Using the Advanced Version of DIPS

Introduction

This chapter contains a detailed description of the features found in the ADVANCED version of DIPS 4.0 in order of appearance in the menu tree structure. Figure 2.4 shows the start up screen and main menu options when using the ADVANCED version of DIPS.

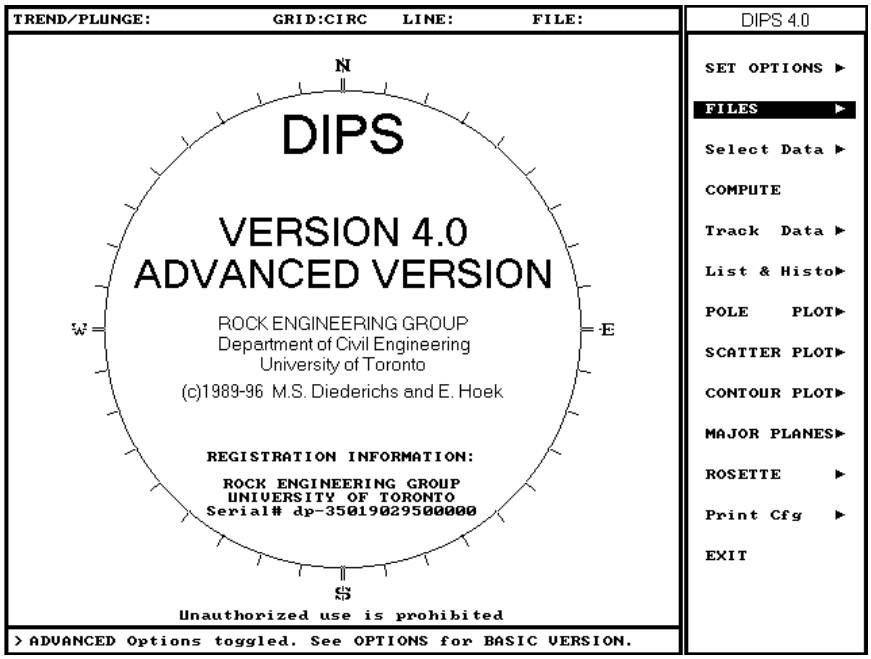
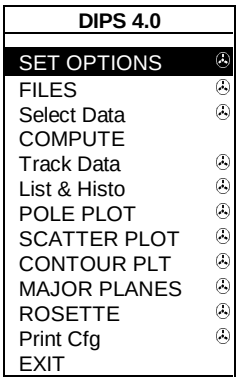


Figure 2.4: The Advanced DIPS screen.

SET OPTIONS

Path: *SET OPTIONS*



DIPS allows you to select a number of different options, listed in the menu box at left, which govern the method of computation, as well as the mode and characteristics of the display. These options are initially set to commonly used default values and settings. While it may not be necessary to change any of the options discussed below, you should familiarise yourself with the default settings and their significance.

When you first enter the DIPS environment, one of the following three prompts will appear on the prompt line:

> No CFG file: Default = ADVANCED (see OPTIONS for BASIC version)

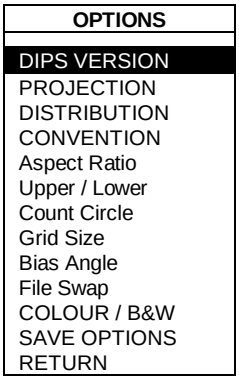
> ADVANCED options toggled. See OPTIONS for BASIC version.

> BASIC options toggled. See OPTIONS for ADVANCED version.

The first prompt will be shown if you are using DIPS in a current directory which does not include a DIPS.CFG file. However, if you have executed the **SAVE OPTIONS** command during a previous DIPS work session, the second or third prompt will be displayed.

DIPS VERSION

Path: *SET OPTIONS / DIPS VERSION*



DIPS may be run as either the full-featured ADVANCED version, or the trimmed down BASIC version.

When you start the DIPS program, the ADVANCED version menu box and start up screen will appear automatically. Should you wish to work in the BASIC version of the program (see the Quick Start tutorial in Part 1 – Getting Started), select the **SET OPTIONS->DIPS VERSION** button. You will then have to respond to the following prompts:

>You are using the ADVANCED VERSION of DIPS. Change (Y or N)?

Enter *Y*, and the next prompt will be:

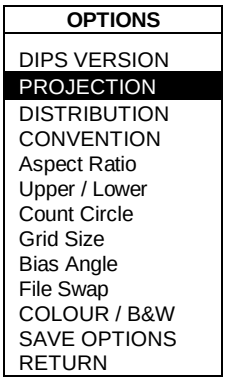
>You are using the BASIC VERSION of DIPS. Change (Y or N)?

Enter *N* (to run the BASIC version of DIPS), or *Y* to toggle back to the first prompt. You will be returned to the **SET OPTIONS** menu when an *N* has been entered at one of the prompts.

Alternatively, the /A or /B command line options (see Part 1 – Getting Started) may be used, which will override any previously saved **SET OPTIONS->DIPS VERSION** toggle selection.

PROJECTION

Path: *SET OPTIONS / PROJECTION*



There are two options available which control the way in which pole points and plane traces on the lower hemisphere are projected to form the two dimensional screen image: the EQUAL ANGLE and EQUAL AREA methods. These projection methods are described below.

When you select the **PROJECTION** button from the **OPTIONS** menu, you will be prompted to accept one of the projection options:

> Projection type is EQUAL AREA: change (Y or N)?

Type *Y* to get the next prompt:

> Projection type is EQUAL ANGLE: change (Y or N)?

Type *N* to remain with the EQUAL ANGLE option.

For the EQUAL ANGLE projection method, a line is drawn from the centre of the top of the sphere (the zenith) to a point A on the sphere (a pole or a point on the great circle). The intersection of this line with a horizontal plane through the centre of the sphere, defines the projection point B – see the margin sketches on the following pages for illustration.

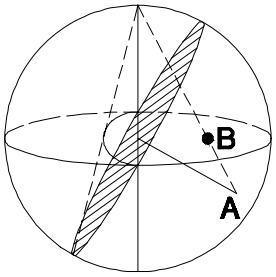
In the EQUAL AREA method, the bottom of the sphere rests on the projection plane. The point A on the sphere is projected down to the plane by swinging this point in an arc about the contact between the sphere and the plane, giving point B. The resultant projection is then scaled back to the size of the projection sphere.

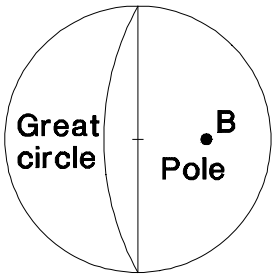
These two methods produce slightly different results. Each method has advantages and disadvantages, depending upon the type of analysis being performed, as described by Hoek and Bray (1981) or Hoek and Brown (1980). The type of grid and the results of the projections generated for each of the methods are shown in the following pages.

It is essential that the two projections are never mixed. Decide upon one or the other, and use that projection for all data presentation and analysis on a project.

EQUAL ANGLE Projection

The EQUAL ANGLE projection option is the default option. This method preserves only the geometry of the projected shapes. The area on the surface of the sphere, represented by a projected region, depends on its location. The projected area of a given circle increases towards the equator of the projection.





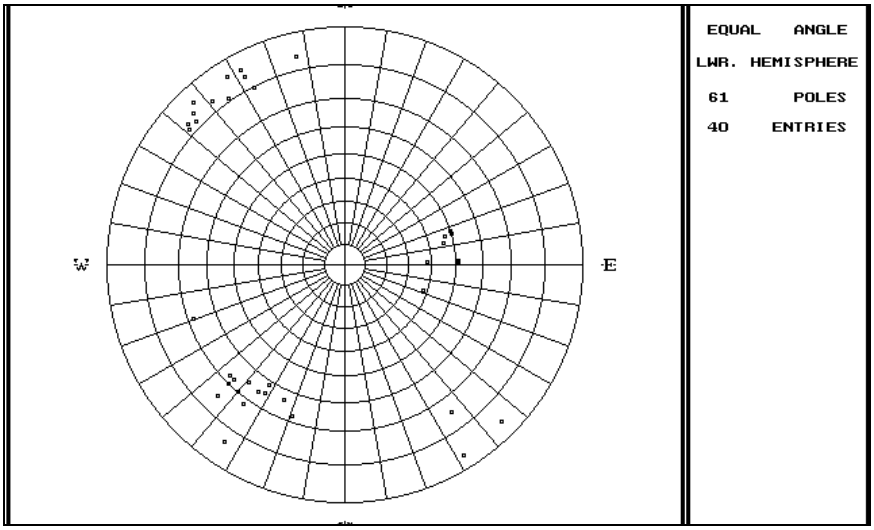


Figure 2.5a: Polar projection grid and poles – EQUAL ANGLE method.

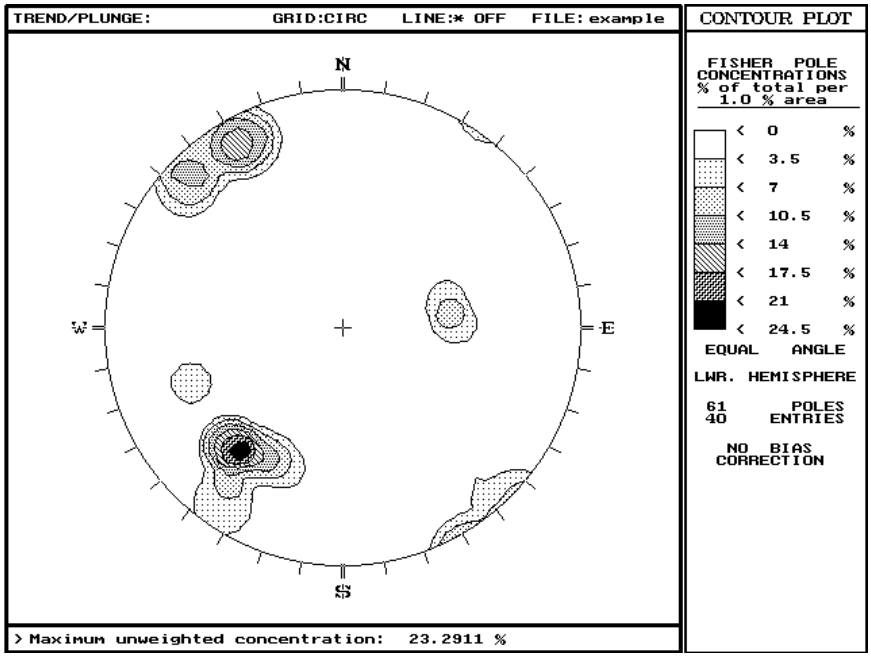
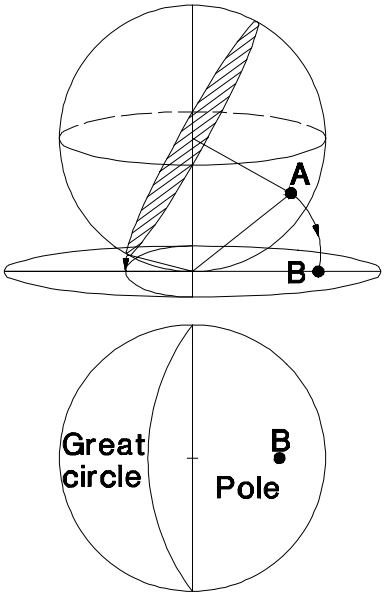


Figure 2.5b: Unweighted contour plot using EQUAL ANGLE projection.

EQUAL AREA Projection

This method distorts geometrical shapes such as small circles (circles with centres not coincident with that of the sphere). Nevertheless, a constant area on the projection represents a constant area on the surface of the sphere, regardless of its location. This method reduces visual bias in comparisons between data clusters in different parts of the sphere.



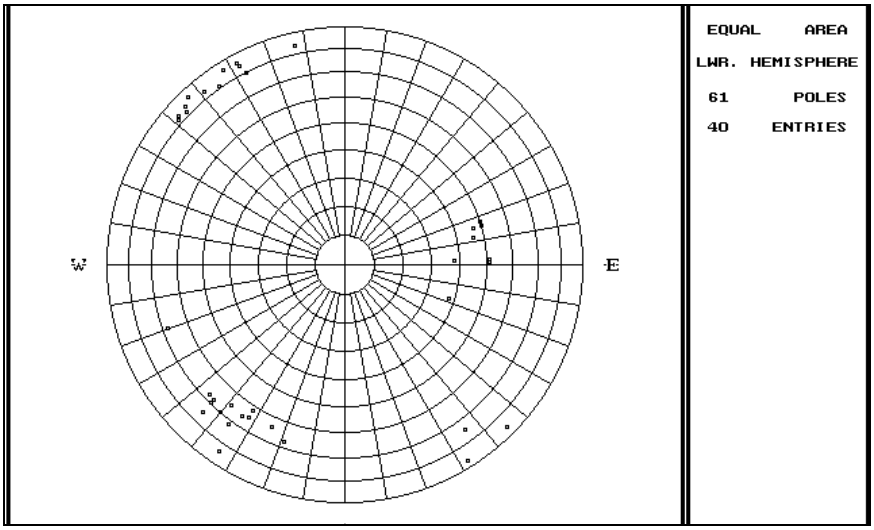


Figure 2.6a: Polar projection grid and poles – EQUAL AREA method.

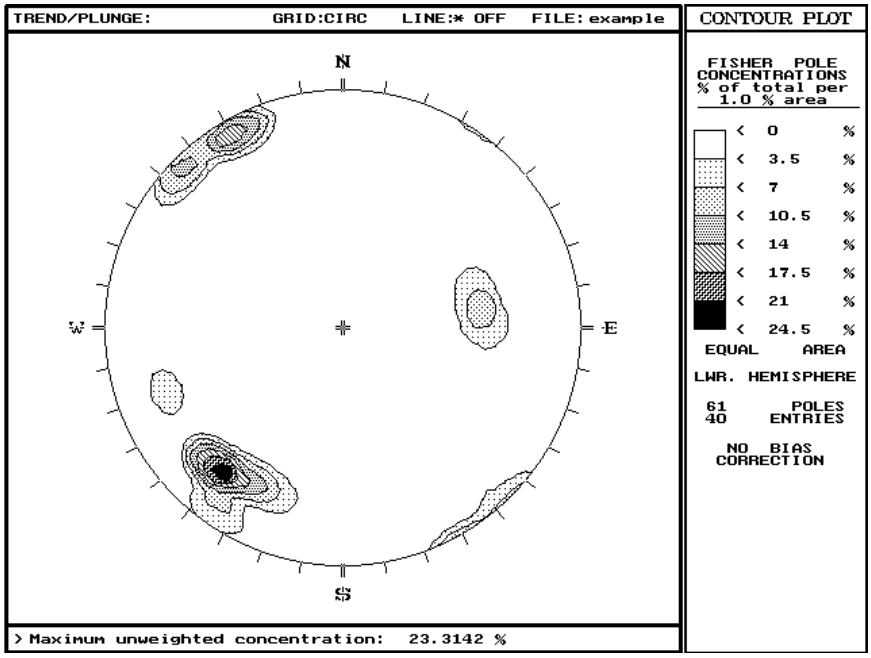


Figure 2.6b: Unweighted contour plot using EQUAL AREA projection.

All calculations in DIPS take place on the reference sphere and not on the projection – *the choice of projection method has no effect on computed results.*

All of the calculations in DIPS take place on the *reference sphere* and not on the *projection*, so none of the distortions mentioned above affect the computed results. The **PROJECTION** option is therefore provided only for the customisation of the display, since different users may be more experienced in visually analysing one type of projection than the other.

DISTRIBUTION

Path: *SET OPTIONS / DISTRIBUTION*

There are two options available which control the way that DIPS computes the pole density concentration values for the data:

- SCHMIDT distribution
- FISHER distribution.

(Details of the calculation methods are given in the following pages.) The SCHMIDT distribution method provides very quick computation time and, for large amounts of data, produces concentration values which are very similar to those obtained with the FISHER method. When the quantity of data is limited, however, the SCHMIDT distribution produces very crude contour diagrams and often misleading results, since each measurement is assumed to be 100 percent accurate and any existing errors are exaggerated due to lack of data. Therefore in this case, it is advisable to use the FISHER distribution, since it tends to suppress any undue influence that a single measurement might have on the data contained in a limited data set. When you have lots of data, there is little difference between the plots generated by the two methods, and the SCHMIDT distribution is faster.

OPTIONS

DIPS VERSION
PROJECTION
DISTRIBUTION
CONVENTION
Aspect Ratio
Upper / Lower
Count Circle
Grid Size
Bias Angle
File Swap
COLOUR / B&W
SAVE OPTIONS
RETURN

Selection of the **DISTRIBUTION** option will display the following prompt line:

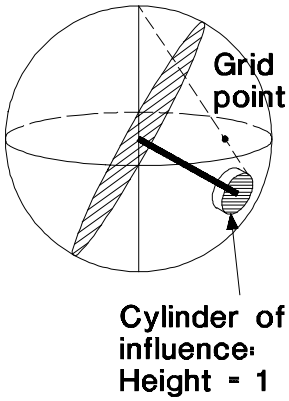
> Contour distribution type is SCHMIDT: change (Y or N)?

To change the distribution type from SCHMIDT to FISHER, press *Y* or the *Left Mouse Button* to get the prompt:

> Contour distribution type is FISHER: change (Y or N)?

To accept the FISHER distribution, press *N*.

SCHMIDT Distribution



The SCHMIDT distribution is the classical method, in which each pole is assigned a constant influence value of 1. The integrated zone of influence is a cylinder of constant height with a radius equal to the radius of the counting circle. A counting grid is superimposed on the stereonet plane, or in the case of DIPS, on the surface of the reference sphere. Convention dictates the use of a counting circle with an area equivalent to 1% of the lower hemisphere surface. For each pole plotted, any grid point falling within a circle of arbitrary constant radius centred on this pole is incremented by the value of the pole. After the influence of all plotted poles is thus distributed, the density plotted at each grid point is calculated by dividing the pole count at that grid point by the total pole influence.

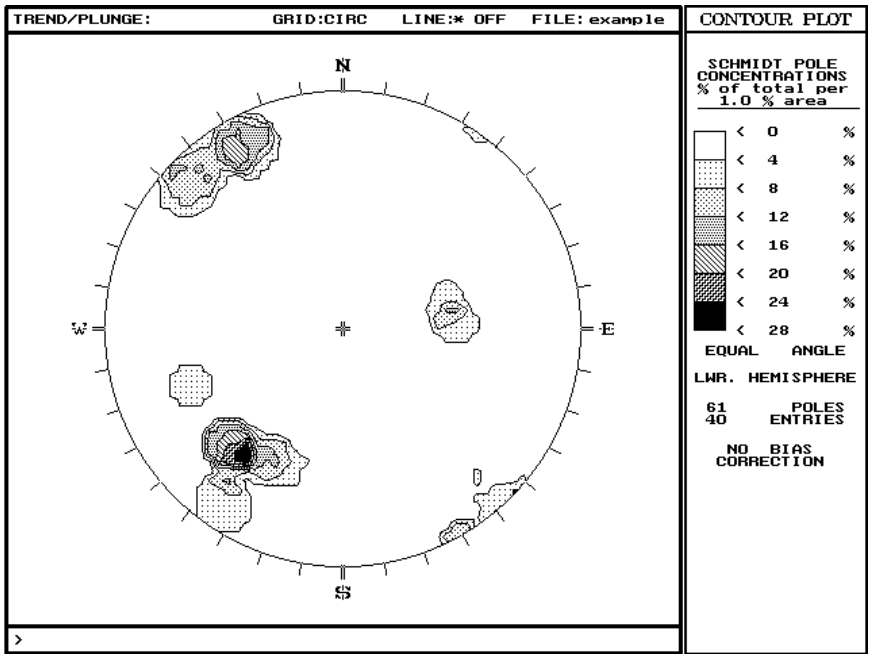
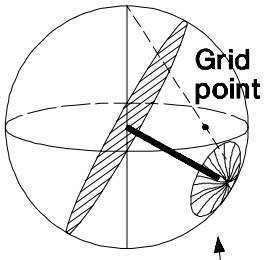


Figure 2.7: An unweighted contour plot using the SCHMIDT distribution.

