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**PRO/MAPPER—A PLOTTING PROGRAM FOR THE
DEC PRO/300 PERSONAL COMPUTERS UTILIZING
THE MAPPER GRAPHICS LANGUAGE**

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ABSTRACT

PRO/Mapper is an application for the Digital Equipment Corporation PRO/300 series of personal computers that facilitates the preparation of visuals such as graphs, charts, and maps in color or black and white. The user prepares an input data file containing English-language commands and writes it into a file using a standard editor. PRO/Mapper then reads these files and draws graphs, maps, boxes, and complex line segments onto the computer screen. Axes, curves, and error bars may be plotted in graphical presentations.

The commands of PRO/Mapper are a subset of the commands of the more sophisticated MAPPER program written for mainframe computers. The PRO/Mapper commands were chosen primarily for the production of linear graphs. Command files written for the PRO/300 are upward compatible with the Martin Marietta Energy Systems version of MAPPER and can be used to produce publication-quality slides, drawings, and maps on the various output devices of the Oak Ridge National Laboratory mainframe computers.

1. INTRODUCTION

The MAPPER program was originally written by David Dahl of Los Alamos National Laboratory to permit nonprogrammers to produce maps of radioactivity distributions. Because it was intended to produce maps, it was called MAPPER. Because it so improved the production of graphical presentations, it was soon being used for purposes far removed from the mapping. Extensive changes and improvements have been made to it, and today the MAPPER user group has expanded to include personnel at other national laboratories, including Oak Ridge National Laboratory (ORNL), where B. A. Clark and others have adapted it to the Digital Equipment Corporation (DEC) System-10.¹

The Computing and Telecommunicating Division and Graphics Arts Department of the Information Resources Organization of Martin Marietta Energy Systems, Inc., have enhanced the capabilities of MAPPER so that it produces publication-quality plots using pen-and-ink drawings, 35-mm color slides, and other output media available through the Martin Marietta Energy Systems, Inc., computer facilities. These plots can also be produced on regular computer plotting terminals, and the ease with which this can be done has led to its use as a common means of visualizing experimental and computed data.

PRO/Mapper has been written to extend this facility to the DEC PRO/300 Personal Computer (PC). The PRO/300 with the Extended Bit-Map Option has extensive graphics capability that can be accessed through the Core Graphics Language from Fortran 77 programs.

PRO/Mapper reads MAPPER data files, which have been created using a standard editing program such as EDT, PROSE, or TECO. Only certain MAPPER commands—primarily those associated with producing linear plots—are effective in the PRO/Mapper environment. Many of the options in mainframe MAPPER are not available. They may appear in the command file but are ignored in producing the PRO/300 display.

In general, PRO/Mapper uses the default values of MAPPER. If a PRO/Mapper command file is transported to the PDP-10 and submitted to MAPPER, it will produce a similar plot. Differences may appear in areas such as type size and font, symbol type, and symbol size, but the basic features will be the same. Relatively little editing will produce publication-quality output.

A person familiar with MAPPER can very quickly adapt to the constraints of PRO/Mapper. Indeed, those who use MAPPER through a remote plotting terminal on a telephone line find that the PC version plots with a speed that greatly facilitates editing. MAPPER users can use Sect. 4, the command-summary section of this report, to identify the allowable commands and the restrictions that apply. Commands not in this listing are ignored and do not affect the result.

Section 2, "Operating Procedures," discusses the methods for producing plots on the PRO/300. Section 3, "Source File Format," informs persons who are not familiar with MAPPER commands about the basic concepts of the command structures.

2. OPERATING PROCEDURES

PRO/Mapper requires a DEC PRO/300 computer with a bit-map option. It utilizes the routines of the Professional Core Graphics Library (CGL),² as well as certain P/OS routines. These applications must be loaded before PRO/Mapper can be used.

PRO/Mapper is supplied on a diskette that contains the application, a few examples, and a short description of the PRO/Mapper commands.

2.1 INSTALLING PRO/Mapper

The application is loaded into the computer using the "Install Application" option of the Disk/Diskette Services Menu that is entered from the Main Screen. Once installed, PRO/Mapper may be entered in the usual fashion for an application.

2.2 USING PRO/Mapper

The user is guided in using PRO/Mapper by a series of menus from which one or more options may be chosen. A help file is associated with each of the menus and with each option listed in a menu. These menus are reproduced in the Appendix.

The first PRO/Mapper screen prompts the user to choose between selecting an "Old" or a "New" file for the session. If a new file is to be generated, succeeding menus permit the user to furnish the name of the new file and to commence writing the file using the PROSE editor. If an old file is to be used, the user may specify the extension of the file, whereupon the files in the current library that have that extension are listed for selection. If the file is contained in a different directory, the "Additional Options" key will allow the selection of the desired directory, and the process repeats.

There are two important requirements on the source file: (1) the commands (but not titles, labels, etc.) must be written in upper case, and (2) it must not reside on a file-protected diskette.

When the file name has been chosen, the user is presented with the Main PRO/Mapper menu from which he may choose to view the current source file, edit the file, or print it on the attached printer. Other options permit the user to view the output of the DEBUG facility, to print the debug output, to quit PRO/Mapper, or to change the active source file.

The editing and printing options are identical to those provided with the P/OS Operating System and are described in the User's Guide.³ It should be noted, however, that while all the options provided with the PROSE Editor are implemented, the source

file must not contain form feeds, indent marks, and the like. Therefore, on exiting PROSE, the program purges these marks from the source file.

The "View" option of this screen causes the current source file to be converted into its equivalent graphical form and plotted on the PRO/300 monitor screen. When the screen presentation is complete, a "beep" sound will be heard, and the screen will hold the view until the "RESUME" key is pressed. During this time the entire keyboard will be locked out except for the "RESUME" and "PRINT SCREEN" keys. Pressing any other key will have no effect except that a "beep" sound will warn the user that the key is inactive.

The "PRINT SCREEN" key will produce a printed representation of the screen. However, the aspect ratio of the screen is not reproduced on the LA-50 printer, and, thus, the vertical dimensions are compressed in the transfer.

After viewing the screen, pressing the "RESUME" key will enable the next plot of the same computer file to be viewed. At the end of the file, "RESUME" must be pressed one more time to return to the main PRO/Mapper menu.

2.3 PRO/Mapper Examples

The following are examples of PRO/Mapper graphs that illustrate various aspects of the language. These examples are provided on the diskette containing the application. They may be plotted on the PRO/300 by selecting "Old File" from the first menu and "*.MPR" from the second menu and then by changing to directory [PROMAPPER] on volume PROMAPPER, which is contained on the diskette. One of these examples is then selected and, at the Main PRO/Mapper Menu, plotted using the "View" option.

2.3.1 BARCHART.MPR

BARCHART.MPR (see Fig. 1) is an example that uses boxes to produce a bar graph. The START view window conforms to the size of the PRO/300 screen so that dimensions on the screen are also those of the viewing surface. CLABEL commands are used to position the labels.

This version of the plot requires the user to make the translation from dollars to inches: the same graph is made more easily by treating it as a graph, calling X-AXIS and Y-AXIS with the year and dollar ranges, and then plotting line segments with height equal to the dollar value.

