

GLFRC MODELING GROUP SOFTWARE

P3D

A USER'S MANUAL

by

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INTRODUCTION

P3D was designed to draw representations of 3-dimensional data. A 3-dimensional graph is basically composed by plotting the values of a dependent variable (Z) on the vertical axis, versus those of 2 independent variables (X and Y) forming a plane (Horizontal) called the BASE of the graph. Thus, the 3 axes (X, Y, and Z) form a BOX, inside which data values are to be positioned and displayed.

Intricate problems of presentation exist in 3-dimensional graphing. Of these, hidden-line removal (not drawing features which are "behind" others) is the most difficult. P3D DOES NOT PERFORM HIDDEN LINE REMOVAL. Other aspects, such as viewing angles (side or top view) and perspective (distance from observer) are easier to handle, and were considered in the development of P3D.

Thus, in many applications, P3D should be viewed as an AID in developing 3-dimensional graphs, rather than a system yielding a finished product. With P3D, it is likely that the user will need to have recourse to a draftsman when a final draft is needed.

However, P3D is very efficient in viewing a set of 3-dimensional data, choosing optimal graphing parameters, and preparing copies to be used in final drafting.

P3D is a fully interactive program which was designed to process data read directly from files stored on disk on the PDP-11/70. P3D responds to a series of COMMANDS which it reads from the TERMINAL screen. Graphs can be built gra-

dually, and can be displayed (using the GRAPH command) at any time during a session. Once a graph has been prepared to the user's satisfaction, it is possible to SAVE the graph on disk for later reproduction or further development.

A note on the notation used in this manual to describe command syntax: only the capitalized portion of words is needed in commands, and arguments between [] are optional (can be omitted). Thus, only the first 3 letters of commands are needed, and literal arguments may be abbreviated to only the first letter if desired.

1.0 DATA PREPARATION AND ENTRY

1.1 The Structure of P3D Data Sets

P3D handles 2 types of data sets. In the first, the data can be represented in a RECTANGULAR MATRIX (or 2-way table) where the lines and columns constitute the X and Y axes of the graph (Table 1), and data values represent the third (Z) axis to be plotted vertically on the graph. Such matrices can best be represented as SURFACES, since each datum is connected logically to its immediate neighbors in the X and Y directions. Thus, when this manual refers to SURFACES, it is implied that the data constitute a 2-way table (or rectangular matrix).

TABLE 1
GENERALIZED STRUCTURE OF A P3D
SURFACE DATA SET.

X AXIS	Y AXIS			
	Y_1	Y_2	...	Y_r
X_1	Z_{11}	Z_{12}	...	Z_{1r}
X_2	Z_{21}	Z_{22}	...	Z_{2r}
\vdots	\vdots	\vdots	\vdots	\vdots
X_n	Z_{n1}	Z_{n2}	...	Z_{nr}

In the second type of 3-dimensional data set, values cannot readily be placed in a rectangular matrix (where X and Y coordinates are always the same). Here, X and Y coordinates are more or less RANDOM with respect to each other, so that the simplest way to write the data is in a series of

OBSERVATIONS (lines) composed of 3 values: X, Y, and Z (Table 2). For such a set of data, a surface cannot be drawn directly, since there is NO SEQUENTIAL CORRESPONDANCE of points along the axes. Therefore, the best representation of these points would be a SCATTER diagram, in 3-dimensions.

TABLE 2
GENERALIZED STRUCTURE OF A P3D
SCATTER DATA SET.

OBSERVATION	POINT COORDINATES			OPTIONAL PREDICTED Z
	X	Y	Z	
1	X_1	Y_1	Z_1	P_1
2	X_2	Y_2	Z_2	P_2
⋮	⋮	⋮	⋮	⋮
N	X_N	Y_N	Z_N	P_N

P3D is capable of representing BOTH 3-d surfaces and 3-d scatter diagrams, separately or together on the same graph. This is particularly useful in presenting the results of regression analyses where there are 2 independent variables (thus, where the predictive equation can form a response surface).

1.2 Preparation of P3D Data Sets

1.2.1 Surfaces -

When a data set is suitable for drawing as a 3-d response surface (see Table 1), there are normally 2 disk files needed by P3D to produce a graph. The first contains only the Z values (or the data matrix); the second contains the numerical values of the X and Y coordinates of the matrix (Table 3). However, the second file (the coordinate file) is needed only when the X and Y coordinates are UNEVENLY SPACED. Thus, if the X coordinate ranged from 0 to 100 in steps of 10, and the Y from 0 to 50 in steps of 5, the coordinate file would not be necessary (P3D could GENERATE artificial coordinates).

TABLE 3
STRUCTURE OF FILES NEEDED FOR
SURFACE DISPLAYS.

FIRST FILE:

z_{11}	z_{12}	...	z_{1r}
z_{21}	z_{22}	...	z_{2r}
\vdots	\vdots	\vdots	\vdots
z_{n1}	z_{n2}	...	z_{nr}

SECOND FILE:

x_1	x_2	x_3	...	x_n
y_1	y_2	y_3	...	y_r

The first file, called a SURFACE file, can be entered on disk via MINITAB, key-punched CARDS, or with the PDS file EDITOR. The second file, because of its small size, is best created with the file EDITOR.

1.2.2 Scatter Diagrams -

Data which cannot be presented in table form must be entered in a disk file as in Table 2. The file CAN contain, in addition to the X, Y, and Z coordinates of each point (first 3 columns), a 4th column containing predicted values for the Z coordinate. This optional column is very useful in presenting the results of regression analysis etc. Where a scatter diagram and corresponding surface are superimposed.

1.2.3 File Format -

P3D reads data files in LIST-DIRECTED format. This means that no particular format is required, provided that all data values are separated by at least one blank, or a comma.