FISHER Distribution



Bell dome of influence.
Max. height = 1 coincident with pole vector
Base radius = 2 x Schmidt cylinder radius
Total volume of influence function is = Schmidt cylinder

In the FISHER method each pole is assigned a *normal* influence or FISHER distribution over the surface of the sphere, rather than a point value, as in the SCHMIDT method. The integrated zone of influence is a bell shaped distribution with a maximum height of 1, and a basal radius twice that of the counting circle radius. The influence contribution to a grid point is represented by the height of the influence zone immediately above the grid point. In this method, the *total influence* of an individual pole is the same as in the SCHMIDT method but its *distribution of influence* reflects an assumed probability of measurement error. For large quantities of data, this option will produce similar results to the familiar SCHMIDT option. The real strength of the FISHER option is in "smoothing" density plots for sparse data sets.

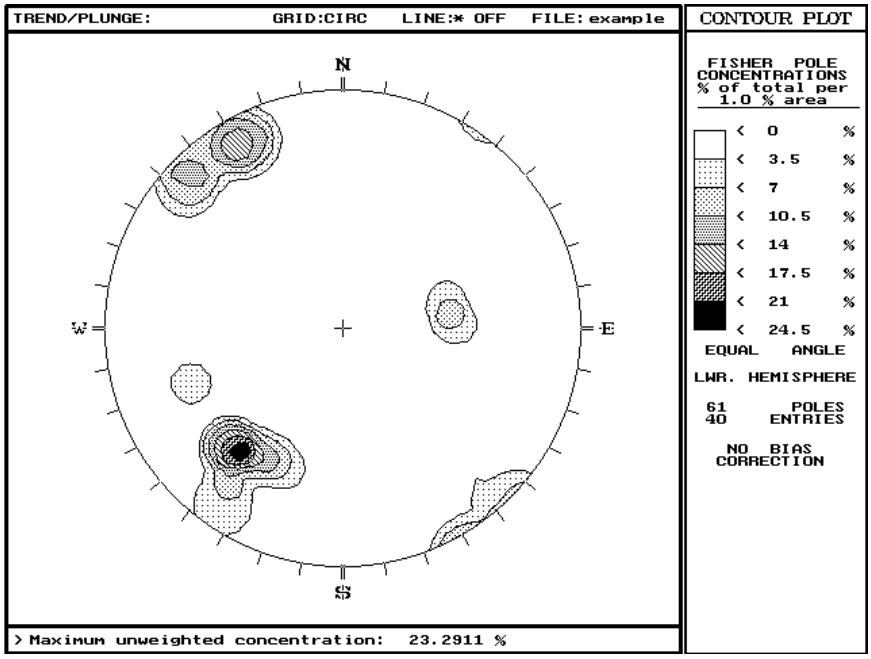
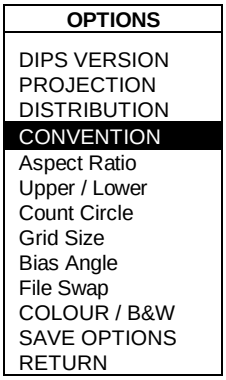


Figure 2.8: An unweighted contour plot using the FISHER distribution.

CONVENTION

Path: *SET OPTIONS / CONVENTION*

In DIPS, poles are **always** plotted using the trend and plunge of the pole vector with respect to the reference sphere. However, numerical listings of orientation pairs, such as "00/000" or "000/00", can correspond to either the orientation of the *poles* or the *planes* that they represent. While the plot of the data will appear the same, the numerical listing in the Upper Status Box will show the orientation *according to the setting of this option*. There are two conventions for these listings: the POLE VECTOR Convention or the PLANE VECTOR Convention. The default is the POLE VECTOR Convention.



One of these two numerical conventions can be selected with the **CONVENTION** option:

> Pole display convention is POLE VECTOR: change (Y or N)?

To change the data listing convention, press *Y* or the *Left Mouse Button* to get the prompt:

> Pole display convention is PLANE VECTOR: change (Y or N)?

To accept the PLANE VECTOR option, type *N*.

It is important to know what the numbering convention is when viewing listings of the orientation data. The orientation data is displayed in the Upper Status Box when the **LOCATE POLES** and **SET WINDOWS** features are being used, and in the **List & Histo** displays, as well as in the **MAJOR PLANES** menu.

POLE VECTOR Convention

In the POLE VECTOR Convention, all orientation listings are displayed as the TREND/PLUNGE of the pole (eg. 120/35).

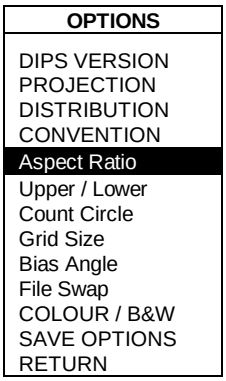
PLANE VECTOR Convention

In this convention, orientation listings are displayed using the orientation type specified in the data file by the GLOBAL ORIENTATION FLAG only. These types include:

DIP/DIP DIRECTION	(55/300)	(of a plane)
STRIKE/DIP (left)	(030/55)	(of a plane)
STRIKE/DIP (right)	(210/55)	(of a plane)
TREND/PLUNGE	(120/35)	(of a linear feature)

Aspect Ratio

Path: *SET OPTIONS / Aspect Ratio*



The **Aspect Ratio** option *should only be necessary if you are using older monitors or printers*, which may cause the circular stereonet of the DIPS screen – viewed on the monitor or generated by the printer – to be distorted into an oval.

Note: this option is not available in the extended DOS version of DIPS, only in the 640K version.

When you select **Aspect Ratio** from the **SET OPTIONS** menu, you will be prompted with the current screen ratio and asked if you wish to change it:

> Height:Width ratio = 10000: 10000..change (Y or N)?

Enter *Y* to get the prompt:

> NEW (N) or DEFAULT (D) or SELECTED (S) ratio?

Selecting NEW (N) enables you to change the current aspect ratio. (The acceptable input for NEW WIDTH ranges from 2500 to 30000.) Selecting DEFAULT (D) resets the aspect ratio to the original default for your graphics card. The SELECTED (S) ratio allows you to recall a given value, such as the appropriate width for the printer, which has been saved previously using **SAVE OPTIONS** (see below).

DIPS automatically detects the graphics card you are using, and chooses the highest resolution setting on your card, and sets the aspect ratio so that the stereonet will appear circular on the screen. (For instance, in EGA mode, the width of a pixel is 0.875 times the height of a pixel, therefore the default **Aspect Ratio** is 10000:8750. In VGA, the pixels are square, so the ratio will be 10000:10000.) The aspect ratio set for your *graphics card*, however, will not always yield a circular stereonet on a *hard copy printout*. Therefore it may be necessary to change this ratio to suit your needs. Use the following procedure.

To find the correct aspect ratio for your printer (or for your screen if DIPS is incorrectly calculating the aspect ratio for your display), set the aspect ratio to 1:1 by inputting 10000 for NEW WIDTH. Print the screen, to obtain a printout with the circle trace displayed. With a ruler, measure the width of the circle on the printout and divide by the height. Multiply this value by 10000 to obtain the correct WIDTH input value for your printer / screen combination. *Inputting this value will distort the screen image, but yield a round circle in the printed image.* This value for width is the 'printer width'.

Note that **COMPUTE** does not have to be reexecuted when this option is toggled. You may do all of your screen manipulation first using an aspect ratio which shows a circular stereonet on the screen, and change the ratio only when you wish to obtain a printout.

Saving a Selected Aspect Ratio

Once you have the correct width for your printer or screen, select **SAVE OPTIONS**. At any time in the future, you can reset the width to the DEFAULT, a NEW value, or recall the width you have saved by choosing the SELECT option (see prompt line on previous page). If you select the **S** option, the saved width will be recalled, and made the active width. Selecting **S** a second time will cause the following prompt to appear on your screen:

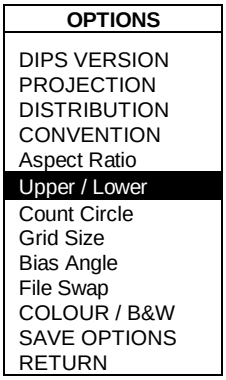
```
> Input your new PIXEL WIDTH:
```

Enter a new number.

This value is now stored as the SELECTED width until you exit DIPS. If you **SAVE** the **OPTIONS** in the **SET OPTIONS** menu, this value is stored along with all other active option settings and is thereafter retrieved as the initial SELECTED width whenever DIPS is entered from the current directory.

Upper / Lower

Path: *SET OPTIONS / Upper/Lower*



The default projection in DIPS is a lower hemisphere projection. For a horizontal stereonet projection, this means that the plot represents the TRACES of planes and poles on the *lower half* of the sphere as viewed from *above*. An upper hemisphere plot is also available. This displays the TRACES of the planes and poles on the *upper half* of the sphere, when viewed from *above*. Use whichever plot you prefer, but be consistent or confusion will result.

```
> LOWER HEMISPHERE projection is used:  Change (Y or N)?
```

To change to UPPER HEMISPHERE, press *Y* or the *Left mouse button* to get the prompt:

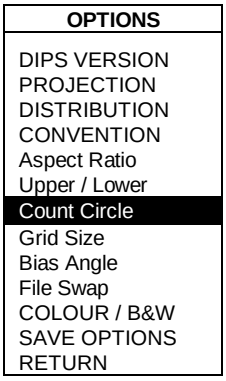
```
> UPPER HEMISPHERE projection is used. Change (Y or N)?
```

To accept this option, press *N*.

Count Circle

Path: *SET OPTIONS / Count Circle*

The generally accepted size for the counting circle used in contour calculations is *one percent* of the surface area of the lower reference hemisphere. This is, however, merely convention and if desired, you may use a different size of counting circle. The allowed range of counting circle area as a percentage of hemisphere area is 0.2 % to 5.0 %. For meaningful results, a range limit of 1.0 % to 2.5 % is recommended.



The following prompts will be displayed when this option is activated. To change the circle area, press *Y* or the *left mouse button* at the first prompt. Input a new area in percent (e.g. *2.5*) at the second prompt. To accept the new area and return to the **SET OPTIONS** menu, press *N* or the *right mouse button* at the third prompt.

> Counting area is 1.0 % of total. Change (Y or N)?

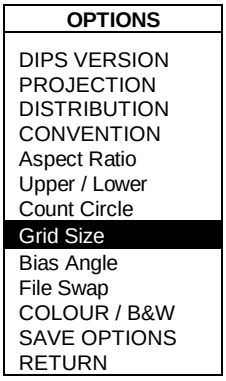
> New counting area in percent (0.2-5.0)=

> Counting area is 2.5 % of total. Change (Y or N)?

Grid Size

Path: *SET OPTIONS / Grid Size*

The **COMPUTE** command in the main menu calculates statistical pole concentration values for points in a grid overlay on the surface of the sphere. These points are then projected onto the stereonet plane to form a square grid pattern. The **CONTOUR PLOT** option generates a filled contour pattern by interpolating between these grid values. The speed of computation and plot generation decreases with decreasing separation between these grid points. On the other hand, the accuracy and smoothness of the contour plot are improved with a finer grid. Since a finer grid increases storage requirements, select a coarser grid if memory restrictions are a problem. Your choice of grid size should be governed by considerations of computer speed, presentation quality and quantity of data. You may choose between grid spacing options of 4% (default) and 6% of the projection radius, by selecting the **Grid Size** button in the menu box, and responding to the prompt line questions:

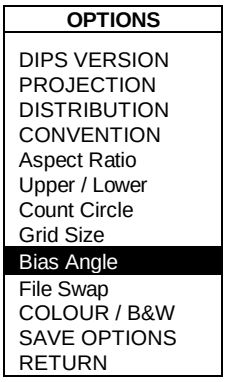


> Counting grid spacing is 4 % of radius. Change (Y or N)?

> Counting grid spacing is 6 % of radius. Change (Y or N)?

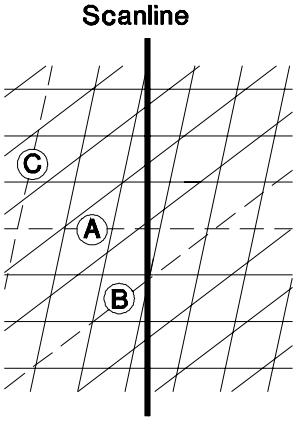
Bias Angle

Path: *SET OPTIONS / Bias Angle*



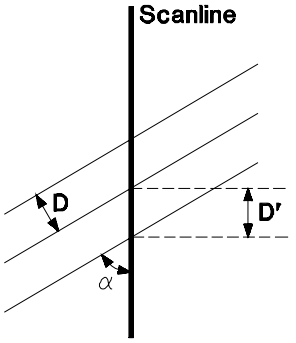
The **Bias Angle** option can be used to change the bias angle limit, which is set at 15°. The Bias angle is used by the Terzaghi correction, in which a weighting is applied to the orientation data to account for sampling bias.

When orientation measurements are made, a bias is introduced in favour of those features which are perpendicular to the direction of surveying. To illustrate this concept, three joints of identical spacing along a scanline are shown in the margin sketch. Measurements along the scanline record many more joints in Set A than in Set C, which will bias the density contour plot heavily in favour of Set A. To compensate for this bias, a geometrical weighting factor is calculated and applied to each feature measured. This weighting, W, is used in the DIPS *weighted contour plot* and in the *weighted mean vector* calculations. The bias correction should only be used for planar features, and will not account properly for measurement bias in linear features such as acicular crystal fabric.



The geometric weighting factor, W, is calculated as follows:

α		Minimum angle between plane and traverse
D'		Apparent spacing along traverse
D	= D' sin α = D' 1/W	True spacing of discontinuity set
R'	= 1 / D'	Apparent density of joint population
R	= 1/ D = 1 / D' sin α = D' cosec α	True density of joint population
W	= (1) cosec α	Weighting applied to individual pole before density calculation



Since the weighting function tends to infinity as α approaches zero, a maximum limit for this weighting must be set to prevent unreasonable results. This maximum limit corresponds to a minimum angle, which can be between 0.1° and 89.9°. However, the recommended range is limited to 5° to 25°, and the default is set to 15°.

The effect of applying the Terzaghi weighting to some data distributions can be quite severe. *If you use weighted data plots for design or interpretation, be sure you understand the weighting procedure.*

The results of applying the weighting procedure to an example data file are shown in the following figure. In this case, there is a very important subnormal group of joints, which is masked by abundant structural data collected on horizontal scanlines. In this case, the heavy bias introduced by the horizontal data can be removed by weighting the data.

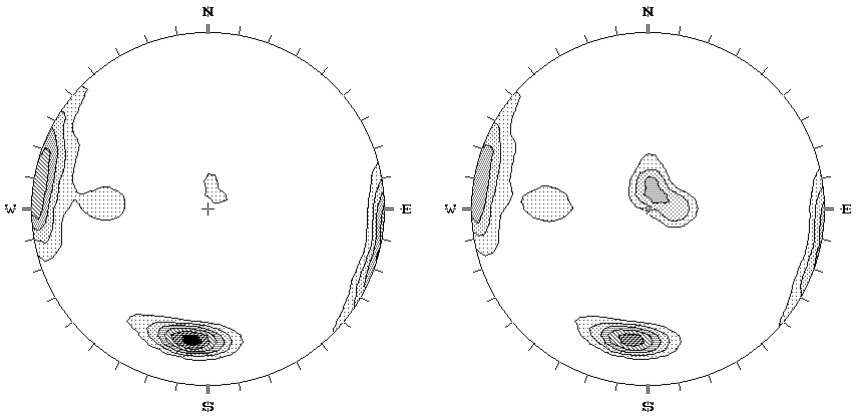


Figure 2.9: Unweighted and weighted plot of the example.dip data file.

File Swap

OPTIONS
DIPS VERSION
PROJECTION
DISTRIBUTION
CONVENTION
Aspect Ratio
Upper / Lower
Count Circle
Grid Size
Bias Angle
File Swap
COLOUR / B&W
SAVE OPTIONS
RETURN

Path: *SET OPTIONS / File Swap*

The current data capacity for DIPS depends in part on how many additional programs are being run in the background. With average RAM usage (DOS shell, mouse and other utilities), approximately 3000 to 5000 data units (rows of data in a file) may be processed. This number reduces drastically if several RAM intensive utilities and programs are also running. This limitation is due to the fact that the data is read from your ASCII file and stored in RAM, where it is accessed by DIPS. To solve this problem, a **File Swap** has been included in the ADVANCED version of DIPS.

This option allows you to select a running environment which performs temporary data storage, and data manipulation on and from your hard drive. While this may slow performance on older computers, the difference in computational speed on a 386 or later is negligible. The main advantage of selecting this option is that the data capacity of the DIPS program becomes unlimited. RAM space is also freed up for use by other RAM resident utilities or other programs if you are running DIPS from a shell.

The **File Swap** feature is toggled from the **SET OPTIONS** menu. The default setting is:

```
> Computed data is stored in RAM:  change (Y or N)?
```

This setting causes DIPS to run as before and is recommended if your memory restrictions are not severe. (This is the only setting recommended if you are running DIPS from a floppy drive.) The **File Swap** mode:

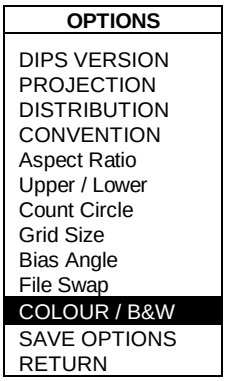
```
> Data will be transferred to/from disk:  change (Y or N)?
```

is toggled by responding *Y* to the first prompt, and then *N*.

This setting is saved with the other options, by using **SAVE OPTIONS**.

COLOUR / BLACK AND WHITE

Path: *SET OPTIONS / COLOUR/B&W*



The **COLOUR/B&W** option allows you to customise the screen, for display and for screen dumps. Selection of this option from the menu box will display the following prompt:

> Alter Colour Palette (P), switch to B&W (B) or Reverse (R)?

Entering *P* will allow you to alter the colour of the palette, the contours, or the symbols used in the DIPS screen display. Entering *B* switches the screen to Black and White, where the information on the screen is printed in white on a black background. Entering *R* will reverse the screen display, so that black is printed on a white background.

If you choose to alter the **Colour Palette**, a list of the **Palette** numbers and their associated colours, of the **Contour** numbers and their associated Colours and Palette numbers, and of the **Symbol** numbers and their associated Symbols, Colours and Palette numbers will be displayed on the screen. You can alter any of these items by responding to the following prompt appropriately:

> Palette (P), Contour (C), Symbols (S), Reset (R) or ACCEPT (any key)

If you choose to alter the Palette, Contour or Symbol colours, you will then be prompted to indicate the number of the item you wish to change. After selecting the appropriate number, follow the instructions shown in the prompt line to alter the colour:

> COLOUR #: ARROWS to change, ESC to reset, ENTER to accept.

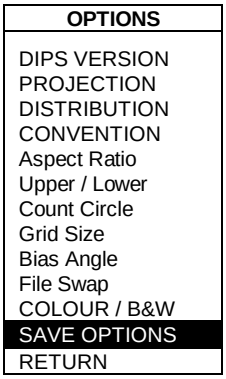
Once the screen shows the colours that you are happy with, push any key other than p, c, s, or r, to **ACCEPT** the settings. If at any point, you want to return to the original screen settings, enter *R* to reset the screen. You will be asked:

> Use PREVIOUS USER SETTINGS (U) or DIPS DEFAULTS (D)?

Previous User Settings are those which were current when **SAVE OPTIONS** was last used.

You can escape from this option at any time by pressing *Esc*.

SAVE OPTIONS



Path: *SET OPTIONS / SAVE OPTIONS*

When you select **SAVE OPTIONS** all of the option settings discussed above are saved to the file DIPS.CFG in the current directory**.** You will see the prompt:

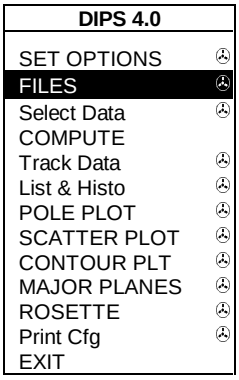
> PREVIOUS SETTINGS AND COLOURS WILL BE LOST–PROCEED (Y or N)?

Answer *Y* to save your currently selected OPTIONS. Whenever DIPS is subsequently activated from this same directory, these option settings replace the default values. The file DIPS.CFG can be changed at any time by selecting **SAVE OPTIONS** with the desired option values toggled.

If you accidentally save some options which you do not wish to work with, you should select **SAVE OPTIONS** again before exiting the program, (after toggling the desired options) since the most recent **SAVE OPTIONS** settings are preserved in the DIPS.CFG file until they are overwritten.

Select the **RETURN** button or press *Esc* to return to the main menu.

FILES Menu



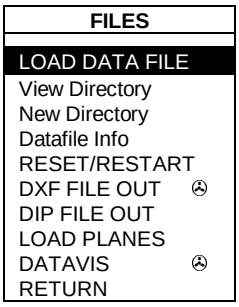
Path: *FILES*

This menu contains options to load data files for analysis, to view and change the current directory, and to review setup information on the current data file.

When you enter this menu from the main menu, the name of the current directory will be displayed in the prompt line, and the menu shown in the margin will appear.

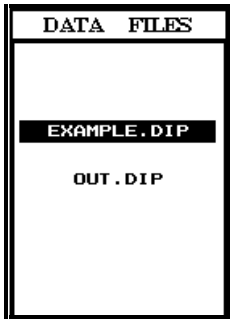
LOAD DATA FILE

Path: *FILES / LOAD DATA FILE*



When you select the **LOAD DATA FILE** option, you will be presented with a list of existing data files (files with a **.dip** extension) in the current directory, as illustrated in the margin figure. If the data file list is very long, you will have to position the cursor on the **-page down-** option at the bottom of the file list to scroll up and view more file listings. Move the cursor to the file you wish to select and press *Enter* or the *Left Mouse Button*. The selected file will then be loaded and its header information will be displayed on the screen. It is a good idea to check this information for errors before continuing, since most file errors will show up here.

Once a file has been successfully loaded, DIPS will automatically leave the **FILES** menu and position the cursor at the **COMPUTE** option in the main menu.



To exit from the data file list without selecting a file, use the *Esc* key or the *Right Mouse Button* to return to the **FILES** menu.

If, when you select the **LOAD DATA FILE** option, you receive the prompt:

> No data (*.DIP) files in this dir...press any key to return

select the **NEW DIRECTORY** option to change to the correct directory.

Loading a new file resets all work performed on previous data in memory (not on disk), with the exception of orientations selected with the **LOCATE POLES** option.

See the previous chapter for information on DIPS data file preparation.

View Directory

Path: *FILES / View Directory*

FILES
LOAD DATA FILE
View Directory
New Directory
Datafile Info
RESET/RESTART
DXF FILE OUT
DIP FILE OUT
LOAD PLANES
DATAVIS
RETURN

This option allows you to browse through a list of all files in the current directory. When you select this option the default filemask:

> MASK= *.* Change mask and/or press ENTER to view...

(ie. view all files) will be displayed on the prompt line. To change this mask, type in a new mask at the prompt (eg. type ***.pcx** to view all PCX files in the current directory), before pressing *Enter* to view the directory listing. Scan through the listing with the cursor, selecting *Page Down* or *Page Up* as required to view more file listings.

Selecting a file from the **View Directory** listing (*Enter* or the *Left mouse button*) will cause the relevant FILE SIZE and FILE CREATION DATE to be displayed on the prompt line. Press *Esc* or the *Right mouse button* to return to the file list. Press *Esc* or the *Right mouse button* again to return to the **FILES** menu.

New Directory

Path: *FILES / New Directory*

FILES
LOAD DATA FILE
View Directory
New Directory
Datafile Info
RESET/RESTART
DXF FILE OUT
DIP FILE OUT
LOAD PLANES
DATAVIS
RETURN

When you need to move to a different directory to retrieve files or to save data, select this option. The current directory will highlighted (if you have a colour screen) on the prompt line. Type the directory path name which you desire and press *Enter*. If you are moving into a subdirectory of the current directory, *only the name of the subdirectory is required*. If you are moving back out of a subdirectory or moving to another branch of the directory tree, the full path name is required. If moving to a directory on another disk you do not have to change drives first as with DOS, instead simply include the drive letter in the path name (i.e. d:\dips\data). The new directory will be displayed on the prompt line if the transfer was successful. Otherwise an error message will appear and you will remain in the previous directory.

Datafile Info

Path: *FILES / Datafile Info*

FILES
LOAD DATA FILE
View Directory
New Directory
Datafile Info
RESET/RESTART
DXF FILE OUT
DIP FILE OUT
LOAD PLANES
DATAVIS
RETURN

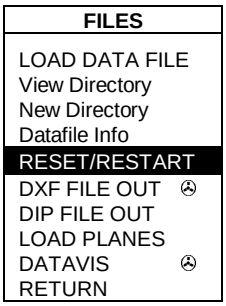
Selecting this option will cause the set-up information for the current data file to be displayed on the screen, as it is when a file is initially loaded, as shown in Figure 2.10. This is useful if a data file is not behaving properly and you wish to check if the data file was set up correctly.

Press *any key* to return to the **FILES** menu.

```
 PROJECT IDENTIFICATION
 DATA COLLECTOR          DATE
Traverses: 4
 ID#  1:Linear Traverse oriented ; 120/30
   Level 3,Stope 3.A,sublevel 310
 ID#  2:Planar Traverse oriented; 100/10
   Level 5,Stope 5.D roof before shrinkage
 ID#  3:Oriented Borehole at; 20/145/120
   borehole
 ID#  4:Planar Traverse oriented; 010/190
   Level 5 Stope 5.D roof(aux data)
Data is STRIKE/DIP (Right hand rule) format
Mag Decl (W pos): -5.50
Multiple Data Flag (QUANTITY) is ON
Mandatory Data Set:
>number   strike    dip,(rt) quantity traverse
3 Extra Col:
>spacing,m type     surface
```

Figure 2.10: Datafile Info listing for the example.dip file.

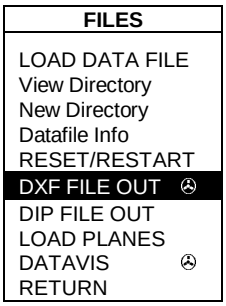
RESET / RESTART



Path: *FILES / RESET/RESTART*

Selecting the **RESET/RESTART** button allows you to reset all options to default and to select a new data file if desired. This option allows you to restart your DIPS session *without having to exit the program or load a new file.*

DXF FILE OUT

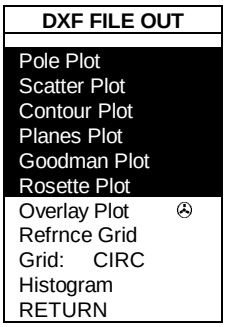


Path: *FILES / DXF FILE OUT*

The **DXF FILE OUT** option generates a .dxf file for import into **WORD**, **WORDPERFECT**, **AUTOCAD**™ or any acad.dxf compatible package for inclusion into a document, database or for output using AUTOCAD's printer and plotter drivers. The choice of options available in this utility is shown in the margin, and discussed below.

DXF Out: Pole, Scatter, Contour, Planes, Goodman, Rosette Plots

Path: *FILES / DXF FILE OUT / Pole Plot* (**or** *Scatter Plot* **or** *Contour Plot ... etc*)



The **Pole Plot** option writes a pole plot to a file using the same ranges and symbols used in DIPS.

The **Scatter Plot** option writes a scatter plot to a .dxf file.

The **Contour Plot** option writes a contour plot to a .dxf file using the default contour range or the range selected with the **ALTER RANGE** option in the main **CONTOUR PLOT** menu. LINE CONTOURS are the only contouring method compatible with .dxf creation, and will be used regardless of the plot option selected in the main contour menu.

The **Planes Plot** option will write great circles and pole points to a file. You will be asked to specify the labelling desired:

> Label POLE VECTORS (V), PLANES (P), BOTH (B), NONE (any key)?

The **Goodman Plot** is similar to the **Planes Plot** with the exception that planes (great circles) are not cropped at the stereonet equator. They form complete circles outside of the net. This option facilitates the kind of key block wedge studies used by Goodman and Shi. This option is only available when the EQUAL ANGLE projection is being used.

The **Rosette Plot** option writes the rosette to a .dxf file. The settings must be toggled within the **ROSETTE** menu.

DXF Out: Overlay plot

Path: *FILES / DXF FILE OUT / Overlay Plot*

An **Overlay Plot** file can be written as well, which contains up to three of the plots described above. For example, contours and great circles can be superimposed on a pole plot. *However, you can not overlay a pole plot and a scatter plot in the same file* – toggling the pole plot locks out the scatter plot and vice versa. In the **Overlay** option, you will find the sub-menu shown in the margin. Before selecting the **CREATE PLOT** option, toggle the PLOT options you wish to use in the overlay. Selecting an option will toggle it ON and OFF.

DXF FILE OUT

Pole Plot
Scatter Plot
Contour Plot
Planes Plot
Goodman Plot
Rosette Plot
Overlay Plot
Refrnce Grid
Grid: CIRC
Histogram
RETURN

OVERLAYS

Pole Plt	OFF
Scatter	OFF
Contour	OFF
Planes	OFF
CREATE	PLOT

DXF Out: Reference Grid

Path: *FILES / DXF FILE OUT / Refrnce Grid*

The **DXF FILE OUT** option may also be used to create a **Reference Grid** file. The reference grid may be a stereonet perimeter circle, a circle with trend markings, or trend and plunge markings, or a full polar or equatorial net. The grid type for this option (and for all DXF plots) is toggled using the **Grid** option described below.

DXF FILE OUT

Pole Plot
Scatter Plot
Contour Plot
Planes Plot
Goodman Plot
Rosette Plot
Overlay Plot
Refrnce Grid
Grid: CIRC
Histogram
RETURN

The **Grid** option allows you to select the reference grid to be used by all of the plot options in the DXF menu. The **Grid** option includes, in order:

CIRC	Perimeter circle with trend markings and compass points.
GRID	Perimeter circle with trend markings, plunge markings and compass points.
NET	Full reference stereonet. Choose either: POLAR - 10 degree trend and plunge increments EQUATORIAL - 10 degree latitude and longitude increments. Select trend/plunge of the net axis (default = 0,0).
NONE	Perimeter circle only.

To select the desired grid, select the **Grid** button repeatedly until the desired option is toggled. The results of toggling these options are shown in the following figure.

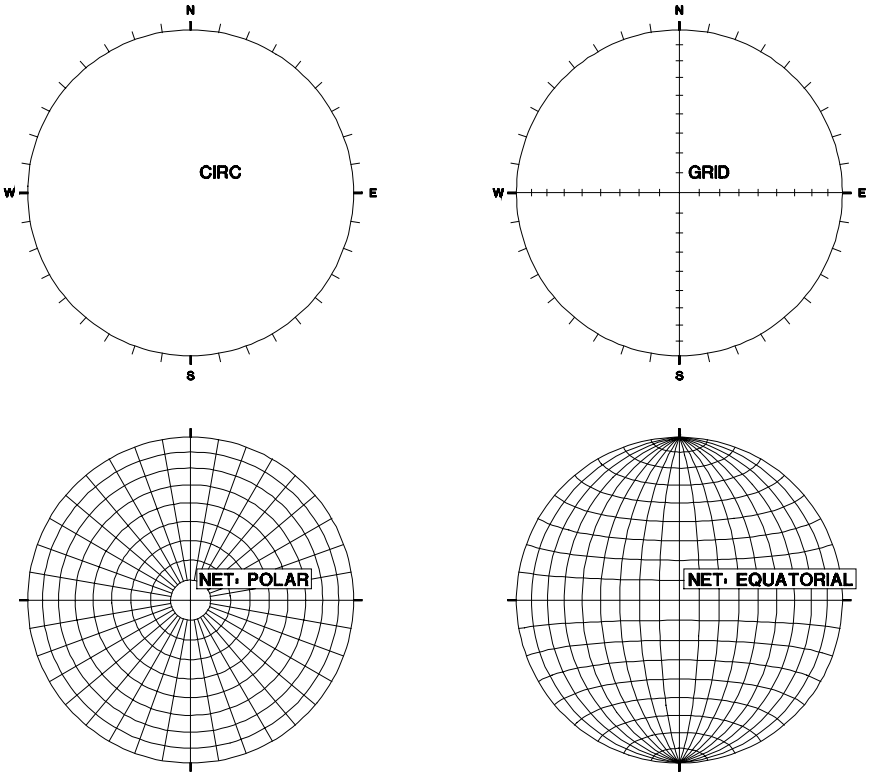
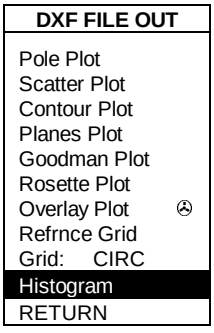


Figure 2.11: The reference grid options available in the **DXF OUT** option.

DXF Out: Histogram

Path: *FILES / DXF FILE OUT / Histogram*



A .dxf file containing a data **Histogram** may be written using this option. The histogram is set up using the **Track Data** and **List & Histo** options (described later in this chapter), in the main menu.

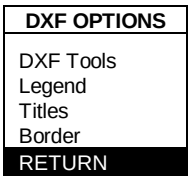
When you select this feature, you will be asked for a file name. Then you will be asked to give three co-ordinates corresponding to the approximate location of the centre of the histogram display. You will then be prompted to give a length for the percent axis of the histogram. The default values are usually adequate for a normal output, but selection of other values allows customisation within AUTOCAD.

DXF Out: Writing the file

Once you have selected one of the **DXF FILE OUT** options, you are required to type in a filename for the .dxf file, and for all but the **Histogram** option, to establish co-ordinates for the centre and radius of the stereonet. Generally you can use the default numbers in these prompts, which are (0,0,0) and 100 respectively. These numbers are used to locate the stereonet drawing when the file is retrieved using the dxfin option in AUTOCAD. If you wish to place the stereonet on an existing AUTOCAD drawing, you can specify the appropriate co-ordinates and radius in response to these prompts. The z co-ordinate in the circle centre can be used to place the stereonet in a 3-D AUTOCAD drawing. In response to the prompts you may also alter the scale of the labels and symbols (the default is 1% of radius) and separate the colours and text into layers.

DXF OPTIONS: Customising the file

Path: *FILES / DXF FILE OUT / DXF Tools* etc.



Once the selected stereonet plot information has been written to a file, you will be presented with the **DXF OPTIONS** menu shown in the margin. From this menu you may add a simplified **Legend**, job **Titles**, and a simple border to the drawing file. You may change the job titles during this procedure if so desired. Note that AUTOCAD allows you to create your own customised border layout with company logo etc. A DIPS file can then be imported into this template form as required. These options are shown in the accompanying .dxf file, which was imported to AUTOCAD, and then written to a file for inclusion into this document.

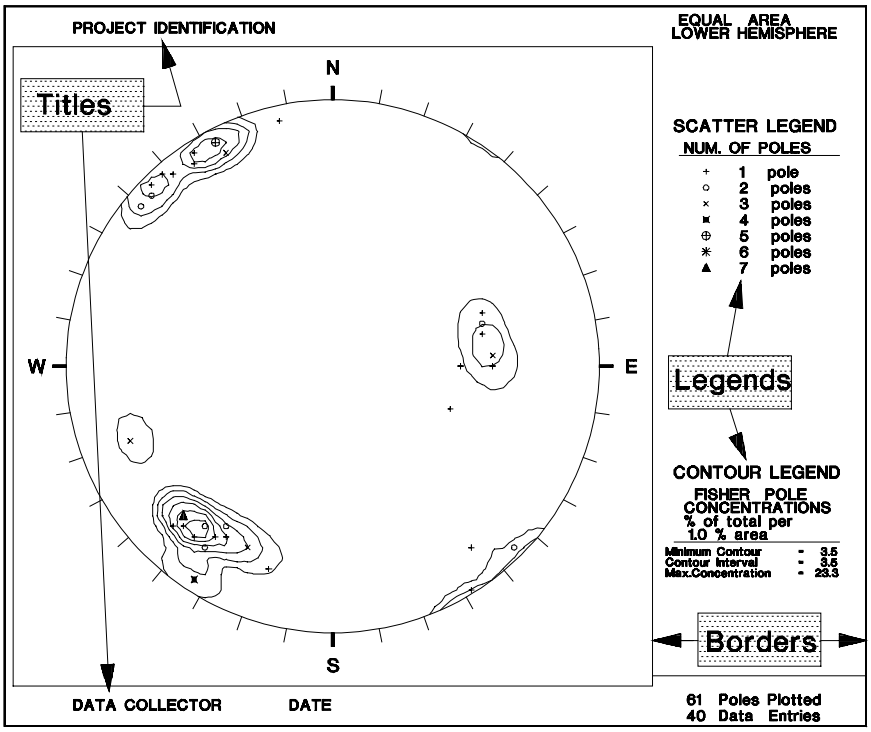
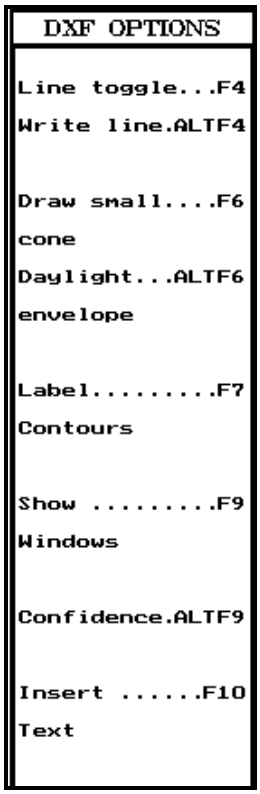


Figure 2.12: A .dxf file created using the **Overlay Plot** option in DIPS, customized with a legend, titles and border from **DXF Options**.



You may also use the **DXF Tools** described below to customise the .dxf file. Every option executed from this menu box is written directly to the output .dxf file.

Line Toggle (F4) and **Write Line (ALT F4)** are provided so that a trend line can be written to the file. The desired line type must first be toggled using **F4**, and moved to the desired position using the cursor. Pressing **F4** repeatedly toggles between the various line options: **Line**, **Ends**, **Mid** and **Off**. The line can then be written to the file by pressing **ALT F4**.

The **Draw Small Cone (F6)** option allows you to plot a small circle on the DXF stereoplot. The cursor must be moved to the desired cone axis (circle centre) before selecting F6. If you place the cursor outside the central circle before pressing F6, you will be prompted for the numerical values of the Trend and Plunge of the cone axis. In both cases, you will then be asked to enter the degree of the small cone, which is the angle between the cone perimeter and axis. Further discussion of the small cone is given in the **LOCATE POLES** section of this chapter.

The **Daylight Envelope (ALT F6)** option allows you to plot the daylight envelope corresponding to a selected or calculated plane. The definition of a Daylight Envelope and instructions for the creation of the envelope are given in the **LOCATE POLES** section.

Using **F7** you can **Label Contour** lines in the DXF plot. Move the cursor to a contour line you wish to label, and press F7. A numerical interval label will be written to the desired location on the contour. Note that only numeric labels are available in this feature, unlike the screen plots where a choice of alpha/numeric labels is provided.

The **Show Windows** option **F8** causes the window limits currently defined to be written to the DXF plot.

The **Confidence** Limits for the mean pole calculation, within a percentage specified by the user, can be shown by pressing **Alt F9**. The variability about the mean can also be plotted. You will be prompted to choose one or the other option.

Text can be included on the plot using the **Insert Text (F10)** option. This option allows text to be written on the stereoplot. If you are using AUTOCAD, you may find it easier to insert text using AUTOCAD's text draw routines.

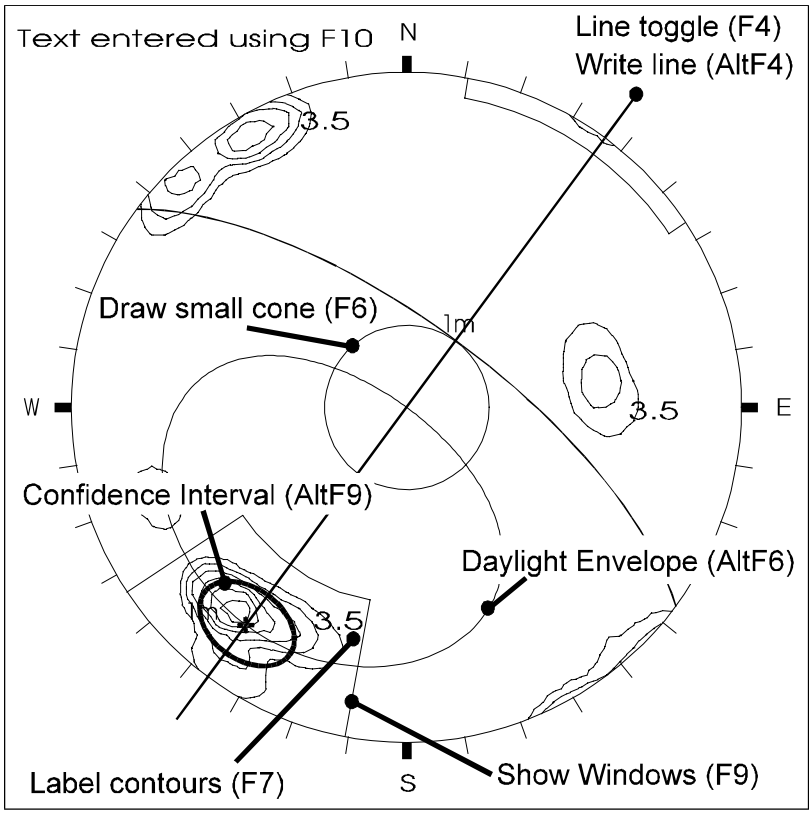
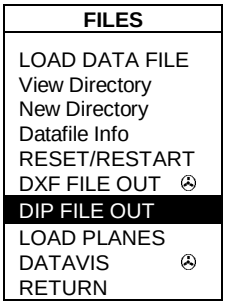


Figure 2.13: DIPS DXF Tools options – Line toggle (F4), Write line (Alt F4), Draw small cone (F6), Daylight envelope (Alt F6), Label contours (F7), Show windows (F9), Confidence interval (Alt F9) and Insert text (F10).

DIPS File Out

Path: *FILES / DIP FILE OUT*



The **DIP FILE OUT** option allows you to save a complete DIPS file, based on the data being analysed currently. This file is different from the one created by **Save Pole Data** in the **List & Histo** menu, since it includes all columns of the original data and not just the column being tracked. This file will have the following properties:

- The TITLES will be the current titles. The titles can be changed by using the **SCREEN DUMP** option.

- There are 0 active TRAVERSES in this file. All of the traverse information is maintained in comment format (starting with a *), but the information is not used for bias correction. At the user's request, when prompted before the file save, the quantity column can be multiplied by the weights of each pole to preserve the bias correction values.

- The ORIENTATION FLAG will be TREND/PLUNGE if the **CONVENTION** is set to POLE VECTOR. If the **CONVENTION** is set to PLANE VECTOR, then the data will be converted to this orientation convention, according to the GLOBAL ORIENTATION FLAG.

- The DECLINATION is set to zero. All of the data has been offset by the declination (if any) recorded in the original file.

- This column is set so that the QUANTITY is on. The user is asked if they would like to use the WEIGHTED or UNWEIGHTED quantities.

  If the user selects the WEIGHTED option, and traverses are present, the QUANTITY column will reflect the actual quantity of the measurements multiplied by the weight. When this file is read back into DIPS, the UNWEIGHTED contour values will actually reflect the WEIGHTED pole concentrations. (WEIGHTED plots will be identical in this case.)

  If the user selects the UNWEIGHTED option, then the QUANTITY column will reflect the number of measurements only. The user will not be able to use this file to plot WEIGHTED plots. (In this case, WEIGHTED plots will reflect the unweighted data.)

- EXTRA DATA COLUMNS will be added to the file according to the following:

Number	Unchanged.
Orient1; Orient2	These values will replace the orientations in the original file. These values will correspond to the GLOBAL ORIENTATION FLAG and the current **CONVENTION**.
Quantity or Quantity * W	This column will replace the original quantity column, if the latter was present. This column will be added if not. At the users request, this column can be multiplied by the WEIGHT to produce an effective "weighted" quantity (*W). Otherwise the bias information will not be accessible in this file.

The user is then asked if they would like to include SET and/or WEIGHT information.

If requested, a SET column is added, which contains the set ID# of each pole. This is the ID# of the window containing the pole (0 if none).

If requested, a -ve set ID can be used to identify "wrapped data" in a given window. The pole orientation is the Unaltered orientation. This option is an aid for post-processing applications. For mean orientation calculation outside of DIPS, for example, the user must calculate the orientation of the upper (-ve) pole when the set is -ve. (i.e. plunge=-plunge, trend = trend + 180).

The WEIGHT column is added for information only. If this column is requested, a second QUANTITY column will also appear, which contains the number of measurements for a pole. If weighted data has been selected, the product of these two columns will appear in the first QUANTITY column.

Traverse	If the original data file contained traverse information, this column will be maintained as an "extra column", for information purposes only.

The user will also be asked to save poles from a specific window, or from the entire set.

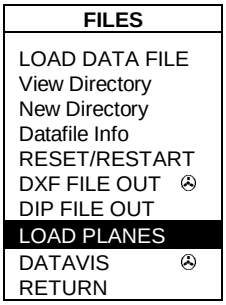
Only data being analysed currently will be saved using this option: for example, the whole data file, or data retrieved with the **Select Data** option.

Any data transformed using the ROTATE in **SET WINDOWS** will be saved with the new rotated global orientation. The bias correction weighting from the original data set will be preserved.

All other data columns will be saved as they appear in the original file.

Save Planes / Load Planes

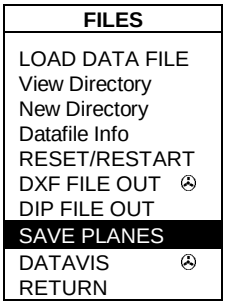
Path: *FILES / SAVE PLANES* **or** *LOAD PLANES*



- When no planes have been selected, and no windows defined, this option is called **LOAD PLANES**.

- Once a plane or pole has been selected with **LOCATE POLES** or a window established with **SET WINDOWS**, this button is titled **SAVE PLANES**.

Using this option, you may save the pole orientations you have selected with the **LOCATE POLES** option, and/or the windows created with the **SET WINDOWS** option. This option is useful since windows and mean vectors you create are destroyed whenever a file is loaded, or **COMPUTE** is reexecuted.



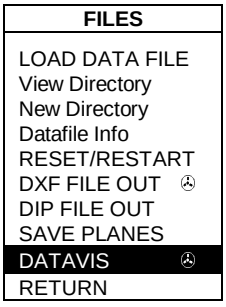
The information is saved as a **.dwp** file (**d**ips **w**indows and **p**lanes), in the subdirectory in which you are working. This .dwp file can be loaded into DIPS at a later time for manipulation, or can be superimposed on a data file. A .dwp file can also be imported for use in the UNWEDGE program (available from the Rock Engineering Group at U of T).

When you **SAVE** the **PLANES**, you will be asked whether you wish to save WEIGHTED or UNWEIGHTED means and then you will be prompted to enter a filename for the planes.

If data is present on the stereonet when the windows are imported, and **COMPUTE** has not been executed, the window mean planes will be converted to selected planes. However, once **COMPUTE** is reexecuted, new mean planes will be calculated for each window present, according to the data in the current file.

DATAVIS

*Arbitrary **DATA** (Scalar Value Versus Orientation) **VIS**ualization.*



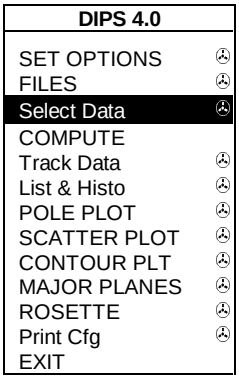
DATAVIS is a new DIPS utility which allows the user to create a contoured stereonet plot of any oriented data set (arbitrary scalar **data** vs. orientation **vis**ualization).

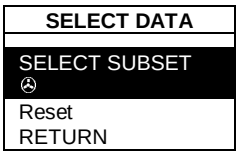
That is, if a grid of data is created where some value is specified at regular orientation intervals (eg. NORMAL STRESS, PERMEABILITY, SEISMIC VELOCITY, etc. as a function of orientation in space) this value can be contoured on a stereonet. **DATAVIS** requires the user to calculate or specify the values at fixed orientation points.

Two example **DATAVIS** utilities have been supplied in your \UTILS subdirectory, JOIFREQ and JOISLIP, along with their computer source code (C), to illustrate the creation of your own **DATAVIS** utility.

For a full description of **DATAVIS**, refer to the next chapter, DIPS Utilities. Also, a readme file can be viewed by entering the \UTILS\ JOIFREQ or \UTILS\JOISLIP directories, and typing *datavis* at the DOS prompt.

SELECT DATA





*With the **Select Data** option, you can use a single file as your main data base and interactively extract and process subsets of this data based on your own selection criteria*

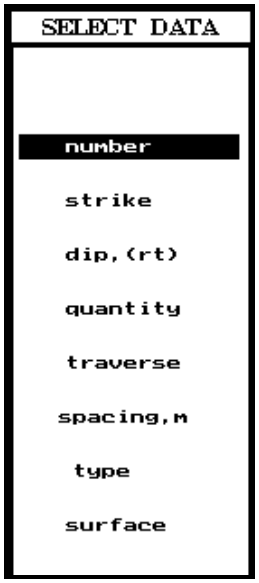
Path: *Select Data*

DIPS allows you to plot or contour selected subsets of your main data file. To do this, use the **Select Data** option, the menu for which is shown in the margin. Using the **Select Data** option, you can use a single file as your main data base for a given project, and then interactively extract and process subsets of this data based on your own selection criteria.

SELECT SUBSET

Path: *Select Data / SELECT SUBSET*

When you toggle the **SELECT SUBSET** button, you will be presented with a list, in the right side menu area, of all the column titles which you used to make up your data file: shown here below for the example.dip file. Select a column which you wish to use in your selection criteria by moving the cursor to the column title and pressing *Enter* or the *Left mouse button*. You will then be asked whether the data is QUALITATIVE or QUANTITATIVE.



If the data is QUALITATIVE, you will then be asked for the number of individual labels (or character strings) which will be used for selection. Input the number desired and you will then be prompted to input each string. The string can be any combination of numbers and characters but must match the labels in the data column or no data will be selected; for example, the "joint" and "shear" types used in Tutorial 1 (see Part 3 –Tutorial Manual).

If the data is QUANTITATIVE, select this option and you will be prompted for the number of individual numerical ranges which will be used for selection. Input the number desired and you will then be prompted to input a numerical pair, representing the lower and upper bounds *of each selection range*.

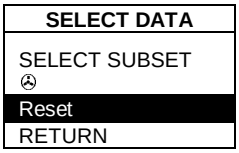
Any or all of the data columns listed can be used for selection individually or all together until your selection criteria are met. **COMPUTE** must now be reexecuted from the main menu. *Only data meeting all of the selection criteria will now be processed*.

If you try to select from a data column that is already in use, either through **Select Data** or **Track Data**, you will be reminded of this on the prompt line and asked if you wish to change and/or proceed.

Once you have finished working in this menu, **RETURN** to the main menu and re-execute the **COMPUTE** option.

Reset

Path: *Select Data / Reset*

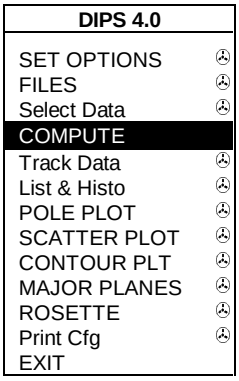


This option will reset the selection criteria, causing *all* of the data in the file to be selected and processed with **COMPUTE**.

Select the **RETURN** option or press *Esc* to return to the main menu.

COMPUTE

Path: *COMPUTE*



COMPUTE must be executed before any data analysis can be performed. **COMPUTE** loads all of the data from the active file (which meets the selection criteria if **Select Data** has been used) and calculates pole positions (**POLE PLOT** and **SCATTER PLOT**) and concentrations (**CONTOUR PLOT**).

The use of certain options in DIPS may require **COMPUTE** to be reexecuted. If this is the case, you will find that the cursor will be repositioned on **COMPUTE** automatically. If you attempt some action without executing **COMPUTE** when required, you will be prompted to do so.

> COMPUTE will have to be (re)executed.

Executing **COMPUTE** resets in memory all work performed on the data file, such as **SET WINDOWS** and the ROTATE **(ALT F6)** option in **SET WINDOWS**. Orientations selected using **LOCATE POLES**, however, are preserved, as are the **Select Data** and **Track Data** settings and options. Rotations of poles selected with **LOCATE POLES** (using the **ALT F6** option in **SET WINDOWS**) are also preserved.

COMPUTE may be aborted by pressing the *Esc* key.

TRACK DATA

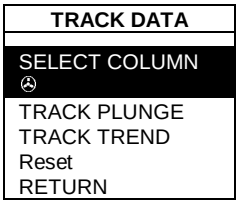


Path: *Track Data*

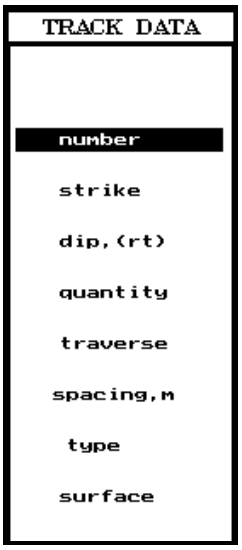
DIPS allows you to load the contents of one of the data columns into memory, for presentation in the **POLE PLOT** and in the **List & Histo** menu options. Any single column may be selected for this purpose, but only one at a time may be processed. Changing the column to be 'tracked' automatically resets the previous choice.

SELECT COLUMN

Path: *Track Data / SELECT COLUMN*



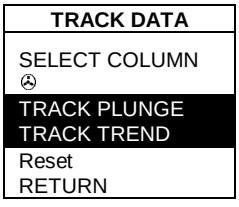
Choosing **SELECT COLUMN** from the **Track Data** menu will create a list in the right side menu area of all the titles of the columns in the current file; in this case for the example.dip file. Move the cursor to the title of the column to be tracked and press *Enter* or the *Left mouse button*. You will be asked if the data is QUALITATIVE or QUANTITATIVE.



If the column you wish to track is already being used by **Select Data**, you will be alerted to this by the prompt line and asked if you wish to proceed. You may **Track** a column that has already been used by **Select Data**.

Note – if you select either ORIENTATION column for plotting, the results may be misleading if the DECLINATION is non-zero, or if there is more than one orientation type present (i.e. mixed DIP/DIPDIRECTION and STRIKE/DIP data). To plot orientations, use the **TRACK PLUNGE** or **TRACK TREND** options described below.

TRACK PLUNGE / TRACK TREND Options



Path: *Track Data / TRACK PLUNGE* **or** *TRACK TREND*

If **SET OPTIONS->CONVENTION** is set to POLE VECTOR, the second and third **Track Data** menu items will read **TRACK PLUNGE** and **TREND** respectively. Otherwise they will track the orientations specified by the GLOBAL ORIENTATION FLAG. These options will track the processed orientations (e.g. rotated borehole data).

Reset

TRACK DATA
SELECT COLUMN
TRACK PLUNGE
TRACK TREND
Reset
RETURN

Path: *Track Data / Reset*

This option will de-select any column used by **Track Data**. Select the **RETURN** option or press *Esc* to return to the main menu.

LIST & HISTO Menu

DIPS 4.0
SET OPTIONS
FILES
Select Data
COMPUTE
Track Data
List & Histo
POLE PLOT
SCATTER PLOT
CONTOUR PLT
MAJOR PLANES
ROSETTE
Print Cfg
EXIT

Path: *List & Histo*

This menu allows you to view and save a listing of the processed data. This menu also contains an option to present, in the form of a histogram, the particular data characteristic selected using the **Track Data** feature described above.

List Pole Data

LIST & HISTO
List Pole Data
Save Pole Data
Data Histogram
RETURN

Path: *List & Histo / List Pole Data*

The **List Pole Data** option allows you to browse through a list of the data as it is stored after processing (use PAGE UP, PAGE DOWN). The orientations shown in the list will be in the format governed by the **CONVENTION** option. Other information contained in the listing includes the QUANTITY of multiple data units, the Terzaghi Weighting, and a number called SET. This number corresponds to data groupings defined with the **SET WINDOWS** option in the three **PLOT** menus.

TREND/PLUNGE: GRID: OFF LINE:* OFF FILE: example

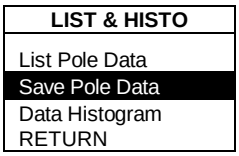
NUMBER	TREND/PLUNGE	QUANTITY	WEIGHT	SET
1	317 / 04	1	1.3152	0
2	321 / 07	1	1.4185	0
3	315 / 06	1	1.3301	0
4	314 / 08	1	1.3582	0
5	312 / 07	1	1.3218	0
6	135 / 04	2	1.1885	0
7	311 / 08	2	1.3324	0
8	148 / 03	1	1.3456	0
9	347 / 06	1	2.1456	0
10	328 / 04	1	1.4677	0
11	332 / 06	4	1.5963	0
12	332 / 04	1	1.5482	0
13	333 / 10	3	1.7362	0
14	325 / 09	1	1.5268	0
15	204 / 26	3	3.8637	0
16	199 / 22	1	3.8637	0
17	224 / 15	1	3.8637	0
18	220 / 20	1	3.8637	0
19	219 / 25	2	3.8637	0
20	224 / 22	1	3.8637	0
21	216 / 18	2	1.0138	0
22	250 / 22	3	1.0495	0
23	212 / 25	1	1.0408	0
24	214 / 24	1	1.0365	0
25	214 / 06	4	1.0011	0
26	212 / 28	1	1.0582	0
27	212 / 28	1	1.0582	0
28	074 / 43	1	1.4305	0
29	224 / 22	3	1.0316	0
30	226 / 22	1	1.0326	0
31	224 / 22	2	1.0316	0
32	072 / 40	1	1.3689	0
33	078 / 44	1	1.4378	0
34	224 / 20	1	1.0232	0
35	074 / 40	1	1.3613	0
36	088 / 39	3	1.2929	0
37	089 / 39	1	1.2897	0
38	144 / 15	1	1.0081	0
39	088 / 52	1	1.6216	0
40	108 / 52	1	1.5123	0

> PAGE-DOWN, PAGE-UP or ESCAPE(to quit)...

Figure 2.14: The **List** of **Pole Data** for the example.dip file.

Save Pole Data

Path: *List & Histo / Save Pole Data*



This option allows you to save the list described above, to a file or to a printer (use PRN, LPT1, LPT2, etc. instead of a filename when prompted).

If you add a .dip extension to the file name, a file is created using a format which can be used again by DIPS. This is useful for saving the **SET** numbers in a data set. These can be viewed later using this new file and the **Track Data** option in the main menu. The .dip file is written using the orientation type specified by the **CONVENTION** option and the GLOBAL ORIENTATION FLAG.

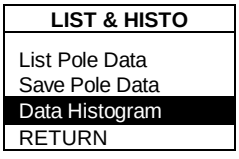
If no extension or an extension other than .dip is used, then the file format is composed only of a column header line and the data beneath it. This is useful for importing WEIGHT and SET number data back into a spreadsheet package for further manipulation. If the original data set was created with LOTUS 123, for example, the original .wk1 file can be supplemented by importing the modified file into the same spreadsheet.

If a .set extension is used, a file similar to the non .dip file described above will be created, but the orientation format will be TREND/PLUNGE regardless of the current CONVENTION. You will notice that some features will have a negative plunge. The .set extension will be used by a block analysis package currently under development.

In all cases, you will be asked to insert blank lines for missing data. This is to compensate for gaps created by **Select Data** screening, so that rows will match when combining old and new files in a spreadsheet or editor. If (and only if) the data column used by **Track Data** is QUANTITATIVE, you will also be asked if you wish to include this column.

Data Histogram

Path: *List & Histo / Data Histogram*



This option creates a histogram which displays the data attributes selected with the **Track Data** option. If data has been grouped into sets with the **SET WINDOWS** option in the **PLOT** menus, you will be prompted to identify the set whose attributes you wish to display. If no sets have been selected, all of the data will be plotted.

Once the histogram has been displayed you will be asked:

> Insert titles for HARDCOPY (Y or N)?

Subsequent prompts are similar to those used with the **SCREEN DUMP** option (see the POLE PLOT / SCREEN DUMP section for details). Answering *Y* when asked to 'change titles' will allow you to alter the titles currently used (those from the data file). Pressing *Esc* when entering these titles will reset them to the original file titles. Pressing the *Backspace* key twice when prompted with a title and then pressing *Enter* will cause the title bars to disappear from the screen plot.

To print the screen, press the designated *hot key* combination, <*Ctrl P*> or <*Ctrl O*>. Figure 2.15 below illustrates a **Data Histogram** of discontinuity type, for the example.dip file.

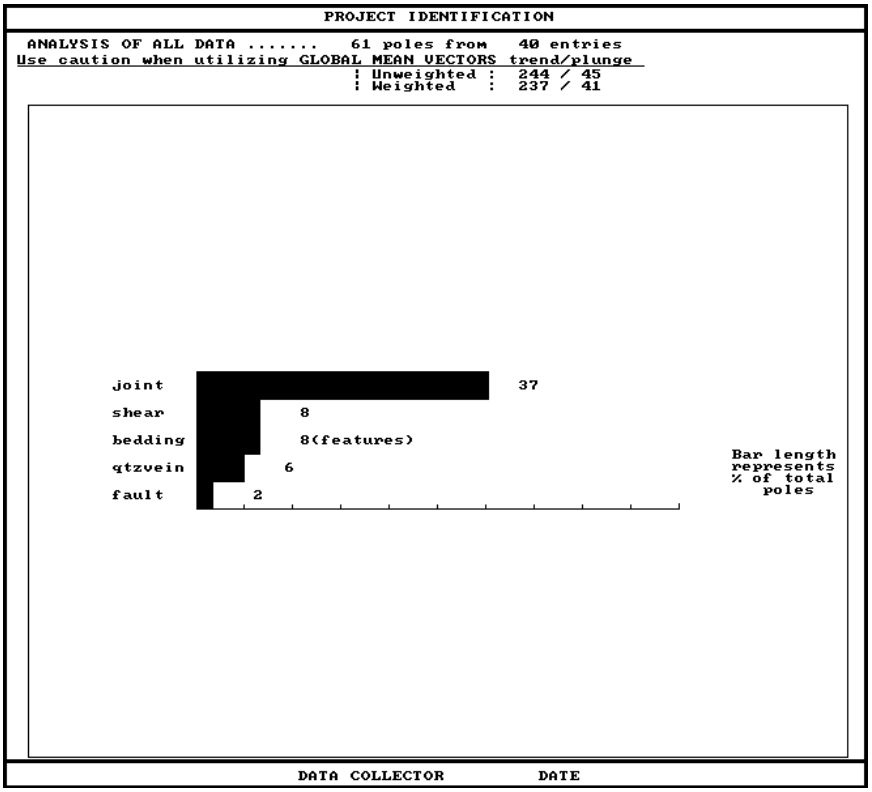


Figure2.15: **Data Histogram** of discontinuity type, for example.dip file.

To alter the *intervals* or *colours* used in the histogram, use **Alter Legend** in the **POLE PLOT** menu.

Select **RETURN** or press *Esc* to return to the main menu.

Using LOCATE POLES and SET WINDOWS in the PLOT Menus

The main forms of data visualisation in DIPS are the various types of stereonet plots – **POLE, SCATTER, CONTOUR** and **MAJOR PLANES**.

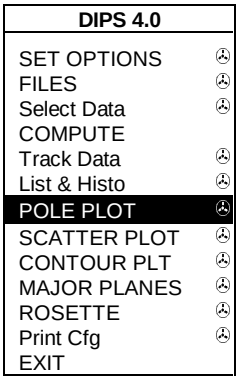
Each **PLOT** menu has its own set of unique commands and options which will be discussed later in this chapter. However, a number of similar options also appear, in particular the **LOCATE POLES** and **SET WINDOWS** options. It is useful to learn the mechanics of **LOCATE POLES** and **SET WINDOWS** before learning the specific details of each **PLOT** menu, as these provide direct links between the different plots.

Overview of Plot Types

First, the four methods of graphically viewing stereographic data are briefly described in the following sections.

POLE PLOT

Path: *POLE PLOT*



In the **POLE PLOT** points are plotted on a stereonet which correspond to the orientation of either (1) linear features or (2) poles representing planes. If a data column has been selected for visualisation using **Track Data** in the main menu, representative symbols will be plotted at each point corresponding to the column entry for a given data unit.

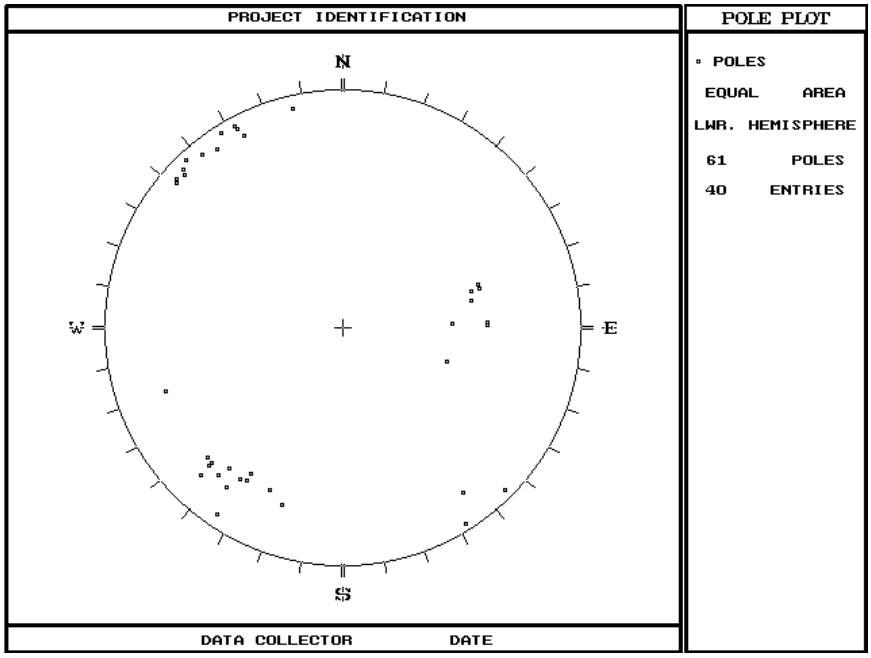


Figure 2.16: **POLE PLOT** for the example.dip file. The **FEATURE LEGEND** is also shown.

SCATTER PLOT

Path: *SCATTER PLOT*



In the **SCATTER PLOT**, points are plotted on a stereonet with a symbolic legend representing the number of data units which plot in the region surrounding each grid point. The numbers in the legend refer to the number of poles which plot within *half a grid spacing* of each grid point (see **Grid Size** in **SET OPTIONS** for a discussion of the counting grid size.) For ease of interpretation it is useful to think of this number as the number of coincident poles. *It is important to note that the plotted symbols fall on the location of the grid points and may not correspond exactly to the actual plotted locations viewed in the* **POLE PLOT**.

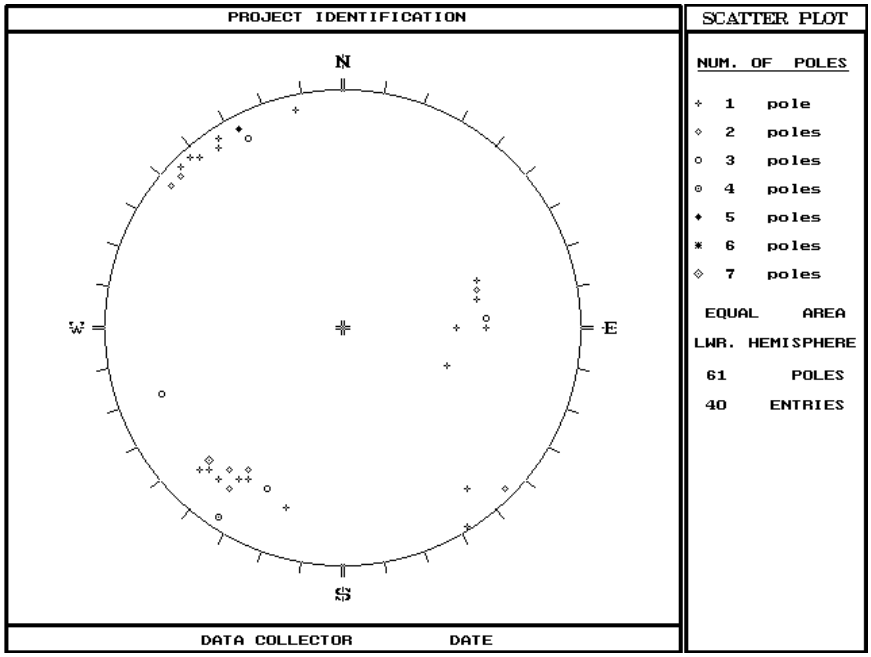


Figure 2.17: **SCATTER PLOT** for the example.dip file. The **SCATTER LEGEND** is also shown.

CONTOUR PLOT

Path: *CONTOUR PLOT*



In the **CONTOUR PLOT** a statistical calculation of pole density using either the:

- SCHMIDT or
- FISHER

distributions (as selected by the user in the **SET OPTIONS** menu), is calculated by **COMPUTE** in the main menu, and plotted using graphical colour or monochrome contouring on the stereonet.

This is the main tool for analysing mean and/or maximum pole concentrations from an orientation database.

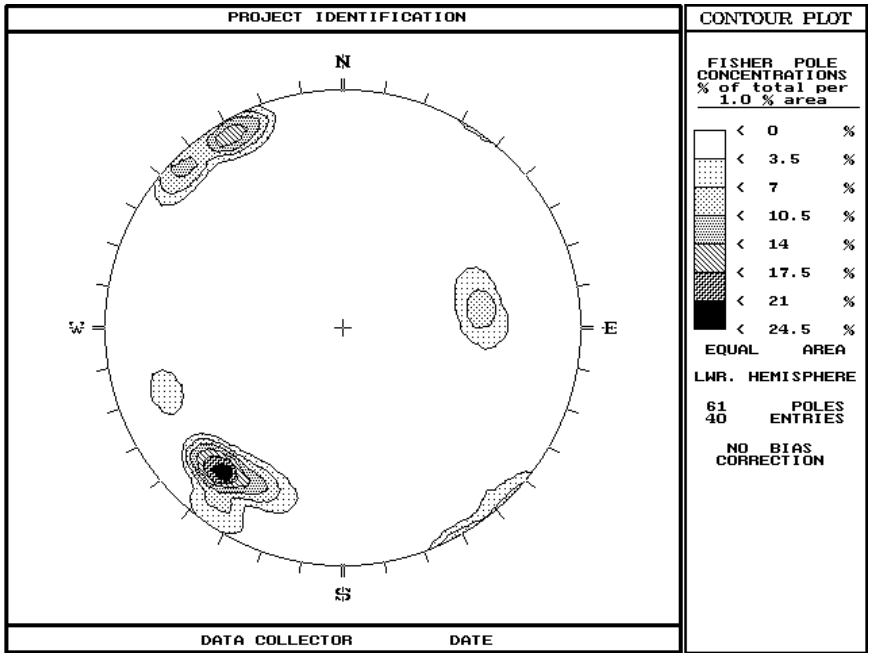


Figure 2.18: **CONTOUR PLOT** for the example.dip data. The **CONTOUR LEGEND** is also shown.

MAJOR PLANES PLOT

Path: *MAJOR PLANES*



Planes and poles selected in this or any of the other **PLOT** menus (selection procedures will be discussed later in this section) can be plotted using this option. As you will read presently, planes and poles may be plotted as overlays on any of the other plots as well.

The **MAJOR PLANES** menu, however, allows you to plot them on a *clean stereonet*.

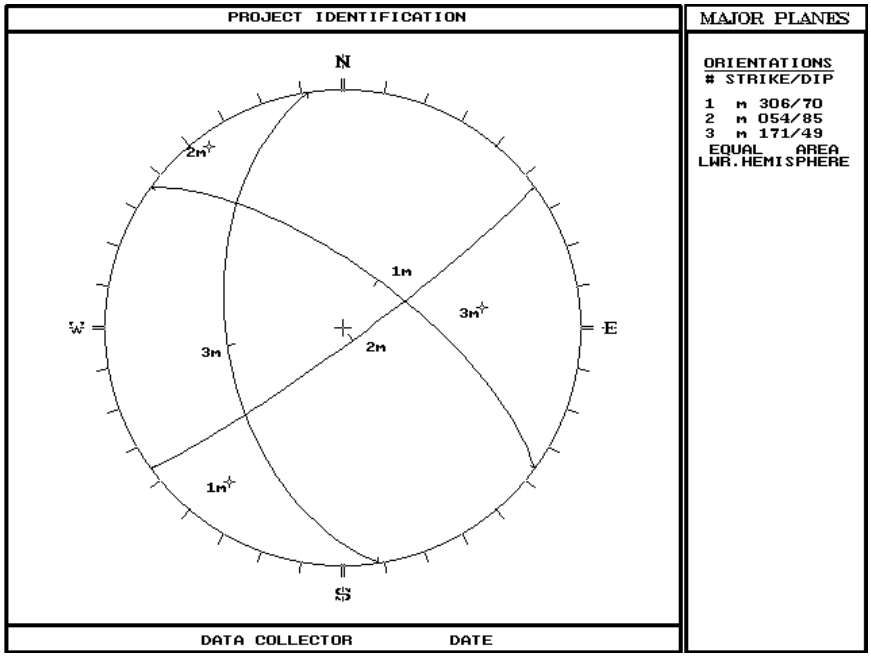


Figure 2.19: **MAJOR PLANES** and MEAN VECTORS (poles) for the example.dip file. The **PLANES LEGEND** is also shown.

Using LOCATE POLES

Path: *PLOT / LOCATE POLES*



When this option is selected from the current **PLOT** menu (for example, the **MAJOR PLANES** menu shown at left), a cursor will appear at the lower left corner of the screen, and a list of options (illustrated in the margin) will appear in the space previously occupied by the menu. These options are activated by *Enter*, *Esc*, the *Mouse Buttons* and the keyboard *Function Keys*.



The **LOCATE POLES** *option is primarily designed to allow you to locate distinct orientations on the stereonet with the cursor. The orientation corresponding to the cursor location is listed at the left side of the Upper Status Box at the top of the screen*. This orientation is expressed in the format selected using **SET OPTIONS->CONVENTION**. An orientation (POLE) can then be saved for recall onto other plots or for conversion to an equivalent PLANE (represented by an arc on the stereonet). **LOCATE POLES** also includes some features that allow you to customise the plot for hard copy printout. All of these options are discussed in the following sections.

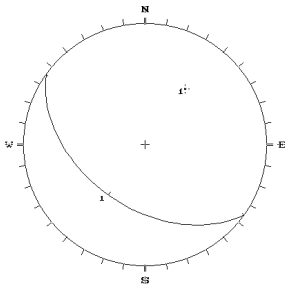
SELECT POLE

Path: *PLOT / LOCATE POLES / SELECT POLE* (Enter or the Left mouse button)

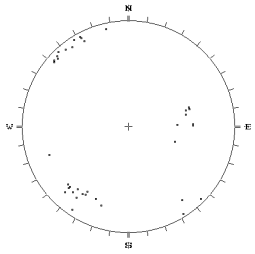
The **SELECT POLE** option allows you to save the orientation of the pole corresponding to the current cursor position. There are two ways to select a pole (or orientation) of interest:

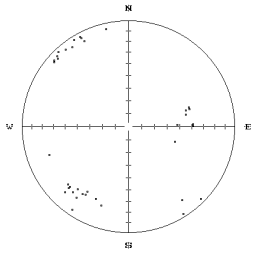
(1) Graphically — a pole may be selected by moving the cursor to a desired position *within* the stereonet and then pressing *Enter* or the *Left mouse button*. The orientation thus selected corresponds to the current position of the cursor.

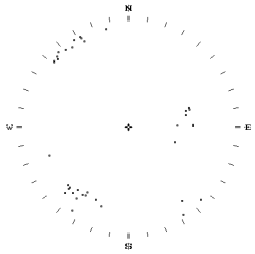
(1) Prompt line — if you already know the orientation you wish to select, move the cursor *outside* of the circular stereonet, and press *Enter* or the *Left mouse button*. You will be prompted to manually input the orientation pair (i.e. 000/00 or 00/000) in the prompt line – the format of this input is governed by the orientation **CONVENTION** in effect.

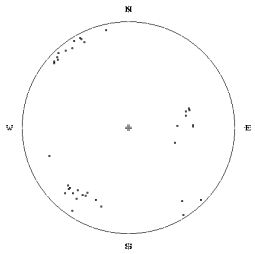


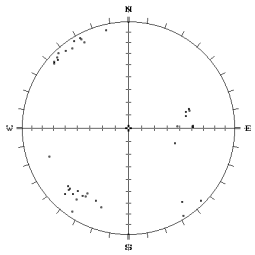
After you select a pole with either method, you will be prompted to assign to it an identifying number (ID) and an optional descriptive label. You will also be asked if you wish to plot the plane (shown as an arc or 'great circle' on the stereonet) corresponding to the selected pole.













All selected poles are stored in a list that can be viewed at any time using the **SELECT PLANES** option in the **MAJOR PLANES** menu. *If you select a pole but do not initially choose to plot its corresponding plane, it may be toggled for plotting at a later time through the* **SELECT PLANES** option.

Poles that have been toggled for plotting (either initially when prompted or at a later time) can be recalled onto any of the four plots using the **DRAW PLANES** option in any of the **PLOT** menus. From within the **LOCATE POLES** menu, **Show All** (F9) will draw all of the previously selected poles, whether or not the corresponding planes have been toggled.

It is important to note that all poles selected using **LOCATE POLES** remain stored for use, even if a new file is loaded or **COMPUTE** is executed. This is a useful feature for comparing orientations in different files. **Delete All** (F8) *is the only way to reset this pole list without leaving DIPS*.

The default labelling uses the pole ID number. **SELECT PLANES** in the **MAJOR PLANES** menu permits the use of the TEXT LABEL for identification.

Grid Toggle

Path: *PLOT / LOCATE POLES / Grid Toggle* (F1)

This option allows you to customise the screen by choosing one of six radial grid overlays. Press F1 repeatedly until the desired grid is shown on the screen. The grids cycle between CIRC, GRID and NONE twice with the results shown in the margin sketches, from top to bottom respectively. A crude description of the current grid appears in the second entry from the left in the Upper Status Box (eg. GRID:CIRC).

Grid Reset

Path: *PLOT / LOCATE POLES / Grid Reset* (F2)

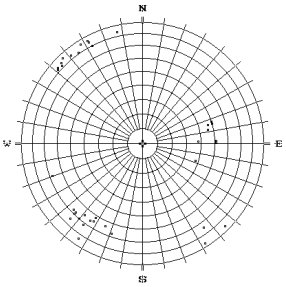
This option removes the radial grid and the perimeter great circle from the current plot. Pressing F2 and then F1 will restore the default grid.

Stereonet

Path: *PLOT / LOCATE POLES / Stereonet* (ALT F2)

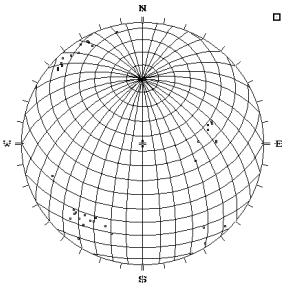
This option allows you to place a full stereonet overlay on top of your data, as shown in the next two margin sketches. When you select this option the prompt line will read:

> Equatorial (E) or Polar (P) Stereonet ?



POLAR — Select *P* to generate a polar net with 10 degree latitude and meridian lines.

EQUATORIAL — Select *E* to generate an equatorial stereonet overlay. You will have to input a trend and plunge for the stereonet axis, either graphically or in the prompt line.



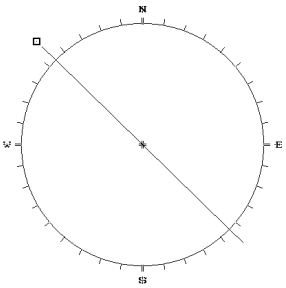
When generating an EQUATORIAL net, if the cursor is placed *outside* the net before selecting *ALT F2*, you will be prompted to enter an axis orientation from the keyboard. If the cursor is *inside* the stereonet, the location of the cursor will define the axis orientation. Once the axis orientation is entered, a stereonet grid in 10 degree increments will be drawn at this orientation, as shown in the margin sketch for an orientation of 0,45.

Line Draw Features: Line Fix/Move, Line Toggle, Save Line

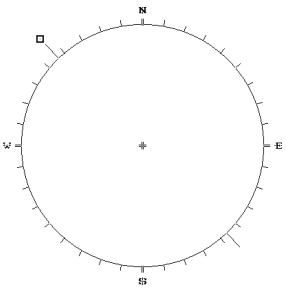
Path: *PLOT / LOCATE POLES / Line Fix/Move* (F3)

Path: *PLOT / LOCATE POLES / Line Toggle* (F4)

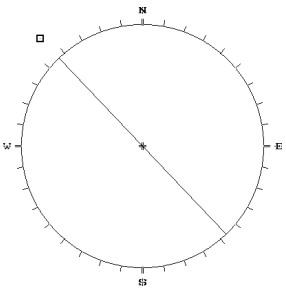
Path: *PLOT / LOCATE POLES / Save Line* (ALT F4)



Using these options, you can draw lines through the center of the circle and through the current cursor position. Inserting a line is useful when comparing poles or concentrations on opposite sides of the stereonet. The line may also be used to show a dominant orientation such as the trend of a tunnel centreline or the strike of a vertical wall. The line may move with the cursor, or be permanently drawn on the plot. The line controls are **Line Fix/Move**, **Line Toggle**, and **Save Line**.



The **Line Fix/Move** (F3) command allows you to fix the position of the line (fix), or to make the line position move with the cursor (move). Press *F3* to **Fix** the line position and press *F3* again to restore the **Move** option when required. When the **Move** option is toggled, a star appears after the word LINE:* in the Upper Status Box.



With the **Move** option selected, pressing *F4* (**Line Toggle**) allows you to select from four line style options. Make sure that the line is "move"able (toggle F3) and press F4 repeatedly until the desired line style is displayed. After each selection, it may be necessary to move the line slightly to see the new line style plotted. The line style option currently in use is indicated in the Upper Status Box (eg. LINE:* OFF). The four options are (see the margin sketches):

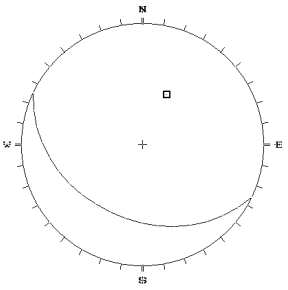
OFF	No line is plotted.
LINE	A full line is plotted, extending past the perimeter.
ENDS	Two collinear line segments are plotted outside the perimeter.

MID	A full line is plotted, terminating at the perimeter

Line Fix/Move (F3) is used to fix the position of a single line. If you need to plot more than one line on the screen at once, use the **Save Line** option to draw permanent lines on the plot. Move the line to the desired position with the cursor and press *ALT F4*. The line will disappear until the cursor is moved, revealing a fixed line on the diagram. *All lines so selected are lost when a new plot is drawn.*

Many uses for this set of line tools will become apparent as you experiment with the DIPS program.

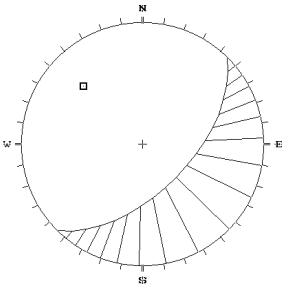
See Plane



Path: *PLOT / LOCATE POLES / See Plane* (F5)

Press *F5* to plot an arc with its center point at the location of the current cursor position. This arc, termed the cursor plane, represents the great circle corresponding to the location of a plane. The arc will move as the cursor is moved. Press *F5* again to turn off this arc.

Pitch Grid

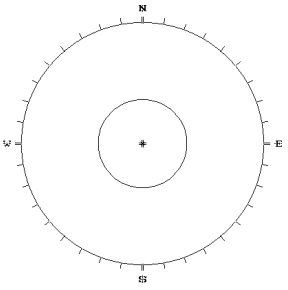


Path: *PLOT / LOCATE POLES / Pitch Grid* (F5, ALT F5)

If the **See Plane** option is turned on (*F5*), radial lines representing pitch angles can be turned on or off by pressing *ALT F5*. These pitch lines are at 10 degree increments and are oriented with respect to the strike of the plane – see the margin sketch for an illustration.

See Plane and **Pitch Grid** can be used to calculate the angle between two features on the stereonet. Move the cursor until the cursor plane passes through the two features in question, count the pitch lines between them and multiply by 10 degrees. Other uses for this moveable plane and pitch grid will become apparent as you use DIPS.

Draw Cone



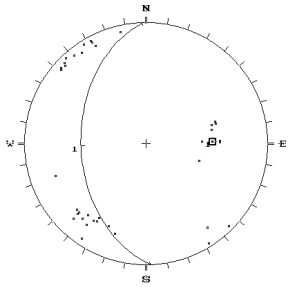
Path: *PLOT / LOCATE POLES / Draw Cone* (F6)

The **Draw Cone** option draws cone traces or 'small circles' on the stereonet. Position the cursor on the true center of the small circle (the cone axis). Then press *F6*. If you would prefer to enter the numbers corresponding to the trend and plunge of the cone axis, position the cursor *outside* the stereonet and press *F6*. You will be prompted for the cone angle, which is the acute angle between the cone perimeter and its axis. After you have entered this angle in the prompt line, the small circle trace will be drawn on the current plot.

Note that, depending on the projection type, small circles may not be projected as circles (they may appear elliptical) and may not appear to be centered on their true axes. Small circles can be confusing on a two-dimensional projection, so be sure you understand their geometry before using them for interpretation.

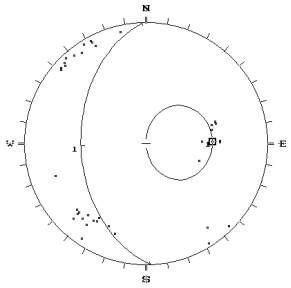
Daylight Envelope

Path: *PLOT / LOCATE POLES / Daylight Envelope*



The **Daylight Envelope (**ALT F6**)** option allows you to plot the daylight envelope corresponding to a selected or calculated plane. It is kinematically feasible for any poles that plot within the daylight envelope to slide.

The daylight envelope is used primarily in slope stability analysis work. To generate daylight envelopes, first generate the desired reference plane(s) using either the **LOCATE POLES** or **SET WINDOWS** options, as shown in the first margin sketch. From within the **LOCATE POLES** option, press *ALT F6* for **DAYLTE ENV** and enter the ID number of the reference plane you wish to use, in response to the prompts:

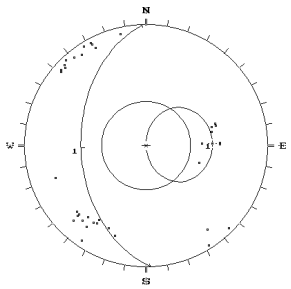


> Show envelope for SELECTED (S) or CALCULATED (C) plane?

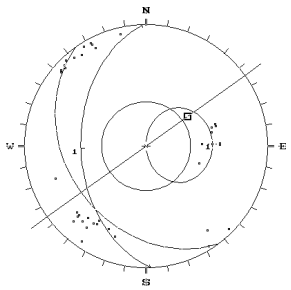
Enter *S* for a plane you have *selected* in the **LOCATE POLES** option, or *C* to input a plane that you have previously *calculated* using the **SET WINDOWS** option.

> Input ID of SELECTED plane:

Enter the appropriate ID number.



The daylight envelope will then be drawn on the stereonet, as shown in the second margin sketch. The reference plane must first be generated, but need not be drawn on the current plot before drawing the daylight envelope. In this example, there are several poles from the data set that are kinematically feasible for sliding.



To determine the stability of these planes, you must consider the frictional strength of the planes. If we assume that the planes in question have a friction angle of 30º, then using the **Draw Cone** option it is possible to add the friction circle to the stereonet, as shown in the margin sketches.

The daylight envelope feature is also present in the **DXF Tools** option in **DXF FILE OUT**. (Please note that ALT F6 in the **SET WINDOWS** option toggles the rotate data feature.)

Legend

Path: *PLOT / LOCATE POLES / Legend > < Help* (ALT F7)

When you first select **LOCATE POLES**, the list of options which appears on the right hand side is called the **HELP** menu. If you wish to see the legend for the current plot option, *while you are using* **LOCATE POLES**, press *ALT F7*, and the operative legend will replace the **HELP** menu. To toggle back to the **HELP** menu, press *ALT F7* again.

Delete All

Path: *PLOT / LOCATE POLES / Delete All* (F8)

Pressing *F8* will delete all previously selected poles from the pole list.

Convention

Path: *PLOT / LOCATE POLES / Convention* (ALT F8)

The co-ordinates of the cursor position are listed at the left side of the Upper Status Box. The convention of this information can be toggled between TREND/PLUNGE and STRIKE/DIP when this option is selected. *Using this option does not affect how the data is plotted on the screen.*

Show All

Path: *PLOT / LOCATE POLES / Show All* (F9)

Pressing *F9* will plot crosses representing all previously selected poles on the current plot. This is useful when operating in two or more different plots.

Insert Text

Path: *PLOT / LOCATE POLES / Insert Text* (F10)

This option allows you to insert horizontal text anywhere in the current plot. Move the cursor to the *top left corner of the desired text location* and press *F10*. You will be prompted to type the desired text:

```
> Text to insert:
```

When finished, press *Enter* and the text will be placed in the desired location on the plot. You will then be prompted:

```
> Press 'D' to delete or any key to continue
```

If the location of the text is not satisfactory, press *D*. Otherwise, press *any key* to continue with the LOCATE POLES option.

RETURN TO MENU

Path: *PLOT / LOCATE POLES / RETURN TO MENU* (Esc or the Right mouse button)

This will return you to the **PLOT** menu from which you originally entered **LOCATE POLES**.

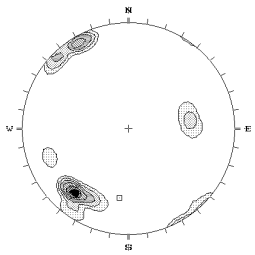
Using SET WINDOWS

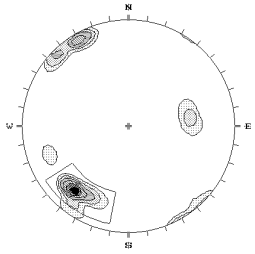
Path: *PLOT / SET WINDOWS*

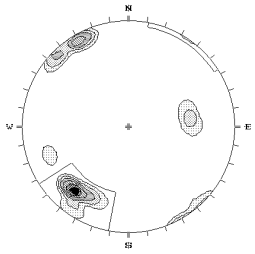
MAJOR PLANES
PLANES LEGEND
DRAW PLANES
SELECT PLANES
DELETE PLANES
LOCATE POLES
SET WINDOWS
Print Planes
Contour Plot
Load / Save
SCREEN DUMP
RETURN

There are a number of features in DIPS which require you to subjectively group data into similarly oriented data sets (within the bounds of reasonable variation limits). Data sets are captured using the **SET WINDOWS** option, available in each of the plot menus (the **MAJOR PLANES** menu is shown in the margin). *For each captured set, a mean vector representing a mean orientation is calculated and can be plotted if desired.*

The **SET WINDOWS** option behaves in a similar fashion to **LOCATE POLES** and has some similar features. When you enter this option you will see a cursor (initially in the lower left corner of the screen) which you can move with the arrow keys or the mouse. The orientation corresponding to the current cursor position will appear at the left side of the Upper Status Box.







SELECT WINDOW LIMITS

Path: *PLOT / SET WINDOWS / SELECT WINDOW LIMITS* (Enter or Left mouse button)

Windows enclosing the selected sets are defined by two trend values and two plunge values, at opposite corners. The curvilinear four sided windows may be combined to enclose complex pole distributions and can wrap around to the opposite side of the stereonet to group data near the perimeter.

To capture a set of data in a window, as shown in the margin sketches:

- Place the cursor on one of the two *counter clockwise* corners of the data group to be captured. (The initial position of the cursor is important, since the window is formed in a *clockwise* direction).
- Press *Enter* or the *left mouse button* once. (Be careful not to leave the mouse button depressed, or confusion will result. A short tap on the button will suffice.)



- Now move the cursor and you will see a window stretching from the corner selected, *in a clockwise direction*, to the current cursor position. If the cursor moves beyond the circle perimeter, it will "wrap around" (vanish and instantly reappear on the opposite side of the stereonet) with the window still attached.

- Once you have stretched the window to enclose all of the desired data press *Enter* or the *Left mouse button* again to fix the window. The formation of a window will take practice, especially when wrapping around to the other side of the stereonet.

Note 1 – if you place the cursor *outside* the stereonet and press either mouse button, you can manually enter the orientation of the window start point in the prompt line. This is useful if you already know the exact orientation you wish to start the window with. Completion of the window is as described above.

Note 2 – if the starting point is specified as the *center of the stereonet, then a circle rather than a curvilinear square window will be drawn*. This facilitates the selection of sets near the center of the stereonet.

After the window has been created, you will be prompted to enter an ID number for the SET of data that the window encloses.

> SET ID NUMBER (No analysis if ID = 0):

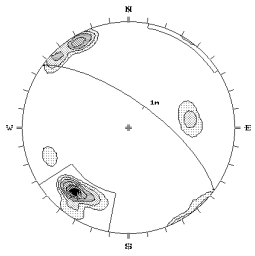
You will then see the prompt:

> Mean vectors/planes will not be plotted. Change (Y or N)?

If you answer *Y* the next prompt will be:

> PLOT Unweighted(U), Weighted(W), Both(B), or None(N)?

If you answer *U, W* or *B*, the last prompt you will see is:



> Pole Vectors(V), Planes(P), or Both(B)?..View with DRAW PLANES

For subsequent windows you create, the second prompt (above) will reflect your previous responses to the third and fourth prompts. These responses apply to all subsequent windows until new responses are entered – experiment using different responses to the prompt lines and see the results.

- Any mean pole/plane combination not initially toggled for plotting can be toggled for plotting later using the **SELECT PLANES** option in the **MAJOR PLANES** menu.

- Unlike the **LOCATE POLES** option, mean planes are **not** displayed on the stereonet in the **SET WINDOWS** option, *even if you entered P or B at the last prompt*. As indicated in the prompt, mean planes and poles are to be viewed using the **DRAW PLANES** option in any of the **PLOT** menus.

- Regardless of the plotting toggles entered at the above prompts, weighted and unweighted mean poles *are always calculated* for each SET and stored in a list, which can be viewed using the **SELECT PLANES** option in the **MAJOR PLANES** menu. In addition, all data within a window is flagged with the set window number. This can be seen with the **List Pole Data** option in the **List & Histo** menu.

- Any windows and all associated mean planes and pole vectors are erased when a new file is loaded or **COMPUTE** is re-executed.

Multiple Windows for a Single SET

If multiple 'wrapped' windows are given the same SET ID, then all the windows in the set must 'wrap' in the same direction.

Several windows can be used to capture the data for a single SET by using the same numerical identifier for each window in the set. Care must be taken when using multiple windows for a data set that wraps around the equatorial perimeter of the net. Because of the more complex logic used to calculate the mean vector in this particular case (see below), all windows must 'wrap' in the same direction. This means that all windows representing a single set must start on the same side of the net. Failure to do so will result in an incorrect mean calculation for the data set.

Mean Vector Calculation for Wrapped Windows

The mean vector calculation is simply vector addition of all of the poles within a window, which are then normalised to the sphere boundaries. When pole vectors are clustered near the equator, a mean orientation calculated from the lower hemisphere alone will be incorrect. The vectors that plot on the opposite side of the stereonet, but which are included within the window, are incorporated into the vector addition as negative poles, so that the mean will be correctly calculated.

Overlapping Windows

When windows are overlapped and some data points fall within both windows, the affected data will be removed from the initial window and set and will become part of the latest window to be drawn. Each data point can only belong to one set at a time. All mean vectors are recalculated each time a new window is drawn and any data transfers will change the affected means.

RESTART WINDOW SELECTION

Path: *PLOT / SET WINDOWS / RESTART WINDOW SELECTION* (Esc or Right mouse button)

If the window you are currently trying to complete gets out of control, as may occur when you are not familiar with DIPS, you can restart by pressing *Esc* or the *Right mouse button*. Do not hold down the mouse button or you will leave the **SET WINDOWS** option altogether. A sharp tap will suffice. This will restore you to the original status when you first entered the **SET WINDOWS** option. Re-select your window as before.

If your mouse is too sensitive and window "clicking" is difficult, simply move the cursor with the mouse, and use the *Enter* key for selecting.

Grid Toggle

Path: *PLOT / SET WINDOWS / Grid Toggle* (F1)

This option allows you to customise the screen by choosing one of six radial grid overlays. Press *F1* repeatedly until the desired grid is shown on the screen. The range of possibilities is described and shown in the **LOCATE POLES / Grid Toggle** discussion.

Grid Reset

Path: *PLOT / SET WINDOWS / Grid Reset* (F2)

This option removes the radial grid and the perimeter great circle from the current plot. Pressing *F2* and then *F1* will restore the default grid.

Line Draw Features: Line Fix/Move, Line Toggle, Save Line

Path: *PLOT / SET WINDOWS / Line Fix/Move* (F3)

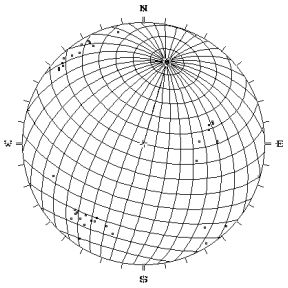
Path: *PLOT / SET WINDOWS / Line Toggle* (F4) etc.

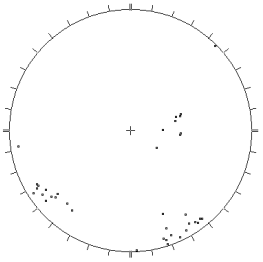
These options function in exactly the same way as described in the discussion of **Line Draw Features** in the **LOCATE POLES** section.

Rotate Data about Axis

Path: *PLOT / SET WINDOWS / Rotate data about axis* (ALT F6)

The **Rotate data about axis** option allows you to rotate some or all of the data in the current file about some arbitrary axis. This option can be used to adjust structural data in a folded domain or to create 'inclined' hemisphere projections.





To rotate all of the data, first move the cursor to the position of the axis of rotation you wish to use. If the cursor is placed outside the stereonet before entering *ALT F6*, you will be prompted to enter the axis orientation from the keyboard. With the cursor properly located, press *ALT F6* to activate this option. At this point, a stereonet grid with 10 degree increments of latitude and longitude will be drawn in alignment with the axis of rotation. You will now be asked to input the clockwise angle of rotation about the selected axis (in degrees). You will then be asked for the set ID # of the data to rotate. *Input 0 to rotate all of the data*. If you select 0 for all, you will also be asked if you wish to rotate any of the orientations selected with **LOCATE POLES**. The data will be reprocessed and the current plot will be regenerated with the rotation performed. The upper margin sketch shows the position of the cursor when the **Rotate Data** option was invoked, and the grid that is generated on the screen. In the second margin sketch, the data has been rotated about the selected point by 20º.

To rotate specific data within the plot, first capture the desired data in one or a series of windows (remember that more than one window can have the same ID #). Then repeat the above process, inputting the desired set ID # when asked to do so. Only the data in this set will be affected by the rotation.

All window information and calculated mean orientations are erased when this option is invoked. Note that **TRAVERSE** orientations are unaffected. **WEIGHTED** contour plots are therefore meaningless after rotating data: so use the **UNWEIGHTED** option. *Rotations may be reset by re-executing* **COMPUTE** *in the main menu*.

Rotations of 'selected poles' will not be reset when you re-execute **COMPUTE**. *You must perform an equivalent opposite rotation to reset these orientations*. When rotating the entire net, it is useful to first mark the true north, a horizontal plane or some other reference by selecting this point with **LOCATE POLES**. This pole or plane will be rotated, if you request it, with the data and will serve as a reference point.

When all of the data is rotated, the direction letters (North, South, etc.) will not be plotted on the stereonet until the net is reset with **COMPUTE**. The orientations of features listed in the various legends, the data listings, and the Upper Status Box are always relative to the current stereonet (with apparent North at the top) and, depending on your intentions, may not be the correct orientations if ALL of the data has been rotated. Use caution when using these listed values in this case.

Legend

Path: *PLOT / SET WINDOWS / Legend > < Help* (ALT F7)

When you first select **SET WINDOWS**, the list of options which appears on the right hand side is called the **HELP** menu. If you wish to see the legend for the current plot option, while you are using **SET WINDOWS**, press *ALT F7* and the operative legend will replace the **HELP** menu. To toggle back to the **HELP** menu, press *ALT F7* again.

Hide / Reset

Path: *PLOT / SET WINDOWS / Hide/Reset* (F8)

To delete all of the previously selected window limits from the lists and the screen, press *F8* and answer *Y* at the prompt:

```
> Do you wish to RESET all (Y or N)?
```

To **Hide** the selected window without deleting, enter *N* at the prompt.

Convention

Path: *PLOT / SET WINDOWS / Convention* (ALT F8)

The coordinates of the cursor position are listed in the Upper Status Box of the screen. The convention of the coordinates can be toggled between TREND/PLUNGE and STRIKE/DIP when this option is selected. *Using this option does not affect how the data is plotted on the screen.*

Show All

Path: *PLOT / SET WINDOWS / Show all* (F9)

Pressing *F9* will redraw *all previously selected windows* on the screen, and will plot, if selected, the mean poles for each window. This is useful for viewing windowed set data in two or more different plots.

Conf / Var

Path: *PLOT / SET WINDOWS / Conf/Var* (ALT F9)

The calculations of the mean vector can be associated with FISHER dispersion constants and CONFIDENCE or VARIABILITY cone angles.

Two statistical sub options are available.:

Confidence Limit

This angular value reflects confidence in the mean within a specified degree of certainty. For example, a 68% confidence cone indicates that the true area lies within the cone angle of the calculated mean, with a 68% confidence. This feature gives an indication of the reliability of the sample or if the sample is big enough.

Variability Limit

This value reflects the natural variability of the data assuming that the mean is correct. A 68% variability indicates that any pole, selected from the population represented by the mapped sample, has a 68% probability of falling within the variability cone. This feature can be used for probabilistic stability studies (see Tutorial 2 in Tutorial Manual).

The confidence and variability cone angles and the FISHER constants for each set can be viewed using the **SELECT PLANES** option in the **MAJOR PLANES** menu.

RETURN TO MENU

Path: *PLOT / SET WINDOWS / RETURN TO MENU* (Esc or Right mouse button)

If you wish to exit from this menu while in the middle of creating a window, press *Esc* or the *Right mouse button* once to **RESTART WINDOW SELECTION** and again to return to the menu from which you entered **SET WINDOWS**.

POLE PLOT Menu



This plot displays the vector points corresponding to the orientation data, on a lower hemisphere polar stereonet. If the data is linear in nature (eg. stress trajectories), then the corresponding point on the stereonet represents this orientation directly. If, however, the data is planar (eg. rock structure survey), the points on the plot represent the poles (normal vectors) to the planes in question.

This plot option is also capable of displaying feature attribute information in the form of colour coded and/or symbolic plots. Use the **Track Data** feature in the main menu to select the particular attribute to plot. For example, if a column corresponding to "joint spacing" is selected with **Track Data**, symbols corresponding to different ranges of spacing will appear at the pole locations on the stereonet and can be interpreted using the **FEATURE LEGEND** option, which is discussed below.

The pole plot is generated immediately upon entering the **POLE PLOT** menu.

FEATURE LEGEND

Path: *POLE PLOT / FEATURE LEGEND*



Selecting this option will cause a legend to replace the menu area on the right hand side of the screen. See Figure 2.16 earlier in this chapter for an illustration. If **Track Data** has not been used, this legend will contain only one symbol, representing poles. If **Track Data** has been executed and the data is QUANTITATIVE, the range of values displayed in the legend is a calculated default range based on rounded values. This range can be altered using the **Alter Legend** option discussed below. If the data is QUALITATIVE, one symbol representing each of the discrete character strings in the data column being tracked (up to eleven symbols) will appear in the legend. The **Alter Legend** option can also be used to tailor a qualitative legend.

Pressing any key or mouse button returns you to the **POLE PLOT** menu.

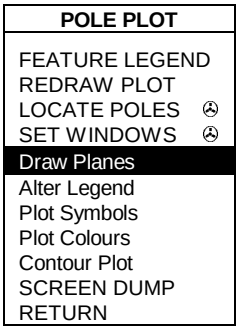
REDRAW PLOT

Path: *POLE PLOT / REDRAW PLOT*

After using **SET WINDOWS** and **LOCATE POLES** and their associated features, the screen may become cluttered. Use this option to generate a fresh pole plot.

LOCATE POLES and SET WINDOWS

These options are discussed in detail earlier in this chapter.



Draw Planes

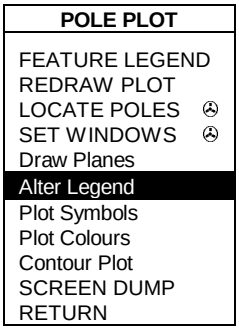
Path: *POLE PLOT / Draw Planes*

This option allows you to superimpose great circles onto the **POLE PLOT**. The planes plotted are those that were toggled for plotting in either **LOCATE POLES** or **SET WINDOWS**. You will be asked to specify how you wish to label these features on the plot.

Alter Legend

Path: *POLE PLOT / Alter Legend*

This option is only relevant if the **Track Data** option has been utilised. The prompts generated by this option will differ depending upon whether the tracked data is QUALITATIVE or QUANTITATIVE.



If the data being tracked is QUALITATIVE, selecting this option will replace the plot region with a list of symbols and their assigned data labels, as shown in Figure 2.20. The prompt line will request that you select from three options:

```
> Change...SYMBOLS(S)?..LABELS(L)?  or  QUIT(Q)?
```

Select *L* to change the LABEL strings. The prompt will read:

```
> Input Type No. to change ('-1' for title):
```

Select the Type Number (displayed in the list) to change an individual data label. Or you can change the column title by entering '-1' (eg. you could change 'dtype' to 'discont. type'). Note that the label size limit is 15 letters.

Select *S* to change a SYMBOL. The prompt will read:

```
> Input change:  SYMBOL NO. , TYPE NO. =
```

The symbols may be *rearranged* within the list to emphasise a particular type. When making a change, the SYMBOL NO. refers to the actual graphical symbol. Its corresponding label will not necessarily have the same TYPE NO. At the prompt, input the new combination of symbol and type number you wish to create. The previous Type No. and Label which corresponded to this Symbol will be placed over to the right of the list, and are not allocated. To reassign a symbol to this label, repeat the process using another *symbol number* and the *deallocated type number*.

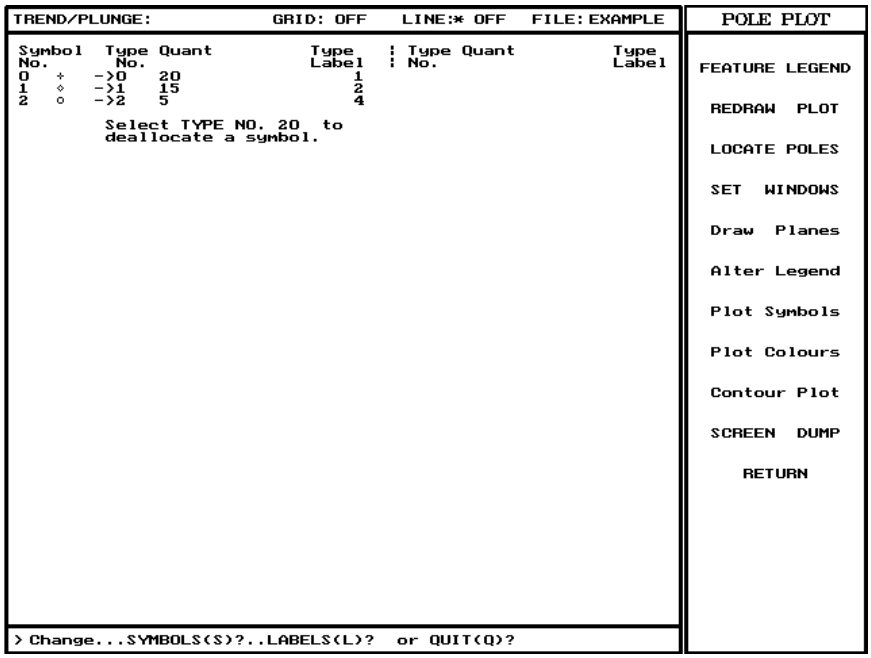


Figure 2.20: Altering the Legend for QUALITATIVE tracked data in the **POLE PLOT**.

Only 11 symbols are used in DIPS, however up to 20 labels can be recorded. Unassigned labels will be listed on the right side of the list and can be used to replace any labels (type numbers) on the left as described above.

If the legend is QUANTITATIVE, you will first be prompted:

> Change TITLE(T) or RANGE(any key)?

Changing the column TITLE is the same as for the QUALITATIVE label change (see above), and does not affect the data base on disk. If you choose to alter the RANGE, you will be prompted with the current range and asked to confirm your change.

> Current range (## to ##)..CHANGE(Y or N)?

If you answer *Y* you will be prompted:

> Use DEFAULT(D), LOG SCALE(L) or LINEAR RANGE(any key)?

The DEFAULT option generates the legend range that was originally calculated. The LINEAR RANGE requires a 'from' and a 'to' value to be input.

> INPUT LINEAR RANGE (from,to) =

This range can be from highest to lowest as well as lowest to highest. This affects the colour and complexity gradient of the symbols used. You may wish to use more intense symbols to emphasise the smaller values in the range (eg. joint spacing). The LOG range prompt is similar:

```
> INPUT BASE 10 EXPONENT RANGE (from,to) =
```

Instead of two absolute bounds, you are asked to input the base 10 exponent range you wish to use, for example -1 to 2 for a range of 0.1 to 100.

Plot Symbols

Path: *POLE PLOT / Plot Symbols*

This option is active by default. It causes actual graphical symbols to be used by the **POLE PLOT**. These are essential for monochrome displays and for use with monochrome printers. Selecting this option will change all of the symbols to a single type.



Plot Colours

Path: *POLE PLOT / Plot Colours*

If the number of data points is very high, the symbolic **POLE PLOT** may appear congested. If you have a colour monitor, you may wish to select this option to reduce the symbols to small squares of different colours to clarify the plot.

Contour Plot

Path: *POLE PLOT / Contour Plot*

This option overlays a LINE **CONTOUR PLOT** of pole density on the **POLE PLOT**. The settings are the same as selected in the **CONTOUR PLOT** menu.

SCREEN DUMP

Path: *POLE PLOT / SCREEN DUMP*

This option prepares the screen for printing by displaying the plot legend in the menu box area, and job titles in the Upper Status Box and prompt line.

When you select this option you will be asked if you wish to change either of the two titles. Selecting *Y* will allow you to edit the titles. When each title is displayed on the prompt line, you may edit them and press *Enter*, or you can erase them by pressing *Backspace* twice and then pressing *Enter* for each title. This will remove the respective title bar from the plot. The original data file titles may be recalled by pressing *Y* and *Esc* when prompted to change the titles.

SCREEN DUMP is only used to set up the screen for printing. To actually capture the screen to a printer or to a file, press the *hot key* combination (<*Ctrl P*> or <*Ctrl O*>) specified via the **Print Cfg** option in the main menu. See the section on Print Configuration in Part 1 – Getting Started, for details.

Select **RETURN** or press *Esc* to return to the main menu.

SCATTER PLOT Menu



The second plot type is the **SCATTER PLOT** which permits visual analysis of pole distribution by plotting symbols and/or colours representing the *number of approximately coincident poles at a given orientation*. The locations of the pole symbols shown in this plot actually correspond to grid locations, and the quantities represented are the numbers of poles within a half grid spacing of the grid point. This is a crude but informative presentation of pole density.

The **SCATTER PLOT** is generated automatically upon entering this menu.

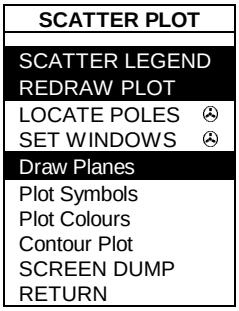
SCATTER LEGEND

Path: *SCATTER PLOT / SCATTER LEGEND*

This option causes a legend to replace the menu area on the right side of the screen. The legend indicates the quantities associated with each of the symbols used in the plot.

Pressing *any key or mouse button* will return you to the **SCATTER PLOT** menu.

REDRAW PLOT



Path: *SCATTER PLOT / REDRAW PLOT*

After using **SET WINDOWS** and **LOCATE POLES** and their associated features, the screen may become cluttered. Use this option to generate a fresh scatter plot.

LOCATE POLES and SET WINDOWS

Path: *SCATTER PLOT / LOCATE POLES* **or** *SET WINDOWS*

These options are discussed in detail earlier in this chapter.

Draw Planes

Path: *SCATTER PLOT / Draw Planes*

This option allows you to superimpose onto the **SCATTER PLOT,** the great circles corresponding to the planes selected and toggled for plotting using **LOCATE POLES** or **SET WINDOWS**. You will be asked to specify how you wish to label these features on the plot.

Plot Symbols

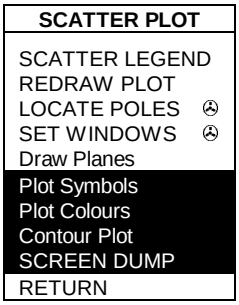
Path: *SCATTER PLOT / Plot Symbols*

This option is active by default. It causes graphical symbols to be used by the **SCATTER PLOT**. These are essential for monochrome displays and for use with monochrome printers.

Plot Colours

Path: *SCATTER PLOT / Plot Colours*

If the number of data points is very high, the symbol plot may appear congested. For this reason you may wish to select this option, which will *change all symbols to small squares of different colours* to clarify the plot. Select the **Plot Colours** button and the plot will be regenerated in the new form.



Contour Plot

Path: *SCATTER PLOT / Contour Plot*

This option overlays a LINE **CONTOUR PLOT** of pole density on the **SCATTER PLOT**. The settings are the same as selected in the **CONTOUR PLOT** menu.

SCREEN DUMP

Path: *SCATTER PLOT / SCREEN DUMP*

This option causes the legend to appear in place of the menu and places the two titles from the data file at the top and bottom of the plot area.

See the POLE PLOT / SCREEN DUMP section for further details.

Select **RETURN** or press *Esc* to return to the main menu.

CONTOUR PLOT Menu



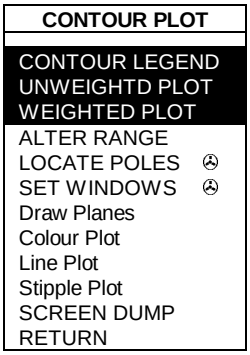
CONTOUR PLOT is used to visualise the clustering of orientation data not immediately evident from a **POLE PLOT** or a **SCATTER PLOT**. Contours representing statistical pole concentrations are displayed in this plot option.

The **CONTOUR PLOT** is not immediately generated upon entry into this menu. Either the **UNWEIGHTED PLOT** button or **WEIGHTED PLOT** button must be selected to generate the plot. A brief discussion of the difference between the unweighted and weighted plots is given below, and for a full discussion, see the SET OPTIONS / Bias Angle section earlier in this chapter.

CONTOUR LEGEND

Path: *CONTOUR PLOT / CONTOUR LEGEND*

This option displays a legend showing the contour intervals for the current contour plot (UNWEIGHTED or WEIGHTED). The range shown is a calculated default range and can be adjusted using the **ALTER RANGE** option in this menu.



UNWEIGHTED PLOT

Path: *CONTOUR PLOT / UNWEIGHTED PLOT*

This plot is a direct contouring of the pole orientation data as measured and recorded. No bias corrections are made to adjust for directional sampling bias.

WEIGHTED PLOT

Path: *CONTOUR PLOT / WEIGHTED PLOT*

This plot is generated by assigning a weighting to each pole based on the sampling bias that was inherent in its measurement. This is governed by the orientation and type of traverse in which it was recorded. For example, a plane sub-parallel to a traverse line or plane will be more heavily weighted than one perpendicular to the traverse.

Use this option with caution, and be sure you understand the physical significance of the correction before drawing critical conclusions based on its results. *See the SET OPTIONS / Bias Angle section earlier in this chapter, for a detailed discussion of sampling bias.*

Since the weighting increases to infinity as the plane becomes parallel to the traverse, a limit is placed on the value of the angle between the feature and the traverse. This limit can be adjusted using the **Bias Angle** option in the **SET OPTIONS** menu.

ALTER RANGE

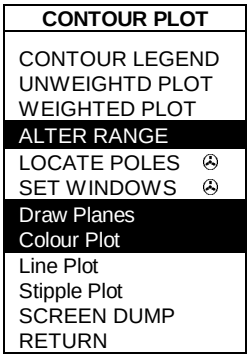
Path: *CONTOUR PLOT / ALTER RANGE*

This option allows you to adjust the range of the concentration spanned by the contour intervals. You will be prompted with the current range and asked to confirm that you wish to change. You may then choose the **DEFAULT** range or select a **NEW** range (ie. enter new minimum and maximum concentration levels).

Note that the minimum contour concentration limit is always zero. If you select a minimum limit which is greater than zero, this limit will be used as the lower bound of the *second contour interval*. To generate a set of rounded interval levels, select a range which is a multiple of 6 if your lower bound is zero, or a multiple of 5 if your minimum level is above zero.

LOCATE POLES and SET WINDOWS

These options are discussed in detail earlier in this chapter.



Draw Planes

Path: *CONTOUR PLOT / Draw Planes*

This option allows you to superimpose, onto the **CONTOUR PLOT**, great circles corresponding to the planes selected and toggled for plotting using **LOCATE POLES** or **SET WINDOWS**. You will be asked to specify how you wish to label these features on the plot.

Colour Plot

Path: *CONTOUR PLOT / Colour Plot*

This option makes COLOUR the active contour type. The contours will appear as coloured regions corresponding to concentration ranges. After selecting this option, the **UNWEIGHTED PLOT** or **WEIGHTED PLOT** option must be reselected to generate the coloured contour plot.

If EGA or VGA colour graphics cards are in use, this is the default contour type and does not have to be selected.

Line Plot

Path: *CONTOUR PLOT / Line Plot*

This option makes **LINE** CONTOURING the active contour type. When you select this option, you will be asked if you wish to label the contours with LETTERS or VALUES.

> Label contour lines with LETTERS(L) or VALUES(V)?



Selecting LETTERS allows you to use the letters a-f to label line contour intervals. The VALUES option uses the actual concentration values to label contours. The prompt line will then remind you to:

> Use F7 in LOCATE POLES to mark labels on contours...

Contour labelling is performed interactively using **LOCATE POLES** in the **CONTOUR PLOT** menu, for **LINE CONTOURS** only. By positioning the cursor in **LOCATE POLES** *on the line contour you wish to label* and then pressing *F7*, the appropriate label is placed on the contour line.

Stipple Plot

*After selecting a new plot style (Colour, Line or Stipple) the **UNWEIGHTED PLOT** or **WEIGHTED PLOT** button must be reselected to regenerate the contour plot with the new style.*

Path: *CONTOUR PLOT / Stipple Plot*

This option makes **STIPPLE** the active contour type. The contours will appear as regions with a simulated stippled grey scale corresponding to concentration ranges. When selecting this option, you will be asked if you wish to combine the stipples with line contours. This produces a line contour pattern with stippled fills between contours.

STIPPLE is the default contour type and does not have to be selected, if Monochrome or CGA cards, or if EGA or VGA colour graphics cards in monochrome mode are in use (see Part 1 – Getting Started for information on video card options).

SCREEN DUMP

Path: *CONTOUR PLOT / SCREEN DUMP*

This option causes the legend to appear in place of the menu and places the two titles from the data file at the top and bottom of the plot area.

See the POLE PLOT / SCREEN DUMP section for a complete description of this option.

Select **RETURN** or press *Esc* to return to the main menu.

MAJOR PLANES Menu



Once you have identified major planes of interest using **LOCATE POLES** or **SET WINDOWS**, you can view them using the **DRAW PLANES** option in any of the **PLOT** menus. The plane plots are superimposed on the data plots themselves. If you wish to view the planes only, you may do so using the **MAJOR PLANES** menu.

Notice that **SET WINDOWS** and **LOCATE POLES** also appear in this menu and may be used in the same way as in the other **PLOT** menus. See the previous sections dealing with **LOCATE POLES** and **SET WINDOWS** (as well as the Quick Start Tutorial in Part 1 – Getting Started) for information on selecting, calculating and toggling (for plotting) poles and planes using these two menu options.

The **MAJOR PLANES** menu, however, may be used without loading a data file or computing any data. This allows this menu to be used as a stand-alone stereonet manipulation tool if desired.

PLANES LEGEND

Path: *MAJOR PLANES / PLANES LEGEND*

This option lists the orientations of the planes and poles that are *toggled for plotting*, in the right hand menu area. Note:



- Mean unweighted orientations calculated with **SET WINDOWS** are labelled with an 'm' (for ***m****ean*) to distinguish them from
- *Selected* orientations (**LOCATE POLES**), which have *no letter*, and
- Weighted means, which are are labelled with a 'w' (for ***w****eighted*).

Press any key to return to the **MAJOR PLANES** menu.

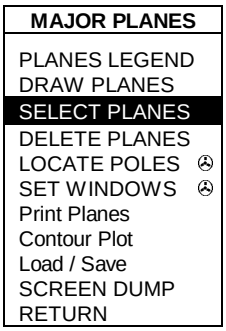
DRAW PLANES

Path: *MAJOR PLANES / DRAW PLANES*

This option functions in the same manner as the **DRAW PLANES** option in the other three **PLOT** menus. You are asked to specify how you wish to label the features to be plotted. Poles and planes which are currently toggled for plotting will then be drawn.

SELECT PLANES

Path: *MAJOR PLANES / SELECT PLANES*



When planes and poles are *selected* or *calculated* using **LOCATE POLES** or **SET WINDOWS** respectively, *they may or may not be toggled for plotting*. You may wish to later redesignate which planes and poles will be plotted without having to reselect them or delete them from the list. **SELECT PLANES** *allows you to list the planes and poles currently in the list and allows you to retoggle any one or all of them for plotting*.

When you select this option, a list of **SELECTED** planes (via the **LOCATE POLES** option) will be displayed. If there are no such planes in the list or if you press any key as prompted, a list of **CALCULATED** planes (via the **SET WINDOWS** option) will be displayed – this is illustrated in Figure 2.21 below, for the example.dip file. Pressing any key will scroll through this list or return you to the **SELECTED** planes list.

```
CALCULATED MEAN PLANES (via 'SET WINDOWS' option):
ID    TREND/PLUNGE STRIKE/DIP-R DRAW-POLE DRAW-PLANE
.... LABEL                      *          *
     Fisher's Dispersion Coeff.(Larger K -> tighter cluster)
     Variability Limit = Angle of cone containing n% of data
     Confidence Limit  = Actual mean is within this angle of
                         calculated mean with n% confidence

1  m 216/20        306/70          *          *
.... UNWEIGHTED mean orientation                      set #  1
     Fisher's K =                                          68
     68.27% Variability Limit =                       10.5 deg
     68.27% Confidence Limit  =                        2.1 deg
1  w 215/22        305/68          *          *
.... WEIGHTED mean orientation                        set #  1
     Fisher's Kw=                                          67
     68.27% Variability Limit =                       10.6 deg
     68.27% Confidence Limit  =                        2.1 deg
2  m 325/05        055/85          *          *
.... UNWEIGHTED mean orientation                      set #  2
     Fisher's K =                                          51
     68.27% Variability Limit =                       12.2 deg
     68.27% Confidence Limit  =                        2.6 deg
2  w 326/05        056/85          *          *
.... WEIGHTED mean orientation                        set #  2
     Fisher's Kw=                                          51
     68.27% Variability Limit =                       12.2 deg
     68.27% Confidence Limit  =                        2.6 deg
3  m 084/43        174/47          *          *
.... UNWEIGHTED mean orientation                      set #  3
     Fisher's K =                                          78
     68.27% Variability Limit =                        9.8 deg
     68.27% Confidence Limit  =                        3.1 deg
3  w 084/43        174/47          *          *
.... WEIGHTED mean orientation                        set #  3
     Fisher's Kw=                                          75
     68.27% Variability Limit =                       10.1 deg
     68.27% Confidence Limit  =                        3.2 deg
```

Figure 2.21: List of calculated (mean) planes displayed via **SELECT PLANES**. All planes and poles are toggled (*) for plotting.

Follow the instructions on the prompt line and press the appropriate keys to toggle and untoggle the desired planes. As you toggle/untoggle the poles/planes to plot, the asterisk (*) markers in the list will indicate your selections. Experiment and see how this works.

Once you have completed your selections, *Esc* will return you to the **MAJOR PLANES** menu and your changes can be viewed using the **DRAW PLANES** and **PLANES LEGEND** options.

DELETE PLANES

Path: *MAJOR PLANES / DELETE PLANES*

Use this option if you wish to delete *all* of the planes that you have drawn on the stereonet.

LOCATE POLES and SET WINDOWS

Path: *MAJOR PLANES / LOCATE POLES* **or** *SET WINDOWS*

Notice that by using **LOCATE POLES** and **SET WINDOWS** in this menu without loading a data file, you may use the **MAJOR PLANES** menu as a stand-alone stereonet manipulation tool for analysing arbitrary planes and poles which you select. See earlier in this chapter for detailed discussion of these two options.



Print Planes

Path: *MAJOR PLANES / Print Planes*

Using this option, it is possible to write the information about the plane(s) to a .prn file, which you can view later.

Contour Plot

Path: *MAJOR PLANES / Contour Plot*

This option overlays a LINE **CONTOUR PLOT** of pole density on the **MAJOR PLANES PLOT**. The settings are the same as selected in the **CONTOUR PLOT** menu.

In order to execute this option, you must have plotted a contour plot previously: otherwise exit out of the **MAJOR PLANES** menu, generate a contour plot from the **CONTOUR PLOT** menu, and then return to the **MAJOR PLANES** menu.

Save Planes / Load Planes

Path: *MAJOR PLANES / Save Planes* **or** *Load Planes*

In the BASIC version of DIPS, this option can be used to save the pole orientations you have entered in the **LOCATE POLES** option, and the windows created in the **SET WINDOWS** menu. This information can be loaded into DIPS at a later time for manipulation, or can be superimposed on a data file. Note that the windows and mean vectors you have created will be destroyed whenever a file is loaded, or **COMPUTE** is reexecuted.

In the ADVANCED version of DIPS, the planes are saved/loaded via the **FILES** menu – see the FILES section earlier in this chapter for more information. (You will see the following prompt if you select MAJOR PLANES->Load/Save):

> VERSION 4.0 – See FILES menu for SAVE/LOAD PLANES

SCREEN DUMP

Path: *MAJOR PLANES / SCREEN DUMP*

This option prepares the screen for printing by displaying a legend in place of the menu and placing the two titles from the data file at the top and bottom of the plot area.

See the POLE PLOT / SCREEN DUMP section for further details.

Select **RETURN** or press *Esc* to return to the main menu.

ROSETTE Option

DIPS 4.0

SET OPTIONS
FILES
Select Data
COMPUTE
Track Data
List & Histo
POLE PLOT
SCATTER PLOT
CONTOUR PLT
MAJOR PLANES
ROSETTE
Print Cfg
EXIT

What is a Rosette?

Throughout the rest of this manual you have been dealing with points on a stereonet representing 3D orientations and, more specifically, the orientations of poles (normals) to planes. The orientation of one of these poles is expressed in TREND and PLUNGE, while the plane it represents can be described by an ordered pair representing either DIP and DIP DIRECTION or STRIKE and DIP. These ordered pairs completely describe the orientation in 3D space of the vector or plane being considered. These pairs also serve to represent the orientation on a graduated stereonet.

Another widely used technique for representing orientations is called the ROSETTE. The conventional rosette begins with a horizontal plane (represented by the equatorial (outer) circle of the stereonet). A radial histogram (with arc segments instead of bars) is overlain on this circle, indicating the density of planes intersecting this horizontal surface. The radial orientation limits(azimuth) of the arc segments correspond to the range of STRIKE of the plane or group of planes being represented by the segment. In other words, *the rosette diagram is a radial histogram of strike density or frequency*.

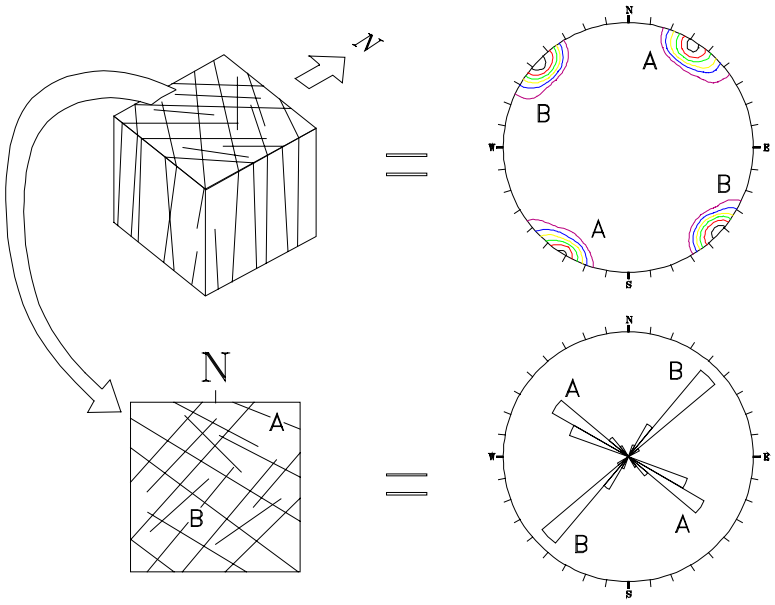


Figure 2.22: The top left figure shows 3-D rock mass structure. Top right figure shows the equivalent pole density stereonet. Bottom left figure shows the intersection of the joint planes with a horizontal section. The bottom right figure shows a radial histogram or rosette of the strike of the joint planes. This rosette approximates the visual impression of the joint intersections with the horizontal plane (bottom left figure).

DIPS has removed the requirement that the base plane of the rosette be horizontal. The plane can be oriented at any orientation in space. The ROSETTE then represents the *apparent* orientation of the lines of intersection between the base plane of the ROSETTE and the planes in the data set.

The line of sight is always specified as being normal to the plane – however a *positive* or *negative* normal line of sight may be chosen. The orientation of the intersection lines are described by their APPARENT STRIKE. (The true STRIKE of a plane is the azimuth of the plane's intersection line with the horizontal, as measured from north.) North is usually at the top of the diagram. Following this convention, the APPARENT STRIKE is measured from the top of the rosette.

Applications of a Rosette?

The rosette conveys less information than a full stereonet since one dimension is removed from the diagram. In cases where the planes being considered form essentially two dimensional geometry (prismatic wedges, for example) the third dimension may often overcomplicate the problem. A horizontal rosette diagram may, for example, assist in blast hole design for a vertical bench where vertical joint sets impact on fragmentation. A vertical rosette oriented perpendicular to the axis of a long topsill or tunnel may simplify wedge support design where the structure parallels the excavation. A vertical rosette which cuts a section through a slope under investigation can be used to perform quick sliding or toppling analysis where the structure strikes parallel to the slope face.

From a visualisation point of view and for conveying structural data to individuals unfamiliar with stereographic projection, rosettes may be more appropriate when the structural nature of the rock is simple enough to warrant 2D treatment.

Using the Rosette Option

The rosette is automatically generated when you enter the **ROSETTE** option from the main menu.

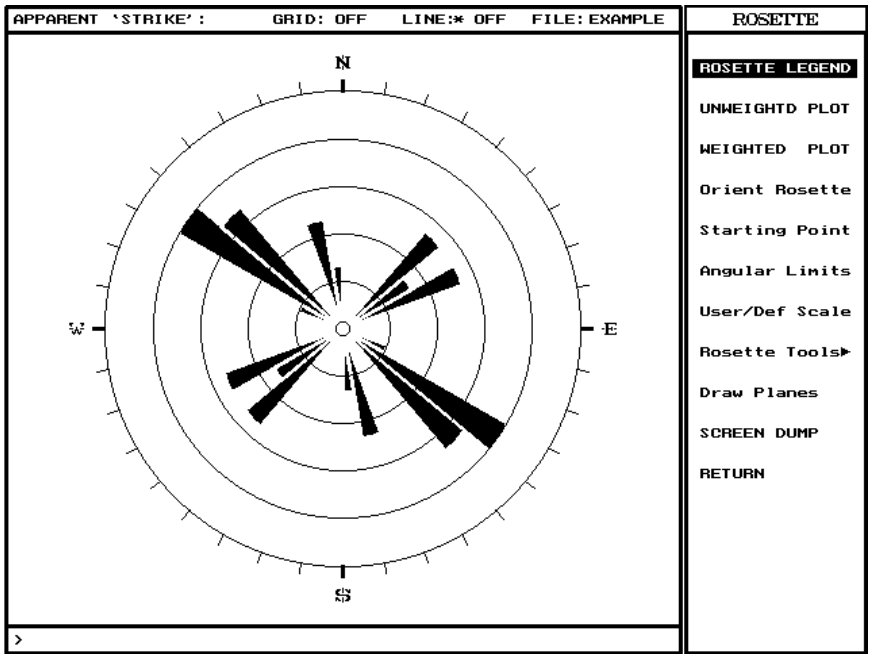


Figure 2.23: The ROSETTE option (default settings).

In the default plot the rosette is generated using a horizontal (equatorial) base plane. NORTH will appear at the top just as in the stereonet. The rosette arcs will have the same apparent strike (= actual strike) as the great circles (planes) in the stereonet. The rosette is divided into 10 degree arc segments and the angular limits of each segment represent a range of strike encompassed by the segment. The interior of the rosette is divided into 5 concentric rings (including the outer ring). These rings represent intervals in terms of "number of planes". The radial length of each arc therefore represents the total number of planes whose strikes fall within the bounding limits of the arc segment.

ROSETTE

ROSETTE LEGEND
UNWEIGHTD PLOT
WEIGHTED PLOT
Orient Rosette
Starting Point
Angular Limits
User / Def Scale
Rosette Tools ✇
Draw Planes
SCREEN DUMP
RETURN

Rosette Menu

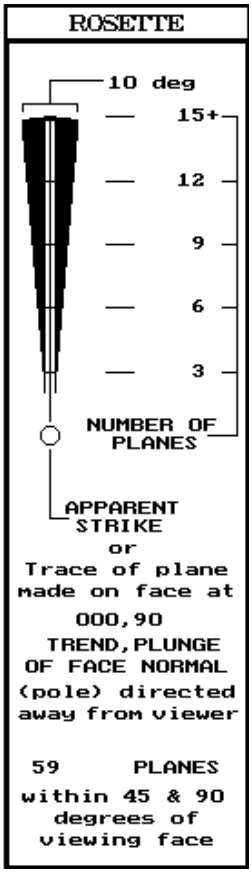
Path: *ROSETTE*

There are a number of user definable settings which can be used to customise the rosette. These are described below. Once the rosette is generated with the desired options, the **SCREEN DUMP** option is available for output as well as a **DXF** file creation option for **Rosette Plot** in the **FILES->DXF FILE OUT** menu.

ROSETTE LEGEND

Path: *ROSETTE / ROSETTE LEGEND*

A sidebar legend can be generated to assist in ROSETTE interpretation.



A representative arc segment is illustrated in the legend. Note that each arc segment has an equal and opposite counterpart (180 degrees apart). The rosette does not differentiate between LEFT and RIGHT handed strike and places planes with strikes 180 degrees apart in the same bin.– a "bin" = range defined by one arc segment. The arc segment in the plot and in the legend is 10 degrees wide. The legend gives a scale (number of planes) for the radial length of the arc segment. This scale can be altered with the **User/Def Scale** option.

The legend reminds the user that the central orientation of each arc segment or bin represents the central **APPARENT STRIKE** of the bin. The legend describes the nature of the plot, gives the orientation of the base plane and indicates the orientation of the line of sight (direction in which the rosette is viewed). See the example shown in the margin for an illustration. eg.

```
Trace of plane
made on face [base plane] at
000,90
TREND,PLUNGE
of face [base plane] normal
(pole) directed away from viewer
```

The default base plane normal is 000,90 (vertical-down) indicating a horizontal plane. The sense of 000,90 means that the base plane surface is viewed from above (i.e. looking down with 000,90 directed 'away from viewer'). If the base plane normal was 000,-90, the rosette would be drawn as if viewed from below, looking up. The base plane orientation and the line of sight can be changed using the **Orient Rosette** option.

Finally the legend indicates the number of planes used to create the rosette and the angular limits used to process the data. These angular limits (45 to 90 degrees in this example) indicate the smallest angle between the base plane or face and the planes in the data set. Only planes within these limits will be used to generate the plot. *The default range ensures that only planes that are more perpendicular than parallel to the base plane will be used*. This range can be changed with the **Angular Limits** option.

UNWEIGHTED PLOT

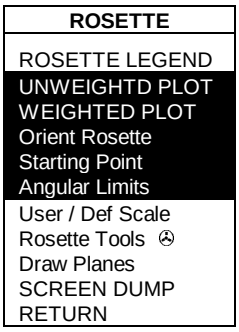
Path: *ROSETTE / UNWEIGHTED PLOT*

The default plot is **UNWEIGHTED**. The scale in this case corresponds to the actual "number of planes" in each bin.

WEIGHTED PLOT

Path: *ROSETTE / WEIGHTED PLOT*

This option utilises the TERZAGHI weighting. The scale in this case corresponds to the **WEIGHTED** number of planes in each bin.



Orient Rosette

Path: *ROSETTE / Orient Rosette*

The default rosette is horizontal. The default normal to the base plane is therefore 000,90 indicating a line of sight directed down from above the plane. A new sight line normal can be specified. *The orientation input is the direction of sight – the base plane is positioned normal to this line.* The top of the rosette will correspond to the top of the user's view. A vertical base plane will have a normal orientation in the form of ###,00, where ### is the azimuth of the sight line normal. A horizontal rosette will have NORTH positioned at the top of the rosette. The sight line normal can be specified with a negative plunge if the rosette is to be viewed from below, looking up.

Starting Point

Path: *ROSETTE / Starting Point*

The leftmost (counter-clockwise) boundary of the first bin is, by default, at azimuth 000. This means that the bin ranges are defined at 10 degrees, 20 degrees, 30 degrees, etc. The starting point can be redefined using a value of 0 to 10 degrees. The rosette bins will define 10 degree intervals starting from this new value. It is advisable that data be viewed from two different starting points (eg. 000 and 005) to filter the ranking artefacts of the radial histogram procedure.

Angular Limits

Path: *ROSETTE / Angular Limits*

The default angular limits are 45-90 degrees. This means that only planes which make a (small) angle of greater than 45 degrees with the base plane will be considered. This range can be set to any pair of values from 0 to 90.

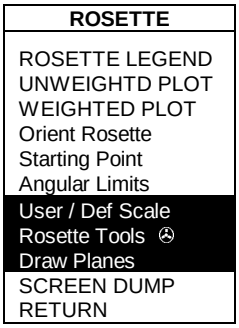
User / Def Scale

Path: *ROSETTE / User/Def Scale*

A default scale is set automatically so that all of the rosette falls inside the circle. This range can be fixed or reset by the user. If the interval selected by the user is too small and some segments of the rosette extend past the outer circle, those rosette segments will be truncated.

Rosette Tools

Path: *ROSETTE / Rosette Tools*



Several drawing tools are available in this menu. Selecting this option activates the LOCATOR cursor in the Upper Status Box. As the cursor is moved around the screen, the APPARENT STRIKE of a line from the circle center to the cursor is displayed.

Line Toggle

Path: *ROSETTE / Rosette Tools / Line toggle* (F4)

A line can be placed on the plot and moved with the cursor to assist in taking apparent strikes off the rosette using the LOCATOR window.

Write Line

Path: *ROSETTE / Rosette Tools / Write Line* (ALT F4)

A line can be permanently placed on the plot.

Insert Text

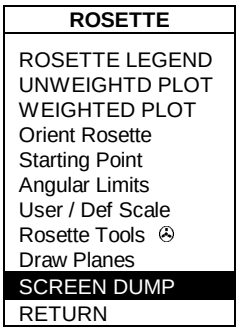
Path: *ROSETTE / Rosette Tools / Insert Text* (F10)

Text can be inserted onto the plot.

Draw Planes

Path: *ROSETTE / Draw Planes*

Any planes created with the **LOCATE POLES** option in the other **PLOT** menus can be plotted on the ROSETTE. Only the APPARENT STRIKE of SELECTED planes within the **Angular Limits** will be plotted.



SCREEN DUMP

Path: *ROSETTE / SCREEN DUMP*

As in the other menus, the screen may be prepared for output using this option. Output may also be created using the **Rosette Plot** option in the **FILES->DXF FILE OUT** menu.

Select **RETURN** or press *Esc* to return to the main menu.

EXIT

To leave DIPS at any time, select the **EXIT** button in the main menu and select *Y* when asked to confirm:

```
> Are you sure you want to EXIT (Y or N)?
```

Alternatively, you can immediately exit DIPS from any menu by pressing the hot key combination ***<Alt X>***.