

W H W H W H W H W H W H W H W H W H W H W H W H W H W H W H

**WSMX80**

A *Wordstar Print Processor*  
for  
*MX-80 or MX-100 printers*  
equipped with  
*Graftrax or Graftrax Plus*

Release 3.3

**Wheatland Design Laboratory**  
2601 Belle Crest  
Lawrence, Kansas 66044

## TABLE OF CONTENTS

I.	Control Characters . . . . .	1
1.	Boldface (^B) . . . . .	2
2.	Double-strike (^D) . . . . .	2
3.	Boldface/Double-strike (^B^D) . . . . .	2
4.	Double-wide (^A/^N) . . . . .	2
5.	Italics (^Q/^W) . . . . .	2
6.	Compressed (^Y) . . . . .	2
7.	Underline (^S) . . . . .	3
8.	Strikeout (^X) . . . . .	3
9.	Full-sized Superscripts (^T) . . . . .	3
10.	Full-sized Subscripts (^V) . . . . .	3
11.	Half-sized Superscripts (^P) . . . . .	3
12.	Half-sized Subscripts (^E) . . . . .	4
13.	Backspace (^H) . . . . .	4
14.	Alternate Character Set (^R) . . . . .	4
15.	Table of Contents Entry (^G) . . . . .	4
16.	Index Entry (^K) . . . . .	4
17.	Others . . . . .	4
II.	Standard Dot Commands . . . . .	4
III.	Dot Commands with Special Meanings . . . . .	5
1.	Line Height, .LH . . . . .	5
2.	Subscript/Superscript Roll, .SR . . . . .	5
3.	Paper Length, .PL . . . . .	5
4.	File Insert, .FI . . . . .	5
IV.	Dot Commands which are Ignored . . . . .	5
V.	Dot Commands Unique to WSMX80 . . . . .	6
1.	Empty Page, ..EP . . . . .	6
2.	Print Empty Page, ..PE . . . . .	6
3.	Save/Restore Line Height, ..SL and ..RL . . . . .	6
4.	Chain text files, ..CH . . . . .	6
5.	Change ^X character, ..CX . . . . .	7
6.	Load Alternate Character Set, ..AC . . . . .	7
7.	Redefine Control Characters, ..RD . . . . .	8
8.	Table of Contents File, ..TC . . . . .	8
9.	Index File, ..NX . . . . .	8
VI.	Some Examples . . . . .	8
VII.	Implementation of WSMX80 . . . . .	9
1.	Executable Versions . . . . .	9
2.	Execution Procedure . . . . .	9
3.	Command Line Execution . . . . .	12
4.	Commands During Execution . . . . .	12
5.	Installation . . . . .	13
VIII.	Generation of Alternate Character Sets . . . . .	14
IX.	In Case of Problems . . . . .	15
Appendix I.	Alternate Character Set (GREEK.CHR) . . . . .	16
Appendix II.	Control Character Assignment Summary . . . . .	17

Throughout this manual, references are made to CP/M, MP/M, Grafrax, and WordStar. CP/M is a registered trademark of Digital Research, and MP/M is a trademark of Digital Research. Grafrax is a registered trademark of Epson America. WordStar is a trademark of MicroPro International.

January, 1983

## Introduction to WSMX80

This document describes a stand-alone program which accepts a *CP/M* compatible text file which was prepared under the *WordStar* word processing program package and prints that file on the *Epson MX-80* or *MX-100* printer (with an 8-bit interface) equipped with either the *Graftrax* or the *Graftrax Plus* option. By separating the printing function from *WordStar* and its internal print processor, all of the internal functions of the printer can be used to full effect. This program may also be useable with some other *CP/M*-compatible word processing programs that can insert control characters.