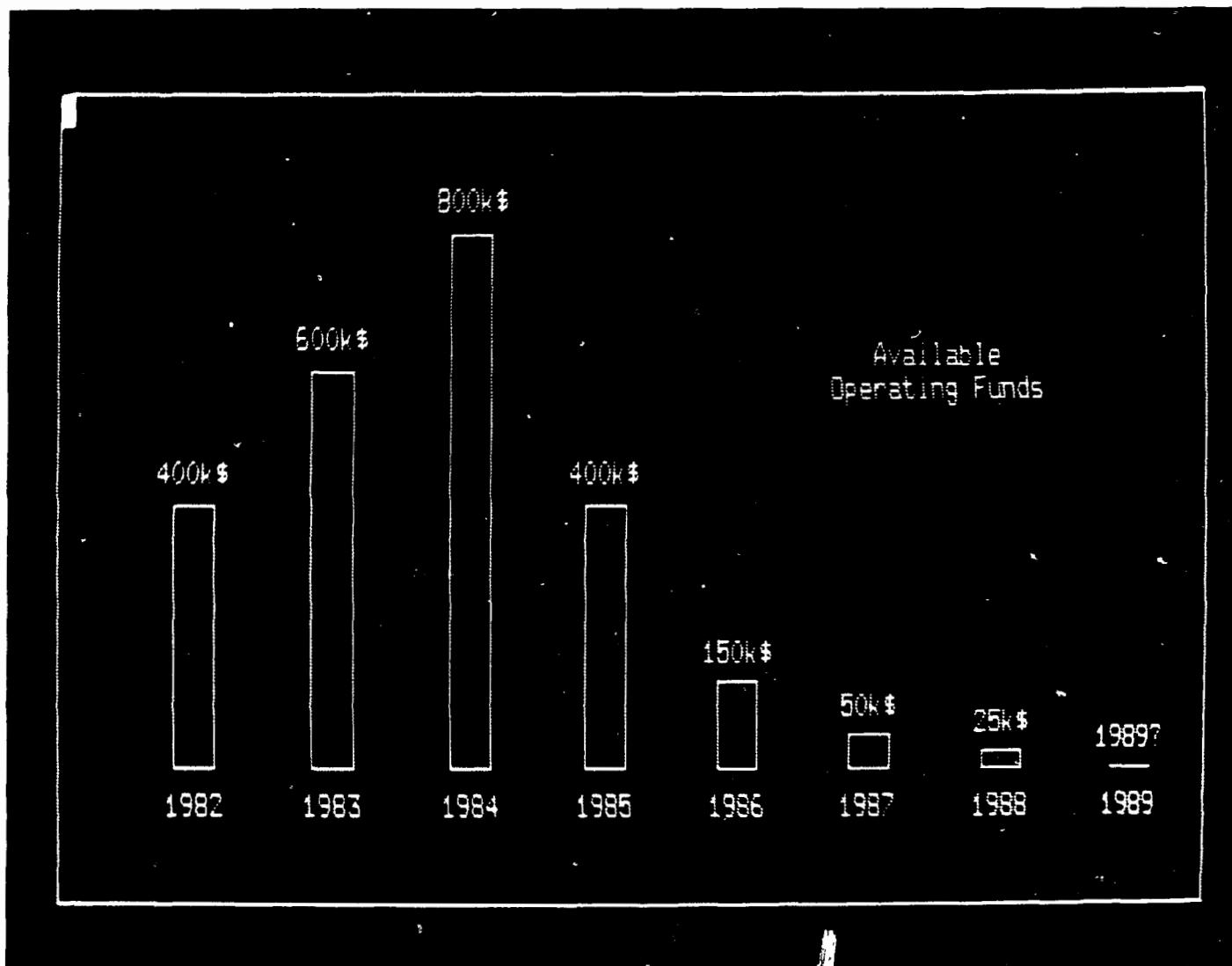


Fig. 1. BARCHART.MPR: example of the use of the BOX command to produce a bar chart.

2.3.2 SCATTER.MPR

In SCATTER.MPR (see Fig. 2) the default START frame is used, a box is drawn, and the X-AXIS and Y-AXIS commands are used to make the graph. Because this is a scatter diagram, the PLOT IT command simply plots the points.

The legend is formed by choosing the unused upper left quarter of the graph space, plotting a single point there, and using LLABEL to identify the symbol.

ORNL-PHOTO 0879-86

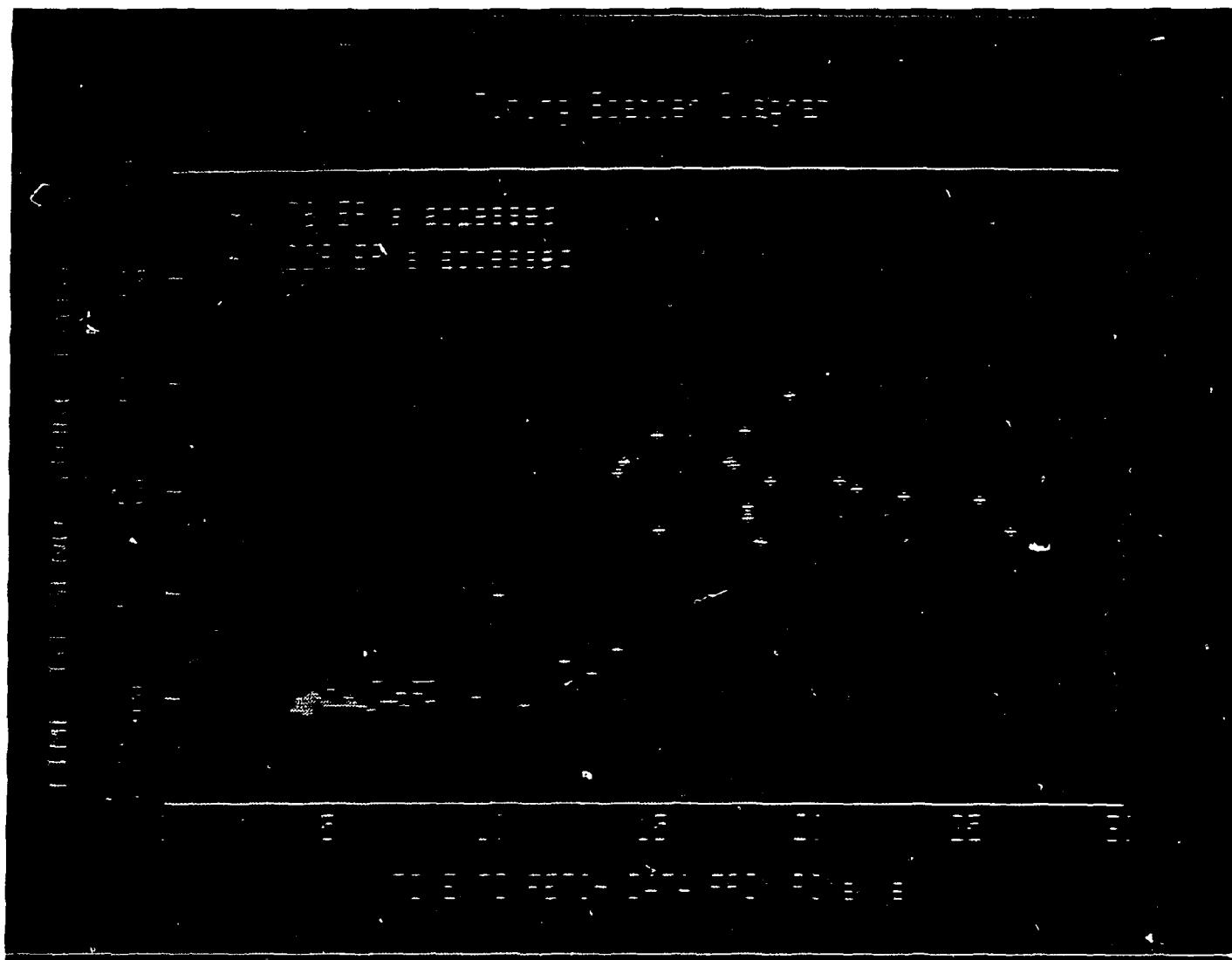


Fig. 2. SCATTER.MPR: example of a scatter diagram produced by the PLOT IT command.

2.3.3 TWOPILOT.MPR

Two plots are combined in TWOPILOT.MPR (see Fig. 3) to show the relationships among several associated variables having different units.

Because the x-axis is common for both plots, the X-AXIS commands are identical except that the notation "N" is used to prevent drawing the tick labels for the x-axis of the upper plot.