1. SURFACE FILES: often a set of values corresponding to one X coordinate (one line of a table) is too long to be entered on an 80-character line. P3D will accept that such sets be split into as many lines as necessary, provided that EACH SET CORRESPONDING TO A NEW X COORDINATE STARTS ON A NEW LINE in the file.

2. COORDINATE FILES: The set X of and Y coordinates must each start on a new line of the coordinate file. Sets can be split into several lines if necessary.
3. SCATTER DIAGRAM FILES: Each new observation (3 or 4 values depending on the presence of predicted Z coordinates) must start on a new line.

1.2.4 Size of Data Sets -

P3D can process surfaces of up to 1500 points ($N \times R < 1500$), and scatter diagrams of up to 750 points

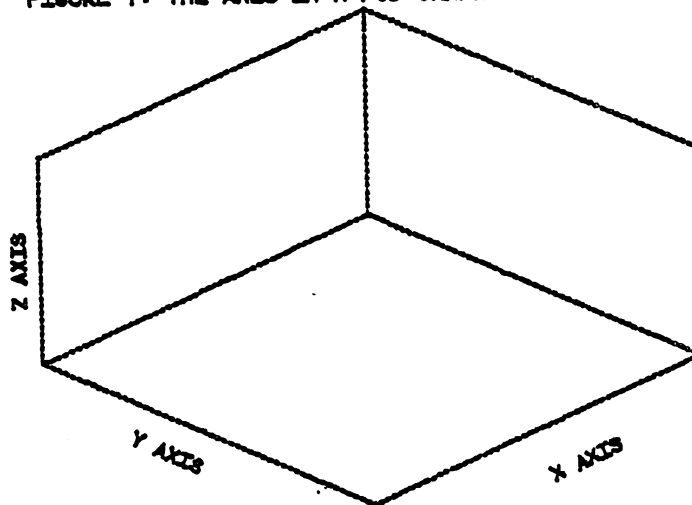
1.2.5 Missing Values -

Missing values cannot be present in any files to be processed by P3D. Values should be estimated and entered before using the program.

2.0 STRUCTURE OF THE P3D GRAPH

P3D, by default, represents the set of axes (X, Y, and Z) as a flattened CUBE, rotated counterclockwise 45 degrees, and tilted (to see the "top") also by 45 degrees with respect to the observer (Figure 1).

FIGURE 1: THE AXES IN A P3D GRAPH



The position of each point (or line) in this cube is PROJECTED geometrically onto the 2-dimensional terminal screen (Figure 2). In doing this, a certain amount of information is lost (namely, depth). The projecting technique used, however, allows a certain amount of that information to be maintained through the PERSPECTIVE transformation. Thus, objects further from the eye appear smaller than closer objects. The amount of perspective applied can be adjusted by the user (see the PERSpective command below).

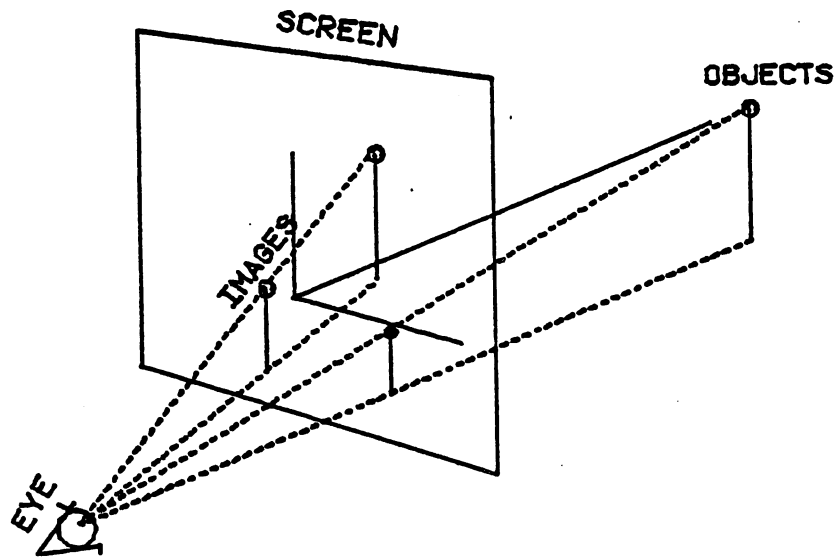


FIGURE 2: GEOMETRIC PROJECTION METHOD USED IN P3D

More loss of information may also occur when objects lie in front of each other in the same line of view. For convenience, the user can change the viewing angles in order to minimize this loss (see the ROTate and TILt commands below). In cases where data to be displayed are highly variable (e.g. sharp peaks in surfaces), or when the density of X and Y coordinates is strongly imbalanced (e.g. a 200 by 20 matrix) it is possible to alter the basic cubic shape of the graph to flatten it along either the Z or the Y axis (see REDuce command below).

3.0 THE P3D COMMANDS

The P3D commands form 4 logical categories:

1. Data definition commands
2. Data display commands
3. Graph structure commands
4. Program control commands

3.1 Data Definition Commands

3.1.1 The SURface Command -

SYNTAX: SURface [FILENAME N R]
where

FILENAME is any valid IAS file specification, N is the number of "lines" and R the number of "columns" in the rectangular data matrix stored in FILENAME.

Upon issuing the SURface command, P3D reads $N \times R$ values (up to 1500) from FILENAME, and generates X and Y coordinates under the assumption that the axes are REGULAR (evenly spaced). If this is not the case, the user must issue a COordinates command (see below). The input file FILENAME must be prepared as discussed in section 1.2.1.

When the parameters of the SURface command are omitted, P3D will omit drawing any previously defined response surface, as if the command has never been issued.