In *WordStar*, commands for the printer are placed in the text file by the placement of control characters and dot commands. To a certain degree, the code for controlling the *MX80* can be patched into *WordStar*, but the range of dot matrix capabilities that can be controlled in this way is very limited; hence the need for this separate program. *WSMX80* interprets the control characters and dot commands, wherever possible following the definitions set by *WordStar*. In addition, many other useful functions were added.

The first section of this manual is a guide to the preparation of text files. In following sections, the implementations of both standard and non-standard dot functions will be presented. A guide to printing the text will be presented, and information for generation of special fonts will be provided.

This manual was copied from text printed directly from *WordStar* using *WSMX80* rather than being typeset. As such, it provides the examples of the available functions. For continued reference, the entire source file for the manual is provided with the *WSMX80* software.

### I. Control Characters

The control (non-printing) characters are entered into the text under *WordStar* by using the control P (^P) prefix, and most of these characters are used to control printing characteristics. Many of these characters have been assigned to special *MX-80* and *MX-100* functions. In most cases, the characters' definitions

have been chosen to correlate with the *WordStar* definitions, but many are new. In this section, the control character definitions are summarized and illustrated. A brief summary is provided in Appendix II.

1. The **boldface** mode is controlled by control B (^B) to turn on and off the *Epson* "double-pass" feature. It achieves a single level of highlighting. Each character is printed twice on separate passes of the print head with the second pass printed a fraction below the first. This sentence is printed using the boldface mode.
2. The **double-strike** mode is controlled by control D (^D) to turn on and off the *Epson* double strike or "emphasized" mode. This document is printed using the double-strike mode through most of it. For comparison, this sentence is printed with neither boldface or double-strike.
3. Use of boldface and double-strike together gives an even bolder effect; the density of the dots is great enough to give a fully-formed appearance.
4. The **double wide** font is turned on and off by ^A and ^N respectively. For double wide font, the *WordStar* "alternate pitch" syntax is followed. NOTE: *WordStar* cannot account for this change in its internal justification process. The line with the double wide characters extends beyond the right-hand margin unless the formatting is done manually.

The following are examples of double wide with the double density printing:

```
Double Wide normal;
Double Wide with ^B;
Double Wide with ^D;
Double Wide with ^B and ^D.
```

5. The **Italics** font is turned on and turned off by using the ^Q and ^W pair within the text. *Italics may be printed plain, in boldface, double strike, double wide, and compressed* as well.
6. The **compressed** font is turned off and on with the ^Y which is listed in *WordStar* as the ribbon-change function. The following is an example of the print.

There are two limitations to the use of compressed font. The first is that the *WordStar* justification process cannot take the narrow characters into account. The second is that the double strike (^D) function must not be used since it will over-ride the compressed font command and can cause words to over-print each other. However, within the compressed font, *italics*, *boldface*, and *double wide* may still be used.

7. The **underline** command employs a pair of ^S's. With *Graf-trax*, a dashed underline is printed while with *Graftrax Plus*, the line is solid. Note that spaces are not underlined. If a solid line is desired, even under a space, enter a control F (^F, noted in the *WordStar* manual as a phantom space) instead of a space. Although *WordStar* does not show a space when the print control display is off (see ^OD in the manual), a slight inconvenience, it will format properly, and as follows, it will print properly.

8. The **strikeout** command requires a pair of ^X's: ~~THIS PHRASE IS STRUCK BY USING CONTROL X~~. The comments regarding control F in the previous paragraph also apply here. See also section V.5.

9. Full-sized **Superscripts** are produced with a pair of ^T's. When the line height is too small to allow scripts and superscripts without overlapping, extra space will be inserted so that they will fit in. This document is printed with a line height of 1-1/4 spaces, so extra space is unnecessary. Entering t^T2^T prints  $t^2$ ; A^T\*^T yields  $A^*$ . The default subscript/superscript roll is 5/12 of the standard line height but can be changed by using .SR commands (Sec. III.2.). Both members of the pair of ^T's must be on the same text line.