ORNL-PHOTO 0880-86

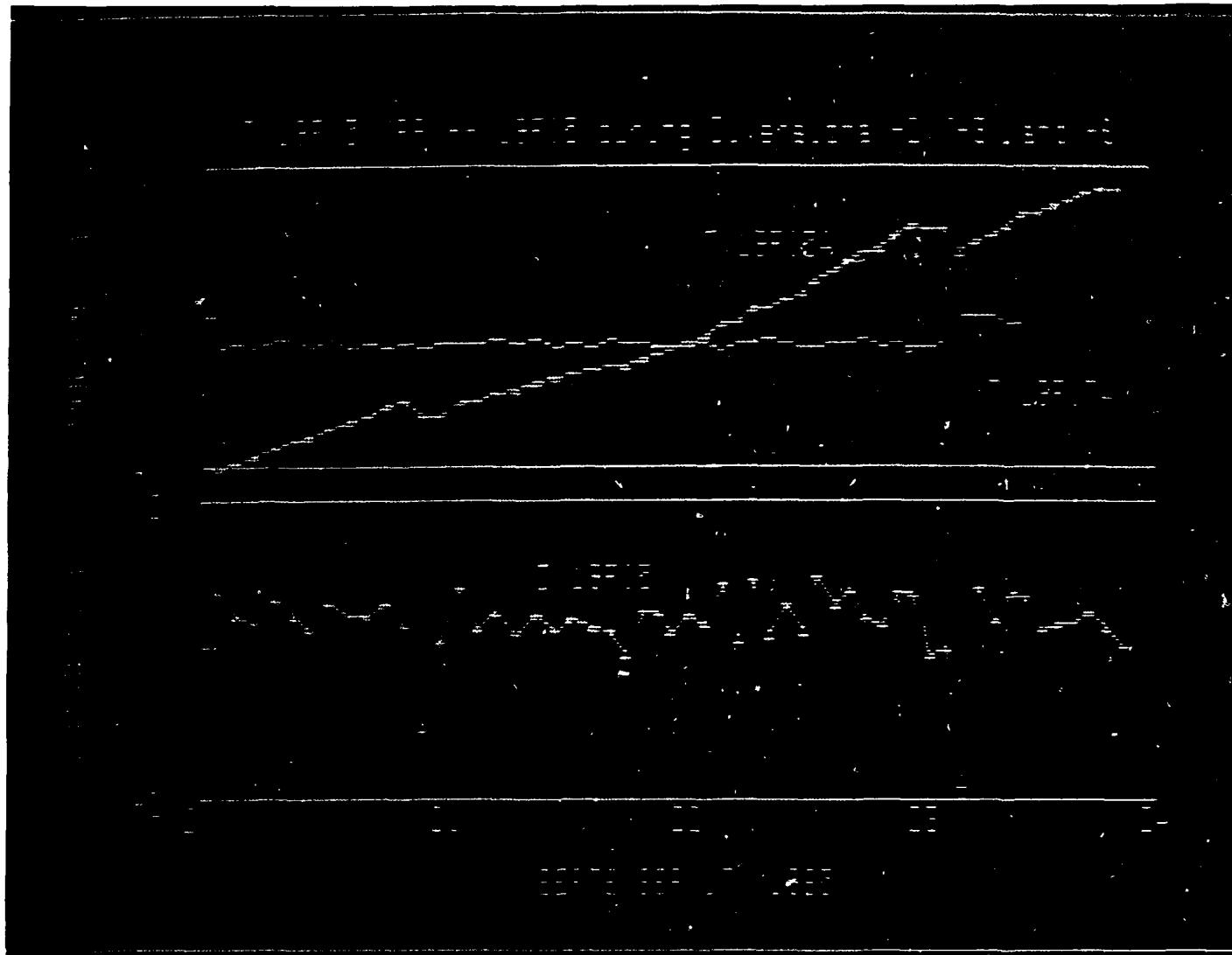


Fig. 3. TWO PLOT.MPR: example of possible combinations of two plots.

3. SOURCE FILE FORMAT

The source file contains the commands that instruct PRO/Mapper to draw the desired graphical figures on the screen. All of these commands correspond to the mainframe MAPPER commands; however, the PRO/Mapper commands are less sophisticated and do not allow the wide range of options available in MAPPER. Nevertheless, the concepts of "World Space," "Graphical Space," and "Current Space" are common to both systems, and the user is directed to the *MAPPER User's Manual* for information to supplement that which follows.

PRO/Mapper was written primarily to provide programmer and nonprogrammer alike immediate access to the graphics capabilities of the PRO/300 without learning the CGL language. Because the primary need has been the production of plots of data, the following description is directed entirely toward that end. More complete descriptions of these commands are provided in the command-summary section and in the MAPPER manual.

3.1 THE START COMMAND

Normally, the START command is the first command in the source file. It serves to define the size of the view window in terms of a coordinate system selected by the user. The view window is that seen on the screen of the monitor and may or may not include the origin of the coordinate system. The START command usually draws a box that defines the outer limits of the view window.

The four arguments of the START command, XMIN, XMAX, YMIN, and YMAX, define the positions of the view window in the chosen coordinate system and provide a precise definition of a position within the window in the manner of a plot. While the shape of the rectangular view window is arbitrary, the units of the coordinate system must be the same for both the horizontal axis (x-axis) and the vertical axis (y-axis). These units are termed the "World Units" in contrast to other coordinate systems that may be used for special purposes such as plotting. A special command, REVERT, allows return to the world unit system at any time.

The START command requires two lines: As with all MAPPER commands, the first line contains the command and must be in upper case. The second line is required if the command takes parameters (arguments). These parameters must be separated by commas.

```
START
XMIN,XMAX,YMIN,YMAX
```

A possible choice of view window might be

```
START
0,35,0,25
```

This defines a window in world coordinate space whose corners would be defined by the (x,y) coordinate points: (0,0),(0,25), (25,35), and (35,0). As will be seen in Sect. 4, a box may be constructed in the center of the view window by defining its center to be at (17.5,12.5).

The actual size of the view window does not depend upon the choice of units for the world coordinate system. When projecting the view window onto the screen, its size is zoomed so that either the horizontal side or the vertical side of the view window fills the screen. Because the vertical-to-horizontal ratio of the sides of the available screen area is about 0.7, a view window will completely fill the screen if the corresponding dimensions of the START window are in the same ratio. the command

```
START
0,8.6,0,6
```

defines a window that conforms to the aspect ratio of the screen so that the total area will be included in the view window. In the case of the VR241-A monitor, the display area is about 8.6 by 6 in. so that the world coordinate units correspond to inches and a displacement of one world unit will translate to a displacement of 1 in. on the screen.

Note that a convention in the specifications of arguments allows zeros to be represented by commas so that the previous command could be given as

```
START
,8.6,,6
```

3.2 THE GRID COMMAND

Once the START window has been defined, locations within the window are defined by giving the x- and y-coordinates in world units. To assist in identifying specific locations, the grid of (x,y) points may be displayed by using the GRID command:

```
GRID
XINT,YINT
```

will fill the window with ticks (plus signs) with spacings in the x- and y-directions of XINT and YINT world units. If the XINT and YINT values are zero or if the line "GRID" is followed by a blank line, the x- and y-intervals will be one world unit.

3.3 THE UNITS SYSTEMS

Immediately after execution of the START command, the world units system is in effect. The expression "Current Units" then refers to the world units coordinate system. In drawing a graph, however, a new system of units is defined by use of the X-AXIS and Y-AXIS commands. When this is done, the graph coordinate units become the current units. Subsequent commands that otherwise would have referred to the world units as the current units now refer to the graph units, the new current units. When the graph and its curves, tags, notations, and other requirements have been completed, the user returns to the world unit system by issuing the REVERT command.

3.4 THE LINE COMMAND

The LINE command causes a straight line to be drawn from one point on the view window to another. The line segment is defined by its end points. Because it is often desirable to draw, the command sequence consists of a series of x,y position definitions, each accompanied by a mode flag that tells the routine whether a line is to be drawn from the previous position ("pen-down") or whether the "pen" is to be moved without drawing ("pen-up"). Thus, the command is

```
LINE
X,Y,MODE
X,Y,MODE
X,Y,MODE
```

where X and Y define a position in current units, MODE is 1 to signal a move to that position without drawing a line, MODE is 0 (or omitted) if a line is to be drawn from the last position, and MODE is -1 to terminate the LINE command. Any number of points may be included in a LINE command.

3.5 THE BOX COMMAND

The BOX command draws a box with sides parallel to those of the view window and with specified center and lengths of sides. The command is

```
BOX
XC,YC,XL,YL
```

where the center of the box is located at (XC,YC) in current units and the lengths of the horizontal and vertical sides are XL and YL.

3.6 THE LABEL COMMANDS

The CLABEL (and RLABEL and LLABEL) commands provide a means of entering text material into the view window. The CLABEL command accepts a specified number of lines of text and presents them as a block of text centered horizontally and vertically about the specified center position. One argument, which specifies the height of the characters in mainframe MAPPER, is currently ignored in PRO/Mapper.

The CLABEL command structure is

```
CLABEL
NLINES,(HEIGHT),XLABEL,YLABEL
text
text
text (NLINES of text)
```

where the block of NLINES of text is centered at (XLABEL,YLABEL) in current units.

In CLABEL and LABEL, each line of text is centered about the vertical center line. LLABEL left-justifies the lines, starting one character to the right of XLABEL; BLABEL right-justifies them, starting one character to the left of XLABEL. However, while the coordinates XLABEL,YLABEL refer to the center of the entire block of text for CLABEL, they refer to the first line only for LABEL, LLABEL, and RLABEL.

3.7 THE X-AXIS AND Y-AXIS COMMANDS

These commands look back to the last box that was drawn and operate on the box as the outline of a linear graph. The X-AXIS command scales the bottom edge of the box according to the desired units for the *x*-axis of the graph by drawing ticks extending up into the box and labeling these ticks with the corresponding graph *x*-axis units. In addition, the desired description of the *x*-axis is written underneath the tick labels, centered under the box. The Y-AXIS command operates similarly on the left edge of the defining box.

