will be used on the current page.

The number of lines between the heading and text can be changed with the .HM (heading margin) command. This command moves the heading, without altering the page length or the position of the text on the page; the heading margin falls within the top margin.

No heading will be printed if the top margin (.MT) is set to zero.

Underline, Boldface, and other enhancements invoked by print control characters may be used freely in headings (and footings). Print controls in .HE (and .FO) commands do not affect the body of the text, nor do those in the body of the text effect the heading (or footing). If you vary the character width (as discussed below), the heading (or footing) will be printed in the character width that was in effect when the .HE (.FO) command was given. However, if ^A or ^N is used within the heading (or footing), the pitch in effect at each time the heading is printed will be used.

Page Footings: the .FO command may be used to specify a line of text to be printed at the bottom of each page. Use of this command is similar to use of the .HE command (preceding). The most recently specified footing is used when the bottom of each page is encountered. If the footing contains a #, the page number will be printed in place of the #.

The .FM (footing margin) command may be used to specify the number of blank lines between the bottom of the text area and the footing line. The footing margin lies within the bottom margin; varying the footing margin moves the footing up and down without changing the number of lines of text on the page. No footing will be printed if the bottom margin (.MT) is set to zero.

The Default Footing is the Page Number: If no footing is in effect (no .FO command given, or most recent .FO command had no text after ".FO"), WordStar will print the page number in the footing line unless suppressed with a .OP command. The page number is centered at the column specified with the .PC command; the default is column 33 (or column 30 if a 64-column wide screen is used, reflecting the narrower default margins used in the edit function), so as to be centered under text formed using the default margins.

Page Numbering: by default, WordStar numbers the pages in each file from 1 up as the file is printed. The page number may be changed as desired with the .PN command. For example, if a file represented the second chapter of a large document, and there were 23 pages in the first chapter, you might want to put

.PN 24

at the beginning of the chapter 2 file, so that its pages would be numbered from 24 up as it was printed. Note that .PN effects the page numbering at printout only; the page numbers displayed in the status line during editing always start with 1 and increase by 1 each page.

The maximum page number WordStar will accept is 65533. (For the other dot commands, the maximum argument is 255.)

The page number may be positioned wherever desired in the heading or footing line by using a # in the .HE or .FO command, as discussed above. If no footing is specified, the page number is printed by default in the footing line. This default page number printout may be disabled with .OP, and re-enabled with .PN (no number need be given after .PN unless it is also desired to set the page number). The column at which the page number prints in the default footing may be changed with .PC n. For example, if you wanted to center the page number under text 80 columns wide (as formatted during editing) you could use:

.PC 40

The following footing command would have the same effect:

.FO #

Left-Right Page Numbers: By using the special character ^K in a .HE or .FO command, you can make WordStar print page numbers (or other heading and/or footing texts) at the right hand side of odd numbered pages but at the left hand side of even numbered pages, so as to be on the side of the page farthest from the binding. The effect of ^K to suppress printing of following spaces (up to the next non-space character) if the page number is even. For example, the following footing is used in this section of this manual:

.FO ^K

10-

The above footing prints as

.FO 10-

on even numbered pages, putting "10-" and the page number on the lower left corner of the page, and, on odd numbered pages, as

.FO

10-

Pagination: Page break control is used for two purposes: to force the following text to begin at the top of a page, as at the beginning of a chapter, and to prevent going to a new page in an inappropriate place. (Such as in the middle of a table or after a Section title but before the beginning of the text after the title). Many users also wish to prevent page breaks one or two lines into a paragraph, preferring that the entire paragraph be on the next page.

For the first case, where a new page is always desired, use the page command:

.PA

For the second case, it is usually desired to have a page break occur only when less than a certain number of lines remain on the current page. For these cases, use the "Conditional Page" (.CP) command. This command tests the number of lines remaining on the current page, and causes a page break only if too few remain. For example, if you have a table 10 lines long, put

.CP 10

above it. This will cause a page break during printout (and displayed on the screen, if page break display is on) only if less than 10 lines remain on the current page. That is, the following 10 lines, containing your table, will print on the current page if they will fit, otherwise a new page will be begun, with your table at the top.

Using .CP instead of .PA reduces the need to check pagination and move dot commands as the document is updated. For example, if a page break fell in the middle of the table of the previous example and you corrected this by inserting a .PA above it, you would need to find and remove the .PA later if you made an insertion above the table as .PA always causes a page break even if it falls at the top of a page. On the other hand, a .CP 10 that falls more than 10 lines above the bottom of a page has no effect and may be left in the document, to become active whenever revisions preceding it make it fall near the bottom of the page.

As another example, we suggest always putting .CP 5 (or so) above each Section title. This invokes a new page if less than 5 (or whatever number you specify) lines remain on the page, so that a section title will not appear as the last line on a page or with only two or three lines of text after it. If you enter these as a matter of habit when initially entering documents, then as the document is revised it will always print well-paginated even if you do not review the pagination after each edit.

One more example: look at this manual. It rarely pages in mid-paragraph. This was accomplished via generous use of .CP commands.

Paper Length: WordStar assumes 66 lines to the page, corresponding to 11-inch (letter size) paper at 6 lines per inch. If you wish to use a different size of form (such as legal size), specify the number of lines on each COMPLETE PIECE OF PAPER with the .PL command. This is not the number of lines of text printed, but the form length. The paper length may be set shorter than the actual form length only if your printer has hardware form feed capability and the USE FORM FEEDS option is elected every time print is initiated (Section 11).

A .PL command should also be used as appropriate if your non-daisy printer prints lines spaced other than 6 to the inch. For example, if your printer prints 8 lines to the inch and you want to use 11 inch paper, put .PL 88 at the beginning of your file.

Top and Bottom Margins: WordStar leaves a number of blank lines set by the Top Margin command (.MT) at the top of each page (with the heading positioned in this space, if a heading is in use), and a blank area (containing the page number, or the footing if one has been specified) set by the Bottom Margin (.MB) command. The number of lines of text printed on each page, if no page break is caused by a .PA or .CP command, is equal to the paper length (.PL), less the top and bottom margins. To increase the amount of text on a page, decrease the top or bottom margin; to decrease the amount of text, increase one or both margins.

Position of Text on the Page: the text can be moved up or down on the page either by changing the top (.MT) and bottom (.MB) margins by the same amount, or by moving the paper in the printer, as preferred. The default top and bottom margins approximately center the text vertically on the page if the paper is positioned with the print head two or three lines down from the top of the page when printing is initiated.

If you are loading single sheets, such as letterheads, you may want to move the text up (smaller top margin) so that you can roll each sheet under the bail.

The text can be moved horizontally on the page by changing the Page Offset. By default, WordStar prints 8 spaces (in addition to any in the file) at the beginning of each line; to move the text to the left edge of your printer carriage, put the following at the beginning of the document:

.PO 0

Interaction with Dynamic Page Break Display: When possible, use the .PL, .MT, .MB and .LH commands once only at the beginning of the file, so that dynamic page break display (Section 4.5) will accurately show the printout page breaks on-screen while editing.

Changing Line Height: on Daisy wheel printers, the line height may be specified in 48ths of an inch with the .LH command. For example, to print 8 lines per inch instead of the usual 6, use the command:

.LH 6

When the line height is changed on a Daisy-wheel printer, PREVIOUSLY SPECIFIED margins and paper length are not effected. They remain the same in inches, regardless of the line size. However, subsequent .PL, .MT, .MB, .HM, and .FM commands are interpreted (converted to inches) in terms of the new line height.

Thus, if you use the .LH command, carefully consider the order in which .LH and other vertical format commands are given. For example, .LH 6 followed by .MT 4 yields a 1/2 inch top margin (4 lines of 6/48 each), whereas .MT 4 followed by .LH 6 yields a top margin of 2/3 inch, because the .MT command, appearing first, is interpreted using the default line height of 8/48 of an inch.

The print function will handle as many changes of line height as you wish, but for dynamic page break display to work, you must set the line height only at the beginning of the file.

Hint: to achieve varying line heights without interfering with dynamic pagination, set the line height to, 4 (one-half of normal) at the beginning of the file, then use double-spaced text for close-spaced printout, and triple or quadruple spaced text for wider line spacing. The ^OS command, Section 8.06, can be used to cause automatic double, triple, etc. spacing as text is entered or reformed.

What Happens When You Change the Line Height on a Non-daisy Printer: the line spacing on printout is unaffected, but the page breaks and page length are determined AS THOUGH ON A DAISY-WHEEL PRINTER. Thus, drafts of text to be finalprinted on a daisy-wheel may be printed on a line printer with page breaks occurring as they will in the final, but with the amount of text being printed on a page frequently too little or too much for the forms in use. Use of the USE FORM FEEDS option (Section 11) is suggested.

If you have a document containing .LH commands and you wish to print it neatly on a non-daisy printer, remove the .LH commands. A good way to do this is to change them to ..LH with the Replace command. Then they can easily be changed back later.

Changing the Character Pitch: The width of each character printed (how far the print head moves between characters) can be varied in two ways: with the ^A and ^N print control characters (Section 10.1), which may be imbedded mid-line to allow switching between two character widths, and (on a Daisy wheel printer) with the .OW command, which allows setting any character width, but only between lines. These can interact, as will be described shortly.

When a page offset (.PO), page number column (.PC), heading (.HE), or footing (.FO) is specified, it is interpreted in the current character pitch; subsequent pitch changes do not alter the page offset, page number position, or the character spacing in previously specified page headings or footings.

Pitch Changing on Non-daisy Printers is done with the Alternate pitch (^A) and standard pitch (^N) print control characters. Their effect depends on your printer's capabilities and on what control sequences are installed in WordStar for these characters (Section 15). There will be no effect if no control sequences are installed or your printer has one pitch only.

Pitch Changing on a Daisy Wheel Printer is accomplished with the ^A and ^N print controls and/or the .OW command:

- ^A selects Alternate pitch, which defaults to 12 characters per inch and may be changed by giving a .OW when alternate pitch is in effect;
- ^N selects standard pitch, which defaults to 10 characters per inch and may be changed by giving a .OW when standard pitch is in effect;
- .OW n sets the character width to n 120ths of an inch for standard or alternate pitch, whichever is in effect, without affecting the other pitch.

Daisy Wheel Pitch Change Examples:

^NThe word "Acrammed"**^N** is printed in alternate pitch will print with the word "crammed" in 12 pitch and the rest in 10 pitch if no preceding .OW commands have altered the pitches.

```
^A
.OW 20
^N
.OW 8
narrow^C^A wide ^C^Nnarrow
```

will print "narrow" in characters 8/120 inch wide (15 characters per inch), then wide characters. The carriage returns after the ^A and the ^N will cause two blank lines to be printed first.

SECTION 11: THE PRINT FUNCTION

The Print Function prints a document or other file from a diskette. Unless suppressed by an option described below, the top margin, bottom margin, page heading, and page footing are added to the text in the file, and dot commands (as described in Section 10.2) are interpreted. The print control characters (Section 10.1) are always interpreted during printout to control underline, boldface, pauses for typewheel changes, character pitch, etc.

If the printer in use is a daisy wheel printer (Diablo or Qume), thimble printer (NEC) or other printer capable of incremental spacing, and WordStar is properly installed to use this printer (Section 14), the printed copy will be **Microspace Justified**: WordStar will remove the "soft" spaces (Section 4) used to justify formed lines on the screen, and add space in units of 1/120th inch between words, and possibly between characters, to produce an evenly spaced line without large gaps between words. To further enhance the appearance of printed text, punctuation characters such as periods and commas are printed in a space narrower than other characters, and M's and W's are widened slightly.

Microspace Justification is applied only to the area between the left and right margin of lines "formed" (Section 4) with Word Wrap or Paragraph Reform, so that margin alignment and position of any text outside the margins is maintained. Lines not "formed" with Word Wrap or Paragraph Reform are not Microspace Justified, so that the alignment of columns in tables is precisely reproduced (the last line of a newly-entered paragraph must be "formed" with paragraph reform in order to be Microspace Justified on printout).

Only a disk-stored document can be printed by WordStar; refer to Section 8.05 for document saving commands.

Since the print function can operate at the same time as the edit function, it does not have its own menus, but is invoked, stopped, and resumed with the P command of the no-file menu, or the ^KP command while editing. When the print function is inactive, these commands will invoke initiation of printing. When printing is in progress, the same commands will stop printing. If printing is suspended ("paused"), the P or ^KP command will cause printing to resume. The menus change appropriately to indicate the current meaning of the command.

When printing is in progress, the no-file menu or the file being editing shows on the screen in the normal manner.

Editing can be initiated or continued, and other no-file commands executed, while the print function is active except on computers with minimal RAM memory. Keyboard response is somewhat slowed during printing; concurrent editing and printing are suggested for review and minor correction, but not for high-speed initial entry of text. When editing while the print function is active, watch for DISK WAIT in the status line, or listen for clicks from your disk drive, and stop entering text until the disk activity completes. You may suspend printing (as described later in this section) temporarily when faster keyboard response is desired.

There are no error messages during print execution. Unrecognized dot commands are ignored (NOT printed); control characters with no special definition are printed as ^ and a letter. Contradictory page formats, such as the heading margin greater than the top margin minus 1, cause an assumption to be made so that printing can continue.

While the Print function is intended primarily for printing documents prepared with WordStar, you may print any ASCII disk file. Form feeds work as page indicators, and tab (^I) characters expand to 8-column stops, ensuring compatibility with languages and other programs that output print files to diskettes. An option is available for suppressing page formatting to permit printing a direct image of an (already-paginated) file.

Print function output can be directed to disk as well as to the printer, so that a print image can be saved for later output or for examination on the screen with the edit function. In a disk output file thus produced, all dot commands present have been interpreted (unless suppression of page formatting was specified) but most print control characters remain. If no WordStar print control characters were used, the disk print output file may be printed without using WordStar.

Printer Setup: you will want to position the paper in your printer so that the text comes out in the desired vertical and horizontal position. A few trials may be needed to establish the desired paper position. The position of the text on the page can also be manipulated via the .PO, .MT, and .MB dot commands (section 10.2) as well as by moving the paper in the printer. The print function assumes the paper to be at the "top of form" position when printing is initiated, unless the USE FORM FEEDS option (below) is specified.

11.1 Initiating Print

When the print command (P from the no-file menu, or ^KP while editing) is given with no print in progress and no print suspended, the command means initiate print. WordStar will ask:

NAME OF FILE TO PRINT? ■

Enter the file name. (File names are described in Section 3.06, and summarized on the screen by the no-file menu D command.) The usual control characters (Section 9.1) may be used to correct typing errors or invoke file directory display, etc.

To start printing immediately with all options defaulted; make sure the printer is ready and the paper properly positioned, and press the ESCAPE key after typing the file name. To cause WordStar to ask the print options questions before beginning to print, terminate the file name with the RETURN key. If the file is not found, a message will be displayed and the question reasked.

When the name of the file to print is terminated with the RETURN key, WordStar will ask the following Print Options Questions before starting to print:

DISK FILE OUTPUT (Y/N) :

START AT PAGE NUMBER (Return FOR BEGINNING) ?

USE FORM FEEDS (Y/N) :

SUPPRESS PAGE FORMATTING (Y/N) :

PAUSE FOR PAPER CHANGE BETWEEN PAGES (Y/N) :

READY PRINTER, HIT Return:

All of the Y/N questions are answered with a single character: Y or y or ^Y for "yes", any other character for "no"; either the RETURN or ESCAPE keys can be used to give a "no" or other default response to of the options questions. Six RETURNS thus produces the same effect as hitting the escape key after the name of the file to print. Initially, you will probably want to default most or all of the questions. The print command can be aborted by typing ^U at any of the print options questions.

Explanations of each of the print options questions follow.

DISK FILE OUTPUT (Y/N) : ■

A "no" response (any single character except Y or y or ^Y) will cause the print output to go to the printer, as normally desired.

A response of Y or y or ^Y causes WordStar to ask "OUTPUT FILE NAME?". The "printed" output will then be placed on this file; this file will differ from the input in that it will be a print image, with all dot commands expanded (unless a "yes" answer is given to SUPPRESS PAGE FORMATTING) suitable for later copying to the printer or for examination on the screen with the edit function.

START AT PAGE NUMBER (Return FOR BEGINNING) ? ■

Type a number followed by a carriage return or escape in order to start the print at that page number. This allows restarting after printer paper jams, or printing only some latter part of a document.

A null, 0, or 1 response causes printing to begin at the beginning of the file. A non-numeric, non-null response will cause the question to be reasked until an acceptable answer is given.

Note: to print only the beginning of a document, interrupt the printing (as described below) after the desired number of pages have been printed.

PAUSE FOR PAPER CHANGE BETWEEN PAGES (Y/N) : ■

A "no" response (any character but Y, y, or ^Y) causes WordStar to print continuously. This assumes you are printing on continuous forms.

To print on single sheets which must be individually loaded into the printer, such as letterheads, give a "yes" response (Y or y or ^Y) to this question. WordStar then pauses after printing each page. When such a pause occurs, PRINT PAUSED appears in the status line. After changing the paper, type a P (no file) or ^KP (while editing a file) to continue printing.

USE FORM FEEDS (Y/N): ■

Normally, WordStar sends the correct number of line feeds to the printer to advance to the top of the next page. Answering Y to this question causes WordStar to send a "form feed" character (0C hex) instead of multiple line feeds between pages, and also before the first page (most printers ignore form feeds when already at top of form.) Of course, the printer must be equipped to respond to form feeds, and the paper must be loaded into the printer with the top of form in the desired position.

Using form feeds is faster with some non-daisy printers, and eliminates the need for the Paper Length set with the .PL command to exactly match the forms and the need to vertically position the paper manually before initiating print.

SUPPRESS PAGE FORMATTING (Y/N): ■

A "Y" response to this question causes WordStar to print the dot commands in the file, rather than interpreting them. The page formatting normally done under control of the explicit or default dot commands is not done -- (no top margins, bottom margins, page offsets, headings, footings, or page numbers are added to the text in the file). The output will print across the folds in the paper if not already paginated. Most print control characters in the file are interpreted regardless of the answer to this question.

Use of the SUPPRESS PAGE FORMATTING option yields a printout of the exact contents of the file, rather than a formatted document, allowing you to proofread the dot commands. This option is also appropriate for printing already-paginated files not created by WordStar, and for printing disk files created with the print function DISK FILE OUTPUT option.

READY PRINTER, HIT Return: ■

Make sure your printer is ready - turned on, set "on-line", whatever your equipment requires. Unless the USE FORM FEEDS option was specified, make sure the paper is positioned where you wish the top of the first page to print. If the paper is positioned part way down a page, each successive printed page will begin at this position.

Then press any key. Printout will begin, and control will return to the no-file menu or to the edit function.

SUPPRESS PAGE FORMATTING (Y/N): ■

A "Y" response to this question causes WordStar to print the dot commands in the file, rather than interpreting them. The page formatting normally done under control of the explicit or default dot commands is not done -- (no top margins, bottom margins, page offsets, headings, footings, or page numbers are added to the text in the file). The output will print across the folds in the paper if not already paginated. Most print control characters in the file are interpreted regardless of the answer to this question.

Use of the SUPPRESS PAGE FORMATTING option yields a printout of the exact contents of the file, rather than a formatted document, allowing you to proofread the dot commands. This option is also appropriate for printing already-paginated files not created by WordStar, and for printing disk files created with the print function DISK FILE OUTPUT option.

READY PRINTER, HIT Return: ■

Make sure your printer is ready - turned on, set "on-line", whatever your equipment requires. Unless the USE FORM FEEDS option was specified, make sure the paper is positioned where you wish the top of the first page to print. If the paper is positioned part way down a page, each successive printed page will begin at this position.

Then press any key. Printout will begin, and control will return to the no-file menu or to the edit function.

11.2 Suspending and Aborting Print

A print command (P if no file, ^KP while editing) given while printing is in progress will cause WordStar to stop printing, display a message showing the name of the file being printed, and ask the following question:

TYPE "Y" TO ABANDON PRINT, "N" TO RESUME, ^U TO HOLD: ■

A "Y" response causes the print in progress to be aborted.

An "N" response causes printing to continue. You may resume printout after stopping to adjust the paper in the printer, etc.

An interrupt character (^U) causes control to return to the no-file menu or to the edit function with the print suspended ("paused") but not aborted. The next print command typed will cause print to continue. Any number of other commands may intervene before printing is continued.

To abort when print is already "paused" (next subsection): resume, then stop by typing two print commands in succession. This will get you the ABANDON question; answer Y.

11.3 Continuing Print

Whenever printing is "paused" (suspended), printing can be resumed by entering a print command - P if no file being edited, ^KP if editing.

Print can become "paused" for any of the following reasons:

1. PAUSE BETWEEN PAGES option in use and page completed (section 11.1);
2. ^C print control character (pause until resumed by operator, as for typewheel change, Section 10.1) encountered in file;
3. Print stopped by operator with print command, then ^U entered at RESUME question (section 11.2);
4. Disk full when DISK FILE OUTPUT is in use (an explanatory message is also displayed; see discussion in Section 12.7).

When printing is "paused", PRINT PAUSE appears in the status line. When editing, an additional message, TYPE ^KP TO CONTINUE PRINT, is displayed above the main command menu.

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SECTION 12. ERRORS AND MESSAGES

This section contains explanations of WordStar's error and warning messages. Error messages that can occur while INSTALLing WordStar are described in Section 14.

12.1 The Disk Text File

Many of WordStar's messages are read in from a disk file WSMGS.COM as they are needed for display. This includes most error messages, the menus, and many explanatory messages. The messages are stored in a disk file in order to reduce WordStar's RAM requirements while allowing full, understandable message and explanation texts and multiple menus.

When WordStar is in use, the file WSMGS.COM should always be on the diskette in drive A, or in the diskette in the logged disk drive (if other than A), or both. If diskettes are changed during WordStar use, be sure to keep a diskette containing WSMGS.COM in drive A, or the logged disk drive, at all times. Operation of WordStar without WSMGS.COM present is normally an error, but experienced users may operate WordStar thus if desired.

If the message text file is not present, the following message appears:

Message text file WSMGS.COM not found.

Menus and some messages will display as

" @@@@ " only. "Help level" set to 0.

WordStar will continue running, but many messages will be replaced with "@@@@"; in particular, the menus will appear as @@@@ only. Hence WordStar sets the "Help Level" (Section 5.3) to 0 if WSMGS.COM is not present to minimize the display of messages and menus.

12.2 The Error Release Key

A number of the edit function errors require the user to hit the ESCAPE key after the error message is displayed. This is to make sure the message stays on the screen until read, and to insure that WordStar does not proceed to the next command even if the user has typed ahead. The messages for most of these errors have the form:

*** ERROR n: (specific message) *** HIT Esc KEY ■

When such a message is displayed, WordStar forgets any typed ahead characters and ignores further input until an ESCAPE is typed. Editing then continues; the command that caused the error usually will have made no change in the file and not moved the cursor.

If such an error occurs when the disk message text file (previous subsection) is not available, the message will appear as:

*** ERROR n: @@@@ HIT Esc Key ■

The @@@@ is printed in place of text that would have been obtained from WSMGS.COM had that file been present. The number (n) remains the same, so the message may be found in the following section.

12.3 Edit Function Error Messages

*** INTERRUPTED *** HIT Esc KEY ■

Occurs when the "interrupt" key, ^U, is pressed. This isn't actually an error, but the error message mechanism is used to call attention to the fact that the command in progress has been aborted and/or additional typed-ahead characters have been discarded. Hit the ESCAPE key and continue editing. Does not occur if ^U is typed when there is nothing to interrupt.

*** NOT FOUND: string *** HIT Esc KEY ■

Occurs when the Find (^QF), Replace (^QA) or Find/Replace Again (^L) command (Section 8.07) cannot find the specified string between the cursor position and the end of the document (beginning if B option used). The user's answer to the FIND? question is included in the message. The cursor is left at the end (beginning) of the document.

The ^QV command (Section 8.01) may be entered after a NOT FOUND message to return the cursor to the starting point. If a repeat count or the G option was given, this will be the position of the last occurrence found. Also, ^QP (Section 8.01) may be entered immediately after hitting ESCAPE to return the cursor to the position where the command was given, even if a count or the G option was used.

When a repeat count is specified, this message will occur if fewer occurrences are found. With the G (global) option, the message will occur only if no occurrences are found.

*** ERROR E5: THAT PLACE MARKER NOT SET *** HIT Esc KEY ■

You gave a "move cursor to place marker" command for a place marker that you have not set since you began editing the file you are now editing. As described above, press the ESCAPE key to release the error message and continue. Place markers are described in Section 8.08.