10. Full-sized **Subscripts** require a pair of ^V's. A t^V2^V prints  $t_2$ . The size of the roll and the space allowed are the same as for ^T. Both members of the pair of ^V's must be on the same text line.

11. The **half-sized superscript** is switched on and off with ^P's. It can only be used with printers equipped with the *Graf-trax Plus* option. The full character set can be printed at reduced height at the top of the print line; no carriage roll is required: letters, <sup>a</sup>b<sup>c</sup>d<sup>e</sup>f<sup>g</sup>, numbers, <sup>1</sup>2<sup>3</sup>4<sup>5</sup>, and other characters, <sup>!''\*\*%&</sup>. Italics, <sup>ABC</sup>, and narrow width, <sup>GHJK</sup> can be used in conjunction with this mode. However, wide character width and control D emphasis cannot be used. Both members of the pair of ^P's must be on the same text line.

12. The **half-sized subscript** is switched on and off with **^E's**. It places reduced height characters at the bottom of the print line, and is otherwise similar to the superscripts. For example, the following subscripts are printed with this option:  $A_{abc}B_{abc}$ , and  $C_{123}$ . Both members of the pair of **^E's** must be on the same text line.

13. The **backspace** command is **^H**. Special characters can be printed by using the backspace to overprint. For example, with a **0^H/**, the character  $\emptyset$  is printed. Other examples are shown in Section VI. If *Graftrax Plus* is used, the printer will not backspace over characters produced using graphics (**^R**), subscript (**^P**) or superscript (**^E**) commands.

14. The **Alternate Character Set** is invoked to substitute characters from a user-defined character set. In *WSMX80*, characters found within a pair of **^R's** are substituted using a separate file of character definitions which can be defined by the user. The chosen character set must first be loaded from a disk file with the **..AC** command. The command is described in detail in the section under non-standard dot commands, **..AC** (Sec. V.6.).

15. The **Table of Contents** command utilizes a control G (**^G**) to indicate entries into a file for a table of contents. Everything to the left is written to this file. Details of setting up this command are provided in section III.8.

16. The **Index** command is used to enter words into a separate file for an index. Words or phrases surrounded by a control K (**^K**) are entered into a file set up as described in III.9.

17. Certain other control characters are used for non-printing functions. Control O (**^O**) is handled exactly as described in the *WordStar* manual. The **^P^M** (or **^P RETURN**) defined in *WordStar* cannot be used under *WSMX80*.

## II. Standard Dot Commands

The following dot commands are executed exactly as documented in the *WordStar* manual:

.PO	.IG	.CP	.FO	.FM	.HE	.HM
.MB	.MT	.PA	.OP	.PN	.PC	.DM

### III. Dot Commands with Special Meanings.

Several have a slightly different connotation or restriction.

1. The `.LH n` (Line Height) command is largely unchanged where the parameter `n` is line height in  $1/48$ ths of an inch. Because the MX printers operate in steps of  $1/216$  of an inch, the internal conversion requires that, for an accurate translation, `n` should be even. For example `n=8` means  $8/48" = 36/216"$ . However, a change to `n=9` would mean  $9/48" = 81/432"$  which is rounded off to  $40/216"$ ; the error will seldom be observable.

The default line height remains eight. In the previous paragraph, the line height was varied from 6 to 22 in steps of 4.

2. The `.SR n` (Subscript/superscript Roll) command uses the same dimensions as the line height; therefore, it must also be even for highest accuracy. The default value of `n=3` is  $3/48"$  (.0625") in *WordStar* which is approximated as  $13/216"$  (.0602"); the difference can generally be ignored.

3. The `.PL n` (Paper Length) command sets the page length to  $n/6$  inches with a default of 66 lines at  $1/6"$ . The positions of the page breaks may differ slightly from those shown in *WordStar* since the subscripts, superscripts, and changes in line height are taken into account in *WSMX80* but not in *WordStar*.