These commands are

```
X-AXIS
XMIN,XSTEP,XMAX
text of the x-axis label
Y-AXIS
YMIN,YSTEP,YMAX
text of the y-axis label
```

where XMIN is the value to be attached to the lower left corner of the graph, XMAX the value for the lower right corner of the graph, and XSTEP the spacing between tick marks. The Y-AXIS command operates in similar fashion for the scale extending from the lower left corner of the graph to the upper left corner of the box in *y*-axis graph units.

Once an X-AXIS or Y-AXIS command has been executed, the current units for the horizontal or vertical directions, respectively, become changed to the units specified for the graph. When both axes have been defined, the CLABEL command, for example, may be used to enter text within the graph and to locate text according to the graphical units. Also, the GRID command may be used to fill the interior of the graph with grid intersection marks.

3.8 THE PLOT IT COMMAND

Once the graph outline has been drawn and scaled with the BOX, X-AXIS, and Y-AXIS commands, the plots could be entered using the LINE command, which will now operate on graph units because they are now the current units. The PLOT IT command operates similarly and provides for different markers to define plotted points, allows connecting line segments to be drawn or omitted, and draws error bars (in the *y*-axis direction) through the plotted points. The command is

```

PLOT IT
NPTS,MODE,MARK
x,y,e
x,y,e
x,y,e (NPTS sets of x,y,e)

```

NPTS defines the number of points to be plotted and the number of sets of (x,y,e) to follow. MODE is zero if only the line is to be plotted. If MODE is greater than zero, the line is drawn, and markers are plotted for every MODE points. Thus, if MODE = 1, every point will be marked; if MODE = 5, the first and every fifth point thereafter will carry a marker. The actual shape of the marker is defined by MARK according to the table given in Sect. 4. If MODE is less than zero, the points are plotted as in the MODE.GT.0 case, but the line is omitted. Scatter diagrams, therefore, are generated with MODE = -1.

Points will be plotted at positions of (x,y) in graph units. If e is zero or omitted, no error bars will be drawn. If e is greater than zero, a line will be drawn from $y + e$ to $y - e$ at every point at which a symbol is to be drawn. It is not possible to draw an error bar where there is no symbol; however, the symbol “.” (a period) can be used.

3.9 THE END COMMAND

The commands for a given plot are terminated by the END command. Multiple plots in a given file may be generated by continuing beyond the END command with the commands for the next plot. A file may contain any number of plots.

If the END command is omitted, the program will lock and must be aborted and restarted from the beginning.

4. COMMAND SUMMARIES

All commands applicable to PRO/Mapper Version 1.0 are listed below in alphabetical order. A detailed description is given with each command, and differences between the MAPPER and PRO/Mapper commands are described.

MAPPER commands not included in this list may usually be included in the command listing but will be skipped over by the PRO/Mapper program and have no effect on the PRO/300 presentation.

BLACK

no parameters

BLACK changes the current color black so that subsequent drawing will be done using that color.

BLUE

no parameters

BLUE sets the color to be used to blue so that subsequent drawing will be done using that color.

BOX

XC,YC,XL,YL (,ANGLE,IBLNK are ignored)

BOX defines and draws a box with location and dimensions as follows

XC = horizontal center position in current units.
Default = previous value. \odot

XC = vertical center position in current units.
Default = previous value.

XL = horizontal box length. Default = previous value.

YL = vertical box length. Default = previous value.

CHAIN DASH

no parameters

This command causes subsequent lines to be drawn in a distinctive alternating pattern of long- and short-dashed lines that can be distinguished from simple dotted, dashed, or solid lines. This command is effective when the line is long enough to establish the pattern: all the broken-line style commands (DOT, DASH, etc.) are ineffective for very short line segments.

CHAIN DOT

This command causes subsequent lines to be plotted as a combination of dots and dashes. See note at CHAIN DASH.

CLABEL

N,HITE,XC,YC (,XL,YL,ANGLE,SHIFT are ignored)
text

CLABEL draws a block of text that is centered horizontally and vertically at the indicated location.

N = number of text lines that follow. N must be less than six.
HITE = ignored. Character height is standard.
XC = horizontal center of block of text in current units.
Default = previous value.
YC = vertical center of block of text in current units.
Default = previous value.

DASH

no parameters

DASH causes subsequent lines to be drawn as dashes. See note at CHAIN DASH.

DEBUG

IPRT (,IEND,ISPACE are ignored)

Because DEBUG opens a new data set, the program will bomb if the source file is written on a file-protected diskette. The value of IPRT defines the amount of output produced:

IPRT = 0—no diagnostic output.
= 1—List commands not valid in PRO/Mapper.
= 2—1 + list valid commands
= 3—2 + echo arguments.
= 4—3 + many extra debug outputs.

DOT

no parameters

DOT causes subsequent lines to be drawn dotted. See note at CHAIN DASH.

DRAW

no parameters

DRAW sets a flag causing subsequent lines to be drawn.

END

no parameters

END must be the last command in the command sequence for a particular plot. The plot will remain on the PC/300 screen until the RESUME key is pressed. When the last plot has been viewed, RESUME must be pressed a second time to exit the PRO/Mapper program.

GREEN

no parameters

GREEN causes subsequent lines to be drawn in green.

GRID**XINT,YINT,(,XREF,YREF,PER are ignored)**

GRID causes a grid of tick marks to be drawn in the interior of the last box. All parameters are in current units.

XINT = The horizontal interval between ticks. Default = 1.

YINT = The vertical interval between ticks. Default = 1.

LABEL**N,HITE,XC,YC (,XL,YL,ANGLE,SHIFT are ignored)**

text

LABEL draws a block of text that is centered horizontally at the indicated *x*-position and has its first line positioned vertically at the indicated *y*-position.

N = number of text lines that follow. **N** must be less than six.

HITE = ignored. Character height is standard.

XC = horizontal center of block of text in current units.
Default = previous value.

YC = vertical center of first line of text in current units.
Default = previous value.

LINE**X,Y,C****X,Y,C**

etc.

LINE is used to draw straight line segments between adjacent points defined by the sequence of locations given in the **X** and **Y** coordinates. The values of **C** determine whether a line is drawn or the locus is moved without drawing a line, (i.e., defines "pen-up" or "pen-down" operation). Any number of points

may be included in a single LINE command. If the NO DRAW command is active, no lines will be drawn.

X = horizontal position of point in current units.

Y = vertical position of point in current units.

C = flag for draw or move:

C.GT.0—move (pen-up)

C.EQ.0—draw (pen-down)

C.LT.0—end-of-data flag

A line containing ENDLINE starting in the first column may be used instead.

LLABEL

N,HITE,XC,YC (,XL,YL,ANGLE,SHIFT are ignored)

text

LLABEL draws a block of text that is left-adjusted to the indicated x-position, with the first line at the vertical position of the indicated y-position.

N = number of text lines that follow. N must be less than six.

HITE = ignored. Character height is standard.

XC = location in current units of the vertical line to which the block of text will be left-adjusted. Default = previous value.

YC = vertical center of first line of text in current units.
Default = previous value.

MAGENTA

no parameters

MAGENTA sets the color to be used to magenta so that subsequent drawing will be done using that color.

NO DRAW

no parameters

NO DRAW sets a flag that suppresses subsequent drawing. Once set, NO DRAW stays set until cleared by the command DRAW.

ORANGE

no parameters

ORANGE sets the color of subsequent lines to the color orange.

PLOT IT

N,MODE,MARK (SMOOTH,MISING,SIZE,PFRAC,PPTS are ignored)

X(1),Y(1),E(1)

X(2),Y(2),E(2)

.....to.....

X(N),Y(N),E(N)

PLOT IT causes a curve to be drawn with optional marker symbols and error bars.

N = number of points in the curve to be drawn. Limit—100 points.

MODE = flag to draw line or symbols or both.

MODE >0 —draw both; symbol every **MODE** points.

MODE = 0—line only, **MODE.LT.0**—symbols only, every **MODE** points.

MARK = marker symbol selection.

MARK	Symbol
0	+
1	*
2	O (upper case O)
3	X (upper case X)

X = horizontal position of points in current units.

Y = vertical position of points in current units.

E = Error value of point. If **E > 0**, a line is drawn from **Y + E** to **Y - E** in current units.

RED

no parameters

RED sets the color to be used to red so that subsequent drawing will be done using that color.

REVERT

no parameters

REVERT is used to restore current units to world units.

RLABEL

N,HITE,XC,YC (,XL,YL,ANGLE,SHIFT are ignored)
text

RLABEL draws a block of text that is right-adjusted to the indicated *x*-position with the first line at the vertical position of the indicated *y*-position.

N = number of text lines that follow. **N** must be less than six.
HITE = ignored. Character height is standard.
XC = location in current units of the vertical line to which
 the block of text will be right-adjusted.
 Default = previous value.
YC = vertical center of first line of text in current units.
 Default = previous value.

START

XMIN,XMAX,YMIN,YMAX

START must be the first command in a file. **START** establishes in world units the dimensions of the view window.

START takes the parameters specified and constructs the view window. This window, or port, is then expanded to fill the PC/300 screen. Because the relative horizontal-to-vertical ratio of the window is defined by the input parameters, the expanded view window will not completely fill the screen unless the aspect ratio for the window is the same as that for the screen.

After constructing the view window, PRO/Mapper draws an outline of the window on the screen. To omit this border, use the **NO DRAW** command before the **START** command.

MIN = minimum horizontal value.
MAX = maximum horizontal value.
MIN = minimum vertical value.
MAX = maximum vertical value.

WHITE

no parameters

WHITE sets the color to be used to white so that subsequent drawing will be done using that color.

X-AXIS

MIN,STEP,MAX,OFFSET,LOC (other arguments are ignored)
text of x-axis label

X-AXIS draws, defines dimensions, and labels a linear axis of specified scaling on the lower edge of the box defined by the last **BOX** command. In addi-

tion, it redefines the *x*-dimension of the current units so that subsequent commands using current units will be located according to the redefined units, whether or not the location lies within the confines of the defining box. The REVERT command can be used to restore the world units.

The *x*-axis scale is drawn starting at the lower left corner of the defining box. Ticks are drawn above the lower edge of the box and tick labels below. The text of the *x*-axis label is centered below the box and positioned below the tick labels. The size of the labelling characters is that of the standard font when the PC/300 is turned on.

MIN	= the axis value to be attached to the lower left corner of the defining box.
STEP	= axis step size.
MAX	= the axis value to be attached to the lower right corner of the defining box.
OFFSET	= Distance from corner of defining box that the axis origin is to be offset.
LOC	= If set to "N," axis labels will be suppressed.

Y-AXIS

MIN,STEP,MAX (other arguments are ignored)

text of *y*-axis label

Y-AXIS draws, defines dimensions, and labels a linear axis of specified scaling on the left edge of the box defined by the last BOX command. In addition, it redefines the *y*-dimension of the current units so that subsequent commands using current units will be located according to the redefined units whether or not the location lies within the confines of the defining box. The REVERT command can be used to restore the world units.

The *y*-axis scale is drawn starting at the lower left corner of the defining box. Tick marks are drawn to the right of the left edge of the box and tick labels to the left. The text of the *y*-axis label is written in a vertical direction. It is centered with respect to the box and positioned to the left of the tick labels. The size of the labelling characters is that of the standard font when the PC/300 is turned on.

MIN	= the axis value to be attached to the lower left corner of the defining box.
STEP	= axis step size.
MAX	= the axis value to be attached to the upper left corner of the defining box.

YELLOW

no parameters

YELLOW sets the color to be used to yellow so that subsequent drawing will be done using that color.

REFERENCES

1. B. A. Clark et al., *Mapper User's Manual*, ORNL/CSD/TM-163, November 1983.
2. Digital Equipment Corporation, *Core Graphics Library Manual*, vol. 2, Maynard, Mass., 1984.
3. Digital Equipment Corporation, *User's Guide: Hard Disk System*, 3rd ed., Maynard, Mass., 1984.

Appendix

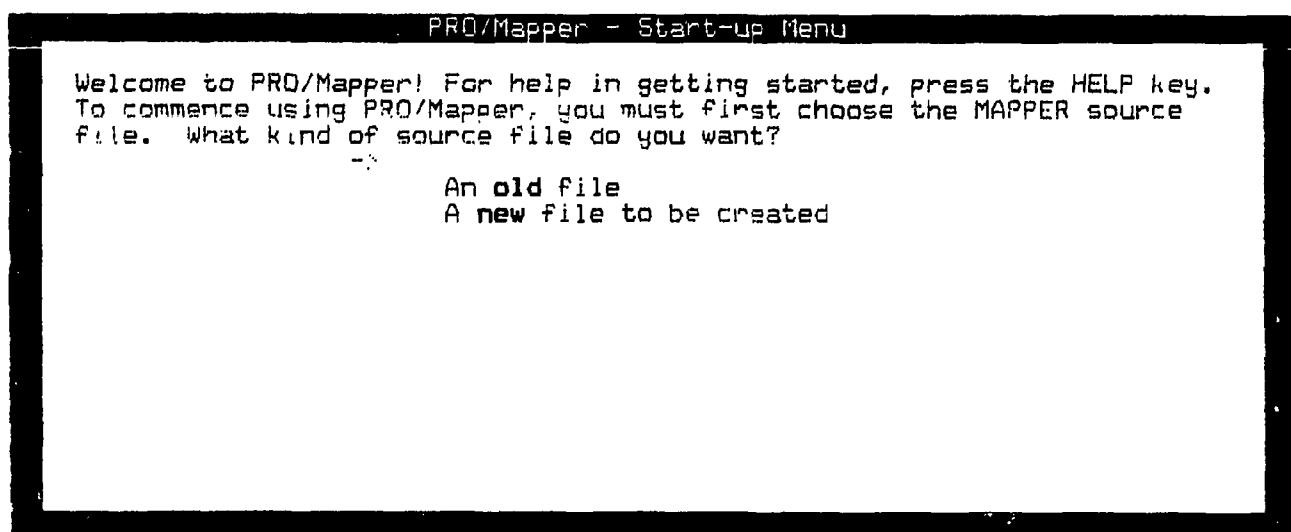
LISTINGS OF MENUS AND HELP FILES

The user is led through his use of PRO/Mapper by the menus and help files. Because so much instructive material is contained in these files, the screen dumps of most of the menus and help files normally encountered in using PRO/Mapper are presented here. Those not included are associated with the PROSE Editor or other system routines and are covered in the *User's Guide*.

Each menu and help file is identified here by the title, which is embedded in the top of the frame. The files are ordered by presenting each menu followed by all the help files associated with that menu. The first help file is that produced by pressing the HELP key when the selection pointer is not positioned at any of the options. The remaining help files for that menu are obtained when the pointer is positioned at one of the options and the HELP key is pressed.

The order of the menus follows that normally encountered in starting work on a PRO/Mapper session. It is assumed initially that a new file is to be created. The optional path is that of selecting an old file. In this case, it is assumed that the desired file is one of the examples supplied on the application diskette. If the user starts from a directory on BIGVOLUME, the file does not appear in the initial listing of files, and, as illustrated here, the ADDITIONAL OPTIONS key must be used to select the file.

Once the source file has been identified, the tasks of viewing, editing, or printing are selected from the Main PRO/Mapper menu.



Make a choice and press 00:

Introduction to PRO/MAPPER

Welcome to PRO/MAPPER!

PRO/MAPPER reads a source file which defines the graphics you wish to draw on the PRO/300 screen. The source file is written in the language originated by David A Dahl of the Los Alamos Scientific Laboratory and extended by B. A. Riley, et al., of the Oak Ridge National Laboratory. The PRO/MAPPER input commands are a small subset of the MAPPER commands which enable graphs, maps, boxes and complicated line segments to be drawn. The PRO/MAPPER source files are upwardly compatible with the mainframe MAPPER files and can be transferred to a mainframe for the production of publication-quality slides, drawings, and the like, although further editing is required to improve type size, fonts, etc.

Press the NEXT SCREEN key for further information.

Press RESUME to return to the menu.

Press EXIT to quit the PRO/MAPPER application.

Introduction to PRO/MAPPER -- Part 2

You must first identify a source file containing MAPPER commands.

For further help, position the pointer on a choice and press the HELP key.

Press RESUME to return to the menu.

Reference:

"PRO/MAPPER: A Plotting Program for the DEC PRO/300 computers Utilizing the MAPPER Graphics Language", J. W. Wachter, Oak Ridge Nat'l Laboratory, P. O. Box X, Oak Ridge, TN 37830, Report ORNL/TM-9233, February 1986.

PRO/MAPPER - Defining the Old File Name .

Choosing the selection "OLD FILE" enables a choice among the files accessible from your userid. The list of all such files contained in the the current directory will be presented to you. Files in other directories are also accessible (use the HELP key when you have made the choice).

Press RESUME to return to the menu.

Press NEXT SCREEN to see the help screen for NEW file choice.

Press EXIT to quit the PRO/MAPPER application.

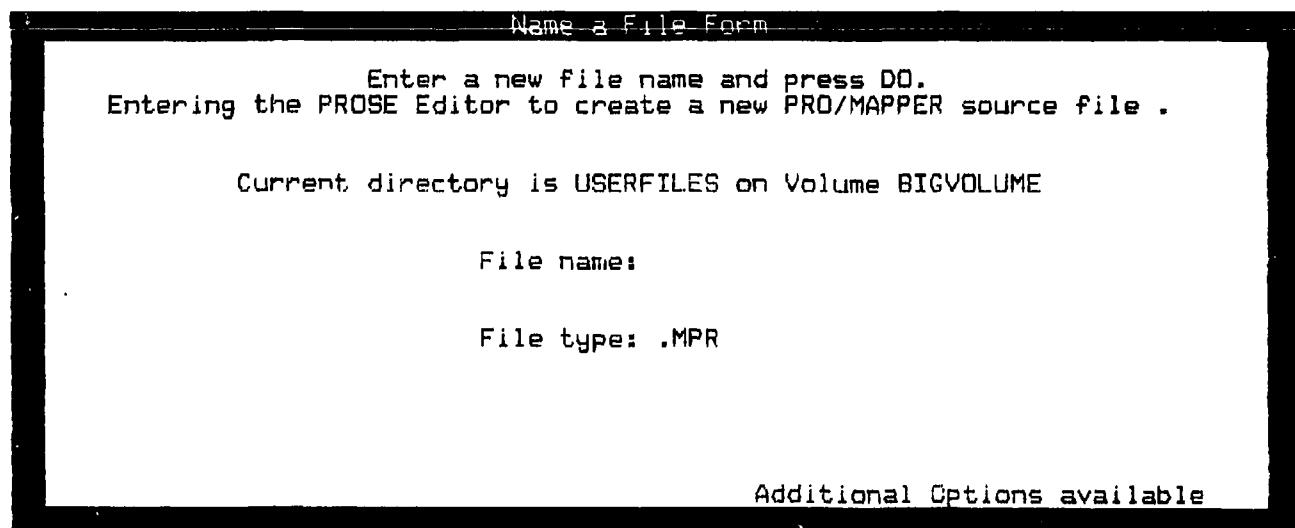
PRO/MAPPER - Help for New File Definition

You must define an appropriate name for the new MAPPER source file using the next menu selection frame. The new file will be entered into the current directory.

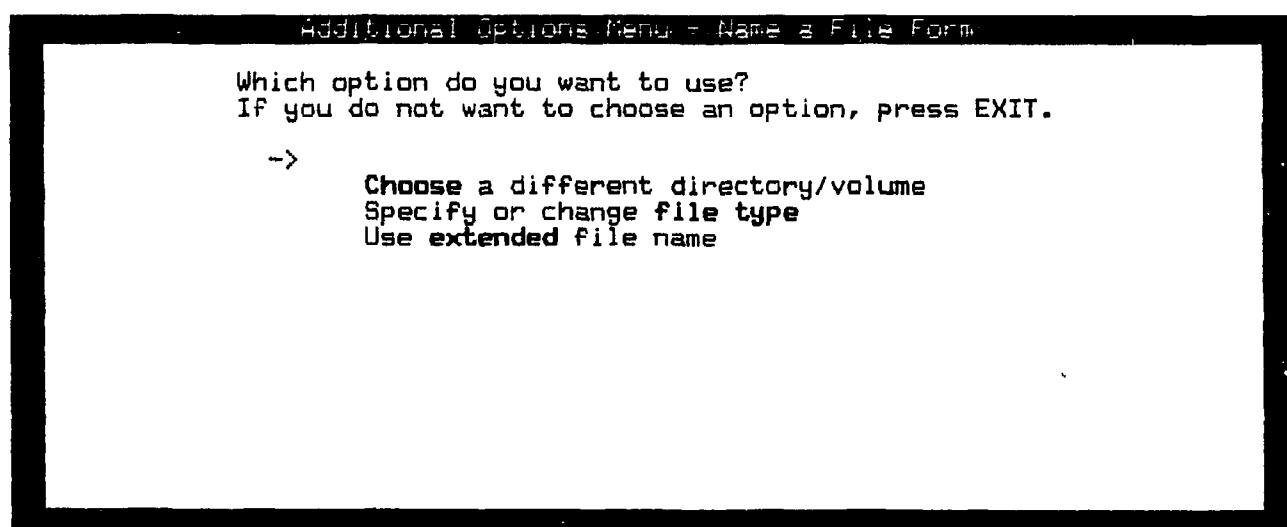
If you have many files in your directory, it will be advantageous to specify PRO/MAPPER source files by a unique extension. The new file name will default to the extension ".MPR", but this can be changed by using the ADDITIONAL OPTIONS key (see the HELP file for the next frame).

Press RESUME to return to the menu.

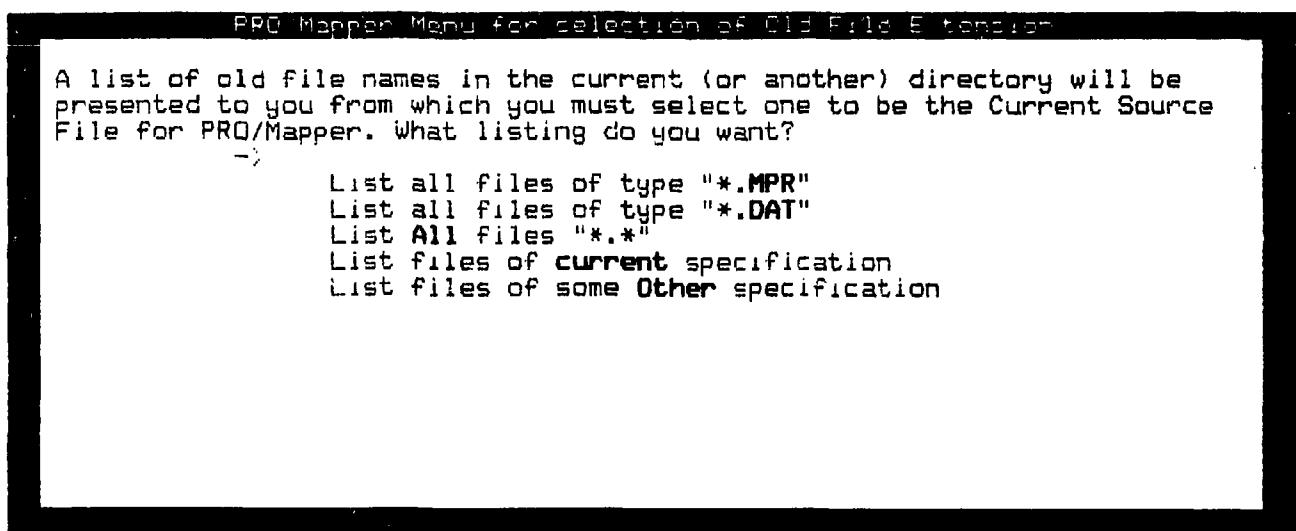
Press EXIT to quit the PRO/MAPPER application.



Name the file to be worked on..



Make a choice and press DD:



Make a selection and press DD.

The current list specification is: ***.MPR**

PRO/MAPPER Help for the ".MPR" Extension

Choosing a wildcard specification reduces the length of the list of files from which the Source File for PRO/MAPPER is made.

Press NEXT SCREEN to view help frames for other options.

Press RESUME to return to the menu.

PRO/MAPPER Help for the ".MPR" Extension

Selection of this option will restrict the listing of old source files to those having the extension ".MPR". This has arbitrarily been chosen as the default extension for MAPPER files.

Press NEXT SCREEN for other options,
Press PREVIOUS SCREEN for general information on this menu.

Press RESUME to return to the menu.

The current list specification is: *.MPR

PRO/MAPPER Help Frame For Wildcard Selection

Choosing a wildcard specification reduces the length of the list of files from which the Source File for PRO/MAPPER is made.

Press NEXT SCREEN to view help frames for other options.

Press RESUME to return to the menu.

PRO/MAPPER Help For the ".MAP" Option

Choosing this option restricts the list of old source files to those having the extension ".MAP". This extension has been chosen as the alternate default extension for MAPPER source files.

Press PREVIOUS SCREEN or NEXT SCREEN for information on other options.

Press RESUME to return to the menu.

The current list specification is: *.MPR

PRO/MAPPER Help Frame for Wildcard Selection

Choosing a wildcard specification reduces the length of the list of files from which the Source File for PRO/MAPPER is made.