*** ERROR E6: BLOCK BEGINNING NOT MARKED
(OR MARKER IS UNDISPLAYED) *** HIT Esc KEY ■

You gave a block move (^KV), block copy (^KC), block delete (^KY), or block write (^KW) command without first marking the beginning of the text to be operated on with the mark block beginning command (^KB). As with all error messages containing "HIT Esc KEY", press the ESCAPE key to release the error.

To tell WordStar where the beginning of the block of text to move, delete, etc. is, position the cursor on the first character in the block, and type ^KB. After marking both the beginning and the end, repeat the command that yielded the error.

ERROR E6 also occurs after "hiding" (undisplaying) the block beginning marker with ^KB (cursor already at marker) or with block hide/display (^KH). In these cases the existing marker can be redisplayed with a(nother) block hide/display command (^KH).

See Section 8.09 for a full description of the block commands.

***** ERROR E7: BLOCK END NOT MARKED
(OR MARKER IS UNDISPLAYED) *** HIT Esc KEY █**

Similar to error E6 except end is not marked. To tell WordStar where the end of the text to operate on is, place the cursor on the CHARACTER AFTER the last character to move, delete, etc., and type ^KK. After marking the end of the block (or causing the marker already set to display), repeat the command that gave the error. See Section 8.09.

***** ERROR E8: BLOCK END MARKER BEFORE BLOCK BEGINNING MARKER
*** HIT Esc KEY █**

You have put the end marker earlier in the file than the beginning marker, and it is not clear to WordStar what text to block move, copy, delete, or write. Correct the markers, then reissue the command that gave the error. Section 8.09.

***** ERROR E9: BLOCK TOO LONG -
MOVE OR DELETE IN TWO SMALLER BLOCKS *** HIT Esc KEY █**

The amount of text between the beginning and end markers is more than WordStar can block move, copy, or delete. Operate on it in two or more smaller pieces.

Users with minimal RAM will see this message a lot; with more RAM, it will occur less often. The number of characters that may be in a block is about 500 in the smallest RAM that WordStar will operate in and every added K of RAM adds 1024 characters to the maximum block size. Adding 8K adds about 8000 characters to the block size, making it possible to move seventeen times as much text.

The block write command is not subject to any block size limitation.

***** ERROR E11: THAT FILE EXISTS ON DESTINATION DISK.
DELETE EXISTING FILE FIRST,
OR USE A DIFFERENT DISKETTE. *** HIT Esc KEY █**

This message only occurs when you have specified that a file on one diskette be edited and the new version be placed on a different diskette. See "Starting WordStar", Section 5.1 and the D command in Section 5.2. This message indicates that a file with the same name and type already exists on the destination drive (the second drive name given). If WordStar proceeded in this situation, the existing file on the destination diskette would be lost. This error prevents inadvertent file destruction.

After the ESCAPE key is pressed, WordStar goes to the no-file menu; the requested edit is not initiated. From the no-file menu you can delete the existing file if desired, then re-invoke the edit with the D command. Alternatives include inserting a different diskette to accept the destination file, and exiting to the operating system and using the RENAME command to change the name or type of one of the files.

**Can't edit a file of type .BAK or .\$\$\$
-- RENAME the file before editing**

Occurs at D or N command from no-file menu if the file name entered ends in .BAK or .\$\$. The edit is not initiated and the no-file menu remains on the screen. If you really wish to edit the file, eXit to the operating system, copy (with PIP) or rename (with the REN command) the file to a different type, then re-invoke WordStar and initiate the edit. Alternately, for a file of moderate size, you could edit a new file name and then read the .BAK or .\$\$ file into it with the additional file read (^KR) command.

**ALLOW PRINT TO FINISH BEFORE EDITING A FILE.
YOUR SYSTEM DOES NOT HAVE ENOUGH MEMORY TO
PERMIT SIMULTANEOUS EDITING AND PRINTING.**

Occurs at D or N command from no-file menu if the print function is in use and your system has relatively little memory, or the operating system is not relocated to make all memory present available to WordStar (see description of error F25 in Section 12.6). The edit is not initiated; the no-file menu remains on the screen. See Section 13 with regard to memory requirements.

***** ERROR E12: DISK FULL *** HIT Esc KEY ■**

The diskette is full. May occur when moving cursor towards beginning of a large file (see "Long Document Considerations", Section 9.2), in which case it will still be possible to move the cursor toward the end of the file and to save your work. If it occurs while moving cursor forward or while saving, you are probably out of luck. **DON'T LET YOUR DISKETTE GET FULL!**

To prevent full diskettes, check your file sizes and disk space frequently with the system STAT command, and keep lots of extra space on each of your diskettes. See Section 3.07 for further discussion of diskette space.

Suggestions for recovering from a DISK FULL error:

1. If cursor was being moved toward the beginning of a large file (see section 9.2), it may still be possible to move it toward the end. In that case, get back to the beginning by SAVING with ^KS, then move FORWARD to the desired position.
2. If cursor was being moved toward end of the file, or the DISK FULL error occurred while saving, first delete (^KJ command) any unneeded files. You could also delete any file that you know you could replace later from another diskette, including WS.COM or even WSMSSGS.COM. Proceed with your edit, and remember to arrange more diskette space (e.g. by moving some documents to a different diskette) after saving.
3. If deleting files doesn't allow you to complete your edit, and you don't have much work to lose, abort the edit, make more diskette space available (erase unwanted files or move some files to another diskette), then repeat the edit.
4. If you have made substantial changes or additions, and thus don't want to abort the edit, yet can't get enough space to complete the edit by deleting files, one of the following drastic measures may work:
 - a. If there extra space on a diskette in the other drive, try putting the changed portions of the file on it with block write. Then recombine in a subsequent edit after arranging more diskette space.

- b. Delete unchanged portions of the file until saving does not yield a DISK FULL error. Then recover these portions from the BAK file or from a previous backup copy you (hopefully) kept.
- c. Desperate measure, use only with extreme caution and only if you have a lot of work at stake: if the entire original file has been read, that is, if you can do an ^QC command and see the end of the file on the screen, delete the input file with the ^KJ command. Then save. WordStar may bomb out with a fatal error F29, in which case your file will have type \$\$. Use the operating system RENAME command to reestablish the type. There will be no BAK file. Arrange for more diskette space and make a backup copy.
- 5. If the DISK FULL arises out of a block write (^KW) command, the above recoveries are not relevant. Delete (^KJ) the file written, as it is incomplete and not "closed". If you can arrange additional disk space by deleting other files or using a different drive, repeat the block write. Then proceed with your edit.

Sometimes as soon as you hit the ESCAPE key, another DISK FULL error will occur. In this case your diskette is really full and you are out of luck. Don't let this happen -- watch your disk space!

THE BEST CURE FOR DISK FULL ERRORS IS PREVENTION!

FILE name.typ NOT FOUND

The file named in response to the FILE NAME? question asked by the additional file read command (^KR, Section 8.09) or the print command (Section 11) does not exist. The actual name you typed appears in the message; the message appears on the screen below the FILE NAME? question, and the cursor is replaced after the question. Enter the corrected name -- be sure you include the drive if needed -- or just enter RETURN if you don't want to complete the command. Forward cursor (^D) and ^R can be used to bring back characters from the previous answer without retyping them (Section 9.1).

Note: the delete file command (^KJ; Section 8.10) does not indicate whether the file existed; the block write command (^KW) does not indicate whether a file with the given name already exists, but destroys any previous contents.

BAD FILE NAME: xxxxx

Similar to the previously described error; whatever you typed in response to the question (echoed back in the message where xxxxx is shown above) was not a correctly formed file name. File naming is described above in Section 3.06 and is detailed in your system documentation; the D command summarizes the form of file names on the screen.

Note: WordStar will not accept "wild card" file names containing * or ?; those characters get the above error.

```
*** INTERNAL ERROR I15: INVALID COPY LENGTH *** HIT Esc KEY ■
*** INTERNAL ERROR I16: INVALID ADDRESS *** HIT Esc KEY ■
*** INTERNAL ERROR I17: MEMORY FULL *** HIT Esc KEY ■
*** INTERNAL ERROR I18: MEMORY SHORTAGE *** HIT Esc KEY ■
*** INTERNAL ERROR I19: POINTER > 64K FROM CURSOR *** HIT Esc KEY ■
```

The above are internal errors which should not occur. If one does occur, saving immediately and exiting to the operating system is recommended. Make a copy of the .BAK file, as the internal error may have garbled your document. Then reinvoke WordStar and check your file. If one of these errors

is reproducible (i.e. if you can find a reliable way to make it happen again), please report it to MicroPro International Corporation.

12.4 Warnings

The following are warnings, for your information. See also Section 12.7 for Print Function Warnings.

*** WARNING: WORD TOO LONG TO FIT MARGINS

When forming a line, WordStar found more characters than would fit between the currently set left and right margins with no word break (space or hyphen). For example, if you type a line of '*'s across the screen, (e.g. as part of a table heading), with word wrap on and the margins not released, this message will appear when it gets wider than the margins. You can leave it too wide, or delete the excess '-'s, depending how you want the page to appear. The message will also appear on a "word" too long during paragraph reform (^B).

When a "word" is too long, WordStar looks about 10 characters beyond the margin for a break. If found, it is used, and the "word" is allowed to project into the right margin. If not found, the word is split AT the margin.

CAN'T DISPLAY PAGE BREAKS IN A NON-DOCUMENT FILE

An ^OP command was given during a "non-document" edit invoked with the N command (sections 9.5 and 5.2). The command was disregarded.

PUT AT FILE BEGINNING FOR CORRECT PAGE BREAK DISPLAY

This appears, highlighted, ON THE SCREEN LINE with a .PL, .MT, .MB, or .LH dot command that is preceding by document text (anything, including blank lines, other than dot commands) when page break display is on. The intent of this message is to remind you that dynamic page break display (Section 4.5) will not pick up and respond to this dot command, and thus may show different page breaks during editing than will occur on printout. The command is nevertheless entered into the file, and will be interpreted by the print function. The message is on the screen only; it is not entered into your document. This message does not appear if page break display is off (^OD command) or during non-document edits (N command, Section 9.5).

?

A question mark appears in the rightmost screen column, highlighted, opposite incomplete or apparently erroneous dot commands. An unrecognized two-letter code, a missing numeric argument where required, or a number greater than 255 (except except with the .PN command) will cause a ? to display. Also appears as a command is being entered; disregard until command is fully typed. Does not appear during non-document edits (N command, Section 9.5).

Message text file WSMGS.COM not found.
Menus and some messages will display as
" @@@@ " only. "Help level" set to 0.

Occurs when WordStar is started, when at the no-file menu, and/or when editing of a file is initiated if the message text (WSMGS.COM) is not found on the diskette in drive A: nor on the diskette in the current logged drive. See "The Disk Text File", Section 12.1.

@@@

The disk text file WSMGS.COM is not present, and WordStar tried to display some message or menu (including the no-file menu) from that file. See "The disk Text File" at the beginning of this section.

Note: the most common and important error messages will display even if WSMGS.COM is not on line, or will display part of their text (including the error number, if any), followed by **@@@**. However, the menus will be completely unavailable and only **@@@** will appear at the top of the screen.

***** WARNING:**

**WRONG VERSION OF WSMGS.COM --
SOME MESSAGES MAY BE INCORRECT *****

Occurs if the disk text file WSMGS.COM in use is that from a different release than the WordStar (WS.COM) being run. The message file may not contain all of the correct messages; some messages may be absent. WordStar execution continues; an attempt to display a message not in the text file will yield: **IF THIS DISPLAYS YOU ARE USING WRONG VERSION OF WSMGS.COM.**

Exception: the first release of WSMGS.COM did not contain the **WRONG VERSION OF WSMGS.COM** warning; use of a later WS.COM with the earliest WSMGS.COM will cause **IF THIS DISPLAYS THERE IS A BUG** to display.

!'s and beeps

!'s appear on the screen, wherever the cursor happens to be, usually accompanied by beeps from the terminal, when WordStar is receiving keyboard input at a faster rate than it can process and has exhausted its capacity to store characters for later processing. This normally occurs only when using the REPEAT key on the terminal, or holding down an auto-repeat key. The !'s and beeps are to warn you that WordStar is losing keystrokes; stop typing or release the key you are REPEATING when they occur. After processing all characters not missed, WordStar will redisplay the screen, removing the !'s. You may then continue editing.

***** WARNING: DISK FULL,**

**OLD .BAK FILE HAS BEEN DELETED TO MAKE SPACE
(NORMALLY, THE PREVIOUS BACKUP FILE IS DELETED
ONLY AFTER EDIT IS SUCCESSFULLY COMPLETED).**

If you are working with files of moderate size, take this as a warning that your diskette is filling up. Save the document you are working on, and make more diskette space available (by deleting unwanted files, or moving some files to new diskettes) before proceeding. See Section 3.07 about diskette space and file sizes, and Section 3.11 about .BAK files.

When working with files so large that three copies of the file cannot fit on a diskette (two copies if you have specified a different destination diskette), this message will always occur in the course of an edit. Disregard it. See Section 9.2, "Long Document Considerations".

**WARNING: You are editing the same file as you are printing.
WordStar will not allow you to save the edited version
until the print has completed or has been abandoned.**

WordStar permits editing and printing the same file at the same time, but the edited version cannot be saved while the print is in progress. When you initiate editing of the file that is being printed, the above warning message is displayed.

12.5 Informational Messages

FINISHING PRINT BEFORE EXIT (type ^U to cancel exit command) ...

Occurs if an X command from the no-file menu, or an ^KX command while editing, is given while the print function is active. Printing will continue; the exit to the operating system occurs when printing completes.

FINISHING PRINT OF SAME FILE BEFORE SAVING (Type ^U to cancel Save command) ...

Occurs when any Save command (^KD, ^KS, ^KX) is given while the file that is being edited is also being printed. WordStar will wait for the print to complete, then save. If you wish to use other commands before the print and save are complete, interrupt the save command by typing ^U. Note that if printing is paused, WordStar will wait forever if left to itself. In this case, type ^U to cancel the save command, then issue the appropriate commands to continue or abandon printing.

FINISHING PRINT OF .BAK FILE BEFORE SAVING (Type ^U to cancel Save command) ...

Occurs if any Save command is given while printing the .BAK file of the file being edited; similar to preceding message.

12.6 Fatal Errors

The following errors terminate WordStar execution and return control to the operating system.

You are attempting to run an uninstalled WordStar. Please run INSTALL first.

Occurs upon invoking the uninstalled WordStar (file WSU.COM) supplied on the distribution diskette. Before attempting to run WordStar, "Install" WordStar for your particular terminal and printer by invoking the INSTALL program, also supplied on the distribution diskette, and answering the questions it asks. See Section 14 for details on installation.

***** FATAL ERROR F23: INVALID SCREEN HEIGHT OR WIDTH**

This can occur only after an error has been made in custom installation by "patching" as described in Section 15. The screen height is set less than 16 or greater than 120 lines, or the screen width is set less than 64 or greater than 250 columns.

***** FATAL ERROR F25: NOT ENOUGH MEMORY OR YOUR OPERATING SYSTEM IS NOT RELOCATED TO MAKE ALL RAM AVAILABLE**

Occurs when WordStar is started. Not enough memory is available for WordStar to operate in. See Section 13 for memory requirements. Note that your operating system (CP/M or equivalent) must be "relocated" to operate at the top of memory; this is accomplished with a system command, sometimes called "CPM", "MOVCPM", or "RELOC". See your system documentation. Whenever more memory is added to your system, such relocation must be repeated before the memory will be used.

***** FATAL ERROR F27: DISKETTE DIRECTORY FULL**

The number of file directory entries a diskette can hold has been exceeded. This happens rarely, as the byte capacity is usually the ruling factor, but if you use many small files, such as 1-page letters or paragraphs of boiler plate, you may find it necessary to watch your file count.

The maximum number of file directory entries on a diskette is system-dependent but is often 64 entries on single density diskettes. Each file requires one entry, and any file over 16K (about 16000) characters long requires an additional entry for each additional 16K or fraction thereof. When counting files remember that WordStar can generate two working files, each possibly as long as the file being edited.

***** FATAL ERROR F28: CLOSE FAILURE
SYSTEM FAILURE, OR YOU CHANGED DISKETTES******* FATAL ERROR F29: RENAME FAILURE
SYSTEM FAILURE, OR YOU CHANGED DISKETTES**

These messages should not occur; they indicate some sort of operating system error has occurred, or you changed the diskette in a drive during an edit, or you deleted the input file or the work file with the ^KJ command.

12.7 Print Function Messages

The following messages can occur during the dialog to initiate printing:

FILE name.typ NOT FOUND

BAD FILE NAME: xxxxxx

Name of a non-existent file, or an invalidly formed file name, entered. Descriptions in Section 12.3 apply.

WARNING: You are printing the same file as you are editing.
The last saved version will be printed, not reflecting unsaved changes. Furthermore, WordStar will not allow you to save the edited version while the print is in progress.

This warning occurs when the ^KP command is used to initiate print and the file name entered is that of the file being edited. The warning reminds you that WordStar does not permit saving (^KD, ^KS, ^KX) while the same file is being printed, and that WordStar prints only disk-saved files -- edits you have not yet saved will not be printed.

**END EDIT (^KD) BEFORE STARTING PRINT.
YOUR SYSTEM DOES NOT HAVE ENOUGH MEMORY TO
PERMIT SIMULTANEOUS EDITING AND PRINTING.**

Occurs when the ^KP command is given if your system has insufficient RAM to support concurrent printing and editing. (May also occur if your operating system isn't relocated to make all RAM available; see the description of error F25 in Section 12.6.)

When DISK FILE OUTPUT is in use, the following can occur:

***** FATAL ERROR F25: DISKETTE DIRECTORY FULL**

As described in Section 12.6.

***** PRINT OUTPUT DISK FULL. PRINT PAUSED. *****

Occurs when the diskette on which the print output file is being written becomes full. A print pause is automatically invoked; PRINT PAUSED appears in the status line as usual. After this message, you may make additional diskette space available (for example, by deleting files; see discussion of ERROR E12 in Section 12.3), then continue the print with the usual command (P on no-file menu, or ^KP while editing). If you continue the print without making more diskette space, the PRINT OUTPUT DISK FULL message will recur after about a second.

If you wish to abandon the (paused) print after the output diskette has filled up, type two print commands in rapid succession, then answer Y to the question evoked by the second print command — that is, at the no-file menu, type P^Y; while editing, type ^KP^KPY. After abandoning, you will probably want to delete the disk output file, since it will be incomplete and not "closed". Be sure to abandon the print before deleting the file.

Other than the above, the print function has no error messages — other conditions, such as invalid dot commands, are handled by ignoring the command or making an assumption. See Section 11, "The Print Function".

12.8 Some Operating System Messages

These are some of the messages from the operating system that may arise in conjunction with WordStar use. Texts vary from system to system; those shown here are typical only. Refer to your system documentation.

LOAD ERROR or TOO BIG

Occurs at attempt to invoke WordStar if you have far too little memory, or your operating system is relocated for far too little memory. This message means that the WordStar program (WS.COM) won't fit in the memory available.

DISK d: NOT READY

Means that WordStar accessed a diskette drive that contained no diskette, or the diskette was present but the drive door was not closed. WordStar always requires a diskette in drive A, and in the current logged drive if other than A, as well as in any drive addressed by a WordStar command. Most systems will proceed when the diskette is inserted. The message may appear if a diskette is inserted and a command is then given without waiting a few seconds; in this case, disregard it.

BDOS ERR R/O

Occurs on some systems if you change diskettes when you shouldn't, or changed diskettes when at the system prompt (A>) and neglected to type ^C. If you get this message, reread Section 3.10 about diskette changing.

SECTION 13: SYSTEM REQUIREMENTS

This section is intended for readers who wish to select a computer system on which to use WordStar, and those who wish to determine whether WordStar can be used on their present system.

WordStar's system requirements are an 8080/8085/Z80 Microcomputer with adequate RAM, floppy disk drives, a CRT terminal or video board, and CP/M or a similar operating system, such as IMSAI IMDOS, Cromemco CDOS, etc. Although the edit function of WordStar may be used without a printer, you will normally also want a printer or access to another system with a printer.

Disk Drives: Two floppy disk drives are highly recommended, to allow convenient back up of files and set up of new working disks, but one can be used if you have a means of copying files from diskette to diskette.

Terminal or Video Board: Any CRT terminal or video board providing a display area of at least 16 lines by 64 columns (and not larger than 120 lines by 250 columns) capable of displaying ASCII codes 20 thru 7E hex and with cursor positioning and clear screen functions may be used. The terminal must be accessible as the "console" device under CP/M; certain video boards (see Section 14) may also be accessed on a direct memory mapped basis for fastest display.

CRT's with line insert, line delete, and character-by-character inverse video or bright/dim provide enhanced performance with WordStar; video boards accessed on a direct memory mapped basis also provide excellent performance.

WordStar must "know" the control sequences used by the particular terminal or video board to position the cursor and perform other (optional) functions; these are set by the "installation" procedure, Section 14. WordStar may be installed for many common terminal types via a simple menu selection.

RAM Memory: A minimum of 48K RAM is required when using a terminal with a 24 x 80 or smaller screen, including space for the operating system (CP/M) and text work areas. 3K more are required to edit and print at the same time. Terminals with unusually large screens require one additional byte for each character position on the screen in excess of 1920 total characters. (2K less are adequate if you have one of the video boards that WordStar can access in direct memory mapped mode - see Appendix A).

While WordStar is perfectly usable in the minimum amount of RAM, additional RAM is recommended for systems which will be used intensively in word processing applications involving documents longer than a few pages. Each additional K increases by 1024 characters the amount of text that can be held in RAM simultaneously; thus, more RAM speeds editing and increases productivity by reducing disk access. (Additional RAM does not affect maximum file size; file size is limited by the capacity of the diskette, not of the RAM.)

Printer: WordStar can be installed to drive virtually any printer. The features available are limited to those supported by the printer. Special installation is required to access some features of some printers. Under-lining, boldface (multi-strike method), and double strike require a printer that can overprint (most printers have this capability). Microspace Justification, variable line height, variable character pitch, subscripts, superscripts, boldface (offset and restrike method), and use of a two-color ribbon (without special installation) require a Daisy Wheel or other printer capable of incremental motion, such as a Diablo, Qume, or NEC.

For a large installation, you will probably want a line printer for fast draft printout and daisy wheel printers for high quality final copy printout. When multiple work stations are used, it is practical to omit the printer (commonly the most expensive hardware item) on some, using these as editing stations only and moving documents on diskette to a printing system.

The printer may be accessed as the CP/M "list device" or by direct I/O to the printer interface ports. Provision is available for the "ETX/ACK" communications protocol required to run some daisy wheel printers at maximum speed without buffer overrun.

The following daisy wheel and similar printers are currently supported; a simple menu selection (detailed in Section 14) will install WordStar to make use of all capabilities for one of these printers. Furthermore, WordStar prints bidirectionally on these printers.

Diablo 1610/1620, 1640, 1650
Qume Sprint 5
Nec 5510/5520

All other printers ("Teletype-like" or "non-daisy" printers) are treated in two classes, those that can backspace and those that cannot. The ability to return the carriage without feeding the paper is assumed; if this ability is lacking, overprint lines, boldface, and double strike will not work, but WordStar will be otherwise functional. WordStar can be installed for a basic "Teletype-like" printer of either class via selection from a menu. Through special installation, additional printer capabilities of the printer can be supported: choice of two character pitches, two ribbon colors, and up to four other special functions.

The next section, Section 14, details installing WordStar to work with your terminal and printer.

SECTION 14. INSTALLATION

The "Installation" procedure sets up WordStar to work with your particular terminal and printer. This procedure enables one distributed WordStar version to work with a wide variety of computer equipment. For most cases, installation is accomplished by entering choices from menus, as described in this section. For exceptional terminals and printers, and for achieving refinements in installation, there are extensive provisions for "patching" by a programmer as described in Section 15.

14.1 Terminal Installation Considerations

WordStar's installation dialog can automatically supply the necessary control codes for many of the most common terminals, including the following:

LEAR-SIEGLER ADM-3A	LEAR-SIEGLER ADM-31
HAZELTINE 1500	SOROC IQ-120
MICROTERM ACT-IV	BEEHIVE 150 / CROMEMCO 3100
IMSAI VIO	PROCESSOR TECH SOL
INFOTON I-100	PERKIN-ELMER 550 (BANTAM)
HEWLETT-PACKARD 2621 A/P	

If your terminal is not shown, you will need to determine its control codes for cursor positioning and screen clearing and for other (optional) functions, from the manufacturer's manual, then "patch" them in as described in Section 15.

Some terminals have option switches which must be correctly set:

CLEAR SCREEN, if present, must be ON (enabled);
CURSOR CONTROL, if present, must be ON;
AUTO LINE FEED, if present, must be OFF.

Usually such switches are hidden under a cover, on the back of the terminal, or inside the case. In Appendix A, we give hints with regard to some specific terminals.

14.2 Printer Installation Considerations

Daisy Printers and Teletype-like Printers

WordStar supports two classes of printers: Daisy Wheel and Similar Printers, and "Teletype-like" Printers (i.e. most other printers). We will discuss the general characteristics and capabilities of these classes of printers here, and also other considerations relating to printer installation. Appendix B gives additional specific information for each particular printer supported. Section 14.4.2 describes the actual printer installation procedure used once you know what choices you wish to make.

Daisy Wheel and Similar Printers: these are printers capable of incremental horizontal and vertical motion, allowing use of variable line height, variable character spacing, subscripts, and the rest of WordStar's print enhancements as described in Sections 2 and 10. "Microspace Justification" is automatic when printing on a daisy wheel or similar printer. Since the control sequences are different for each daisy wheel or similar printer, WordStar must be specifically installed for the printer that is to be used. WordStar can be installed for one of the following daisy wheel and similar printers via a simple "menu" selection which will be detailed in Section 14.4.2:

Diablo 1610/1620
Diablo 1640/1650
Qume Sprint 5
NEC Spinwriter 5510/5520

Selecting one of the above printers from the menu installs WordStar to make use of all capabilities of that printer. WordStar will print bidirectionally if any of the above printers are selected.

When using one of the above printers with WordStar, you will generally wish to set the printer and the computer interface to 1200 baud (120 characters per second), the highest transmission speed supported by these printers. When printing Microjustified text, or when printing underline, boldface, or other enhancements on a daisy wheel or similar printer, WordStar sends many control sequences in addition to the characters to be printed this results in a printing speed far slower than the printer's capability if the printer is interfaced at 300 baud (30 characters per second) or less. Use of 1200 baud requires use of a "Communications Protocol" to prevent loss of characters.

"Teletype-like" Printers: this class includes almost all printers other than daisy wheel and similar printers -- any printer that prints the ASCII printing characters (codes 20 through 7E hex) and responds to the carriage return and line feed codes. Using a Teletype-like printer, WordStar can underline, strike out, double strike, and overprint. Boldface is printed with three strikes. Subscripts and superscripts are printed in the line below or above if that line is blank, otherwise in the line in which they appear. Variable line height is not available. A choice of two character pitches and two ribbon colors is available through special installation, described in Section 15.2. Right-justification of printout on a Teletype-like printer is accomplished by inserting whole spaces between words, as on the screen during editing.

A daisy wheel or similar printer will operate with a WordStar installed for a Teletype-like printer, but only the Teletype-like printer capabilities will be available, and bidirectional printing will not occur.

Two menu selections are provided for Teletype-like printers:

- A. Any Teletype-like Printer
- B. Teletype-like Printer That Can Backspace

Selecting A or B above installs WordStar to make use of the basic capabilities common to all Teletype-like printers. Use of additional capabilities of specific printers, such as character pitch change or ribbon color change, can be enabled via special installation as detailed in Section 15. The Backspacing selection produces faster printing of underline, boldface, double strike, and backspace. Use this selection if you know your printer can backspace; if you are in doubt as to whether your printer can backspace, Selection A will work.

Other Printers: Generally, WordStar is installed for printers that are not Teletype-like (nor among the specific daisy wheel and similar printers supported) by making one of the two "Teletype-like" selections in the installation dialog. Additional patches, if required, are covered in Section 15.2.

Both of the "Teletype-like" printer selections (A and B above) assume the printer will return carriage without advancing to the next line when sent a carriage return code that is not followed by a line feed code. If your printer cannot return its carriage without advancing to the next line, but can backspace (Selection B), overprint lines (see Section 8.06) will not print correctly, but WordStar will be otherwise operational. If your printer cannot return the carriage without feeding to the next line, nor backspace, use Selection A and avoid use of underline, strikeout, boldface, double strike, backspace, and overprint lines.

If your printer can return the carriage independently of advancing the paper, but does these functions under control of characters other than the standard ASCII carriage return and line feed codes, WordStar can be made fully operational with your printer by patching the appropriate control strings as described in Section 15.2.

Another selection on the Printer Menu, "Half-Line Feed Printers", is intended to facilitate installation for printers that can advance the paper one-half line at a time; the half-line advance is utilized in printing subscripts and superscripts. After making this selection, patches will probably be required. See Section 15.2 and Appendices B and C.

Communications Protocols

A "Communications Protocol" is a convention whereby the printer tells WordStar when to stop transmitting characters while those already received by the printer are printed, and when to resume transmitting.

A communications protocol is not necessary with most Teletype-like printers, as the interface hardware normally handles signalling when the printer is ready to receive the next character. Users with Teletype-like printers generally do not need to read this subsection.

A communications protocol is not necessary with a daisy wheel or similar printers interfaced at 150 baud (15 characters per second) or less, and generally not at 300 baud (30 characters per second). However, if you have such a printer interfaced at that speed, you will want to change it to 1200 baud when you discover how slowly it prints.

A COMMUNICATIONS PROTOCOL IS ALWAYS NECESSARY with a daisy wheel or similar printer interfaced at 1200 baud (120 characters per second) (the only exception is a NEC with a special cable, as noted in Appendix B). If no communications protocol is installed, the printer's buffer will overflow and characters will be lost. Usually, the printer buzzes when this occurs and some daisy printers stop printing completely under these conditions.

We will describe the available communications protocols in general here; see Appendix B for specific notes relating to your printer. The protocols supported by WordStar are "ETX/ACK Protocol" and "XON/XOFF Protocol".

ETX/ACK Protocol: under this protocol, WordStar sends a "message" consisting of a specified maximum number of characters, followed by an "ETX" character. After printing all characters up to the ETX, the printer transmits an "ACK" character back to the computer, thus signalling WordStar that another message may be transmitted. All daisy wheel and similar printers supported by WordStar can use this protocol, though some printers require specific optioning to activate it. See Appendix B and the printer manufacturer's documentation.

XON/XOFF Protocol: under this protocol, the printer transmits an "XOFF" character (DC3 ASCII code) to the computer when WordStar should stop transmitting characters, then transmits an "XON" character (DC1 ASCII code) when transmission may resume. XON/XOFF protocol is supported as an alternate protocol by some daisy wheel and similar printers; we suggest using XON/XOFF instead of ETX/ACK only if other considerations, such as other software to be run on the same hardware, necessitate its use, or if you have an unusual printer that will perform XON/XOFF but not ETX/ACK.

Both communications protocols require that the computer be able to receive characters from the printer as well as transmit characters to the printer. This complicates installation when a communications protocol is to be used, as the normal method of accessing a printer under CP/M, the "list device", provides only for transmission of characters from the computer to the printer.

Printer Drivers

The normal method whereby a program accesses the printer under CP/M and similar operating systems -- the "list output device" -- does not support receiving characters from the printer, as required by "Communications protocols" (preceding subsection).

Also, the list output device does not allow the program to determine whether the printer is busy or ready to receive another character. Determination of whether the printer is busy ("Printer busy test") is not essential to WordStar operation, but is desirable as it improves keyboard response and printer speed during concurrent editing and printing.

To handle communications protocols and printer busy tests, and accomodate special cases, WordStar provides several ways to access the printer. Each way of accesing the printer is termed a Printer Driver. When installing WordStar, one of the following printer drivers may be chosen. The following paragraphs discuss each printer driver in detail. Selecting the desired printer driver is accomplished during installation by selecting from a menu (Section 14.4.2).

- CP/M "List Output" Device (LST:)
- CP/M "TTY:" Console Device
- CP/M "CRT:" Console Device
- Port Driver (direct input/output by WordStar)
- Custom Subroutines

CP/M List Output Device (LST:): This driver outputs characters to the printer via the printer driver in your operating system. The list output device is the simplest way to access your printer if your printer requires no communications protocol (preceding subsection) and no printer busy test is desired. If your printer requires a communications protocol (as all daisy wheel and similar printers interfaced at 1200 baud do), you may wish to choose another of WordStar's printer driver options, or you may wish to make use of WordStar's provisions for installation of a user-supplied list device character input routine. (See Section 15.2).

The "CP/M list output device" choice will work correctly from WordStar only if your operating system can already output characters to the printer as the list device. Suitable installation of the operating system is often necessary to enable it to drive a specific printer. In some cases, the computer dealer or manufacturer supplies a CP/M with a suitable printer driver already installed. In other cases, the user must install a suitable subroutine in the "BIOS" portion of the operating system if the system is to drive the printer. Of course, such system installation is not necessary for WordStar use unless WordStar is installed to do printer output via the CP/M list device.

In many systems, the "list output device" (LST:) is a "logical" device which can be assigned to one of several "physical" devices. If this is true of your system (check your system manual), the necessary STAT or other command to assign LST: to the desired printer device must be given before invoking WordStar.

To verify that your operating system drives your printer and that LST: is indeed assigned to the printer, type a control-P at the system prompt (A>), then type additional characters. All additional characters typed on the console should be printed on the printer until you type another control-P.

CP/M has no provision for inputting characters from the list output device, as required by the communications protocols, nor does it have a uniform provision for a printer busy test. However, WordStar has provision for installation of user-supplied printer character input and printer busy test subroutines for use in association with CP/M list output device printer output. (See Section 15.2).

CAUTION: Do not attempt to install or use code IN THE OPERATING SYSTEM to implement ETX/ACK protocol when driving a Diablo daisy wheel printer. For WordStar to work with these printers under this protocol, the protocol MUST be executed by WordStar.

Alternate Consoles: In many versions of CP/M and similar operating systems, the "console" is a logical device (CON:) which can be assigned to any one of four physical devices, usually called "TTY:", "CRT:", "BAT:", and "ULL". The terminal used by the operator is one of the "physical" consoles and must be the active one when WordStar is invoked; WordStar can access the printer as another of the consoles. WordStar can be installed to access the printer as the TTY: or CRT: console device by making an appropriate selection at the Printer Driver menu (Section 14.4.2). The other two physical consoles can be accessed via patching (Section 15.2).

Accessing the printer as an alternate console allows inputting characters from the printer, as required by communications protocols, without system software modifications or patching. The TTY: or CRT: printer driver is often the most convenient printer driver choice when a communications protocol is required, as by a daisy wheel printer set to 1200 baud. Accessing the printer as an alternate console does not provide a printer busy test unless the user installs his own subroutine (Section 15.2).

TTY: Alternate Console Device Printer Driver: This driver accesses the printer as the "TTY:" console device. This driver will support communications protocols and may be used if your CP/M or similar operating system supports multiple consoles and the terminal from which WordStar is operated is not the "TTY:" device.

CRT: Alternate Console Device Printer Driver: Similar to the preceding, this driver accesses the printer as the "CRT:" console device. This driver will support communications protocols and may be used if your CP/M or similar operating system supports multiple consoles (and the terminal from which WordStar is operated is not the "CRT:" device).

Port Driver: WordStar's "Port Driver" bypasses the operating system and does input-output directly to the printer interface. The port driver supports character input from the printer and includes a printer busy test; it thus handles communications protocols (preceding subsection) and allows WordStar to provide the best keyboard response during concurrent editing and printing.

Installation of the port driver requires that you specify whether your printer interface uses "I/O ports" or is "memory mapped". If in doubt, assume "I/O ports" as this case is most common. Installation of the port driver requires determination of the output data port number (or memory address if memory mapped), output status port number, output status bits, and, if a communications protocol is to be used, the input data port, input status port number, and input status bits. If you don't know the port numbers for your interface, the WordStar installation program can be directed to search for the ports (as will be detailed later). In most cases, the search will find the port numbers

correctly. If you don't know the status bits, they can also be determined automatically.

If your printer interface involves more than one output data port (or memory mapped location), one output status port, one input data port, and one input status port, WordStar's port driver is not applicable. Otherwise, if you know your printer's port numbers (or memory mapped addresses) and status bits, or can determine them in your system with the installation program's automatic search features, the port driver is the best printer driver choice where a communications protocol is required or a printer busy test is desired.

Custom Subroutines Printer Driver: This printer driver selection calls user-coded, user-installed subroutines to output to the printer, input from the printer (for communications protocols), and determine whether the printer is busy. This choice may be used when the CP/M list device won't work (e.g. because a communications protocol, and thus printer character input, is required) and the port driver won't work (e.g. because an unusual printer uses several data or status ports).

After selecting "Custom Subroutines" on the menu, it is up to the user to code and install the necessary routines. See Appendix C for listings of the area in which to install your code, and Section 15.2 for discussion thereof.

Recap of Printer-Related Installation Selections

If you have a Teletype-like (non-daisy) printer and your CP/M or other operating system will already drive it, specify "Teletype-like" at the printer choice menu, specify "None" for communications protocol, and specify "CP/M List Output Device" for printer driver. Alternately, you may wish to use the port driver for better keyboard response during concurrent editing and printing.

If you have a daisy wheel or similar printer interfaced at 300 baud (30 characters per second) or less, and your CP/M can already drive it, specify the specific printer type at the printer choice menu, specify "None" for communications protocol, and specify "CP/M List Output Device" for printer driver. Or use the Port Driver if desired, for better keyboard response during concurrent editing and printing. You will want to change your printer to 1200 baud as soon as possible so WordStar will print faster.

If you have a daisy wheel or similar printer interfaced at 1200 baud (120 characters per second), you will need to use a communications protocol and a driver that can input as well as output characters. See Appendix B for specific discussion of your printer. Specify the particular printer type at the printer choice menu. Specify EIX/ACK protocol, and set the printer to match, unless unusual considerations dictate using a different protocol. For printer driver, we suggest using the port driver. However, if your operating system supports multiple consoles and your printer is already accessible, or can be easily made accessible as one of the console devices, you may wish to consider using one of the easier-to-install TTY: or CRT: alternate console drivers. The CP/M List Output Device printer driver cannot be used with a communications protocol unless you patch in your own Printer Character Input routine (Section 15.2).

If your 1200 baud printer is a NEC Spinwriter, you may be able to make a special cable instead of using a communications protocol. (See Appendix B). If you use the special cable, you may specify "None" for protocol and "List Output Device" or "Port Driver" for printer driver.

Printer Configuration

Some printers have option switches which must be correctly set. These switches may be on an external control panel, on a control panel under the printer cover, or buried on circuit boards inside the printer. Common switches include:

AUTO LF or LOCAL LF (makes printer line feed upon receiving a carriage return code): MUST BE OFF.

AUTO CR (makes printer start a new line if an overlong line is printed): OFF recommended.

SPEED: must match the rate at which your computer transmits characters.

PARITY: set to ignore parity ("M" position on some printers).

Communications Protocol: a "Communications Protocol" must be used with daisy wheel and similar printers interfaced at 1200 baud (120 characters per second), as discussed above. With many printers, use of a communications protocol requires setting switches or adding jumpers on circuit boards inside the printer. See Appendix B and your printer's documentation.

FORM LENGTH: should be set to match paper in use if USE FORM FEEDS print option is to be used.

SET TOF: press after positioning paper at top of form, if USE FORM FEEDS print option is to be used.

14.3 The Distribution Diskette

The diskette you receive upon purchasing WordStar contains the following files:

- | | |
|-------------|---|
| WSU.COM | Uninstalled WordStar; installation for your terminal and printer is achieved by running INSTALL as described in Section 14.4. |
| WSMSG.S.COM | WordStar message text file; should be on diskette in logged drive or drive A whenever WordStar is being used. |
| INSTALL.COM | WordStar installation program; used to customize (install) WordStar for a particular hardware configuration. |
| EXAMPLE.TXT | File of sample text demonstrating some features of WordStar. |

At your earliest convenience, make one or more backups of these files by copying them to another diskette and storing that diskette safely. The operating system command PIP may be used for this purpose.

For convenience in installing WordStar, we suggest that you copy the above files to a system diskette prepared as required for your system — refer to your operating system manual for the procedure to format a diskette (if required) and transfer the "system image" to the diskette.

14.4 Installation Procedure

Before installing WordStar, we recommend that you copy the files WSU.COM, WSMSG.S.COM, and INSTALL.COM from the WordStar distribution diskette to a system diskette prepared as required for your system. Refer to your operating system documentation for the procedure to format a diskette (if required) and to transfer the operating system's "system image" to the diskette (this transfer is accomplished in many systems with a program called SYSGEN). Then copy the files from the WordStar distribution diskette to this prepared diskette.

To initiate WordStar installation, insert the diskette containing WSU.COM, WSMSG.S.COM, and INSTALL.COM, type control-C (if your system is already up, or else cold-start (boot) the system), and type the command:

INSTALL

and a carriage return. INSTALL will take several seconds to load, after which it will display a signon message and ask its first question. At this point, the screen should appear as follows:

A>INSTALL

COPYRIGHT (C) 1979, MicroPro International Corporation

INSTALL for MicroPro WordStar release n.n

Do you want a normal first-time INSTALLation of WordStar?
(Y = yes; N = display other options): ■

In response to this question, type a Y. (If N is entered, additional options not needed for initial installation as described here are displayed. These Installation Options will be described in Section 14.4.4.) In response to the Y, INSTALL will tell you what it is going to do -- create an installed WordStar on file WS.COM, obtaining the uninstalled version from file WSU.COM -- and ask for your confirmation -- as follows:

This will INSTALL the WSU.COM on the current drive, save
the result on file WS.COM on the current drive, and then
run the INSTALLED WordStar. OK (Y/N): ■

Type a Y. (An N here produces additional options that you don't need now, as at the previous question). An error message will occur at this point if WSU.COM is not on the current (logged) drive (Section 14.4.5 below describes INSTALL's error messages; look there if you need further explanation of any error message displayed while you are INSTALLing your WordStar.)

14.4.1 Selecting the Terminal Type

The terminal choice "menu" appears next, as follows:

MicroPro WordStar release n.n serial 000000
No terminal has yet been selected
No printer has yet been selected

***** WordStar TERMINAL MENU *****

A Lear-Siegler ADM-3A	C Lear-Siegler ADM-31
D Hazeltine 1500	E Microterm ACT-IV
F Beehive 150/Cromenco 3100	G IMSAI VIO
H Hewlett-Packard 2621 A/P	I Infoton I-100
J Processor Tech SOL / VDM	K Soroc IQ-120
L Perkin-Elmer 550 (Bantam)	Z none of the above
U no change	W TRS80 Model-2

PLEASE ENTER SELECTION (1 LETTER): ■

Enter the letter corresponding to your terminal type. If your terminal type is not shown on the menu, enter Z for "None of the above", and, after completing the installation dialog, patch the required control functions for your terminal into WordStar as described in Section 15.1.

After the terminal type letter is entered, INSTALL will display a brief message confirming the terminal type and ask

OK (Y/N) :

If you made an error or wish to change your selection, type an N, and the TERMINAL TYPE question will be asked again. Upon repetition, a choice U for "NO CHANGE" will appear on the menu. When you answer Y to OK (Y/N) :, INSTALL will proceed to printer choice. A "B" can be entered at this or any following question to return to the terminal choice menu.

14.4.2 Printer-Related Selections

Installing WordStar for a printer involves choosing the specific printer type, communications protocol, and printer driver, as discussed in Section 14.2.

The next "menu" displayed by INSTALL allows you to choose the type of printer which the installed WordStar will drive:

***** PRINTER MENU *****

- A Any "Teletype-like" printer (ie almost any printer)
- C "Teletype-like" printer that can BACKSPACE
- D DIABLO 1610/1620 daisy wheel printer
- E DIABLO 1640/1650 daisy wheel printer
- F QUME Sprint 5 daisy wheel printer
- G NEC Spinwriter 5520/5520 thimble printer
- I "Half-Line-Feed" Printers
- U no change
- Z none of the above

PLEASE ENTER SELECTION (1 LETTER): ■

If your printer is listed, enter the appropriate letter. If you don't see your printer, enter A, (or C if you know your printer can backspace). See Section 14.2 above and Appendix B for futher discussion of the printer choices. INSTALL will then display a message explaining any special considerations relating the printer selection, then ask

OK (Y/N) :

If wish to change your selection, type an N, and the PRINTER question will be repeated. To proceed to the next menu, type a Y. Also, you may enter a B to return to the beginning of the dialogue. The space bar may then be hit to keep the prior answer to questions whose answer you do not wish to change.

The next menu displayed permits choosing a "Communications Protocol", as discussed in Section 14.2 above.

***** COMMUNICATIONS PROTOCOL MENU *****

A "Communication Protocol" is necessary with some printers to prevent printer buffer overflow and character loss.

- E EXT/ACK Protocol
- X "X-ON/X-OFF" Protocol
- N NONE required (or handled outside of WordStar)
- U no change

PLEASE ENTER SELECTION (E, X, N, B, or U): █

As discussed in Section 14.2, the appropriate answer is usually "None" except for daisy wheel and similar printers interfaced at 1200 baud (120 characters per second), for which the appropriate choice is usually "EXT/ACK". Enter the desired letter. INSTALL will then display a message confirming the selection, then ask OK (Y/N): as for the preceding menus.

The final printer-related menu permits choosing a printer driver:

***** DRIVER MENU *****

Or, how should WordStar send characters to your printer?

- L CP/M "List" device
- P Direct I/O to 8-bit port
- S User-installed driver subroutines
- U no change

PLEASE ENTER SELECTION (L, P, S, B, OR U): █

If "none" was specified for "Communications Protocol", then "CP/M List Output Device" is commonly the appropriate choice here. See Section 14.2 for further discussion. Enter the desired letter. INSTALL will display a confirming message and ask OK (Y/N): as after previous selections.

14.4.2.1 Port Driver

The following menus are only pertinent if you chose the "P" selection on the above menu:

At this time INSTALL prints a warning message prompting you to remove the disks from the disk drives. This is due to the fact that during the following procedure INSTALL may access a disk drive during testing of I/O ports. Please follow this instruction carefully.

The first decision to be made is whether the printer port is I/O or memory mapped.

| Are the printer ports I/O Ports or Memory Mapped (I or M): ■ |

Enter either "I" for "I/O" or "M" for "Memory Mapped" or <CR> for the default condition which is I/O.

The next decision is to let INSTALL determine the which ports your printer is connected to or to accept the port number from you.

| DO YOU WISH WORDSTAR TO DETERMINE THE VALUES OR SHOULD
| WORDSTAR ACCEPT THEM FROM YOU (D OR A): ■ |

Enter "D" if you want INSTALL to help determine it for you, or "A" to let INSTALL accept the values that you provide or <CR> for the default condition of "A". If you chose "D" skip the next step.

This step only pertains if you answered "A" to the last question.

| What is the OUTPUT port number in hex: ■ |

Enter the value. If you are not certain of the value, check the technical data on your computer and it should be listed there. Skip the next procedure as it does not pertain to the "A" choice.

This step only pertains if you answered "D" to the Determine/Accept question.

| Now OUTPUTing to PORT #: XX OK (Y/N): ■ |

Where XX represents the port # that INSTALL is outputting data to.

The initial value for the XX port is 00. INSTALL is now sending characters to that port. If the printer starts printing that is the port# your printer is connected to and you should answer "Y" to that question. If your printer is idle answer "N", and INSTALL will increment the port number and start outputting to that port.

After the Input port number is decided. The Input status port must be determined. Again we have the choice of accepting the port # from you or letting INSTALL determine the port #.

| DO YOU WISH WORDSTAR TO DETERMINE THE VALUES OR SHOULD |
| WORDSTAR ACCEPT THEM FROM YOU (D OR A): ■ |

Enter "D" for Determine, "A" for Accept, or <CR> for the default value of Accept. If you entered "D" then skip the next step.

This step only pertains if you answered "A" to the previous question.

| What is the INPUT STATUS port number in hex: ■ |

Enter the hexadecimal value of the INPUT STATUS port that is connected to the printer. If you are not sure of the value, consult the technical manual that comes with your computer or try letting INSTALL determine them for you.

If you answered "D" to the last Determine/Accept question, INSTALL will attempt to determine the status port number and will tell you the value. It will also determine the bits that change for printer ready. If the port and bits were determined you can skip the next paragraph.

INSTALL will ask questions to determine what the status bits are. The questions are in the same structure as the preceding questions, and you should respond accordingly.

14.4.2.2 Patch-Area Modification Routine

A brief description of the process for patching data will be printed on your terminal, followed by the (Y/N): prompt. Enter "N" if you wish to make a patch to the present program or "Y" to leave it unchanged. If you enter "Y" proceed to section 14.4.3.

This routine allows you to change the patch area listed in USER1 or USER4 of your manual. References can be made to memory addresses in one of two ways; by entering the numeric hexadecimal address of the memory location you wish to change, or by the label name as listed in the USER1 or USER4 listing. If you enter a label followed by a "+", the next number will be an offset added to the base address of the label (i.e. CLRSCR:+2).

| LOCATION TO BE CHANGED: ■ |

Enter either the hexadecimal value of the memory address to be changed or the label of the address to be changed. If a label has previously been entered, typing <CR> will cause the previously entered label to be the default value. If you are done entering data enter 0 to continue to section 14.4.3

INSTALL will now find the present data for the memory address or label entered, display the data and prompt you for the data you wish to replace it with.

| ADDRESS: AAAAH OLD VALUE: OOH NEW VALUE: ■ |

Where AAAAH represents the hexadecimal address of the data to change and OOH represents the old value that is presently occupying that memory address. Enter the hexadecimal data that you wish to be replace the old value with or <CR> to make no change. You will now be prompted to enter a new location.

14.4.3 Confirming / Correcting Your Selections

All of the installation choices have now been presented. INSTALL will next display the terminal type, printer type, communications protocol, and printer driver that you have selected, then ask OK (Y/N): yet once more. If you wish to make any changes, enter an N or a B, and INSTALL will return to the Terminal Menu, allowing you to repeat all of the selections. For those choices you do not wish to change, enter a space. INSTALL will keep the previous selection.

When everything is as you wish it, type a Y at this final confirmation. INSTALL will then automatically save the installed WordStar on a file named WS.COM, for future use, then start (pass control to) the installed WordStar, allowing immediate use.

The next two subsections describe installation options (not normally needed for initial installation) and explain the various error messages that can occur while INSTALLing.

14.4.4 Installation Options

As described above, the install program normally takes an uninstalled WordStar from file WSU.COM on the current drive, creates an installed WordStar on file WS.COM on the current drive, then runs the installed WordStar.

Occasions may arise when you wish to vary the above procedure. You might wish to use different file names, or files on drives other than the current drive. You might wish to start with a previously installed WordStar in order to change one of the selections without reentering them all.

INSTALL has provisions for operator entry of the file names to be used, and for return to the operating system instead of starting the installed WordStar. To use these options, invoke INSTALL, then type N at first question "Do you want a normal first-time installation?". INSTALL will then display the INSTALLATION OPTIONS menu as follows:

******* WordStar INSTALLATION OPTIONS MENU *******

- A INSTALLation of a distributed WordStar, INSTALLing WSU.COM, producing WS.COM, and then running the INSTALLED WordStar.
- B INSTALLation or re-INSTALLation of a WordStar COM file of your choice, placing the newly INSTALLED WordStar in a file of your choice, and then exiting to the operating system.
- C Same as B except run the INSTALLED WordStar.
- D Modification of the INSTALLation of a WordStar COM file of your choice. The modified WordStar replaces the original file. The modified WordStar is then run.

PLEASE ENTER SELECTION (A, B, C, or D): ■

Installation Option A: Selection A on the Installation Options menu corresponds to the normal case. The dialog then proceeds as described above, as though you had entered Y to the question "do you want a normal first-time installation?".

Installation Option B: Selection B asks for two file names as follows:

Filename of WordStar to be INSTALLED? ■

At this question, type in the name of the file from which INSTALL is to take the WordStar to be "customized" for your terminal and/or printer. Normally, this is file WSU.COM; you might want to enter, say, "B:WSU" to get WSU.COM from drive B even if the currently logged drive is A; or, you might want to enter the file name of a previously installed WordStar (e.g., "WS") in order to change some of the installation selections without reentering all of them.

Typing errors in the file name may be corrected by backspacing with control-H or rubout. Control-U may be used to erase the entire answer. Terminate your answer with the RETURN key. If you omit the period and file type, INSTALL will assume .COM.

If INSTALL does not find the file you specify, INSTALL will respond

THAT FILE DOES NOT EXIST

then repeat the question. Note that you must include the drive name (letter followed by colon) at the beginning of the file name unless the file is on the diskette in the current logged drive.

Filename for saving INSTALLED WordStar? ■

At this question, type in the file name on which you wish INSTALL to save the WordStar it has customized for your terminal and/or printer. "WS" is the normal answer to this question; you might want to enter, say, "B:WS" to save the WordStar on the diskette in the other drive; or might prefer a file name other than "WS".

After the two file names are accepted, the dialog under Option B proceeds as described above (Subsections 14.1.1-14.4.3). After the final confirmation, INSTALL saves (records) the installed WordStar on a file of the specified name and then exits to the operating system. Option B does not run the installed WordStar.

Installation Option C: Selection C on the Installation Options menu is the same as selection B — file names are requested as above — except that after the installed WordStar is saved on the disk, it is run. Option C is thus a convenience when immediate use of the installed WordStar is desired.

Installation Option D: Selection D on the Installation Options menu combines the two questions of selection B or C into a single question: one file name only is requested. WordStar is read from this file, customized for your terminal or printer as you specify during the dialog, then re-saved on a file of the same name. This option is a convenience when you wish to modify the installation of a previously-installed WordStar — for example, to change the printer type while keeping the same terminal, or to change the communications protocol without changing anything else.

When modifying the installation of a previously installed WordStar under options B, C, or D, you may type a U, or just press the space bar at any menu whose selection you do not wish to change. INSTALL will respond by displaying "Previous selection left unchanged:" and the previous terminal, printer, driver selection, communications protocol, etc, and allow you to confirm this unchanged selection by asking OK (Y/N): in the usual manner.

14.4.5 INSTALL Error Messages

Refer to this subsection if a message is displayed and you do not find it self-explanatory.

**NOT ENOUGH MEMORY TO RUN INSTALL,
OR YOUR OPERATING SYSTEM IS NOT
RELOCATED TO MAKE ALL RAM AVAILABLE.**

This message will occur when INSTALL is invoked if your computer system contains insufficient Memory. Also, this message will occur even when sufficient memory is present in the computer but your operating system (CP/M or equivalent) has not been "relocated" to make the RAM available. Such relocation is accomplished with a system command sometimes called "CPM", "MOVCPM", or "RELOC" — see your system documentation for details.

**NOT ENOUGH MEMORY TO RUN WordStar,
OR YOUR OPERATING SYSTEM IS NOT
RELOCATED TO MAKE ALL RAM AVAILABLE.**

This variation of the preceding message will occur when the memory available is sufficient to run INSTALL, but not enough to run WordStar. If you get this message, you can still produce an installed WordStar on a diskette file (for use after more memory has been made available on the system, or for use on a different system) by re-invoking INSTALL and specifying Installation Option B. This error message can occur only on normal installation and on those options which run the installed WordStar after installation has been completed.

See Section 13 for WordStar's RAM memory requirement.

WSU.COM NOT FOUND ON CURRENT DISK

This message occurs during "normal" installation, or under Installation Option A (Section 14.4.4) if the uninstalled WordStar (file WSU.COM) is not found on the logged drive. For example, if WSU.COM is not on the diskette in any drive, or if the current drive is A: but file WSU.COM is on the diskette in drive B. Copy WSU.COM onto the diskette in use, or use installation option B or C to read it from the diskette in another drive.

THAT FILE DOES NOT EXIST

This message does not occur during "normal" installation. Under Installation Option B, C, or D, this message indicates that no file was found with the name you entered for the WordStar to be installed. This message usually indicates that the name was mistyped, the drive was omitted, or the desired diskette was not in the drive. After displaying the message, INSTALL asks for the file name again, allowing you to enter the corrected name or allowing you to reenter the name after inserting the correct diskette.

INCORRECTLY FORMED FILENAME

Under Installation Options B, C, and D, this message indicates that a file name entered was not a correctly formed CP/M file name as described in Section 3.06. After displaying this message, INSTALL will repeat the file name question. Enter the corrected filename.

UNEXPECTED END OF FILE DURING READ

The file from which the uninstalled WordStar was being read was shorter than expected. This message may indicate that you are using a bad copy of WSU.COM -- try getting a fresh copy from your distribution diskette. If you entered the file name under Installation Option B, C, or D (Section 14.4.4), this message may indicate that the file you named was not a WordStar.

DISK FULL**DISKETTE DIRECTORY FULL**

The diskette, or its file directory, has filled up while attempting to record the installed WordStar. After this message, the WS.COM (or other file being written under Installation Option B, C, or D) will not be valid. Arrange more diskette space (e.g. by copying some files off onto another diskette), then repeat installation.

ERROR CLOSING FILE

This message should not occur; it indicates a system failure, or that you changed diskettes while INSTALL was recording the installed WordStar.

This version of INSTALL is incompatible with the version of WordStar you are trying to install

This message can occur on using one release of INSTALL with a different release of WSU.COM, or with a previously installed WordStar of a different release. Use INSTALL and WSU from the same distribution diskette together. This message may also occur if the file from which the uninstalled WordStar is being taken (WSU.COM, or name entered by operator under Installation Option B, C, or D) does not actually contain a WordStar).

The **INSTALL** signon message, showing the release number, and the **WordStar** signon message, showing its release number, are displayed on the screen below this error message.

14.5 Testing Your Installed WordStar

When WordStar is invoked -- either as automatically occurs at termination of **INSTALLation**, or when you type **WS** (or whatever file name your installed **WordStar** is saved on) -- **WordStar** should clear the screen and display a signon showing the **WordStar** release and serial number and the terminal, printer, protocol, and printer driver choices you made at installation.

After several seconds (or as soon as you hit any key), the screen will again clear and the no-file menu plus the names of the files on your diskette should display, like this:

```

no file is now being edited

D=create or edit a Document file      H=set Help level
N=create or edit a Non-document file  P=Print a file
F=File directory off (ON)             K=delete a file
L=change Logged disk drive          X=eXit to system ■

DIRECTORY of disk A:
EXAMPLE.TXT  INSTALL.COM  PIP.COM      STAT.COM
WS.COM       WSMGS.COM   WSU.COM

```

In the above diagram, the symbol **■** represents the cursor position. If highlighting is installed, the words displayed will be highlighted; if inverse video highlighting is in use, inverse video boxes will be formed around the menu and the phrase at the top of the screen.

If you get something like

```

= " D=create or edit a Document file      H=set Help level = #
N=create or edit a Non-document file  P=Print a file = $ F=Fil
e directory off (ON)                  K=delete a file = %
L=change Logged disk drive          X=eXit to system = no file is n
ow being edited = ) EXAMPLE.TXT  INSTALL.COM  PIP.COM      STA
T.COM = * WS.COM       WSMGS.COM   WSU.COM = (DIRECTORY of di
sk A: ■

```

with the lines run together and possibly random punctuation between the lines, then the cursor positioning control codes are not working. Check your terminal documentation and the setting of all option switches on the terminal, and

reinstall WordStar or correct your terminal as required.

If you get

```
no file is now being edited  
eeee ■  
  
Message text file WSMGS.COM not found.  
Menus and messages will display as  
"eeee" only. "Help Level" set to 0.
```

then the file WSMGS.COM, supplied on the distribution diskette, has not been copied to the diskette in use (or the diskette is neither in drive A nor in the logged drive). This file should always be on the diskette in drive A, or the diskette in the logged drive (or both), when WordStar is in use. Type an X to exit from WordStar and return to the operating system, copy WSMGS.COM to the current drive (the command PIP is used to copy files in most CP/M compatible operating systems), and invoke your installed WS again.

Now (at the no-file menu, which should still be on the screen) type a D. You should get:

```
D      no file is now being edited  
  
Use this command to create a new document file,  
or to initiate alteration of an existing document file.  
  
A file name is 1 to 8 letters/digits, a period,  
and an optional 1-3 character type.  
File name may be preceded by disk drive letter A-D  
and colon, otherwise current logged disk is used.  
  
^S=delete character  ^Y=delete entry  ^F=File directory  
^D=restore character  ^R=Restore entry  ^U=cancel  
  
NAME OF FILE TO EDIT? ■  
  
DIRECTORY of disk A:  
EXAMPLE.TXT  INSTALL.COM  PIP.COM  STAT.COM  
WS.COM  WSMGS.COM  WSU.COM
```

If parts of the no-file menu (what was last on the screen) appear where there should be blank lines, then an erase to end line code is installed but not working.

Hit the RETURN key. The no-file menu and directory should again be displayed, with the rest of the screen clear.

Enter D to obtain again the last screen shown. Answer the question NAME OF FILE TO EDIT? by typing

TEST.DOC

(or some other file name that is not in use on your diskette) and a carriage return. The phrase

NEW FILE

will be added to the screen display. After several seconds, the screen display should change to the following:

A:TEST.DOC PAGE 1 LINE 1 COL 1			
CURSOR:	[^] A=left word	[^] S=left char	[^] D=right char
	[^] E=up line	[^] X=down line	[^] F=right word
SCROLL:	[^] Z=up line	[^] W=down line	[^] C=up screen
DELETE:	DEL=char left	[^] G=char right	[^] T=word right
OTHER:	[^] V=insert on/off	[^] I=tab	[^] Y=entire line
	[^] B=insert a RETURN	[^] B=reform to end para	[^] U=stop
			[^] L=find/replace again
HELP:	[^] J displays menu of information commands		
PREFIX KEYS	[^] Q [^] J [^] K [^] O [^] P	display menus of additional commands	
L-----!	-----!	-----!	-----!-----R
■			
			•
			•
			•
			•
			•
			•

Type a few words. They should appear on the screen line below the "ruler" (the line with the -'s and !'s); they should not be highlighted; the cursor should move right as you type. If the cursor does not move, the "column" portion of the cursor control codes is not functioning.

Type a [^]J ([^]J on the screen menus and in this manual means to type control-J, that is, hold down the CTRL key on your keyboard and type a J). After a second or two, a different menu should appear. The top line of the screen, the "ruler", and the words you typed, should remain. If portions of the previous menu remain to the right of the new, narrower one, then an erase to end line code is installed but not working. Hit the space bar to return to the previous menu (the main menu).

Now type several lines of text. Gibberish is OK for our present purposes. WordStar will "wrap" the line for you if you type beyond the R end of the ruler without using the RETURN key; this is the normal operation of word wrap.

It should be possible to move the cursor around within the text you have entered, using [^]E to move it up, [^]D to move it right, [^]S to move it left, and [^]X to move it down. Try it. Recall that [^] means to hold down the CTRL key while typing the following letter.

Type a control-Y. The line of text containing the cursor should disappear, and the following lines move up. This tests the "delete line" control code, if one is installed. Type a control-N. A blank line should appear, with the lines below the cursor moving down. This tests the "insert line" control code, if one is installed.

Additional Tests for Highlighting: Type a control^K. A different menu will appear. Type a B (or a b or ^B). The original menu will reappear, and "" will appear at the cursor position, highlighted if you have installed highlighting it is working. The characters on the line to the right of the cursor will move right three characters to make room for the . Move the cursor forward a few characters (^D) or down a line or two (^X), and type ^K twice. The menu may not change, depending how soon you type the second ^K. If no highlighting is installed, <K> will appear at the cursor position. If highlighting is installed, the characters from the position of the to the position where ^K was typed should highlight - display in inverse video, or dimmer or brighter than the rest of the screen. The should disappear. (What you have just done is "marked" a "block" of text, as in preparation for a block move or block copy command.) If the disappears but the characters do not highlight, then inoperative highlighting control codes are installed. Check the codes and reinstall if necessary; if they can't be made to work, remove them so the and <K> will display. Another possibility, if you are using bright/dim highlighting, is that the contrast or brightness on your terminal are set such that bright and dim characters are indistinguishable.

Now type ^K. A new menu will appear. Type a D (or d or ^D). The message

SAVING FILE A:TEST.DOC

should appear. This saves the entered text on the disk, so that you can try printing it. Whenever text is entered or updated with WordStar, it is necessary to save it in order to keep it permanently, or to print it. After the save is complete (a few seconds), the no-file menu should reappear, as shown above.

To test the printer installation, type a P at the no-file menu. WordStar will ask you for the name of the file to print; enter TEST.DOC or whatever you called the file. Hit the RETURN key. Several more questions will be asked; just hit RETURN at each one for now. When READY PRINTER, HIT RETURN appears, make sure your printer is turned on and on-line (whatever your particular printer needs to be ready for use), then hit any key. The text you entered should be printed, then the paper should feed to the bottom of the page and a "1" (page number 1) should be printed.

To return to the operating system, type an X at the no-file menu. The system prompt A> will appear at the bottom of the screen. You can now check the text you entered, with the CP/M command:

TYPE TEST

Your file should appear on the screen. Finally, you may delete the test file with the operating system command

ERA TEST.DOC

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SECTION 15. MODIFICATION

Modification by patching is used in installing WordStar for terminals not included in the installation menus (Section 14) and for printers that require special control strings or modifications to one of WordStar's printer drivers, and for achieving refinements in installation, such as supporting special features of specific non-daisy printers, circumventing the "DELETE-backspace feature" of certain operating systems, or enabling display in the last column of the last line of the screen.

Since basic installation is achieved with the **INSTALL** program ("installation dialog"), as described in Section 14, most users should have little or no need to patch.

"Patching" means modifying the program (WS.COM) by changing the contents of bytes in it, with the debugger (DDT in most systems; DEBUG in some; must be purchased separately from certain operating system suppliers) or with the front panel switches. The rest of this section is written for the reader who already understands patching, usually an assembly language programmer. We will not attempt to explain patching technique or to describe the background concepts.

Listings in Appendix: Appendix C of this manual contains absolute assembly listings of two user-patchable portions of WordStar, USER1 and USER4. USER1 is the module containing all terminal-installation related patch areas; USER4 contains all printer-related patch items for non-daisy printers, plus many used for both daisy and non-daisy printers.

The listings are commented heavily; read them for a detailed description of each item. The following paragraphs give general description of the modules, and hit a few high points of the details, but do not attempt to duplicate the detailed information contained in the program comments.

The modules whose listings are supplied were combined with a linking loader after assembly; they contain external references whose values are not shown in the listings. Generally, these are in locations there will be no need to change, but if you do need to move or use one of them, examine the locations with your debugger (DDT, or whatever your version is called) to determine the value. These values will change with each release of WordStar.

Before Patching, install WordStar as described in Section 14, then make patches in the installed copy. The "None of the above" terminal selection and the "No change" printer selection may be used to bypass those questions.

15.1 Terminal Patch Area

Modification of the terminal patch area is used to install WordStar for a terminal or video board not covered by the installation dialog; modification of the terminal patch area may also be used to achieve a different installation for a terminal that is on the menu (e.g. to reverse the sense of bright/dim highlighting, to suit individual preference) and to achieve refinements in installation, such as permitting display in the last character position of the last line of the screen or disabling the backspace-on-rubout "feature" of some operating systems if this feature interferes with WordStar's screen updating.

15.1.1 Installation for a Terminal Not Shown on Terminal Menu

Before patching WordStar for a terminal not on the installation dialog terminal selection menu, it is necessary to determine that the terminal is suitable for use with WordStar, and to determine the terminal's control codes from the terminal manufacturer's manual.

Terminal Requirements: To be used with WordStar, the terminal must have a screen at least 16 (and not more than 120) lines high by at least 64 columns wide. The terminal must have the capability of clearing the screen upon receipt of a control character sequence from the computer, and it must have the ability to position the cursor at any position on the screen.

Desirable, but not essential, additional terminal features include line insert, line delete, and/or erase to end line — these speed screen redisplay during editing — and inverse video, bright/dim, or some other form of character-by-character highlighting — highlighting allows WordStar to differentiate the menus and questions from the text of the document being edited, and to highlight the "marked block" of text that is to be moved or deleted..

Determining Control Codes: study the terminal manufacturer's manual for your terminal to determine the screen size and the control codes which WordStar must transmit to the terminal to accomplish the various functions. Additional discussion of each required and optional function follows; patching the codes into WordStar is covered in Section 15.1.3.

Clear Screen/Home Cursor: Determine the character or sequence of characters which will blank the entire screen and place the cursor in the upper left hand corner. Usually "Home Cursor" is implicit in the "Clear Screen" function; if it is not, include a "Home Cursor" command in the "Clear Screen" string patched into WordStar; if the terminal has no "Home Cursor" command, use a suitable cursor positioning sequence.

Position Cursor: Positioning the cursor is the most complex terminal function used by WordStar, since it involves transmitting the row and column at which the cursor is to be placed. The form of the control string sent to the terminal to position the cursor varies widely from terminal to terminal; WordStar's cursor positioning patch items are designed to accommodate almost all commonly used forms. For these reasons, it is necessary to analyze your terminal's cursor positioning sequence to derive the information needed to patch WordStar.

Some terminals have a single control sequence to position the cursor at a line (row) and column (character) number; others have separate control sequences to position the cursor on a line and at a column; either will work with WordStar. In the former case, the terminal may require either the row or column trans-

mitted first. For some terminals, the line and column numbers are sent with no offset, that is, a zero is sent for the top line on the screen (or left column), a one for the next line down (next column over), etc. For others, an "offset" is added. For example, several terminals require 20 (hexadecimal) for the top line or left column, 21 for the second line (or column), etc.

Analyze the cursor positioning codes for your terminal and determine:

1. Number of characters and character values that must be sent before either the line or column is transmitted.
2. Whether the row or column is transmitted first.
3. Number of characters and character values that must be sent after the row (or column, whichever is sent first), and before the other dimension is sent. For many terminals, this is no characters.
4. Number and values of characters to send after both row and column, if any -- usually none.
5. Offset to add to row number -- usually zero or 20 hex.
6. Offset to add to column number -- usually same as for row.

Cursor Example A: terminal requires, in order, 1B hex, 3D hex, line number plus 20 hex, column number plus 20 hex, to set cursor position. The answers to the above questions are:

1. 2, 1B, 3D
2. row is first
3. none
4. none
- 5 and 6. 20 hex

Cursor Example B: terminal requires 1B hex, 01 hex, line number to set cursor to line, and 1B hex, 02 hex, column number to set cursor to column. The above questions may be answered as follows:

1. 2, 1B, 01
2. row is first
3. 2, 1B, 02
4. none.
- 5 and 6. 0

If you have an unusual terminal, you may find that it is not possible to analyze its required cursor positioning commands into answers to the above six questions -- e.g., it may be necessary to transmit the row and column numbers as strings of ASCII digits. For such cases, you must write a subroutine to generate the necessary cursor positioning command sequence.

Highlighting (Optional): we also recommend determining the codes to invoke highlighting, if available, by inverse video display, bright/dim display, or some other method. If both bright/dim and character-by-character inverse video are available, we suggest inverse video, as it will highlight blanks as well as other characters, and stands out strongly. The highlighting method must operate on a character-by-character basis, take no screen positions, and not be tied to field protection. Determine the code or code sequence to turn highlighting on, and the sequence to turn highlighting off. The "Highlighting on" sequence should cause subsequently transmitted characters to be highlighted until a "Highlighting off" sequence is transmitted. WordStar always turns highlighting off before transmitting a carriage return, line feed, clear screen, or cursor positioning sequence; therefore, it does not matter whether these functions cancel highlighting on your terminal or not.

Erase to End Line (Optional): this function blanks all character positions from the cursor position to the end of the current screen line.

Delete Line (Optional): this function should delete the entire screen line containing the cursor, moving the following screen lines up one line.

Insert Line (Optional): this function should insert a blank line on the screen at the line containing the cursor, moving the cursor line and following lines down one line. If your terminal inserts below the cursor line, put a "cursor up" code at the beginning of the "insert line" string patched into WordStar.

After determining your terminal's control codes as just discussed, proceed to section 15.1.3.

15.1.2 Video Boards

A video board accessible through the operating system character output calls may be installed as any other terminal; proceed as described for terminals. Clear screen and cursor positioning functions must be available by outputting special characters.

However, WordStar can access memory mapped video boards meeting certain restrictions directly. This results in superior performance: extremely fast screen update, use of all character positions including last column of last line, and line insertion and deletion without the need of control codes for these functions. Further, direct access to a video board makes about 2K more memory available for the file being edited. The restrictions are:

1. Each character position must appear as a location in memory, contiguously from a starting address. The first line must begin at the starting address, the second line must immediately follow the first, etc. The lines must always be full length; WordStar will blank-fill them as required.
2. It must be possible to make a cursor appear on the screen either by setting the high order bit of the character under the cursor, or by sending the cursor positioning character sequence specified as above (with some boards, the cursor positioning control codes are not effective when the program is storing directly into the video RAM).

When accessing a video board on a direct memory-mapped basis, WordStar can position the cursor either with the control code sequence (sent to the operating system as for a terminal), or by setting the high order bit in memory of the character under the cursor. Highlighting can be produced by setting the high order bit; this produces inverse video on many boards. If the high order bit is used both for highlighting and for cursor display, WordStar can blink the cursor to make it stand out when it is on or adjacent to highlighted text.

Even if cursor display is by high order bit, a cursor position code sequence should be installed, as WordStar uses it to position the cursor at the bottom of the screen at exit, and to initially get its cursor and the externally known cursor in the same place. The clear screen sequence may be omitted.

Installation for direct memory access to a video board must be accomplished by patching; proceed to Section 15.1.3.

15.1.3 Terminal Patch Area

All variables items relating to variations between terminals are in program module USER1, as listed in Appendix C. Many are set by the installation dialog (thus, the installation dialog should be run before, not after, patching); additional items can be changed only by patching. Each item is identified and explained in detail by comments in the listing; the following discussion corresponds approximately to the order of items in the listing.

Note that all character strings to be sent to the terminal (clear screen, erase to end line, etc.) have the number of characters to be sent in the first byte, and the characters to send in following bytes.

Terminal Installation: Section 15.1.1 discussed requirements and information to be obtained from the terminal manufacturer's manual before making a custom terminal installation; read that section first if you have not already read it. The locations into which to patch terminal-related items are clearly identified by comments in the USER1 listing. The locations include, in approximate order, starting at the beginning of the listing, locations for screen height and width; the clear screen and home cursor control character string; and locations for cursor control string specification as analyzed per the six questions given in Section 15.1.1. There is provision for cursor position by an alternate method, calling a subroutine written and "patched in" by the user. Space for the optional erase to end line, delete line, insert line, highlighting on, and highlighting off strings is given. Spaces for strings to be sent to the terminal at startup and at exit are provided, to allow special initialization or mode selection and deselection; there are also provisions for user-supplied subroutines which are called at startup and at exit.

Displaying in Last Column of Last Line: A flag, USELST, is provided in USER1 which may be patched non-zero to enable display in the rightmost column of the last line of the screen, making the "flag" character for this line display.

WordStar does not normally display in the rightmost column of the last line of the screen (except when using direct memory access to a video board), because many terminals automatically carriage return after display in the last column of a line, scrolling the screen up a line if it was the line at the bottom of the screen. For some terminals, scrolling after display in the last character position on the screen can be disabled via an option switch (possibly called "AUTO RETURN") inside the terminal; for others, such scrolling can be disabled via a mode selected with a control character string sent from the computer.

If you have a terminal which does not scroll after display in the last character position, or has been configured thus, patch USELST in USER1 (see listing in Appendix for address) non-zero to see the "flag" on the last file line displayed. If a mode which does not scroll after display in the last character position can be selected by a control sequence sent from the computer, the initialization string TRMINI may be used; the exit string TRMUNI may be then used to restore the normal mode for convenience when using other programs after exiting from WordStar. Note: it doesn't matter where the cursor goes - nowhere, or back to "home" - after displaying in the last character position, so long as the screen does not scroll up a line.

Patchable Delays, DELCLR, DELCUS, and DELMIS are provided, for use after the terminal functions indicated in the listing. These are present because many terminals loose characters sent too soon after clear screen or other functions. The default values are sufficient for most terminals; the installation dialog increases them as necessary for certain terminals on the menu. For custom installations, you may need to patch longer delays as explained in the comments.

Video Board Installation: To Install WordStar to access a Video Board meeting the restrictions given in Section 15.1.2 on a direct memory mapped basis, patch locations MEMAPV, MEMADR, HIBIV, HIBCUR, and CRBLIV as explained in the associated comments. Note that the cursor positioning items as used for a terminal should always be patched even if HIBCUR is non-zero.

Circumventing the System ~~DELETE~~-Backspace "Feature"

Background: When a command is being entered to the operating system and the ~~DELETE~~ (RUBOUT) key is used to erase the last character entered, standard CP/M echoes the character erased. A number of manufacturer's and distributors variants of CP/M have a modification added in the I/O patch section of the system ("BIOS") to cause the ~~DELETE~~ key to erase the character on the screen instead of echo another copy of the character erased. This modification works by outputting "backspace, space, backspace" IN PLACE OF THE NEXT CHARACTER OUTPUT AFTER a ~~DELETE~~ is input. While a convenience in entering normal system commands, this feature interferes with WordStar operation: the next character output by WordStar after a ~~DELETE~~ is input is normally the beginning of a cursor positioning sequence, and if it is not transmitted without modification, the results on the screen are disastrous. Hence, there are provisions in USER1 for disabling the ~~DELETE~~-backspace "feature".

Symptoms: If your operating system erases characters on the screen, rather than echoing characters, when you use the ~~DELETE~~ key while inputting a system command, AND if the screen line containing the cursor is not correctly updated when you use the ~~DELETE~~ key while editing with WordStar, or the cursor is misplaced after use of the ~~DELETE~~ key, then your system has the ~~DELETE~~-backspace "feature" and this "feature" must be disabled for correct screen updating in WordStar. Examine the code of the BIOS (I/O patch) section of your system (listings of this portion of the system are normally supplied, or available on request, or you may poke around with your debugger without a listing) to determine how your ~~DELETE~~ backspace "feature" works, and apply one of the following methods to disable it.

ZAFCIN: Many ~~DELETE~~-backspace implementations set a flag when a ~~DELETE~~ is input, or just store the last character input, in a fixed memory location, then substitute "backspace, space, backspace" for the next character output after a ~~DELETE~~ is input. Such implementations can be disabled when WordStar is running by patching the address of this location into USER1 at ZAFCIN: if ZAFCIN is non-zero, the location it points to is Zeroed After Character INput by WordStar. For example, S. D. Sales and Digital Microsystems' versions of CP/M, among others, store the last character input in location 4F hex. Patching ZAFCIN to 4F prevents the ~~DELETE~~-backspace feature in these systems from interfering with WordStar's screen updating after the ~~DELETE~~ key is used.

RUBXF - RFIXER: These USER1 locations may effect a partial fix to the ~~DELETE~~-backspace problem in cases where ZAFCIN cannot be effectively applied. If RUBXF (RUBout FiX Flag) is patched non-zero, then the contents of RFIXER is output immediately after a ~~DELETE~~ is input. Put a relatively harmless character in RFIXER - try null (00 hex), backspace (08 hex), or space (20 hex). When this character is output, your system will replace it with "backspace, space, backspace"; this will have less deleterious effect than changing the beginning of a subsequent cursor positioning string to "backspace, space, backspace". The results will probably be a single blanked screen position, instead of an entire messed up line and a misplaced cursor.

Patch Space for Added Subroutines: items UCRPOS, INISUB, and UNISUB each allow for a user-added subroutine; however, space is provided at these items for a JMP instruction only. There is space for a moderate amount of code at MOPAT, on the last page of the USER1 listing. If more space is needed, go to the end of the WordStar program (the beginning of unused memory), as pointed to by the actual contents (examine with DDT) of PBGMEM at the end of USER1. If you make additions there, be sure to patch PBGMEM to point beyond your additions, and be sure to determine and use the necessary SAVE command size -- note that there are several hundred bytes of variable storage between the normal end of the .COM file and address contained in PBGMEM. Also, if you operate on your WordStar with the INSTALL program after adding code at the end, you will need to redo your additions -- INSTALL will delete any code beyond the normal end of WordStar.

Testing Your Terminal Installation: Review the "Testing Your Installed WordStar" subsection of Section 14. That subsection shows various correct and incorrect screen displays, and gives likely causes of the incorrect displays; The tests given there will help you determine whether your installation is functioning correctly, and, if not, which patch item is most likely at fault.

15.2 Printer Patch Area

Modifications in the printer patch area are used to handle transmission of characters from (as required by communications protocols, Section 14.2) and to the printer, to support communications protocols including specification of ETX/ACK message length, to support optional features of Teletype-like printers, and to install unusual printers which are similar to, but not exactly, "Teletype-like".

This manual does not cover patching to support the features of daisy-wheel printers, because the installation dialog performs complete installation to support all available features of the common daisy wheel and similar printers, and because patching for such printers is extremely complex due to the interaction of many features and the requirements of bidirectional printing. However, all aspects of transmission of characters to and from serial daisy wheel and similar printers are accessible and documented in this section.

The absolute assembly listing of module USER4, in Appendix C, shows all modifiable items relating to Teletype-like and other non-daisy printers, and all modifiable items relating to transmission of characters to and from Teletype-like printers and serial daisy wheel and similar printers.

The rest of this section will follow the approximate order of items in the USER4 listing, to facilitate relation of the text to the listing. Users making an installation requiring a communications protocol (Section 14.2) will probably be first interested in the printer driver patch items; these are described in Section 15.2.4.

15.2.1 Printer Type and Related Items

POSMTH (Printer OverStrike Method): Determines how overprinting, as required for boldface, double strike, underline, etc. is achieved.

If POSMTH contains FF hex (as set by the installation dialog when "Any Teletype-Like Printer" is selected), WordStar will overprint by sending a carriage return code (see item PSCR) followed by another complete line, containing spaces in columns not to be overprinted. Several overprint lines for the same document line will be sent if necessitated by the use of multiple enhancements or boldface.

If POSMTH contains zero (as set by the installation dialog when "Teletype-like Printer That Can Backspace" is selected), WordStar will overprint by backspacing (see item PBACKS) then sending the character to be overstruck, as each character position requiring multiple strikes is encountered. POSMTH=0 produces faster execution than POSMTH=FF for printers that can backspace; also, POSMTH=0 will allow printing underline, double strike, boldface, etc. on printers that can backspace but cannot return the carriage without line feeding.

If any daisy wheel or similar printer is selected in the installation dialog, POSMTH will be set to 1 and should not be altered.

BLDSTR: This location contains the number of strikes of each character used for the "boldface" print enhancement. For Teletype-like printers, it may be increased or decreased to yield darker or lighter boldface; for daisy wheel and similar printers it should not be altered.

DBLSTR: This location contains the number of strikes (normally 2) used for the "double strike" print enhancement; it may be increased for darker "double strike" or reduced to 1 for no double strike, on any printer type.

15.2.2 Printer Function Strings

Patchable strings for a number of mandatory and optional printer functions are provided. Each string consists of the number of characters, followed by the character values. When altering a string, make sure you set the number of characters correctly. The optional string items should have a zero "number of characters" if the optional function is not installed.

PSCRRLF: This is the character string, normally carriage return, line feed, sent to advance a non-daisy printer to the beginning of the next line. The characters in the string may be altered as required by unusual printers; the count may be increased to send nulls (zeroes) (up to a total of 10 characters) after the character string is sent if the printer requires a delay while the carriage returns and the paper advances.

PSCR: This is the character string, normally carriage return only, used to return the carriage of a non-daisy printer to the beginning of the same line. This string is used whenever a carriage return without a line feed (see Overprint Lines in Section 8.06) is encountered in the document, and also for overprinting for underline, etc. if POSMTH (above) is FF hex.

PBACKS: This is the character string, normally an ASCII "backspace" character, used to backspace a non-daisy printer. This string is transmitted whenever a backspace is encountered in the document (see ^H in Section 10.1), and also for overprinting for underline, etc. if POSMTH (above) is zero. Note that if POSMTH is not zero and ^H is never used in a document, this string is never transmitted and thus the printer need not be capable of backspacing.

PSHALF (Optional): This is a character string to return the carriage and advance the paper one-half line, for non-daisy printers with this capability but without the capability of advancing the paper backwards a fractional line (see also **ROLUP** and **ROLDOW** below). If installed, the half-line advance will be used to print subscripts and superscripts one-half line below or above, respectively, the rest of the line.

Example: if the printer advances one-half line for each line feed code sent, install the sequence "carriage return, line feed" at PSHALF and the sequence "carriage return, line feed, line feed" or "carriage return, line feed, carriage return, line feed" at PSCRLF. Note: The **INSTALL** Printer Menu selection "Half-Line-Feed Printers" sets PSHALF and PSCRLF to the foregoing strings; this selection is otherwise identical to the selection "Teletype-Like Printer that can BACKSPACE".

ROLUP (Optional): This is a character string to roll the carriage UP (move the paper down) a fractional line, for non-daisy printers with this capability. If ROLUP and ROLDOW are installed, subscripts and superscripts will be printed by moving the carriage up and down in the course of printing a line.

ROLDOW (Optional): If ROLUP (preceding) is installed, then the string to roll the carriage down (paper up) a fractional line should be installed at ROLDOW.

PALT (Optional): A string may be installed here to set the printer to an alternate character pitch (character width), for non-daisy printers with this capability. An alternate pitch print control (^A; Section 10.1) in the document will then invoke transmission of this string. Note: WordStar contains the necessary logic to restore normal pitch while printing page offsets, headings, etc. that were specified when normal pitch was in effect.

PSID (Optional): If PALT (preceding) is installed, then the string to restore the printer to its normal character pitch should be installed at PSID.

USR1 through **USR4** (Optional): These strings may be installed to invoke special functions of your non-daisy printer in response to the print controls ^Q, ^W, ^E, and ^R imbedded in your document.

RIBBON and **RIBOFF** (Optional): These strings may be installed by the user to allow selection of alternate ribbon color with the ^Y print control (section 10.1) on non-daisy printers with this capability; for daisy wheel and similar printers, RIBBON and RIBOFF are set appropriately by the installation dialog.

PSINIT (Optional): This is a string transmitted to the printer at the start of printing. For non-daisy printers, you may add any desired controls, e.g. to turn the motor on or select a line spacing or character pitch. The installation dialog puts a carriage return in this item; add your bytes and increase the count appropriately. For daisy printers, this item is appropriately set by the installation dialog and should not be altered.

PSFINI (Optional): Similar to PSINIT, this string is sent at the conclusion of printing.

PRINIT and **PRFINI** (Optional): These are subroutines called at the beginning and end of printing, respectively; they may be used to perform printer assignment or special initialization functions that cannot be performed by transmitting a character string. Space is provided for a JMP only; see the end of section 15.1.3 re finding space to put your subroutine.

15.2.3 Printer Driver Flags

CSWTCH: Determines which of the printer drivers (Section 15.2.4) is used to transmit characters to (and possibly from) the printer:

- 0: CP/M "List Output" Device
- 1: WordStar's "Port Driver"
- 2: User-installed Printer Driver Subroutines

CSWTCH applies to all printers. CSWTCH is set by the installation dialog in accordance with the answer to the "Printer Driver" question.

HAVBSY: This location should be non-zero if the printer driver in use has a "printer busy test" implemented, or zero if no provision has been installed for determining when the printer is ready to accept a character. When non-zero, WordStar will not output to the printer until the printer is ready, and WordStar will check more often whether the printer is ready to accept a character. Thus, a correctly installed printer busy test, plus a non-zero value in HAVBSY, cause the printer to run more steadily when editing is being performed at the same time as printing, while improving keyboard response in editing because the printer output routine will never "hang" while waiting for the printer to be ready to accept a character.

The installation dialog sets HAVBSY non-zero if the port driver is selected, or zero if the list device is selected. The user should set HAVBSY non-zero after adding a busy test to the CP/M list device driver or installing custom driver subroutines that include a printer busy test.

15.2.4 Printer Drivers

Code for three distinct printer drivers is provided in USER4, and thus accessible to user modification. Location CSWTCH, described above, determines which driver is called.

Driver Entry Points: As discussed in Section 14.2, WordStar must be able to input from the printer as well as output to the printer when a "Communications Protocol" (as required for daisy wheel and similar printers at 1200 baud) is in use. Also, WordStar's performance improves when a "printer busy test" is available to determine whether the printer is ready to accept an output character. Thus, each driver has three entry points, defined as follows:

Printer Busy Test: this entry should return the carry flag set (1) if the printer is NOT ready to accept a character; the carry flag should be returned clear (0) if the printer is ready to accept a character or if the busy test is not implemented. If this entry is implemented, HAVBSY (above) should be non-zero; if not implemented, HAVBSY should be 0.

Print Character: this entry should output the character in the A register to the printer. If HAVBSY is non-zero, this entry is not called until the Printer busy test entry returns the carry flag clear.

Input Character From Printer: this entry need be implemented only if a communications protocol (Section 14.2) requiring input from the printer is to be used. This entry should return the carry flag set (1) if no character has been received from the printer since last called, or return the character in the .. register and the carry flag clear (0) if a character has been received.

Specific descriptions of the three drivers follow.

CP/M List Device Driver: The "Print Character" entry point to this driver is implemented to make the appropriate operating system call to print the character. The "Printer Busy" and "Input Character From Printer" entries are not implemented, as standard CP/M provides no system calls for these purposes; space is provided at LIBSY and LISINP respectively for patching in JMP instructions to user-installed subroutines for these purposes. See the end of Section 15.2.3 with regard to finding space into which to patch added subroutines.

If you add a "Printer Busy Test" routine, patch HAVBSY to a non-zero value.

If you use a communications protocol with the List output driver, you must code and patch in an Input Character From Printer routine, and put a JMP to it at LISINP.

WordStar's Port Driver: The "Port Driver" does direct hardware I/O to any printer interface using one data port and one status port. The port driver includes implemented printer busy test and printer character input routines. As supplied, the port driver uses one particular set of port numbers and status bits (see USER4 listing or discussion in Section 14.2); for other ports or status bits, the user must make patches.

To Modify the Port Driver for other ports or status bits, determine the following quantities (from your system documentation) and patch them in as indicated. The listing of USER4 in Appendix C defines the labels referred to here, and may be used as an example.

POOP: data port number

POSTAT: status port number

POMASK: bit mask for all status bits which must have a particular value (either 0 or 1) before a character may be output to the printer.

POOM: bit mask for those bits in POMASK which must be 1.

For example, if status bit 1 must be zero and bit 3 must be one to indicate that the printer interface is ready to receive a character, then POMASK should be patched to 05 hex and POOM to 04 hex.

POINSK: bit mask for all status bits which must have a particular value to indicate that a character is ready from the printer.

POIM: bit mask for those bits in POINSK which must be 1, not zero.

User-supplied Printer Driver Subroutines: Space is provided at PUSEND, PUBSY, and PUINP for patching in JMPs to user-coded and user-installed printer character output, printer busy test, and printer character input routines. See the end of Section 15.1.3 with regard to finding space into which to patch your routines; also, you may patch over the other drivers if you do not expect to use them at a later date, and over the zeroes at the end of USER4. Note that the printer character input routine is mandatory if a communications protocol is installed; otherwise, this routine is not needed. Also patch HAVBSY non-zero if the busy test entry is implemented, or zero if it is not implemented.

CSWTCH must be set to 2 to cause WordStar to call the user-installed printer driver subroutines; this patch may be achieved by selecting "User Subroutines" in the installation dialog before patching in your routines.

15.2.5 Communications Protocols

A Communications Protocol (Section 14.2) is normally used with a daisy wheel or similar printer interfaced at 1200 baud; in these cases, the communications protocol items are correctly set by the installation dialog. However, the communications protocol logic will function with any printer; for an unusual Teletype-like printer that requires a communications protocol, you may wish to patch these items.

PROTCL: Determines type of communications protocol. The types of protocols are defined in the program comments and also in Section 14.2:

- 0: None
- 1: ETX/ACK (and see EAKBSZ, next)
- 2: XON/XOFF

PROTCL is set by the installation dialog in accordance with the answer to the "Communications Protocol" question.

EAKBSZ: This location contains the message length for ETX/ACK protocol; it must be equal to or less than ONE-HALF OF the printer's buffer size, as WordStar keeps two "messages" active at a time. The default value (127) assumes the printer can hold a buffer of at least 254 bytes; be sure to reduce it if you install ETX/ACK protocol for a non-daisy printer with a smaller buffer. When a daisy wheel or similar printer is installed with ETX/ACK protocol, the installation dialog automatically sets EAKBSZ for the buffer capacity of the particular printer selected.

15.3 Terminal and Printer Signon Messages

WordStar's signon includes a description of the installed terminal and printer and this is automatically changed for the devices selected in the installation dialog. To adapt for custom patched-in installations, find the message by dumping memory from 100 hex to the beginning of USER1. Do not alter the copyright, release number, and serial number information, which you will also find in this area, or you will violate your Agreement with MicroPro International Corporation.

15.4 Additional Modifications

In addition to the previously described patch items relating to terminal and printer installation, WordStar can be patched for a number of additional items, including:

- Command keys, including prefix relationships and keystroke synonyms
- Disk-stored message and menu texts
- Initial values of insert toggle and on-screen formatting options
- Default page format
- Flag characters
- Daisy wheel and similar printer function strings

Listings of the patch areas for these items, and discussion thereof, are contained in a separate publication, the WordStar Customization Notes. If you are interested in obtaining a copy of that publication, contact MicroPro International Corporation.

APPENDIX A. SPECIFIC TERMINALS

This section describes the features available on each terminal implemented in the INSTALL program as of this writing, plus pointers on configuration of some terminals.

Beehive 150: No highlighting, erase to EOL, or line insert/delete implemented.

Cromemco 3100: Same as Beehive 150.

Hazeltine 1500: AUTO LINE FEED switch (under little cover above keyboard) must be OFF. Highlighted text displays dim. Erase end line and line insert/delete are used.

Hewlett-Packard 2621 A/P: Not tested. No highlighting, erase EOL, or line insert/delete implemented.

IMSAI VIO: This includes the IMSAI VDP-40, VDP-80, PCS 80/30, and other integrated systems containing the VIO display board. Highlighting and cursor display is by inverse video; WordStar blinks the cursor when necessary to distinguish it from highlighted areas. The video RAM is accessed directly at F000 hex, producing fast screen update. The VIO must have the firmware ROM (as it always does in the above integrated systems), or equivalent routines must be present in your operating system.

Infoton I-100: Highlighted text displays dim; line insert/delete are implemented.

Lear-Siegler ADM-3A: The CLEAR SCREEN and CURSOR control switches inside the terminal must be ON. No highlighting.

Lear-Siegler ADM-31: Highlighted areas display dim. Erase end line and line insert/delete are used.

MicroTerm ACT IV: Highlighted text displays dim, assuming terminal was in dim state when WordStar invoked. Erase end line implemented; terminal does not have line insert/delete invocable from CPU.

Processor Technology VDM / SOL: The VDM is accessed through the operating system; 0B hex is sent to clear the screen, escape, 2, line number, escape, 1, column number is sent to position the cursor. No other functions are implemented. WordStar's working with the VDM depends on the particular adaptation of CP/M to the VDM not interfering; in particular, transmission of all line feeds and all non-redundant carriage returns must occur.

Soroc IQ-120: No highlighting, erase EOL, or line insert/delete implemented.

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APPENDIX B. SPECIFIC PRINTERS

B.1 Daisy Wheel and Similar Printers

Features: All printers described in this section support all of WordStar's print enhancements and other features, as described in Section 10, except as noted in individual descriptions below. All printers described here will print bidirectionally; "formed" text (Section 4) will print with Microspace Justification.

Choice of Typewheels: The interchangeable typewheels for daisy printers come in many choices of characters and character arrangements. The printed characters will match those seen on the screen during editing only if the typewheel in use contains the standard ASCII characters in the standard ASCII order. Some typewheels have other character graphics; many have a different character arrangement so that, for example, a period in the document will print as some other character. Some compatible typewheels for each printer are listed below.

Controls: Most daisy wheel and similar printers have a control panel including some or all of the following switches:

AUTO LF: must be OFF.

AUTO CR: should be OFF.

Line Spacing 6/8 Lines per inch

Character Pitch 10/12 Characters per inch

These switches have NO EFFECT on printing under WordStar. Character and line spacing under WordStar always default to 6 lines per inch and 10 characters per inch respectively, and may be modified via print directives imbedded in each document (Section 10). After printing with WordStar, the printer is left set to the switch settings for use with other software, except as noted below.

FORM LENGTH: set to match length of paper in use -- commonly 11 inches or 66 lines; setting does not matter if USE FORM FEEDS print option (Section 11) will not be used and you don't wish the FF switch to work.

SET TOF: depress after positioning paper at top of form; necessary only if USE FORM FEEDS print option is to be used or you wish the FF switch to work.

FF or FORM FEED: depress to feed paper to top of form, e.g. after aborting print.

Installation: All daisy wheel and similar printers interfaced at 1200 baud (120 characters per second) must be installed with a "Communications Protocol" (as discussed in Section 14.2) in order to avoid buffer overrun and consequent character loss (a possible exception for the NEC is noted below). At speeds slower than 1200 baud, these printers print slowly; you will find the effort invested to install one of these printers with a communications protocol rewarding because of the markedly increased printing speed.

CAUTION: Do not attempt to use ETX/ACK communications protocol implemented in your operating system when driving a Diablo or Qume printer from WordStar. It won't work. If your operating system already can drive a Diablo or Qume printer at 1200 baud through the use of ETX/ACK protocol, the portion of the operating system which implements the protocol must be disabled or bypassed when printing from WordStar. This limitation does not apply to XON/XOFF protocol, nor to NEC printers. (The reason for this limitation is that if an "ETX" inserted in the character stream happens to fall within an "escape sequence" being transmitted to the printer, the printer will not recognize it as an ETX, and not respond with an ACK; nor will the printer interpret the escape sequence correctly. Keeping the ETX's out of the escape sequences is practical only in the program generating the character stream; WordStar contains the necessary special code.)

Diablo 1610/1620

Features: The "phantom space" and "phantom rubout" features of WordStar (Section 10) are not supported by these printers.

After printing, WordStar leaves these printers set for 6 lines per inch and 10 characters per inch. To set the character spacing according to the printer's "spacing 10/12" switch before use of other software, depress the "Clear" button. If other software has printed on the printer since it was powered up and before WordStar prints, you may, in unusual cases, find it necessary to press the printer's "clear" button, or to turn the printer off and on, before WordStar will print correctly (this is because the Diablo 1610/20 has no provision for a full reset initiated from the computer).

Installation: When installing WordStar to use a Diablo 1610/1620 printer interfaced at 1200 baud (120 characters per second), specify "ETX/ACK" protocol, and a driver capable of inputting characters, as discussed in Section 14. No settings are required on the printer for ETX/ACK operation. These printers do not support XON/XOFF protocol.

Compatible Typewheels for the Diablo 1610/1620 include:

Diablo 38100	Courier 10
Diablo 38107	Courier 72
Diablo 38101	Pica 10
Diablo 38102	Elite 12
Qume 82167	Prestige Elite 12

Diablo 1640/1650

Installation: When installing WordStar to use a Diablo 1640/1650 printer interfaced at 1200 baud (120 characters per second), specify "ETX/ACK" protocol, and a driver capable of inputting characters, as discussed in Section 14. A switch setting may be necessary inside the printer to enable ETX/ACK protocol (switch 2 on the HPRO4 circuit board, if operator control panel is fitted, or as described in your Diablo manual). These printers also supports XON/XOFF protocol (Diablo calls it DCL/DC3 protocol); a switch setting is necessary inside the printer to enable this protocol (switch 3 on HPRO4 circuit board, or as described in your Diablo manual).

Compatible Typewheels for the Diablo 1640 are as listed for the 1610/20 above.

Qume Sprint 5

Installation: When installing WordStar to use a Qume Sprint 5 interfaced at 1200 baud (120 characters per second), specify "ETX/ACK" protocol, and a driver capable of inputting characters, as discussed in Section 14. No settings are required on the printer for ETX/ACK operation. The Qume Sprint 5 does not support XON/XOFF protocol.

Compatible Typewheels for the Qume are as listed above for the Diablo 1610/20.

NEC Spinwriter 5510/5520

Features: The "phantom space" and "phantom rubout" features (Section 10) are not supported on, nor relevant to, these printers.

The NEC Spinwriter will buzz and stop printing if the (carbon) ribbon is used up, the paper runs out, or the cover is opened. Install a new ribbon, new paper, or close the cover, then press the "Reset" switch, and printing will continue with no character loss.

Installation: When installing WordStar to use a NEC Spinwriter at 1200 baud (120 characters per second), a communications protocol or a special cable must be used to prevent buffer overrun and character loss. The NEC printer is extremely versatile; we know of four possible solutions to the buffer overrun problem:

1. Check that the printer is set to use ETX/ACK protocol (switch 4 OFF on DIP switch SW1 on the circuit board behind the control panel, or as described in the NEC documentation). In the WordStar installation dialog, specify ETX/ACK protocol and a driver that can input characters from the printer (as discussed in Section 14). We suggest this as the normal solution.
2. Set the printer for XON/XOFF protocol (switch 4 ON on DIP switch SW1 on the circuit board behind the control panel, or as described in the NEC documentation). In the WordStar installation dialog, specify XON/XOFF protocol and a driver that can input characters from the printer (as discussed in Section 14).
3. ETX/ACK or XON/XOFF protocol implemented in a printer driver installed in your operating system may also be used with a NEC printer. In this case, specify "None" for protocol in the WordStar installation dialog.

4. This is a hardware solution, requiring fabrication of a cable adapter. It may not work in all cases; if it works in your case it has the advantages that it works with other software in addition to WordStar, and that no communications protocol, nor a printer driver that can input characters, need be specified in WordStar installation.

Make up a cable adapter which runs the printer's "Reverse Channel" signal (line 19 of EIA connector) into the "Request to Send" line (pin 4 of EIA connector) of the computer's serial interface. Check that the printer is set to produce a "low" signal on buffer full (switch 5 OFF on DIP switch SW1 on the circuit board behind the control panel, or as described in the NEC documentation). This signal will cause the USART in the computer's serial interface to stop sending characters when the printer cannot accept them, without any special software considerations.

B.2 Teletype-like (Non-daisy) Printers

The term "Teletype-like" printer includes almost any printer designed to be connected to a microcomputer. The printer should return the carriage to the beginning of the line without advancing the paper upon receipt of a "carriage return code", advance the paper one line upon receipt of a "line feed" code, and print the appropriate character upon receipt of ASCII codes 20 through 7E hex. With such a printer, WordStar will not Microspace Justify nor print using variable line height nor variable character pitch. Subscripts and superscripts are printed in-line, or in the line below or above if it is a blank line; boldface is printed by overprinting the same characters three times; backspace is supported only if the printer can backspace.

If your printer has an AUTO LF switch, make sure it is OFF.

The following special features of specific Teletype-like printers may be supported via special installation (patching) done by the user as discussed in Section 15:

Choice of TWO character pitches via ^A and ^N print controls

Choice of two ribbon colors via ^Y print control

Ability to feed paper up and down a fractional line for superscripts and subscripts

Up to 4 other special features via ^Q, ^W, ^E, ^R print controls

Any printer shown explicitly in WordStar's printer selection menu should be installed with the appropriate selection, rather than as "Teletype-like", to make its full capabilities available.

"Any Teletype-like Printer": This menu selection will drive any printer meeting the above description, with the limitations noted above. Use it when no other selections match or when in doubt about the applicability of other selections.

"Teletype-like Printer That Can Backspace": This menu selection is preferred for printers that can back up the carriage to the preceding character position on the same line upon receipt of an ASCII "backspace" code (08 hex). Use of this selection will yield faster printing of underline, boldface, and double strike, and makes the "backspace" print control available.

B.3 Other Printers

Printers That Cannot Return the Carriage without Advancing the Paper, such as Selectrics: Limited support of these printers is provided. If printer can backspace, install as "Teletype-like printer that can backspace" and avoid use of overprint lines (Section 8.06). Other print enhancements will work as described for "Teletype-like" printers. If printer cannot backspace, install as "Any Teletype-like printer" and avoid use of underline, strike out, double strike, bold face, backspace, and overprint lines in your documents.

"Half-Line-Feed Printer": This menu selection is provided for use with printers that advance one-half line at a time, such as a Selectric with a half-line ratchet. Backspacing capability is also assumed by this menu selection, but no ability to feed paper backwards is required. The half-line advance is utilized to print superscripts and subscripts half a line above and below, respectively, the rest of the text. Two line feeds are transmitted between lines where no subscripts and superscripts appear. Depending on the characters your interface is equipped to respond to, patching may be required after this selection is made; see Section 15.

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APPENDIX C. LISTINGS OF USER MODIFIABLE AREAS

Listings of the WordStar user-modifiable modules USER1 and USER4 follow this page.

These assembly listings are supplied for the convenience of the occasional user who may need to install WordStar for an unusual terminal or printer.

See Section 15 for discussion of these listings.

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```
0000'           TITLE USER1 03/01 /80 TERMINAL PATCH AREA
; FOR WORDSTAR RELEASE 1.00 FEBRUARY, 1980.
; 03/01/80 *1.00* CHANGED TBASE TO BE 4300H FRO TRS80 & HEATH89
;

0000 OR4200 EQU 0 ;-1 IF BOOT IS 4200H, 0 IF BOOT IS 0H
0000 ENTRY HITE,WID,CLEAD1,CLEAD2,CTRAIL,CB4LFG,LINOFF,COLOFF
0000 ENTRY ASCUR,UCRPOS,CLRSCR,ERAEO1,LINDEL,LININS
0000 ENTRY IVON,IVOFF,TRMINI,TRMUNI,INISUB,UNISUB,DELCUS,DELMIS
0000 ENTRY USELST,MEMAPV,MEMADR,HIBIV,HIBCUR,CRBLIV,ZAFCIN
0000 ENTRY RUBFXF,RFIXER,UCONO,UCONI,UCNSTA,MORPAT,PBGMEM
0000 EXT CUTCHR, MEMORY
;
0000' IF OR4200
TBASE EQU 4300H ;WHERE TO LOAD PROGRAM
0000' ELSE
TBASE EQU 100H
0000' ENDIF
;
ASEG ;ABSOLUTE CODE, FOR LISTING
ORG TBASE+140H ;BEGINS AT 240 HEX
; ****
; *
; *      USER-MODIFIABLE CONSTANTS AND ROUTINES FOR      *
; *      HARDWARE-DEPENDENT TERMINAL CHARACTERISTICS      *
; *      AND FUNCTIONS USED BY EDITOR                      *
; *
; ****
;NOTE: THIS AREA IS NORMALLY PATCHED FOR YOUR TERMINAL
;TYPE VIA THE INTERACTIVE INSTALL PROGRAM. ADDITIONAL
;PATCHING TO THIS AREA IS NEEDED ONLY FOR UNUSUAL TERMINALS
;OR UNUSUAL VIDEO BOARDS, OR TO MEET SPECIAL REQUIREMENTS
;OR ENHANCE OR PERSONALIZE PERFORMANCE.
;PATCHES ALWAYS NEEDED: SCREEN HITE & WIDTH, CURSOR.
;
;ALL OTHERS ARE OPTIONS FOR SPECIAL CASES OR ENHANCEMENT.
```

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```

;
; SCREEN SIZE
;
0240 18   HITE: DB 24 ;MUST BE EXACT SCREEN HEIGHT IN LINES
0241 50   WID:  DB 80 ;MUST BE <= EXACT SCREEN WIDTH
;
; IN ALL CHARACTER STRINGS TO BE SENT TO TERMINAL,
; FIRST BYTE IS NUMBER OF CHARACTERS, CHARACTERS FOLLOW.
;
0242      IF -1
;CLEAR SCREEN AND HOME CRSOR CHARACTER STRING
;MUST LEAVE CRSOR AT UPPER LEFT - IF THIS IS NOT
;INHERENT IN THE CLEAR SCREEN FUNCTION OF YOUR
;TERMINAL, INCLUDE A HOME CRSOR FUNCTION.
;SHOWN SET TO SEND ESCAPE, * AS AN EXAMPLE.
;***** NO LONGER USED, LEFT TEMPORAROLY PENDING INSTALL
; MODIFICATIONS ***** 10/30/79
0242 02   CLRSCR: DB 2      ;LENGTH: 2 CHARACTERS
0243 1B           DB 1BH    ;FIRST CHARACTER: ESCAPE
0244 2A           DB '*'     ;SECOND CHARACTER
0245 00 00 00 00   DB 0,0,0,0 ;3RD THRU 6TH GO HERE
;
0249 00 00 00 00   DB 0,0,0,0 ;... IF NEEDED
024D          ENDIF
;
; PROVISIONS FOR PATCHING
; CURSOR POSITIONING CONTROL SEQUENCES
;
; CURSOR POSITIONING PATCH IS MANDATORY.
;
; CURSOR POSITIONING FOR MOST TERMINALS
; IS ACCOMPLISHED BY SENDING:
;
; 1. A "LEAD-IN" STRING OF ONE OR MORE
;    TERMINAL-SPECIFIC CHARACTERS;
; 2. THE LINE NUMBER, WITH AN OFFSET (OFTEN 0)
;    ADDED; OR, FOR SOME TERMINALS,
;    THE COLUMN NUMBER IS SENT FIRST;
; 3. ANOTHER LEAD-IN STRING, FOR SOME TERMINALS;
; 4. THE COLUMN (OR LINE) NUMBER, WITH OFFSET;
; 5. ANOTHER STRING (FOR SOME TERMINALS).
;
; FOR MOST TERMINALS, THE LINE AND COLUMN ARE SENT
; AS 1-BYTE BINARY NUMBERS; FOR A FEW TERMINALS,
; TWO- OR THREE-DIGIT ASCII NUMBERS ARE SENT.
;
; FOR TERMINALS THAT DON'T FIT THE ABOVE PATTERNS,
; YOU MUST CODE YOUR OWN SUBROUTINE.
;
```

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```

;CURSOR PATCH AREAS ARE ON NEXT PAGE
; CURSOR POSITIONING...
; SEE COMMENTS PRECEDING PAGE
; FOR EXAMPLE, THE CURSOR IS POSITIONED ON THE
; ADM-3A TERMINAL BY SENDING:
; ESCAPE, =
; LINE # PLUS 20 HEX,
; COLUMN NUMBER PLUS 20 HEX.
; THE FOLLOWING PATCH AREAS ARE SET UP FOR THIS
; TERMINAL, AS AN EXAMPLE.
; CURSOR POSITIONING INITIAL LEAD-IN STRING
CLEAD1: DB 2 ;NUMBER OF CHARACTERS
        DB 1BH ;FIRST CHARACTER
        DB '=' ;SECOND CHARACTER
        DB 0,0,0 ;SPACE FOR MORE
        DB 0,0,0 ;.. CHARACTERS
; CURSOR POSITIONING STRING SENT BETWEEN
; LINE AND COLUMN
CLEAD2: DB 0 ;NUMBER OF CHARACTERS -
        ; NONE IN OUR EXAMPLE
        DB 0 ;FIRST CHARACTER
        DB 0,0,0 ;SECOND THRU 4TH
; CURSOR POSITIONING STRING SENT AFTER
; BOTH LINE AND COLUMN HAVE BEEN SENT
CIRAIL: DB 0 ;NUMBER OF CHARACTERS (NONE)
        DB 0,0,0,0
; FLAG NON-ZERO TO SEND COLUMN BEFORE LINE
CB4LFG: DB 0 ;LINE GOES BEFORE
        ;..COLUMN IN OUR EXAMPLE
; OFFSET TO ADD TO LINE
LINOFF: DB 20H ;ADD THIS TO LINE #
        ;(WHERE 0 IS TOP LINE ON
        ; SCREEN BEFORE OFFSET)
; OFFSET TO ADD TO COLUMN
COLOFF: DB 20H ;ADD THIS TO COLUMN #
        ;(WHERE 0 IS LEFT EDGE OF
        ; SCREEN BEFORE OFFSET)
; BINARY / ASCII FLAG AND # ASCII DIGITS
ASCUR:  DB 0 ;ZERO TO SEND BINARY LINE & COLUMN
        ;2 TO SEND 2-DIGIT ASCII NUMBERS
        ;3 TO SEND 3-DIGIT ASCII NUMBERS
        DB 0,0,0 ;RESERVED
;SEE NEXT PAGE FOR POSITIONING
;CURSOR VIA USER-CODED SUBROUTINE
;CURSOR POSITIONING...
;
; PROVISION FOR POSITIONING CURSOR BY USER-CODED
; SUBROUTINE INSTEAD OF UNDER CONTROL OF ABOVE ITEMS,
; FOR USE IN EXCEPTIONAL CASES ONLY:

```

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;
 ; PUT A JMP INSTRUCTION TO YOUR SUBROUTINE IN
 ; FOLLOWING 3 BYTES. WHENEVER FIRST BYTE IS
 ; NON-0, THIS LOCATION WILL BE CALLED TO POSITION
 ; CURSOR; ABOVE CURSOR PATCH ITEMS WILL BE DISREGARDED.
 ;
 0267 00 UCRPOS: NOP ;NORMALLY 0, OR JMP TO YOUR
 0268 00 NOP ;SPECIAL CURSOR POSITIONING
 0269 C9 RET ;ROUTINE.
 ; SEE "MORPAT" AT THE END OF THIS LISTING
 ; FOR SPACE TO PUT YOUR SUBROUTINE IN.
 ; YOUR SUBROUTINE WILL RECEIVE LINE IN L REGISTER
 ; (0=TOP SCREEN), COLUMN IN H (0=LEFT EDGE).
 ; YOUR SUBROUTINE MAY ALTER ALL REGISTERS.
 ; TO OUTPUT A CHARACTER TO THE TERMINAL FROM WITHIN
 ; WITHIN YOUR SUBROUTINE, CALL OUTCHR. EXAMINE THE
 ; FOLLOWING 2 BYTES WITH YOUR DEBUGGER TO DETERMINE
 ; THE ADDRESS TO CALL IN CURRENT RELEASE OF WORDSTAR:
 026A 0000 * DW OUTCHR ;ADDRESS OF BYTE OUTPUT
 ;ROUTINE LOADED HERE
 ; YOUR CUSTOM CURSOR POSITIONING ROUTINE WILL
 ; ALSO RECEIVE THE FOLLOWING, WHICH MIGHT BE USEFUL
 ; IN SPECIAL VIDEO BOARD DRIVERS:
 ; DE=NUMBER OF CHAR POSITIONS FROM BEGINNING OF SCREEN
 ; TO NEW CURSOR POSITION (0=UPPER LEFT CORNER).
 ; BC=NUMBER OF CHAR POSITIONS FROM BEGINNING SCREEN TO
 ; BEGINNING OF LINE IN WHICH CURSOR IS BEING PLACED.
 ; ADDED RELEASE 0.946, NOT YET TESTED.
 026C 00 00 00 00 DB 0,0,0,0 ;RESERVED BYTES
 ;
 ;EVERYTHING THAT FOLLOWS IS OPTIONAL.
 ; EACH ITEMS RELATE EITHER TO ENHANCED PERFORM-
 ; ANCE (FOR EXAMPLE, USE OF INVERSE VIDEO
 ; OR BRIGHT/DIM TO SET OFF BLOCKS OF TEXT),
 ; OR TO ACCOMODATING UNUSUAL TERMINALS.
 ;
 ;ERASE TO END OF LINE. OPTIONAL - IF FUNCTION
 ;NOT AVAILABLE, LEAVE FIRST BYTE ZERO AND EDITOR
 ;WILL DO THE FUNCTION MORE SLOWLY VIA SOFTWARE.
 ERAEOL: DB 0 ;PUT NUMBER OF CHARCTERS HERE
 DB 0 ;PUT FIRST CHARACTER HERE
 DB 0 ;IF 2-CHAR SEQUENCE, PUT 2ND HERE
 DB 0,0,0,0 ;IF 3 TO 6 CHAR SEQUENCE,
 ;PUT ADDITIONAL CHARS HERE.
 ;DELETE SCREEN LINE CONTAINING CRSR, MOVE
 ;LOWER LINES ON SCREEN UP ONE LINE. OPTIONAL.
 ;SUPPLYING THIS SPEEDS SCREEN UPDATE.
 LINDEL: DB 0 ;PUT LENGTH HERE
 DB 0,0,0 ;SPACE FOR 1-6 CHARACTERS

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 027B 00 00 00 DB 0,0,0
;INSERT A BLNK LINE ON SCREEN, MOVING CURSOR
;LINE AND LINES BELOW IT DOWN ONE. OPTIONAL.
;SUPPLYING THIS SPEEDS SCREEN UPDATE.
;N. B. IF YOUR TERMINAL INSERTS BELOW THE
;CURSOR LINE, PUT A "CURSOR UP" BEFORE THE
;"INSERT LINE" CHARACTER(S).

027E 00 LININS: DB 0 ;PUT LENGTH HERE
 027F 00 00 00 00 DB 0,0,0,0 ;SPACE FOR 1-8 CHARACTERS
 0283 00 00 00 00 DB 0,0,0,0
;TURN ON HIGHLIGHTING (INVERSE VIDEO, BRIGHT/DIM, OR
;OTHER MEANS OF HIGHLIGHTING A SECTION OF TEXT).
;APPLICABLE ONLY IF MEMAPV (NEXT PAGE) IS 0. OPTIONAL.

0287 00 IVON: DB 0 ;LENGTH
 0288 00 00 00 DB 0,0,0 ;UP TO 6 CHARACTERS
 028B 00 00 00 DB 0,0,0
;TURN OFF HIGHLIGHTING. OPTIONAL.
;IF NO STRING PATCHED IN, IVON STRING WILL BE
;USED TO TURN OFF AS WELL AS ON.

028E 00 IVOFF: DB 0 ;LENGTH
 028F 00 00 00 DB 0,0,0 ;UP TO 6 CHARACTERS
 0292 00 00 00 DB 0,0,0
;TERMINAL INITIALIZATION STRING: ANY BYTES YOU
;WANT SENT TO YOUR TERMINAL AT BEGINNING OF
;SESSION. OPTIONAL. SEE ALSO INISUB, NEXT PAGE.

0295 00 TRMINI: DB 0 ;LENGTH
 0296 00 00 00 00 DB 0,0,0,0 ;THE BYTES,
 029A 00 00 00 00 DB 0,0,0,0 ;MAX LENGTH 8.
;ANY BYTES YOU WANT SENT TO TERMINAL AT END OF
;SESSION. OPTIONAL. SEE ALSO UNISUB

029E 00 TRMUNI: DB 0 ;LENGTH
 029F 00 00 00 00 DB 0,0,0,0 ;THE BYTES,
 02A3 00 00 00 00 DB 0,0,0,0 ;UP TO 8.
;
;USER-PATCHABLE INITIALIZATION SUBROUTINE. CALLED
;JUST BEFORE TRMINI (PREVIOUS PAGE) IS SENT, THIS
;SUBROUTINE MAY BE USED FOR SPECIAL CONSOLE INIT-
;IALIZATION OR OTHER PURPOSES.
;
 02A7 00 INISUB: NOP ;ENTRY POINT. PUT DESIRED CODE IN
 02A8 00 NOP ;"MOPAT" AREA (3 PAGES AHEAD IN
 02A9 C9 RET ;THIS LISTING) AND PATCH IN A "JMP"
;INSTRUCTION HERE. FOR YET MORE
;SPACE, SEE "PBMEM" ON SAME PAGE.

;
;USER-PATCHABLE DE-INITIALIZATION SUBROUTINE.
;CALLED AT EXIT (JUST BEFORE TRMUNI IS SENT),
;THIS SUBROUTINE MAY BE USED TO "UNDO" ANY SPECIAL
;TERMINAL STATUS USED IN THE EDITOR.

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; UNISUB: NOP ;PUT DESIRED CODE IN
02AA 00 NOP ;"MOPAT" AREA, PATCH IN
02AB 00 RET ;A "JMP" HERE.

; MISCELLANEOUS TERMINAL-RELATED ITEMS

; FLAG TO PERMIT DISPLAY IN LAST COLUMN OF LAST LINE.
; INITIALLY DISABLED, AS MANY TERMINALS SCROLL SCREEN
; WHEN A CHARACTER IS DISPLAYED IN THIS POSITION.

02AD 00 USELST: DB 0 ;PATCH NON-0 TO PERMIT LAST CHAR ON LAST
; LINE TO DISPLAY IF THIS WILL NOT SCROLL
; SCREEN OF YOUR TERMINAL. NORMALLY LEAVE 0
; FOR USE WITH TERMINAL, PATCH NON-0
; FOR USE WITH MEMORY-MAPPED VIDEO BOARD.

02AE 00 00 DB 0,0 ;BYTES RESERVED FOR EXPANSION

; DELAYS EXECUTED AFTER VARIOUS TERMINAL FUNCTIONS,
; BEFORE NEXT CHAR IS SENT TO TERMINAL, TO ALLOW RESPONSE
; TIME REQUIRED BY CERTAIN TERMINALS WHEN USED AT HIGH
; BAUD RATES. PATCH LARGER IF YOU EXPERIENCE, FOR
; EXAMPLE, LOSS OF CHARACTERS AFTER CURSOR POSITIONING.
; EACH DELAY IS APPROX NUMBER OF MILLISECONDS ON
; 4 MHZ Z-80; DELAY IS ABOUT TWICE AS LONG ON 2 MHZ 8080.

; DELCUS: DB 10 ;10+ MSEC DELAY AFTER CURSOR SET
02B0 0A DELMIS: DB 5 ;5+ MSEC DELAY AFTER OTHER FUNCTIONS

; PROVISIONS FOR MEMORY-MAPPED VIDEO BOARDS THAT MEET
; THE FOLLOWING RESTRICTIONS:
; 1. CHARACTERS POSITIONS APPEAR AS MEMORY LOCATIONS
; AT SEQUENTIAL INCREASING ADDRESSES FROM A BASE.
; 2. HIGHLIGHTING, IF USED, IS INVOKED BY SETTING
; HIGH ORDER BIT OF CHARACTER.
; IF MEMAPV IS NON-ZERO, WORDSTAR WILL STORE DIRECTLY
; INTO YOUR VIDEO BOARD RATHER THAN DOING CONSOLE OUTPUT
; VIA CP/M. THIS IS THE BEST INSTALLATION METHOD FOR
; VIDEO BOARDS MEETING THE RESTRICTIONS.
; FOR INSTALLATION SUGGESTIONS FOR OTHER VIDEO BOARDS,
; SEE DISCUSSION NEAR END OF THIS LISTING OR IN MANUAL.

; MEMAPV: DB 0 ;NON-0 TO USE MEMORY-MAPPED VIDEO DISPLAY
02B2 00 ;DISPLAY BY DIRECT STORAGE METHOD.

; MEMADR: DW 0 ;ADDRESS OF VIDEO SCREEN RAM, TOP LINE,
02B3 0000 ;LEFTMOST COLUMN. THE REST OF THE SCREEN
; MUST BE AT CONTIGUOUS ASCENDING ADDRESSES.
; WHEN USING MEMAPV, CHECK THE FOLLOWING ITEMS BELOW:
; HIBIV: NON-0 FOR HIGH-BIT HIGHLIGHTING (DETAILS BELOW)
; HICUR: NON-0 FOR HIGH-BIT CURSOR

```

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; CRBLIV: NON-0 TO BLINK CURSOR IF ON HIGHLIGHTED CHAR
; SETTING USELST ABOVE IS ALSO RECOMMENDED.
;
; FLAG TO SAY INVERSE VIDEO, HIGH BRIGHTNESS, OR OTHER
; MEANS OF HIGHLIGHTING CHARACTER WILL OCCUR IF HIGH
; ORDER BIT OF CONSOLE OUTPUT CHARACTER IS ON.
; INTENDED PRIMARILY FOR USE WHEN MEMAPV IS NON-ZERO
; (SEE IVON/IVOFF ABOVE FOR HIGHLIGHTING ON TERMINALS);
; BUT MIGHT ALSO BE USEFUL WITH CUSTOM CONSOLE OUTPUT
; ROUTINE (UCONO, BELOW).
;
02B5 00 HIBIV: DB 0 ;PATCH NON-0 IF YOU HAVE INVERSE
;VIDEO ETC. INVOKED BY HI ORDER BIT.
;
; FLAG TO INVOKE DISPLAY OF CURSOR ON MEMORY MAPPED
; VIDEO BOARD BY SETTING HIGH ORDER BIT OF CHARACTER
; UNDER CURSOR, RATHER THAN BY SENDING A CURSOR POSI-
; TIONING STRING UNDER CONTROL OF THE PATCH ITEMS ON
; PAGES 2 AND 3.
; THIS SAVES TIME AND ELIMINATES INTERACTION PROBLEMS
; THAT CAN ARISE IF CHARACTER DISPLAY IS BY DIRECT
; STORAGE BUT CURSOR POSITIONING IS VIA THE EXTERNAL
; BOARD DRIVER.
;NOTE: CURSOR POSITION PATCHES SHOULD STILL BE INSTALLED
; TO INTERFACE TO EXTERNAL CURSOR POSITION FUNCTION;
; IT IS USED AT STARTUP AND EXIT TO PLACE INTERNAL AND
; EXTERNAL CURSORS IN SAME PLACE.
;
02B6 00 HIBCUR: DB 0 ;NON-0 TO DISPLAY CRSR BY SETTING
;HIGH ORDER BIT OF CHARACTER.
;APPLICABLE IF MEMAPV, ABOVE, IS NON-0.
;
; FLAG TO SAY CURSOR MUST BE BLINKED BY THE EDITOR
; IN ORDER TO BE VISIBLE WHEN ON OR ADJACENT TO AN
; INVERSE VIDEO (OR OTHERWISE HIGHLIGHTED)
; CHARACTER. THIS SHOULD BE 0FFH IF YOUR CURSOR
; IS NOT VISUALLY DISTINCT FROM YOUR INVERSE VIDEO
; AND INVERSE VIDEO IS USED (VIA IVON/IVOFF OR HIBIV).
;NORMALLY NEEDED WITH MEMORY MAPPED VIDEO BOARDS
;WITH HIBIV AND HIBCUR BOTH 0FFH.
;APPLICABLE TO BOTH TERMINALS AND VIDEO BOARDS.
;BLINK METHOD USED FOR A TERMINAL: ALTERNATELY
;SEND IVON, IVOFF STRINGS, WITH DELAYS.
;
02B7 00 CRBLIV: DB 0 ;FF HEX FOR EDITOR TO BLINK CURSOR
;WHEN ON INVERSE VIDEO CHARACTER.
;
; TWO SCHEMES FOR CIRCUMVENTING OPERATING SYSTEMS
; THAT BACKSPACE WHEN "DELETE" IS INPUT.

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;

; A NUMBER OF PROPRIETARY VERSIONS OF CP/M
; OUTPUT BACKSPACE, SPACE, BACKSPACE IN PLACE OF THE
; THE NEXT CHARACTER OUTPUT AFTER A "DELETE" (RUBOUT)
; IS INPUT. THE CODE TO DO THIS IS IN THE "BIOS"
; SECTION OF YOUR SYSTEM.

; THE INTENT OF THIS "FEATURE" IS TO MAKE THE
; "DELETE" KEY ERASE A CHARACTER ON THE SCREEN,
; INSTEAD OF ECHOING THE DELETED CHARACTER, DURING
; SYSTEM COMMAND LINE INPUT.

; UNFORTUNATELY, THIS "FEATURE" CAUSES A MESS ON
; THE SCREEN AFTER THE DELETE KEY IS PRESSED IN WORDSTAR,
; BECAUSE THE CHARACTER THAT YOUR SYSTEM REPLACES WITH
; BACKSPACE-SPACE-BACKSPACE IS USUALLY THE FIRST
; CHARACTER OF A CURSOR POSITIONING SEQUENCE BEING
; OUTPUT BY WORDSTAR.

;

; THE "DELETE-BACKSPACE" FEATURE THUS MUST BE DISABLED
; DURING WORDSTAR OPERATION; TWO METHODS ARE:

;

1. BY REFERRING TO YOUR "BIOS" LISTING IN YOUR
SYSTEM DOCUMENTATION, IDENTIFY THE LOCATION
IN WHICH YOUR OPERATING SYSTEM SAVES THE LAST
CHARACTER INPUT IN ORDER TO TEST FOR "DELETE"
ON OUTPUT. IN SOME SYSTEMS, THIS IS LOCATION 4F.
PATCH THIS ADDRESS, LOW ORDER BYTE FIRST, INTO
"ZAFCIN" BELOW.

;

2. PATCH "RUBFXF" BELOW TO NON-ZERO. THE CONTENTS
OF "RFIXER" WILL THEN BE OUTPUT IMMEDIATELY
AFTER A "DELETE" IS INPUT; THIS CHARACTER, RATHER
THAN THE NEXT CURSOR POSITIONING STRING, SHOULD
THUS BE REPLACED WITH BACKSPACE-SPACE-BACKSPACE,
REDUCING THE CONSEQUENCES OF YOUR SYSTEM'S
MACHINATIONS. TRY NULL (ZERO) IN RFIXER FIRST;
IF THIS DOESN'T WORK, TRY BACKSPACE (08) OR SPACE.

;

02B8 0000 ZAFCIN: DW 0 ;ZERO OR POINTER TO LOCATION TO ZERO
02BA 00 RUBFXF: DB 0 ;AFTER EACH KEYBOARD CHARACTER IS INPUT
02BB 00 RFIXER: DB 0 ;NON-ZERO TO OUTPUT CHARACTER IN RFIXER
; ;AFTER EACH "DELETE" IS INPUT.
; ;CHARACTER TO OUTPUT AFTER EACH "DELETE"
; ;IS INPUT IF "RUBFXF" IS NON-0.

;

; OPTIONAL USER-SUPPLIED CONSOLE I/O SUBROUTINES.
; USER MAY PATCH JMP'S HERE TO HIS OWN CONSOLE INPUT,
; OUTPUT, AND STATUS ROUTINES, IN WHICH CASE THESE
; ROUTINES INSTEAD OF THE OPERATING SYSTEM "BIOS" ENTRY
; POINTS WILL BE USED FOR ALL CONSOLE I/O (EXCEPT I/O

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; TO PRINTER INSTALLED AS ALTERNATE CONSOLE).
 ; THESE ROUTINES MAY ALTER ALL REGISTERS.
 ;
 ; OPTIONAL USER CONSOLE CHARACTER READY ROUTINE
 UCNSTA: NOP ;NORMALLY 0, OR JMP TO YOUR OWN STATUS
 NOP ;SUBROUTINE. MUST RETURN 0 IN A
 RET ;IF NO CHAR READY, 0FFH IF CHAR IS READY.
 ; OPTIONAL USER CONSOLE INPUT ROUTINE
 UCONI: NOP ;NORMALLY 0, OR JMP TO YOU OWN INPUT
 NOP ;SUBROUTINE. MUST RETURN CHARACTER IN A.
 RET ;NOT CALLED BEFORE CHARACTER IS READY.
 ; OPTIONAL USER CONSOLE OUTPUT ROUTINE
 ;USE OF A CUSTOM ROUTINE ACCESSED HERE IS SUGGESTED,
 ;FOR EXAMPLE, TO DRIVE A VIDEO BOARD THAT CANNOT BE
 ;DRIVEN VIA OUTPUT TO OPERATING SYSTEM AND WHICH DOES
 ;NOT MEET RESTRICTIONS FOR USE OF "MEMAPV" ABOVE.
 UCONO: NOP ;NORMALLY 0, ELSE JMP TO YOUR OWN CONSOLE
 NOP ;OUTPUT SUBROUTINE. SUBROUTINE RECIEVES
 RET ;CHARACTER IN A; IF HI-BIT HILITING IS IN
 ;USE ("HIBIV" SET ABOVE), HI ORDER BIT
 ;WILL BE ON IF CHAR SHOULD BE HILITED.
 ;UCONO ROUTINE MUST HANDLE THE FOLLOWING CHARACTERS:
 ; ASCII PRINTING CHARACTERS 20H THRU 7EH: DISPLAY CHAR,
 ; ADVANCE CURSOR TO NEXT POSITION. HI ORDER BIT WILL
 ; BE 1 FOR HIGHLIGHTED CHARS IF HIBIV, ABOVE, IS NZ.
 ; CR (0DH): POSITION CURSOR AT BEGINNING OF SAME LINE
 ; LF (0AH): MOVE CURSOR DOWN ONE LINE; OR, IF ALREADY
 ; ON BOTTOM LINE OF SCREEN, SCROLL SCREEN
 ; UP ONE LINE.
 ; PLUS ALL CONTROL SEQUENCES GENERATED BY CURSOR PATCH
 ; ITEMS ABOVE (MANDATORY) AND OPTIONAL PATCH ITEMS ERAEOL,
 ; LINDEL, LININS, IVON, IVOFF, TRMINI, AND TRMUNI ABOVE.
 ;
 ; DISCUSSION OF MEMORY-MAPPED VIDEO BOARD INSTALLATION
 ;
 ;1. THE SIMPLEST INSTALLATION METHOD IS TO ACCESS THE BOARD
 ; THROUGH THE OPERATING SYSTEM, AS THOUGH IT WERE A TER-
 ; MINAL. THIS REQUIRES, OF COURSE, THAT CURSOR CAN BE
 ; POSITIONED BY OUTPUTTING A CHAR SEQUENCE. ONLY THOSE
 ; OPTIONAL FEATURES (LINE INSERT, ERASE END LINE, ETC.)
 ; THAT CAN BE INVOKED VIA CHAR SEQUENCES MAY BE USED.
 ;
 ;2. MEMAPV/MEMADR (SEE PAGE 6 OR SO): FOR BOARDS THAT MEET
 ; THE RESTRICTIONS (SEE PAGE 6), THIS METHOD IS BEST FOR
 ; SPEED, MEMORY UTILIZATION, AND BECAUSE ERASE TO END
 ; LINE, LINE INSERT, AND LINE DELETE FUNCTIONS ARE
 ; IMPLICITLY AVAILABLE WITH NO INSTALLATION CONSIDERATION.
 ;
 ;3. BOARDS THAT DO NOT MEET THE MEMAPV/MEMADR RESTRICTIONS:

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; A. ACCESS AS A TERMINAL IF PRACTICABLE - ITEM 1
;
; B. BOARDS THAT CANNOT BE ACCESSED AS A TERMINAL (E.G.
; BECUASE CURSOR POSITIONING OR SOME DESIRED OPTIONAL
; FEATURE NOT ACCESSIBLE THROUGH OPERATING SYSTEM) AND
; FOR WHICH MEMAPV/MEMADR CANNOT BE USED (E.G. BECAUSE
; HIGHLIGHTING IS DESIRED AND IT IS NOT INVOKED BY
; HIGH ORDER BIT OF CHARACTER, OR BECAUSE CHARACTER
; POSITIONS DO NOT APPEAR AT CONTIGUOUS INCREASING
; MEMORY ADDRESSES): YOU MUST CODE YOUR OWN DRIVER.
;
; SUGGESTIONS FOR CODING YOUR OWN VIDEO BOARD DRIVER:
;
; BUILD THE DRIVER AROUND A CUSTOM CHARACTER OUTPUT
; SUBROUTINE ACCESSED VIA THE "UCONO" ITEM. THIS ROUTINE
; WILL RECEIVE THE ASCII CHARACTER CODES 20H-7EH (WHICH IT
; MUST DISPLAY), THE CONTROL CHARACTERS CARRIAGE RETURN AND
; LINE FEED, WHICH IT MUST PROPERLY INTERPRET, AND OTHER
; CONTROL CHARACTERS PER YOUR PATCHES IN THE CURSOR POSI-
; TIONING ITEMS AND OTHER TERMINAL ITEMS, AS USED.
; CURSOR POSITIONING MAY BE BY CHARACTER SEQUENCE (USE
; CURSOR PATCH ITEMS AS FOR A TERMINAL, PAGE 2, AND INTER-
; PRET THE CHAR SEQUENCE IN YOUR UCONO ROUTINE, OR BY
; CUSTOM SUBROUTINE (UCRPOS, PAGE 3. READ COMMENTS WITH
; WITH UCRPOS RE USEFUL INFO IN REGISTERS CAREFULLY!).
; HIGHLIGHTING MAY BE INVOKED BY HIGH ORDER BIT ON
; EACH HILITED CHARACTER (HIBIV) OR BY CHAR SEQUENCES
; (IVON AND IVOFF, AND INTERPRET THE CHARS IN UCONO).
; ERASE END LINE, LINE DELETE, AND LINE INSERT, IF IMP-
; LEMENTED, MUST BE INVOKED BY CHAR SEQUENCES PATCHED INTO
; ERAEOL, LINDEL, AND LININS AND INTERPRETED IN UCONO.
; INITIALIZATION MAY BE DONE VIA TRMINI OR INISUB.

02C5 00 00 00

DB 0,0,0 ;SPACE RESERVED FOR EXPANSION

;
; SPACE FOR USER-ADDED SUBROUTINES
;

02C8	00 00 00 00
02CC	00 00 00 00
02D0	00 00 00 00
02D4	00 00 00 00
02D8	00 00 00 00
02DC	00 00 00 00
02E0	00 00 00 00
02E4	00 00 00 00
02E8	00 00 00 00
02EC	00 00 00 00
02F0	00 00 00 00
02F4	00 00 00 00

MORPAT:	DB 0,0,0,0	;ADDITIONAL SPACE THAT MAY
	DB 0,0,0,0	;BE USED FOR USER PATCHES,
	DB 0,0,0,0	;FOR EXAMPLE FOR A CURSOR
	DB 0,0,0,0	;POSITIONING SUBROUTINE, OR
	DB 0,0,0,0	;FOR "INISUB" OR "UNISUB"
	DB 0,0,0,0	;SUBROUTINES.
	DB 0,0,0,0	;FOR YET MORE SPACE,
	DB 0,0,0,0	;SPACE, SEE "PBMEM", NEXT.

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02F8 00 00 00 00 DB 0,0,0,0
;PBMEM POINTS TO BEGINNING OF MEMORY TO USE FOR
;WORKING STORAGE. IF YET MORE SPACE IS NEEDED FOR
;PATCHES, INSTALL FIRST, THEN PUT YOUR ADDED CODE
;WHERE PBMEM POINTS AND INCREASE PBMEM TO POINT
;BEYOND YOUR PATCHES. BE SURE TO USE A LARGE
;ENOUGH "SAVE" COMMAND!

02FC 0000 * PBGMEM: DW MEMORY
;AN INDEFINITE AMOUNT OF CODE MAY BE
;ADDED HERE AFTER INSTALLATION. DO NOT
;ADD CODE BEFORE INSTALLING, AS
;INSTALL WILL DELETE IT!
; ** END TERMINAL MODIFICATION AREA **
02FE ALABEL EQU \$;ASSEMBLER SHOULD PRINT 2FE
;NEXT MODULE LOADS AT LOCATION 300 HEX
02FE END

APPENDIX C

USER1 Listing

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OR4200	0000	HITE	0240	WID	0241	CLEAD1	024D
CLEAD2	0256	CTRAIL	025B	CB4LFG	0260	LINOFF	0261
COLOFF	0262	ASCUR	0263	UCRPOS	0267	CLRSCR	0242
ERAEO1	0270	LINDEL	0277	LININS	027E	IVON	0287
IVOFF	028E	TRMINI	0295	TRMUNI	029E	INISUB	02A7
UNISUB	02AA	DELCUS	02B0	DELMIS	02B1	USELST	02AD
MEMAPV	02B2	MEMADR	02B3	HIBIV	02B5	HIBCUR	02B6
CRELIV	02B7	ZAFGIN	02B8	RUBFXF	02BA	RFIXER	02BB
UCONOKA	02C2	UCONI	02BF	UCNSTA	02BC	MOPAT	02C8
PBGMEM	02FC	OUTCHR	026A*	MEMORY	02FC*	TBASE	0100
ALABEL	02FE						

ASSEMBLY COMPLETE, NO ERRORS

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0000'

TITLE USER4 12/01 /79 PRINTER PATCH AREA
; FOR WORDSTAR RELEASE 1.00 FEBRUARY, 1980.
; 01/14/80 *.947B* CHANGED TBASE TO BE 4300H FOR TRS80/HEATH89
; ADDED OR4200 EQUATE TO DECIDE UPON PROPER SYSBASE
;
; ITEMS IN THIS FILE ARE NORMALLY SET AS REQUIRED BY THE
; INSTALLATION DIALOG (OR USED WITHOUT CHANGE). THERE IS
; NORMALLY NO NEED TO REFER TO THIS LISTING IN ORDER TO
; MAKE WORDSTAR OPERATIONAL, AS THE INSTALLATION DIALOG
; WILL SET MOST ESSENTIAL ITEMS AS REQUIRED. MODIFICATIONS
; SOME USERS MAY WISH TO MAKE IN ITEMS LISTED HERE INCLUDE:
;
; 1. ADDING CONTROL SEQUENCES FOR A TELETYPE-LIKE (NON-
; DAISY) PRINTER TO SUPPORT ADDITIONAL FEATURES, E.G.:
; CHARACTER PITCH CHANGE
; RIBBON COLOR CHANGE
; PARTIAL LINE MOTION (FOR SUBSCRIPTS).
;
; 2. MODIFYING OR ADDING TO THE DRIVER CODE USED TO
; SEND CHARACTERS TO AND FROM THE PRINTER, TO:
; A) ALLOW RECEIVING CHARACTERS FROM PRINTER,
; FOR PRINTERS WHICH REQUIRE ETX/ACK
; PROTOCOL TO OPERATE AT MAXIMUM BAUD RATE;
; B) ALLOW WORDSTAR TO DETERMINE IF PRINTER IS
; READY TO RECEIVE A CHARACTER, FOR BETTER
; PERFORMANCE IN CONCURRENT PRINTING;
; C) INSTALLING A CUSTOM DRIVER FOR PRINTER
; NOT SUPPORTED BY USER'S OPERATING SYSTEM.
;

USER4 03/01 /80 PRINTER PATCH AREA MAC80 3.0 PAGE 2

```

; ENTRIES
0000' ENTRY POSMTH,BLDSTR,DBLSTR,PSCRLF,PSCR,PSHALF,PBACKS
0000' ENTRY PALT,PSTD,ROLUP,ROLDDW, RIBBON,RIBOFF
0000' ENTRY USR1,USR2,USR3,USR4
0000' ENTRY PSINIT,PSFINI, PRINIT,PRFINI, CSWTCN,HAVBSY
0000' ENTRY LIBSY,LISEND,LISINP, POBSY,POSEND,POINP
0000' ENTRY POSTAT,POMASK,POOM,POOP,POINSK,POIM,PISTAT,POIP
0000' ENTRY PUBSY,PUSEND,PUINP
0000' ENTRY ACBSY,ACSEND,ACINP,ACFIN,ACSTAL,ACSTAR,CONFIE
0000' ENTRY PROTCL,EAKBSZ

; EXTERNAL ROUTINES FOR ALTERNATE CONSOLE PRINTER I/O
0000' EXT COUCH      ;SEND CHARACTER IN A REGISTER TO CONSOLE
0000' EXT CONSTA     ;RETURN FLAGS "NZ" IF CONSOLE INPUT READY
0000' EXT INCHR      ;INPUT CHARACTER FROM CONSOLE TO A
; EQUATES
0000 OR4200 EQU 0 ; -1 IF ORIGIN IS 4200H, 0 IF ORIGIN IS 0 H
;
; IF OR4200
0000' TBASE EQU 4300H ;WHERE PROGRAM IS LOADED
0000' ELSE
0100' TBASE EQU 100H ;NORMAL
0000' ENDIF
;
; IOBYTE EQU TBASE+3-100 ;LOCATION OF SYSTEM I/O ASSIGNMENTS
009F          ;STATUS BYTE, USED BY ALTERNATE
              ;CONSOLE PRINTER DRIVER.

0008 BS      EQU    8      ;BACKSPACE CHARACTER
000A LF      EQU    10     ;LINE FEED
000C FF      EQU    12     ;FORM FEED
000D CR      EQU    13     ;CARRIAGE RETURN
007F DEL     EQU    7FH    ;DELETE OR RUBOUT
0000' ASEG   ;ABSOLUTE CODE, FOR USER LISTING
0000' ORG TBASE+480H ;BEGINS AFTER END OF USER3
              ;ITEMS RELATING TO ALL PRINTERS
;
; PRINTER CHARACTERISTICS AND PRINTING METHOD
;
; PRINTER TYPE / OVERSTRIKE METHOD **** VERY
; IMPORTANT: DETERMINES METHOD OF DOUBLE
; STRIKE, UNDERLINE, ETC, AND WHETHER DAISY-
; LIKE PRINTER CAPABLE OF MICROSPACE JUSTIFY.
; POSMTH=FF HEX:
; PRINTER CAN OVERPRINT ONLY BY CARRIAGE
; RETURN WITHOUT LINE FEED.
; POSMTH=0:
; PRINTER CAN OVERPRINT BY BACKSPACING AS
; WELL AS BY CARRIAGE RETURNING.
; NOTE: WITH POSMTH=0, CR-OVERPRINT IS USED

```

USER4 03/01 /80 PRINTER PATCH AREA MAC80 3.0 PAGE 3

; ONLY FOR OVERPRINT LINES IN FILE. FOR
; PRINTERS THAT CAN BACKSPACE BUT NOT RETURN
; CARRIAGE WITHOUT LINE FEED (EG SELECTRIC),
; USE POSMTH=0 AND DON'T USE OVERPRINT LINES.
;POSMTH=1:
; PRINTER IS A DAISY WHEEL OR SIMILAR INCRE-
; MENTAL PRINTER. CAN PRINT WITHOUT SPACING;
; CAN SPACE AND ROLL IN SMALL INCREMENTS.
; MICROJUSTIFICATION OCCURS ONLY IF POSMTH=1.
; ADDITIONAL PATCH ITEMS IN USER5.MAC ARE SET
; BY INSTALLATION DIALOG FOR DAISIES.

0580 FF

POSMTH: DB 0FFH
;FF SEND CR THEN ANOTHER WHOLE LINE
;00 SEND BACKSPACE THEN CHAR TO
; PRINT OVER LAST CHAR SENT
;01 DAISY WHEEL PRINTER WITH ALL NECESS
; ITEMS IN USER4 AND USER5 INSTALLED.

0581 03

BLDSTR: DB 3 ;NUMBER OF STRIKES FOR "BOLDFACE"
;SET 4, 5, ETC FOR DARKER "BOLDFACE"
;ON NON-DAISY PRINTER. FOR DAISY
;PRINTERS, 2 IS USED - DON'T CHANGE.

0582 02

DBLSTR: DB 2 ;NUMBER OF STRIKES FOR "DOUBLE
;STRIKE". INCREASE AS DESIRED.

0583 00 00 00

DB 0,0,0 ;RESERVED
; ***** USER-PATCHABLE FUNCTION
; STRINGS FOR NON-DAISY PRINTERS *****
; EACH STRING CONSISTS OF THE NUMBER OF BYTES,
; FOLLOWED BY THE BYTES TO BE SENT.
; IF FUNCTION IS NOT AVAILABLE,
; NUMBER OF BYTES SHOULD BE ZERO.
; ITEMS ON NEXT N PAGES APPLY ONLY WHEN
; POSMTH (ABOVE) IS 0 OR FF, NOT 1.
;
; STRING TO ADVANCE TO NEXT LINE, USED WHEN
; CR,LF ENCOUNTERED IN FILE.
;
; IF YOUR PRINTER REQUIRES NULLS SENT
; AFTER CARRIAGE RETURN (FOR DELAY),
; INCREASE COUNT SO SOME OF
; FOLLOWING ZEROES ARE SENT.
;
; IF YOUR PRINTER AUTO LINE-FEEDS AFTER
; CR CODE, REMOVE LF. (IF POSSIBLE,
; TURN OFF AUTO-LF IN YOUR PRINTER
; INSTEAD, FOR GREATER FLEXIBILITY OF
; WORDSTAR USE).

0586 02
0587 0D

PSCRLF: DB 2 ;NUMBER OF CHARACTERS
DB CR ;1ST CHAR: CARR RET

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```

0588  0A          DB LF ;2ND CHAR: LINE FEED
0589  00 00 00 00   DB 0,0,0,0 ;SPACE FOR 8
058D  00 00 00 00   DB 0,0,0,0 ;...MORE CHARS
;
;STRING TO RETURN CARRIAGE TO BEGINNING
;OF SAME LINE, TO OVERPRINT.
;
;USED FOR UNDERLINE, DOUBLE STRIKE, ETC IF
;POSMTH (ABOVE) IS FF.
;AND WHEN CR WITHOUT LF IS ENCOUNTERED
;IN FILE IF POSMTH IS FF OR 0.
;ALSO USED WHEN POSMTH IS FF AND BACKSPACE
;(^H) IS ENCCUNTERED IN FILE.
;
0591  02          PSCR:  DB 2 ;2 CHARS: CR AND A NULL,
                           ;TO ALLOW A LITTLE TIME
                           ;FOR CERTAIN PRINTERS.
0592  0D          DB CR ;CARRIAGE RETURN
0593  00          DB 0 ;NULL, FOR DELAY
0594  00 00 00 00   DB 0,0,0,0 ;SPACE FOR 4
                           ;MORE CHARS.
                           ;NON-DAISY STRINGS...
;
; STRING TO DO CARRIAGE RETURN AND HALF LINE
; FEED, FOR PRINTERS THAT CAN DO HALF LINE FEED
; DOWNWARD BUT NOT UPWARD. USED TO PRINT
; SUBSCRIPTS AND SUPERSCRIPTS AT HALF-LINE
; INTERVALS IF ROLUP (BELOW) NOT INSTALLED
; AND POSMTH IS FF OR 0.
;
; FOR EXAMPLE, FOR A SELECTRIC THAT ALWAYS
; FEEDS HALF LINES, INSTALL ONE CRLF HERE,
; TWO IN "PSCRLF" ABOVE.
;
0598  00          PSHALF: DB 0
0599  00 00 00 00 00   DB 0,0,0,0,0,0
;
;STRING TO BACKSPACE, IE TO OVERPRINT LAST
;CHAR PRINTED.
;
;USED FOR UNDERLINE, DOUBLE STRIKE, ETC IF
;POSMTH <(ABOVE)> IS 0. ALSO USED WHEN BACKSPACE
;(^H) ENCOUNTERED IN FILE IF POSMTH IS 0.
;
059F  01          PBACKS: DB 1
05A0  08          DB BS      ;ASCII BACKSPACE
05A1  00 00 00 00   DB 0,0,0,0
                           ;NON-DAISY STRINGS...

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```

; ***** THE FOLLOWING ARE OPTIONAL
; STRINGS, PERMITTING USE OF ADDITIONAL
; FEATURES IF SUPPORTED BY YOUR PRINTER.
;
; STRING TO SET ALTERNATE CHARACTER
; WIDTH, IF AVAILABLE.
;
; PALT: DB 0 ;0 CHARS: NOT AVAILABLE
; DB 0,0,0,0
;
; STRING TO RESET TO STANDARD CHARACTER WIDTH
;
; PSTD: DB 0,0,0,0,0
;
; STRING TO ROLL CARRIAGE UP A PARTIAL LINE
; WITHOUT ALTERING CARRIAGE COLUMN,
; IF AVAILABLE, FOR USE BEFORE SUPERSCRIPT
; AND AFTER SUBSCRIPT. ROLDDW SHOULD ALSO
; BE INSTALLED TO ROLL CARRIAGE SAME AMOUNT
; IN OTHER DIRECTION. APPLIES IF POSMTH=FF OR 0.      00 1014
;
; ROLUP: DB 0,0,0,0,0
;
; STRING TO ROLL DOWN, AS AFTER SUPERSCRIPT,
; IF AVAILABLE. USED ONLY IF ROLUP ALSO
; INSTALLED.
;
; ROLDDW: DB 0,0,0,0,0
; ***** USER-PATCHABLE ITEMS FOR BOTH
; BOTH DAISY AND NON-DAISY PRINTERS *****
;
; STRINGS FOR USER-DEFINED FUNCTIONS 1-4, INVOKABLE
; WITH PRINT CONTROL CHARACTERS IMBEDDED IN FILE.
; USE ONLY WITH EXTREME CAUTION AND VERY THOROUGH
; TESTING ON DAISY PRINTERS, AS WORDSTAR'S CONTROL
; SEQUENCES AND YOURS COULD EASILY INTERFERE.
; LINES CONTAINING CONTROLS THAT INVOKE THESE
; ALWAYS PRINT FORWARD EVEN IF BIDIRECTION PRINT IS ON.
;
; USR1: DB 0
; DB 0,0,0,0
USR2: DB 0
; DB 0,0,0,0
;
USR3: DB 0
; DB 0,0,0,0
USR4: DB 0
; DB 0,0,0,0
;
; DAISY / NON-DAISY STRINGS...

```

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;STRINGS USED BY BOTH DIASIES AND NON-DAISIES. AUTOMATICALLY PATCHED FOR DAISIES BY INSTALLATION DIALOG;
;MEDDLE WITH CAUTION FOR DAISY PRINTERS.

; ; CHANGE RIBBON COLOR (OPTIONAL)

ANSWER **ANSWER** **ANSWER** **ANSWER**

05CD 00 RIBBON: DB 0 ;CHANGE TO ALTERNATE COLOR
05CE 00 00 00 00 DB 0,0,0,0
05D2 00 RIBOFF: DB 0 ;CHANGE BACK TO BLACK
05D3 00 00 00 00 DB 0,0,0,0

; STRING TO INITIALIZE PRINTER. SENT AT
; START OF PRINTING, MAY BE USED TO TURN MOTOR
; ON, SET STANDARD CHARACTER SIZE AND LINE
; HEIGHT, OR OTHER FUNCTIONS FOR YOUR SPECIFIC
; HARDWARE. ALWAYS PATCHED BY INSTALLATION
; DIALOG, ADD YOUR BYTES AFTER INSTALLATION.

05D7 01 .REVIEW READING BY PSINIT: DB 1 ;NUMBER OF CHARACTERS
05D8 0D .REVIEW READING BY DB CR ;CARRIAGE RETURN, TO MAKE SURE
;CARRIAGE STARTS AT LEFT EDGE
;OF PAPER.

05D9	00 00 00	0000-0000	DB 0,0,0	
05DC	00 00 00	0000-0000	DB 0,0,0,0	;UP TO 16 CHARACTERS ..
05E0	00 00 00	0000-0000	DB 0,0,0,0	;.. TOTAL TO SEND ..
05E4	00 00 00	0000-0000	DB 0,0,0,0	;.. TO PRINTER

• (EDITIVE) : SIRING SENT TO PRINTER AT CONCLUSION OF PRINTING, EG TO TURN MOTOR OFF.

05E8 00 OT CALLIN? PSFINI: DB 0
05E9 00 00 00 00 DB 0,0,0,0
05ED 00 00 00 00 DB 0,0,0,0
05F1 00 00 00 00 DB 0,0,0,0
05F5 00 00 00 00 DB 0,0,0,0 :UP TO 16 CHARS

; CUSTOM PRINTER INITIALIZE SUBR, CALLED BEFORE
; STRING (PSINIT OR DINIT) IS SENT. USE FOR
; ANYTHING THAT CAN'T BE ACCOMPLISHED WITH
; A STRING, SUCH AS ASSIGNMENT OR INITIALIZING
; A SPECIAL DRIVER INSTALLED IN YOUR BIOS.

05F9 00 PRINIT: NOP ;INITIALLY NULL. PATCH A JMP
05FA 00 NOP ;TO YOUR ROUTINE HERE. SEE END
05FB C9 RET ;OF USER1.MAC RE FINDING PATCH
;SPACE.

CUSTOM PRINTER FINISH (CLOSE) SUBR, CALLED
AFTER STRING (PSFINI OR DFINI) IS SENT.

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```

;          ;  

05FC 00    ;PRFINI: NOP  

05FD 00    ;NOP  

05FE C9    ;RET  

05FF 00 00 00 00  DB 0,0,0,0 ;RESERVED  

; ***** FLAGS RELATING TO TRANSMISSION  

;          OF CHARACTERS TO PRINTER *****  

; ITEMS ON THIS PAGE RELATE TO ALL PRINTERS.  

0603 00    CSWITCH: DB 0 ;WHERE TO SEND EACH OUTPUT  

; CHARACTER:  

; 00 TO CP/M LIST DEVICE.  

; HAVBSY SHOULD BE 0 (UNLESS YOU  

; INSTALL A "BUSY" ROUTINE AT LIBSY)  

; 01 TO DIALOG-PATCHABLE PORT DRIVER  

; 02 TO USER SUBROUTINE, ENTRY POINTS  

;          PUBUSY, PUSEND, AND PUINP.  

; 03 TO OEM DIABLO DRIVER. FORCES POSMTH=1.  

; 04 TO ALTERNATE CONSOLE PRINTER DRIVER.  

0604 00    HAVBSY: DB 0 ;NON-ZERO IF PRINTER DRIVER  

; AS INSTALLED AND PATCHED  

; HAS A "BUSY" TEST SEPARATE FROM  

; "PRINT A CHARACTER". IF NON-ZERO,  

; CONCURRENT EDITING AND PRINTING  

; WILL PERFORM BETTER; MUST BE ZERO  

; IF CAN'T FIND OUT WHETHER PRINTER  

; IS BUSY (AS WHEN CHARACTERS ARE  

; OUTPUT THROUGH CP/M "LIST" DEVICE).  

; DB 0 ;RESERVED FOR EXPANSION  

; ***** PRINTER DRIVERS PER SE *****  

; THERE ARE FIVE DRIVERS, CORRESPONDING TO  

; CSWITCH (PREVIOUS PAGE) = 00, 01, 02, 03, 04  

; EACH OF THE DRIVERS HAS THREE ENTRIES:  

; 1. BUSY STATUS ENTRY. RETURNS CY=1 IF  

;     PRINTER IS NOT READY. IF UNIMPLEMENTED,  

;     RETURN CY=0. HAVBSY SHOULD BE 0 IF  

;     UNIMPLEMENTED AND FF IF IMPLEMENTED.  

; 2. SEND CHARACTER (A REGISTER) ENTRY.  

; 3. INPUT A CHAR TO A, OR RETURN CY=1 IF NO  

;     INPUT CHARACTER READY. THIS ENTRY IS  

;     USED ONLY FOR EIX/ACK AND XON/XOFF  

;     BUFFER FULL PROTOCOLS IMPLEMENTED  

;     WITHIN EDITOR (SEE "PROTCL" BELOW).  

; THESE ROUTINES MAY CLOBBER ALL REGISTERS.  

; PRINTER DRIVER TO OUTPUT TO CP/M LIST  

; DEVICE. ONLY CALLED IF CSWITCH=00.  

;

```

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0105 BDOS EQU TBASE+5 ;SYSTEM CALL ENTRY POINT
 0005 LISTF EQU 5 ;CP/M LIST FUNCTION #
 0606 LIBSY: ;BUSY TEST ENTRY - BUSY TEST MAY BE
 ;ADDED HERE IF YOUR OPERATING SYSTEM
 ;ALLOWS DETERMINING WHETHER PRINTER
 ;IS READY. PATCH HAVBSY TO FF IF USED.
 0606 00 NOP
 0607 B7 ORA A ;RETURN CY=0 TO SAY
 0608 C9 ;CALL SYSTEM
 0609 LISEND: ;OUTPUT CHARACTER (A) TO LIST DEVICE
 0609 5F MOV E,A ;CHARACTER IN E FOR CP/M
 060A MVI C,LISTF ;FUNCTION # IN C
 060C CALL BDOS ;CALL SYSTEM
 060F B7 ORA A ;CLEAR CY FLAG
 0610 C9 RET ;RETURN TO CALLER
 0611 LISINP: ;INPUT CHARACTER TO (A) OR RETURN CY=1
 ;IF NONE. THIS FUNCTION IS NOT SUPPLIED
 ;BY OPERATING SYSTEM, USER MUST SUPPLY
 ;SUBROUTINE IF ETX/ACK OR XON/XOFF
 ;SIGNALS AREN'T SUPPORTED; PROTOCOL IS TO BE USED.
 0611 00 NOP
 0612 37 NO MASK STC ;IF NO ROUTINE INSTALLED, SAY
 0613 C9 A MI HAIO HITW WHT RET ;.. NO CHARACTER READY.
 ;... PRINTERS...
 CSWITCH: ;
 ;PORT DRIVER. CALLED ONLY IF CSWITCH=1.
 ;REVISED 10/79 RELEASE 0.94.
 SWITCHING TO ;DOES I/O DIRECT TO HARDWARE PORTS; DIALOG PATCHABLE.
 ;WHEN PORT DRIVER IS SELECTED VIA INSTALLATION
 ;DIALOG, HAVBSY IS SET TO FF.
 HAVING DATA ;AS ASSEMBLED, USES PORT 4 FOR DATA, PORT 5 BIT 7
 XE XMAS ON ;ON TO INDICATE READY FOR OUTPUT, PORT 5 BIT 6 ON TO
 ;INDICATE INPUT CHARACTER READY.
 ;
 0614 OT 24MC 0010H POBSY: ;PORT DRIVER STATUS ENTRY
 00 ,SWOEA BYT ;BUSY TEST CODE:
 0614 DB DB (IN) ;"IN" INSTRUCTION
 0615 05 ,SWOEA BYT POSTAT: DB 5 ;PATCH OUTPUT STATUS PORT # HERE
 0616 00 TA SWOEA BYT NOP ; - PORT 5 SHOWN AS EXAMPLE
 0617 E6 POMASK: DB (ANI) ;MASK BIT(S) OF INTEREST -
 0618 01 POMASK: DB 1 ;BIT 7 SHOWN AS EXAMPLE.
 0619 EE GLAVNG-REGU C1 DB (XRI) ;COMPLEMENT BITS WHICH MUST
 061A 01 TI I=YD POCOM: DE 1 ;BE 1 FOR PRINTER READY.
 ;YUHEK KUH KUH ;NOW HAVE NON-ZERO IF PRINTER NOT RDY
 061B 37 .SF-YD 0010H STC ;SAY NOT READY
 061C C0 RNC ;RETURN IF NOT READY
 061D B7 GLAVNG-REGU C1 DB (XRI) ORA A ;CLEAR CARRY: SAY READY
 061E C9 RET ;RETURN
 061F POSEND: ;PORT DRIVER SEND CHAR ENTRY

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061F	D3		DB (OUT)	
0620	04	POOP:	DB 4 ;OUTPUT DATA PORT PATCHED HERE -	
0621	00		NOP ; PORT 4 SHOWN AS EXAMPLE.	
0622	C9		RET	
0623		POINP:	;PORT DRIVER INPUT CHAR ENTRY, ;USED IF PROTCL=1 OR 2 ONLY.	
0623	DB		DB (IN)	
0624	05	PISTAT:	DB 5 ;PATCH INPUT STATUS PORT # HERE	
0625	00		NOP	
0626	B6		DB (ANI)	
0627	02	POINSK:	DB 2 ;MASK BITS OF INTEREST - B6	
0628	EE		DB (XRI) ;COMPLEMENT BITS THAT ARE ON WHEN	
0629	02	POIM:	DB 2 ; INPUT CHARACTER IS READY	
062A	37		;NOW HAVE NZ IF INPUT CHARACTER NOT READY	
062B	00		STC	
			RNZ ;RETURN CY=1 IF NO CHAR READY	
			;CHARACTER IS READY, INPUT IT	
062C	DB		DB (IN)	
062D	04	POIP:	DB 4 ;PATCH INPUT DATA PORT # HERE	
062E	00		NOP	
062F	B7		ORA A ;CLEAR CY	
0630	C9		RET ;RETURN WITH CHAR IN A	
			;PRINTER DRIVERS...	
0631	00 00 00 00 00		DB 0,0,0,0,0,0,0	;RESERVED
0636	00 00			
			;	
			;USER-SUPPLYABLE PRINTER OUTPUT SUBROUTINES	
			;CALLED ONLY IF CSWITCH=2.	
			;	
			; THIS MAY BE USED WHERE SPECIAL INTERFACE	
			; REQUIREMENTS NECESSITATE A MORE COMPLEX	
			; ROUTINE THAN THE PORT DRIVER ABOVE.	
			;	
			; SPACE IS PROVIDED HERE ONLY FOR THE JMP'S TO	A100
			; THE ROUTINES; PATCH OVER DRIVERS ABOVE, OR	
			; IN "MOPAT" AREA AT END OF USER1 MODULE	
			; (SEE PRECEDING LISTING). FOR MORE SPACE,	
			; SEE "PRGMEN" AND ASSOCIATED COMMENTS AT	
			; END OF USER1 LISTING.	
			;	
0638	00	PUBSY:	NOP ;ENTRY POINT TO USER-SUPPLIED	
			; ROUTINE TO RETURN CY=1 IF	
			; PRINTER IS NOT READY.	
0639	B7		ORA A ;IF UNIMPLEMENTED, RET CY=0.	
063A	C9		RET	
063B	00	PUSEND:	NOP ;ENTRY POINT TO USER-SUPPLIED	
063C	00		NOP ;ROUTINE TO PRINT CHARACTER	
063D	C9		RET ; IN A REGISTER.	
063E	00	PUINP:	NOP ;ENTRY POINT TO USER-SUPPLIED	

APPENDIX C

USER4 Listing

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ESER4 03/01 /80

PRINTER PATCH AREA

MAC80 3.0

PAGE 11

;PRINTER DRIVERS... ALTERNATE CONSOLE DRIVER...

065A ACFIN: ;ALTERNATE CONSOLE DRIVER COMMON EXIT ROUTINE

065A 78 MOV A,B ;ORIGINAL IOBYTE, SAVED BY "ACSTAR"

065B ACSTAI: ;"ACSTAR" SUBROUTINE JOINS HERE

065B 32 009F STA IOBYTE ;SET NEW IOBYTE OR RESTORE ORIGINAL

065E 7A MOV A,D ;RESTORE A REGISTER

;RETURN CY=1 IF A=0: THIS IS NEEDED AT EXIT FROM
;"ACINP" ROUTINE, DOES NO HARM IN OTHER CASES.

065F B7 ORA A ;TEST FOR NON-ZERO, CLEAR CY FLAG

0660 C0 RNZ ;IF NON-ZERO, RETURN CY FLAG CLEAR

0661 37 STC ;ELSE SET CARRY FLAG

0662 C9 RET ;FOR A=0 RETURN CY=1

0663 57 ACSTAR: ;COMMON ENTRY SUBR FOR ALTERNATE CONSOLE DRIVER

0663 57 MOV D,A ;SAVE A IN D, FOR ACSEND.

0664 3A 009F LDA IOBYTE ;GET I/O ASSIGNMENTS STATUS BYTE

0667 47 MOV B,A ;SAVE INITIAL IOBYTE IN B

0668 E6 FC ANI 0FCH ;ZERO THE "CONSOLE" PART OF IOBYTE

066A F6 DB (ORI) ;SET DESIRED CONSOLE BITS

066B 01 CONFIE: DB 01 ;USER OR INSTALLATION SETS DESIRED

;CONSOLE BITS, HERE:

; 00 = TTY: PHYSICAL DEVICE

; 01 = CRT: PHYSICAL DEVICE

; 02 = BAT: PHYSICAL DEVICE

; 03 = UCL: PHYSICAL DEVICE

; NEW IOBYTE VALUE IS NOW IN A

066C C3 065B JMP ACSTAI ;GO SET IOBYTE FROM A, RESTORE A
066F 00 00 00 ;FROM D, AND RETURN TO CALLER.

DB 0,0,0 ;RESERVED

; **** PRINTER COMMUNICATIONS PROTOCOL ****

;

; APPLICABLE IF CSWICH=0, 1, OR 2.

; APPLICABLE FOR ALL POSMTH VALUES.

;

; THREE BUFFER FULL PROTOCOLS ARE SUPPORTED: * 0000 CD AP30

;

; NO PROTOCOL: (PROTCL=0): NO PROTOCOL EXECUTED IN WORD-

; STAR: USE IF NONE REQUIRED OR IF HANDLED ELSEWHERE,

; EG IN OPERATING SYSTEM OR IN USER DRIVER ROUTINES.

;

; ETX/ACK PROTOCOL (PROTCL=1): WS TRANSMITS "ETX" AND END

; OF STRING OF CHARACTERS, PRINTER RESPONDS WITH

; "ACK" WHEN ALL OF THESE CHARACTERS HAVE BEEN

; PRINTED. DRIVER MUST BE ABLE TO INPUT CHARACTERS.

;

; XON/XOFF PROTOCOL (PROTCL=2): PRINTER

; SENDS "XOFF" WHEN WS SHOULD STOP SENDING,

; "XON" WHEN TRANSMISSION SHOULD BE RESUMED.

; DRIVER MUST BE ABLE TO INPUT CHARACTERS.

APPENDIX C

USER4 Listing

USER4 03/01 /80 PRINTER PATCH AREA MAC80 3.0 PAGE 12

0672 00

; PROTCL: DB 0 ;0=NO PRINTER BUFFER FULL PROTOCOL
; ;1=ETX/ACK PROTOCOL. SET EAKBSZ BELOW!
; ;2=XON/XOFF PROTOCOL
; USE 0 FOR MOST TTY-LIKE PRINTERS AND FOR SERIAL
; DAISY PRINTERS INTERFACED AT 300 BAUD OR SLOWER.
; FOR DIABLO AND QUME AT 1200 BAUD, USE 1.
; FOR NEC AT 1200 BAUD, USE 1 OR 2 AND CONFIGURE THE
; PRINTER APPROPRIATELY, OR USE 0 & CABLE ADAPTER.
EAKBSZ: DB 127 ;ETX/ACK MESSAGE LENGTH (1/2 PRINTER'S
; BUFFER SIZE). APPLICABLE ONLY IF PROTCL=1,
; AUTOMATICALLY PATCHED FOR DAISY PRINTERS.

0673 7F

DB 0,0 ;RESERVED
DB 0,0,0,0,0,0,0,0 ;RESERVED
DW 0,0,0,0,0,0,0,0 ;FILL TO END MODULE

0674 00 00

0676 00 00 00 00 00

067B 00 00 00

067E 0000 0000

0682 0000 0000

0686 0000 0000

068A 0000 0000

068E 0000 0000

0692 0000 0000

0696 0000 0000

069A 0000 0000

ALABEL EQU \$;ASSEMBLER SHOULD PRINT 69E
;NEXT MODULE LOADS AT TBASE+5A0H
END

069E

USER4 01-

13

PAGE

PRINTER PATCH AREA MAC80 3.0

10

POSMTH	0580
PSCR	0591
PSID	05A1
RIBOFF	05D
USRA	05C
PRFINI	05F
LISEND	06
POINP	06
POOP	06
POIP	06
ACBSY	0
ACSTAI	0
EAKBSZ	0
OR4200	0
LF	0
EDOS	0

BLDSTR	0581	DBLSTK	059F	PALI	05CD
PSHALF	0598	PBACKS	05B4	RIBBON	05C3
ROLUP	05AF	ROLLOW	05BE	USR3	05F9
USR1	05B9	USR2	05E8	PRINIT	0606
PSINIT	05D7	PSFINI	0604	LIBSY	061F
CSWITCH	0603	HAVBSY	0614	POSEND	061A
LISINP	0611	POBSY	0618	POOM	0624
POSTAT	0615	POMASK	0629	PISTAT	063E
POINSK	0627	POIM	063B	PUINP	065A
PUBSY	0638	FUSEND	0650	ACFIN	0672
ACSEND	0647	ACTNP	0668	PROTCL	0657*
ACSTAR	0663	CONFIE	0654*	INCHR	0608
COUCH	064B*	CONSTA	069F	BS	007F
TBASE	0100	TOBYTE	000D	DEL	
FF	000C	CR	069E		
	2005	ALABEL			

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