4. The `.FI filename` (File Insert) command allows another file to be printed from within the file containing the `.FI` command. This command emulates a MailMerge command. Additional files can be inserted in the inserted files up to six levels deep.

### IV. *WordStar* Dot Commands which are Ignored.

The following dot commands were created for daisy wheel printers and have no meaning for *WSMX80*:

`.BP`      `.UJ`      `.CW`

## V. Dot Commands Unique to WSMX80.

The following dot commands were created to realize certain functions which were considered useful but were not included in *WordStar*. In order to avoid confusing *WordStar* during the edit process, they should be preceded by a double dot (..) which makes *WordStar* consider them comments.

1. The Empty Page (..EP [string]) command is a way of creating an empty page within a document in which figures can later be added. It differs from the possible use of the .PA command in that the empty page will not be added until the next page break is reached. The empty page is not actually printed unless directed by the ..PE command (below). When the empty page is printed, the heading, the footing, and the string are printed on it, making a convenient method of entering figure titles. Up to four EP dot commands may be placed in any single page of printed text.

2. The Print Empty page (..PE n) command will, if n=1, allow the blank pages to be printed as requested by ..EP; the empty page will have the same heading and footing as the rest of the document and will also be printed with the ..EP string. Artwork could easily be pasted up on these blank pages and would be included in the numbering.

If n=2, the captions entered by the ..EP strings will be printed in the bottom margin between the footing and the bottom of the page if there is space.

If n=0, the ..EP commands are ignored. This is the default value.

3. The Save Line height (..SL n) and Restore Line height (..RL) commands temporarily store the current line height and set the line height to a new value of n; the old value can be restored by the RL command. The SL/RL combination is quite useful when an equation or table is included in a text; the equation or table may require a different line height than the main text, and the SL and RL commands allow the line height to be changed for that section only without affecting the remainder of the document.

4. The CHain command (..CH filename) closes the current text file and immediately begins printing the one which is specified by filename; when it is used, the CH command should be the last



line of the file. By using this command a large document can be printed in a single operation but can be edited in convenient small modules.

5. The Change X character (`..CX n`) command is used to change the character used to print over the text with the `^X` command. The value of `n` may be 0, 1, 2, or 3. The lines below illustrate the effect:

```
n=0 THIS IS STANDARD STRIKEOUT.
n=1 Strikeout with a horizontal line.
n=2 Double underline.
n=3 Wavy underline.
```

Since the `^B` and `^D` types of emphasis do not always reproduce well on old photocopiers, the types of emphasis specified by options 2 and 3 are sometimes preferred or requested by editors.

6. The Alternate Character set (`..AC filename`) command is used to load an alternate character set from a file specified by `filename`. That file contains the specifications for 96 ASCII characters in a dot matrix of 8 dots high by up to 11 dots wide.

When a control R (`^R`) is encountered in the text, the characters which follow are converted to their ASCII equivalents from the character set file until another `^R` is encountered.

There are two limitations in the use of the `^R`. First, both the leading `^R` and the trailing `^R` must be on the same line. Second, no other control functions should be placed within an alternate character string. Failure to observe those limitations will lead to unpredictable results.

An alternate character source file for the character set `GREEK.CHR` is shown in Appendix I. `WSMX80` can be used to print the contents of the file. As much as possible, the same correspondence between this character set and the standard ASCII set was used as is employed for the IBM 66/40 ink-jet printer. The means of printing two over-size characters was included: a double-high  $\int$  and a double-high  $\Sigma$ . These are produced as subscript/superscript pairs with a backspace:

```
^T^R(^R^T^H^V^R)^R^Vabc    prints     $\Sigma abc$ 
^T^R(^R^T^H^V^R)^R^Vabc    prints     $\int abc$ 
```

Through the imaginative use of subscripts, superscripts, and backspaces, it should be possible to print most equations.

7. The ReDefine control characters (`..RD a=b`) command allows a user to change control character definitions. After this dot command is executed, any time that the control character `a` is encountered it will be executed as a `b`. For example if `RD X=D` is entered, any time a control `X` is encountered, it will be executed as a control `D`.