Press NEXT SCREEN to view help frames for other options.

Press RESUME to return to the menu.

PRO/MAPPER Help for the All choice of extensions

Choosing this option means that you will be able to select an old source file from all the files available to you.

Press NEXT SCREEN or PREVIOUS SCREEN for information on other options.

Press RESUME to return to the menu.

The current list specification is: *.MPR

PRO/MAPPER Help Frame for Wildcard Selection

Choosing a wildcard specification reduces the length of the list of files from which the Source File for PRO/MAPPER is made.

Press NEXT SCREEN to view help frames for other options.

Press RESUME to return to the menu.

PRO/MAPPER help for use of the current extension

The current wildcard selection is given at the bottom of the menu. If you wish to retain this extension in choosing an old file, select this option.

Press PREV SCREEN for information on other options; NEXT SCREEN for more general information on this menu.

Press RESUME to return to the menu.

The current list specification is: *.MPR

PRO/MAPPER Help Frame For Wildcard Selection

Choosing a wildcard specification reduces the length of the list of files from which the Source File for PRO/MAPPER is made.

Press NEXT SCREEN to view help frames for other options.

Press RESUME to return to the menu.

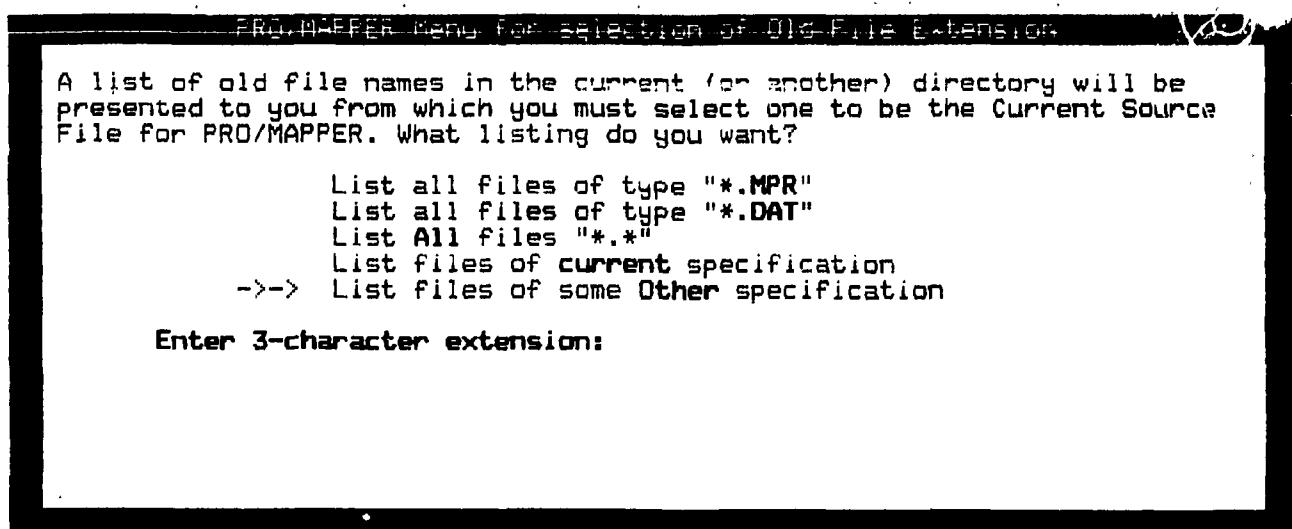
PRO/MAPPER Help Frame For Specifying a Non-Standard Extension

Select this option to specify an extension other than those given in the menu. When you make this selection, you will be prompted for the three-character extension: if you input less or more than three characters, the prompt will repeat.

Press NEXT SCREEN or PREV SCREEN for information on other options.

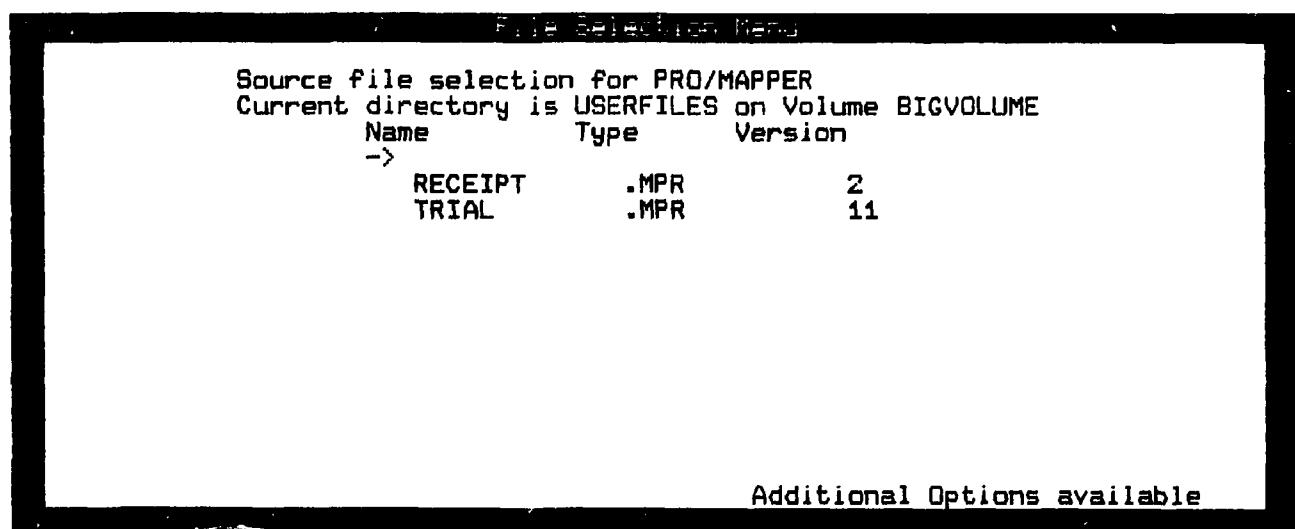
Press RESUME to return to the menu.

The current list specification is: *.MPR



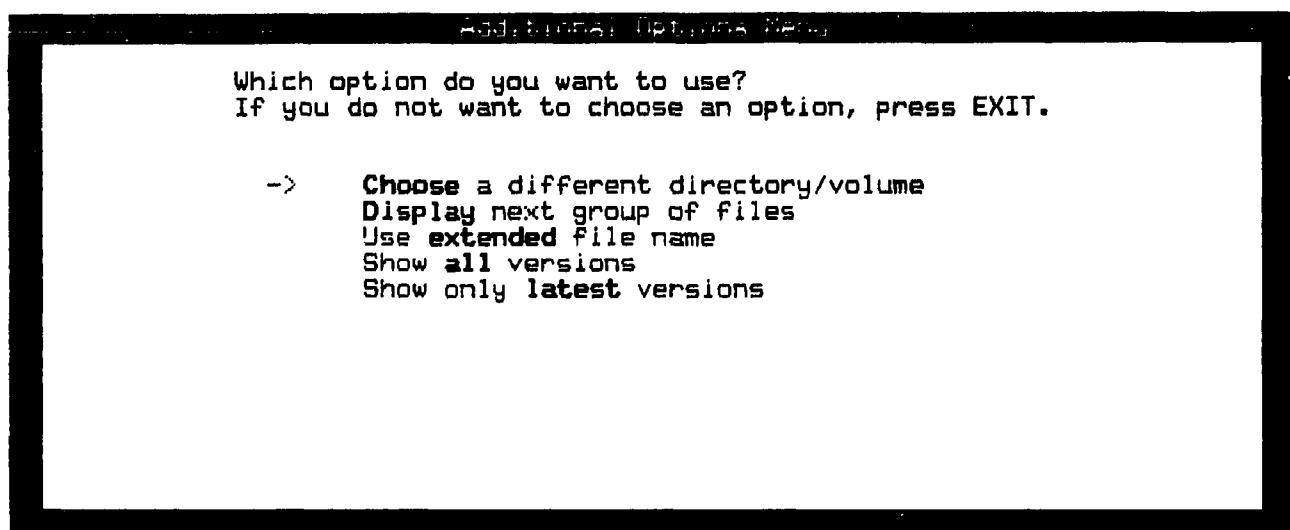
Make a selection and press DD.

The current list specification is: *.MPR

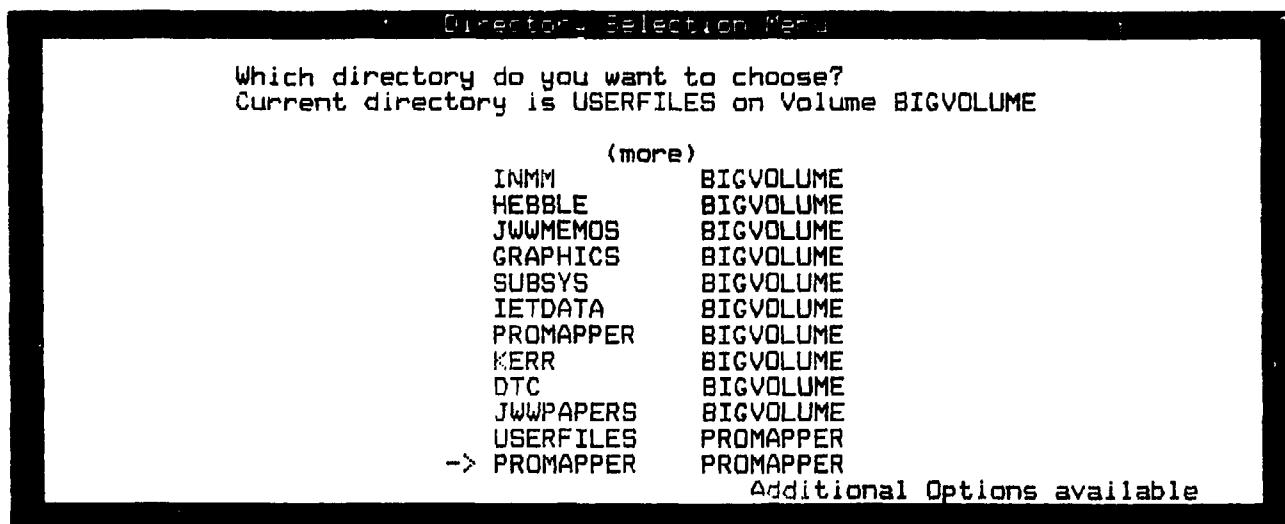


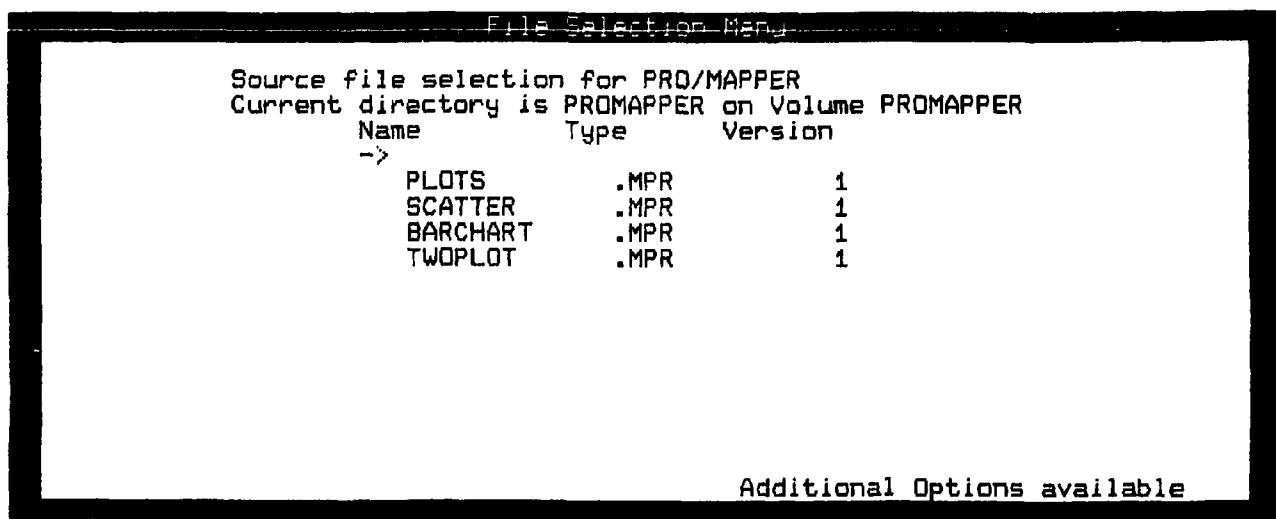
Make a selection and press DO.
To change directory, press ADDITIONAL OPTIONS

Select up to 1 items
(0 chosen)



Make a choice and press DO:





Make a selection and press DO.
To change directory, press ADDITIONAL OPTIONS

Select up to 1 items
(0 chosen)

PRO/MAPPER Main Menu for Task Selection

Select the next task which you wish to perform.
Press HELP for more information or EXIT to return to START-UP screen.

->

- View the plot output of the current source file.
- Edit the current source file using the PROSE editor.
- List the current source file on the printer.
- Examine the Debug output on the screen.
- Print the Debug output.
- Change the current source file to a new or old file.
- Quit PRO/MAPPER.

Make a selection and press DD.

Current source file is: BIGVOLUME:[PROMAPPER]SCATTER.MPR

HELP for PRO/MAPPER Main Screen

This screen enables you not only to invoke the PRO/MAPPER program to plot the source file on the PRO/300 screen, but also to enter the PROSE Editor to make changes or additions to the file, to print the source file, to switch from the current source file to another existing file or a new file which you create, and to examine on the screen, or by listing, the Debug output which you can invoke by inserting the DEBUG command into the source file.

For further information on each choice, position the pointer on the option and press HELP in place of DO. Alternatively, pressing the NEXT SCREEN key repeatedly will display the help screens for all the options.

Press RESUME to return to the menu.

From the menu, press EXIT to quit the PRO/MAPPER application.

HELP For PRO/MAPPER PLOT Section

This option selects the PRO/MAPPER graphics program to present on the PRO/300 screen the graphical representation of the commands in the current source file.

The screen presentation will begin as soon as you make the selection. When it is complete a "beep" sound will be heard and the screen will hold its view until the RESUME key is pressed. During this time the entire keyboard will be locked out except for the RESUME and PRINT SCREEN keys. Pressing any other key will have no effect except that a "beep" sound will warn you that the key is inactive. Pressing the PRINT SCREEN key will produce a printed representation of the screen which is, however, compressed in the vertical direction.

After viewing the screen, press the RESUME key to view the next plot in the current source file (if any). At the end of the file, press RESUME one more time to exit PRO/MAPPER and return to the Main Menu.

HELP For PRO/MAPPER EDIT option

This option invokes the PROSE Text Editor of the PRO/300 to enable additions and changes to the current source file.

PROSE operates during the editing process exactly as described in the PRO/ User's Guide. On exit, however, the Exit Menu does not appear and you are returned to this PRO/MAPPER menu.

The MAPPER Graphics language is not very forgiving of editorial formatting of the input commands: consequently the formatting options of PROSE are turned off on entry. Any formatting changes which you make in the course of the editing session are discarded when you exit from PROSE. The effect on PRO/MAPPER of such format manipulations is uncertain.

Press RESUME to return to the menu.

HELP FOR PCD MAPPER LIST

This selection enables you to get a listing on your printer of the current source file.

When printing is complete, this menu will re-appear.

Press RESUME to return to the menu.

Press NEXT SCREEN or PREVIOUS SCREEN for further information on other options.

HELP FOR PRO/MAPPER VIEW DEBUG OUTPUT

Including a "DEBUG" command in the source file causes diagnostic output to be written to a data set named "PROMAPPER.DBG".

Selecting this option enables you to view the debug output without leaving the PRO/MAPPER session. This is done by pulling the debug output into the PROSE Editor enabling you to scan through the output using the "Screen" keys and to locate specific portions of the output using the "Find" key.

This option accesses the most recent version of "PROMAPPER.DBG". If you did not include a DEBUG command in your present source file, the debug output you see is from an old run.

When you exit from PROSE, you will be returned to this menu.

Press RESUME to return to the menu; EXIT to quit PROMAPPER.

HELP for PRO/MAPPER PRINT DEBUG Option

Including a "DEBUG" command in the source file causes diagnostic output to be written to a data set named "PROMAPPER.DBG".

By selecting this option, you will be able to list the debug output on the printer without having to leave the PRO/MAPPER session.

After printing the data set, you will be returned to this menu.

HELP FOR PROGRAMMER SOURCE FILES Options

When you have finished working with the current source file, this option enables you to switch to a different source file, whether new or old.

Press RESUME to return to the menu.

Press NEXT SCREEN or PREVIOUS SCREEN for further information on other options.

Press EXIT to quit the PRO/MAPPER application.

HELP FROM MAPPER EDIT Option

Select this option when you want to leave the PRO/MAPPER application. It will return you to the menu from which you chose PRO/MAPPER.

Press RESUME to return to the main menu.

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