EXAMPLE

```
P3D> SUR P3DSURF.DAT 12 8
P3D>
```

ERROR MESSAGE

P3D will print an error message and will not execute a SURface command when $N \times R > 1500$. An error in the file specification will cause a severe error condition, and control will return to PDS. This is true of any command involving access to disk files.

3.1.2 The COOrdinates Command -

SYNTAX: COOrdinates [FILENAME]

where

FILENAME is a valid IAS file specification.

This command instructs P3D that X and Y axis coordinates for a PREVIOUSLY DEFINED SURFACE are contained in file FILENAME. The COOrdinates command is needed only when the axes of the surface are irregular (unevenly spaced). Otherwise, the COOrdinates command is not needed.

The input file FILENAME must conform to the description in section 1.2.1.

When the FILENAME parameter is omitted, the COOrdinates facility is disabled (X and Y axes become regular).

One use of the COOrdinates command is to produce logarithmic X or Y scales.

EXAMPLE

```
P3D> SUR P3DSURF.DAT 12 8
P3D> COO P3DAXES.DAT
P3D> GRA
```

Note the irregular line spacing requiring use of the COOrdinates command (Figure 3).

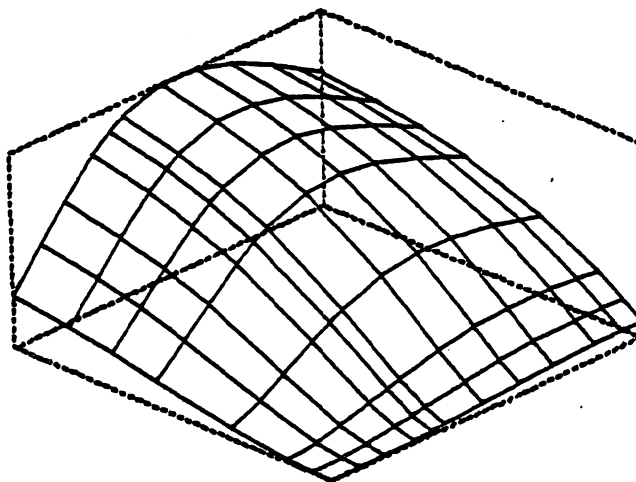


FIGURE 3: P3D SURFACE WITH IRREGULAR SPACING

ERROR MESSAGE

P3D will print an error message and will not execute a COOrdinates command if a SURface or BAsE command has not been issued previously (see below for BAsE command).

3.1.3 The SCAtter Command -

SYNTAX: SCAtter [FILENAME] [OPTION]

where

FILENAME is a valid IAS file specification
and OPTION is either Predicted or Stems (may
be abbreviated)

The SCAtter command causes P3D to read from file FILENAME up to 750 observations entered, one observation per line, as the X, Y, and Z coordinates of prints. When the Predicted option is used, a 4th value is read from each line: the predicted Z value. If the Stems option is used, P3D will GENERATE stems from observed Z values to the base of the graph. The file FILENAME must be prepared as discussed in section 1.2.2.

When the FILENAME parameter is omitted, the SCatter facility is disabled.

EXAMPLE

```
P3D> SCA P3DSCAT.DAT S
P3D> GRA
produces Figure 4.
```

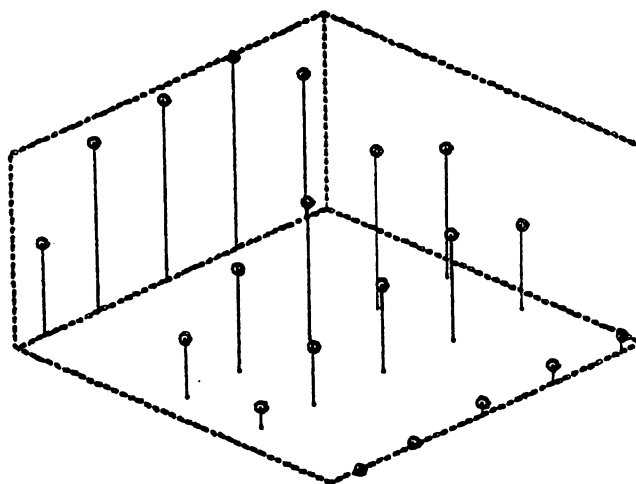


FIGURE 4: P3D SCATTER DIAGRAM (WITH S OPTION)

Using the SURface command in conjunction with a SCatter command:

```
P3D> SUR P3DSURF.DAT 12 8
P3D> COO P3DAXES.DAT
P3D> SCA P3DSCAT.DAT P
produces Figure 5.
```

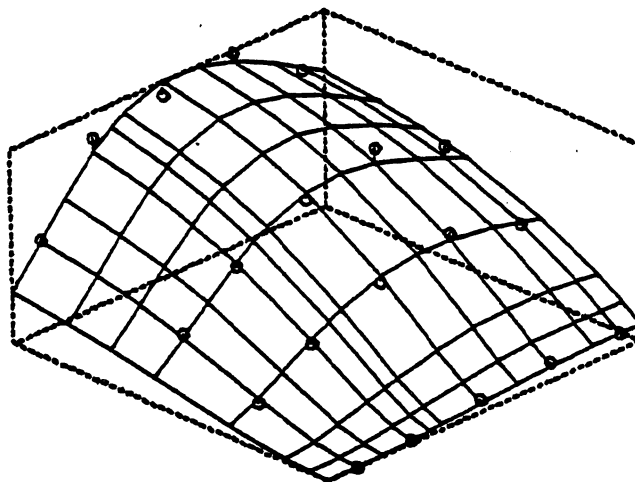


FIGURE 5: P3D SCATTER (WITH P OPTION) AND SURFACE

ERROR MESSAGE: None

CAUTION: The SCATTER diagram facility of P3D has not been programmed to evaluate axis minima and maxima. Therefore, any time the SCATTER command is issued without a COORDINATES command being issued previously, the user MUST USE THE AXIS COMMAND TO DEFINE AXIS MINIMA AND MAXIMA.

3.1.4 The BASE Command -

SYNTAX: BASE [N R]

where

N and R are the number of lines to be drawn perpendicular to the X and Y axis (respectively).

The BASE command is the logical equivalent of the SURFACE command when a grid of lines is to be generated on the base of the graph (X-Y plane). Such a grid may be useful in presenting some types of scatter diagrams (for

example, when one of the axes is logarithmic).

The BASE and SURface commands are mutually exclusive. Thus issuing one disables the other. Here again $N \times R < 1500$ must be respected. The COOrdinates command can be used in conjunction with the BASE command produce irregular grids.

When N and R parameters are omitted, the grid is disabled.

EXAMPLE

```
P3D> BAS 12 8  
P3D> COO P3DAXES.DAT  
P3D> GRA  
produces Figure 6.
```

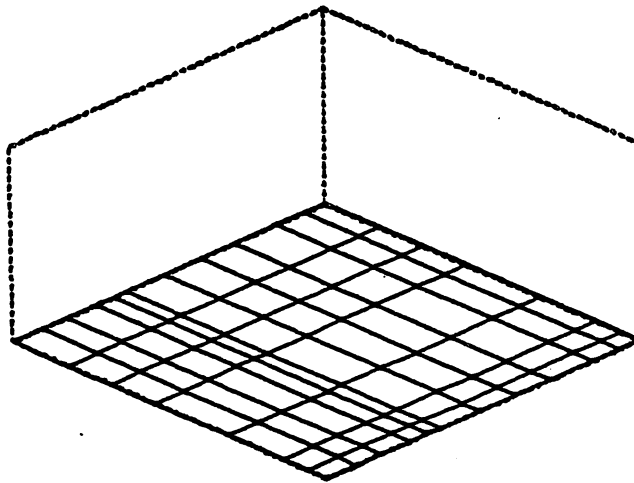


FIGURE 6: USE OF THE BASE COMMAND (IRREGULAR SPACING)

ERROR MESSAGE

P3D will return an error message and will not execute a BASE command if $N \times R > 1500$.

3.2 Data Presentation Commands

3.2.1 The AXIS Command -

SYNTAX: AXIS ID MIN MAX

where

ID is either X, Y, or Z, and MIN, MAX are the relevant axis minimum and maximum.

P3D is programmed to evaluate data minima and maxima ONLY FOR SURFACES. Whenever a SCATTER diagram is to be displayed without previously defining SURface and COOrdinates files, it is necessary to define axis minima and maxima with the AXIS command.

This apparently cumbersome requirement is made necessary by the need for extreme flexibility encountered in properly displaying surfaces and scatter diagrams simultaneously. Unlike the more automatic PLT and SCT, P3D obeys specified axis mins and maxs exactly.

EXAMPLE

```
P3D> SCA P3DSCAT.DAT S
P3D> AXI X 6 25.6
P3D> AXI Y 4 55
P3D> AXI Z 0 70
P3D>
```

ERROR MESSAGE: None

3.2.2 The SYMBOL Command -

SYNTAX: SYMBOL TYPE

where

TYPE is a valid symbol type.

This command modifies the default symbol (a circle) used to display points in scatter diagrams. The symbols

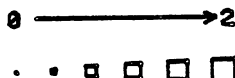
available are shown in Table 4.

TABLE 4

SYMBOLS AVAILABLE

0	-----		
1	-----	O	
2	-----	X	
3	-----	Δ	
4	-----	□	
5	-----	★	
6	-----	◇	
7	-----		
8	-----	+	
9	-----	!	
10	-----	↓	
11	-----	▽	

SIZES



EXAMPLE

P3D> SYM 5

P3D>

ERROR MESSAGE: None

3.2.3 The SIZE Command -

SYNTAX: SIZE V

where

V is the desired size (any number > 0.)

This command changes the size of symbols used to represent data points in scatter diagrams. The default size is 1. See Table 4 for an idea of the size range.

ERROR MESSAGE: None

3.2.4 The HISTogram Command -

SYNTAX: HISTogram [XW YW]
where

XW and YW are the widths of the histogram bars RELATIVE to the length of the X and Y axes, respectively.

The HISTogram command is used to change the graph from a scatter diagram to a 3-d histogram. This command can be used when either the Stems or Predicted option of the SCAtter command is in effect.

XW and YW are numbers in the range [0,1] and represent the PROPORTION OF THE RELEVANT AXIS covered by on histogram bar. Thus, XW = .05 means that each bar will be 5 % of X - axis length. This allows to vary the SIZE and SHAPE of the bars. It is possible to have the bars TOUCHING on all sides if the data is suitable.

When the width parameters are omitted, P3D disables the HISTogram facility, and returns to the scatter diagram mode. Note that the SIZE command should be used to restore a suitable symbol size after HISTogram is disabled.

EXAMPLE

```
P3D> SCA P3DSCAT.DAT S
P3D> AXI X 6 25.6
P3D> AXI Y 4 55
P3D> AXI Z 0 100
P3D> HIS .05 .05
P3D> GRA
produces Figure 7.
```

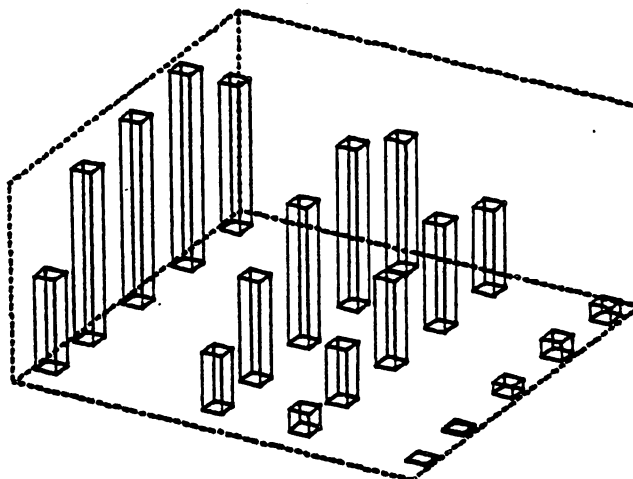


FIGURE 7: EXAMPLE OF P3D HISTOGRAMME

ERROR MESSAGE: None

3.2.5 The TRAjectory Command -

SYNTAX: TRAjectory

The TRAjectory is useful in special types of 3-d scatter diagrams where the SEQUENCE of points carries a meaning and is to be represented. Time series are sometimes presented this way. P3D simply connects all points following the sequence in which they appear in the data file.

RE-issuing the TRAjectory command disables this feature.

ERROR MESSAGE: None

3.2.6 The LINES Command -

SYNTAX: LINES [AXIS]

where

AXIS is either X or Y.

The LINES command is used in conjunction with the SURface or BASE commands. It allows drawing the set of lines in the surface or base grid PARALLEL to the specified axis. This is especially useful when the density of lines along one axis is too high (for example, in a file containing 200 lines by 10 columns, one would perhaps not want to see 200 lines parallel to the Y axis, and should issue LIN X).

EXAMPLE

```
P3D> SUR P3DSURF.DAT 12 8
P3D> COO P3DAXES.DAT
P3D> LIN X
P3D> GRA
produces Figure 8.
```

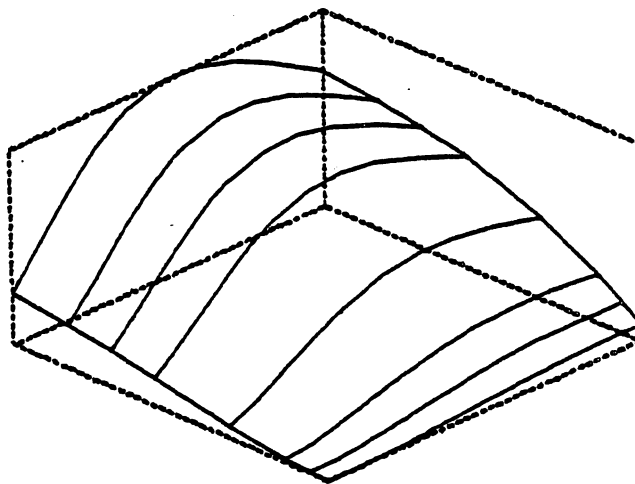


FIGURE 8: EXAMPLE OF THE LINE COMMAND IN P3D

ERROR MESSAGE: None

3.3 Graph Structure Commands

3.3.1 The ROTate Command -

SYNTAX: ROTate T

where

T is the rotation angle in degrees, of the X-Y plane.

The ROTate command executes a COUNTERCLOCKWISE rotation of the X-Y plane of the graph, according to angle T. For clockwise rotation, specify $T < 0$. By default, the X-Y plane is rotated 45 degrees.

EXAMPLE

P3D> ROT 60

P3D>

(see Figure 9a,b).

ERROR MESSAGE: None

3.3.2 The TILt Command -

SYNTAX: TILt T

where

T is a tilting (top view) angle in degrees.

The TILt command executes a change in a TOP-VIEW angle as specified by T. At $T = 90$, the graph is viewed from the top. Useful angles respect $0 < T < 90$. Although any angle can be used.

EXAMPLE

P3D> TIL 80

P3D>

(see Figure 9c,d).

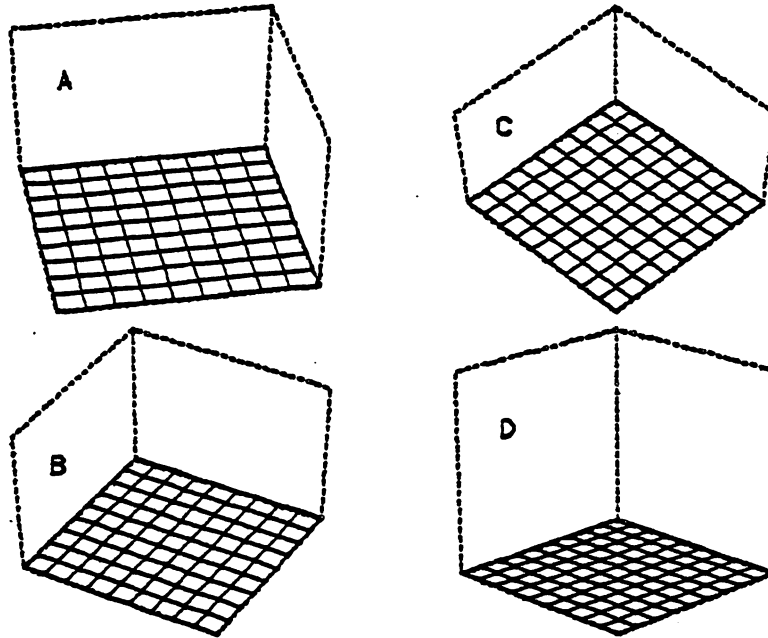


FIGURE 9: THE ROTATE (A, B) AND TILT (C, D) COMMANDS

ERROR MESSAGE: None

3.3.3 The PERSpective Command -

SYNTAX: PERSpective RATIO
where

RATIO is the ratio of length of objects at the back of the graph to those at the front ($0 < \text{RATIO} < 1$).

The PERSpective command is used to produce the illusion of depth on a graph. If $\text{RATIO} = 0$, the graph is vanishing at the back of the screen. If $\text{RATIO} = 1$, there is no depth in the graph. This command is equivalent in effect to changing the distance between the object and the eye (the closer, the more depth). By default, P3D sets $\text{RATIO} = 1$.

The effect of the RATIO parameter is non-linear and the user will soon realize that useful RATIO's range between .75 and .95. Very large changes in allure of the graph result

from small reductions of **RATIO** in the vicinity of 1.

EXAMPLE

```
P3D> PER .75  
P3D>  
(see Figure 10).
```

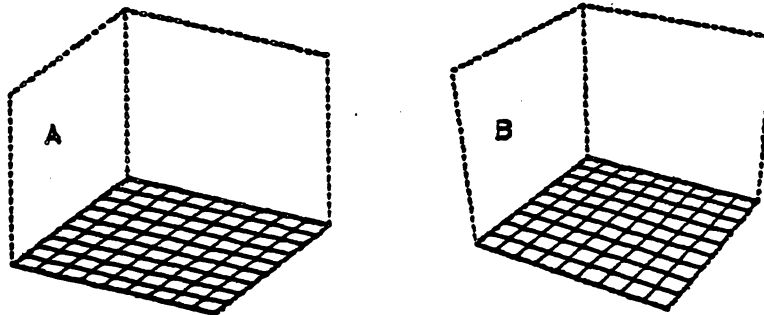


FIGURE 10: PERSPECTIVE COMMAND (A: 1; B: .75)

ERROR MESSAGE: None

3.3.4 The BOX Command -

SYNTAX: BOX

The **BOX** command enables or disables drawing of the X-Y-Z box (dotted lines) on the graph. When a **SURface** command is in effect, no axes are drawn at all when **BOX** is disabled. If a **SCatter** diagram alone is in effect, the periphery of the X-Y plane will be displayed (Figure 11).

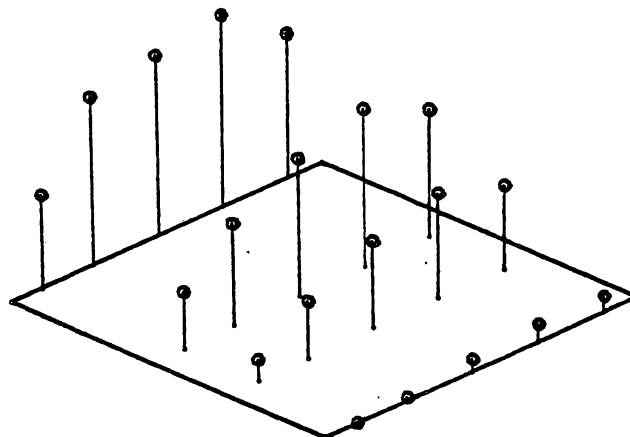


FIGURE 11: USE OF THE BOX COMMAND

EXAMPLE

```
P3D> BOX
P3D>
```

ERROR MESSAGE: None

3.3.5 The REDuce Command -

SYNTAX: REDuce AXIS FACTOR
where

AXIS is either X or Z, and FACTOR is in the range (0,1).

The REDuce command is used to change the default form of the graph (an even-sided cube) to some other shape by REDUCING the length of one of the axes with respect to the X axis. Reducing the Z axis is particularly useful in cases where data are highly variable. Reducing the Y axis may be useful when line density is disproportional along the X axis (few Y values, many X values).

EXAMPLE

```
P3D> RED Z .5  
P3D> RED Y .25  
P3D>  
(see Figure 12).
```

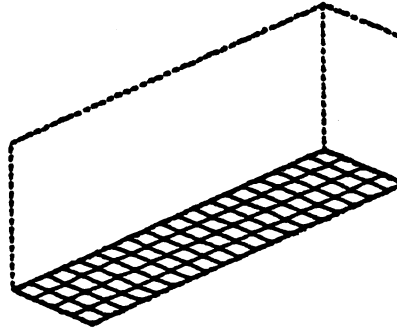


FIGURE 12: USE OF THE REDUCE COMMAND (RED Y .25)

ERROR MESSAGE: None

3.3.6 The SCReen command -

SYNTAX: SCReen ASPECT MIN MAX

where

ASPECT is either Horizontal or Vertical (abbreviated if desired) MIN and MAX are the relevant screen minimum and maximum.

The SCReen command controls the size, location and shape of the graph on the terminal screen. The screen of VT-640 and Tektronix 4010 terminals consists of a matrix of phosphorous dots called addressable points. There are 1023 such points along the horizontal aspect of the screen, and 780 along the vertical aspect (thus 1023 x 780 points on the screen). The entire graph is located within a window defined by the minimum and maximum addressable point specified for each aspect. By default, P3D uses points [40,983] and [40,740] as limits along the horizontal and vertical

aspects respectively. Any valid limits (from 0 to 1023 horizontal and 0 to 780 vertical) can be specified in a SCReen command. It is even possible to create MIRROR IMAGES of graph by REVERSING the order of the MIN and MAX arguments in the SCReen command (Figure 10).

EXAMPLE

```
P3D> SCR H 40 400
```

```
P3D> GRA
```

```
P3D> SCR H 800 540
```

```
P3D> GRA
```

This string of commands produces Figure 13 (only the axes).

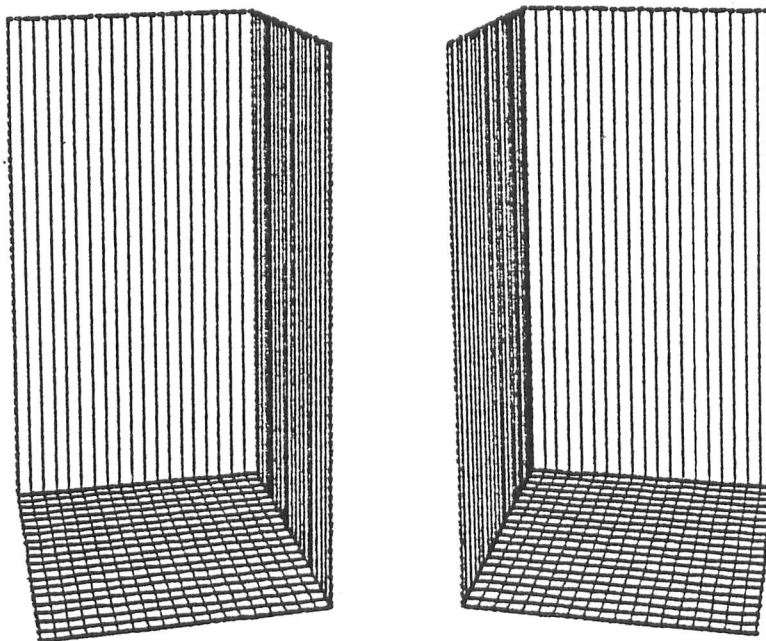


FIGURE 13: USE OF THE SCREEN COMMAND TO EXPAND Z OR TO PRODUCE MIRROR IMAGES.

ERROR MESSAGE

P3D will return an error message and will not execute a SCReen command if MIN or MAX is invalid.

3.4 Program Control Commands

The following P3D commands do not modify the graph, but give instructions as to what to do with it.

3.4.1 The GRAPh Command -

SYNTAX: GRAPh

This command produces the graph on the terminal screen. It can be issued at any time during a P3D session. After a graph has been drawn, press return to pursue the P3D session. The screen is cleared immediately following this return.

ERROR MESSAGE: None

3.4.2 The PENplot Command -

SYNTAX: PENplot

This command is used to produce copies of the graph on the Digital pen plotter ONLY. DO NOT issue this command if you are not working on the Textronix 4010, or if the pen plotter has not be properly prepared. Otherwise, the graphic terminal may be disabled and the current P3D session will be lost. Before issuing the PENplot command, make sure that

1. the pen plotter is "ON"
2. the margins have been set
3. paper is positioned on the plotter
4. the "load" and "local" keys are disabled, and

5. the pen cap has been removed.

Execution of the Penplot command is immediate and cannot be interrupted. Press return AT THE END of the graph to pursue.

ERROR MESSAGE: None

3.4.3 The HELp Command -

SYNTAX: HELp [COMmand]

where

COMmand is any valid P3D command (may be abbreviated to 3 letters).

This facility provides a summary of the information in this manual, command-by-command, as a refresher. If COMmand is not a valid P3D command, the HELp command will not be executed. If the COMmand parameter is omitted, the HELp facility will list the P3D commands available (Table 5). The HELp facility is a subprogram of P3D, and the prompt HELp> will appear at the end of a HELp printout, awaiting another COMmand parameter. To exit the HELp facility, simply press return.

TABLE 5

THE P3D HELP FACILITY MENU

P3D-COMMANDS AVAILABLE:

COMMAND	DESCRIPTION
SURFACE	RECTANGULAR (MATRIX) RESPONSE SURFACE (FILE)
COORDINATE	FOR UNEVELY SPACED AXES, FILE INPUT
SCATTER	X-Y-Z 3-D SCATTER PLOT (FILE INPUT)
HIST	3-D HISTOGRAM (FILE DEFINED IN SCATTER)
BOX	CONTROLS DRAWING OF AXES
BASE	DRAWS A N*M GRID ON THIS X-Y PLANE
LINES	DRAW LINES PARALLEL TO X OR TO Y AXIS
AXIS	DEFINE AXIS MINIMA & MAXIMA
TRAJECTORY	3-D TRAJECT. (WHEN SEQUENCE OF POINTS COUNTS)
SYMBOL	CHOICE OF SYMBOL FOR 3-D SCATTER DIAGRAMS.
SIZE	SELECT SIZE OF SYMBOLS ON SCATTER DIAGRAMS
PERSPECTIVE	AMOUNT OF "DEPTH" IN THE GRAPH
ROTATE	ROTATION OX XY PLANE (COUNTERCLOCKWISE)
TILT	TILT OF XZ PLANE (TOP VIEW)
REDUCE	ALTERING THE RELATIVE SIZE OF Y OR Z-AXIS
SCREEN	CHANGE SIZE & POSITION OF GRAPH ON SCREEN
PENPLOT	PEN PLOTTER OUTPUT ON TEKTRONIX TERM. ONLY
GRAPH	PRODUCES THE GRAPH AS SPECIFIED
CLEAR	RESTORES MEMORY TO INITIAL VALUES
HELP	COMMAND DOCUMENTATION
SHOW	DISPLAY CURRENT PARAMETER VALUES
SAVE	SAVE THE PLOTTING PARAMETERS FOR LATER USE
RETRIEVE	RETRIEVE SAVED PARAMETERS
BYE	TERMINATE EXECUTION

TYPE ANY COMMAND (FIRST 3 LETTERS) OR <RETURN>
HELP>

ERROR MESSAGE: None

3.4.4 The SHOW Command -

SYNTAX: SHOW

The SHOW command produces a display of the various features and parameters currently in use during a P3D session. It is useful in cases where graphs are complex. See Table 6 for example of the SHOW printout. Press return to

pursue the P3D session.

TABLE 6
THE SHOW COMMAND PRINTOUT
PLOTING PARAMETERS FOR FIGURE 5

```

P3D> SHOW
PARAMETER STATUS REPORT
                                POINTS
                                X      Y
SURFACE:P3DSURF.DAT
COORDI.:P3DAXES.DAT
BASE:OFF                        12      8
                                LINES:ALL
SCATTER:P3DSCAT.DAT  PREDICTED  SYMBOL: 1  SIZE:1.000
TRAJECTORY:OFF
PERSPECTIVE:0.990
ROTATION: 45.0
TILT: 45.0
                                MIN      MAX
HORIZONTAL SCREEN WINDOW      40      983
VERTICAL SCREEN WINDOW        40      740
                                X-AXIS    25.600
                                Y-AXIS    55.000
                                Z-AXIS    59.261
BOX:ON  AXIS REDUCTION: Y:1.000  Z:1.000

```

ERROR MESSAGE: None

3.4.5 The CLEAr Command -

SYNTAX: CLEAr

This command is equivalent to starting P3D anew.
Initial values are restored, and file names are erased.

ERROR MESSAGE: None

3.4.6 The SAVE Command -

SYNTAX: SAVE FILENAME
where

FILENAME is a valid IAS file specification.

This command creates a file containing all the parameters needed to reproduce the graph in its present form at some later time (during the same or another P3D session). Whenever a user is satisfied with a graph, and wishes to obtain a copy from the pen plotter, he should save his graph under an appropriate name, for later retrieval. We suggest using file type P3D for simplicity.

EXAMPLE

```
P3D> SAV JUNK.P3D
```

ERROR MESSAGE: None

3.4.7 The RETrieve Command -

SYNTAX: RETrieve FILENAME
where

FILENAME is a valid IAS file specification.

This command reads from file "FILENAME" the parameters needed to produce a previously saved graph. Only files created by the P3D SAVE command can be retrieved. Immediately following the RETrieve command, P3D will read all the original data files.

EXAMPLE

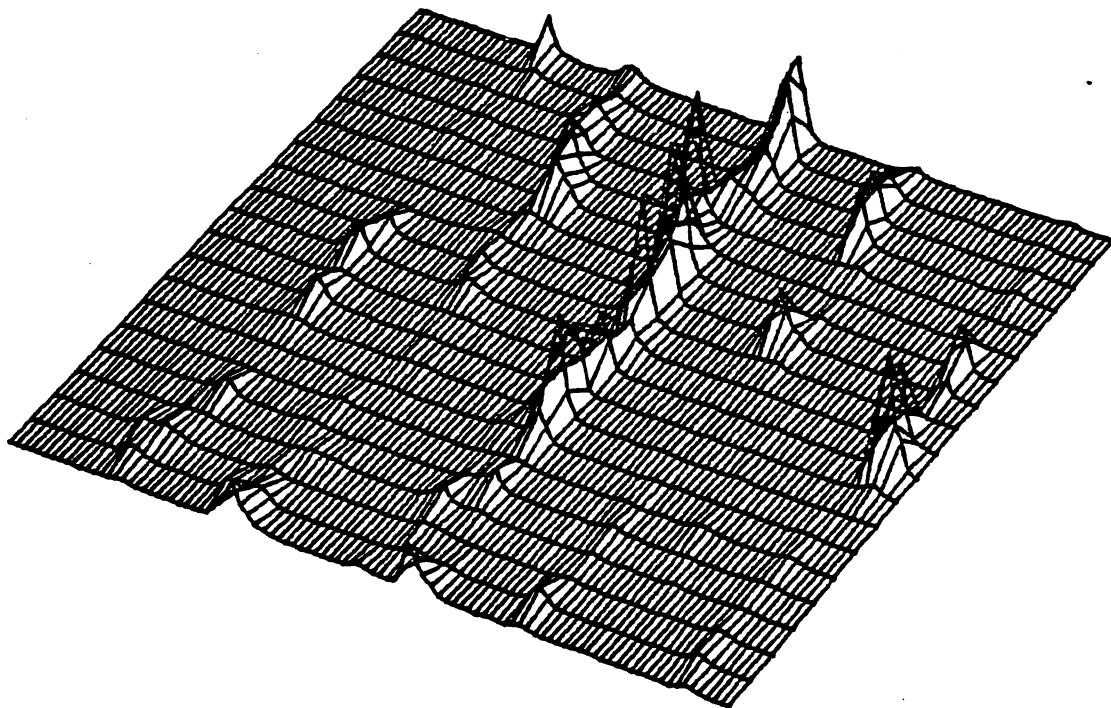
```
P3D> RET JUNK.P3D  
NUMBER OF OVSEVATIONS READ: 10
```

ERROR MESSAGE

P3D will return an error message and will not execute the RETrieve command if the specified file was not created by a P3D SAVE.

3.4.8 The BYE Command -

SYNTAX: BYE
This command terminates P3D and returns control to PDS.



4.0 COMMAND SYNTAX SUMMARY

SURface [FILENAME N R]	N x R < 1500
COOrdinates [FILENAME]	
SCAtter [FILENAME] [OPTION]	OPTION = S or P
BASE [N R]	N x R < 1500
AXIS ID MIN MAX	
SYMBOL TYPE	TYPE = (0,11)
SIZE V	V > 0
HISTogram XW YW	0 < XW, YW < 1
TRAjectory	
LINEs [AXIS]	
ROTe T	
PERspective RATIO	0 < RATIO < 1
REDuce AXIS FACTOR	AXIS = Y or Z
	0 < FACTOR < 1
SCReen ASPECT MIN MAX	ASPECT = H or V
GRAPh	
PENplot	
HELp [COMmand]	
SHOW	
CLEAR	
SAVE FILENAME	
RETRieve FILENAME	
BYE	