8. The Table of Contents (`..TC filename`) command is a means of generating a paginated table of contents. The filename for the table of contents is set with this dot command. Thereafter, whenever a control `G` is encountered in the file, the text to the left on that line will be included in the Table of Contents file with the page number. This command can be of great help when a document undergoes regular change which changes page numbers. Some editing of the destination file will usually be required before it is used as a final table of contents.

9. The INdeX (`..NX filename`) command sets up a file into which all marked words are entered (see section I.16). After alphabetizing and editing, the index will be complete without the need for searching for keywords.

## VI. Some Examples

The examples in this section may provide some help in attempts to produce special equations. Although some sequences may appear cumbersome at first, working through the examples character by character might alleviate initial apprehensions.

<code>Z^H-</code>	prints	<code>Z</code>	<code>7^H-</code>	prints	<code>7</code>
<code>--^H&gt;</code>	prints	<code>-&gt;</code>	<code>AB^H^H^T^R--^R^T</code>	prints	<code>AB</code>
<code>!^H^</code>	prints	<code>↑</code>	<code>^T&gt;^T^H=</code>	prints	<code>≥</code>
<code>^T!^T^H^R-^R^H^V2^V</code>	prints	<code>½</code>	<code>0^H/</code>	prints	<code>∅</code>
<code>^R*****^R</code>					
prints					
~~~~~					

The alternate character set is useful in other ways than just providing Greek characters.

<code>&lt;^H^R--^R</code>	prints	<code>←</code>	<code>^R!^R6^H^R&amp;^R</code>	prints	<code>√6</code>
---------------------------	--------	----------------	--------------------------------	--------	-----------------

In order to print the equation below, the line height was temporarily changed with a `..SL 8` command, and afterward a `..RL` restored the original line height.

$$R = \frac{v^R t^{R3^R / Rt^R}}{(2^R \sin^W R)^{T^R 2^R T}}$$

prints:

$$R = \frac{e^{-2\alpha t}}{(2\pi \sin \theta)^2} \times t^3 / \tau$$

$$M = \int_{t=0}^{\infty} a \, dt$$

prints:

$$M = \int_{t=0}^{\infty} a \, dt$$

## VII. Implementation of WSMX80

1. **Executable Versions.** *WSMX80* is distributed as a single executable file, *WSMX.COM*. The alternate character set package includes *GREEK.CHR*, its source file, *GREEK.TXT*, and a character set compiler, *CHRCOM.COM*. An installation program, *MXPATCH.COM*, and this documentation in machine-readable form, *WSMX.TXT* serving as a demonstration file, are included.

2. **Execution Procedure.** *WSMX80* can be executed as a separate program or from within *WordStar* with the "R" command; the latter is usually more convenient.

*WSMX80* can be executed with or without command line parameter entry. In the following discussion, text generated by the computer is printed in italics, and the user responses are printed in boldface. To execute *WSMX80* without the command line, simply enter the name of this program, and it will respond with the heading:

```

WSMX80
PRINT PROCESSOR -- WordStar to Epson MX-Printers
Version 3.21; November, 1982

```

The upgrade from the *Graftrax* option to the *Graftrax Plus* option is a significant improvement in the efficiency of the print operation; the print head seeks the correct position much more rapidly. Furthermore, several functions are available only

with *Graftrax Plus*. Unfortunately, the new is not completely upward compatible with the old; (in fact *Graftrax* is not completely upward compatible with the plain printer, and the *Graftrax Plus* contains what must be bugs that are filtered by this program). Some commands in the old version were left out of the new, and some new functions, particularly subscripts and superscripts, were added. Therefore, the program must be told which version it is speaking to. Consequently, the following prompt is added:

*Enter 0 for Graftrax or 1 for Graftrax+: 1*

The information in this prompt can be permanently installed by the procedure described later.

The dialog that follows requests the name of the file and several operating parameters:

*Enter the file name (fx:lname.ext): afile.doc*

The file name may be entered in either upper or lower case. If the extension is omitted, it will default to ".TXT". If the file to be printed has no extension, the dot must be entered; *i.e.*, *AFILE* will call the file *AFILE.TXT* while *AFILE.* will call the file *AFILE* without extension. An invalid file name returns the program to this query after an error message.

*Direct output to the Printer (P) or a disk File (F): P*

If the Printer/ disk File query is defaulted with simply a carriage return, the printer is the default device, and a *P* is printed. If the disk File option is selected, the file name is requested; if the file name is entered without an extension, a default ".PRN" is added. The resultant file can then be printed directly either by PIP or with a spooler.

*Wait (W) or Continue (C) at the end of each page: C*

The default response is to Continue. The Wait feature is useful if single sheets are to be fed into a MX-80 FT, the friction feed model. If the Wait feature is activated, the paper-out sensor in the printer is disabled.

*First page printed (CR=Beginning):* 3  
*Final page printed (CR=End):* 4

If the entire document is to be printed, carriage returns are entered. When printing does not begin at the beginning of the file, the program interprets the text exactly as if it was to be printed until the beginning page is reached, and one must wait until that processing is complete.

*Is the source file non-document (N) or document (D)?* D

The default response is the Document mode, but if the Non-document mode is selected (usually for a program listing), the print font will default to compressed font without a lefthand margin and the program will ask the user for a character string to be included in the heading. Typically that string will contain a title, the date and/or the time. Therefore, the text need have no dot commands although any that are included will be executed. The following query is made:

*Enter desired heading:* Date, time, message, etc.

The entire heading is composed of the name of the file being printed on the left side, the page number on the right, and the string entered in response to the query centered.

*Number of copies:* 3

A number between 1 and 9 may be entered and the text will be printed that number of times. A carriage return will enter a default value of one.

*Print an additional file at conclusion of AFILE (Y/N)?* N

If the reply is Y, the user will be prompted for another file to be printed at the end of the first. The default response is N if a carriage return is entered.

It is possible to edit responses by moving backwards in the query sequence. Striking a backslash (\) in response to a query will display the previous query.

If, in response to any query, a slash (/) is entered, the remainder of the queries will be skipped, and the parameters will

be set to default values unless they were already set before backing up with backslashes.

3. **Command line execution.** Most of the options can be controlled directly from the command line which is faster and facilitates the use of SUBMIT files. This command takes the form

```
A>WSMX filename[.ext] [/switch1/switch2/switch3...]
```

The filename includes the drive name if the default drive is not used. The extension, if omitted, defaults to .TXT. If an invalid file name is entered, the dialog in section 2, above, is entered.

Five software switches may optionally be added which replace most of the dialog required in the non-command line mode. The entire document is printed. The default switch settings are: output to the printer; document mode, no wait at the end of the page; single copy; exit at the end of the file. These defaults may be changed by adding the following switches:

<b>/F=filename</b>	sends the output to the disk file specified by filename.
<b>/N[=string]</b>	specifies non-document mode and includes the <i>string</i> in the command line as part of the heading unless a .HE dot command is found in the text.
<b>/W</b>	requests a wait at the end of each page.
<b>/M=ncopies</b>	Prints a number of copies of the file equal to <i>ncopies</i> .
<b>/A</b>	Returns to prompt for an Additional file at the end of the current file.

4. **Commands During Execution.** Several commands can be entered during execution to abort or change parameters.

The printing can be made to abort at any line with a ^C; as a precaution, a query (Y/N) is made before the exit is made.

The printing can be made to pause when ^S is pressed; pressing any key will cause it to resume.

Pressing ^P while printing is taking place leads to a prompt for the insertion in the text character stream of a control

character from the keyboard. This command is useful when an error in editing leaves one of the special functions on when it should have been turned off. For example, if a pair of words were to be underlined using the ^S function but the second ^S was accidentally omitted, the remainder of the document would be underlined. In order to speed the printing of the document, a control P followed by a control S could be entered from the keyboard, and the underlining would be aborted immediately.

Several features apply only if *WSMX80* is operated under *MP/M*. First, a ^D will detach the program from the console. If an error later occurs during execution, *WSMX80* will attempt to attach to the console again, and a ^D from the console monitor will restore the program; if no error message is pending, an *ATTACH* command from *MP/M* is used to restore the program. Second, the program will attempt to take control of the printer; if a different process (e.g., *PIP* or another user employing this program) already has control, the user can command *WSMX80* to either abort or wait. When waiting, the program will avoid tying up the CPU by checking only once per second to determine if the printer is available. If the wait option is chosen, that state can either be aborted with a control C or detached with a control D.

**5. Installation.** This program requires a *CP/M-80* system with a minimum of 48K of memory. The printer is driven through the *CP/M* list (*LST:*) device. Seven or eight bit data transfer is possible. The distribution version uses eight bits. In some systems, the high bit is cleared, and one result in text printed under *WSMX80*, is that the gap which should be present when a new page is begun is wrong; the text "creeps up". The top line of user-defined characters will also be missing. A method is provided for handling the former result but not the latter. The problem may lie either in an interface only wired for seven bits or in the *CP/M BIOS*.

The choices of *Graftrax* or *Graftrax Plus* and seven or eight bit interface can be permanently patched into the file by changing an internal flag using the utility program *MSPATCH*. The program prompts for the choices and patches the *WSMX.COM* file. It is always prudent to make a back-up copy of all software before any changes are made.

## VIII. Generation of Alternate Character Sets.

Custom character sets can easily be prepared if needed by following a two-step process. First a text file is prepared specifying the characters, and then that file is compiled to produce a compact file which is loaded with the .AC command.

The following procedure is used to prepare the character source file: a file is produced in which a single line contains the specification for a single character: the first number on the line is the number of columns of dots,  $n$ , required to print a character followed by a comma and the  $n$  values for the  $n$  dot columns each followed by commas. The column values are produced by converting a series of eight 1's and 0's for the eight possible dots in a column from binary to a decimal number. For example, to produce the character  $\pi$ , the following  $8 \times 11$  matrix was produced:

Binary weight \ column number	1	2	3	4	5	6	7	8	9	10	11
128	.	.	.	.	.	.	.	.	.	.	.
64	.	.	.	.	.	.	.	.	X	.	.
32	X	X	X	X	X	X	X	X	.	.	.
16	.	.	X	.	.	.	X	.	.	.	.
8	.	.	X	.	.	.	X	.	.	.	.
4	.	.	X	.	.	.	X	.	.	.	.
2	.	X	.	.	.	.	.	X	.	.	.
1	.	.	.	.	.	.	.	.	.	.	.

The resulting code line specifies 9 columns as follows:

```
9,32,34,60,32,32,32,60,34,64, greek pi
```

Note that after the last comma, the line may be annotated as desired. The character source file must contain 96 lines of data, but may also contain dot commands to control printing this character source file. The disk file then contains the specifications for 96 characters beginning with the alternate for a space (ASCII 20<sub>HEX</sub>), continuing through the alternate for ASCII 7F<sub>HEX</sub>.

The character source file is then compiled with a utility program, *CHRCOM*. This program simply prompts for the names of source and compiled alternate character files after which the ASCII file is compiled into a more compact binary file.



## **IX. In Case of Problems.**

Any errors encountered or other problems with the execution of this program should be directed to the Wheatland Design Laboratory. Please include the error message and a description of the file which created the problem.

## APPENDIX 1. ALTERNATE CHARACTER SET (GREEK.CHR)

!	"	#	\$	%	&*	'	(*	)*	**	+
√	•	{	}	±	—	÷	∇	∠	⊗	⊖
,	—*	.	/							
—	—	~	~							
0	1	2	3	4	5	6	7	8	9	0
0	1	2	3	4	5	6	7	8	9	0
:	;	<*	=*	>*	?	@*				
^	..	«	»	»	∫	∫				
A	B	C	D	E	F*	G	H	I	J*	K
∇	⊖	ψ	φ	←	≥	∧	¶	↑	≤	⊗
L	M	N	O	P	Q	R	S	T	U	V
Ω	θ	~	↓	ℓ	∫	⊖	Σ	→	≡	κ
W	X	Y	Z							
Δ	≡	Υ	≅							
[	\*	]	^*	_*	'					
π	‡	Π	†	—	~					
a	b	c	d	e	f	g	h	i	j	k
α	β	ϕ	ϕ	ε	α	λ	η	ι	θ	κ
l	m	n	o	p	q	r	s	t	u	v
ω	μ	ν	ο	ρ	ϕ	θ	σ	τ	ε	χ
w	x	y	z							
δ	χ	υ	ζ							
{*	!*	}*	~*							
†	‡	§	~							

\* Indicates that the character is not the same as used by the IBM 66/40 ink-jet printer.

## APPENDIX II. CONTROL CHARACTER ASSIGNMENT SUMMARY

^A Turn *on* the **wide** font.  
 ^B Turn *on/off* the **boldface** mode.  
 ^C Pause while printing.  
 ^D Turn *on/off* the **double-strike** mode.  
 ^E Turn *on/off* the *Graftrax Plus* subscript.  
 ^F Treated as a space which can be underlined.  
 ^G Generates a Table of Contents entry.  
 ^H Backspace.  
 ^K Used for setting page number positions in headings and footings and for making index entries.  
 ^N Turn *off* the **wide** font.  
 ^P Turn *on/off* the *Graftrax Plus* superscript.  
 ^Q Turn *on* the *italics* font.  
 ^R Turn *on/off* the alternate character set.  
 ^S Turn *on/off* the underline.  
 ^T Turn *on/off* the <sup>super</sup>script.  
 ^V Turn *on/off* the subscript.  
 ^W Turn *off* the *italic* font.  
 ^X Turn *on/off* the **strikeout**:   ~~strike/~~ (CX=0)  
                                           ~~strike-~~ (CX=1)  
                                           ~~strike.~~ (CX=2)  
                                           ~~strike~~ (CX=3)  
 ^Y Turn *on/off* the **compressed** font.

<u>Characteristic</u>	<u>ON command</u>	<u>OFF command</u>
Alternate Character Set	^R	^R
Backspace	^H	
<b>Boldface</b>	^B	^B
Compressed	^Y	^Y
<b>Double-Strike</b>	^D	^D
Index entry	^K	^K
<i>Italics</i>	^Q	^W
Pause while printing	^C	
<del>strike/</del> (cx=0)	^X	^X
<del>strike-</del> (cx=1)	^X	^X
<del>strike.</del> (cx=2)	^X	^X
<del>strike</del> (cx=3)	^X	^X
Subscript	^V	^V
subscript (Graftrax Plus)	^E	^E
Superscript	^T	^T
superscript (Graftrax Plus)	^P	^P
Table of Contents	^G	
Underline	^S	^S
<b>Wide</b>	^A	^N

**WHEATLAND DESIGN LABORATORY**  
2601 Belle Crest, Lawrence, Kansas 66044

Please take the time to provide us with the information listed below so that we may support you better by informing you of updates or problems with this software and by telling you of new software that becomes available.

Name \_\_\_\_\_

Address \_\_\_\_\_

Computer on which this software is used: \_\_\_\_\_

Location of the computer: \_\_\_\_\_

From whom did you obtain the software? \_\_\_\_\_

Comments on the performance of this software and the features that might be useful in future versions: