

GWN-COGO

Version 4
for
MicroStation V8
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MANUAL

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1.0 INTRODUCTION

GWN Systems Inc. is pleased to announce the release this new version of GWN-COGO. GWN-COGO is a series of integrated micro-based software modules designed to work as an interactive graphics Coordinate Geometry package. This package is designed to work with Bentley MicroStation V8.

GWN-COGO allows the professional surveyor to enter, edit and adjust survey data according to standard geometric routines. Supported functions include automatic plotting with annotation, curve, cell and spiral design, area calculations, alignments, audit trail generation, automatic backup of important files, reporting and batch processing.

GWN Systems Inc. is committed to enhancements of current products and development of additional complimentary modules. We also provide custom programming, in-house training services and product development in AEC applications. Information on modules under development is available by contacting GWN Systems Inc.

1.1 Overview

GWN-COGO is a third party software program aimed at users of MicroStation who work in Engineering, Surveying and related disciplines.

It operates seamlessly with MicroStation and may be used with a minimum of training, although a thorough knowledge of GWN-COGO may take some time to acquire considering the number of commands available. Like most CADD operators who know only a few important commands, and know them very well, you can survive without most of the others. Many of GWN-COGOs' commands may never be used by the average person though they might actually save time and effort.

Basically, GWN-COGO loads two programs when started. The COGO product itself and the Feature Table which can operate independently of COGO.

In essence, GWN-COGO is a drafting program that takes a minimum of information required to place points, lines and text and processes the data, draws it to the screen and records it in one of various files for later retrieval. The user can set the parameters for colour, level, style, weight, font, symbols etc. for a feature and whenever that particular "feature" is activated, the settings are retrieved and initiated in MicroStation.

1.2 System Requirements

GWN-COGO is available in a compiled form for the IBM-PC, XT and AT or compatible MS-DOS machines, Windows 98/2000/NT/ME/XP.

MicroStation V8.x

1.3 Functionality

The main mode of processing is interactive with continuous graphic update and easy error recovery. A batch operation mode is also provided for off-line processing using ASCII text files.

The system is pulldown menu based in the same fashion of MicroStation commands. Distances, angles and points may be graphically picked from the view.

MicroStation commands like panning and zooming are fully supported in the COGO environment. The user may move between the COGO and MicroStation environments for easy cartographic positioning of text, manual text placement and other digitizing methods.

Integrity is maintained between the data files and the graphics file. When points are deleted from the database, the appropriate point information is also deleted from the graphic design file.

Automatic plotting of all graphics types are allowed with complete user control of their graphic parameters such as; colour, style, weight, font, text height, text angle, etc.. There are a number of annotation methods available to the user as well. An example of these would be the display of legal distances as input from plans of survey instead of the adjusted distances.

GWN-COGO provides the means to save and set graphic parameters for feature types, such as lots and blocks, in a cadastral mapping application.

The software is designed to enable the user to customization and any unused commands may be removed from the system via the Commands.dat file.

GWN-COGO operates in either 3-D or 2-D design files.

Several parameters exist for the automatic conversion of input data. Any conversion of mean units, such as chains to feet, can be applied to distances before coordinate calculations are made. A combined scale factor based on position and elevation, can be applied to input distances. A convergence factor can be applied to bearings from plans with different bearing derivations and a shift to the coordinates can be applied when using local coordinate systems.

ID's for points and figures may be alphanumeric as well as numeric in nature.

The coordinates are stored as real world double precision numbers.

Reporting capabilities are supported for coordinate listings, inverses, traverse adjustments and area calculations. In addition, an audit trail file is optionally recreated which can be edited and used in batch processing to retrieve lost data.

Data may be backed up either before each operation via the Parameter File settings or the pulldown menu. This heightens GWN-COGOs ability to preserve the security of your data.

Least squares and Compass rule are available for traverse adjustments with up to 300 traverse legs per adjustment.

2.0 INSTALLATION

2.1 Setup For MicroStation V8.x

Double-click the GWN-COGO installation program MS_COGOV8.EXE and follow instructions.

To add these lines from within MicroStation:

From the [User] pulldown, select [Workspace] - [Modify User Configuration]

From the listbox on the left, select "All (Alphabetically)".

Activate the "New..." button

Enter then environment variable **MS_COGO** in the "Variable" text field.

Enter the directory path terminated with a "\" in the "New Value" text field and activate the "OK" button.

Repeat for environment variable **MS_FEAT**.

Activate "OK" button.

To add the font library that GWN-COGO typically uses to plot point symbols:

At the MicroStation command line, type "**mdl load fontinst**".

From the dialogue box that appears, activate the "Open" button on the left, below the "Source File" listbox.

Go to the GWN_COGO directory.

In the file listbox, "**cogoFont.rsc**" should appear. Highlight it and activate the "OK" button.

Activate the "Open" button on the right side of the main dialogue box and select the file "**Font.rsc**" in the MicroStation directory.

From the "Source File" listbox, highlight the line "**85 font85**".

Activate the "Copy" button found between the two listboxes and ensure that the line is indeed added to the "Destination File" listbox.

Activate the "Done" button.

2.2 Upgrade Procedure

Before installing an update, we recommend that you save your "Feature.tbl" file into the "GWN_FEAT" directory.

Perform a regular installation, then copy your saved "Feature.tbl" file into the "GWN_FEAT" directory.

Ensure the MicroStation environment variables are properly.

2.3 Software Lock Installation

This copy of GWN-COGO is protected from unauthorized use via a software lock. The software lock will function for 15 days after installation without an unlock key. On activating COGO, a reminder dialog box appears with a machine fingerprint ie. "**B3DC-4F4A**". For an authorization request, email you user name and machine fingerprint to support@gwnsys.ca. An unlock key will be generated and returned by email.

After the key is acquired, select ENTER KEY in the reminder dialog box. Cut and paste the NAME and KEY information from the email into the appropriate keyin areas in the dialog box and select OK.

2.4 File Naming:

A file is identified by a name consisting of two parts; the primary file name and the extension. The primary file name (consisting of up to eight characters) is always required. The extension (consisting of up to three characters) is optional for many user created files but there use is highly recommended. A dot "." is used to divide the file name and its extension:

filename.ext

Valid characters for a filename are limited to the following:

A - Z a - z \$ & # % ' () - @ { } ~ ! _

3.0 GETTING STARTED

3.1 Creating the Design File

It is assumed that MicroStation has been previously loaded and is fully operational at this point. It is also assumed that GWN-COGO has successfully been installed before continuing with the following steps.

A design file for use with GWN-COGO is created using normal MicroStation commands. (See MicroStation documentation for more information) The specification of the file units and offsets are critical for smooth and trouble free operation but depend on the type of coordinate system being used, the map projection system and the map scale.

3.2 Using The GWN-COGO Menu System

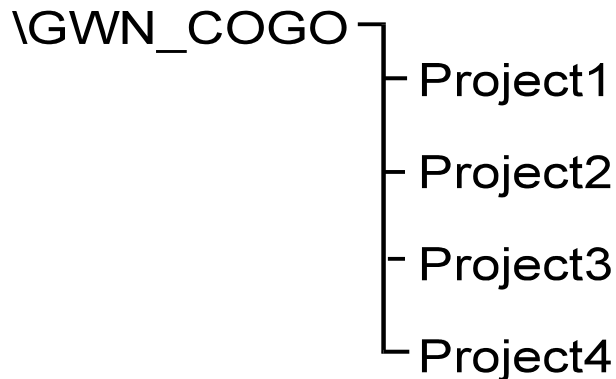
A pulldown menu system has been provided for GWN-COGO allowing quick and easy access to all commands. The Parameter file and Feature table, also accessed via the pulldown menu, incorporate similar styles of button oriented dialogue boxes.

Both the Backup/Restore commands may be executed from a pulldown menu as well as Batch Processing mode.

3.3 Using Project Directories

In the production environment, it is important to have well organized file structures. Such setups allow easy archiving, backup, copying and removal of files pertaining to that project.

Recommended setup:



Each project directory would house the point, figure and parameter file associated with that individual project. This would be accomplished by moving into that directory before entering the MicroStation environment or shelling to DOS and moving into that directory before operating on its design file.

To move between directories in DOS, use the following simple commands:

cd <directory name> - to change from your present directory to an adjacent one.

md <directory name> - to create a directory adjacent to your present directory.

3.4 Default Graphics Parameters

Before generating GWN-COGO data structures and starting to run COGO (see Chapter 5) it may be useful to talk about default graphics parameters. The “Feature.tbl” file has a feature already specified called “default” and this is the feature used whenever the command “New Job” is executed to establish the graphics parameter values.

It is recommended that the user review and modify the “default” feature before the “New Job” command is executed which will then create the GWN-COGO data structures. See Chapter 8 for more details on modifying the Feature Table.

4.0 INTERACTIVE OPERATION

4.1 Loading GWN-COGO:

All GWN-COGO commands may be accessed via the pulldown menu bar, similar in nature to the MicroStation command window pulldowns. To load GWN-COGO and accessing the pulldown menu, type the following in the Command Window text field:

“mdl load ms_cogo:cogo <cr>“

MicroStation is case insensitive so commands may be in capitals or lower case.

4.2 Starting a New Job:

When starting a new project, the user must execute the “New Job” command in GWN-COGO to create files needed by the software to store the necessary data. These files are:

Parameter File
Figure Table
Coordinate File

These files are created by operating the [Utilities] - [New Job] command on the pulldown menu while in the directory to be used by the project. This is important so that these files, as well as other files GWN-COGO may create regarding this project, are all located in the same place for smooth, trouble-free operation. It also allows the user to more easily backup files and maintain the directories.

This command will not overwrite the existing files should they already be present, however the command should only be executed once (at the start) of the design project. For further information on “New Job”, refer to the Chapter 10 in this manual.

4.3 Input Prompts:

The prompts apply only to the command line mode of operating GWN-COGO but the form of the input applies to the dialogue boxes as well.

| Prompt | Allowable Entry Modes | | | | | | | | | | | | |
|--------------------|--|----------|----------------------------|-----|----------------------------|-------|-------------------------------|--------------|--|--------------------|---|----------------|--|
| ANG> | <p>Keyin, specify an angle graphically using three points with a G delimiter or a combination of the two. Clockwise angles are positive.</p> <p>Examples:</p> <table> <tr> <td>45-00-00</td><td>-simple angle (45 degrees)</td></tr> <tr> <td>45.</td><td>-simple angle (45 degrees)</td></tr> <tr> <td>45.39</td><td>-simple angle (45.39 degrees)</td></tr> <tr> <td>-45 30 23.45</td><td>-simple angle keyin (negative 45 deg. 30 min. 23.45 sec)</td></tr> <tr> <td>(45-00-00 + 34.67)</td><td>-complex keyin (totaling 79.67 degrees)</td></tr> <tr> <td>G 102 103c 104</td><td>-simple keyin or graphic pick describing an interior angle from 102 to 103c (interior point) out to 104.</td></tr> </table> | 45-00-00 | -simple angle (45 degrees) | 45. | -simple angle (45 degrees) | 45.39 | -simple angle (45.39 degrees) | -45 30 23.45 | -simple angle keyin (negative 45 deg. 30 min. 23.45 sec) | (45-00-00 + 34.67) | -complex keyin (totaling 79.67 degrees) | G 102 103c 104 | -simple keyin or graphic pick describing an interior angle from 102 to 103c (interior point) out to 104. |
| 45-00-00 | -simple angle (45 degrees) | | | | | | | | | | | | |
| 45. | -simple angle (45 degrees) | | | | | | | | | | | | |
| 45.39 | -simple angle (45.39 degrees) | | | | | | | | | | | | |
| -45 30 23.45 | -simple angle keyin (negative 45 deg. 30 min. 23.45 sec) | | | | | | | | | | | | |
| (45-00-00 + 34.67) | -complex keyin (totaling 79.67 degrees) | | | | | | | | | | | | |
| G 102 103c 104 | -simple keyin or graphic pick describing an interior angle from 102 to 103c (interior point) out to 104. | | | | | | | | | | | | |

| | | |
|--------------------|--|---|
| | (G 102 103c 104 + 56-25-30) | -complex input combining an interior angle between three points and 56 deg. 25 min. 30 sec. |
| ARC_LEN> | Keyin a specific distance, graphically pick two points (using the delimiter "D") or a combination of the two. (see "Dist" format) | |
| AREA> | Keyin an area amount. | |
| CENTR> | Keyin an existing point ID or identify a point graphically (see "Pnt" format) | |
| COMM> | <cr> or data pick with the mouse/puck to accept the loaded data and to send it to be processed. Use the Reset on the mouse/puck to reject the input and restart the command. | |
| DEFL> | Key-in, specify a graphically defined angle using three points (using the "G" delimiter) or any combination of the two. (see "ANG") | |
| DESC> | <p>A description using any number of points and/or figures.</p> <ul style="list-style-type: none"> • Points will be enclosed by rounded brackets "()". • Figure numbers enclosed in square brackets "[]" will be treated as a single figure. • Figure numbers enclosed in round brackets "()" will be treated as a group of figures. <p>A hyphen "-" can be used to indicate a range of numbers (in ascending order only). There cannot be any spaces before or after the hyphen.</p> <p>When embedding a curve in the description, preface the ID of the centre point of the curve (pivot point) with a "C" and end it with a "L" or "R" (left / right) without any spaces between these characters. e.g.: C123R or C124L</p> <p>When embedding a spiral into the description, preface the point ID of the intersection of the tangents with "SC" (spiral to curve) or "TS" (tangent to spiral) and end with "L" or "R" (left / right). e.g.: SC123L, TS123R, etc..</p> <p>Note that only certain commands support spirals as indicated in the command description section of this manual.</p> <p>Example: (12 C14R 15 20-25 77 TS65L 32) This example describes a curve right from pnt 12 to 15 with a pivot at 14, all points from (and including) 20 to 25, point 77, tangent to spiral (pivot on point 65) going left to point 32.</p> <p>The maximum figure size when using the square brackets is 1000 characters and the number of points making up these figures cannot exceed 2000.</p> | |
| DesINFO> | Key-in a text string without any embedded blanks for the purpose of describing the point in question. Can be used in Annotate Coordinate command. | |

| | |
|---------------------|--|
| DIR> | Key-in a bearing, azimuth graphically pick two points (use "A" delimiter) or any combination. Example: 45-00-00 Simple azimuth key-in (45 degrees from north) 45. Simple azimuth key-in (45 degrees from north) 279.67 Simple azimuth key-in (279.67 degrees from north) -45 30 23.45 Simple azimuth key-in (neg. 45 deg. 30 min. 23.45 sec.) N45E Simple bearing key-in (north 45 deg. east) s45.5w Simple bearing key-in (south 45.5 deg. west) n 79 40.2 e Simple bearing key-in (north 79 deg. 40.2 min. east) s 79-40-12e Simple bearing key-in (south 79 deg. 40 min. 12 sec. east) (45-00-00 + 34.67) Complex azimuth key-in (same as 79.67 deg. from north) A 102 103 Direction defined by two points selected graphically (point 102 toward point 103) (A 102 103 + 56-25-30) Complex input combining a graphic definition using two points and adding 56 deg. 25 min. and 30 sec. (A 102 103 - A 56 90) Complex input using two graphic definitions where the second bearing/azimuth is subtracted from the first) 1..25.123 Numerical method for inputting quadrant bearings with "1.." meaning "NE", "2.." meaning "SE", "3.." meaning "SW" and "4.." meaning "NW". This is valid with all other formats and combinations. |
| DIST> | Key-in, use graphic description of two points (using "D" delimiter) or any combination. Examples: 45. Simple distance key-in (45 units) 450 Simple distance key-in (450 units) (45. + 34.67) Complex distance key-in (79.67 units in total) D 102 103 Graphically picked description of the distance between points 102 and 103. (D 102 103 + 56.2530) Complex input combining a graphically picked description of the distance between points 102 and 103 plus 56.2530 units. (D 102 103 - D 56 90) Complex input using graphically picked descriptions of the distance between points 102 and 103 minus the distance between points 56 and 90. |
| DIST_DES> | Key-in a distance describing a group of distances. Multiple distances of the same magnitude are indicated by prefixing the distance with the asterisk character (*) and prefixing this asterisk with the number of the distances (legs). These distances may become altered slightly to fit the number of legs requested. There must not be any spaces between the numbers and the asterisk. Example: (20*150.5 10*100) -20 legs of 150.5 units each and 10 legs of 100 units each The character (#) is used to preface distances where the distance must be held constant regardless of the number of legs specified. There must not be any spaces between the numbers and "#" sign. Example: (20#100 5#25) -20 legs of exactly 100 units and 5 legs of exactly 25 units. |

| | |
|-----------------------|---|
| EAST> | Key-in the Easting coordinate portion. |
| ELEV> | Key-in the elevation. |
| FEATURE> | Key-in an existing feature ID or asterisk (*) to indicate all features where applicable. |
| FGN> | Key-in a figure number of an existing figure. |
| HEIGHT> | Key-in the height of instrument or the target. |
| NEWFIG> | Key-in a new ID number for a figure (may range from 1 to 10000). |
| NEWPNT> | Key-in a new point ID or <cr> to auto-increment the point ID (max. length of ID of eight alphanumeric characters). |
| NORT> | Key-in the Northing coordinate portion. |
| NorTOL> | Key-in a tolerance distance (see Extract command). |
| NO_DIV> | Key-in the number of divisions desired. |
| OFF> | Key-in, specify a distance graphically using two points (with "D" delimiter) or a combination of the two. |
| PNT> | Key-in the point ID or graphically select the point. |
| RADIUS> | Key-in, graphically pick using two points (with the "D" delimiter) or a combination. (see "DIST") |
| SIGN> | Key-in "1" or "-1". (Usually, 1 indicates Clockwise or Near and -1 indicates CCW or Far) |
| SPIRAL_LEN> | Key-in, graphically describe a distance using two points (using "D" delimiter) or a combination of the two. (see "DIST" format) |
| STATION> | Key-in a station (point ID). |
| UNKNO> | Key-in (assumed to be a user supplied addition to the data input string). |
| VERT_ANGLE> | Key-in angular displacement from the zenith. (see "ANG" format) |
| <cr> | A carriage return used to describe the action of entering a command, accepting an input, etc.. |
| <r> | A Reset used to reject or to return to the start of a command. |

5.0 TUTORIAL

This chapter is meant to be a step by step tutorial in the creation of a sample jobs starting from preparation of the design file for use with GWN-COGO through to the drawing, annotation and coordinate adjustment processes.

There is a separate section for batch processing, creating a traverse file, horizontal adjustment and a horizontal alignment.

A number of GWN-COGO commands will be used but it would be very difficult to use all as some will be more functional and easier to use in some situations than others.

Within the “\GWN_COGO\DEMO” directory, there are a number of existing files. This tutorial will operate on these files in this directory.

Before beginning, ensure that the installation process has been performed without errors and the MicroStation environment variables that GWN-COGO uses are properly set.

5.1 Batch Processing

This operation allows the use of ASCII text files to input and manipulate most of GWN-COGO commands. In fact, the audit trail file created as the project is worked on can be used to recreated both the database and design file elements via this process should it ever be required.

The following, in Figure 5.1, is a sample of the “Demo1.cmd” file which is one of the included demo files in GWN-COGO for batch processing. The comments on the right are added to explain various parts of the file.

| | |
|--|---|
| Set Plot Symbol On | These lines set the Autoplot settings for the graphical environment which can be changed at any time throughout the batch file. |
| Set Plot Line Off | |
| Set Plot Id On | |
| Set Plot Distance Off | |
| Set Plot Arc Annotation Off | |
| Set Plot Angle Off | |
| Store Point | Note that all commands start on the left margin and that all input data is indented at least one space. |
| 2 100815.010 100890.010 | |
| Locate Direction | Multiple inputs can be made by merely inputting continuing data strings on new lines since the command to will remain active until changed. |
| s0-15-0.e 445 | |
| s83-55-8.w 103.52 | |
| s33-59-21.w 157.49 | |
| n82-42-56.w 145 | |
| s7-17-4.w 10 | |
| n82-42-56.w 200 | |
| n7-38-7.e 259.86 | |
| s90-0-0.e 28 | |
| n0-0-0.e 295.16 | |
| s90-0-0.e 470 | These inputs may be up to 1000 characters long in one line. To exceed this length would force GWN-COGO to truncate the input string. |
| Locate Direction | |
| s90 0 0.e (127.5 + 102.5 + 65.5) 11 20 90. 0.0 | |
| s0 0 0.w 203.18 20 21 90. 0.0 | |
| s90 0 0.w 186.1 21 901 90. 0.0 | |

```

Locate Angle
21 901 22 39-30-0. 186.1 90. 0.0
Locate Direction
s39-30-0.w 142 22 23 90. 0.0

```

You can get around this however by adding a “/” before the 255th character indicating that the next line should be added to the first.

Figure 5.1: Batch File Example

To execute a batch file, enter the MicroStation environment, load GWN-COGO and from the **[Utilities]** pulldown, select **[Batch Processing]**. It is as easy as that.

Enter the “\GWN_COGO\DEMO” directory and start MicroStation.

```
C:\GWN_COGO\DEMO\> ustation demo <cr>
```

Load GWN-COGO by typing in the following:

```
mdl load ms_cogo:cogo <cr>
```

Press “**Enter**” and if the environment variable “ms_cogo” has been added correctly to either “Uconfig.dat” or “Default.ucf” files, GWN-COGO should load and display the main pulldown menu somewhere in the view.

Type in: “**fit all** <cr>” and digitize somewhere in the view window.

You should find a diagram of a parcel of land with a road traveling up the centre and lots dividing the area to the right and left of the road. This is the result that would be obtained by running the first of the included batch files in the demo directory.

From the **[Utilities]** pulldown, select **[Batch Processing]**.

A dialogue as shown in Figure 5.2 following will appear. From the file list, find and digitize on the file called “Demo2.cmd” as shown in Figure 5.2.

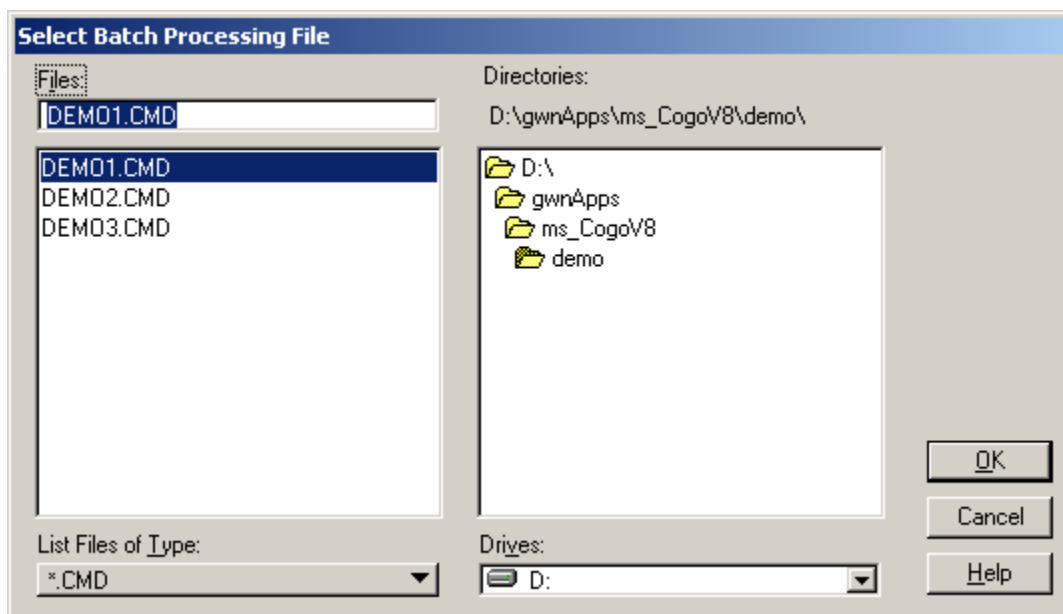


Figure 5.2: Batch Processing Dialogue Box

Immediately following the acceptance of the file name, an Alert box will appear if "Autosave" has not been activated and to ask if you would like the files backed up at that time. Select **"Cancel"** as there is nothing important to back up right now. Were "Autosave" enabled, this box would not be displayed.

The words "Processing input..." should appear in the MicroStation command window. Depending on the settings existing in the autoplot modes and those set via the batch file, you may see elements drawn to the design file. This demo batch file displays points after they are all stored so that you will see the whole block of data being displayed after processing is complete.

Were there syntax errors in the input or command names misspelled, a dialogue box would appear to warn you. Duplicate points and figures would also be displayed in a dialogue box that would allow you to either redefine the ID at the new coordinates, rename the new figure or point ID, or abort the entire process. There should not be any errors in any of the demo files.

Within a few moments, the file will be entirely processed and a message in the command window will alert you to either a successful completion or how many errors were encountered. (A limit on errors before exiting the process is user definable in the Parameter File) The result is shown in Figure 5.3 following.

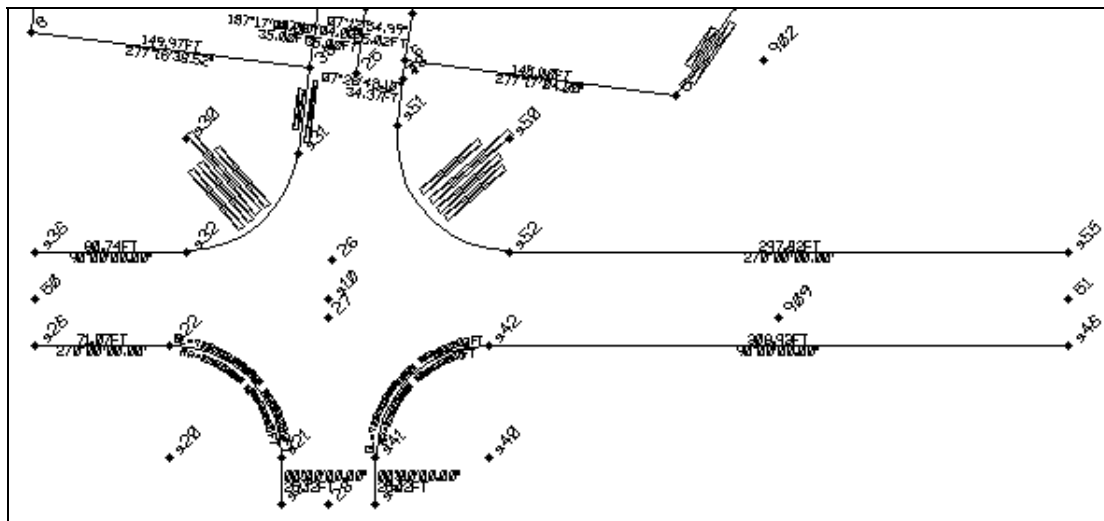


Figure 5.3: Demo2.cmd Batch File Results

"Demo3.cmd" is another batch file included in the installation which will create a culdesac at the Eastern end of the road created in "Demo2.cmd".

Either exit MicroStation or shell out to DOS and start up any ASCII text editor or word processor and create a new batch file. Use the following to create this file:

| Batch file input | Description |
|--------------------|---|
| set plot ID on | The first command to create points starting at 1000 through to 1003 |
| set plot symbol on | |
| Store Point | |
| 1000 101000 100820 | |
| 1001 101000 100900 | |
| 1002 101100 100900 | |

| | |
|--|--|
| 1003 101100 100820 | |
| Store Figure | |
| 100 (1000 1001 1003 1002) A simple figure | Command to store a figure |
| Plot Figure | Figure ID, description and a text string added at the end. |
| 100 | |

In this file, a text string has been added to the end of the line describing the points to be used to create the figure "100". This text may be used at any time when inputting the description to figures and will be stored with the associated data to be displayed when editing or listing the stored figures.

Save the file and run it through the batch process. If done correctly, a vertical rectangle of points will be created just North of the results of the batch file "Demo1.cmd". Select [Meas/Rep] - [List Figures] to display the text string added in the file after the description closing ")" rounded bracket.

5.2 Sample Sub-Division Project

In this tutorial, we will stake out the perimeter of a parcel of land which will be sub-divided into lots. The traverse will be adjusted using Compass Closure to find the true coordinates of the corner markers.

In the field notes, the position of the surveyor at the start is over a previously placed pin indicating the North-East corner of the parcel of land. The loop is closed on the same pin.

Each leg of the traverse is made taking angles and distances. The "Interactive Traverse" command uses directions and distances to calculate coordinates of the ends of the traverse legs.

Step 1: Project Setup

The first thing we must do is set up the working directory and create the necessary files. For our purpose, we will create a copy of the "Demo.dgn" file in a separate directory using MicroStation.

Make a new directory off of the demo directory called "TRAV", change to it and start MicroStation. When prompted, select the "Demo.dgn" file from the "Demo" directory.

Once in the MicroStation environment, place a fence in an area clear of any elements using the "Place Fence" command. After placing the fence, type in the following line which will create a new blank design file called "Trav.dgn" with the same settings as the "Demo.dgn" file: (ff is short for "file fence")

```
ff=<drive>:\gwn_cogo\demo\trav\trav.dgn <cr>
```

Next, change over to the new design file by typing in the following:

```
rd=trav.dgn <cr>
```

The copied design file should come up clean of any elements to work on that exactly matches the settings of the "Demo.dgn" file (for use with this tutorial).

Load GWN-COGO by typing in “**mdl load ms_cogo:cogo** <cr>” and from the [Utilities] pulldown, select [Feature Table] - [Modify Non-Feature Data (COGO)] and turn on the toggle for “Include Feature in Point Information” and set the Point Information size to at least “84”.

Now we are ready to create the new files. From the [Utilities] pulldown, select [New Job] to create the basic parameter, point and figure files needed to operate GWN-COGO.

We are now ready to begin working with GWN-COGO.

Step 2: Traverse and Adjustment

Tables 5.1 and 5.2 following, show the data relating to the placement of the corners of the project. As the shape of the parcel of land is not uniform, there are more than the usual four corners. “Compass Closure” will be used to adjust the coordinates of the data before subdividing the lots via the “Interactive Traverse” command.

For our purposes, the data listed in Table 5.1 and 5.2 are given.

| Station | Northing | Easting | Elevation |
|---------|------------|------------|-----------|
| 2 | 100815.010 | 100890.010 | 0.0 |

Table 5.1: Tie-Down Point On The Traverse

| ID | Direction | Distance |
|----|-------------|----------|
| 3 | S0-15-0.E | 445 |
| 4 | S83-55-8.W | 103.52 |
| 5 | S33-59-21.W | 157.49 |
| 6 | N82-42-56.W | 145 |
| 7 | S7-17-4.W | 10 |
| 8 | N28-42-56.W | 200 |
| 9 | N7-38-7.E | 259.86 |
| 10 | S90-0-0.E | 28 |
| 11 | N0-0-0.E | 295.16 |
| 12 | S90-0-0.E | 469.90 |

Table 5.2: Directions and Distances of Traverse

From the [Store/Delete] pulldown, select [Store Point]. Use the data for point 2 in Table 5.1 to create the start/finish point in the design file. This point is used by the traverse command to base the placement of the other points it generates as well as the linear misclosure.

From the [Horz.Adj.] pulldown, select [Interactive Traverse]. The dialogue box as shown in Figure 5.4 will appear.

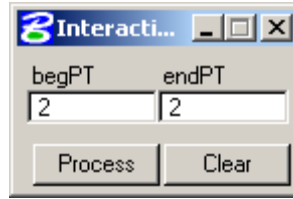


Figure 5.4: Interactive Traverse Dialogue Box

As this traverse involves a closed loop, points 2 and 12 are theoretically the same point but in fact, point 12 is the calculated position of point 2 based on the distances and angles recorded. Input the data as shown in Figure 5.4 and activate the “Process” button. A dialogue box as shown in Figure 5.5 following will appear.

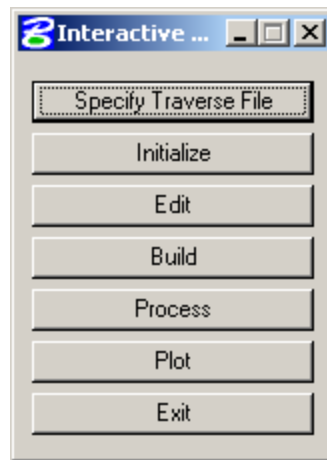


Figure 5.5: Interactive Traverse Sub-Menu Dialogue Box

We have to set up a traverse file to store the input data. This is accomplished by activating the “**Specify Traverse File**” button. The dialogue box shown in Figure 5.6 following will appear with the default file name “Trav.tmp”. Either accept this name or input any other valid file name but for this tutorial simply accept this name.

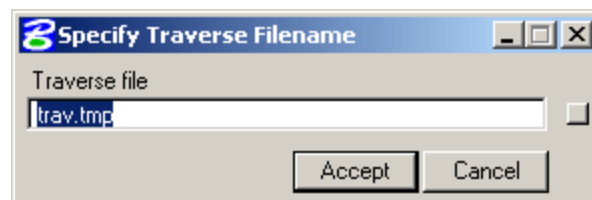


Figure 5.6: Specify Traverse Filename Dialogue Box

Next, we will initialize the file to ensure that there is no garbage information that would create problems later. To do this, simply activate the “**Initialize**” button on the main dialogue box.

To input the traverse data into this new file, select the “**Edit**” button and the dialogue as shown in Figure 5.7 following will appear.

The dialog box is titled "Interactive Traverse Editor". It has a "File" menu at the top left. Below the menu, it says "Traverse File Name: TRAV.TMP". The main area contains a list box with the following data:

| REC | PID | DIRECTION | DISTANCE |
|-----|-----|-------------|----------|
| 1 | 3 | S0-15-0.E | 445 |
| 2 | 4 | S83-55-8.W | 103.52 |
| 3 | 5 | S33-59-21.W | 157.49 |
| 4 | 6 | N82-42-56.W | 145 |
| 5 | 7 | S7-17-4.W | 10 |
| 6 | 8 | N28-42-56.W | 200 |
| 7 | 9 | N7-38-7.E | 259.86 |
| 8 | 10 | S90-0-0.E | 28 |
| 9 | 11 | N0-0-0.E | 295.16 |
| 10 | 12 | S90-0-0.E | 463.90 |
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |
| 15 | | | |

At the bottom of the list box, there are four input fields: "12", "S90-0-0.E", "463.90", and an empty field. To the right of the list box are three buttons: "Insert", "Delete", and "Apply".

Figure 5.7: Edit Traverse File Dialogue Box

To enter the data, highlight the first row of the list box and in each of the text fields found at the bottom of the dialogue, enter the ID, direction and distance of that leg as shown in Table 5.2. Use the "Tab" button to jump from text field to field and once more at the end to have the data display in the listbox. Then highlight the next row and repeat the input process until done.

When done, select from this dialogue box the **[File] - [Save]** pulldown item to store the data in the traverse file "Trav.tmp" and double click in the upper left corner to close the box.

Now that the traverse information is ready to process, activate the **"Build"** button to generate coordinates for the positions of the ends of the legs of traverse. These coordinates are stored with the ID's in the traverse file automatically.

At this point we process the data using Compass Closure Rule by activating the **"Process"** button. Reports generated are shown in Figures 5.8, 5.9 and 5.10 following for this data. Report 1 is the calculation of the generated points, Report 2 is the adjusted coordinates and Report 3 is the summary report.

| ID | TRAVERSE DIRECTIONS | | | Distance |
|----|---------------------|----------------------------|--|----------|
| | Northing | Easting Azimuth | | |
| 2 | 100815.01 | 100890.01 179°45'00.00" | | 445.00FT |
| 3 | 100370.01 | 100891.95 263°55'08.00" | | 103.52FT |
| 4 | 100359.05 | 100789.01 213°59'21.00" | | 157.49FT |
| 5 | 100228.47 | 100700.97 277°17'04.00" | | 145.00FT |
| 6 | 100246.85 | 100557.14 187°17'04.00" | | 10.00FT |

| | | | | |
|----|-----------|---------------|----------|--|
| 7 | 100236.93 | 100555.87 | | |
| | | 331°17'04.00" | 200.00FT | |
| 8 | 100412.34 | 100459.78 | | |
| | | 07°38'07.00" | 259.86FT | |
| 9 | 100669.89 | 100494.31 | | |
| | | 90°00'00.00" | 28.00FT | |
| 10 | 100669.89 | 100522.31 | | |
| | | 00°00'00.00" | 295.16FT | |
| 11 | 100965.05 | 100522.31 | | |
| | | 90°00'00.00" | 469.90FT | |
| . | 100965.05 | 100992.21 | | |
| | | 214°15'36.58" | 181.54FT | |
| 2 | 100815.01 | 100890.01 | | |

Figure 5.8: Interactive Traverse Report 1

| COMPASS CLOSURE SUMMARY | | | | |
|-------------------------|-----------|---------------|----------|----------|
| ID | Northing | Easting | Azimuth | Distance |
| 2 | 100815.01 | 100890.01 | | |
| | | 182°21'06.01" | 476.98FT | |
| 3 | 100338.43 | 100870.44 | | |
| | | 260°22'14.03" | 109.48FT | |
| 4 | 100320.12 | 100762.50 | | |
| | | 214°00'38.15" | 171.01FT | |
| 5 | 100178.36 | 100666.84 | | |
| | | 273°04'16.94" | 151.06FT | |
| 6 | 100186.45 | 100516.00 | | |
| | | 189°21'24.63" | 10.77FT | |
| 7 | 100175.82 | 100514.25 | | |
| | | 326°43'58.29" | 192.80FT | |
| 8 | 100337.03 | 100408.49 | | |
| | | 05°14'53.55" | 240.12FT | |
| 9 | 100576.14 | 100430.45 | | |
| | | 94°15'55.44" | 26.72FT | |
| 10 | 100574.15 | 100457.10 | | |
| | | 357°01'15.91" | 274.58FT | |
| 11 | 100848.36 | 100442.83 | | |
| | | 94°15'55.44" | 448.42FT | |
| 2 | 100815.01 | 100890.01 | | |

Figure 5.9: Interactive Traverse Report 2

| COMPASS CLOSURE SUMMARY | | | | |
|-----------------------------|--------------|---------------------|-----------|------------------|
| ID | Northing | Easting | Azimuth | Distance |
| Angular misclosure | | 00°00'00.00" | | |
| Correction | | 00°00'00.00" | | |
| Traverse Length | | 2113.93FT | | |
| Linear misclosure (eas nor) | | -102.1984 -150.0412 | | |
| Total | 181.5402 (1: | 11) | Allowable | 0.0300 (1: 5000) |

Figure 5.10: Interactive Traverse Report 3

Check the angular and linear misclosures to see if they are acceptable. If not, perhaps the data was incorrectly entered or the survey was too inaccurate to accept and will have to be redone. Our misclosure is totally out of line and we should check the data used for the traverse and the position of the starting point.

Close the final report and call up the **[Meas/Rep]** - **[List Coords]** command and input **"(2)"** in the text field. Check the coordinate readout against Table 5.1.

If that matches, check the traverse input by activating the **"Process"** button on the "Interactive Traverse" dialogue (with "2" in each field). Specify the file again but DO NOT activate the "Initialize" button or all data will be lost and have to be completely re-input. Instead, select **"Edit"** and view the traverse info.

Note that the last point "12" has the ID missing since this coordinate point will be the same as the second of the two point ID's entered in the dialogue box in Figure 5.4 The error is that point 8 should have a direction of "N82-42-56.W" instead of "N28-42-56.W". Highlight that row of data, edit the input showing in the text field and "Tab" out of the three fields to have the data change in the listbox.

Save the file again, run **"Build"** and **"Process"** and compare the summary report to Figure 5.13 as well as the pre and post adjustment data in Figure 5.11 and 5.12 following. The closure should be better but the acceptable tolerances depend on your expectations.

| TRAVERSE DIRECTIONS | | | | |
|---------------------|-----------|----------------------------|----------|--|
| ID | Northing | Easting Azimuth | Distance | |
| 2 | 100815.01 | 100890.01 179^45'00.00" | 445.00FT | |
| 3 | 100370.01 | 100891.95 263^55'08.00" | 103.52FT | |
| 4 | 100359.05 | 100789.01 213^59'21.00" | 157.49FT | |
| 5 | 100228.47 | 100700.97 277^17'04.00" | 145.00FT | |
| 6 | 100246.85 | 100557.14 187^17'04.00" | 10.00FT | |
| 7 | 100236.93 | 100555.87 277^17'04.00" | 200.00FT | |
| 8 | 100262.29 | 100357.49 07^38'07.00" | 259.86FT | |
| 9 | 100519.85 | 100392.01 90^00'00.00" | 28.00FT | |
| 10 | 100519.85 | 100420.01 00^00'00.00" | 295.16FT | |
| 11 | 100815.01 | 100420.01 90^00'00.00" | 469.90FT | |
| . | 100815.01 | 100889.91 88^14'53.26" | 0.10FT | |
| 2 | 100815.01 | 100890.01 | | |

Figure 5.11: Interactive Traverse Report 1

| COMPASS CLOSURE SUMMARY | | | | |
|-------------------------|-----------|----------------------------|----------|--|
| ID | Northing | Easting Azimuth | Distance | |
| 2 | 100815.01 | 100890.01 179°44'50.72" | 445.00FT | |
| 3 | 100370.01 | 100891.97 263°55'07.30" | 103.52FT | |
| 4 | 100359.05 | 100789.04 213°59'13.46" | 157.49FT | |
| 5 | 100228.47 | 100701.00 277°17'05.46" | 144.99FT | |
| 6 | 100246.85 | 100557.18 187°16'54.83" | 10.00FT | |
| 7 | 100236.93 | 100555.91 277°17'05.46" | 199.99FT | |
| 8 | 100262.29 | 100357.54 07°38'16.16" | 259.86FT | |
| 9 | 100519.85 | 100392.07 89°59'59.72" | 28.00FT | |
| 10 | 100519.85 | 100420.08 00°00'09.28" | 295.16FT | |
| 11 | 100815.01 | 100420.09 89°59'59.72" | 469.92FT | |
| 2 | 100815.01 | 100890.01 | | |

Figure 5.12: Interactive Traverse Report 2

| COMPASS CLOSURE SUMMARY | | | | |
|-----------------------------|-------------------|--------------------|------------------|--|
| ID | Northing | Easting Azimuth | Distance | |
| Angular misclosure | 00°00'00.00" | | | |
| Correction | 00°00'00.00" | | | |
| Traverse Length | 2113.93FT | | | |
| Linear misclosure (eas nor) | 0.0951 | 0.0029 | | |
| Total | 0.0952 (1: 22216) | Allowable | 0.0300 (1: 5000) | |

Figure 5.13: Interactive Traverse Report 3

The final step in this process is to plot the result but before doing so, check the autoplot settings ([Utilities] - [Autoplot]) to ensure everything is on (or as you desire) before activating the "Plot" button on the "Interactive Traverse" dialogue box.

Step 3: Sub-Divide Lots

Now we can subdivide the lot into parcels and add a two lane road curving through the center using a number of the more common GWN-COGO commands.

Since the road will curve through the parcel of land, it would be best to define the road centre line and its' boundaries. Starting from the North-West corner, we measure over two lots of 127.5 and 128 feet plus half the road width of 80 feet (narrower at other end of road). As this point is in line with points 11 and 2, we could use "Locate Direction" using the two points as the direction from point 11 or even "Locate Angle".

Table 5.3 lists the commands and inputs for the placement of the points in the road center line. Use this table to create the points.

Before plotting points, we should adjust the autoplot settings using the **[Utilities]** - **[Autoplot]** dialogue box. Turn “ON” Point ID and Point Symbol. Turn “OFF” everything else then activate these selections by double clicking on the upper left corner which will close the dialogue box and activate the commands.

Note that “(extra text)” in the “Store Figure” command is text added after the closing bracket in the description of the points/figures defining the figure and not another prompted field or extra dialogue box text field. This is text that will be stored with the description in the figure table and can be viewed when listing figures or in the “Edit Figure Table” dialogue box.

| Command | Input Type | Input Data | Details |
|---------------------------|---|--|---|
| Locate Direction | Direction Distance From New Point | S90 00 0.E (127.5+118+40) 11 20 | End of road centre line at top of parcel of land |
| Locate Direction | Direction Distance From New Point | S0 0 0.W 203.18 20 21 | Straight section going south. |
| Locate Direction | Direction Distance From New Point | S90 0 0.W 186.1 21 901 | Create centre point for arc in road curve. |
| Location Angle | Backsight From New Point Angle Distance | 21 901 22 39-30-0. 186.1 | Other end of arc curve in road (from 21 to 22) |
| Location Direction | Direction Distance From New Point | S 39-30-0.W 142 22 23 | Straight section of road centre line. |
| Location Direction | Direction Distance From New Point | (S19-30-0.W - 90.) 214.115 23 902 | Create centre point for arc curve in road centre line. |
| Locate Angle | Backsight From New Point Angle Distance | 23 902 24 -32-12-56 214.15 | Other end of curve in centre line of road |
| Locate Direction | Direction Distance From New Point | S7-17-4.W 35 24 25 | Bottom end of road centre line. |
| Locate Direction | Direction Distance From New Point | S90 0 0.W 65.5 20 30 | Road at top of parcel has two return curves which must be placed as part of the road |

| | | | |
|---------------------------------|---|--|--|
| | | | boundary. |
| Locate Direction | Direction Distance From New Point | S0 0 0.W 25.5 30. 903 | These three commands place the beginning, arc centre and arc end points |
| Locate Direction | Direction Distance From New Point | S90 0 0.E 25.5 903 31 | and draws a line between points 30 and 32. |
| Locate Direction | Direction Distance From New Point | S0 0 0.W 68.05 31 32 | |
| Locate Direction | Direction Distance From New Point | S90 0 0.E 199.52 32 904 | Placement of arc centre for curve toward road centre line. |
| Locate Angle | Backsight From New Point Angle Distance | 32 904 33 -16-01-18. 199.52 | Placement of arc centre for narrowing of road on west side arc. |
| Location Direction | Direction Distance From New Point | S90 0 .W 25 21 34 | This will be the corner point of a lot. |
| Two Directions Intersect | New Point From Direction From Direction | 905 904 A 904 33 21 A 21 34 | |
| Store Figure | Figure ID Description (extra text) | 3 (22 23 C902L 24 25) Road Centre Line | Link this line with a single ID (figure) and include a text description. |
| Plot Lines | Description | 3 | Plot the centre line. |
| Parallel Figure | Figure Distance New Point ID | 3 25 35 | Copy the centre line to the right and left to define the road bounds. |
| Parallel Figure | Figure Distance New Point ID | 3 -25 45 | |
| Locate Direction | Direction Distance From New Point | s90.e 65.5 20 40 | Beginning of return curve at east side of north end of the road. |
| Locate Direction | Direction Distance From New Point | s0-0-0.w 25.5 40 906 | Centre of return curve. |
| Locate Direction | Direction | s90-0-0.w | Other end of return |

| | | | |
|-------------------------------------|---|---|--|
| | Distance From New Point | 25.5 906 41 | curve. |
| Locate Direction | Direction Distance From New Point | s0-0-0.w 68.05 41 42 | Point south on straight portion of road south of point 41. |
| Locate Direction | Direction Distance From New Point | s90-0-0.w 199.52 42 907 | Centre of return curve for east side of road where it gets narrower. |
| Locate Angle | Backsight From New Point Angle Distance | 42 907 43 16-01-18. 199.52 | Place other point in return curve where road gets narrower. |
| Locate Direction | Direction Distance From New Point | S 90 0 0.E 25 21 44 | End of arc where road gets narrower. |
| Locate Direction | Direction Distance From New Point | a 11 2 127.5 11 60 | Point defining division of two lots on North edge of parcel. |
| Locate Direction | Direction Distance From New Point | a 11 10 165 11 61 | Point defining division of lots along west edge. |
| Two Directions Intersect | New Point Point on Line Direction Point on Line Direction | 908 907 A 907 43 21 A 21 44 | Centre point of arc between 43 and 44 where road gets narrower. |
| Line Direction Intersect | New Point Origin 1 Origin 2 Point on line Direction | 62 61 34 60 S0 0 0.W | Point defining division of two lots. |
| Locate Direction | Direction Distance From New Point | S0 0 0.E 60 61 63 | Point defining lot division along west edge. |
| Intersect Line Direction | New Point Origin 1 Origin 2 Point on line Direction | 64 35 36 63 S65 44 7E | Point defining division of lots from previous point defined to road. |
| Location Direction | Direction Distance From New Point | N7-38-7.E 127.93 8 65 | Point defining division of lots along west edge. |
| Distance Direction Intersect | New Point Centre Point | 66 902 | Point defining a division of lots at road |

| | | | |
|---|--|--|--|
| | Radius Point on Line Direction Indicator | (214+25) 65 S67-5-22.E 7 | west edge. |
| Store Figure | Fig ID Description | 4 (20 21 C901R 22) Road Centre Line | North part of road CL. |
| Store Figure | Fig ID Description (extra text) | 11 (11 60 62 61 11) Lot #11 | Figure defining lot. |
| Store Figure | Fig ID Description | 12 (60 30 C903R 31 32 C904L 33) Lot #12 | Figure defining lot. |
| Store Figure | Fig ID Description | 13 (3 C905R 34 62) Lot #13 | Figure defining lot |
| Store Figure | Fig ID Description (extra text) | 14 (34 C901R 35 64 63 61) Lot #14 | Figure defining lot. |
| Store Figure | Fig ID Description (extra text) | 15 (64 36 10 36) Lot # 15 | Figure defining lot. |
| Store Figure | Fig ID Description | 16 (36 C902L 66 65 9 10) Lot #16 | Figure defining lot. |
| Store Figure | Fig ID Description (extra text) | 17 (66 C902L 37 38 8 65) Lot #17 | Figure defining lot. |
| Locate Direction | Direction Distance From New Point | S0-15 0.E 203.19 2 70 | Point defining division of a lot along East edge. |
| Locate Direction | Direction Distance From New Point | s0-15 0.e 151.81 70 71 | Point defining division of a lot along East edge. |
| Distance Direction Intersect | New Point Centre Point Radius Point on Line Direction Indicator | 72 901 (186.1+25) 71 n67-15-24.w 22 | Point defining division of a lot along curve of the road. |
| Locate Direction | Direction Distance From New Point | s33-59-21w 100.44 4 73 | Point defining division of a lot along East edge near south end. |
| Locate Direction | Direction Distance From New Point | s39-30-0w 100 73 74 | Point defining division of a lot on straight part of the road. |

| | | | |
|---------------------|---------------------------------------|---|---|
| Store Figure | Fig ID Description (extra text) | 21 (40 2 70 44 C908R 43 C907L 42 41 C906R 40) Lot #21 | Figure defining lot. |
| Store Figure | Fig ID Description (extra text) | 22 (70-72 c901l 44) Lot #22 | Figure defining lot. |
| Store Figure | Fig ID Description (extra text) | 23 (71 3 4 73 45 C901L 44) Lot #23 | Figure defining lot. |
| Store Figure | Fig ID Description (extra text) | 24 (4 75 74 73) Lot #24 | Figure defining lot. |
| Store Figure | Fig ID Description (extra text) | 25 (75 5 6 47 C902R 46 74) Lot #25 | Figure defining lot. |
| List Figures | Description | (1-100) | List all figures stored with IDs' between 1 and 100 |

Table 5.3: Tutorial Input Table

Now that all points are plotted and the figures are stored, we can plot the figures by themselves. Use the “Autoplot” dialogue box by selecting the **[Utilities]** - **[Autoplot]** pulldown item and turn “OFF” the point symbol and ID text and turn “ON” the rest. Remember to close the dialogue before continuing to activate the selections.

Select **[Plot/Anno]** - **[Plot Figures]** and enter the description as follows: **(3-17 21-25)**

If all input was correct, the design should be identical to the “Demo.dgn” sample and as illustrated below in Figure 5.14.

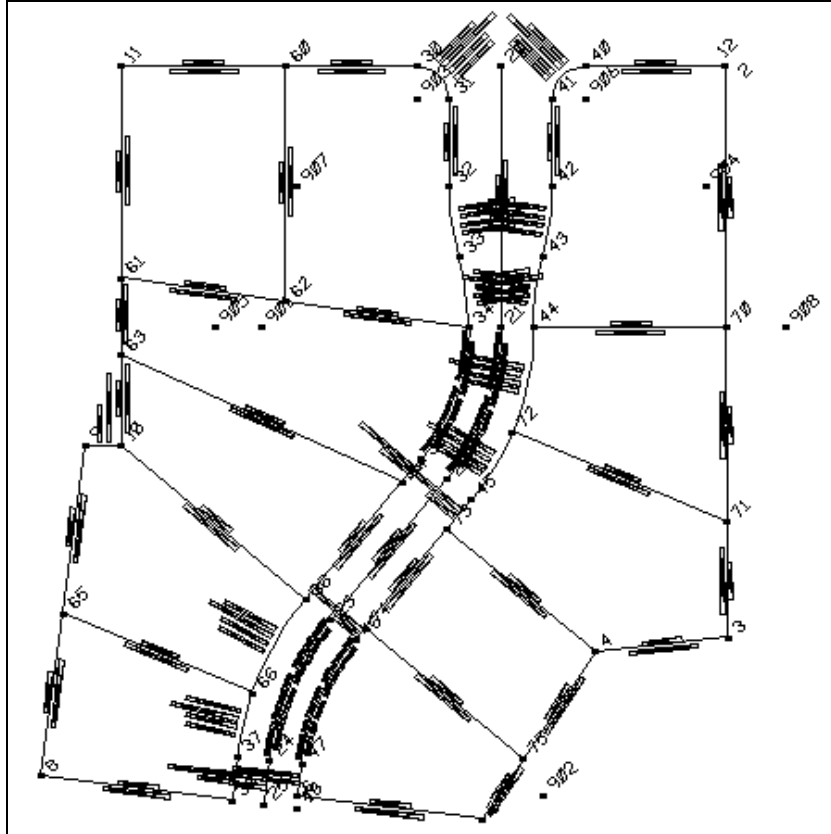


Figure 5.14: Results of Tutorial

Before finishing, annotate the points at the extreme outside of the traverse. To do this, first set the format for the annotation by selecting [**Utilities**] - [**Parameter File**] - [**Plotting**] - [**Annotation Formats**]. Digitize on the "Coordinate sequence" option bar and select one of the possible formats. We can try a different one for each point so after setting the sequence, activate the "**Modify**" button and close all but the "Plotting Options" dialogue box.

From the [**Plot/Anno**] pulldown, select [**Annotate Coordinates**] and enter one or more of the points defining the corners of the sub-division. Activate the "**Process**" button and the point(s) should be annotated according to the settings for text in the Parameter File.

Change the coordinate sequence to some other format and perform the same operation on the rest of the corner points. If you perform a "List Coordinates" command, the format of the output will be that of the "Annotation Format" dialogue box settings. Try listing these points using "List Coordinates" with and without the point information included in the coordinate sequence to see that not all points have the feature any associated information included.



Point information is stored with the coordinates but only if preset in the Feature Table prior to running the "NewJob" command.

5.3 Creating and Placing Features as Cells

We can place a few points as cells representing unique points such as the location of a Bench Mark or for hydrants. To do this, attach a cell library (of your choice) from MicroStations' **[File]** - **[Cell Library]** - **[Attach]** pulldown item for this example. Whichever library attached must contain cells which could be used to represent points and not patterns.

Then, call up the library to examine and select the cells to be used. Do this by typing "**show library** <cr>" at the MicroStation command line. A dialogue box will appear from which you may examine each cell in turn. Make note of the name of at least two of these cells then close this box.

We can create new features using those presently existing in the Feature Table. To do this, we'll copy one to a new name then modify it at will.

From the **[Utilities]** pulldown menu, select **[Feature Table]**. Select **[Specify Feature]** and scroll through the list of features presently existing in the feature table for "default". Hi-lite "default" and activate the "Select" button.

Next, select **[Copy Feature]** and type into the text field either "hydrant" or "Bench_Mk" then activate the "**Copy**" button.

Now, from the main Feature Table dialogue box, select **[Modify Feature]** then from the new dialogue, **[Graphics]** and from that new dialogue, **[Cell Placement]**. In the last field marked "Cell Name (AP):" type in the name of one of the cells you selected from the library and activate the "**Modify**" button to write this information into the Feature Table.

Perform this same action for the other feature using the name of the other cell chosen and close all of the dialogue boxes left open.

Now, we can activate one of these new features and set up the "Autoplot" settings so that the cell is plotted in place of the usual font symbol for that feature. Select **[Utilities]** - **[Set]** - **[Set Feature]** and choose "**Bench_Mk**". Activate the "**Accept**" button.

To alter the "Autoplot" settings, select **[Utilities]** - **[Parameter File]** - **[Plotting]** - **[Auto Plot Modes]**. Turn off the "**Point Symbol**" toggle and turn on the "**Cell**" toggle. Activate the "**Modify**" button and close the rest of the dialogue boxes.

From this point on, each point placed will be the cell chosen for this feature.

Select **[Store/Delete]** and choose **[Store Point]**. Type in the ID "**BM1**" and move the cursor to the "**Northing**" text field. Graphically pick somewhere in a blank portion of the view. (Normally, we would input the exact coordinates of the bench mark but for the purposes of this demonstration of the cell placement facility, we'll just place a random point now).

Accept the coordinates by using the "Data" button on the mouse or puck then activate the "**Process**" button on the "Store Point" dialogue box and if everything has been set correctly, a cell will be placed in this location.

Change the feature to "hydrant" and once again, alter the "Auto Plot Modes" to allow the cell to be placed instead of the point symbol. Try using the "Store Point" command to place a few of these features along the edge of the roadway.



Whenever you change features, the parameter settings change to those set for that feature as found in the Feature Table.

The cells may be set for colour, level and size through either the Parameter File (for temporary changes) or the Feature Table (for permanent changes). The cells can also be graphically selected in the same way the regular point symbols can.

When you are finished, change the feature back to “default” or to whatever you normally use and ensure the “Point Symbol” toggle is set to “on” and the “Cell” toggle is set to off.

5.4 Road Alignment With Spiral Curve Embedded

In this section, we will create a spiral curve which will represent a road center line and use GWN-COGO to annotate an alignment on it.

The road will contain a combination of a straight section, simple curve and a spiral. This exercise will include the use of the simple curve and simple spiral commands and the dialogue option bar (found wherever a “description” field is used) to aid in “mouse only” inputs of the descriptions.

Using either the traverse or original demo design file, move to a location beside any existing drawing.

From the **[Store/Delete]** pulldown, select **[Store Point]** and enter an ID number such as 100. Tab to the next field (Northing) and pick in the view window somewhere in the lower left of the screen. The coordinates should be displayed in the Command Window. Accept these coordinates by clicking the data button on the mouse. The coordinates should be transferred to the dialogue box. Activate the “Process” button and if the symbol and text ID autoplot settings are “ON”, the point will be plotted on the screen.

Reset the ID to “101” in the dialogue box and move the cursor to the “Northing” text field again. Randomly pick a point a bit North-East of the first and about 100 feet away. (Use the “measure” command in MicroStation to get an idea of this distance) Place a second point here.

Bring up the **[Hor.Aln] - [Simple Curve]** dialogue box. Select with the cursor point 100 for the backsight (BT point) and point 101 for the “PC” point.

Call the “Centre Pt” that will be created “105”, the radius of about “85” and an angle of 70 degrees (70.).

Activate the “**Process**” button and a curve will be created starting at point 101 and curving in a clockwise direction, ending with number “107”.

Now call up **[Hor.Aln] - [Simple Spiral]** and create a counter-clockwise spiral with a length of 250 feet, a delta angle of 35 degrees and a PI ID of 110 on your own. If you have trouble with the input, check the end of this section for the correct data.

Before we do the alignment, it might be a good idea to draw in the line between points 100 and 101. This can easily be done using the **[Plot/Anno] - [Plot Lines]** command. The input for this would simply be the starting and ending point for the line, that being “(100 101)”. If the annotation for distance and angle are “ON”, they will be plotted as well.

The resulting “center line” should now look like that in Figure 5.15 immediately following.

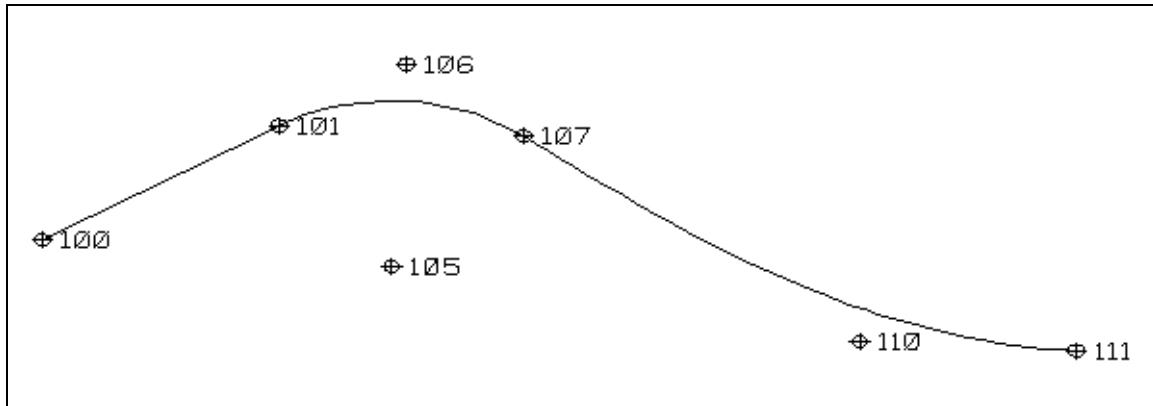


Figure 5.15: Spiral Curve Centre Line

At this point, it is just a matter of deciding which kind of annotation to use. “Annotate Alignment”, “Annotate Stations” or “Label Alignment”. In this section of the tutorial, we will use the **[Plot/Anno] - [Label Alignment]** command.

In the dialogue box as illustrated in Figure 5.16 following, graphically pick from the view, the points in the order as follows, also using the option bar found on the dialogue box to add the appropriate prefixes and suffixes to describe the curve and spiral. Use only one “Data” pick per point or option bar selection unless otherwise indicated.

- Point 100
- Point 101
- Point 105
- Option Bar “CR”
- Point 107
- Point 110
- Option Bar “TSL”
- Point 111
- Data pick in a blank area of the screen to accept the last point “111”

The result of this process should be a description field matching that in figure 5.16. Note the lack of a closing bracket in the description. This bracket will be added before processing if found to be missing by GWN-COGO.

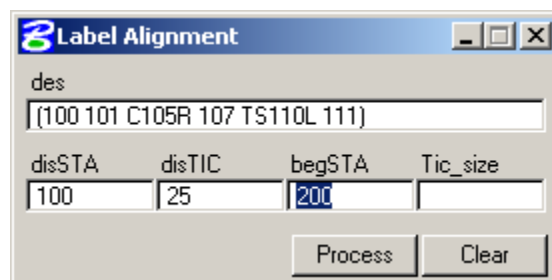


Figure 5.16: Label Alignment Dialogue Box

Set the interval for labeling to 100, the minor interval to 25 and the beginning station at 2000. Activate the “Process” button and a series of tics should appear along the curve in a perpendicular fashion, starting with the annotation of 20 and progressing by an increment of 1 to the end. This is shown in Figure 5.17 following.

6.0 ENVIRONMENT AND ARCHITECTURE

This chapter deals with the manner in which GWN-COGO works within MicroStation. This encompasses the area of user customization and certain aspects of how the program is set up to access various pieces of data.

6.1 Differences and Compatibility Within MicroStation

GWN-COGO is integrated with Bentley's MicroStation CAD and supports fully interactive operation using both coordinate geometry commands and MicroStation graphic commands. The user has the ability to operate within GWN-COGO in the same fashion as with MicroStation.

The following points should help to explain the differences between the GWN-COGO and MicroStation environments.

GWN-COGO:

- Access to the GWN-COGO database structures such as point, figure and parameter files as well as the associated graphic design file and its' elements.
- Access to GWN-COGO processing modules such as Least Squares Adjustment, New Job, etc.
- Full support of MicroStation commands through key-ins.
- Easy transfer of control to the MicroStation environment.
- Operation within the MicroStation environment.
- Dialogue box data input.

MicroStation:

- Access only to the graphics elements and not to GWN-COGO file structures.
- Control can be passed to the GWN-COGO work environment.

6.2 Integrity Of Data

Another important aspect of GWN-COGO operation has been the security and integrity of data between the graphics file and the data base. This means that whenever information is deleted from the data base, the appropriate information is also deleted from the graphics file. However, deleting a graphic element from the design file will have no effect on the data base files. For this reason, if the design file should be corrupted, the data base is not affected. Likewise, if the data base becomes corrupted, all of the presently displayed data may be captured using the "Extract" command to generate point coordinates (though not the figures).

The point ID, its' coordinates and (if setup before running "New Job") point information is stored in the point file. A figure is merely a list of points and/or other figures which make up something similar to a selection set in MicroStation.

By default, all of the data base files used by GWN-COGO are contingent upon a one to one relationship between these files and a design file. The point, figure and parameter files take on the name of the design file that is active when "New Job" is run but have unique extensions. Multiple design files may also use the same COGO files to operate.

The audit trail and report file names may be set by the user in the Parameter File under "Output Options".

A new addition to GWN-COGO is the Backup/Restore command found under the Utilities pulldown. This allows the user to save all files to the same directory but with different names. This ensures that any "test" of the outcome from a command may be confidently performed should there be any unexpected results. The "Restore" command overwrites the existing files with the copies and loads the backed up design file.

There is an option in the [**Parameter File**] - [**Processing Options**] dialogue box for automatic backup of files before each command is enacted but this will definitely slow up the operation and should only be used as necessary. (The design file is not backed up in this mode)

6.3 Auto Incrementing

GWN-COGO has the ability to store alphanumeric point ID's and can increase the value of that label by a value of one (alphanumeric names with a numeric component located at the end of the name). It is expected the name not have any embedded blank spaces.

The length of the ID will not be increased by GWN-COGO so that a name such as "Pin01" can be incremented to "Pin99" whereas "Pin1" can only be incremented to "Pin9".

Note also that any three character ID such as "zb1" will be covered in the description "a1-a100" since every possible three character alphanumeric combination falls within this range.

Depending on the number being incremented, an error may be generated if a point with that ID already exists and unexpected results may be the outcome when the numbers generated are in a range lower than the existing highest number.

6.4 Batch Processing

Batch Processing is a method of generating a set of data base files and graphic elements in a design file (not necessarily) from ASCII text files containing data that has been input using a text editor, word processor or even formatted data output from field observation equipment (such as a "Total Station" theodolite).

Consult the "Batch Processing" section of Chapter 10 (Section 10.4) for information regarding the MicroStation environment operation and file standards for this process.

6.5 Organization Of The Main Data Files

The GWN-COGO environment is built around an existing design file and the generated tables have names uniquely linking them to the graphic design file. This allows for easy system maintenance functions such as copying, archiving and backup of files.

There are three main files necessary for GWN-COGO operation and two optional ones. They are; the parameter, coordinate and figure file. The two optional files are the audit trail and report files which are generated during the operation of the software and are discussed in the next section.

The **Parameter File** houses information such as:

- design file information
- plotting specifications
- graphic parameters for the active feature
- optional file names (audit trail and report files)
- correction factors
- transformation matrix
- list of the last 50 stored points
- user defined default processing options
- positioning information for graphic annotation elements
- tolerance ranges
- cell settings

The file extension for this file is “par” (or “pbk” for the backed copy). It is also accessed by virtually every command function.

The **Coordinate File** contains:

- The eight character point IDs in right justified format.
- Northing, Easting and Elevation each in eight byte floating point format.
- Point Information in a length as specified by the user before running “New Job” with the first eight characters housing the Feature name that was active at the time of point creation. (The Feature name is stored only when “Store Point” and “Store Point Feature” commands are used to create points.)

There is no set limit to the number of points allowed though the larger the file, the slower the reaction time for the system. It is recommended that no more than 1000 points be kept in the active point file.

This file has the same name as the design file but the extension is “cds”. The “Backup” command will generate a copy with the same design file name with the extension “pbk”.

This file is accessed by GWN-COGO in calculations involving the positions of points or the associated point information.

The **Figure File** contains:

- Either groups of point ID's or other figure ID's.

The file format is a numeric four byte ID and up to 1000 characters (2000 in UNIX) for the description.

This file has the extension “fig” (and “fbk” in the backed up copy) and is accessed by functions involving figure descriptions.

The relationship between the COGO files and the design file is one of mutual trust in essence. Unless GWN-COGO is used to affect a change in any of these files, one will then be 'out of synch' with the other. For example, deleting a point symbol in the design file does not delete the associated information in the COGO data files (point file).

GWN-COGO maintains its' own files and MicroStation maintains the design file. The link is the communication between GWN-COGO and MicroStation and GWN-COGO must be the entry point for the command to be executed to ensure this synchronization.

6.6 Other Generated Files

The GWN-COGO environment is supported by a number of files not mentioned in the previous section. These are:

The **Feature Table**:

Stores graphic parameters for user defined features.
A feature ID of any eight alphanumeric combination.
All possible plotting parameters for every feature.
Settings used by the Parameter File and those used to generate the default settings of the Parameter File at the time of it's creation via the "New Job" command.

This file is found in the directory "\GWN_FEAT". It is also a binary file of fixed record length and may be accessed via GWN-COGO through [Utilities] - [Feature Table].

The **Audit Trail File**:

A record of every GWN-COGO command processed along with the associated data input.
Other user input statements via the [Meas/Rep] - [Audit Comment] pulldown command.
This file can have it's name set by the user in the [Parameter File] - [Output Options] pulldown menu. It may also be edited for use in the "Batch Processing" command.

The **Listing Report File**:

Records information for which the user may want to have a hardcopy report such as a coordinate listing.
The "file" can actually be linked directly to a printer as explained in Section 9.1.3.
As with the Audit Trail File, this file may have it's name specified by the user in the [Parameter File] - [Output Options] pulldown menu or the [Utilities] - [Set List File] command.

The **Commands.dat File**:

Listing of all executable GWN-COGO commands with their command descriptors.
This file may be edited by the user through the use of any standard text editor or word processor. The format for this file is as follows:
The first 30 characters are reserved for the command name.
Column 31 for an integer number specifying the number of words in the command description.
Column 32 is reserved for an integer number specifying the task or process associated with the command.
Columns 34 to 36 are reserved for an integer number associated with the command.

Columns 38 to 80 are reserved for the data field descriptors. Each descriptor must be separated by a blank space and optional fields prefixed by a "/".

This file is located in the "\GWN_COGO" directory and the name must always be "Commands.dat".

See Section 6.2 "User Customization" for more information on Commands.dat.

The **Font Library**:

This is a MicroStation font library from version 4.1 and earlier.

This library contains a special font (#85) used by GWN-COGO.

For MicroStation Version 5.0 and later users, this font must be added to the file "font.rsc" used by MicroStation as discussed in the installation procedures in Section 2.3.

The **Demo Files**:

These files are the result of executing the commands in the ASCII file "Demo1.cmd" found in the "\GWN_COGO\DEMO" directory. The results are contained in the graphic design file "Demo.dgn" and its associated data structure files.

6.7 Dialogue boxes In GWN-COGO

Nearly all GWN-COGO pulldown menu commands are equipped with dialogue boxes with which the user may either key-in or graphically pick input data before processing. The main advantage of these boxes is that the input may be either keyed in or graphically picked in the order most advantageous to the user.

As MicroStation allows the user to operate normally on other items while dialogue boxes are displayed on the screen, any reasonable number of these may be brought left on the screen for easy retrieval. All dialogues maintain the last values input during the current working session.

Closing the dialogue boxes by double clicking with the mouse in the upper left hand corner will allow the command line version of that command to become active. Regardless of the active command line operation in place, the activation of the "Process" button on the dialogue will cause it to become the active command internally.

The data fields may be cleared by using the "Clear" button.

On every dialogue box with a "Description" text field, there is an option bar (usually blank when the dialogue appears) that the user may use to add the associated prefix and suffix to point ID's when graphically picking points to describe a curve, spiral or tangent to curves and spirals. This is accomplished by picking on the point to which the pre/suffix is to be appended (though not yet accepted for input) then selecting the appropriate letter combination from the option bar. This ID will appear in the text field with the proper pre/suffix combination.

The name appearing on the title bar at the top of the dialogue is that found in the "Commands.dat" file. The descriptive labels associated to each of the text fields is hard coded into GWN-COGO as is the order of input to the command processor. (e.g.: altering the order of data descriptors in the "Commands.dat" file does not alter the order of data output from the dialogue boxes and therefore causes the dialogues to become useless for that command.)

To prevent the dialogue boxes from appearing by default at the activation of a pulldown item, see Section 9.1.6 in the Parameter File chapter. This will not prevent all dialogues from appearing, only those for which there is a command line alternative.

6.7.1 Duplicate Point / Figure Warning Dialogue Box

This box appears when a point or figure being created has an existing ID in the associated figure or point data base files. This dialogue allows the user to either redefine the ID with the new position or description, rename the newly created point or figure or aborting the command without processing the input data. This box appears as shown in Figure 6.1 following.

Auto-increment is possible only for points and for that reason, the default for renaming a figure in the warning box is blank.

This box will not appear if the option to overwrite points without warnings is set to “on” in the “Processing Options” dialogue in the Parameter File.

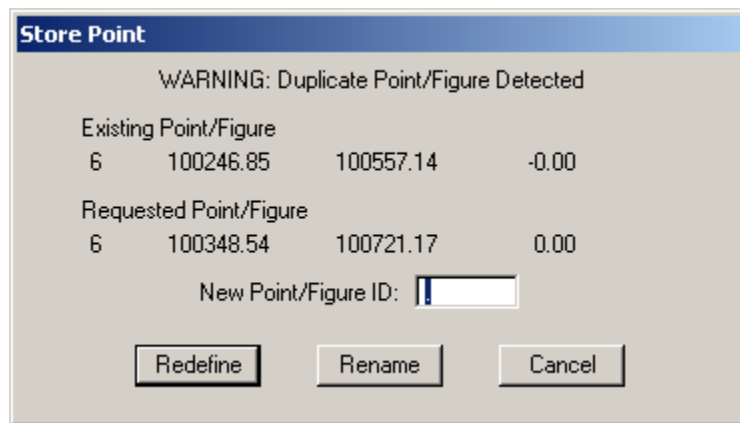


Figure 6.1: Duplicate Point/Figure Warning Dialogue Box

7.0 NEW JOB

Before the user can operate GWN-COGO in a new project, it is necessary to create three files in which valuable information is stored. These are used for point coordinates, figure descriptions and attribute parameters of the items it produces and manipulates in the design file. For these reasons, the “New Job” command must be activated at the start of the project.

This utility may be activated in a number of ways. Firstly, on the [Utilities] pulldown menu, the user will find the command, [New Job].

It is important not to activate this command again during the project as valuable information may be lost should the original files be overwritten. For this reason, there should not be any files with the extensions “.par”, “.fig” or “.cds” and the same filename as the design file in the directory before New Job is executed.



Make sure the “non-modifiable data” is set as desired before running New Job as the only way to change it is to set the Feature Table and then run New Job again resulting in the possible loss of all data collected up to that time in that project. e.g.:Set the point information size and decide whether to include the feature name in the point information beforehand.

7.1 Output:

| File | Description |
|-----------------------|---|
| Parameter File | A parameter file with a name consisting of the current design file name and an extension “.par”. The parameter file contains the default values taken from the default feature in the feature table (found in \GWN_FEAT). It also takes from the feature table the settings for annotation, graphics, placement, output options, processing options, etc.. Therefore, check the feature table for these settings before creating these files to “preset” the parameter file settings. |
| Point Table | A point table with a name consisting of the current design filename and a suffix of “.cds”. Point ID's, their coordiantes and any point information is stored here in a binary file. |
| Figure Table | A figure table with a name consisting of the current design filename and a suffix of “.fig”. Figure descriptions are maintained here in binary form. |

7.2 Preparation:

There should not be any files in the default directory with the names of the output files (as described) to be created. There must also be an existing system feature table containing a feature with a ID of “default” containing the default parameters.

The feature “default” can be modified using the feature table [Modify Feature] button and settings.

7.3 Alternative:

Instead of creating new files, you can use the existing files from previous projects.

Care must be taken in this operation as information deleted is information lost and can only be recovered through use of the Audit.fil.

Copies of the parameter, figure and/or point file can also be copied into the new directory. In such a case, the data is immediately available and will not affect other project directories.

8.0 FEATURE TABLE

This utility allow the user to specify, add, copy, rename, delete, modify and/or activate a feature in the feature table. It is important to note that there is only one feature table per system. This allows the user to use any feature from any graphics file and/or directory.

The feature table may be accessed from the MicroStation graphics environment. A separate utility is provided for interfacing the feature table with MicroStation by way of user commands for third party applications. Example user commands are provided in the directory "\GWN_FEAT\EX" for this purpose. Essentially, this is a mechanism for setting MicroStation parameters to feature parameters.

A set of executable modules located in "\GWN_FEAT" are:

FEATURE.TBL the feature table
FEAT.MA the MDL feature driver

The Feature Table may be accessed three ways. Firstly, under the GWN-COGO menubar, select [Utilities] - [Feature Table]. Secondly, select the "Modify Features" in the COGO tutorial menu and finally, by typing in the command "**Feat** <cr>" in the Command Window text field. The dialogue (in the MicroStation environment) in Figure 8.1 below will appear.

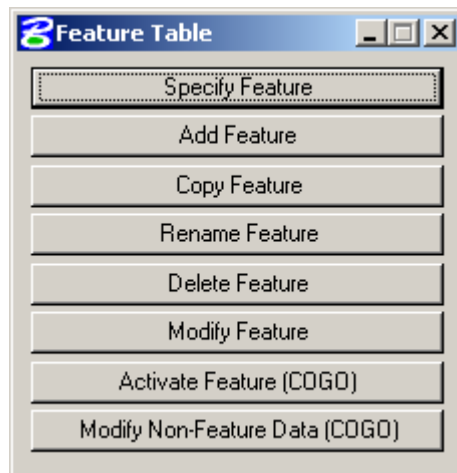


Figure 8.1: Feature Table Main Dialogue Box

Specifications, additions, copying, renaming deletions, modifications and activations can accomplished with the use of the menu driven tutorial. After each operation, the user is returned to the main menu. Consult Chapter 4 for further information regarding the tutorial menu and user commands.



The feature table is used by several GWN packages and not all feature parameters are accessed by all packages.

8.1 Specify Feature

A feature must be selected before anything can be done in the feature table (except for Non-Feature Data).

To specify a feature, either type in the name (case sensitive) into the text field or select the feature from the listbox on the left of the dialogue in Figure 8.2

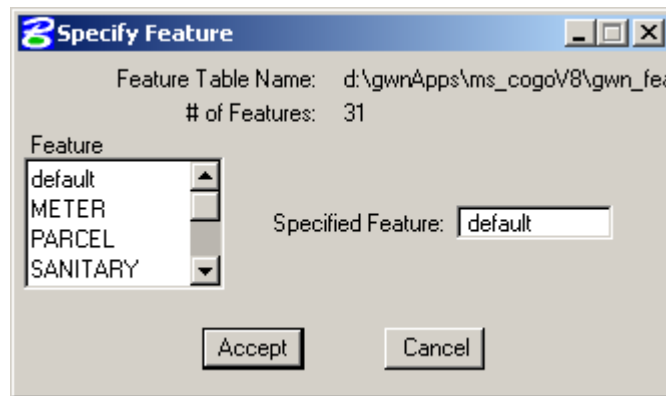


Figure 8.2: Specify Feature Dialogue Box

The feature name may be a string of up to eight alphanumeric characters and case sensitive. This feature is the active feature for other operations within the Feature Table. When creating a new feature, just enter the eight character name in the text field before accepting.

8.2 Add Feature

The active feature is displayed as in Figure 8.3, and if confirmed, the new feature will be added to the feature table. This feature will contain the “default” feature values. To modify the “default” feature, specify that feature as in section 8.1 and go directly to “Modify Feature” in section 8.6.

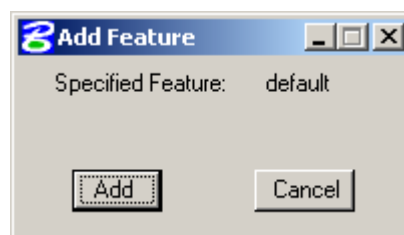


Figure 8.3: Add Feature Dialogue Box

8.3 Copy Feature

The active feature will be displayed along with a listbox of existing features as in Figure 8.4 following. Select from the listbox the feature from which the values will be copied to the feature specified. Use this to set the feature parameters more closely to their desired settings than the defaults, then edit using “Modify Feature”.

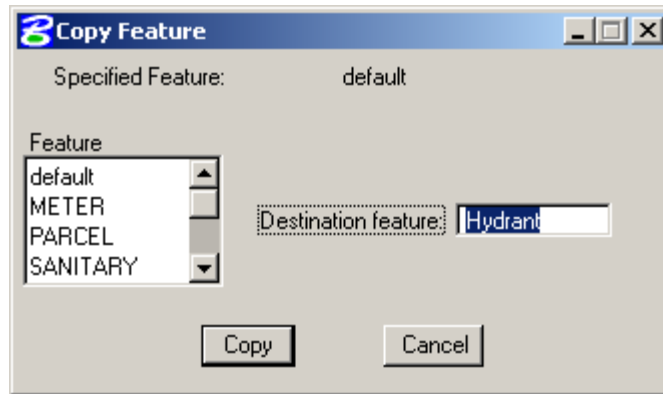


Figure 8.4: Copy Feature Dialogue Box

8.4 Rename Feature

The active feature (specified previously) will be displayed as shown in Figure 8.5, and if confirmed, the feature is renamed in the feature table.

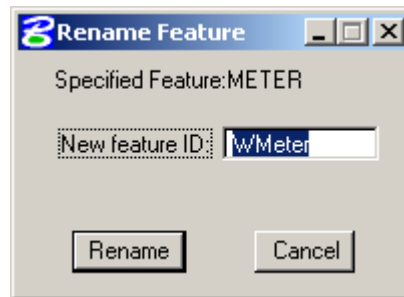


Figure 8.5: Rename Feature Dialogue Box

8.5 Delete Feature

The active feature (specified previously) will be displayed as in Figure 8.6, and if confirmed, the feature is deleted from the feature table.

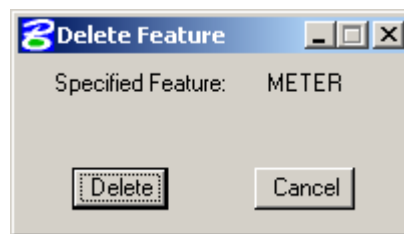


Figure 8.6: Delete Feature Dialogue Box

8.6 Modify Feature

The user can either modify or simply review the feature parameters. Simply select the area of interest to modification/review (as shown in Figure 8.7) and overwrite the previous setting with the desired.

Modification settings must be of the appropriate type and range. (i.e.: numeric values for the level of an item must be within the range of 1 to 63.)



Figure 8.7: Modify Feature Dialogue Box.

8.6.1 Description of Modify Feature Options

The *Plotting* option activates a sub-menu as shown in Figure 8.8 to allow for modification of plotting specification related attributes. Further dialogue boxes are created through activation of each of these buttons and are described in detail on the following pages.

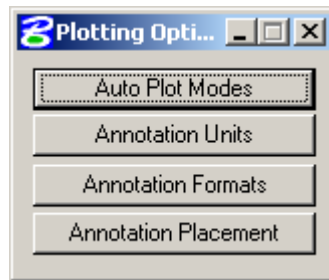


Figure 8.8: Plotting Options Dialogue Box

The *Graphics* option activates a sub-menu dialogue box as shown in Figure 8.9, which allows for modification of graphics specification related attributes.

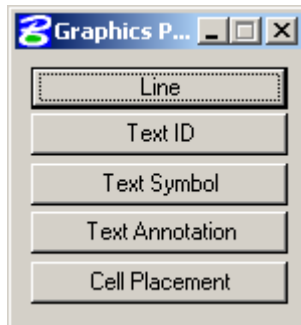


Figure 8.9: Graphics Placement Dialogue Box

The *Priority* option activates the dialogue box as shown in Figure 8.10 and is not used in GWN-COGO.

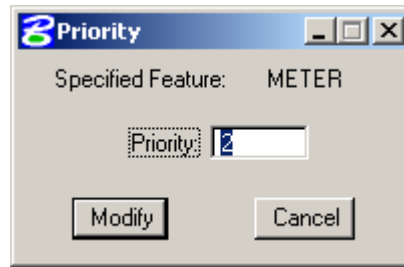


Figure 8.10: Priority Dialogue Box

8.6.1.1 Plotting Options

This section will deal with the options found on the “Plotting Options” dialogue box in the order they are shown. Each is explained in detail in the following sub-sections.

8.6.1.1.1 Auto Plot Mode Settings

This dialogue, as shown in Figure 8.11, toggles on/off the plotting of elements to the design file when called upon during the processing of a command. Each switch is described in Table 8.1 below.

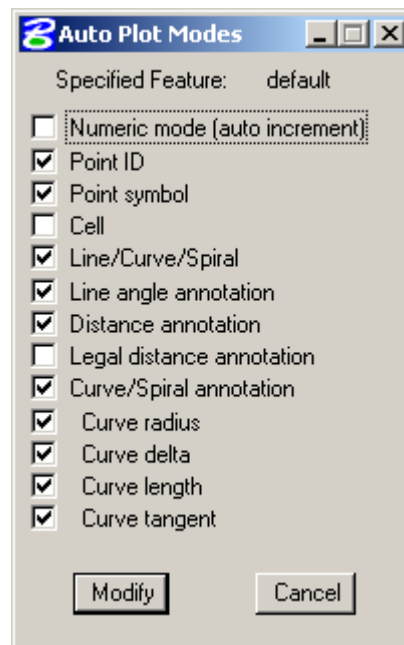


Figure 8.11: Auto Plot Mode Dialogue Box.

| Item | Description |
|--------------------------------------|---|
| Numeric mode (auto increment) | Automatically increment the new point ID by one from the previous point ID. |
| Point ID | An alphanumeric ID of a point is plotted. |

| | |
|----------------------------------|--|
| Point Symbol | The symbol associated with a point is plotted when set to “on”. |
| Cell | The cell associated with the active feature will be plotted when “on”. |
| Line / Curve / Spiral | Lines, curves and spirals are plotted according to associated annotation output options. |
| Line Angle Annotation | The line angle annotation is plotted according to the angle annotation format setting, type and placement options. |
| Distance Annotation | Line distance annotation is plotted according to the distance annotation unit, format and placement options. |
| Legal Distance Annotation | Non-corrected distances are plotted according to the line distance annotation unit, format and placement options. |
| Curve / Spiral Annotation | The following flags determine if specific curve / spiral annotation is plotted according to associated annotation unit and placement options. If “off”, no curve / spiral annotation is plotted. |
| Curve Radius | The radius of the curve is plotted. |
| Curve Delta | The delta angle of the curve is plotted. |
| Curve Length | The length of the curve is plotted. |
| Curve Tangent | The tangent of the curve is plotted. |

Table 8.1: Auto Plot Settings Descriptions



Setting the Auto Increment Mode to “on”, will override any keyed in new point ID’s and will result in an error if a point cannot be incremented.

8.6.1.1.2 Annotation Units

The dialogue box in Figure 8.12 below, deals with units displayed in the design file as called upon by various GWN-COGO commands. Each is described in Table 8.2 that follows.

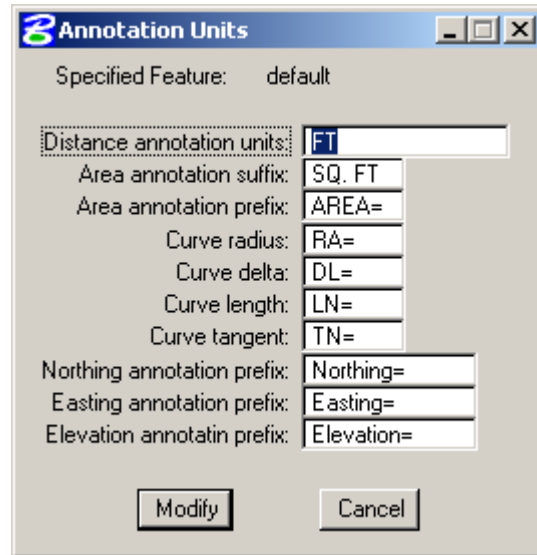


Figure 8.12: Annotation Units Dialogue Box

| Item | Description |
|-----------------------------------|---|
| Distance Annotation Units | A character string with a maximum of eight characters used in the display of distances. |
| Area Annotation Suffix | A character string with a maximum of sixteen characters which follows the area annotation. |
| Area Annotation Prefix | A character string of up to a maximum of eight characters which precedes the area annotation. |
| Curve Radius | A character string of up to a maximum of eight characters placed immediately preceding the curve radii. |
| Curve Delta | A character string of up to a maximum of eight characters placed immediately preceding the curve delta. |
| Curve Length | A character string of up to a maximum of eight characters placed immediately preceding the curve length. |
| Curve Tangent | A character string of up to a maximum of eight characters placed immediately preceding the curve tangent. |
| Northing Annotation Prefix | Character string of up to a maximum of twelve characters to be displayed preceding the coordinate Northing. |

| | |
|------------------------------------|--|
| East Annotation Prefix | Character string of up to a maximum of twelve characters to be displayed preceding the coordinate Easting. |
| Elevation Annotation Prefix | Character string of up to a maximum of twelve characters to be displayed preceding the coordinate Elevation. |

Table 8.2: Annotation Units Description

8.6.1.1.3 Annotation Formats

The dialogue box shown in Figure 8.13 sets the sequence and factor for annotation in the design file. Detailed explanation of these settings follows in Table 8.3.

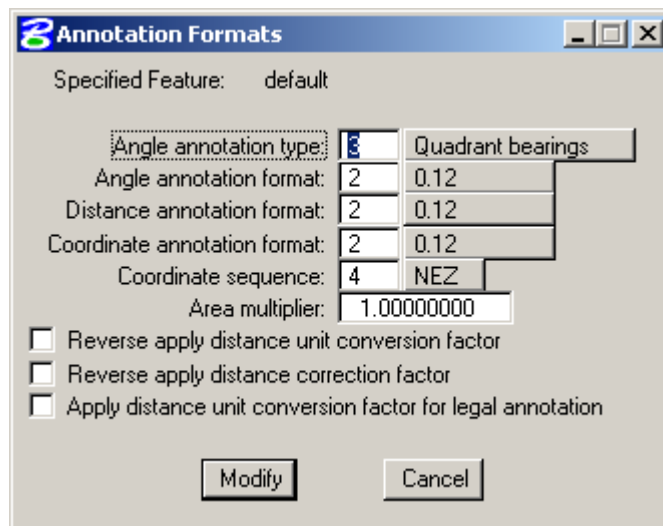


Figure 8.13: Annotation Format Dialogue Box

| Item | Description |
|-------------------------------------|---|
| Angle Annotation Type | Ranges in value between 1 and 5. Specifies the type of angle to be processed. i.e.: azimuth / bearings / deflection / angle. |
| Angle Annotation Format | An integer number (0-9) specifying the number of decimal places of accuracy in the angle annotation. |
| Distance Annotation Format | An integer number (0-9) specifying the number of decimal places of accuracy in the distance annotation. |
| Coordinate Annotation Format | An integer number (0-9) specifying the number of decimal places of accuracy in the coordinate annotation. |
| Coordinate Sequence | An integer value (0-11) specifying the sequence of the coordinate as displayed in the design file and in reports. Options are: N, EN, Z, NEZ, ENZ, N I, EN I, Z I, NEZ I, ENZ I. (I is point information) |

| | |
|---|---|
| Area Multiplier | A real number which is used to convert from area master units to other area units (i.e.: from square feet to acres) |
| Reverse apply distance unit conversion factor | If “on”, any output measurement will have the unit conversion factor reverse applied (legal distance annotation overrides this option). |
| Reverse apply distance correction factor | If “on”, any output measurement will have the distance correction factor reverse applied (legal distance annotation overrides this option). |
| Apply distance unit conversion factor for legal annotation | If “on”, any output legal distance will have the unit conversion factor reverse applied. |

Table 8.3: Annotation Format Description

8.6.1.1.4 Annotation Placement Options

The placement options for annotation are determined according to these settings as shown in Figure 8.14 and described in detail in Table 8.4 below.

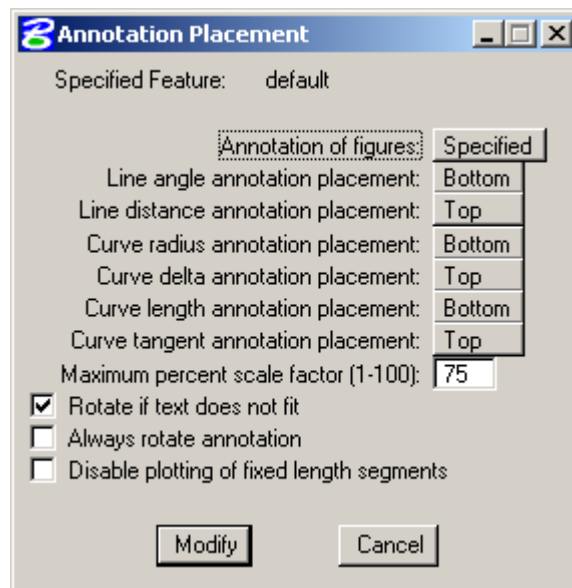


Figure 8.14: Annotation Placement Options Dialogue Box

| Item | Description |
|------------------------------|--|
| Annotation of figures | [I,O,A,S] Option to place the figure annotation: (I) inside the figure (O) outside the figure (A) around the perimeter of the figure (S) as specified in the remaining options as listed below |

| | |
|--|--|
| | Note: This option also affects the placement of annotation for lines and arcs. |
| Line angle annotation placement | [T, B] Option to place the line angle annotation on the top or bottom of the line. |
| Line distance annotation placement | [T, B] Option to place the line distance annotation on the top or bottom of the line. |
| Curve radius annotation placement | [T, B] Option to place the curve radius annotation on the top or bottom of the line. |
| Curve delta annotation placement | [T, B] Option to place the curve delta annotation on the top or bottom of the curve. |
| Curve length annotation placement | [T, B] Option to place the curve length annotation on the top or the bottom of the curve. |
| Curve tangent annotation placement | [T, B] Option to place the curve tangent annotation on the top or bottom of the curve. |
| Maximum percent scale factor | (1-100) Integer value that determines if annotation is to be scaled to fit in desired range (i.e.: line distance annotation between two points). If the annotation still does not fit after scaling, the following option determines how it is placed (i.e.: rotated or not). |
| Rotate if text does not fit | Option to allow rotation of text if it doesn't fit after scaling. |
| Always rotate annotation | Option to specify that annotation should always be rotated. |
| Disable plotting of fixed length segments | If "on", the plotting of fixed length segments will be disabled such as within proportion commands. |

Table 8.4: Annotation Placement Options

8.6.1.2 Graphics Option

This section will deal with the options available on this dialogue box. Each is explained in detail in the following sub-sections.

8.6.1.2.1 Line Placement Specifications

This menu, as shown in Figure 8.15 below, provides the settings for the placement of line parameters within the design file. A detailed description of these settings follows in Table 8.5 below.

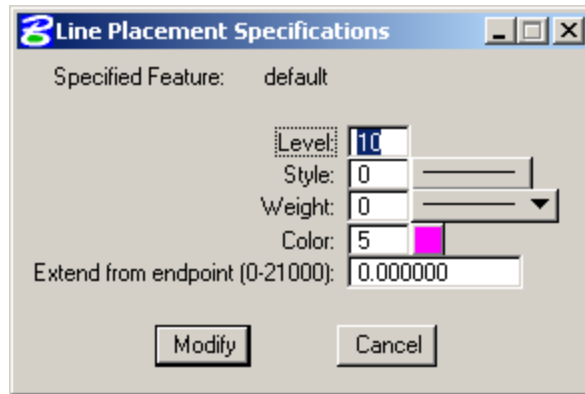


Figure 8.15: Line Placement Specifications Dialogue Box

| Item | Description |
|------------------------------|---|
| Level value | (1-63) Integer value specifying the level for the line. |
| Style value | (0-7) Integer value that specifies the line style. |
| Weight | (0-31) Integer value that specifies the line weight. |
| Colour Value | (0-255) Integer value that specifies the line colour. |
| Extend from end point | (0-21,000) Real value that specifies the distance lines to be deleted back from the ends (over the top of symbols). |

Table 8.5: Line Placement Specifications Details

8.6.1.2.2 Text ID Placement Specifications

This menu, as shown in Figure 8.16, specifies the placement of text ID's in the design file. Details of these items follows in Table 8.6.

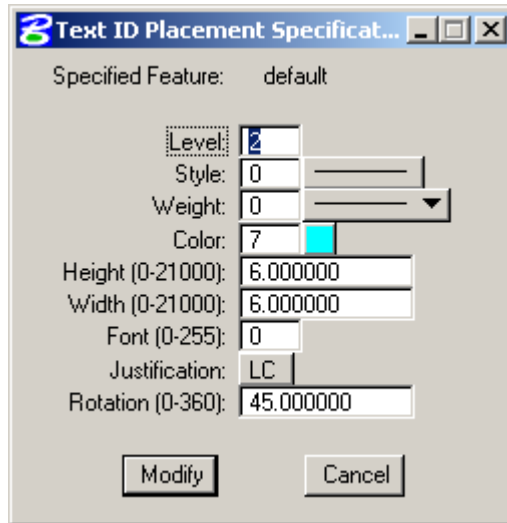


Figure 8.16: Text ID Placement Specifications

| Item | Description |
|----------------------------|--|
| Level value | (1-63) Integer value that specifies the text ID level. |
| Style value | (0-7) Integer value that specifies the text ID style. |
| Weight value | (0-31) Integer value that specifies the text ID weight. |
| Colour value | (0-255) Integer value that specifies the text ID colour. |
| Height value | (0-21,000) Real value that specifies the text ID height. |
| Width value | (0-21,000) Real value that specifies the text ID width. |
| Font value | (0-255) Integer value that specifies the text ID font. |
| Justification value | Two character combination that specifies the justification of the text ID. C = Centre, L = Left, R = Right, B = Bottom, T = Top |
| Rotation value | (0-360) Real value that specifies the text ID rotation. |

Table 8.6: Text ID Placement Specifications

8.6.1.2.3 Text Symbol Placement Specifications

This dialogue, as shown in Figure 8.17 below, sets the text symbol placement parameters. Detail descriptions of each item follows in Table 8.7 below.

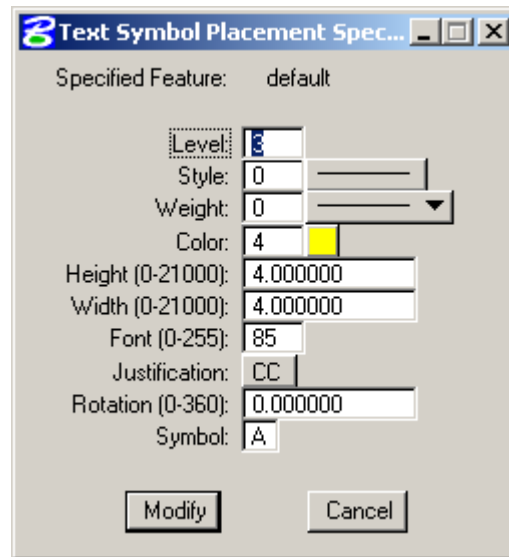


Figure 8.17: Text Symbol Placement Specifications Dialogue Box

| Item | Description |
|----------------------------|--|
| Level value | (0-63) Integer value that specifies the text annotation level. |
| Style value | (0-7) Integer value that specifies the text style value. |
| Weight | (0-31) Integer value that specifies the text annotation weight. |
| Colour value | (0-255) Integer value that specifies the text annotation colour. |
| Height value | (1-21,000) Real value that specifies the text annotation height. |
| Width value | (1-21,000) Real value that specifies the text annotation width. |
| Spacing value | (1-21,000) Real value that specifies the text annotation line spacing. |
| Font value | (0-255) Integer value that specifies the text annotation font. |
| Justification value | Two character combination that specifies the justification of the text annotation. C = Centre, L = Left, R = Right, B = Bottom, T = Top |
| Rotation value | (0-360) Real value that specifies the text annotation rotation. |

Table 8.7: Text Annotation Placement Specifications Dialogue Box



Modifying any text justification will actually modify the position of the text in the graphics file. Also, the rotation for text annotation will be calculated for some commands at placement time.

8.6.1.2.4 Cell Placement Specifications

This dialogue box, as shown in Figure 8.18 below, sets the parameters for cell placement in the design file. A detailed description of each item follows in Table 8.8.

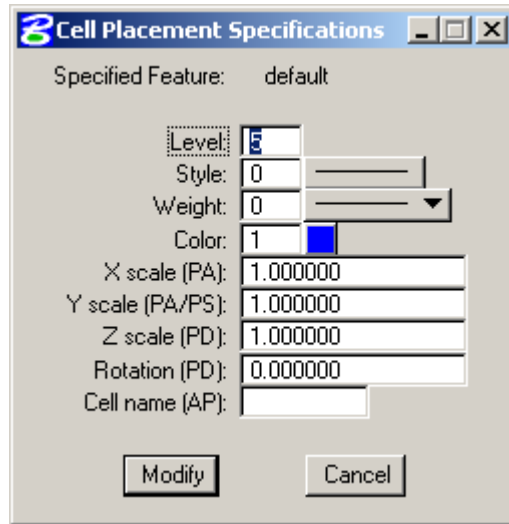


Figure 8.18: Cell Placement Specifications Dialogue Box

| Item | Description |
|----------------------------|--|
| Level value | (1-63) Integer value that specifies the cell or pattern level. |
| Style value | (0-7) Integer value that specifies the cell or pattern style. |
| Weight value | (0-31) Integer value that specifies the cell or pattern weight. |
| Colour value | (0-255) Integer value that specifies the cell or pattern colour. |
| X Scale (PA) | Real value that specifies the cell's X scale or the active pattern angle. |
| Y Scale (PA/PS) | Real value that specifies the cell's Y scale, the active pattern angle for crosshatching or the active pattern scale factor. |
| Z Scale (PD) | Real value that specifies the cell's Z scale or the active pattern spacing between rows. |
| Rotation value (PD) | (0-360) Real value that specifies the cell rotation or the active pattern spacing between columns. |

| | |
|-----------------------|--|
| Cell Name (AP) | Six character string that specifies the cell name or the active pattern cell name. |
|-----------------------|--|

Table 8.8: Cell Placement Specification Details



These fields can be used for either cells or patterns but not both simultaneously.

8.6.1.3 Priority

This dialogue item is used only in GWN-DTM and therefore has no use in GWN-COGO.

8.7 Activate Feature (COGO) Option

Activation of a feature refers to enabling specific default graphic and plotting specifications which are contained in the design file's associated parameter file (in the GWN-COGO environment). The specified feature will be displayed and you will be prompted for confirmation of the activation.

If the feature exists in the feature table and the activation is confirmed, its attributes are copied to the parameter file and are used during plotting of graphics elements.

Activation of a feature can also be accomplished with the use of the **[Set Feature]** command.

The Activate Feature dialogue box is shown below in Figure 8.19.

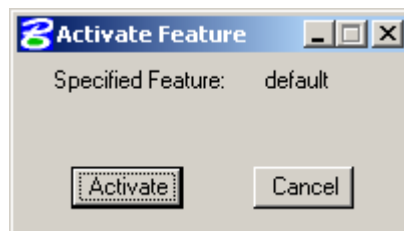


Figure 8.19: Activate Feature Dialogue Box

8.8 Modify Non-Feature Data (COGO) Option

Selecting this option brings up the Non-Feature Modification Menu as shown below in Figure 8.20. Review/modification of the non-feature (common) data is accomplished by selecting the category to be reviewed/modified from this menu.

Once chosen, modification of a value is accomplished by overwriting the previously displayed value with the desired one. Data in this area will not be updated in the Parameter File by the “Activate Feature” command but will be used when new parameter files are created by the “New Job” command.

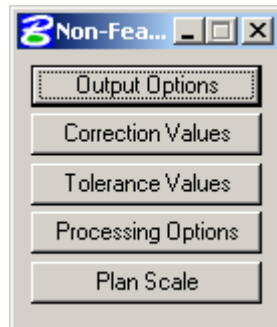


Figure 8.20: Non-Feature Data Dialogue Box

8.8.1 Output Options

This dialogue, as shown below in Figure 8.21, sets the switches for a variety of parameters such as reporting and adjustments. Detailed descriptions follow in Table 8.9 below.

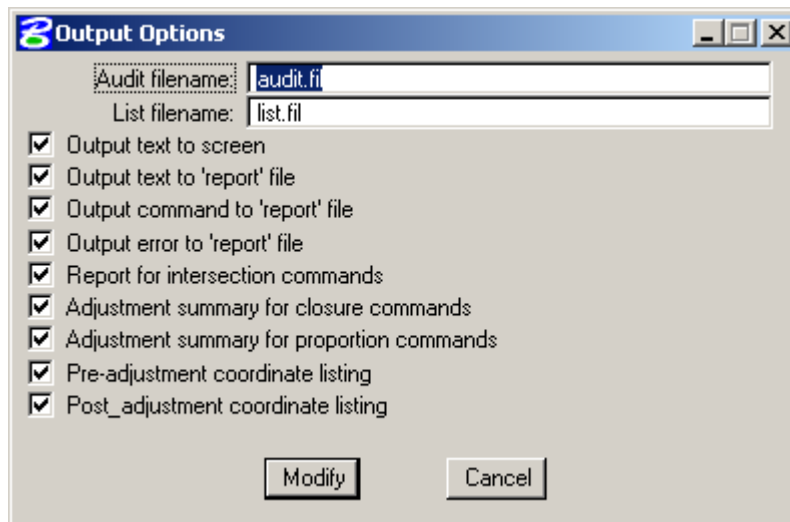


Figure 8.21: Output Options Dialogue Box

| Item | Description: |
|---|--|
| Audit filename | Filename of the audit trail created by GWN-COGO. |
| List filename | Filename of the report output created by GWN-COGO. |
| Output text to screen | Will display any reports generated to the screen. |
| Output text to 'report' file | All reports generated will be output to 'report' file. |
| Output command to 'report' file | All commands executed will be output to 'report' file. |
| Output error to 'report' file | All errors generated will be output to 'report' file. |
| Report for intersection commands | Distance and direction report generated which can be accepted or rejected by user. |
| Adjustment summary for closure commands | Closure adjustment summary report is displayed. |
| Adjustment summary for proportion commands | Proportion adjustment summary is displayed. |
| Pre-adjustment coordinate listing | Option for listing of the coordinates prior to adjustment. |
| Post-adjustment coordinate listing | Option for a listing of the coordinates after the adjustment. |

Table 8.9: Output Options Dialogue Box

8.8.2 Correction Values

In this dialogue box, as shown in Figure 8.22, the user can set various correction factors used in coordinate calculation. A detailed description of each item follows in Table 8.10.

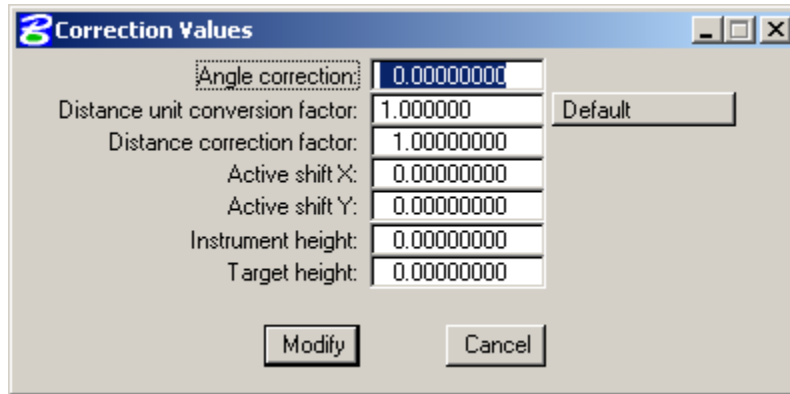


Figure 8.22: Correction Values Dialogue Box

| Item | Description |
|--|--|
| Angle correction value | A real value in degrees or gradients which is to be added to all input angles |
| Distance unit conversion factor | A real value to convert distance units. (i.e.:feet to metres) |
| Distance correction factor | Real value to adjust distances in same way elevation correction factor works. (used as individual combination factor). |
| Active shift X value | Real value to add to X coordinate |
| Active shift Y value | Real value to add to Y coordinate |
| Instrument Height | Real value to add to point elevation |
| Target Height | Real value to subtract from instrument height |

Table 8.10: Correction Value Details

8.8.3 Tolerance Values

The tolerances for items, as shown in Figure 8.23, for a variety of relationships. Table 8.11 gives details of each item.

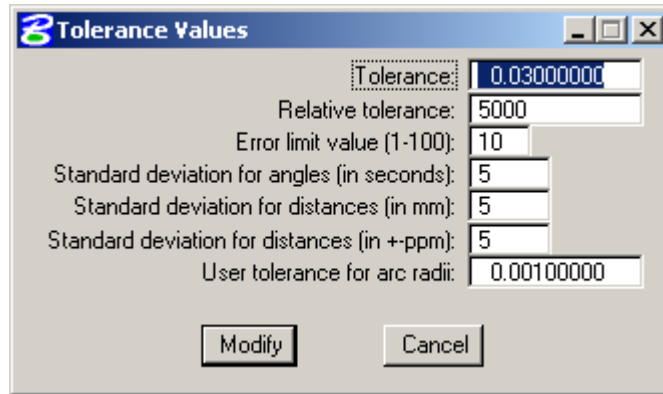


Figure 8.23: Tolerance Values Dialogue Box

| Item | Description |
|---|--|
| Tolerance | Maximum allowable distance error (used in compass closure command). |
| Relative tolerance | Relative distance error (used in compass closure command). |
| Error limit value | (1-100) If number of errors exceeds this value, program is terminated. Used in Batch processing. |
| Standard deviation for angles (in seconds) | Accuracy of observation equipment used for angles in least squares adjustment command. |
| Standard deviation for distances (in mm) | Accuracy of observation equipment used for distances in least squares adjustment command. |
| Standard deviation for distances (in +- ppm) | Accuracy of observation equipment used for distances in least squares adjustment command. |
| User tolerance for arc radii | Error tolerance to be used when measuring arc radii. |

Table 8.11: Tolerance Values Descriptions

8.8.4 Processing Options

As shown in Figure 8.24, this dialogue toggles on/off a number of user options related to processing data. Table 8.12 details each item.

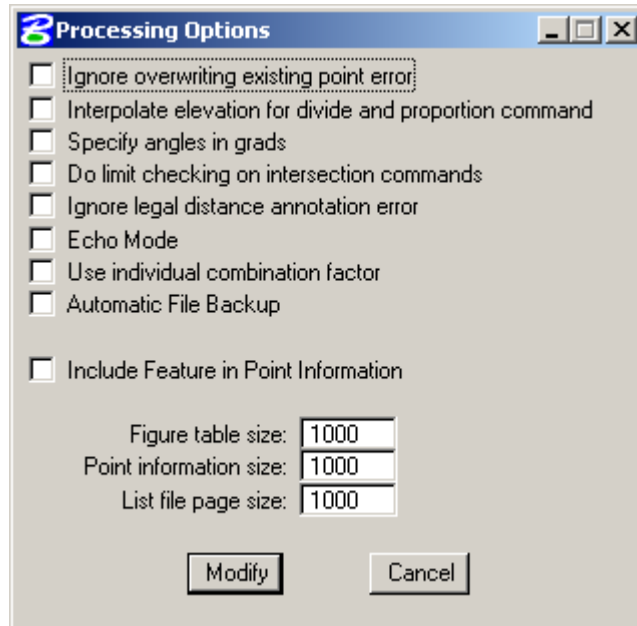


Figure 8.24: Processing Options Dialogue Box

| Item | Description |
|--|--|
| Ignore overwriting existing point error | Any duplicate point or figure ID keyed in will overwrite existing point/figure ID if “on” otherwise the “Duplicate Point/Feature dialogue box will be displayed. |
| Interpolate elevation for divide and proportion command | Elevation set to ‘0’ when “off” for commands such as divide and proportion. |
| Specify angles in grads | All input angles and output angles will be in gradient form if “on”. |
| Do limit checking on intersection commands | For those intersection commands that do limit checking when set to “on”. |
| Ignore legal distance annotation error | This error will be ignored when set to “on”. Certain commands do not allow for output of legal distance annotation (plotted) and an error will occur. |
| Echo mode | Output is echoed to screen via a dialogue designed specifically for this purpose. The ID, Northing, Easting and Elevation etc., for all commands will be output. |
| Use individual combination factor | If set “on”, the individual combination factor will be applied to calculations. |



| | |
|---|--|
| Automatic File Backup | If set “on” the Audit, List, Point, Figure and Parameter files will be backed up before any command is enacted. This option slows the processing time greatly and should not be used generally. |
| Include Feature in Point Information | With this option turned “on”, the feature name will be recorded in the point information (assuming point information space has been allocated before running “NewJob”). |
| Use dialogue boxes for input | Dialogue boxes for most commands will be created when such a command becomes activated from the pulldown menu when the toggle is set to “on”. |
| Figure table size | (0-1000) This value sets the maximum size of a single figure. It must be a multiple of four. (e.g.: 8, 64, 1200, etc.) This value cannot be changed after the figure table has been created. |
| |  Figure tables of varying sizes are not structurally compatible. |
| Point information size | (0-1000) This value sets the maximum number of characters for description of point data. |
| |  If including the Feature name in the point information, it should be understood that the feature will take up eight characters. Therefore, the point information size would have to be a minimum of eight. |
| List file page size | This value sets the maximum number of lines in the report file before paging. If this value is set to 0, no form feeds will be put into the list file. |

Table 8.12: Processing Options Details

8.8.5 Plan Scale

As shown in Figure 8.25, this dialogue box sets the plan scale which is a means of storing the final plot scale of the plan. (Rarely used)

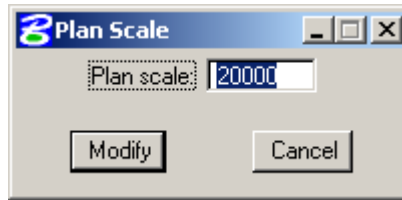


Figure 8.25: Plan Scale Dialogue Box

9.0 PARAMETER FILE

The parameter file contains the settings for all user definable criteria for the associated design file. It allows the user to alter the settings during the working session for most items.

The modifying utility menu, as shown below in Figure 9.1, allows the user to review and modify the design file's associated parameter file. This is done from the **[Utilities] - [Parameter File]** pulldown item or "Modify Parameter File" in the GWN-COGO tutorial environment.

All modifications overwrite the original which cannot be reclaimed unless the file has been backed up recently.

9.1 Parameter File Menu

As shown below in figure 9.1, the Parameter File settings in various categories may be accessed using the appropriate button. Each group is discussed in detail with illustrations in the following sections.

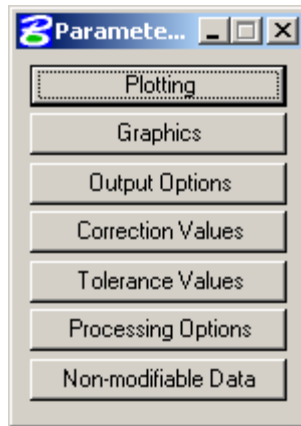


Figure 9.1: Parameter File Utility Dialogue Box

9.1.1 Plotting Option:

This option opens a dialogue box as shown in Figure 9.2 following.

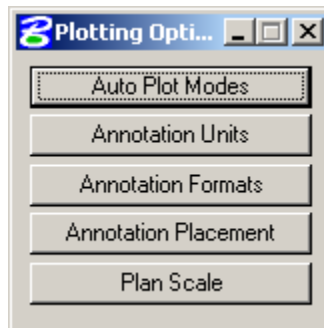


Figure 9.2: Plotting Dialogue Box

9.1.1.1 Auto Plot Modes

This dialogue box allows the user to turn on/off various graphic elements which may be drawn automatically in may GWN-COGO commands. This dialogue is shown in Figure 9.3 below and explained in detail in Table 9.1 following immediately.

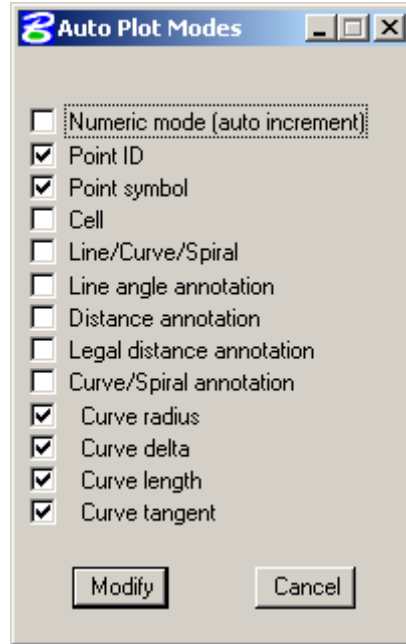


Figure 9.3: Auto Plot Modes

| Option | Details |
|--------------------------------------|--|
| Numeric mode (auto increment) | ID's are auto incremented by one from the last available ID regardless of input by the user. |
| Point ID | Alphanumeric ID's will be displayed if on. |
| Point symbol | The symbol associated with the active feature will be displayed if on. |
| Cell | If on, the cell indicated in the Cell Placement Specification dialogue box (assuming the appropriate cell library is attached) will be normally plotted instead of the regular point symbol. |
| Line / Curve / Spiral | Lines curves and spirals are plotted according to associated annotation output options. |
| Line angle annotation | Line angle annotation is plotted according to angle annotation format, type and placement options. |
| Distance annotation | Line distance annotation is plotted according to distance annotation unit, format and placement options. |

| | |
|----------------------------------|---|
| Legal distance annotation | Non-corrected distances are plotted according to line distance annotation unit, format and placement options. |
| Curve / Spiral annotation | If set to on, the following switches determine if specific curve / spiral annotation is to be plotted according to associated annotation unit and placement options. If off, the following switches have no effect. |
| Curve radius | The radius of the curve is plotted. |
| Curve delta | The delta of the curve is plotted. |
| Curve length | The length of the curve is plotted. |
| Curve tangent | The tangent of the curve is plotted. |

Table 9.1: Auto Plot Mode Details

9.1.1.2 Annotation Units:

This dialogue box as shown in Figure 9.4 following, will set the output strings with the appropriate text. Table 9.2 details each input.

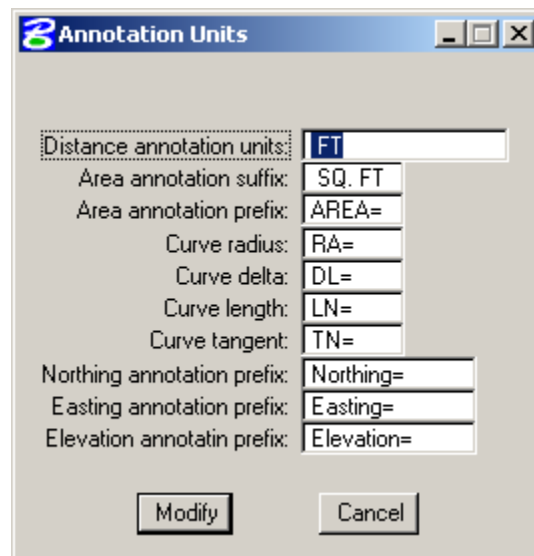


Figure 9.4: Annotation Units Dialogue Box

| Option | Details |
|----------------------------------|---|
| Distance annotation units | The character string to be displayed following distances. (max. eight characters) |
| Area annotation suffix | The character string to be displayed following areas. |

| | |
|------------------------------------|---|
| | (max. sixteen characters) |
| Area annotation prefix | Character string to be displayed preceding areas. (max. eight characters) |
| Curve radius | Character string to be displayed preceding the curve radii. (max. eight characters) |
| Curve delta | Character string to be displayed preceding curve deltas. (max. eight characters) |
| Curve length | Character string to be displayed preceding curve lengths. (max. eight characters) |
| Curve tangent | Character string to be displayed preceding curve tangents. (max. eight characters) |
| Northing annotation prefix | Character string to be displayed preceding northing. (max. twelve characters) |
| Easting annotation prefix | Character string to be displayed preceding easting. (max. twelve characters) |
| Elevation annotation prefix | Character string to be displayed preceding elevation. (max. twelve characters) |

Table 9.2: Annotation Units Details

9.1.1.3 Annotation Formats:

The dialogue shown in Figure 9.5 following, sets the order and type for display in the design and reports. Table 9.3 details each input.

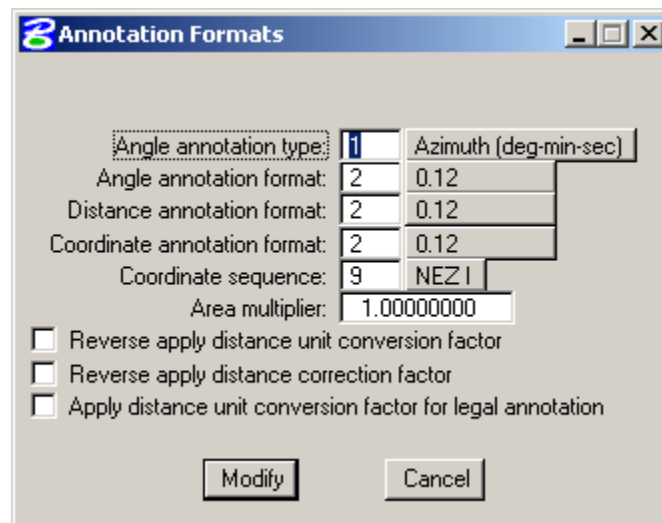


Figure 9.5: Annotation Formats Dialogue Box

| Option | Details |
|---|---|
| Angle annotation type | Specifies the type of angle to be processed numbering (1-4). (i.e.: Azimuth, Bearings, Deflection, Angle) |
| Angle annotation format | An integer number (0-9) specifying the number of decimal places of accuracy in the angle annotation. |
| Distance annotation format | An integer number (0-9) specifying the number of decimal places of accuracy in the distance annotation |
| Coordinate annotation format | An integer number (0-9) specifying the number of decimal places of accuracy in the coordinate annotation. |
| Coordinate sequence | An integer value (1-11) specifying the sequence that the coordinates displayed graphically or in the reports. The options are: NE, EN, Z, NEZ, ENZ, NEI, ENI, ZI, NEZI, ENZI, I. (see Table 9.4 following for full details) |
| Area multiplier | A real number which is used to convert from area master units to other area units such as from square feet to acres. |
| Reverse apply distance unit conversion factor | If on, any output measurement will have the unit conversion factor reverse applied (legal distance annotation overrides this option). |
| Reverse apply distance correction factor | If on, any output measurement will have the distance correction factor reverse applied (legal distance annotation overrides this option). |
| Apply distance unit conversion factor for legal annotation | If on, any output legal distance will have the unit conversion factor reverse applied. |

Table 9.3: Annotation Formats Details

| | | |
|-----|-------|---|
| 1. | NE | Northing followed by Easting |
| 2. | EN | Easting followed by Northing |
| 3. | Z | Elevation only |
| 4. | NEZ | Northing followed by Easting and Elevation |
| 5. | ENZ | Easting followed by Northing and Elevation |
| 6. | NE I | Northing followed by Easting and Point Information |
| 7. | EN I | Easting followed by Northing and Point Information |
| 8. | Z I | Elevation followed by Point Information |
| 9. | NEZ I | Northing followed by Easting, Elevation and Point Information |
| 10. | ENZ I | Easting followed by Northing, Elevation and Point Information |
| 11. | I | Point Information |

Table 9.4: Annotation Coordinate Order

9.1.1.4 Annotation Placement Options:

This dialogue sets the placement of the annotation of plotted elements. This dialogue is shown in Figure 9.6 and details are listed in Table 9.5 following.

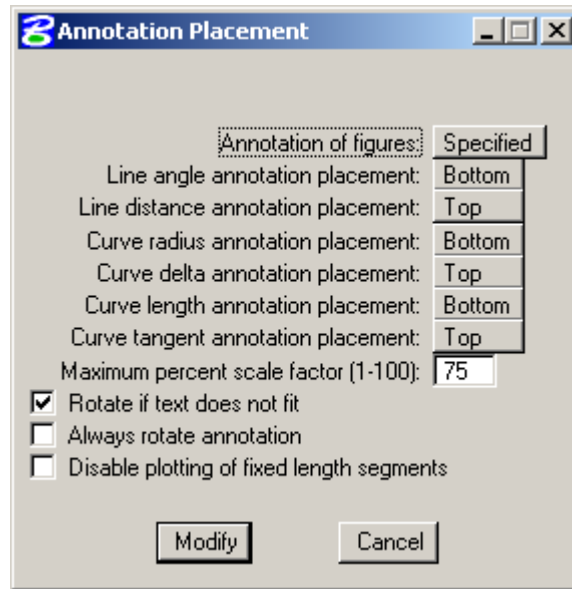


Figure 9.6: Annotation Placement Options

| Option | Details |
|---|--|
| Annotation of figures | This option places figure annotation: I Inside the figure. O Outside the figure. A Around the perimeter of the figure. S As specified in the following settings. |
| Line angle annotation placement | This option places the line angle annotation on the top (T) or bottom (B) of the line. |
| Line distance annotation placement | This option places the line distance annotation on the top (T) or bottom (B) of the line. |
| Curve radius annotation placement | This option places the curve radius annotation on the top (T) or bottom (B) of the curve. |
| Curve delta annotation placement | This option places the curve delta annotation on the top (T) or bottom (B) of the curve. |
| Curve length annotation placement | This option places the curve length annotation on the top (T) or bottom (B) of the curve. |
| Curve tangent annotation placement | This option places the curve tangent annotation on the top (T) or bottom (B) of the curve. |

| | |
|--|--|
| Maximum percent scale factor | An integer value (1-100) that determines if annotation is to be scaled to fit in the desired range. (i.e.: line distance annotation between two points). If the annotation still does not fit after scaling, the following option determines how it is placed. (i.e.: rotated or not). |
| Rotate if text does not fit | This option to allow rotation of text if it does not fit after scaling. |
| Always rotate annotation | This option specifies that the annotation should always be rotated. |
| Disable plotting of fixed length segments | If on, the plotting of fixed length segments will be disabled such as within proportional commands. |

Table 9.5: Annotation Placement Options Details

9.1.1.5 Plan Scale:

As shown in Figure 9.7, this dialogue box sets the plan scale which is a means of storing the final plot scale of the plan. (Rarely used)

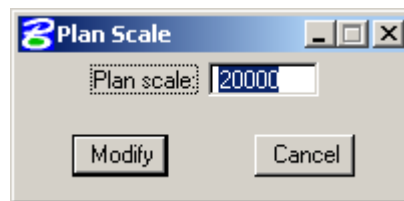


Figure 9.7.: Plan Scale Dialogue Box

9.1.2 Graphics Placement:

This dialogue as shown in Figure 9.8 below, opens other dialogues used to set the graphic parameters for items drawn to the design file. These are illustrated and detailed in the following sections.

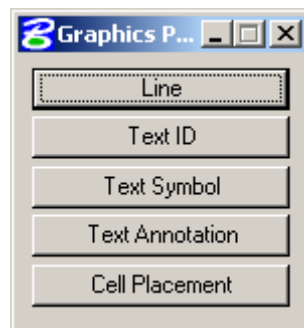


Figure 9.8: Graphics

9.1.2.1 Line Placement Specifications:

This dialogue, as shown in Figure 9.9 following, sets the line placement specifications in the design file.

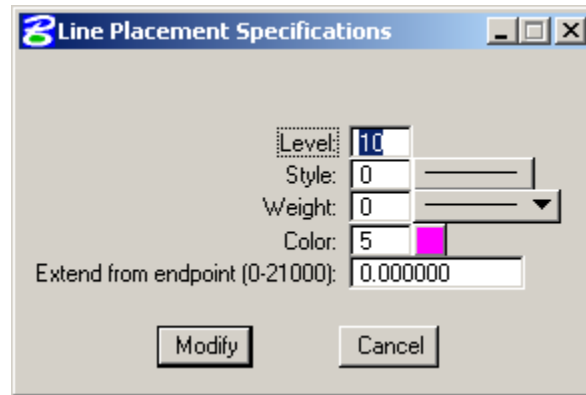


Figure 9.9: Line Placement Specifications Dialogue Box

| Option | Details |
|------------------------------|--|
| Level | An integer value (1-63) that specifies the line level. |
| Style | An integer value (0-7) that specifies the line style. |
| Weight | An integer value (0-31) that specifies the line weight. |
| Colour | An integer value (0-255) that specifies the colour. |
| Extend from end point | A real value that specifies a distance for which lines will be deleted back from the end on top of a symbol. This prevents confusing lines blocking symbols. |

Table 9.6: Line Placement Specifications Details

9.1.2.2 Text ID Placement Specifications:

This dialogue, as shown in Figure 9.10 following, sets the placement of text ID placement. Details follow in Table 9.7 following.

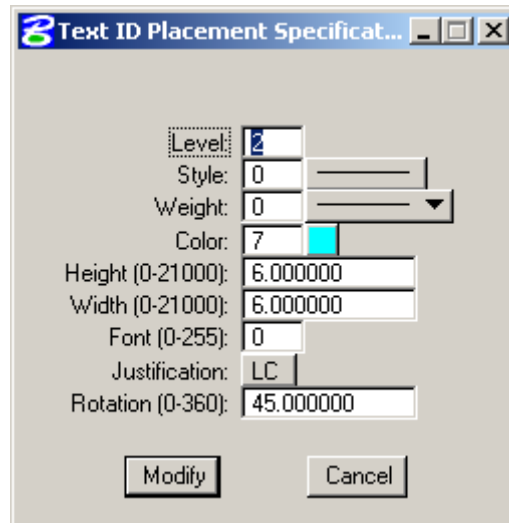


Figure 9.10: Text ID Placement Specifications

| Option | Details |
|--------------------------|--|
| Level | An integer value (1-63) that specifies the text ID level. |
| Style | An integer value (0-7) that specifies the text ID style. |
| Weight | An integer value (0-31) that specifies the text ID weight. |
| Colour | An integer value (0-255) that specifies the text ID colour. |
| Height (1-21,000) | A real value that specifies the text ID height. |
| Width (1-21,000) | A real value that specifies the text ID width. |
| Font (0-255) | An integer value that specifies the text ID font. |
| Justification | Two character combination that specifies the justification of the text ID. The valid set for this is: (LB, LC, LT, CB, CC, CT, RB, RC, RT) where L=Left, C=Centre, R=Right, B=Bottom and T=Top |
| Rotation | A real value (0-360) that specifies the text ID rotation. |

Table 9.7: Text ID Placement Specifications

9.1.2.3 Text Symbol Placement Specifications:

This dialogue, as shown in Figure 9.11, sets the attribute settings for the text symbols and its' placement. Table 9.8 details the possible settings.

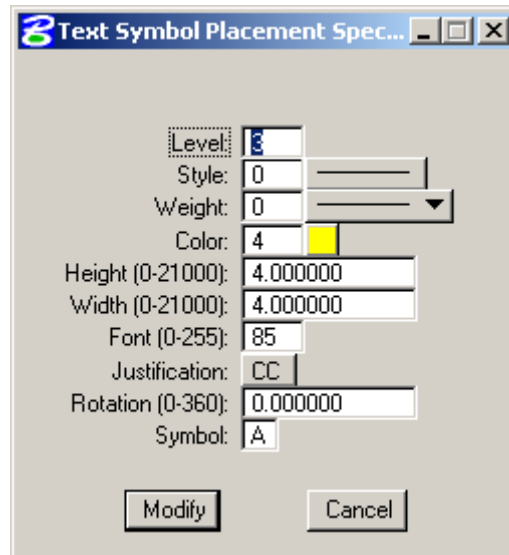


Figure 9.11: Text Symbol Placement Specifications Dialogue Box

| Option | Details |
|--------------------------|--|
| Level | An integer value (1-63) specifying the text symbol level. |
| Style | An integer value (0-7) specifying the text symbol style. |
| Weight | An integer value (0-31) that specifies the text symbol weight. |
| Colour | An integer value (0-255) that a specifies the text symbol colour. |
| Height (1-21,000) | A real value that specifies the text symbol height. |
| Width (1-21,000) | A real value that specifies the text symbol width. |
| Font (0-255) | An integer value that specifies the text symbol font. |
| Justification | Two character combination that specifies the justification of the text ID. The valid set for this is: (LB, LC, LT, CB, CC, CT, RB, RC, RT) where L=Left, C=Centre, R=Right, B=Bottom and T=Top |
| Rotation | A real value (0-360) that specifies the text ID rotation. |
| Symbol | An alphanumeric value to be used as the text symbol. GWN-COGO supplies a font library with default symbols for font 85. |

Table 9.8: Text Symbol Placement Specifications Details

9.1.2.4 Text Annotation Placement Specifications:

This dialogue, as shown in Figure 9.12 following, sets the placement specifications of the text annotation. Details follow in Table 9.9 following.

Modifying any text justification will actually modify the position of the text in the graphics file. also, the rotation for text annotation will be calculated for some commands at placement time.

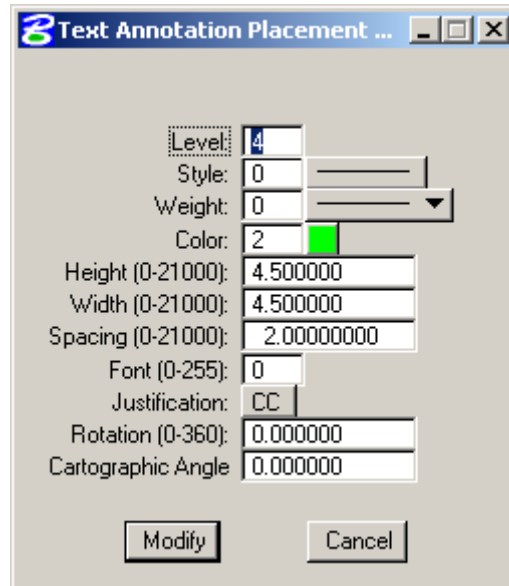


Figure 9.12: Text Annotation Placement Specifications Dialogue Box

| Option | Details |
|--------------------------|--|
| Level | An integer value (1-63) specifying the text symbol level. |
| Style | An integer value (0-7) specifying the text symbol style. |
| Weight | An integer value (0-31) that specifies the text symbol weight. |
| Colour | An integer value (0-255) that a specifies the text symbol colour. |
| Height (1-21,000) | A real value that specifies the text symbol height. |
| Width (1-21,000) | A real value that specifies the text symbol width. |
| Font (0-255) | An integer value that specifies the text symbol font. |
| Justification | Two character combination that specifies the justification of the text ID. The valid set for this is: (LB, LC, LT, CB, CC, CT, RB, RC, RT) where L=Left, C=Centre, R=Right, B=Bottom and T=Top |
| Rotation | A real value (0-360) that specifies the text ID rotation. |

Table 9.9: Text Annotation Placement Specifications Details

9.1.3 Output Options:

This dialogue, as shown in Figure 9.13 following, modifies the file names of the audit trail file and report file as well as other report and adjustment parameters. Details follow in Table 9.10.

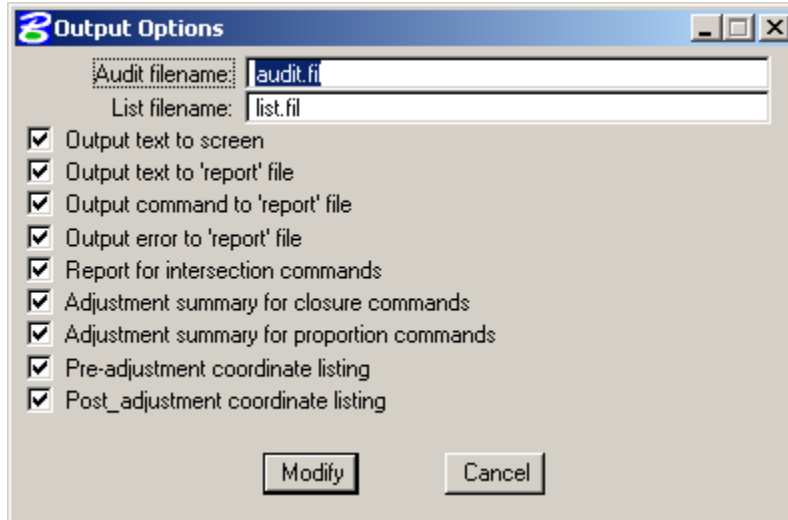


Figure 9.13: Output Options Dialogue Box

| Option | Details |
|--|--|
| Audit filename | A filename for the audit trail file that records each command and input to that command for the life of the project. |
| List filename | A filename for the report output. The report can be sent to a printer directly by specifying "PRN" in this text field. |
| Output text to screen | If on, any reports generated will be output to the screen. |
| Output text to 'report' file | If on, any reports generated will be output to 'report' file. |
| Output command to 'report' file | If on, commands executed will be output to the 'report' file. |
| Output error to 'report' file | If on, any errors generated will be output to the 'report' file. |
| Report for intersection commands | If on, a report of distance and direction is generated which can be accepted or rejected. |
| Adjustment summary for closure commands | If on, closure adjustment summary is displayed. |

| | |
|---|---|
| Adjustment summary for proportion commands | If on, proportion adjustment summary is displayed. |
| Pre-adjustment coordinated listing | Option for a listing of the coordinates prior to adjustment. |
| Post-adjustment coordinate listing | Option for a listing of the coordinates after the adjustment. |

Table 9.10: Output Options Dialogue Box

9.1.4 Correction Values:

This dialogue, as shown in Figure 9.14 and detailed in Table 9.11 following, allows the user to set corrections for a variety of measurements.

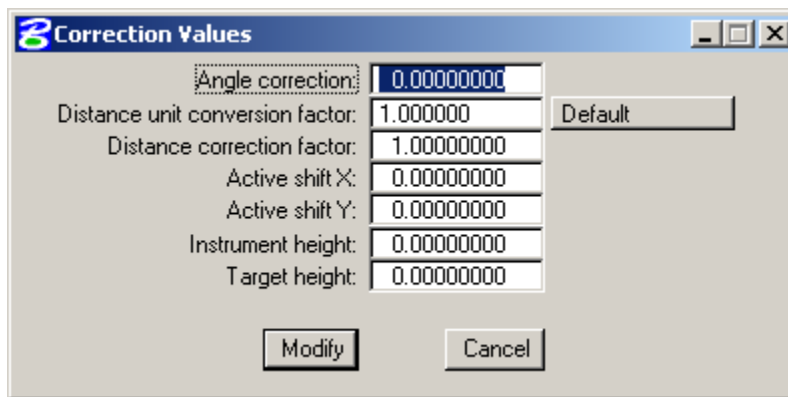


Figure 9.14: Correction Values Dialogue Box

| Option | Details |
|--|--|
| Angle correction value | A real value in degrees to be added to all input angles. |
| Distance unit conversion factor | A real value which converts distance units such as feet to metres. |
| Active shift X value | A real value added to X coordinates. |
| Active shift Y value | A real value added to Y coordinates. |
| Instrument Height | A real value to add to point elevations. |
| Target Height | A real value to subtract from instrument heights. |

Table 9.11: Correction Values Details

9.1.5 Tolerance Values:

This dialogue, as shown in Figure 9.15 and detailed in Table 9.12 following, for various tolerances and standard deviations settings.

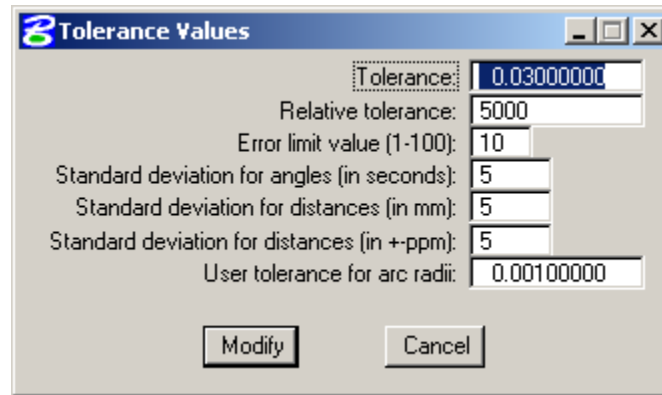


Figure 9.15: Tolerance Values Dialogue Box

| Option | Details |
|---|---|
| Tolerance | The maximum allowable distance error for the Compass Closure command. |
| Relative tolerance | Relative distance error for Compass closure command. |
| Error limit value | The number of errors (1-100) which if exceeded, will terminate the program in Batch Processing and off-line processing modes. |
| Standard deviation for angles (in seconds) | Accuracy of observation equipment used for angles in the Least Squares Adjustment command. |
| Standard deviation for distances (in mm) | Accuracy of the observation equipment used for distances in the Least Squares Adjustment command. |
| Standard deviation for distances (in +- ppm) | Accuracy of observation equipment used for distances in the Least Squares Adjustment command. |
| User tolerance for arc radii | Error tolerance to be used when measuring arc radii. |

Figure 9.12: Tolerance Values Details

9.1.6 Processing Options:

This dialogue, as shown in Figure 9.16 and detailed in Table 9.13, allows the user to select various processing operations such as to display dialogue boxes and overwriting existing points.

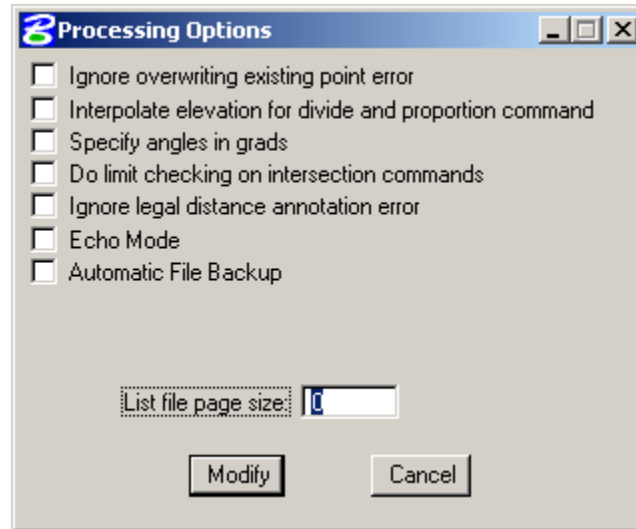


Figure 9.16: Processing Options Dialogue Box

| Option | Details |
|--|--|
| Ignore overwriting existing point error | If on, any point or figure ID keyed in will overwrite existing point /figure ID if necessary. |
| Interpolate elevation for divide and proportion command | If on, the elevation will be set to zero. |
| Specify angle in grads | If on, all input angles and output angles will be in grad format. |
| Do limit checking on intersection commands | For intersection commands that do limit checking, the checking is disabled if this option is off. |
| Ignore legal distance annotation error | If on, this error will be ignored. |
| Echo mode | If on, a dialogue box will appear to display the output as it is processed. |
| Automatic File Backup | If on, the Parameter File, coordinate file, figure file, report file and audit trail file will be copied to a new filename before any command input is processed. (Slows down process therefore use with discretion) |
| List file page size | This value sets the maximum number of lines in the report file before paging. If this value is set to 0, no |

form feeds will be put to the list file.

Table 9.13: Processing Options Details

9.1.7 Non-Modifiable Data

This dialogue, as shown in Figure 9.17 and 9.18 following, displays all non-modifiable parameter file data such as figure table size, point data info. and last feature activated.

Point data information includes point ID, X, Y, and Z values of the last fifty generated points. This is done in reverse chronological order such that the last point entered will be the first one shown.

Figure 9.18 shows the dialogue box after activating the “Points” button.

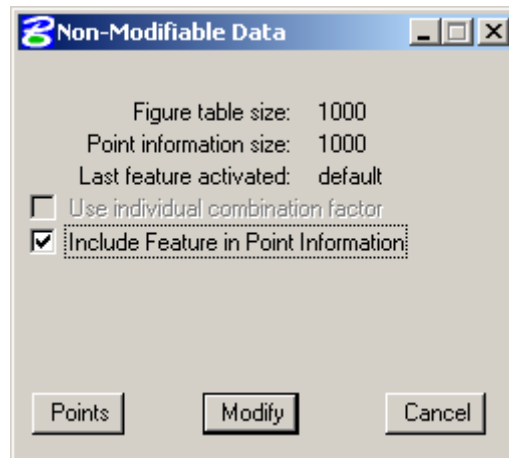


Figure 9.17: Non-Modifiable Data Dialogue Box 1

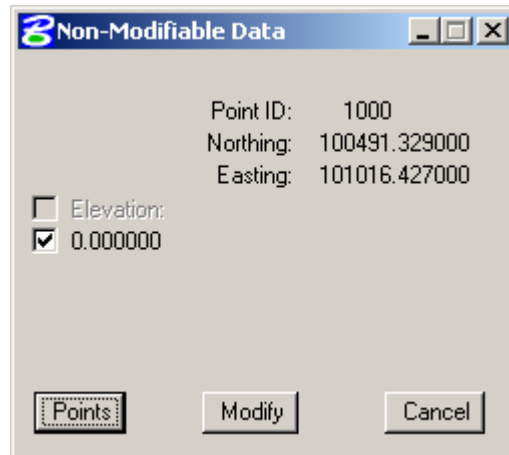


Figure 9.18: Non-Modifiable Data Dialogue Box

10.0 UTILITIES

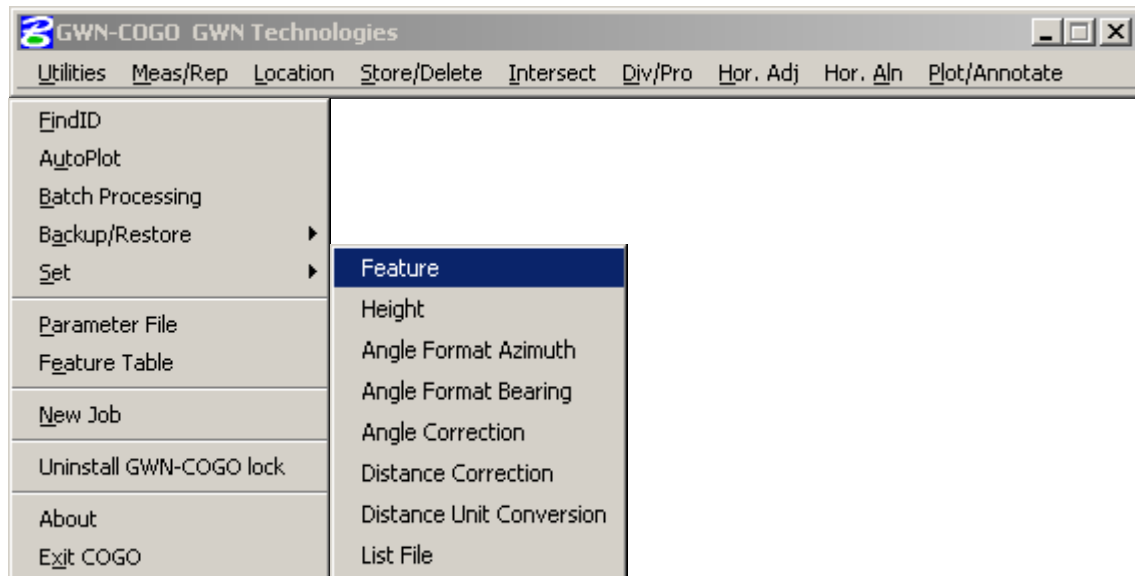


Figure 10.1: Utilities Pulldown Menu and Set Sub-Menu

This chapter deals with the commands found on the Utilities pulldown menu in a reference format.

10.1 FindID

Description:

This command centers the view on the graphically displayed point ID.

Procedure:

1. From the main pulldown menu [**Utilities**], select [**FindID**] or keyin the command window text field "**FindID** <cr>".
2. After the prompt is set in the command window keyin field, enter the point ID and press "**Enter**" (<cr>).
3. If the search is successful for the point ID, you will be prompted to select the view for the display of the point. Data pick in the view as requested and the point requested should fall near the centre of the view.
4. If the search is unsuccessful, the point is not graphically displayed in the design file with its' text ID.

Input Items:

Point ID.

Dialogue Box:

There is no dialogue box for this command.

Related Commands:

List Coordinates, List Figures

10.2 Autoplot

Description:

This command creates a dialogue box with individual toggle switches which allow or inhibit the graphic creation of individual items.

This is only a short form of the more likely switches used over those found in the Parameter File under Auto Plot Modes.

These settings vary from feature to feature and therefore may change after setting a new feature.

Procedure:

1. Under the **[Utilities]** pulldown menu, select **[Autoplot]**.
2. From the displayed dialogue box, turn on/off the items not required to be included in the design file.
3. Double click in the upper left corner to close the box and activate the selections.



The selections made do not take effect until the dialogue box is closed.

Input Items:

None.

Box: Dialogue

The dialogue box as shown below in Figure 10.2 is modeless in nature, meaning that all operations are possible while the box is open.

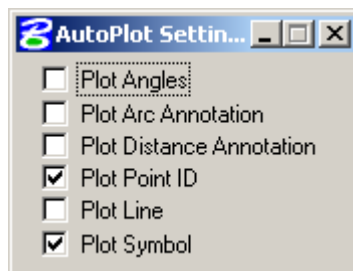


Figure 10.2: AutoPlot Settings Dialogue Box

Related Commands:

[Utilities] - [Parameter File] - [Plotting] - [Auto Plot Modes]

[Utilities] - [Feature Table] - [Plotting] - [Auto Plot Modes]

10.3 Batch Processing

Description:

This process allows either graphic or non-graphic processing.

Requires an ASCII text file with GWN-COGO commands left justified and inputs following on separate lines with at least one blank space indented from the left margin.

All GWN-COGO keyin commands are allowed to be used in the input file.

Procedure:

1. Under the **[Utilities]** pulldown menu, select **[Batch Processing]**.
2. A dialogue box will appear which will request the input file. Operate as all regular MicroStation File Manager dialogue.
3. Any duplicate figures, points or errors will be displayed as normal during processing.
4. If "Echo Mode" is active (see [Parameter File] - [Processing Options]), a listbox dialogue will appear and scroll as the input is processed, displaying the data used.

Input Items:

An ASCII text file with commands left justified and inputs on separate lines and indented at least one space from the left margin. (See demo1.cmd in GWN-COGO supplied directory for an example text file).

Dialogue Box:

The dialogue box displayed upon activation of the pulldown command is the File Manager as shown below in Figure 10.3.

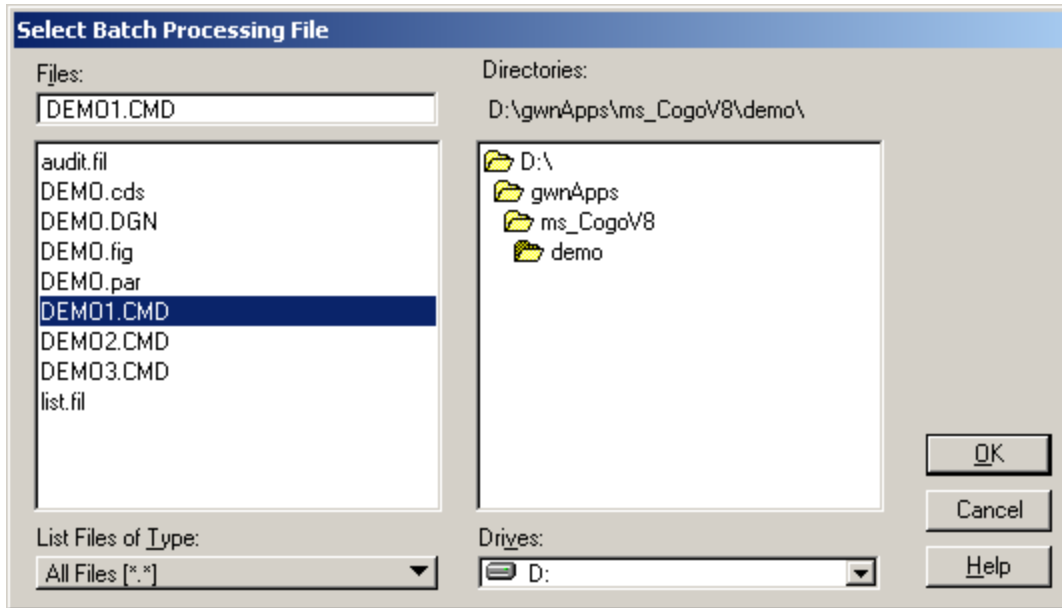


Figure 10.3: Batch Processing Dialogue Box

Example:

See "Tutorial" in Chapter 5 for an example for running and creating a Batch file input.

Related Commands:

Extract.

10.4 Backup / Restore

Description:

The files created and used by GWN-COGO are copied to the same directory with distinct extensions to indicate what files they are backups of.

If Autosave is active, when Restore is activated, the last saved version of the files are copied over the present versions of the files.

The design file is backed up only when Backup is activated from the pulldown menu.

Procedure:

To BACKUP: activate the **[Backup]** sub-item from the **[Utilities]** - **[Backup/Restore]** pulldown menu.

To RESTORE: activate the **[Restore]** sub-item from the **[Utilities]** - **[Backup/Restore]** pulldown menu.



Backup or Restore may be called upon at any time though no files can be restored if they have not yet been backed up first. Also, the design file is only backed up from the pulldown command and not Autosave.

Input Items:

For BACKUP: none

For RESTORE: backed up files as described in Table 10.1. "<dgnfile>" refers to the name of the present design file.

| Backup file | Original File |
|---------------|------------------|
| <dgnfile>.pbk | Parameter File |
| <dgnfile>.fbk | Figure Table |
| <dgnfile>.dbk | Design File |
| <dgnfile>.abk | Audit Trail File |
| <dgnfile>.lbk | List File |

Table 10.1: Backup File Descriptions

Dialogue Box:

None

Related Commands:

None

10.5 Set Feature

Description:

This command makes a feature the active feature from each following command and stays in effect until another feature is set.

Any feature found in the Feature Table is eligible for this function.

Procedure:

1. From the main menubar, select from the **[Utilities]** pulldown the **[Set]** item, then the **[Feature]** item of the sub-menu which will appear as seen (separated from the pulldown menu) in Figure 10.1. Or, keyin “**Set Feature** <cr>” at the command prompt of the MicroStation command window.
2. If using the dialogue box, the user can enter in the text field, the name of the feature or pick it off the list of features. If using the MicroStation command line, the user should enter the name of the feature.



The feature name is case sensitive. For example, storm and STORM are not the same for this command.

Input Items:

feat Feature Name.

Dialogue Box:

The dialogue as shown in Figure 10.4, allows the user to click on the name of the feature from the list box to have it automatically entered in the text field.

This dialogue box closes once the feature is activated.

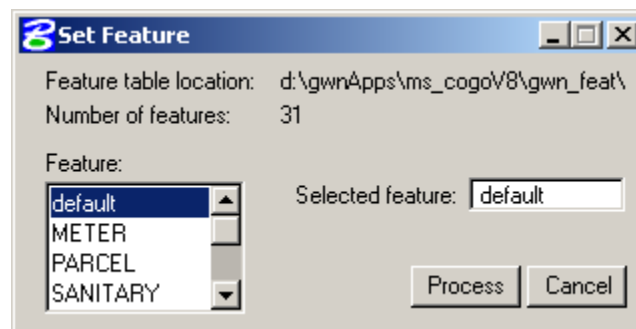


Figure 10.4: Set Feature Dialogue Box

Related Commands:

Set Point Feature, [Utilities] - [Feature Table] - [Activate Feature (COGO)]

10.6 Set Height

Description:

This command records the height of the instrument or target.

The height is used when vertical angles are given to calculate elevations.

Procedure:

1. From the [**Utilities**] pulldown menu, select [**Set**] then the sub-menu item [**Height**] or keyin "**Set Height** <cr>" in the command window text field.
2. Input the height of the target / instrument in the dialogue box text field or the command line of the MicroStation command window.



Care must be taken when using this command as the settings are saved and remain active for each following working session.

Input Items:

| | |
|----------|--------------------|
| htInst | Instrument height. |
| htTARGET | Target height. |

Dialogue Box:

The dialogue box will appear as shown in Figure 10.5. Units of measurement must be the same as the design file settings. e.g.: Metres, Feet, etc..

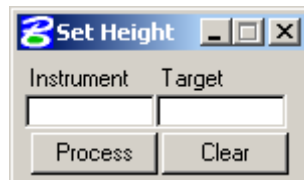


Figure 10.5: Set Height Dialogue Box

Related Commands:

None.

10.7 Set Angle Format Azimuth

Description:

This command sets the “Angle Annotation Type” to “Azimuth” without leaving the GWN-COGO environment.

Procedure:

1. From the [**Utilities**] pulldown menu, select [**Set**] and then [**Angle Format Azimuth**] from the sub-menu. Alternatively, you could type in “**Set Angle Format Azimuth** <cr>” into the MicroStation command line.

Input Items:

None.

Dialogue Box:

None.

Related Commands:

See: [Parameter File] - [Plotting] - [Annotation Formats] - [Angle Annotation Type] in Chapter 9 or 8 (Feature Table).

Set Angle Format Bearing.

10.8 Set Angle Format Bearing

Description:

This command sets the “Angle Annotation Type” to “Bearing” without leaving the GWN-COGO environment.

Procedure:

1. From the [**Utilities**] pulldown menu, select [**Set**] and then [**Angle Format Bearing**] from the sub-menu. Alternatively, you could type in “**Set Angle Format Bearing** <cr>” into the MicroStation command line.

Input Items:

None.

Dialogue Box:

None.

Related Commands:

See: [Parameter File] - [Plotting] - [Annotation Formats] - [Angle Annotation Type] in Chapter 9 or 8 (Feature Table).

Set Angle Format Azimuth.

10.9 Set Angle Correction

Description:

This command sets the angle correction without leaving the GWN-COGO environment.

This is a real value in Degrees (or Gradients) to be applied to all input directions.

Procedure:

1. From the [**Utilities**] pulldown menu, select [**Set**] then [**Angle Correction**] from the sub-menu. Alternatively, the user could type in "**Set Angle Correction** <cr>" at the MicroStation command prompt.
2. Input the angle in Degrees or Gradient format to be used.

Input Items:

| | |
|-----|--|
| ang | Correction angle (ang) in Degrees or Gradients |
|-----|--|

Dialogue Box:

None.

Related Commands:

Set Distance Correction, Set Height.

See Parameter File and Feature Table (Section 8.9.2) for other locations to set values.

10.10 Set Distance Correction

Description:

This command adjusts the distance inputs with a real value without leaving the GWN-COGO environment.

Procedure:

1. From the [**Utilities**] pulldown menu, select [**Set**] then [**Distance Correction**] from the sub-menu. Alternatively, the user could keyin to the MicroStation command prompt, "**Set Distance Correction** <cr>".
2. Enter the distance to use for the adjustment.

Input Items:

| | |
|------------|---------------------|
| disCORRECT | Distance Correction |
|------------|---------------------|

Dialogue Box:

None.

Related Commands:

Set Angle Correction, Set Height.

See Section 8.9.2 for Feature Table and Parameter File locations of input

10.11 Set Distance Unit Conversion

Description:

This command sets a real value to convert distance units of measurement (e.g.:metres to feet) without leaving the GWN-COGO environment.

Procedure:

1. From the [**Utilities**] pulldown menu, select [**Set**] then [**Distance Unit Conversion**] from the sub-menu. Alternatively, the user could keyin to the MicroStation command line, "**Set Distance Unit Conversion** <cr>".
2. Key in the distance to use for the conversion factor.

Input Items:

| | |
|------------|----------------------------|
| disCORRECT | Distance Correction Factor |
|------------|----------------------------|

Dialogue Box:

None

Related Commands:

In Parameter File and Feature Table (see Section 8.9.2)

10.12 Set List File

Description:

This command changes the name of the Report file GWN-COGO writes to if set to in the Parameter File.

Procedure:

1. From the [Utilities] pulldown menu, select [Set] then [List File] from the sub-menu.
2. In the MicroStation command prompt, enter the name of the file (with extension) for the new report file.

Input Items:

Report file name.

Dialogue Box:

None.

Related Commands:

None.



To make it easy to isolate reports for hardcopy outputs on individual details or actions, change the report filename, perform the action command then change the report filename back. This way, you could get a hardcopy of the point file or figure table after listing them or use them to run a batch file in another project to load the individual points or figures desired.

10.13 Parameter File

Description:

The Parameter File is a data base of information regarding the attributes of various pieces of data related to the design file for which it is associated.

Unlike the Feature Table, the Parameter File only holds the attributes for one feature, that being the active feature.

The Feature Table in comparison, is a self-supported program which is accessed by other GWN products for information and thus is cannot be customized to the individual project in the same way as the Parameter File.

The Parameter File and Feature Table are very similar in most respects and the settings of the Feature Table are used in the creation process of the Parameter File at the time of running "New Job".

Annotation, graphic representation of elements, correction factors, etc. are stored in this file which may be modified at any time from within MicroStation or (MicroStation versions 4 and earlier) in the DOS environment.

Most GWN-COGO commands access the Parameter file to check whether to adjust data, what elements are to be plotted, what files to write to, etc..



For further and detailed information regarding the Feature Table and Parameter File consult Chapters 8 and 9.

10.14 Feature Table

Description:

The Feature Table is a self-supported program which maintains a data base of information regarding the attributes of various pieces of data, such as the attributes of all the features stored.

The Parameter File in comparison, is a part of the GWN-COGO program which is accessed by GWN-COGO commands for information regarding customized settings. These settings relate only to the design file to which it is associated.

The Parameter File and Feature Table are very similar in most respects and the settings of the Feature Table are used in the creation process of the Parameter File at the time of running "New Job".

Annotation, graphic representation of elements, correction factors, etc. are stored in this file which may be modified at any time from within MicroStation or (MicroStation versions 4 and earlier) in the DOS environment.



For further and detailed information regarding the Feature Table and Parameter File consult Chapters 8 and 9.

10.15 New Job

Description:

The “New Job” command creates certain files which GWN-COGO commands require to operate.

This command should only be run once, at the start of the project.



| |
|--|
| For detailed information regarding “New Job”, consult Chapter 7. |
|--|

10.16 About COGO

Description:

This command displays a dialogue box that indicates the program operating, version number and information regarding GWN Systems Inc. such as mailing address, phone number, E-Mail address and Fax numbers.

Procedure:

1. From the [**Utilities**] pulldown menu, select [**About COGO**].
2. To Close the dialogue box, press “Enter (<cr>)” or the “Close” button on the dialogue box.

Input Items:

None.

Dialogue Box:

A Modal dialogue box as shown in Figure 10.6 will appear. (Modal means that no other operations can be made outside the dialogue while it is open.)



Figure 10.6: About COGO Dialogue Box

10.17 Exit COGO

Description:

This command causes GWN-COGO to unload from memory, close all associated dialogue boxes and end active commands.

Procedure:

1. From the [**Utilities**] pulldown menu, select [**Exit COGO**].

Input Items:

None.

Dialogue Box:

None.

Related Commands:

None.

10.18 Uninstall Lock

Description:

This command causes GWN-COGO to uninstall the GWN-COGO lock.

To transfer GWN-COGO to another system.

To update key when a change of hardware devices have been made and the key becomes invalid.

Procedure:

1. From [**Utilities**] pulldown the [**Uninstall GWN-COGO lock**].
2. Select “Yes” to continue or “No” to abort.
3. If “Yes” is selected, note down the “Uninstall Verification Key”. See *Figure 10.8*.
4. Email support@gwnsys.ca the “Uninstall Verification Key” and “new machine fingerprint” requesting a new “Unlock Key”.

Input Items:

None.

Dialogue Box:

The dialogue as shown in Figure 10.7 allows the user to click “Yes” to continue or “No” to abort. If “Yes” is select Figure 10.8 is displayed.

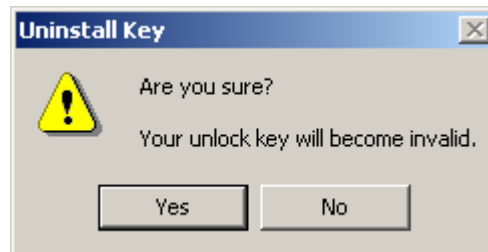


Figure 10.7: Uninstall Key Dialogue Box_1

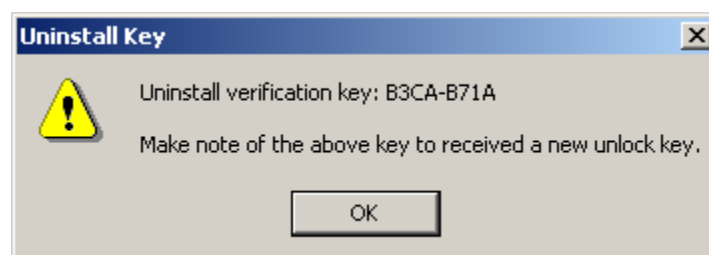


Figure 10.8: Uninstall Key Dialogue Box_2

11.0 MEASURE / REPORT

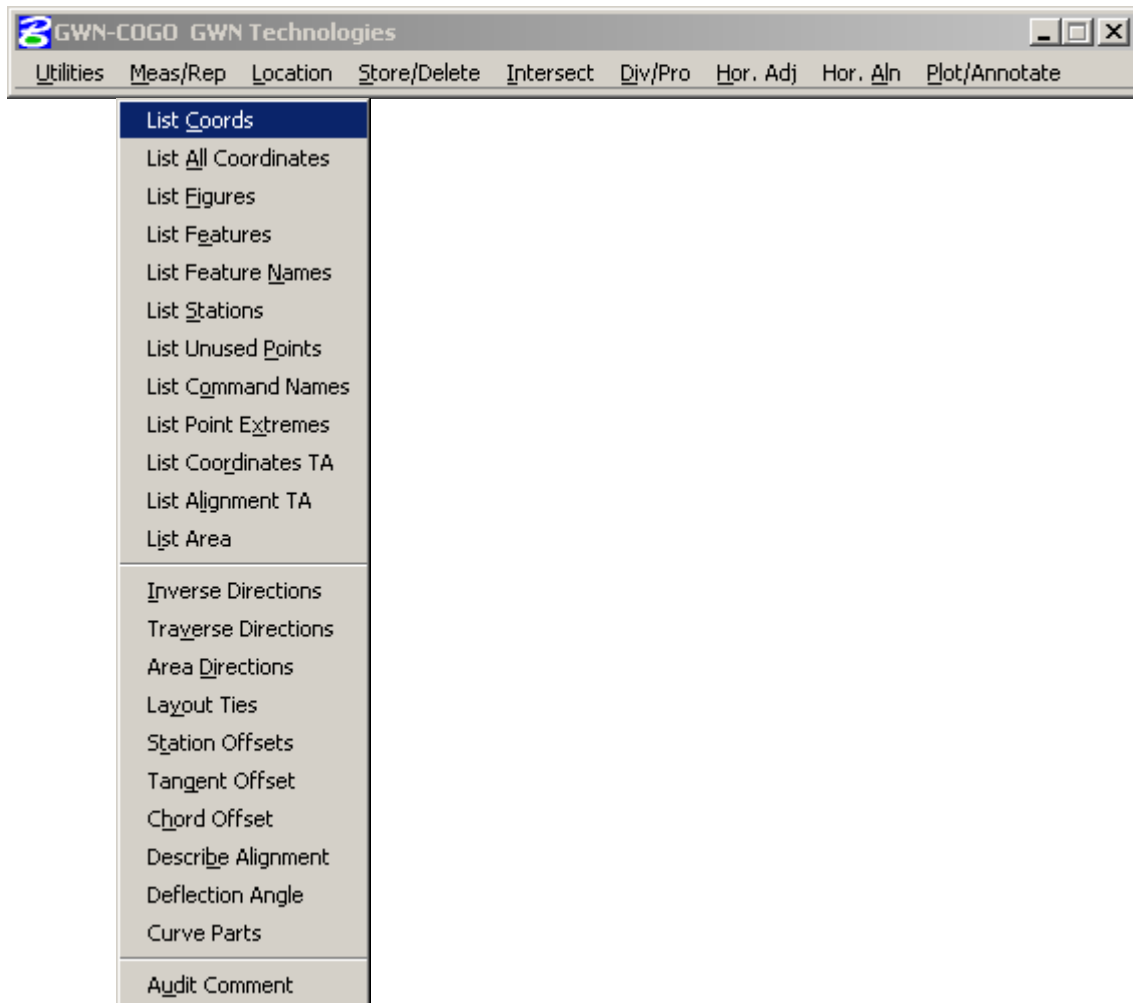


Figure 11.1: Measure/Report Pulldown Menu

This chapter deals with the commands found on the Measure / Report pulldown menu in a reference format

11.1 List Coords

Descriptions:

This command lists the coordinates of the point ID's contained in the "des" description.

The "des" may be a single point ID, series of point ID's or a single figure.

The output will be formatted in accordance with the setting of the "Annotation Format" as set in the Parameter File and as listed below in Table 11.1. This includes the point information, which may include the feature associated with the point as well as a text string.

| | | |
|-----|-------|---|
| 1. | NE | Northing followed by Easting |
| 2. | EN | Easting followed by Northing |
| 3. | Z | Elevation only |
| 4. | NEZ | Northing followed by Easting and Elevation |
| 5. | ENZ | Easting followed by Northing and Elevation |
| 6. | NE I | Northing followed by Easting and Point Information |
| 7. | EN I | Easting followed by Northing and Point Information |
| 8. | Z I | Elevation followed by Point Information |
| 9. | NEZ I | Northing followed by Easting, Elevation and Point Information |
| 10. | ENZ I | Easting followed by Northing, Elevation and Point Information |
| 11. | I | Point Information |

Table 11.1: Annotation Coordinate Order

Procedure:

1. From the [Meas/Rep] pulldown menu, select [List Coords].
2. Either keyin or graphically pick from view, the point ID's required or Figure ID. These may be singular points, in series or combination of the two. (see Example)
3. A report screen will appear listing the point ID(s) and coordinates according to the Annotation Format setting.



All point ID's must be enclosed in round brackets "()".

Dialogue Box:

The List Coords dialogue box will appear as shown in Figure 11.2.

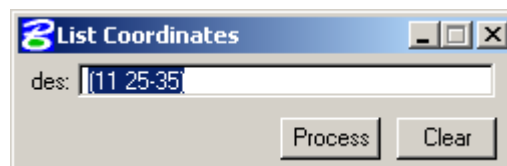
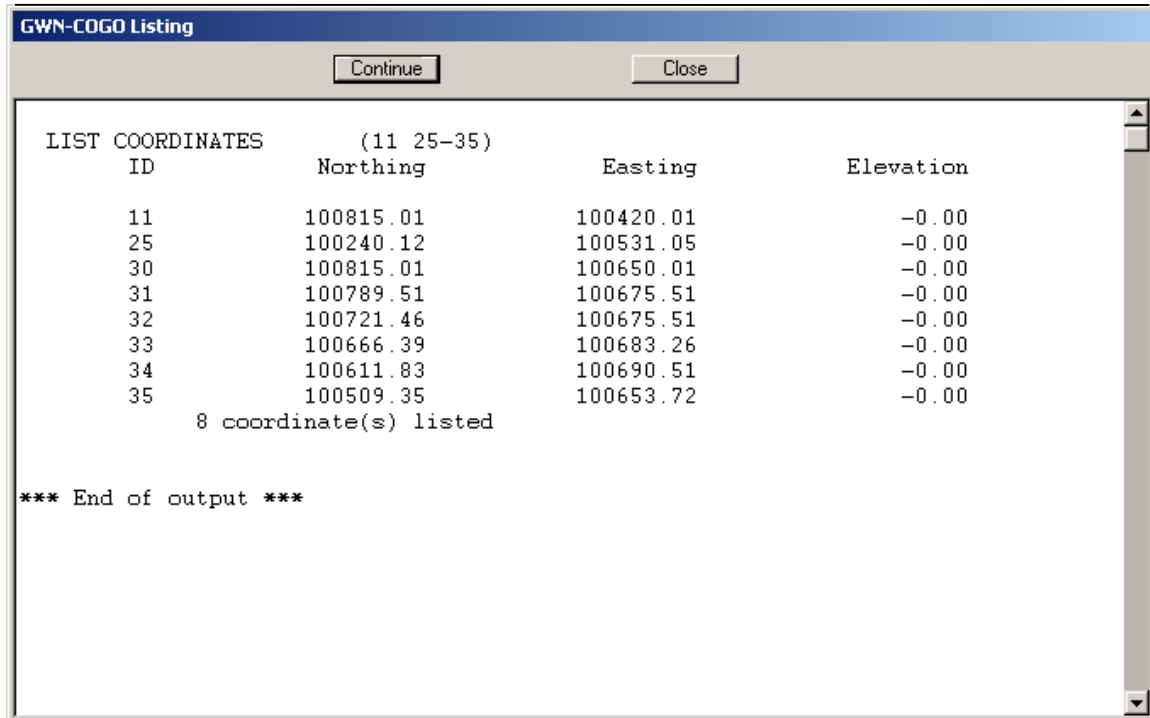


Figure 11.2: List Coords Dialogue Box

Example:

Description (des) (11 25-35)

The points 11 and 25 through to 35 will be displayed as shown in Figure 11.3.



| LIST COORDINATES | (11 25-35) | | | |
|------------------|------------|-----------|-----------|--|
| ID | Northing | Easting | Elevation | |
| 11 | 100815.01 | 100420.01 | -0.00 | |
| 25 | 100240.12 | 100531.05 | -0.00 | |
| 30 | 100815.01 | 100650.01 | -0.00 | |
| 31 | 100789.51 | 100675.51 | -0.00 | |
| 32 | 100721.46 | 100675.51 | -0.00 | |
| 33 | 100666.39 | 100683.26 | -0.00 | |
| 34 | 100611.83 | 100690.51 | -0.00 | |
| 35 | 100509.35 | 100653.72 | -0.00 | |

8 coordinate(s) listed

*** End of output ***

Figure 11.3: List Coords Example Report

Related Commands:

List All Coords, List Figures, List Features

11.2 List All Coords

Description:

This command lists the coordinates of the all point ID's contained in the point file.

The output will be formatted in accordance with the setting of the "Annotation Format" as set in the Parameter File and as listed below in Table 11.2. This includes the point information, which may include the feature associated with the point as well as a text string.

| | | |
|-----|-------|---|
| 1. | NE | Northing followed by Easting |
| 2. | EN | Easting followed by Northing |
| 3. | Z | Elevation only |
| 4. | NEZ | Northing followed by Easting and Elevation |
| 5. | ENZ | Easting followed by Northing and Elevation |
| 6. | NE I | Northing followed by Easting and Point Information |
| 7. | EN I | Easting followed by Northing and Point Information |
| 8. | Z I | Elevation followed by Point Information |
| 9. | NEZ I | Northing followed by Easting, Elevation and Point Information |
| 10. | ENZ I | Easting followed by Northing, Elevation and Point Information |
| 11. | I | Point Information |

Table 11.2: Annotation Coordinate Order

Procedure:

1. From the [Meas/Rep] pulldown menu, select [List All Coords].
2. A report screen will appear listing the point ID(s) and coordinates according to the Annotation Format setting.



The setting in the Annotation Format box of the Parameter File now allows the recorded feature and point information to be displayed in the report if the letter "I" is included in the option bar indicating the coordinate sequence.

Dialogue Box:

None.

Related Commands:

List Coords, List Features, List Figures.

11.3 List Figures

Description:

This command lists the descriptions of the figures requested in the description (des).

There may be a single or list of figures requested.

If more than one figure is requested, enclose the figure ID's in rounded brackets "()".

If a figure comment has been added at the end of the figure description (following the closing ")" bracket, it will be also displayed.

Procedure:

1. From the [Meas/Rep] pulldown menu, select [List Figures].
2. Either keyin or graphically pick from view, the figure ID's required. These may be singular figures, in series or combination of the two. (see Example)
3. A report screen will appear listing the figure ID(s) and its description.

Dialogue Box:

The List Figures dialogue box will appear as shown in Figure 11.4.

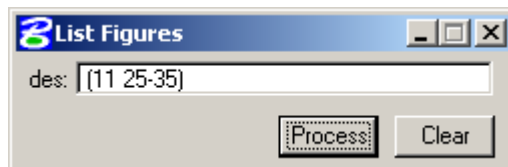


Figure 11.4: List Figures Dialogue Box

Example:

Description (des) (11 25-35)

The Figure 11 and Figures 25 through to 35 will have their descriptions reported as shown in Figure 11.5.

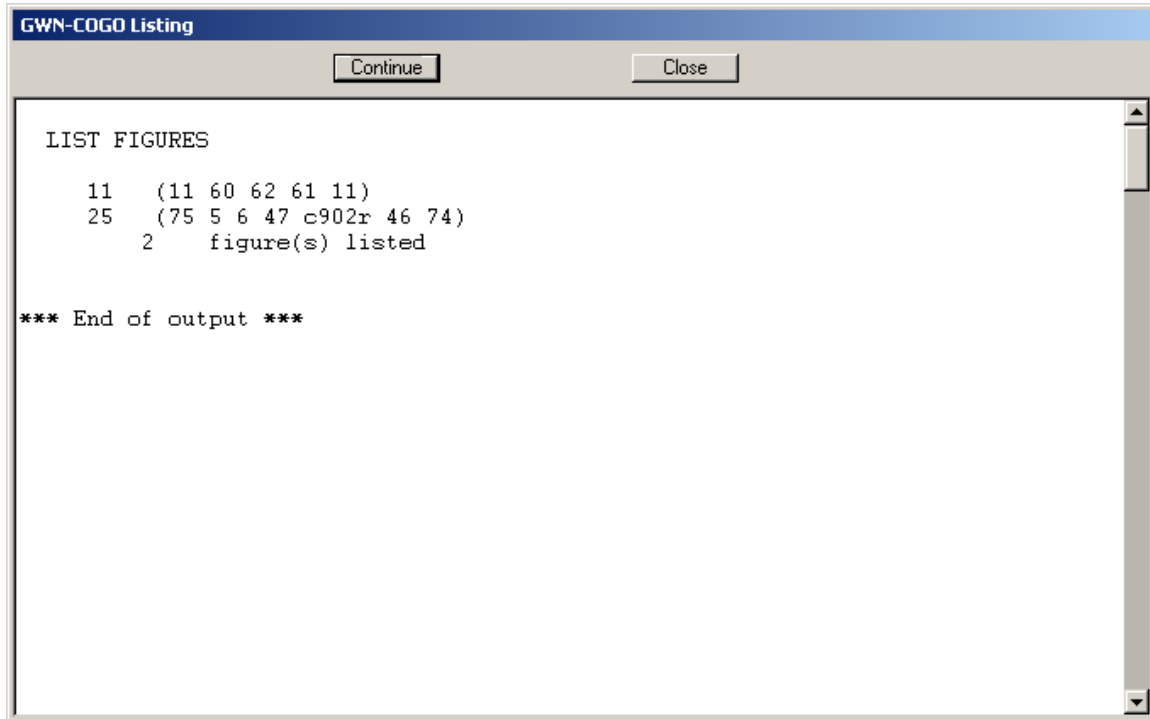


Figure 11.5: List Figures Example Report

Related Commands:

List Coords, List All Coords, List Features

11.4 List Features

Description:

This command lists all the information about a feature contained in the feature table.

When using the MicroStation command prompt keyin option, the user may enter the asterisk character "*" to list information on all features.

Procedure:

1. From the [Meas/Rep] pulldown menu, select [List Features].
2. Either keyin or pick from the list of features, the feature desired.
3. A report screen will appear listing the feature information.

Dialogue Box:

The List Figures dialogue box will appear as shown in Figure 11.6.

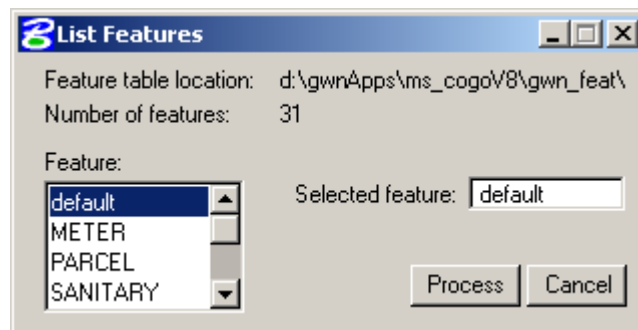


Figure 11.6: List Features Dialogue Box

Example:

Feature: default

The report should appear as shown in Figure 11.7.

| | | | | | | | | | | |
|----------------------------------|--|-----|--|-----|--|-----|--|-----|--|--|
| FEATURES LISTING REPORT | | | | | | | | | | |
| Feature Identifier : default | | | | | | | | | | |
| Specs | | Lvl | | Sty | | Wgt | | Clr | | Height |
| ----- | | | | | | | | | | |
| Sym | | 3 | | 0 | | 0 | | 4 | | 4.00 4.00 85 7 0.00 A |
| Id | | 2 | | 0 | | 0 | | 7 | | 6.00 6.00 0 1 45.00 |
| Annot | | 4 | | 0 | | 0 | | 2 | | 4.50 4.50 0 7 0.00 |
| Line | | 10 | | 0 | | 0 | | 5 | | |
| Id Spacing : 0.00 | | | | | | | | | | |
| Annotation Spacing : 2.00 | | | | | | | | | | |
| Extend line from endpoint : 0.00 | | | | | | | | | | |
| Specs | | Lvl | | Sty | | Wgt | | Clr | | X scale Y scale Z scale Rotate Name |

| | | | | | | | | | |
|--|---|--------------------|--|-------------------|---|-----------|--|--------------|------|
| ----- | | | | | | | | | |
| Cell | | 5 | | 0 | | 0 | | 1 | |
| | | | | | | 1.00 | | 1.00 | |
| | | | | | | | | 1.00 | |
| | | | | | | | | | 0.00 |
| Auto Plot Mode Settings ... | | | | | | | | | |
| Numeric Mode | : | n | | Line Angle Annot | : | y | | Arc Annot | : |
| Point ID | : | y | | Line/Curve/Spiral | : | y | | Point Symbol | : |
| Distance Annot | : | y | | Legal Dist Annot | : | n | | | |
| Curve Settings ... | | | | | | | | | |
| | | Mode | | Annot | | Placement | | | |
| | | ---- | | ----- | | | | | |
| Curve Radius : | | y | | RA= | | Bottom | | | |
| Curve Delta : | | y | | DL= | | Top | | | |
| Curve Length : | | y | | LN= | | Bottom | | | |
| Curve Tangent: | | y | | TN= | | Top | | | |
| Miscellaneous ... | | | | | | | | | |
| Angle Annot Type | : | Bearings | | | | | | | |
| Angle Annot Format | : | 2 decimal place(s) | | | | | | | |
| Dist Annot Format | : | 2 decimal place(s) | | | | | | | |
| Coord Annot Format | : | 2 decimal place(s) | | | | | | | |
| Coordinate Sequence | : | NEZ | | | | | | | |
| Area Multiplier | : | 1.00 | | | | | | | |
| Reverse Apply Dist Unit Conv Factor | : | n | | | | | | | |
| Reverse Apply Dist Corr Factor | : | n | | | | | | | |
| Apply Dist Unit Conv Factor for Legal Annot: | : | n | | | | | | | |
| Dist Annot Units | : | FT | | | | | | | |
| Area Annot Suffix | : | SQ, FT | | | | | | | |
| Area Annot Prefix | : | AREA= | | | | | | | |
| North Annot Prefix | : | Northing= | | | | | | | |
| East Annot Prefix | : | Easting= | | | | | | | |
| Elev Annot Prefix | : | Elevation= | | | | | | | |
| Annot of Figure | : | Top | | | | | | | |
| Line Angle Annot Placement | : | Bottom | | | | | | | |
| Line Distance Annot Placement | : | Top | | | | | | | |
| Scale Factor | : | % 75 | | | | | | | |
| Rotate after Scaling | : | y | | | | | | | |
| Rotate Always option | : | n | | | | | | | |
| Disable plotting of fixed Segments | : | n | | | | | | | |
| Priority | : | 0 | | | | | | | |

Figure 11.7: List Features Example Report

Related Commands:

List Coords, List Figures

11.5 List Feature Names

Description:

This command will list all the Feature names found in the Feature Table located in the \GWN_FEAT directory.

Procedure:

1. From the [Meas/Rep] pulldown menu, select [List Feature Names].
2. A report screen will appear listing the feature information.

Dialogue Box:

None.

Example:

The report should appear as is partially shown in Figure 11.8.

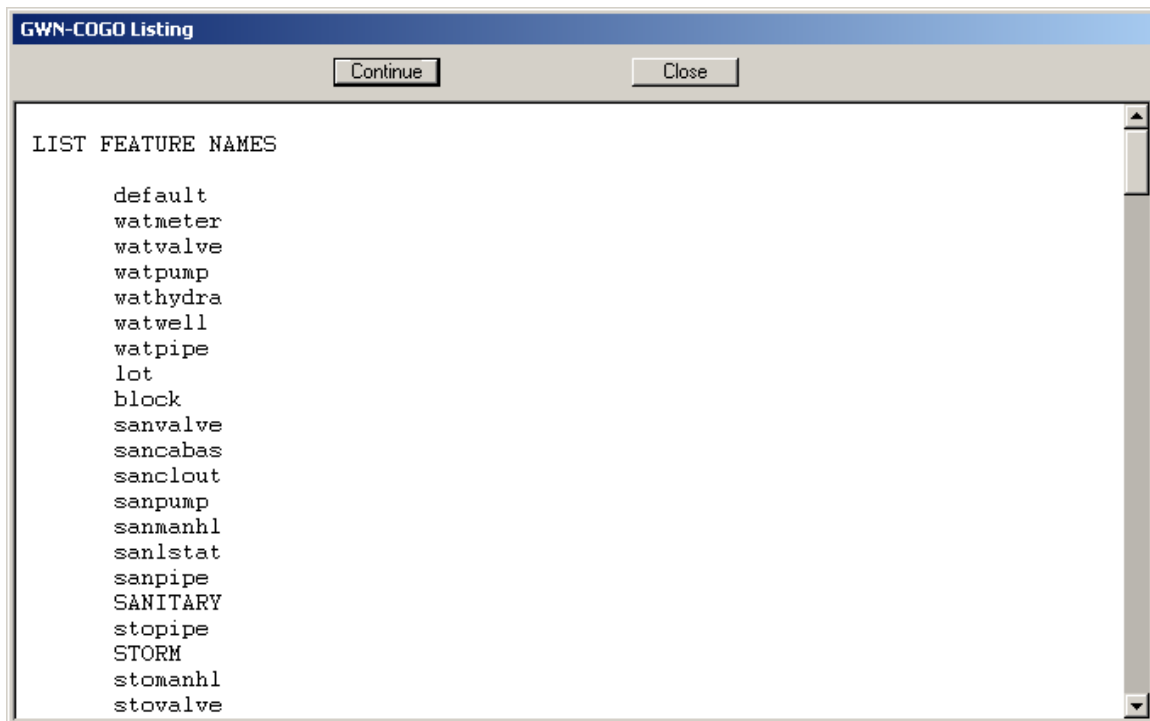


Figure 11.8: List Feature Names Report

Related Commands:

List All Coords

11.6 List Stations

Description:

This command lists the station and offset of specified points.

Points which do not project on the alignment and curve centers of the alignment will be given a station of zero and an offset of zero.

Procedure:

1. From the [Meas/Rep] pulldown menu, select [List Stations].
2. Either keyin or graphically pick from the view, the points or figure ID's which describe the alignment.
3. Keyin or graphically pick from the view the first station of that alignment.
4. Either keyin or graphically pick from the view the figure or group of points which are to be listed by station.
5. A report screen will appear listing the ID's, the station and offset.

Input Items:

| | |
|---------|------------------------------------|
| desAL | Figure or points of the alignment. |
| sAL | First Station of the alignment. |
| desBASE | Figure or points to be stationed. |

Dialogue Box:

The List Figures dialogue box will appear as shown in Figure 11.9.

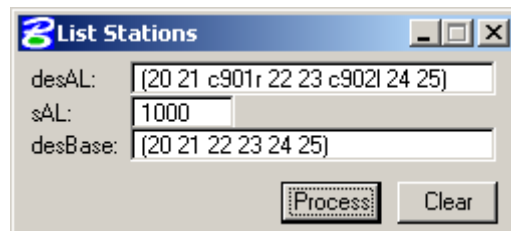
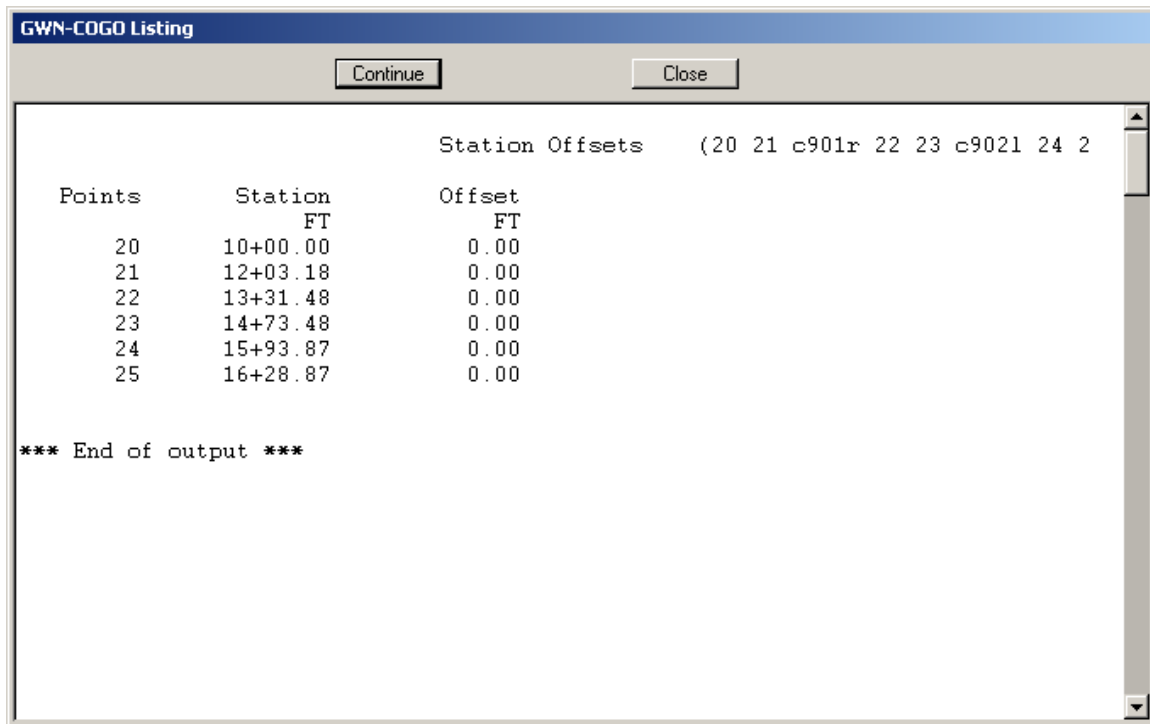


Figure 11.9: List Stations Dialogue BoxExample:

| | |
|-------------------------------------|---------------------------------|
| Points of the alignment (desAL) | (20 21 c901r 22 23 c902l 24 25) |
| First Station of the alignment(sAL) | 1000 |
| Points to Station (desBASE) | (20 21 22 23 24 25) |

The points used could also have been stored as a figure and the figure ID used instead. The result of this input is displayed in the report as follows in Figure 11.10.



| Station Offsets | | | (20 21 c901r 22 23 c9021 24 2 | |
|-----------------|----------|--------|-------------------------------|--|
| Points | Station | Offset | | |
| | FT | FT | | |
| 20 | 10+00.00 | 0.00 | | |
| 21 | 12+03.18 | 0.00 | | |
| 22 | 13+31.48 | 0.00 | | |
| 23 | 14+73.48 | 0.00 | | |
| 24 | 15+93.87 | 0.00 | | |
| 25 | 16+28.87 | 0.00 | | |

*** End of output ***

Figure 11.10: List Figures Example Report

Related Commands:

- Describe Alignment

11.7 List Unused Points

Description:

This command lists all the unused point numbers within a specified numeric range.

Procedure:

1. From the [Meas/Rep] pulldown menu, select [List Unused Points].
2. Using rounded brackets "()", identify the range of numbers to check for unused points.

Dialogue Box:

The List Unused Points dialogue box will appear as shown in Figure 11.11.

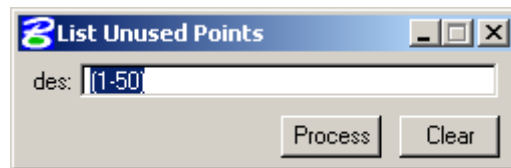


Figure 11.11: List Unused Points Dialogue Box

Example:

Range of points (des) (1-50)

This example input will report on all unused points between 1 and 50. The results of such a check would be displayed as illustrated in Figure 11.12 below.

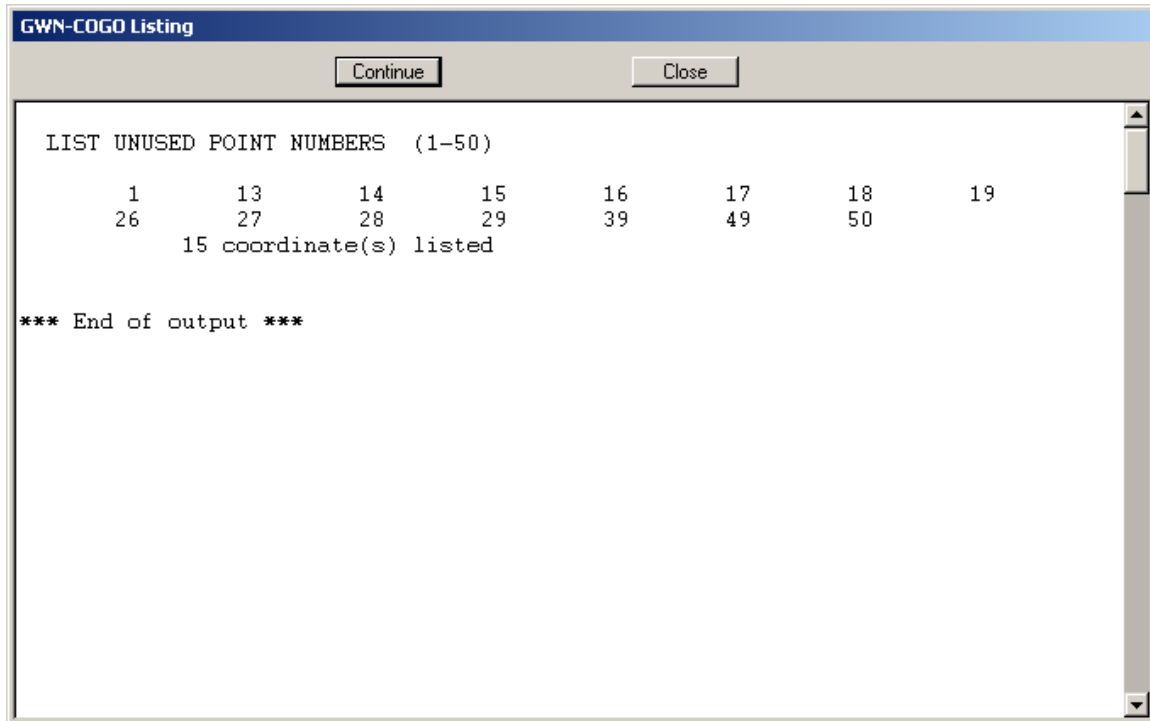


Figure 11.12: List Unused Points Example Report

Related Commands:

List Coords, List All Coords, List Figures

11.8 List Command Names

Description:

This command lists the names and numbers of the available GWN-COGO commands.

Procedure:

1. From the **[Meas/Rep]** pulldown menu, select **[List Command Names]**.
2. A report listing of all available GWN-COGO commands will be generated.

Dialogue Box:

None.



A listing of all GWN-COGO commands is located in the Appendix of this manual.

Example:

See Appendix for listing of GWN-COGO commands.

Related Commands:

List Feature Names

11.9 List Point Extremes

Description:

This command lists the minimum and maximum ID, Northing, Easting and Elevation presently found in the database maintained by GWN-COGO.

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**List Point Extremes**].
2. A report will be generated in the order as specified in the "Annotation Format" as specified in the Parameter File.

Input Items:

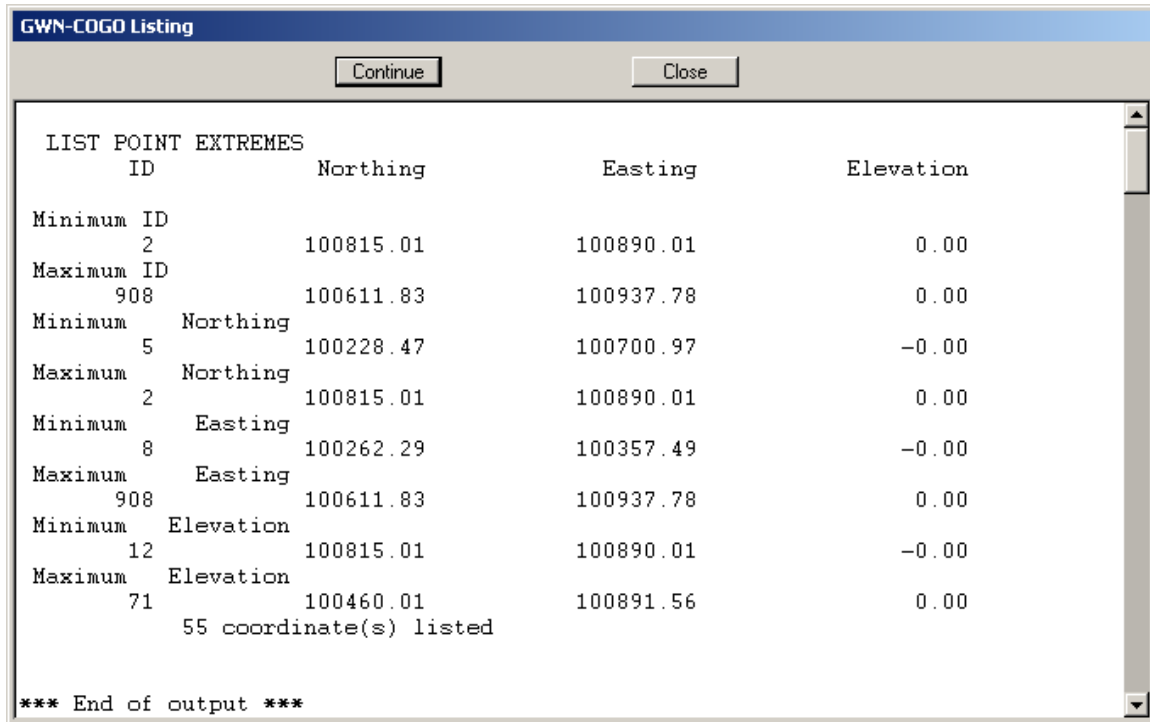
None

Dialogue Box:

None

Example:

Using the demo files supplied with GWN-COGO, a report will be generated as displayed below in Figure 11.13.



| LIST POINT EXTREMES | | | | |
|-------------------------|-----------|-----------|-----------|-----------|
| ID | | Northing | Easting | Elevation |
| Minimum ID | | | | |
| 2 | | 100815.01 | 100890.01 | 0.00 |
| Maximum ID | | | | |
| 908 | | 100611.83 | 100937.78 | 0.00 |
| Minimum | Northing | | | |
| 5 | | 100228.47 | 100700.97 | -0.00 |
| Maximum | Northing | | | |
| 2 | | 100815.01 | 100890.01 | 0.00 |
| Minimum | Easting | | | |
| 8 | | 100262.29 | 100357.49 | -0.00 |
| Maximum | Easting | | | |
| 908 | | 100611.83 | 100937.78 | 0.00 |
| Minimum | Elevation | | | |
| 12 | | 100815.01 | 100890.01 | -0.00 |
| Maximum | Elevation | | | |
| 71 | | 100460.01 | 100891.56 | 0.00 |
| 55 coordinate(s) listed | | | | |
| *** End of output *** | | | | |

Figure 11.13: List Point Extremes Report Example

Related Command:

None.

11.10 List Coords TA

Description:

This command lists the coordinates of the point(s) or figure(s), in the description field, in a TA2 format to the "List" file only (not to the screen).

The point ID's may be individual, in a group of points or a group of figures.

The coordinates listed are those as found in the GWN-COGO files.

This facility basically allows GWN-COGO users to interface data with GWN-DTM programs via the 'List File' generated by this command.

The report generated is to the List file only and not to the screen regardless of Parameter File settings.

Procedure:

1. From the **[Meas/Rep]** pulldown menu, select **[List Coords TA]**.
2. Either keyin or graphically pick from the view the ID's of the points or figures to be listed in the report.
3. A report will be generated in the TA2 format to the "List" file only.



The user may need to open a new "List" file for clean processing of data. Either rename the present "List" file to another name, delete the present file or change the name of the file generated in the **[Utilities]** - **[Parameter File]** - **[Output Options]** Dialogue box.

Input Items:

des The figure or point ID's whose coordinates are to be listed.



All point ID's must be included in rounded "()" brackets.

Dialogue Box:

The List Coords TA dialogue box will appear as shown in Figure 11.14.

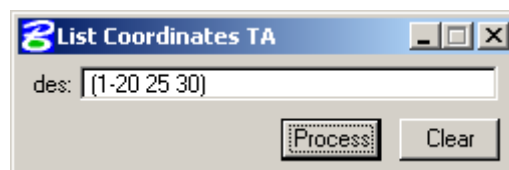


Figure 11.14: List Coord TA Dialogue Box

Example:

Points to be listed (des) (1-20 25 30)

This example input will report on all the points between 1 and 20 and points 25 and 30.
The resulting file generated should look similar to that displayed below in Figure 11.15.

| | | | |
|----|------------|------------|----------|
| 2 | 100890.010 | 100815.010 | 0.000 5 |
| 3 | 100891.952 | 100370.014 | -0.000 5 |
| 4 | 100789.014 | 100359.048 | -0.000 5 |
| 5 | 100700.972 | 100228.466 | -0.000 5 |
| 6 | 100557.142 | 100246.851 | -0.000 5 |
| 7 | 100555.874 | 100236.932 | -0.000 5 |
| 8 | 100357.488 | 100262.291 | -0.000 5 |
| 9 | 100392.015 | 100519.847 | -0.000 5 |
| 10 | 100420.015 | 100519.847 | -0.000 5 |
| 11 | 100420.015 | 100815.007 | -0.000 5 |
| 12 | 100890.015 | 100815.007 | -0.000 5 |
| 20 | 100715.515 | 100815.007 | -0.000 5 |
| 25 | 100531.048 | 100240.124 | -0.000 5 |
| 30 | 100650.015 | 100815.007 | -0.000 5 |

Figure 11.15: List Coords TA Example Report

Related Commands:

List Coords, List All Coords, List Figures, List Alignment TA

11.11 List Alignment TA

Description:

This command lists the coordinates of the alignment in a TA2 format to the “List” file only (not to the screen).

The alignment is described by an individual point, group of points or group of figures.

Coordinates listed in the “List” file are those found in the GWN-COGO files.

This facility allows GWN-COGO users to interact with GWN-DTM programs via the “List” file generated.

The report generated is to the List file only and not to the screen regardless of Parameter File settings.

Procedure:

1. From the [Meas/Rep] pulldown menu, select [List Alignment TA].
2. Either keyin or graphically pick from the view the ID's of the points or figures to be listed in the report.
3. A report will be generated in the TA2 format to the “List” file only.



The user may need to open a new “List” file for clean processing of data. Either rename the present “List” file to another name, delete the present file or change the name of the file generated in the [Utilities] - [Parameter File] - [Output Options] Dialogue box.

Input Items:

des The figure or point ID's whose coordinates are to be listed.



All point ID's must be included in rounded “()” brackets.

Dialogue Box:

The List Alignment TA dialogue box will appear as shown in Figure 11.16.

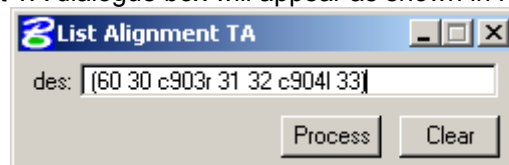


Figure 11.16: List Alignment TA Dialogue Box

Example:

Points to be listed (des) (60 30 c903r 31 32 c904l 33)

This example input will report on points 60 and 30, arc c903r, points 31 and 32, arc c904l and points 33. The resulting file generated should look similar to that displayed below in Figure 11.17.

| | | | | | | |
|----|------------|------------|--------|---|------------|------------|
| | 100547.515 | 100815.008 | -0.000 | 1 | | |
| BC | 100650.015 | 100815.007 | -0.000 | 2 | 100650.015 | 100789.507 |
| EC | 100675.515 | 100789.507 | -0.000 | 2 | | |
| BC | 100675.515 | 100721.457 | -0.000 | 2 | 100875.035 | 100721.457 |
| EC | 100683.265 | 100666.389 | -0.000 | 4 | | |

Figure 11.17: List Alignment TA Example Report

Related Commands:

List Coords, List All Coords, List Figures, List Coords TA

11.12 List Area

Description:

This command computes the area defined by consecutive points in the description (des).

Imbedded curves are handled but spirals are not.

Multiple figures may be specified by enclosing them in square “[]” brackets and they will be treated as a single figure.

The area prefix, area suffix and area multiplier are specified in the Parameter File. If the suffix is specified, the output will be in both the units specified and the default units.

If the area suffix is blank, the area units will be “Sq.” with the distance annotation units specified.

Procedure:

1. From the [Meas/Rep] pulldown menu, select [List Area].
2. Either keyin or graphically pick from the view the ID's of the points or figures to be listed in the report.

Input Items:

des Figure(s) or Point(s) encircling the area to be calculated.

Dialogue Box:

The List Area dialogue box will appear as shown in Figure 11.18.

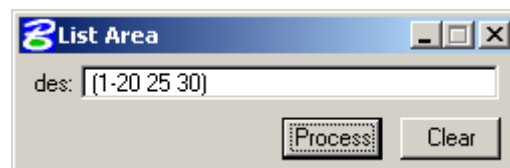


Figure 11.18: List Area Dialogue Box

Example:

Points to be listed (des) (1-20 25 30)
Figures to be listed (des) [11 23-25]

The first example input will report on all the area encircled by the points 1 through 20, 25 and 30. The second example input will report on the combined area of Figure 11, 23, 24 and 25. A report screen as shown in Figure 11.19 below (for example 1) illustrates the results of the calculation.

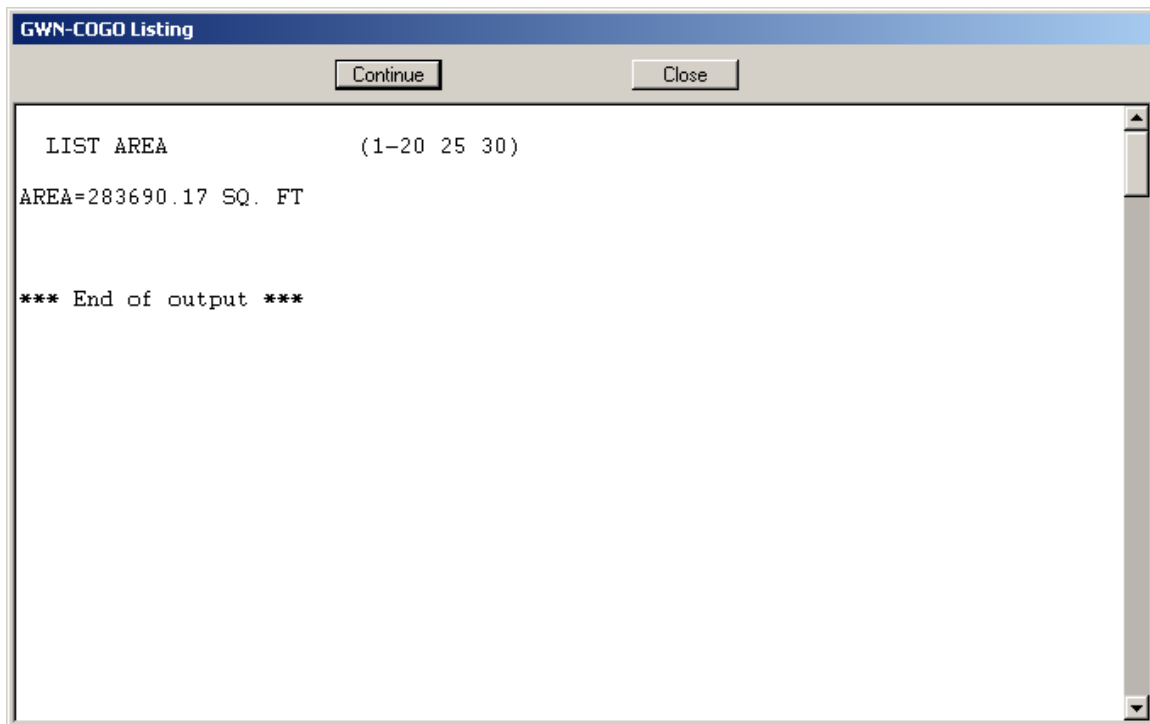


Figure 11.19: List Area Example Report

Related Commands:

Area Directions, List Many Areas.

11.13 Inverse Directions

Description:

This command computes the direction, length, slope distance and elevation difference of each line segment defined by consecutive points in the description (des).

Directions are calculated according to the angle annotation format and the angle annotation type as specified in the Parameter File.

Distances are grid or ground distances and are calculated according to the distance annotation format and the distance annotation units as specified in the Parameter File. (Unit conversion may also be reverse applied)

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**Inverse Directions**]. Alternatively, the user could key into the MicroStation command prompt "**Inverse Directions** <cr>".
2. Either keyin or graphically pick from the view the ID's of the points or figures to be listed in the report.

Input Items:

des Figure(s) or Point(s) to be listed.

Dialogue Box:

The Inverse Directions dialogue box will appear as shown in Figure 11.20.

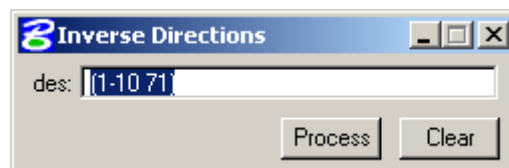


Figure 11.20: Inverse Directions Dialogue Box

Example:

Points to be listed (des) (1-10 71)
 Figures to be listed (des) [11 23-25]

The first example input will report on the points 1 through 10 and point 71. The second example input will report on the Figures 11, 23, 24 and 25. A report screen as shown in Figure 11.21 below (for example 1) illustrates the results of the calculation. (Example is 2-D file)

GWN-COGO Listing

Continue

Close

| INVERSE DIRECTIONS | | (1-10 71) | | | |
|--------------------|----|---------------|-----------|----------------|----------|
| From | To | Azimuth | Distance | Slope Distance | Elev Dif |
| 2 | 3 | 179^45'00.00" | 445.00 FT | 445.00 FT | -0.00 FT |
| 3 | 4 | 263^55'08.00" | 103.52 FT | 103.52 FT | -0.00 FT |
| 4 | 5 | 213^59'21.00" | 157.49 FT | 157.49 FT | -0.00 FT |
| 5 | 6 | 277^17'04.00" | 145.00 FT | 145.00 FT | -0.00 FT |
| 6 | 7 | 187^17'04.00" | 10.00 FT | 10.00 FT | -0.00 FT |
| 7 | 8 | 277^17'04.00" | 200.00 FT | 200.00 FT | -0.00 FT |
| 8 | 9 | 07^38'07.00" | 259.86 FT | 259.86 FT | -0.00 FT |
| 9 | 10 | 90^00'00.00" | 28.00 FT | 28.00 FT | -0.00 FT |
| 10 | 71 | 97^13'53.59" | 475.33 FT | 475.33 FT | 0.00 FT |

*** End of output ***

Figure 11.21: Inverse Directions Example Report

Related Commands:

None.

11.14 Traverse Directions

Description:

This command computes the direction and length of each line segment defined by consecutive points in the description (des).

The coordinates are also listed for each point.

Imbedded curves are described in detail.

Directions are calculated according to the Angle Annotation Format and Angle Annotation Type as specified in the Parameter File.

Distances are grid or ground distances and are calculated according to the Distance Annotation Format and the Distance Annotation Units as specified in the Parameter File. (Unit conversion may also be reverse applied)

Imbedded curves and spirals are described in full.

The listing will be in the order specified in the Coordinate Annotation Format of the Parameter File.

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**Traverse Directions**]. Alternatively, the user could key into the MicroStation command prompt "**Traverse Directions** <cr>".
2. Either keyin or graphically pick from the view the ID's of the points or figures to be listed in the report.

Input Items:

des Figure(s) or Point(s) to be listed.

Dialogue Box:

The Traverse Directions dialogue box will appear as shown in Figure 11.22.



Figure 11.22: Traverse Directions Dialogue Box

Example:

Points to be listed (des) (1-10 71)
 Figures to be listed (des) [11 23-25]

The first example input will report on the points 1 through 10 and point 71. The second example input will report on the Figures 11, 23, 24 and 25. A report screen as shown in Figure 11.23 below (for example 1) illustrates the results of the calculation.

GWN-COGO Listing

Continue

Close

| TRAVERSE DIRECTIONS (1-10 71) | | | | |
|-------------------------------|-----------|-----------|---------------|-----------|
| ID | Northing | Easting | Azimuth | Distance |
| 2 | 100815.01 | 100890.01 | 179°45'00.00" | 445.00 FT |
| 3 | 100370.01 | 100891.95 | 263°55'08.00" | 103.52 FT |
| 4 | 100359.05 | 100789.01 | 213°59'21.00" | 157.49 FT |
| 5 | 100228.47 | 100700.97 | 277°17'04.00" | 145.00 FT |
| 6 | 100246.85 | 100557.14 | 187°17'04.00" | 10.00 FT |
| 7 | 100236.93 | 100555.87 | 277°17'04.00" | 200.00 FT |
| 8 | 100262.29 | 100357.49 | 07°38'07.00" | 259.86 FT |
| 9 | 100519.85 | 100392.01 | 90°00'00.00" | 28.00 FT |
| 10 | 100519.85 | 100420.01 | 97°13'53.59" | 475.33 FT |
| 71 | 100460.01 | 100891.56 | | |

Figure 11.23: Traverse Directions Example Report

Related Commands:

Area Directions.

11.15 Area Directions

Description:

This command computes the length, direction, slope distance, elevation and area of the figure or group of points defined in the description (des).

Distances are grid or ground distances and are calculated according to Distance Annotation Format and Distance Annotation Units specified in the Parameter File. (Unit conversion may also be reverse applied)

This command combines the Traverse Directions and List Area commands.

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**Area Directions**]. Alternatively, the user could key into the MicroStation command prompt "**Area Directions** <cr>".
2. Either keyin or graphically pick from the view the ID's of the points or figures to be calculated in the report.

Input Items:

des Figure(s) or Point(s) to be calculated.

Dialogue Box:

The Area Directions dialogue box will appear as shown in Figure 11.24.

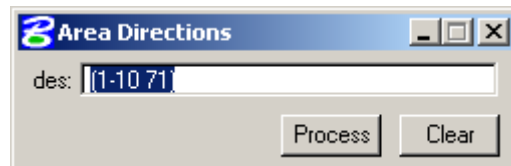


Figure 11.24: Area Directions Dialogue Box

Example:

| | |
|--------------------------------|------------|
| Points to be calculated (des) | (1-10 71) |
| Figures to be calculated (des) | [11 23-25] |

The first example input will calculate using the points 1 through 10 and point 71. The second example input will calculate using the Figures 11, 23, 24 and 25. A report screen as shown in Figure 11.25 below (for example 1) illustrates the results of the calculation.

GWN-COGO Listing

Continue

Close

| TRAVERSE DIRECTIONS (1-10 71) | | | | |
|-------------------------------|-----------|-----------|---------------|-----------|
| ID | Northing | Easting | Azimuth | Distance |
| 2 | 100815.01 | 100890.01 | 179°45'00.00" | 445.00 FT |
| 3 | 100370.01 | 100891.95 | 263°55'08.00" | 103.52 FT |
| 4 | 100359.05 | 100789.01 | 213°59'21.00" | 157.49 FT |
| 5 | 100228.47 | 100700.97 | 277°17'04.00" | 145.00 FT |
| 6 | 100246.85 | 100557.14 | 187°17'04.00" | 10.00 FT |
| 7 | 100236.93 | 100555.87 | 277°17'04.00" | 200.00 FT |
| 8 | 100262.29 | 100357.49 | 07°38'07.00" | 259.86 FT |
| 9 | 100519.85 | 100392.01 | 90°00'00.00" | 28.00 FT |
| 10 | 100519.85 | 100420.01 | 97°13'53.59" | 475.33 FT |
| 71 | 100460.01 | 100891.56 | | |

Figure 11.25: Area Directions Example Report

| GWN-COGO Listing | |
|-----------------------|--|
| Continue | |
| Close | |
| LIST AREA (1-10 71) | |
| AREA=111849.27 SQ. FT | |
| *** End of output *** | |

Figure 11.25a: Area Directions Example Report after CONTINUE in Figure 11.25

Related Commands:

Traverse Directions, List Area, List Many Areas.

11.16 Layout Ties

Description:

This command computes the clockwise angles from the baseline (pBS to pTP) and the lengths from the turning point (pTP) to the points in the description (des).

The tangent (distance along the baseline from point pTP to the layout point) and the offset (perpendicular distance from the baseline to the layout point) are also calculated and displayed.

Angles are calculated according to the Angle Annotation Format as specified in the Parameter File.

Distances are grid or ground distances and are calculated according to the Distance Annotation Format and the Distance Annotation Units as specified in the Parameter File. (Unit conversion may also be reverse applied)

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**Layout Ties**]. Alternatively, the user could key into the MicroStation command prompt "**Layout Ties** <cr>".
2. Either keyin or graphically pick from the view the ID of the point to be used as the backsight on the baseline.
3. Either keyin or graphically pick from the view the ID of the point to be used as the turning point from which the angles and distances are to be calculated.
4. Either keyin or graphically pick from the view the ID's of the point(s) or figure which are the points to layout.

Input Items:

| | |
|-----|-------------------------------|
| pBS | Backsight Point. |
| pTP | Turning Point. |
| des | Figure or Point(s) to layout. |

Dialogue Box:

The Layout Ties dialogue box will appear as shown in Figure 11.26.

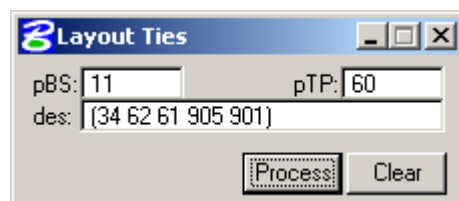


Figure 11.26: Layout Ties Dialogue Box

Example:

Backsight Point (pBT) 11
 Turning Point (pTP) 60
 Layout Points (des) (34 62 61 905 901)

This example illustrates the command in laying out points 34, 62, 61, 905 and 901 in reference to points 11 and 60. The results are shown below in Figure 11.27 and the graphic representation as shown in Figure 11.28.

| GWN-COGO Listing | | | | |
|-----------------------|---------------|-----------|------------|------------|
| Layout At Point | | 60 (pOC) | From Point | 11 (pBS) |
| To | Angle | Distance | Tangent | Offset |
| 11 | 00°00'00.00" | 127.50 FT | 127.50 FT | 0.00 FT |
| 34 | 234°51'43.97" | 248.46 FT | -143.00 FT | -203.18 FT |
| 62 | 270°00'01.28" | 183.00 FT | 0.00 FT | -183.00 FT |
| 61 | 307°41'40.07" | 208.52 FT | 127.50 FT | -165.00 FT |
| 905 | 284°57'09.02" | 210.30 FT | 54.26 FT | -203.18 FT |
| 901 | 275°05'27.63" | 203.99 FT | 18.10 FT | -203.18 FT |
| *** End of output *** | | | | |

Figure 11.27: Layout Ties Output Example Report

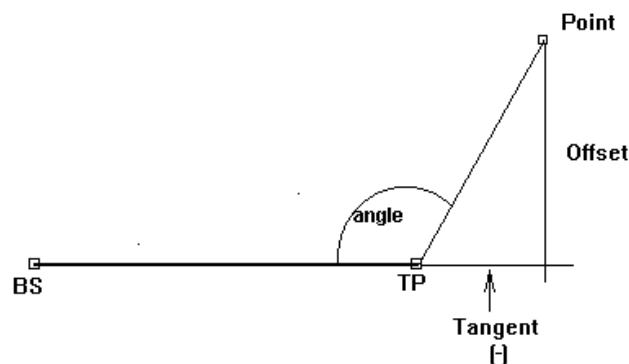


Figure 11.28: Layout Ties Graphic Representation

Related Commands:

Locate Angle, Chord Offsets.

11.17 Station Offsets

Description:

This command computes the station and offsets on an alignment.

Stations and offsets are described in terms of a baseline and a centre line.

Offset distances, which are perpendicular to the baseline, are computed for each even station and transition point along the centerline.

Stations along the baseline are also computed for each offset distance.

Angles are calculated according to the Angle Annotation Format as specified in the Parameter File.

Distances are grid or ground distances and are calculated according to the Distance Annotation Format and the Distance Annotation Units as specified in the Parameter File. (Unit conversion may also be reverse applied)



All straight line segments extend to infinity. If the end station is not specified, a maximum of 99 stations will be computed.



If the user wants to station and offset a group of points, the command "List Stations" would be a better choice.

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**Station Offsets**]. Alternatively, the user could key into the MicroStation command prompt "**Station Offsets** <cr>".
2. Either keyin or graphically pick from the view the ID of the points or figure to be used as the baseline.
3. Enter the first station of the baseline alignment to be assigned.
4. Either keyin or graphically pick from the view the ID of the points or figure to be used as the centerline.
5. Either keyin or graphically pick from the view the distance to be used between stations.
6. Enter the station to begin the centerline alignment.
7. Enter the station ending the centerline alignment. (optional)

Input Items:

| | |
|---------|---|
| desBASE | Baseline description. |
| sBASE | First station of the baseline alignment to be assigned. |
| desCL | Figure or group of points for the centerline. |
| dis | Distance between stations. |
| sBEG | Station beginning the centerline alignment. |
| sEND | Station ending the centerline alignment. (optional) |

Dialogue Box:

The Station Offsets dialogue box will appear as shown in Figure 11.29.

Figure 11.29: Station Offsets Dialogue Box

Example:

| | |
|---------------------------|---------------------------------|
| Baseline | (20 21 c901r 22 23 c902l 24 25) |
| First station on Baseline | 1000 |
| Centerline | (31-36 66 37) |
| Station spacing | 50 |
| First Centerline station | 0 |
| Last Centerline station | none given |

The results of the above example input is displayed in Figure 11.30 and 11.30a below and a graphic representation showing the elements is displayed in Figure 11.31.

| GWN-COGO Listing | | | | |
|--------------------------|---------------------------|-------------------------------|-----------------------------|--------------------------|
| | | Station Offsets (31-36 66 37) | | |
| Points | Baseline Station FT | Baseline Offset FT | Centerline Station FT | Centerline Skew Angle |
| Points On Line 20 to 21 | | | | |
| 31 | 10+25.50 | 40.00 | 0+00.00 | 90°00'00.00" |
| | 10+75.50 | 40.00 | 0+50.00 | 90°00'00.00" |
| 32 | 10+93.55 | 40.00 | 0+68.05 | 81°59'21.00" |
| | 11+25.19 | 35.55 | 1+00.00 | 81°59'21.00" |
| 33 | 11+48.62 | 32.25 | 1+23.66 | 82°25'51.60" |
| | 11+74.73 | 28.78 | 1+50.00 | 82°25'51.60" |
| 34 | 12+03.18 | 25.00 | 1+78.70 | 109°45'00.00" |
| Points On Curve 21 to 22 | | | | |
| | 12+27.28 | 30.90 | 2+00.00 | 102°19'45.65" |
| | 12+87.94 | 33.54 | 2+50.00 | 83°39'18.75" |
| Points On Line 22 to 23 | | | | |
| 35 | 13+31.48 | 25.00 | 2+87.58 | 90°00'00.00" |
| | 13+43.90 | 25.00 | 3+00.00 | 90°00'00.00" |
| | 13+93.90 | 25.00 | 3+50.00 | 90°00'00.00" |

Figure 11.30: Station Offsets Example Results

| GWN-COGO Listing | | | | |
|--------------------------|---------------------------|-------------------------------|-----------------------------|--------------------------|
| | | Station Offsets (31-36 66 37) | | |
| Points | Baseline Station FT | Baseline Offset FT | Centerline Station FT | Centerline Skew Angle |
| Points On Line 22 to 23 | | | | |
| 35 | 13+31.48 | 25.00 | 2+87.58 | 90°00'00.00" |
| | 13+43.90 | 25.00 | 3+00.00 | 90°00'00.00" |
| | 13+93.90 | 25.00 | 3+50.00 | 90°00'00.00" |
| | 14+43.90 | 25.00 | 4+00.00 | 90°00'00.00" |
| Points On Curve 23 to 24 | | | | |
| 36 | 14+73.48 | 25.00 | 4+29.58 | 79°48'48.96" |
| | 14+91.71 | 22.24 | 4+50.00 | 84°41'30.13" |
| | 15+37.02 | 22.91 | 5+00.00 | 96°49'00.43" |
| 66 | 15+49.03 | 24.88 | 5+13.50 | 84°10'20.55" |
| | 15+81.82 | 23.96 | 5+50.00 | 92°56'43.47" |
| Points On Line 24 to 25 | | | | |
| 37 | 15+93.87 | 25.00 | 5+63.47 | 96°10'11.01" |
| *** End of output *** | | | | |

Figure 11.30a: Station Offsets Example Results after scroll down

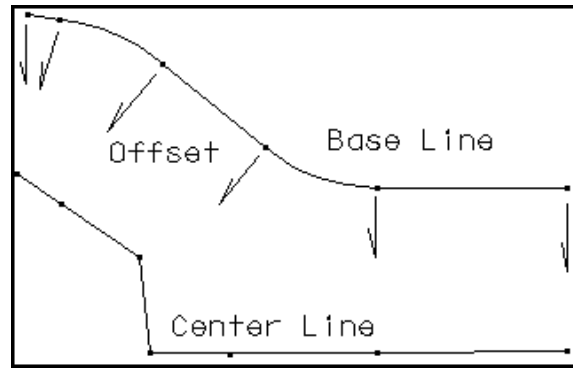


Figure 11.31: Station Offsets Graphic Illustration

In all likelihood, errors would result if the "Center Line" were to backtrack on itself (reverse direction) and then continue on its' original direction. This is because GWN-COGO expects the points listed to be at increasingly greater distances compared to the previous point from the start.

Related Commands:

None.

11.18 Tangent Offset

Description:

This command computes the tangent distances (distance along the tangent from PC for the first half of the curve and along PT for the second half) as well as the perpendicular offsets from the tangent to every station of the curve.

If a station interval (dis) is not specified, a default of ten units will be used.

Distances are grid or ground distances and are calculated according to the Distance Annotation Format and the Distance Annotation Units as specified in the Parameter File. (Unit conversion may also be reverse applied)

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**Tangent Offset**]. Alternatively, the user could key into the MicroStation command prompt "**Tangent Offset** <cr>".
2. Either keyin or graphically pick from the view the ID of the point used as the PC or PI.
3. Select PI or PC from the option bar.
4. Either keyin or graphically pick from the view the angle/delta of intersection of the two tangents.
5. Either keyin or graphically pick from the view the radius of the curve.
6. Either keyin or graphically pick from the view the interval between stations (optional).

Input Items:

| | |
|------|---|
| sta | PC or PI station. |
| sign | Flag indicating PI or PC |
| ang | Interior angle between Station A, Arc Centre and Station B. |
| r | Radius of curve. |
| dis | Interval between stations. |

Dialogue Box:

The Tangent Offsets dialogue box will appear as shown in Figure 11.31.

Figure 11.31: Tangent Offset Dialogue Box

Example:

| | |
|----------------|-------------|
| Station (sta) | 1000 |
| Sign | PC |
| Angle (ang) | G 24 902 23 |
| Radius (r) | D 23 902 |
| Interval (dis) | 10 |

In this example, the station is a PC. The angle is as calculated between points 24, 902 and 23 (prefix "G" indicates angle). The Radius is the distance between point 23 and 902 (prefix of "D" indicates distance). No input is supplied for the interval resulting in the default of 10 units to take effect.

The results of this input are illustrated in Figure 11.32 and an illustration of the setup as shown in Figure 11.33 below.

| Offset from tangent | | | |
|---------------------|----------|---------|--------|
| from | station | tangent | offset |
| | FT | FT | FT |
| PC | 10+00.00 | | |
| | 10+10.00 | 10.00 | 0.23 |
| | 10+20.00 | 19.97 | 0.93 |
| | 10+30.00 | 29.90 | 2.10 |
| | 10+40.00 | 39.77 | 3.73 |
| | 10+50.00 | 49.55 | 5.81 |
| PT | 10+60.00 | 59.22 | 8.35 |
| | 11+20.39 | | |
| | 10+70.00 | 49.93 | 5.90 |
| | 10+80.00 | 40.15 | 3.80 |
| | 10+90.00 | 30.29 | 2.15 |
| | 11+00.00 | 20.36 | 0.97 |
| | 11+10.00 | 10.39 | 0.25 |
| | 11+20.00 | 0.39 | 0.00 |

*** End of output ***

Figure 11.32: Tangent Offset Example Results

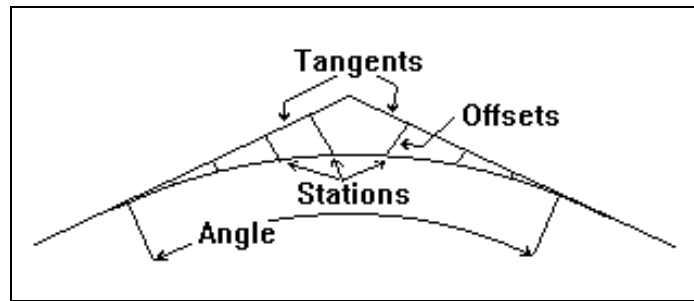


Figure 11.33: Tangent Offset Illustration

Related Commands:

Chord Offset, Deflection Angle

11.19 Chord Offset

Description:

This command computes the chord, chord offset and the deflection angles between stations as well as the back and ahead tangent for the PC station.

If a station interval (dis) is not specified, a default of ten units will be used.

Angles are calculated according to the Angle Annotation Format as specified in the Parameter File

Distances are grid or ground distances and are calculated according to the Distance Annotation Format and the Distance Annotation Units as specified in the Parameter File. (Unit conversion may also be reverse applied)

Procedure:

1. From the [Meas/Rep] pulldown menu, select [Chord Offset]. Alternatively, the user could key into the MicroStation command prompt "**Chord Offset** <cr>".
2. Either keyin or graphically pick from the view the ID of the point used as the PC or PI.
3. Select PI or PC from the option bar.
4. Either keyin or graphically pick from the view the angle/delta of intersection of the two tangents.
5. Either keyin or graphically pick from the view the radius of the curve.
6. Either keyin or graphically pick from the view the interval between stations (optional).

Input Items:

| | |
|------|----------------------------|
| sta | PC or PI station. |
| sign | Flag indicating PI or PC |
| ang | Angle of sweep of arc. |
| r | Radius of curve. |
| dis | Interval between stations. |

Dialogue Box:

The Chord Offsets dialogue box will appear as shown in Figure 11.34.

Figure 11.34: Chord Offset Dialogue Box

Example:

| | |
|----------------|------------|
| Station (sta) | 1000 |
| Sign | PC |
| Angle (ang) | G 24 90 23 |
| Radius (r) | D 23 90 2 |
| Interval (dis) | 10 |

In this example, the station is a PC. The angle is as calculated between points 24, 902 and 23 (prefix "G" indicates angle). The Radius is the distance between point 23 and 902 (prefix of "D" indicates distance). No input is supplied for the interval resulting in the default of 10 units to take effect.

The results of this input are illustrated in Figure 11.35 and an illustration of the setup as shown in Figure 11.36 below.

| GWN-COGO Listing | | | | |
|-----------------------|---------------|----------------|--------------|--------------|
| Chord Offset | | | | |
| | Station FT | Distance FT | Offset FT | angle |
| sBEG | 10+00.00 | | | |
| | 10+10.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 10+20.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 10+30.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 10+40.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 10+50.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 10+60.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 10+70.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 10+80.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 10+90.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 11+00.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 11+10.00 | 10.00 | 0.47 | 02^40'33.37" |
| | 11+20.00 | 10.00 | 0.47 | 02^40'33.37" |
| sEND | 11+20.39 | | | |
| *** End of output *** | | | | |

Figure 11.35: Chord Offset Example Results

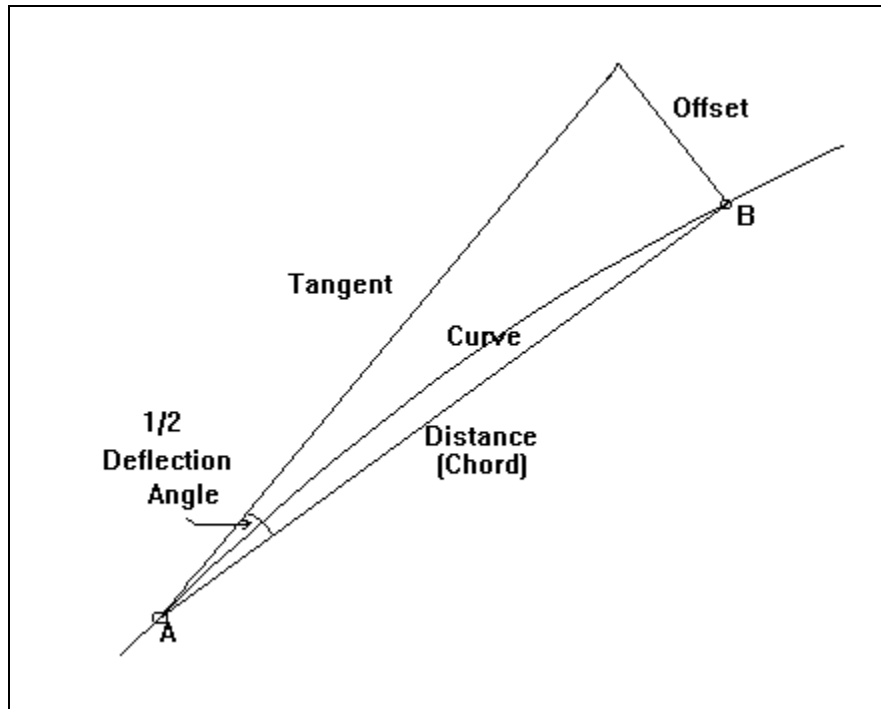


Figure 11.36: Chord Offset Illustration



The tangent illustrated is the “ahead” tangent, which is the extension of the line intersecting the present station “A” and the previous station (known as the back tangent).

Related Commands:

Tangent Offset, Deflection Angle

11.20 Describe Alignment

Description:

This command describes the horizontal alignment feature, computes the coordinates of every station at distance interval (dis) and computes the coordinates of the intersection points of tangents.

Describe alignment works on straight lines and circular curves and spirals.

Angles are calculated according to the Angle Annotation Format as specified in the Parameter File.

Distances are grid or ground distances and are calculated according to the Distance Annotation Format and the Distance Annotation Units as specified in the Parameter File. (Unit conversion may also be reverse applied)

Coordinate precision may be specified by the Coordinate Annotation Format in the Parameter File.

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**Describe Alignment**]. Alternatively, the user could key into the MicroStation command prompt "**Describe Alignment** <cr>".
2. Either keyin or graphically pick from the view the ID of the points or figure to be used.
3. Either keyin or graphically pick from the view, the distance interval between stations.
4. Keyin the desired beginning station of the alignment.

Input Items:

| | |
|------|---|
| des | The figure or points to be described. |
| dis | The distance interval between stations. |
| sBEG | The beginning station of the alignment. |

Dialogue Box:

The Describe Alignment dialogue box will appear as shown in Figure 11.37.

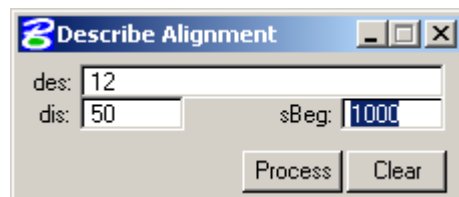


Figure 11.37: Describe Alignment Dialogue Box

Example:

The figure to be described (des) 12
 The interval between stations (dis) 50
 The beginning station (sBEG) 1000

Figure 12 is described as (60 30 C903R 31 32 C904L 33)

This example results in the report illustrated below in figure 11.38 and 11.38a.

GWN-COGO Listing

Continue

Close

Describe Alignment

| | Point | Northing FT | Easting FT | Station FT | Direction |
|-----|------------|----------------|---------------|---------------|--------------|
| PI | 60 | 100815.01 | 100547.51 | 10+00.00 | 90^00'01.59" |
| POL | | 100815.01 | 100597.51 | 10+50.00 | 90^00'01.59" |
| POL | | 100815.01 | 100647.51 | 11+00.00 | 90^00'01.59" |
| PC | 30 | 100815.01 | 100650.01 | 11+02.50 | 90^00'01.59" |
| CC | 903 | 100789.51 | 100650.01 | | |
| | Radius | 25.50 | Degree | 224^41'21.59" | |
| | Length | 40.06 | Delta | 90^00'00.00" | RT |
| | Tangent | 25.50 | Back Dir | 90^00'00.00" | |
| | External | 10.56 | Ahead Dir | 180^00'00.00" | |
| | Long Chord | 36.06 | Chord Dir | 135^00'00.00" | |
| | Mid. Ord. | 7.47 | | | |
| PI | | 100815.01 | 100675.51 | | |

Figure 11.38 Describe Alignment Example Report

| GWN-COGO Listing | | | | | |
|-----------------------|-----|-----------|-----------|---------------|---------------|
| | | | Continue | Close | |
| PI | | 100815.01 | 100675.51 | | |
| PT | 31 | 100789.51 | 100675.51 | 11+42.56 | 180°00'00.00" |
| POL | | 100782.06 | 100675.51 | 11+50.00 | 180°00'00.00" |
| POL | | 100732.06 | 100675.51 | 12+00.00 | 180°00'00.00" |
| PC | 32 | 100721.46 | 100675.51 | 12+10.61 | 180°00'00.00" |
| CC | 904 | 100721.46 | 100875.03 | | |
| Radius | | 199.52 | Degree | 28°43'00.52" | |
| Length | | 55.79 | Delta | 16°01'18.00" | LT |
| Tangent | | 28.08 | Back Dir | 180°00'00.00" | |
| External | | 1.97 | Ahead Dir | 163°58'42.00" | |
| Long Chord | | 55.61 | Chord Dir | 171°59'21.00" | |
| Mid. Ord. | | 1.95 | | | |
| PI | | 100693.38 | 100675.51 | | |
| POC | | 100682.32 | 100679.39 | 12+50.00 | 168°41'13.56" |
| PT | 33 | 100666.39 | 100683.26 | 12+66.40 | 163°58'42.00" |
| *** End of output *** | | | | | |

Figure 11.38a Dscribe Alignment Example Report after scroll down

Related Commands:

Annotate Alignment

11.21 Deflection Angle

Description:

This command computes the deflection angles and chord length from the point PC as well as the degree of curve, the tangent and the curve length.

Angles are calculated as specified in the Angle Annotation Format in the Parameter File.

Distances are grid or ground distances and are calculated as specified in the Distance Annotation Format and Distance Annotation Units in the Parameter File. (Unit conversion may also be reverse applied)

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**Deflection Angle**]. Alternatively, the user could key into the MicroStation command prompt "**Deflection Angle** <cr>".
2. Either keyin or graphically pick from the view the ID of the point used as the PC or PI.
3. Select PI or PC from the option bar.
4. Either keyin or graphically pick from the view the angle/delta of intersection of the two tangents.
5. Either keyin or graphically pick from the view the radius of the curve.
6. Either keyin or graphically pick from the view the interval between stations (optional).

Input Items:

| | |
|------|---|
| sta | PC or PI station. |
| sign | Flag indicating PI or PC |
| ang | Interior angle of intersection of tangents. |
| r | Radius of curve. |
| dis | Interval between stations. |

Dialogue Box:

The Deflection Angle dialogue box will appear as shown in Figure 11.39.

Figure 11.39: Deflection Angle Dialogue Box

Example:

| | |
|----------------|-------------|
| Station (sta) | 1000 |
| Sign | PC |
| Angle (ang) | G 24 902 23 |
| Radius (r) | D 23 902 |
| Interval (dis) | 10 |

In this example, the station is a PC. The angle is as calculated between points 24, 902 and 23 (prefix "G" indicates angle). The Radius is the distance between point 23 and 902 (prefix of "D" indicates distance). No input is supplied for the interval resulting in the default of 10 units to take effect.

The results of this input are illustrated in Figure 11.40 and an illustration of the setup as shown in Figure 11.41 below.

| GWN-COGO Listing | | | | |
|--------------------------------------|---------------|--------------------|-------------|------------------------|
| <div>Continue</div> <div>Close</div> | | | | |
| Deflection Angle | | | | |
| Point | Station FT | Deflection Angr | Chord FT | Curve data |
| P.T. | 11+20.39 | 16^06'28.00" | | I = 32^12'56.00 |
| | 11+20.00 | 16^03'20.19" | 0.39 | Da = 26^45'33.66 |
| | 11+10.00 | 14^43'03.51" | 10.00 | R = 214.12 FT |
| | 11+00.00 | 13^22'46.83" | 10.00 | T = 61.83 FT |
| | 10+90.00 | 12^02'30.14" | 10.00 | L = 120.39 FT |
| | 10+80.00 | 10^42'13.46" | 10.00 | Sta at P.I. = 10+61.83 |
| | 10+70.00 | 09^21'56.78" | 10.00 | |
| | 10+60.00 | 08^01'40.10" | 10.00 | |
| | 10+50.00 | 06^41'23.41" | 10.00 | |
| | 10+40.00 | 05^21'06.73" | 10.00 | |
| | 10+30.00 | 04^00'50.05" | 10.00 | |
| | 10+20.00 | 02^40'33.37" | 10.00 | |
| | 10+10.00 | 01^20'16.68" | 10.00 | |
| P.C. | 10+00.00 | 00^00'00.00" | 10.00 | |
| *** End of output *** | | | | |

Figure 11.40: Deflection Angle Example Results

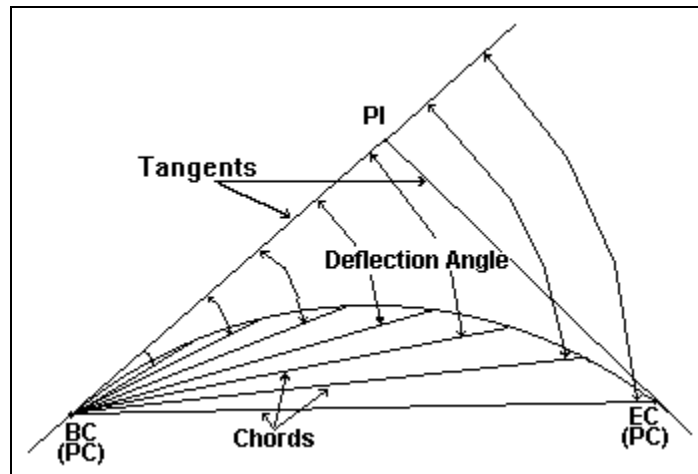


Figure 11.41: Deflection Angle Illustration

This example illustrates the PC stationing. The PI stationing would be similar except that the deflection angles would extend from the tangent line toward the curve station from the viewpoint of the PI. The sweep of the deflection would radiate from the PI observation point and not from the PC point as does the illustration.

Related Commands:

None.

11.22 Curve Parts

Description:

This command computes all parts of a simple curve given either radius or delta and any one of the following curve elements: chord, arc, tangent.

Angles are calculated according to the Angle Annotation Format as specified in the Parameter File.

Distances are grid or ground distances and are calculated according to the Distance Annotation Format and the Distance Annotation Units as specified in the Parameter File. (Unit conversion may also be reverse applied)

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**Curve Parts**]. Alternatively, the user could key into the MicroStation command prompt "**Curve Parts** <cr>".
2. Either keyin or graphically pick from the view the radius of the curve if known.
3. Either keyin or graphically pick from the view the delta angle of the curve if known.
4. Keyin the arc distance subtended by the delta and radius if known.
5. Keyin the tangent of the curve if known.
6. Keyin the chord distance subtended by the delta and radius if known.

Input Items:

| | |
|--------|---|
| disRAD | Radius of the curve. |
| ang | Delta angle of the curve. |
| disARC | The arc distance subtended by the delta and radius. |
| disTAN | The tangent of the curve. |
| disCHO | The chord distance subtended by the delta and radius. |

Dialogue Box:

The Deflection Angle dialogue box will appear as shown in Figure 11.42.

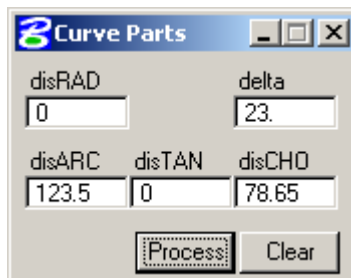


Figure 11.42: Chord Offset Dialogue Box

Example:

| | |
|-------------------------------|-------|
| Curve radius (disRAD) | 0 |
| Delta Angle of curve (ang) | 23. |
| Arc Distance (disARC) | 123.5 |
| Tangent of the curve (disTAN) | 0 |
| Chord distance (disCHO) | 78.65 |

The inputs for this example supply three out of the five possible inputs and more than the required minimum two inputs. The results of the calculation are illustrated in Figure 11.43 below.

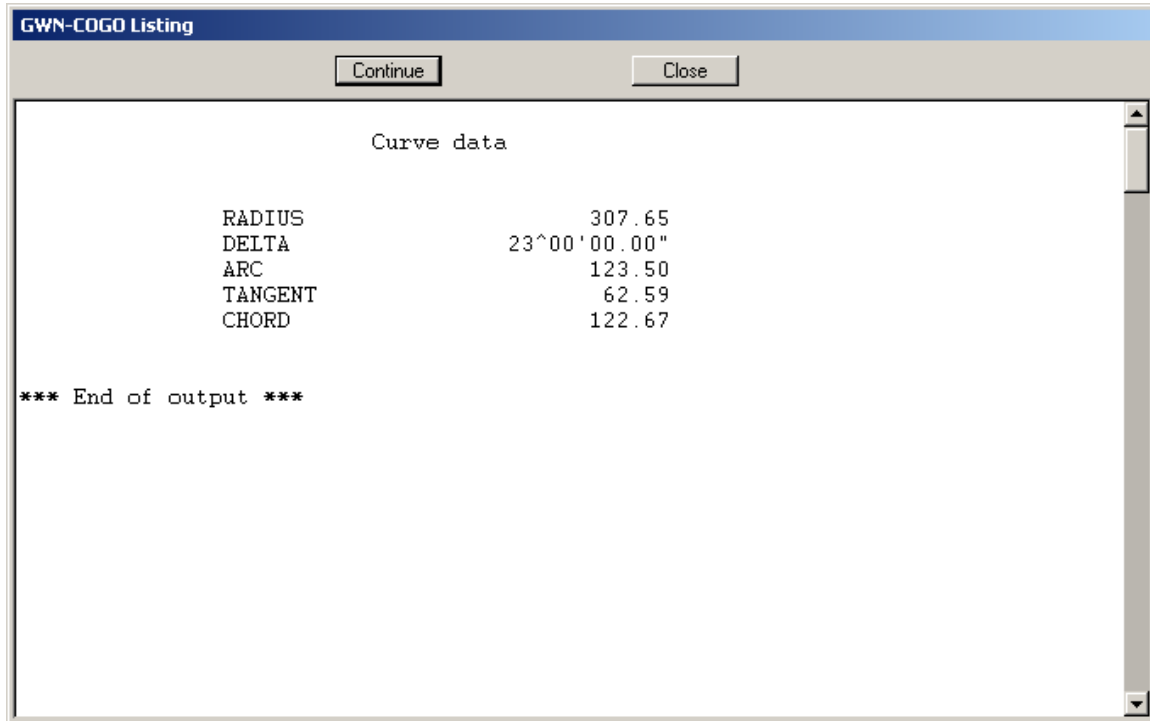


Figure 11.43: Chord Offset Example Results

Related Commands:

None.

11.23 Audit Comment

Description:

This command adds a text line to the audit file created by GWN-COGO.
The length of the line cannot be greater than 254 characters, including blanks.

Procedure:

1. From the [**Meas/Rep**] pulldown menu, select [**Audit Comment**]. Alternatively, the user could key into the MicroStation command prompt "**Audit Comment <cr>**".
2. Keyin the text string as it will appear in the Audit file.

Input Items:

des Text character input.

Dialogue Box:

The Audit Comment dialogue box will appear as shown in Figure 11.44.

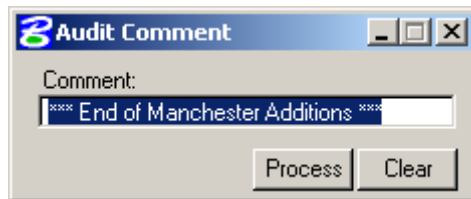


Figure 11.44: Audit Comment Dialogue Box

Example:

Text Input (des) *** End of Manchester Addition ***

This input will add the line as typed into the Audit file and as illustrated below in Figure 11.45.

```
Describe Alignment
26 50 1200
Deflection Angle
1000 2 G 24 902 23 D 23 902
Audit Comment
*** End of Manchester Addition ***
```

Figure 11.45: Audit Comment Example Results

Related Commands:

None.

12.0 LOCATION

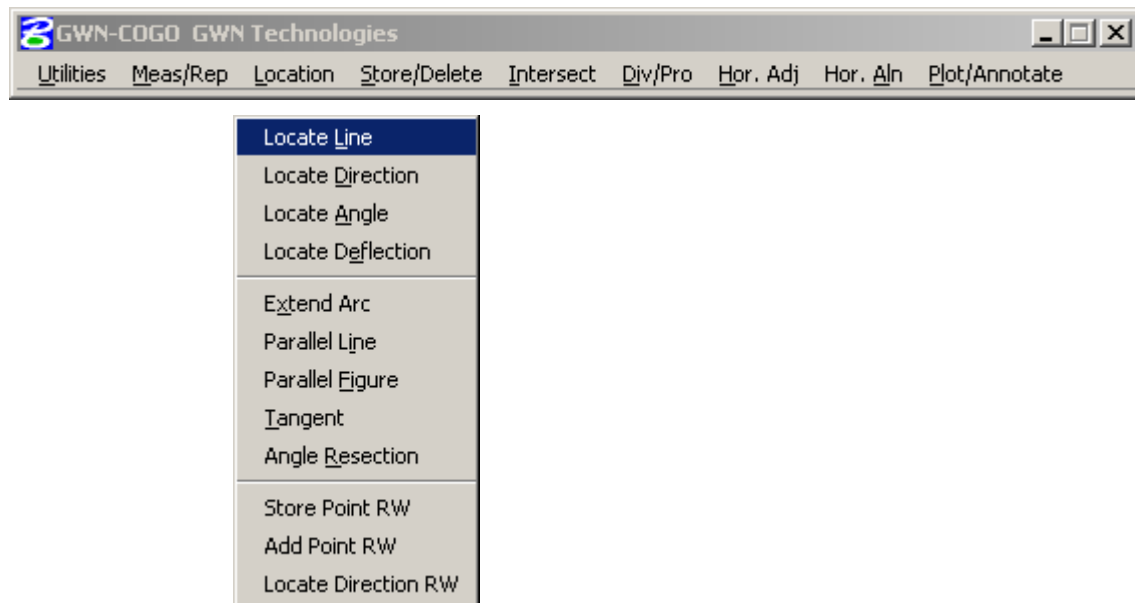


Figure 12.1: Location Pulldown Menu

This chapter deals with the commands found on the Location pulldown menu in reference format.

12.1 Locate Line

Description:

This command locates the new point “n” at a distance “dis” from the point “p1” going in the direction of point “p2”.

A negative distance locates the new point “n” in a direction opposite of that defined by points “p1” and “p2” as normally done.

If the plotting of a line is enabled, the line is drawn from point “p1” to the new point “n”.

Offset distances are to the right (relative to point “p1” facing point “n”) if positive and to the left if negative.



Using the offset distance can be a useful way of placing stations to the left and right of the centre line in straight sections.

Procedure:

1. Either select the **[Location] - [Locate Line]** on the main pulldown menu or keyin the command “**Locate Line** <cr>”.
2. Either keyin or graphically pick from the view, the point “p1” defining the location from which the direction and placement of the new point is made.
3. Either keyin or graphically pick from the view, the point “p2” defining the direction of the line.
4. Keyin the ID of the new point being created or “.” for auto-incrementing the point ID.
5. Either keyin or graphically pick from the view the distance of the new point “n” from the point “p1”. (This will be a slope distance if the vertical angle is not 90 degrees)
6. Keyin the vertical angle “va”. (Horizontal is 90 degrees) (Optional Input)
7. Either keyin or graphically pick from the view the offset distance. (+ for clockwise offset and - for counter-clockwise offset) (Optional Input)
8. Keyin the elevation of the new point (if an elevation is specified, the vertical angle is ignored)

Input Items:

| | |
|--------|--|
| p1 | The point from which measurements are based. |
| p2 | Point indicating direction of the line. |
| n | New point ID. |
| dis | The distance between the point “p1” and the new point “n”. |
| va | The vertical angle. (optional) |
| disOFF | The offset distance. (optional) |
| z | The elevation of the new point. (optional) |

Dialogue Box:

The Locate Line dialogue box will appear as shown in Figure 12.2.

| ocPT | fsPT | newPT | dis |
|------|------|-------|-----|
| 11 | 12 | 10 | 150 |

| va | disOFF | elev |
|------|--------|------|
| 90.0 | 10 | 0.0 |

Process Clear

Figure 12.2: Locate Line Dialogue Box

Example:

| | |
|---------------------------------------|--------------------------------|
| Point (p1) | 11 |
| Point indicating direction (p2) | 12 |
| ID of new point (n) | 10 |
| Distance to new point from "p1" (dis) | 150 |
| Vertical angle (va) | (leave as default in dialogue) |
| Offset distance (disOFF) | 10 |

This example will place a point (10) in the direction of the points 11 toward 12. The distance will be beyond the point 12 and 10 units to the right. The result is illustrated in Figure 12.3 below.

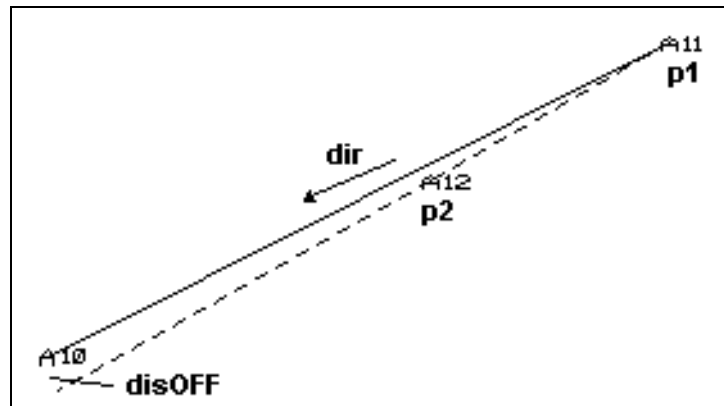


Figure 12.3: Locate Line Example Results

Related Commands:

Locate Angle, Locate Direction, Distance Direction Intersection, Arc Direction Intersection.

12.2 Locate Direction

Description:

This command locates a new point “n” at a distance “dis” from a base point “p” in the direction “dir”.

If the point “p” from which the calculations are made is not specified, the last point defined will be used as the default.

If the plot line is enabled, a line will be drawn from point “p” to the new point “n”.

If the vertical angle is specified (other than 90 degrees), the distance indicated will be used as a slope distance.

The offset is to the right (clockwise) of the direction indicated if positive and left (counter-clockwise) if negative.



The offset is a good option to place stations to the left and right of a centre line for straight sections. See Locate Line for an “Offset” example.

Procedure:

1. Either select the [Location] - [Locate Direction] on the main pulldown menu or keyin the command “**Locate Direction** <cr>”.
2. Either keyin or graphically pick from the view, the direction “dir” (from north) of the new point.
3. Either keyin or graphically pick from view, the distance “dis” to the new point.
4. Either keyin or graphically pick from the view, the point “p” defining the location from which the placement of the new point is made.
5. Keyin the new point ID “n”.
6. Keyin the vertical angle “va” if not horizontal. (optional)
7. Keyin or graphically pick from the view the offset distance “disOFF” from the direction indicated.
8. Keyin the elevation of the new point (if an elevation is specified, the vertical angle is ignored)

Input Items:

| | |
|--------|---|
| dir | Direction of the new point location. |
| dis | The distance to the new point. |
| p | The point from which the measurements are made. |
| n | The ID of the new point. |
| va | The vertical angle. (optional) |
| disOFF | The offset distance. (optional) |
| z | The elevation of the new point. (optional) |

Dialogue Box:

The Locate Direction dialogue box will appear as shown in Figure 12.4.

| ocPT | newPT | dir | dis |
|------|-------|-----|-----|
| 11 | 25 | 45. | 150 |

| va | disOFF | elev |
|-----|--------|------|
| 90. | 0.0 | 0.0 |

Process Clear

Figure 12.4: Locate Direction Dialogue Box

Example:

| | |
|-------------------------------------|---------|
| The base point used (p) | 11 |
| The ID of the new point (n) | 25 |
| Direction of the new point (dir) | 45. |
| The distance to the new point (dis) | 150 |
| The vertical angle (va) | default |
| The distance offset (disOFF) | none |
| New point elevation (z) | none |

The results of this input is displayed in Figure 12.5 below along with a North arrow (0 degrees) and an angle rotation indicator.

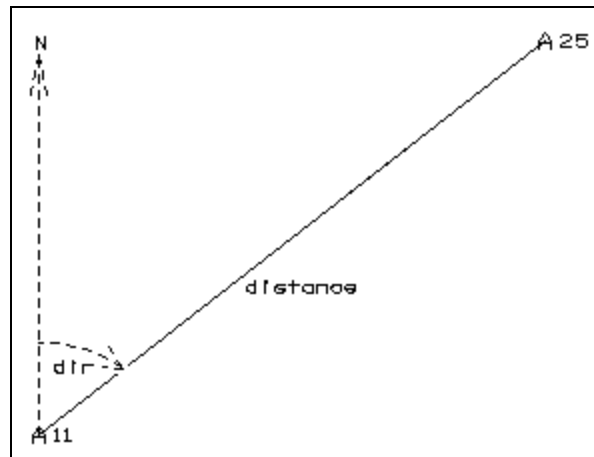


Figure 12.5: Locate Direction Example Results

Related Commands:

Locate Line, Locate Angle, Direction Distance Intersection.

12.3 Locate Angle

Description:

This command locates the new point "nFS" at a distance "dis" and an angle from the base point "pOC" and the backsight "pBS".

If the plot line is enabled, a line will be drawn from the base point "pOC" and the new point "nFS".

If the vertical angle is specified (other than 90 degrees), the distance indicated will be used as a slope distance.

The offset is to the right (clockwise) of the direction indicated if positive and left (counter-clockwise) if negative.



The offset is a good option to place stations to the left and right of a centre line for straight sections. See Locate Line for an "Offset" example.

Procedure:

1. Either select the **[Location] - [Locate Angle]** on the main pulldown menu or keyin the command "**Locate Angle** <cr>".
2. Either keyin or graphically pick from the view the point used as the backsight "pBS".
3. Either keyin or graphically pick from the view the point "pOC" from which the measurements will be placed.
4. Keyin the newly defined point ID "nFS".
5. Either keyin or graphically pick from the view the angle from the backsight to the new point "ang".
6. Either keyin or graphically pick from the view the distance "dis" from the base point "pOC" to the new point "nFS".
7. Keyin the vertical angle "va". (optional)
8. Either keyin or graphically pick from the view the distance offset "disOFF" from the location defined by the previous information.
9. Keyin the elevation of the new point (if an elevation is specified, the vertical angle is ignored)

Input Items:

| | |
|-----|---|
| pBS | Backsight point. |
| pOC | Point used to base measurements on. |
| nFS | The newly defined point ID. |
| ang | The angle turned from the backsight to the new point. |
| dis | The distance from the base point to the new point. |
| va | The vertical angle. (optional) |

disOFF The distance offset. (optional)
 z The elevation of the new point. (optional)

Dialogue Box:

The Locate Angle dialogue box will appear as shown in Figure 12.6.

| bsPT | ocPT | newPT |
|------|------|-------|
| 50 | 21 | 100 |

| ang | dis |
|----------|-----|
| 96-00-30 | 100 |

| va | disOFF | elev |
|-----|--------|------|
| 90. | 0.0 | 0.0 |

Process Clear

Figure 12.6: Locate Angle Dialogue Box

Example:

| | | |
|---------------------|----|----------|
| Backsight (pBS) | 50 | |
| Base point (nOC) | | 21 |
| New point ID (nFS) | | 100 |
| Angle (ang) | | 96-00-30 |
| Distance (dis) | | 100 |
| Vertical Angle (va) | | default |
| Offset (disOFF) | | none |

The above data is illustrated in Figure 12.7 below along with descriptive angle indicators.

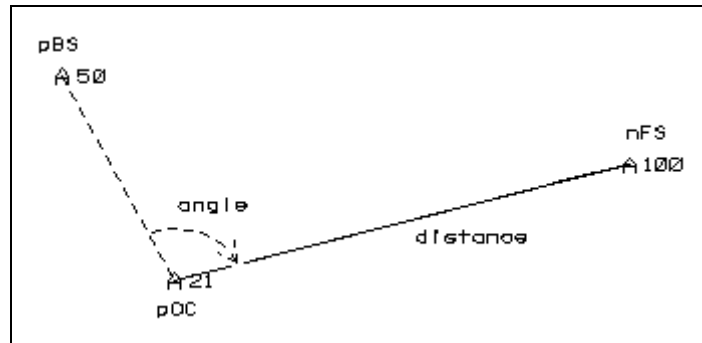


Figure 12.7: Locate Angle Example Results

Related Commands:

Locate Line, Locate Angle, Locate Direction.

12.4 Locate Deflection

Description:

This command locates the new point "nFS" at a distance "dis" and a deflection of an imaginary line connecting points "pBS" and "pOC".

If the plot line is enabled, a line will be drawn from the base point "pOC" and the new point "nFS".

If the vertical angle is specified (other than 90 degrees), the distance indicated will be used as a slope distance.

The offset is to the right (clockwise) of the direction indicated if positive and left (counter-clockwise) if negative.

Procedure:

1. Either select the **[Location] - [Locate Deflection]** on the main pulldown menu or keyin the command "**Locate Deflection** <cr>".
2. Either keyin or graphically pick from the view the backsight point "pBS".
3. Either keyin or graphically pick from the view the base point "pOC" which is used to base the calculations on.
4. Keyin the new point ID "nFS".
5. Either keyin or graphically pick from the view the deflection angle "defl".
6. Either keyin or graphically pick from the view the distance "dis" from "pOC" to locate the new point.
7. Keyin the vertical angle "va", if used.
8. Either keyin or graphically pick from the view the offset distance "disOFF" from the location determined by the previously input data.
9. Keyin the elevation of the new point (if an elevation is specified, the vertical angle is ignored)

Input Items:

| | |
|--------|---|
| pBS | Backsight point. |
| pOC | Point upon which the calculations are based. |
| nFS | The new point ID. |
| defl | Deflection angle between line "pBS to pOC" and the new point. |
| dis | The distance from the point "pOC" and the new point. |
| va | The vertical angle if not the default horizontal 90 degrees. |
| disOFF | The offset distance. |
| z | The elevation of the new point. (optional) |

Dialogue Box:

The Locate Deflection dialogue box will appear as shown in Figure 12.8.

| | | |
|----------|--------|-------|
| bsPT | ocPT | newPT |
| 40 | 45 | 50 |
| defl | | dis |
| 25 00 00 | | 25 |
| va | disOFF | elev |
| 90. | 0.0 | 0.0 |
| Process | | Clear |

Figure 12.8: Locate Deflection Dialogue Box

Example:

| | |
|--|----------|
| Backsight (pBS) | 40 |
| Base Point (pOC) | 45 |
| New point ID (nFS) | 50 |
| Deflection angle (defl) | 25 00 00 |
| Distance from "pOC" to new point (dis) | 25 |
| The vertical angle (va) | default |
| Offset distance (disOFF) | none |

This example data results in the position of point 50 as shown in Figure 12.9 below. A deflection indicator has been included for clarity.

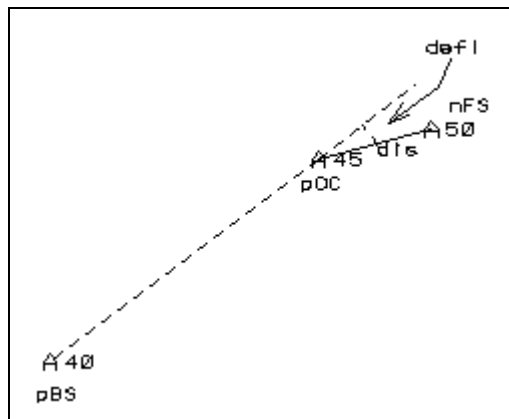


Figure 12.9: Locate Deflection Example Results

Related Commands:

None.

12.5 Extend Arc

Description:

This command calculates the coordinates of the new point “n” based on an arc as defined by a starting point of the arc “pPC”, the pivot point “pCC” and an arc length.

The distance from point “pCC” and “n” will be identical to that of point “pCC” to point “pPC”.

A positive arc length (distance) will locate the point clockwise in direction from point “pPC” and counter-clockwise for a negative arc length (distance).

If the plot line is enabled, a line will be drawn from the base point “pPC” to the new point “nFS” using “pCC” as the centre of the arc.

Procedure:

1. Either select the **[Location] - [Extend Arc]** on the main pulldown menu or keyin the command “**Extend Arc** <cr>”.
2. Either keyin or graphically pick from the view the point “pPC” from which the arc length measurements will be made.
3. Either keyin or graphically pick from the view the point “pCC” which will be used as the arc centre.
4. Keyin the ID of the new point “n”.
5. Either keyin or graphically pick from the view the distance along the arc from point “pPC” and the new point “n”.

Input Items:

| | |
|-----|---|
| pPC | Point from which the arc length measurements are taken. |
| pCC | Point used as the arc centre. |
| n | New point ID. |
| arc | Distance along the arc from point “pPC” to the new point “n”. |

Dialogue Box:

The Extend Arc dialogue box will appear as shown in Figure 12.10.

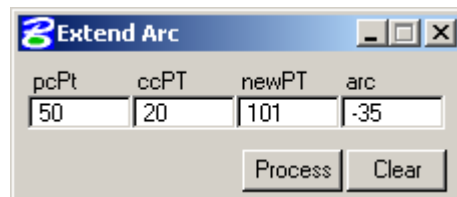


Figure 12.10: Extend Arc Dialogue Box

Example:

| | |
|---------------------------------|-----|
| Backsight point along arc (pPC) | 50 |
| Arc centre point (pCC) | 20 |
| New point ID (n) | 100 |
| Arc length (arc) | -35 |

The results of this input is illustrated in Figure 12.11 below.

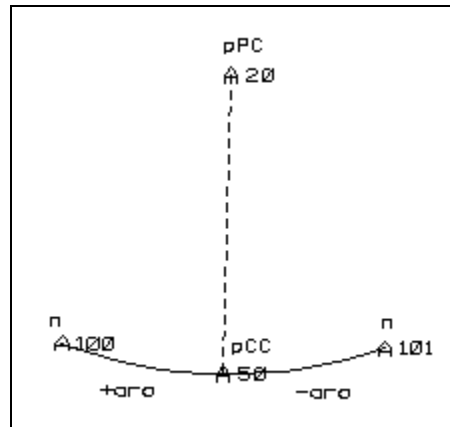


Figure 12.11: Extend Arc Example Results

Related Commands:

Arc Edge.

12.6 Parallel Line

Description:

This command locates two new points in a line parallel to a line between points “p1” and “p2”, a distance “dis” to the right (as viewed from point “p1” facing point “p2”).

A negative distance will result in the parallel line being placed to the left (as described above).

The second new point ID will be incremented by one from the indicated point “n” using auto-increment.

If the plot line is enabled, a line will be drawn between the two new points.



This command is a good way to place stations offset to a centre line in straight sections.

Procedure:

1. Either select the **[Location] - [Parallel Line]** on the main pulldown menu or keyin the command “**Parallel Line** <cr>”.
2. Either keyin or graphically pick from the view the starting point “p1” of the existing line.
3. Either keyin or graphically pick from the view the ending point “p2” of the existing line.
4. Either keyin or graphically pick from the view the distance to offset the new line from the existing line. (+ for the right and - for the left offsets)
5. Keyin the new point ID for the first of the two new points “n” which will be created.

Input Items:

| | |
|-----|--|
| p1 | Starting point of the existing line. |
| p2 | Ending point of the existing line. |
| dis | Distance to offset the new line. |
| n | The ID of the first of the two new points. |

Dialogue Box:

The Parallel Line dialogue box will appear as shown in Figure 12.12.

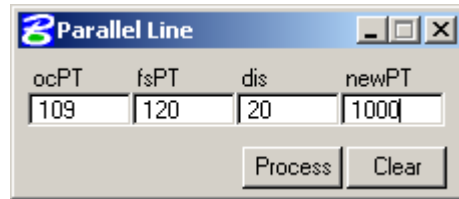


Figure 12.12: Parallel Line Dialogue Box

Example:

| | |
|---|------|
| First point of existing line (p1) | 109 |
| Last point of existing line (p2) | 120 |
| Distance to offset new line (dis) | 20 |
| ID of the first of the two new points (n) | 1000 |

This example input will place a pair of points 20 units to the right of the existing points 109 and 120. A line will be drawn between the new points 1000 and 1001 as the plot line is enabled. The results of this input is illustrated in Figure 12.13 below.



The points “p1” and “p2” do not have to be joined by a line or the endpoints of a line. Their coordinates are used to define a “direction” and “length” separating the points and a base to calculate the position of the two new points.

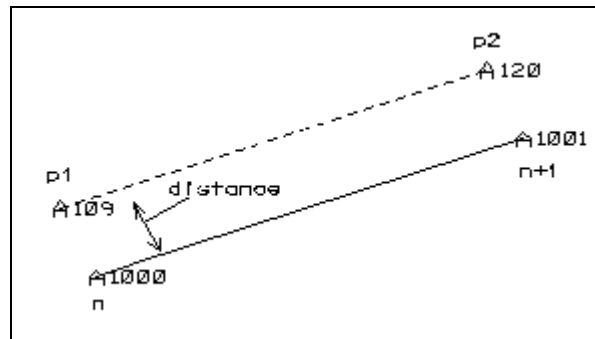


Figure 12.13: Parallel Line Example Results

Related Commands:

MicroStation “Copy Parallel”, Parallel Area Adjustment, Parallel Figure.

12.7 Parallel Figure

Description:

This command locates new points relative to the original group of points of an existing figure at a distance “dis”.

The direction of movement of the points is to the right for positive values and left for negative. The direction is relative to the order of sequence of the original group of points. See example for illustration.

The number “n” will be the ID of the first of the new points created. Its’ location will be relative to the first point of the original figure description. All following points will be auto-incremented.

If the number “nfg” of the new figure is entered, the newly created points will be saved as a figure with that ID.

If the original figure is closed, the first point ID of the description will also be the last.

It is assumed that any arcs in the description “des” are tangent to the connecting lines. The arc angle will be held constant for the new figure. If any distances specified exceed the radius of any arcs in the figure, the results may be unexpected.

Plotting will be done as set in the auto plot settings.

Procedure:

1. Either select the **[Location] - [Parallel Figure]** on the main pulldown menu or keyin the command “**Parallel Figure** <cr>”.
2. Either keyin or graphically pick from the view the figure or figure description to be copied “des”.
3. Either keyin or graphically pick from the view the distance “dis” to the new figure.
4. Keyin the ID “n” of the first point in the new figure.
5. Keyin the ID “nfg” of the new figure (optional).
6. Keyin the interior angle “angBEG” (if different from 90 degrees) at the beginning of the parallel figure. (optional)
7. Keyin the interior angle “angEND” (if different from 90 degrees) at the end of the parallel figure. (optional)

Input Items:

| | |
|-----|---|
| des | The original figure or group of points to copy. |
| dis | The distance to the new figure. |
| n | the ID assigned to the first point of the new figure. |
| nFG | The ID of the new figure. (optional) |

- angBEG The interior angle at the beginning of the parallel figure if different than 90 degrees. (optional)
- angEND The interior angle at the end of the parallel figure if different than 90 degrees (angEND) (optional)

Dialogue Box:

The Parallel Figure dialogue box will appear as shown in Figure 12.14.

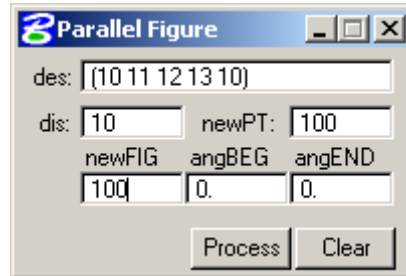


Figure 12.14: Parallel Figure Dialogue Box

Example 1:

| | |
|--------------------------------|------------------|
| Original group of points | (10 11 12 13 10) |
| The distance of the new figure | 10 |
| The ID of the first new point | 100 |
| The ID of the new figure | 100 |
| The beginning interior angle | none |
| The ending interior angle | none |

This example, as illustrated in Figure 12.15 below, shows a closed polygon being copied 10 units “to the right” or in this case, “enlarging” the figure by 10 units on all sides.

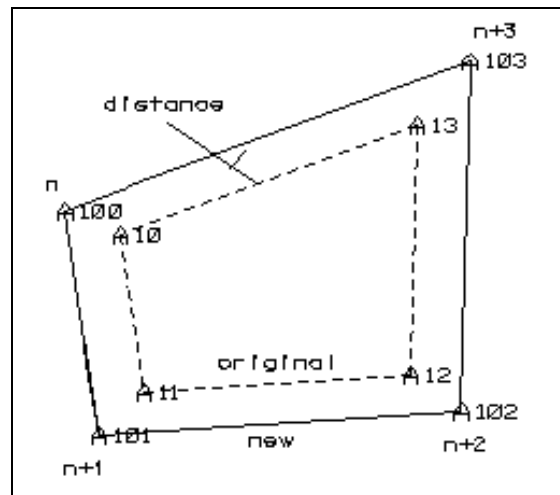


Figure 12.15: Parallel Figure Example 1 Results

Example 2:

| | |
|---------------------------------------|---------------|
| Original group of points (des) | (35 36 37 38) |
| The distance of the new figure (dis) | 30 |
| The ID of the first new point (n) | 45 |
| The ID of the new figure (nFG) | 13 |
| The beginning interior angle (angBEG) | G 38 35 36 |
| The ending interior angle (angEND) | G 37 38 35 |

In this example, as illustrated in Figure 12.6 below, an open polygon intersects a line at an angle other than 90 degrees. The new figure that will be created must also match the intersecting line. This means that the angles of intersection must be specified for the start and end of the figure.

These angles are specified by using the existing points rather than calculating the angle for input. Using a negative distance would have resulted in the new figure being created within the original polygon.

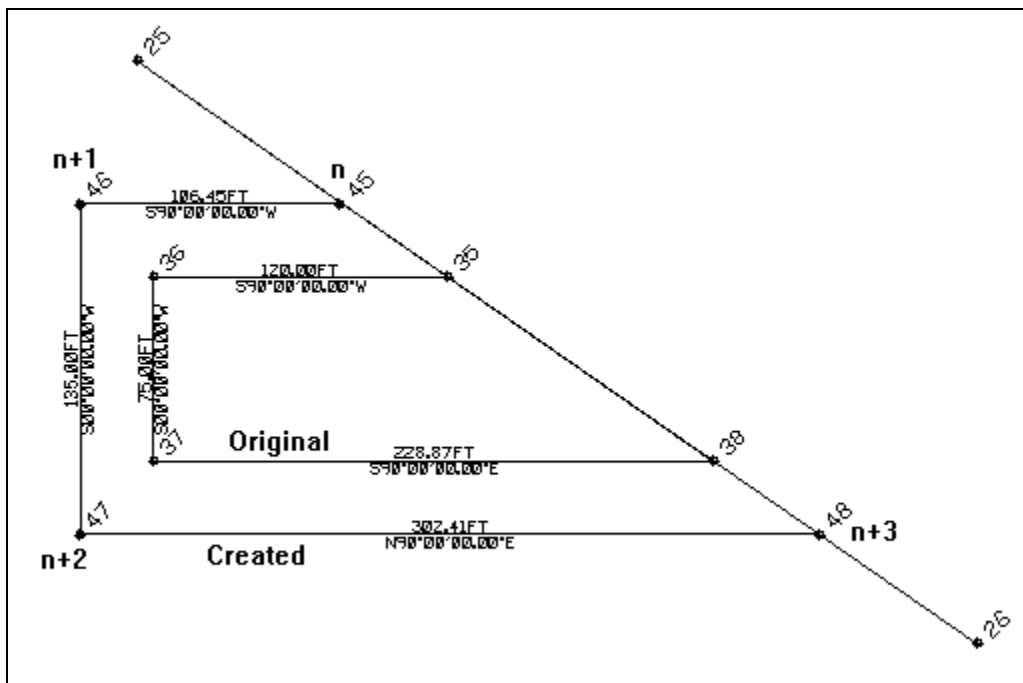


Figure 12.16: Parallel Figure Example 2 Results

Related Commands:

Parallel Line, Parallel Area Adjustment.

12.8 Tangent

Description:

This command locates points on a line tangent to the circle with the centre “pCC1” and the radius “r1” and a circle with the centre “pCC2” and radius “r2”.

The point “n” will be placed on the first circle tangent and the second point will be placed on the second circle tangent and its’ ID will be auto-incremented from the first point ID.

The placement of the points is determined by the radius given for each circle. The directions given (left, right) are relative to a viewpoint from the centre of circle 1 facing the centre point of circle 2.

The placement of the point “n” on the first circle will be to the right of its’ centre if the radius is positive and to the left with a negative radius.

The placement of the point on the second circle will be to the right of its’ centre if the radius is positive (direction relative to view from first circle centre) and to the left if the radius is negative.

If the plot line is enabled, a line connecting the points of tangency will be drawn graphically.

Procedure:

1. Either select the [Location] - [Tangent] on the main pulldown menu or keyin the command “**Tangent** <cr>”.
2. Either keyin or graphically pick from the view the centre point “pCC1” of the first circle.
3. Either keyin or graphically pick from the view the radius “r1” of the first circle.
4. Either keyin or graphically pick from the view the centre point “pCC2” of the second circle.
5. Either keyin or graphically pick from the view the radius “r2” of the second circle.
6. Keyin the ID “n” of the first point defined at the tangency of the first circle (optional)

Input Items:

| | |
|------|---|
| pCC1 | First circle centre point. |
| r1 | Radius of first circle. |
| pCC2 | Second circle centre point. |
| r2 | Radius of second circle. |
| n | ID of first point at tangency to first circle. (optional) |

Dialogue Box:

The Tangent dialogue box will appear as shown in Figure 12.17.

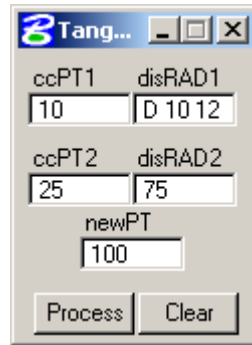


Figure 12.17: Tangent Dialogue Box

Example:

| | |
|-----------------------------------|---------|
| First circle centre point (pCC1) | 10 |
| Radius of first circle (r1) | D 10 12 |
| Second circle centre point (pCC2) | 25 |
| Radius of second circle (r2) | 75 |
| First point ID (n) | 100 |

In Example 1, as illustrated below in Figure 12.18, both radii are positive and the new points are created to the right of the first circle centre point (pCC1) in reference to the second centre point (pCC2).

Were the signs changed to negative for both radii, a mirror image of the positive radii would be the result. Likewise, a mix of positive and negative radii would result in a crossover between the two “pCC’s” as shown below.

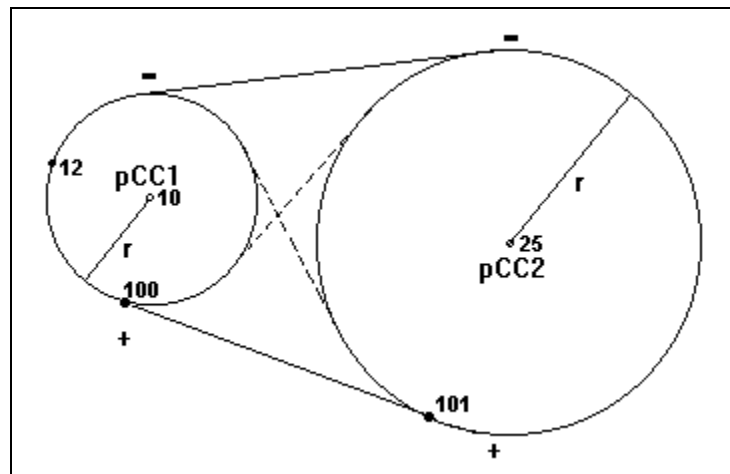


Figure 12.18: Tangent Example 1 Results

Related Commands:

Arc Arc Intersect, Arc Line Intersect

12.9 Angle Resection

Description:

This command locates a new point “n” given three known points “p1”, “p2” and “p3” along with two angles “ang1” and “ang2”.

Each angle should preferably be near 120 degrees each for the most accurate calculations and must be entered in a clockwise direction about point “n” starting at point “p1”.

Procedure:

1. Either select the [Location] - [Angle Resection] on the main pulldown menu or keyin the command “**Angle Resection** <cr>”.
2. Keyin the new point ID “n” to be defined.
3. Either keyin or graphically pick from the view the first point “p1”.
4. Either keyin or graphically pick from the view the second point “p2”.
5. Either keyin or graphically pick from the view the third point “p3”.
6. Either keyin or graphically pick from the view the first angle between points “p1” and “p2”.
7. Either keyin or graphically pick from the view the second angle between points “p2” and “p3”.

Input Items:

| | |
|------|------------------------------|
| n | New point ID. |
| p1 | First point. |
| p2 | Second point. |
| p3 | Third point. |
| ang1 | Angle between “p1” and “p2”. |
| ang2 | Angle between “p2” and “p3”. |

Dialogue Box:

The Angle Resection dialogue box will appear as shown in Figure 12.20.

| newPT | PT_A | PT_B |
|-------|-------|-------|
| 100 | 10 | 11 |
| PT_C | angAB | angBC |
| 12 | 100 | 140 |

Process Clear

Figure 12.20: Angle Resection Dialogue Box

Example:

| | |
|---------------------|------|
| New point ID (n) | 100 |
| First point (p1) | 10 |
| Second point (p2) | 11 |
| Third point (p3) | 12 |
| First angle (ang1) | 100. |
| Second angle (ang2) | 140. |

The results of this example input is shown in Figure 12.21 below.

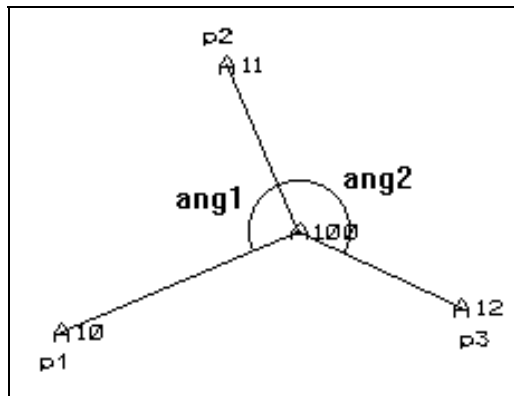


Figure 12.21: Angle Resection Example Results

Related Commands:

Points Intersect, Line Direction Intersect, Direction Intersect

12.10 Store Point RW

Description:

This command stores a point and two coordinates which define the start of a right of way.

The right of way extend coordinates are labelled as "L10W001" or R10W001" where "L" or "R" defines left or right of the centre line. "10" defines the number of the right of way and "001" defines the centre line point ID.



This Right of Way command is equipped with a dialogue box but is usually operated from batch mode.

Procedure:

1. Either use in batch mode or keyin "**Store Point RW** <cr>" in the MicroStation command window.
2. Enter the ID "n" of the centre line point to be defined.
3. Enter the Northing "nor" of the point.
4. Enter the Easting "eas" of the point.
5. Enter the right of way distance on the left of the centre line "disLFT".
6. Enter the right of way distance on the right of the centre line "disRGT".
7. Enter the angle from the centre line point from which the RofW points to be defined.
8. Enter the number of the right of way "div".

Input Items:

| | |
|---------------------------------|--|
| In | D of the centre line point to be defined. |
| nor | Northing of the centre line point. |
| eas | Easting of the centre line point. |
| disLFT | The distance offset to the left of the centre line point. |
| disRGT | The distance offset to the right of the centre line point. |
| ang | The angle used to determine the position of the offset points. |
| The number of the right of way. | |

Dialogue Box:

The Store Point RW dialogue box will appear as shown in Figure 12.21a.

| newPT | north | east | elev |
|-------|------------|------------|-------|
| 100 | 100308.611 | 100810.718 | 0.000 |

| disLFT | disRGT | ang | R/W number |
|--------|--------|------|------------|
| 25 | 25 | 110. | 7 |

Process Clear

Figure 12.21a: Store Point RW Dialogue Box

Example:

| | |
|-----------------------|------------|
| Centre Line new point | 100 |
| Northing | 100308.611 |
| Easting | 100810.718 |
| Left offset | 25 |
| Right offset | 25 |
| Angle to offsets | 110. |
| Number of RofW | 7 |

In this example, as shown in Figure 12.22 below, the centre line point will be used with the angle given to the offsets to determine their location. The lines are added to help the illustration demonstrate the offset angle and the direction of the centre line.

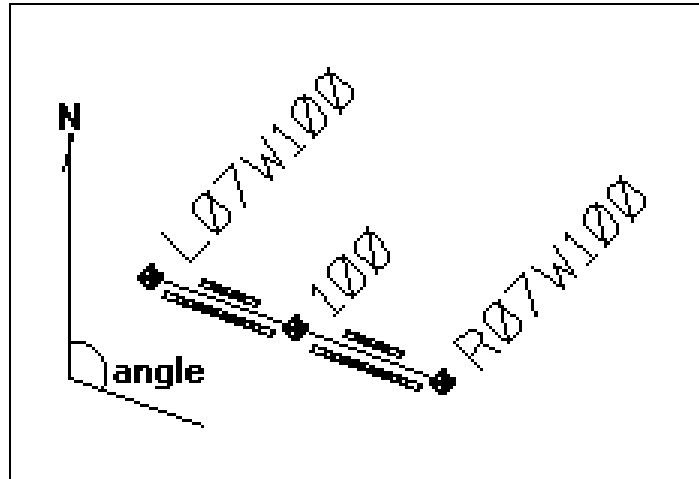


Figure 12.22: Store Point RW Example Result

Related Commands:

Store Point, Parallel Line, Parallel Figure, Add Point RW, Locate Direction RW, End RW.

12.11 Add Point RW

Description:

This command adds a point and two coordinates to an existing right of way.

The right of way extent coordinates are labelled as “L10W002” or “R10W002” where “L” and “R” refer to left and right, “10” refers to the number of the right of way and “002” defines the centre line point ID they relate to.



This Right of Way command is equipped with a dialogue box but is usually operated from batch mode.

Procedure:

1. Either use in batch mode or keyin “**Add Point RW** <cr>” in the MicroStation command window.
2. Enter the ID “n” of the centre line point.
3. Enter the Northing “nor” of the centre line point.
4. Enter the Easting “eas” of the centre line point.
5. Enter the offset distance to the left of centre “disLFT”.
6. Enter the offset distance to the right of centre “disRGT”.
7. Enter the angle from the centre line point from which the RofW points to be defined.

Input Items:

| | |
|--------|--|
| n | ID of the centre line point to be defined. |
| nor | Northing of the centre line point. |
| eas | Easting of the centre line point. |
| disLFT | The distance offset to the left of the centre line point. |
| disRGT | The distance offset to the right of the centre line point. |
| ang | The angle used to determine the position of the offset points. |

Dialogue Box:

The Add Point RW dialogue box will appear as shown in Figure 12.22a.

Figure 12.22a: Add Point RW Dialogue Box

Example:

| | |
|-----------------------|------------|
| Centre Line new point | 100 |
| Northing | 100308.611 |
| Easting | 100810.718 |
| Left offset | 20 |
| Right offset | 40 |
| Angle to offsets | 110. |

In this example, as shown in Figure 12.23 below, the centre line point will be used with the angle given to the offsets to determine their location. The existing Right of Way number will be used.

The lines are added to help the illustration demonstrate the offset angle and the direction of the centre line.

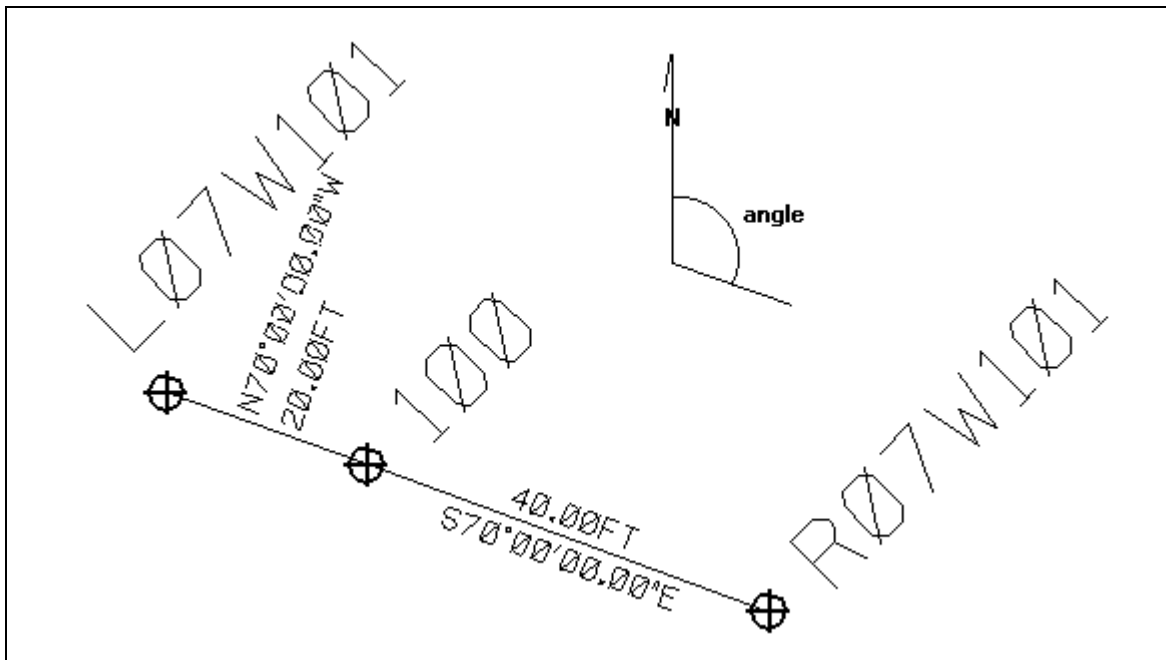


Figure 12.23: Add Point RW Example Result

Related Commands:

Store Point, Parallel Line, Parallel Figure, Store Point RW, Locate Direction RW, End RW.

12.12 Locate Direction RW

Description:

This command locates by direction and will add a point and other two coordinates to an existing right of way.

The right of way extent coordinates are labelled as "L10W003" or "R10W003" where "L" and "R" refer to left and right, "10" refers to the number of the existing right of way and "003" refers to the centre line point ID.



This Right of Way command is not equipped with a dialogue box as is intended to operate from batch mode.

Procedure:

1. Either use in batch mode or keyin "**Locate Direction RW** <cr>" in the MicroStation command window.
2. Enter the ID "n" of the new centre line point.
3. Enter the direction in which the right of way runs.
4. Enter the distance from an existing right of way point.
5. Enter the offset distance to the left of centre "disLFT".
6. Enter the offset distance to the right of centre "disRGT".

Input Items:

| | |
|--------|--|
| n | ID of the new centre line point to be defined. |
| dir | The direction the right of way runs. |
| dis | The distance from an existing right of way centre point. |
| disLFT | The distance offset to the left of the centre line point. |
| disRGT | The distance offset to the right of the centre line point. |

Dialogue Box:

None.

Example:

| | |
|------------------------------|---------|
| New centre line point | 100 |
| Direction of right of way | A 10 20 |
| Distance from existing point | 100 |
| Left offset | 25 |
| Right offset | 25 |

In this example, as shown in Figure 12.24 below, a new centre line point and its' right of way extents will be plotted 100 units in the direction indicated by points 10 and 20. The existing Right of Way number will be used.

The lines are added to help the illustration demonstrate the offset angle and the direction of the centre line.

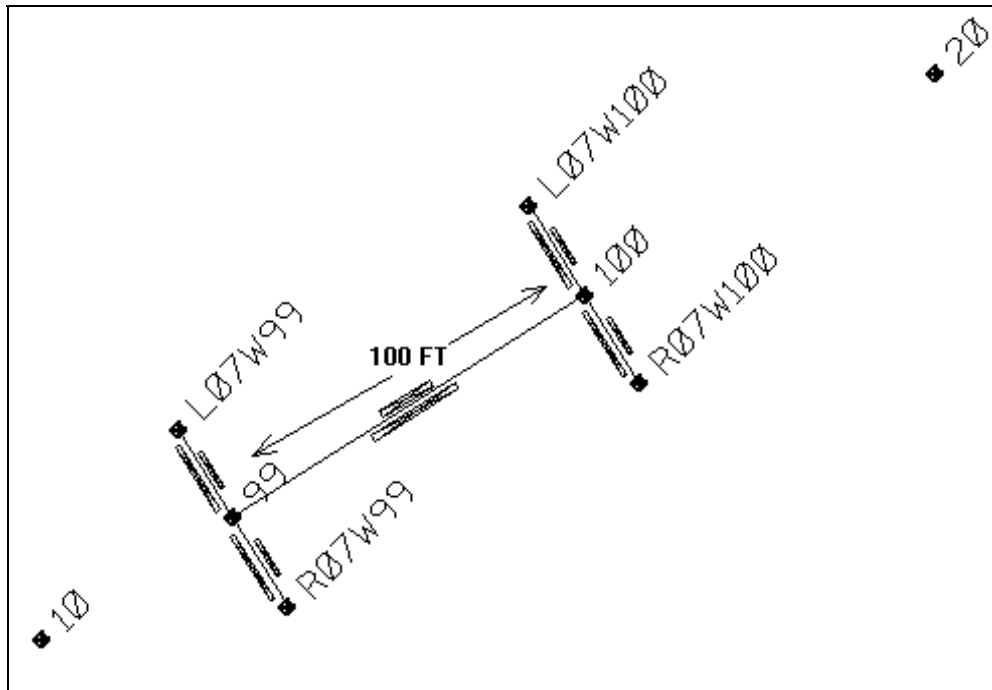


Figure 12.24: Locate Direction RW Example Result

Related Commands:

Store Point, Parallel Line, Parallel Figure, Store Point RW, Add Point RW, End RW.

12.13 End RW

Description:

This command locates an end point on an existing right of way.

The right of way extent coordinates are labelled as "L10W004" or "R10W004" where "L" and "R" define left or right of the centre line, "10" defines the number of the existing right of way and "004" defines the center point ID.



This Right of Way commands is not equipped with a dialogue box as is intended to operate from batch mode.

Procedure:

1. Either use in batch mode or keyin "**End RW** <cr>" in the MicroStation command window.
2. Enter the ID "n" of the new centre line point.
3. Enter the Northing "nor" of the centre line point.
4. Enter the Easting "eas" of the centre line point.
5. Enter the offset distance to the left of centre "disLFT".
6. Enter the offset distance to the right of centre "disRGT".
7. Enter the angle "ang" used to determine the location of the offset points from the centre line.

Input Items:

| | |
|--------|--|
| n | ID of the new centre line point to be defined. |
| nor | The Northing of the centre line point. |
| eas | The Easting of the centre line point. |
| disLFT | The distance offset to the left of the centre line point. |
| disRGT | The distance offset to the right of the centre line point. |
| ang | Angle to locate the position of the extents of the right of way. |

Dialogue Box:

None.

Example:

| | |
|-----------------------|------|
| New centre line point | 100 |
| Northing | 1000 |
| Easting | 1100 |
| Left offset | 25 |
| Right offset | 25 |
| Angle of offset | 110. |

In this example, as shown in Figure 12.25 below, a new centre line point will be plotted at the given coordinates with the extents 25 units to either side at an angle from the direction of the right of way of 110 degrees. The existing Right of Way number will be used.

The lines are added to help the illustration demonstrate the offset angle and the direction of the centre line.

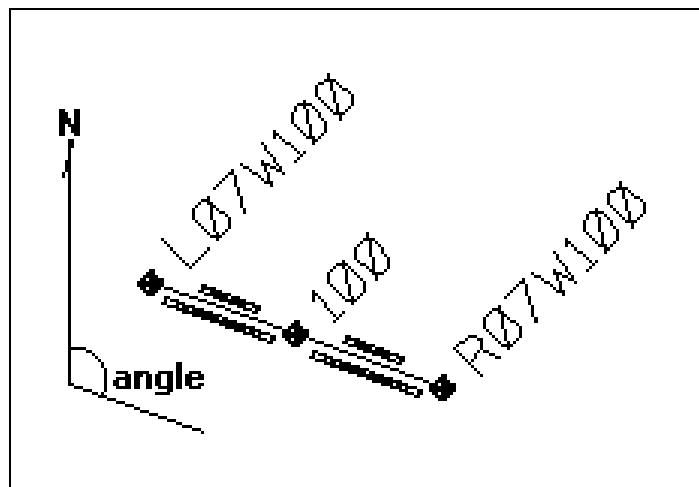


Figure 12.25: Locate Direction RW Example Result

Related Commands:

Store Point, Parallel Line, Parallel Figure, Store Point RW, Add Point RW, Locate Direction RW.

13.0 STORE / DELETE

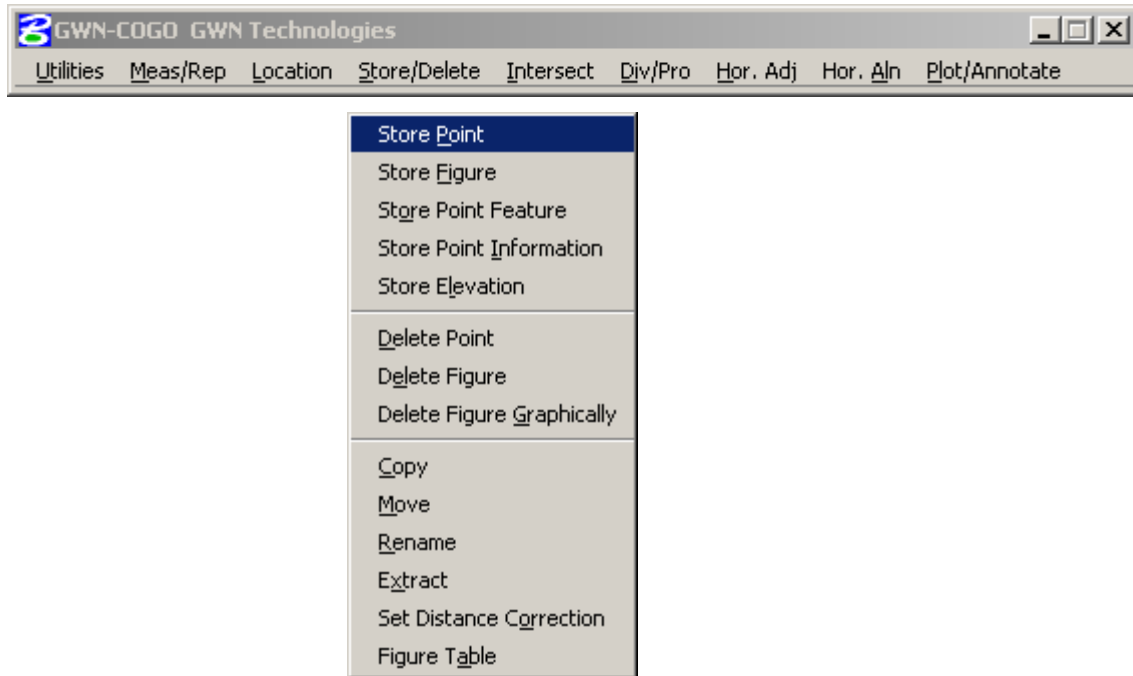


Figure 13.1: Store/Delete Pulldown Menu

This chapter deals with the commands found on the Store / Delete pulldown menu in reference format.

13.1 Store Point

Description:

This command assigns a point ID to a point “n” with the coordinates identified as “nor”, “eas” and “z” (optional) as well as a description input (optional)

The length of the description is determined before running “Newjob” in the Feature Table Processing Options.

If the point information length when “Newjob” is run is at least 8 characters in length and the [Parameter File] - [Processing Options] switch for including the feature in the point information is set to “on”, the feature will be stored with the coordinates for later retrieval and display.

GWN-COGO will alert you to duplicate point numbers with a warning dialogue box if that number already exists in the point file (if the switch for ignoring overwriting points is in the “off” position [Parameter File] - [Processing Options]).

The ID may be any string of alphanumeric characters up to eight characters in length without embedded spaces.

Procedure:

1. Either keyin to the command window keyin field "**Store Point** <cr>" or select the pulldown [**Store/Delete**] and pick the [**Store Point**] command.
2. Enter the ID “n” of the new point to be created or a dot “.” for incrementing automatically.
3. If using the dialogue box, you can either keyin or graphically pick from the view the coordinates or key them in (after putting the cursor in the “Northing” text field) or if using the command line, enter the Northing “nor”, Easting “eas” and “Elevation” “z” (optional).
4. Enter a point description “desINFO” if space has been allocated in the Feature Table prior to running “Newjob”.



You may edit the coordinates in the dialogue box before being processed by GWN-COGO as this data is not used until the “Process” button has been activated.



Features may be specified and activated previous to running this command using the “Set Feature” command.

Input Items:

| | |
|---------|---|
| n | ID of the new point. |
| nor | Northing coordinate. |
| eas | Easting coordinate |
| z | Elevation of coordinate. (optional) |
| desINFO | Point Information for point. (optional) |

Dialogue Box:

The Store Point dialogue box will appear as shown in Figure 13.2 following.

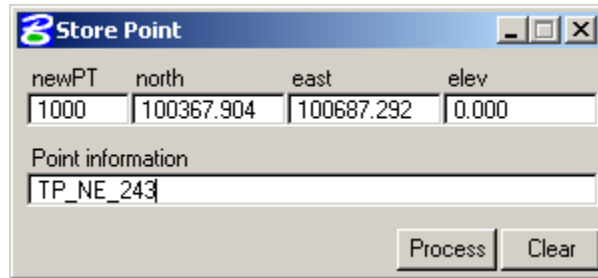


Figure 13.2: Store Point Dialogue Box

Point coordinates may be graphically picked from the screen with the dialogue box, set the cursor in the “North” text field then pick on the screen the location of the point. The user may then edit the data in the text field. (It is possible to use “Tentative” to place the cursor location for this command.)

Example:

| | |
|-----------------------|------------|
| New ID (n) | 1000 |
| Northing (nor) | 100367.904 |
| Easting (eas) | 100687.292 |
| Elevation (z) | 0.0 |
| Description (desINFO) | TP_NE_243 |

This example uses the active feature (the last one set) and places a text symbol for the point and a text label at that location. (This is assuming the autoplot settings are turned on for point symbol and text)

Related Commands:

Store Point Feature, Set Feature, Store Figure, Store Point Information.

13.2 Store Figure

Description:

This command is used to assign to a user defined figure ID “nfg”, a group of points and/or other figures (known as a figure description). The figure ID is used to identify this description of points/figures in other GWN-COGO commands.

The figure ID must be a positive number in the range of 1 to 10,000 (without comma delimiter).

To use other figures in the description, use the other figure ID numbers.

GWN-COGO stores the point ID's and not their coordinates in a figure file. The point ID's in turn refer to their coordinates in the point file of the same database.

A dialogue box will be displayed to prompt you for a new figure ID number if a duplicate is found in the figure file.

Procedure:

1. Either keyin to the command window keyin field **"Store Figure <cr>"** or select the pulldown **[Store/Delete]** and pick the **[Store Figure]** command.
2. Enter the new figure ID “nfg”.
3. Either keyin or graphically pick from the view the point/figure ID's for the figure description “des”.



All point ID's must be enclosed in rounded brackets “()” for this command.



Comments may be stored later using the “Store Point Information” command if left blank at this time.

Input Items:

| | |
|-----|---|
| nfg | ID of the newly defined figure. |
| des | List of point or figure ID's describing figure. |

Dialogue Box:

The Store Figure dialogue box will appear as shown in Figure 13.3 following.

Figure 13.3: Store Figure Dialogue Box

Example:

New figure ID (nfg) 102
Figure Description (des) (11 13 24 25) Extra text put here

This example forms an open polygon using the points listed, in order. This is stored in the figure table for future reference and does not immediately affect the graphic representation of the points.

The text “Extra text put here” can be placed after the closing “)” bracket to be stored with the description in the figure table. This text will be displayed in the figure edit box and when a report is generated when listing figures. This is shown in Figure 13.4 below.

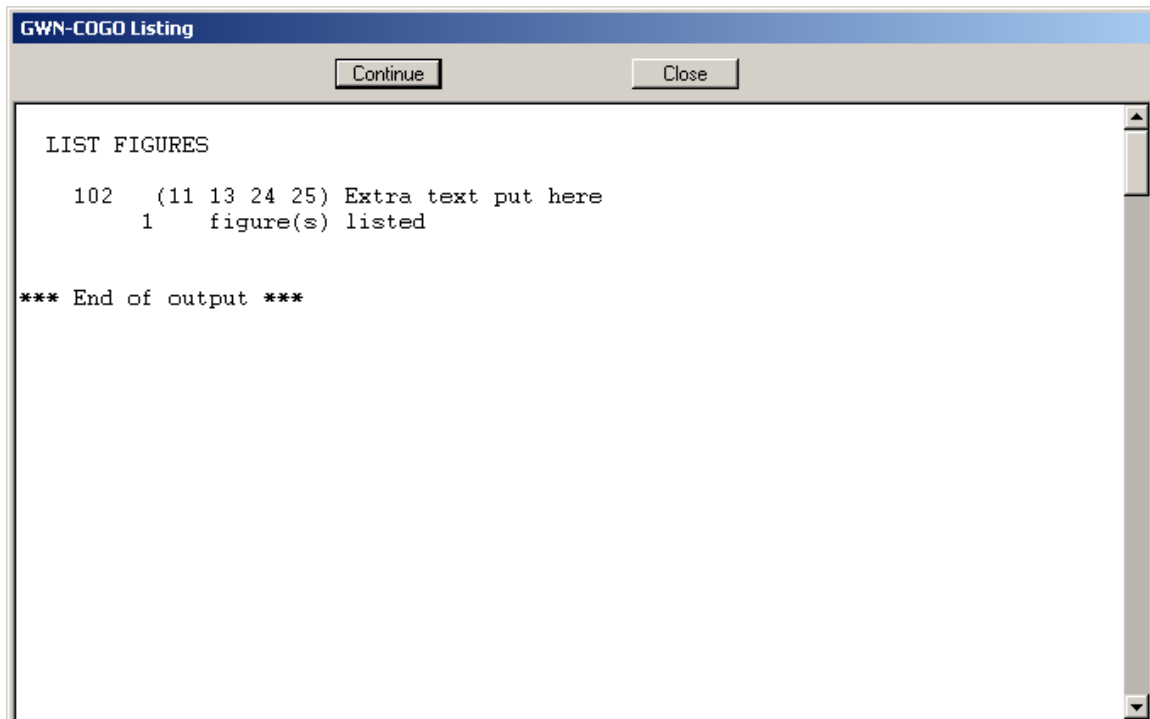


Figure 13.4: List Figures Report Example Results

Related Commands:

Store Point, Store Point Information, Edit Figure Table.

13.3 Store Point Feature

Description:

This command assigns a point ID to the point “n” with coordinates Northing “nor”, Easting “eas” and Elevation “z” (optional) along with the name of the feature to use for placing this point.

The difference between Store Point Feature and Store Point is that the feature may be selected at the time of the point creation. The feature remains the active feature until changed.

The length of the description is determined before running “Newjob” in the [Feature Table] - [Processing Options] - [Include Point Information] setting.

GWN-COGO will alert the user to duplicate point numbers with a warning dialogue box that will allow an Abort, Redefine or Rename option.

The ID may be any string of alphanumeric characters up to eight characters in length without any embedded spaces.

Procedure:

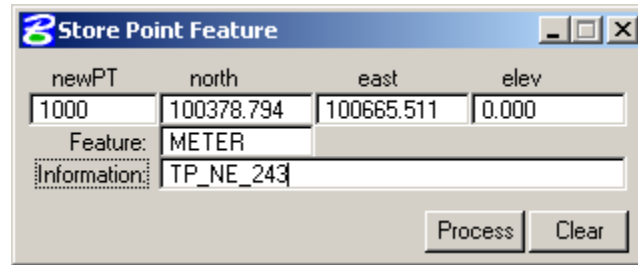
1. Either keyin to the command window keyin field **"Store Point Information"** or select the pulldown **[Store/Delete]** and pick the **[Store Point Information]** command.
2. Enter the ID “n” of the newly defined point.
3. Either keyin or graphically pick from the view the Northing “nor”, Easting “eas” and Elevation “z” (optional).
4. Enter the case-sensitive name of the feature “feat” to be activated when placing this point.
5. Enter a text string (no embedded blank spaces) “desINFO” which will be stored along with the point coordinates in the database.

Input Items:

| | |
|---------|---|
| n | ID of the newly defined point. |
| nor | Northing of the coordinate. |
| eas | Easting of the coordinate. |
| z | Elevation of the coordinate. (optional) |
| feat | Feature used in plotting the point. |
| desINFO | Point Information description field. (optional) |

Dialogue Box:

The Store Point Feature dialogue box will appear as shown in Figure 13.5 following.



| newPT | north | east | elev |
|--------------|------------|------------|-------|
| 1000 | 100378.794 | 100665.511 | 0.000 |
| Feature: | METER | | |
| Information: | TP_NE_243 | | |

Process Clear

Figure 13.5: Store Point Feature Dialogue Box

Example:

| | |
|-----------------------|------------|
| New ID (n) | 1000 |
| Northing (nor) | 100378.794 |
| Easting (eas) | 100665.511 |
| Elevation (z) | 0.0 |
| Feature (feat) | METER |
| Description (desINFO) | TP_NE_243 |

The result of this input will appear identically to that of the “Store Point” command with the “METER” feature active. The Point Information “desINFO” is stored in the database for later use. Therefore, no example results are necessary.

Related Commands:

Store Point, Store Figure, Store Point Information.

13.4 Store Point Information

Description:

This command allows the user to include a string of text without any embedded spaces "desINFO" to be linked with the previously defined point "p".

The length of the information string is determined by the setting in the [Feature Table] - [Processing Options] previous to the "Newjob" command activation.

This input will overwrite any point information currently associated with that point.



The length of Point Information must be divisible by four. The first eight characters may be used for the Feature name if the [Parameter File] - [Processing Options] dialogue has the "Include Feature in point information" switch is set to "on".

Procedure:

1. Either keyin to the command window keyin field "**Store Point Information**" or select the pulldown [**Store/Delete**] and pick the [**Store Point Information**] command.
2. Either keyin or graphically pick from the view the point "p" to which this information is to be associated.
3. Enter the text string to be stored with the data coordinates.

Input Items:

| | |
|---------|--|
| p | ID of existing point. |
| desINFO | Text string to be stored with point coordinates. |

Dialogue Box:

The Store Point Information dialogue box will appear as shown in Figure 13.6 following.

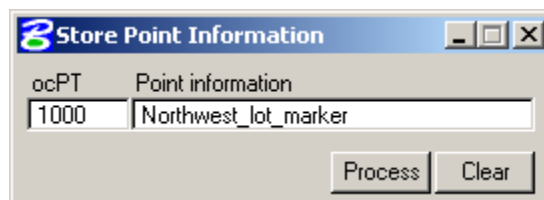


Figure 13.6: Store Point Information Dialogue Box

Example:

Point ID (p) 1000
Description (desINFO) Northwest_lot_marker

The data stored with the point coordinates may be view by requesting a report of the point with the “Annotation Format” including the letter “I” in the order of coordinates. This report is displayed in Figure 13.7 following.

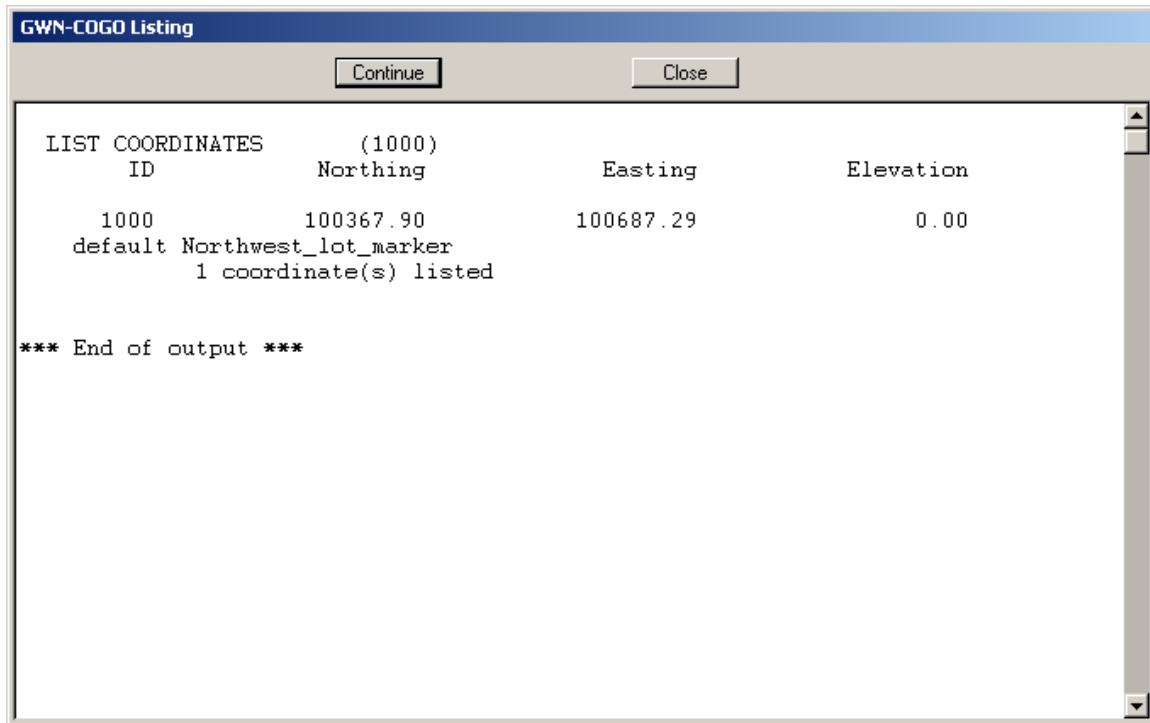


Figure 13.7: Store Point Information Coordinate Report

Related Commands:

Store Point, Store Point Feature.

13.5 Store Point Elevation

Description:

This command sets and overwrites the previously defined point ID's elevation in the coordinate file.

This command is used only in 3-D design files.

Procedure:

1. Either keyin to the command window keyin field "**Store Point Elevation**" or select the pulldown [**Store/Delete**] and pick the [**Store Point Elevation**] command.
2. Either keyin or graphically pick from the view the ID of the point "p" to be affected.
3. Enter the elevation "z" for that point.

Input Items:

| | |
|---|--|
| p | ID of existing point. |
| z | Elevation to enter into the coordinate file. |

Dialogue Box:

The Store Point Elevation dialogue box will appear as shown in Figure 13.8 following.

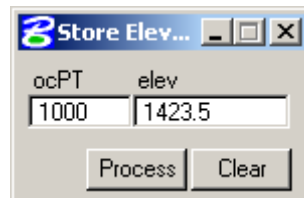


Figure 13.8: Store Point Elevation Dialogue Box

Example:

| | |
|---------------|---------|
| Point ID (p) | 1000 |
| Elevation (z) | 1423.50 |

This input will set the point 1000 to the elevation of 1423.50 in the design and coordinate file.

Related Commands:

Store Point, Store Point Feature, Move.

13.6 Delete Point

Description:

This command deletes points from the database and from the graphic design file.

The points to be deleted are input as a description "des" which may be a point ID , a group of points or a single figure. (Points are enclosed in rounded brackets "()")

A summary report will be displayed or sent to file (as per Parameter File settings) listing the points being deleted, then the success report after operation.

Procedure:

1. Either keyin to the command window keyin field "**Delete Point**" or select the pulldown [**Store/Delete**] and pick the [**Delete Point**] command.
2. Either keyin or graphically pick from the view the point(s) or figure ID "des" to be deleted.

Input Items:

des Point or group of points or single figure ID.

Dialogue Box:

The Delete Point dialogue box will appear as shown in Figure 13.9 following.

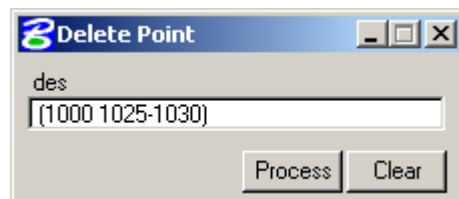


Figure 13.9: Delete Point Dialogue Box

Example:

Point ID (p) (1000 1025-1030)

The points 1000, 1025 through to 1030 will be deleted from the point file and the associated graphics will likewise be deleted. The reports for such a command are shown in Figures 13.10 and 13.11 following.

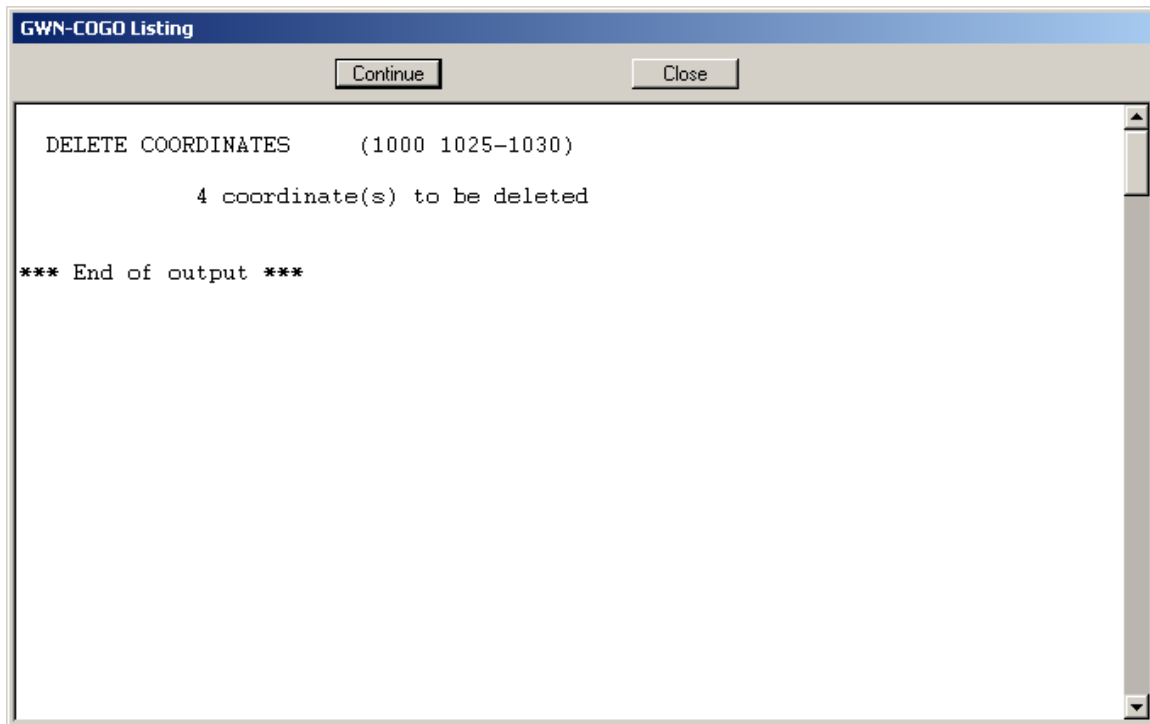


Figure 13.10: Delete Point Example Report 1

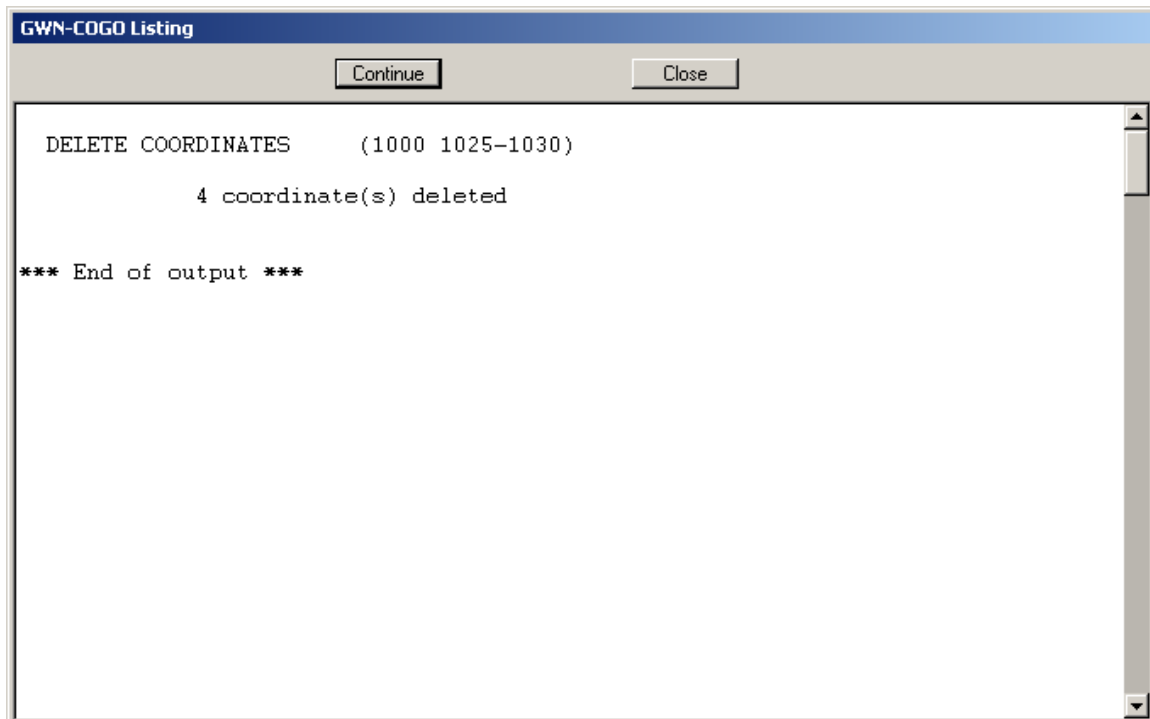


Figure 13.11: Delete Point Example Report 2

Related Commands:

Delete Figure.

13.7 Delete Figure

Description:

This command deletes the description of a group of points as a figure in the database (figure file) but not the points from the point file..

To delete more than one figure at a time, group the figure ID's in rounded brackets "()".

A summary report will be generated to screen or file (as per Parameter File settings).

Procedure:

1. Either keyin to the command window keyin field "**Delete Figure**" or select the pulldown [**Store/Delete**] and pick the [**Delete Figure**] command.
2. Either keyin or graphically pick from the view the figure ID's "des" which will be deleted.

Input Items:

des Description of figure ID's for deletion.

Dialogue Box:

The Delete Figure dialogue box will appear as shown in Figure 13.12 following.

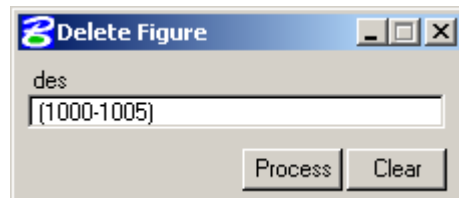


Figure 13.12: Delete Figure Dialogue Box

Example:

Figure ID (des) (1000-1005)

The figures ranging from 1000 to 1005 will have their descriptions deleted, leaving the graphical and point information unaffected.

Related Commands:

Delete Figure Graphically, Delete Point.

13.8 Delete Figure Graphically

Description:

This command will delete the graphic elements related to the figure as well as the annotation when the figure was originally plotted.

Coordinated information related to the description of the figure is not altered in any way.

Procedure:

1. Either keyin to the command window keyin field "**Delete Figure Graphically**" or select the pulldown **[Store/Delete]** and pick the **[Delete Figure Graphically]** command.
2. Either keyin or graphically pick from the view the figure ID's for deletion.

Input Items:

des Figure ID's for deletion.

Dialogue Box:

The Delete Figure Graphically dialogue box will appear as shown in Figure 13.13 following.

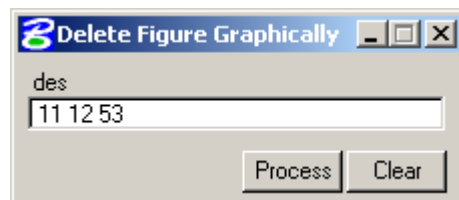


Figure 13.13: Delete Figure Graphically Dialogue Box

Example:

Description (des) 11 12 53

The figures 11, 12 and 53 will be graphically deleted, leaving the figure and coordinate files intact and unaffected.

Related Commands:

Delete Figure.

13.9 Copy

Description:

This command copies the coordinates of an existing point and stores them under a new point ID "n".

If multiple points are specified, (in round brackets "()"), the new ID's will be incremented by one from the specified new ID.

Procedure:

1. Either keyin to the command window keyin field "**Copy**" or select the pulldown [**Store/Delete**] and pick the [**Copy**] command.
2. Either keyin or graphically pick from the view the ID's "des" of the points to be copied.
3. Enter the number of the first of the new points "n".



After copying the point to the same location as the original, try using the "Move" command to relocate the point.

Input Items:

des
n

List of ID points to be copied.
ID assigned to the first of the copied points.

Dialogue Box:

The Copy dialogue box will appear as shown in Figure 13.14 following.

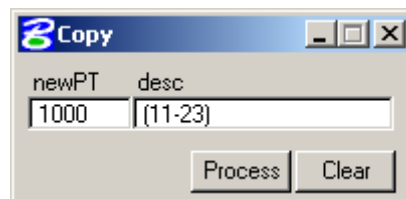


Figure 13.14: Copy Dialogue Box

Example:

Points to be copied (des) (11 23)
ID of first new point (n) 1000

Point 11 will be copied to the same location and the new point will be 1000. Point 23 will also be copied and the point assigned to it's copy will be 1001.

Related Commands:

Move, Rename.

13.10 Move

Description:

This command changes the coordinates of an existing point and updates the position of the associated text symbols and text graphically as well.

Plotting of the point in its' new location will depend on the settings of the autoplot function.

If the point is graphically displayed and the point is selected graphically the text symbol for the point may be dynamically positioned.

The original elevation is maintained if not specified in the new location coordinates.

All points specified in the description "des" will be moved according to the deltas of the first point of the description and the new coordinates of that same point. (nor, eas, /z)

Procedure:

1. Either keyin to the command window keyin field "**Cogo_Move**" or select the pulldown [**Store/Delete**] and pick the [**Move**] command.
2. Either keyin or graphically pick from the view the ID's "des" of the point(s) to be moved.
3. Either keyin or graphically pick from the view the new coordinate position. To graphically pick the location, place the cursor in the "Northing" text field of the dialogue box then pick the screen at the new location. The data may be edited before processing.

Input Items:

| | |
|-----|---|
| des | ID of previously defined points. |
| nor | Northing of new location. |
| eas | Easting of new location. |
| z | Elevation of the new point location. (optional) |

The coordinates will be for the first point of the description and the other points will be given the same x, y and z changes as the first point.

Dialogue Box:

The Move dialogue box will appear as shown in Figure 13.15 following.

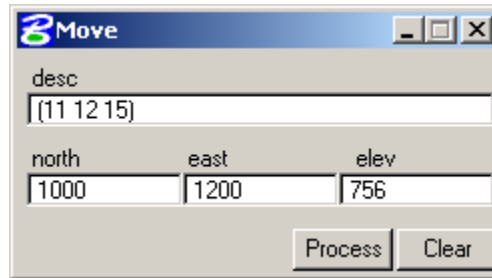


Figure 13.15: Move Dialogue Box

Example:

| | |
|-------------------|------------|
| Description (des) | (11 12 15) |
| Northing (nor) | 1000.000 |
| Easting (eas) | 1200.000 |
| Elevation (z) | 756.000 |

The points 11, 12 and 15 will be moved in relation to the change in position of point 11 as it originally exists and the new coordinate location given. This is shown in Figure 13.15 where the original and final locations are shown.

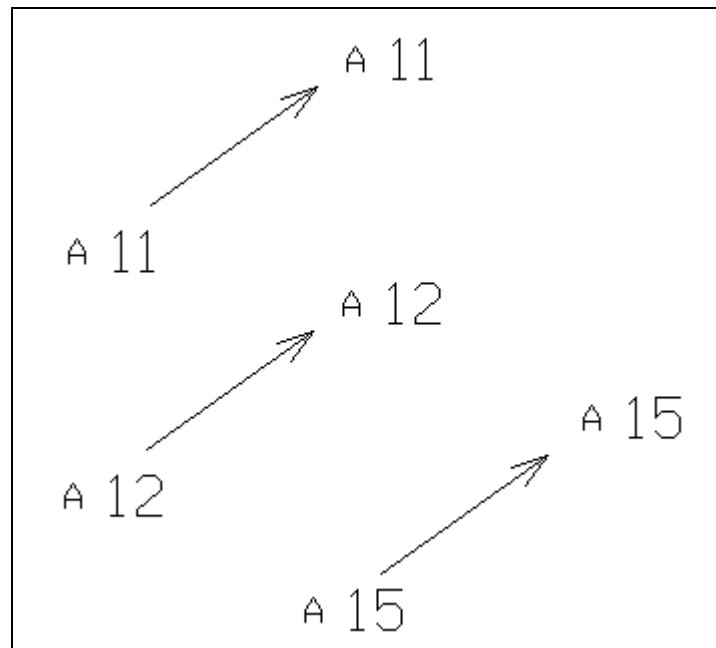


Figure 13.15: Move Example Results

Related Commands:

Copy, Rename.

13.11 Rename

Description:

This command replaces the ID of the point with a new ID as defined by the user.

The original text symbol and text will be deleted and the new symbol and ID will be plotted according to the autoplot settings.

If multiple points are specified, the ID's of these points may all be individually defined.

If more points are specified than new ID's, the points without a specified ID will be auto-incremented from the *last* specified ID.

Procedure:

1. Either keyin to the command window keyin field "**Rename**" or select the pulldown [**Store/Delete**] and pick the [**Rename**] command.
2. Either keyin or graphically pick from the view the ID's "des" of the existing point or group of points.
3. Enter the new ID's "n" in the same order as the respective point in the "des".

Input Items:

| | |
|-----|--|
| des | ID's of the existing points to be renamed. |
| n | New ID's for the respective points in "des". |

Dialogue Box:

The Rename dialogue box will appear as shown in Figure 13.16 following.

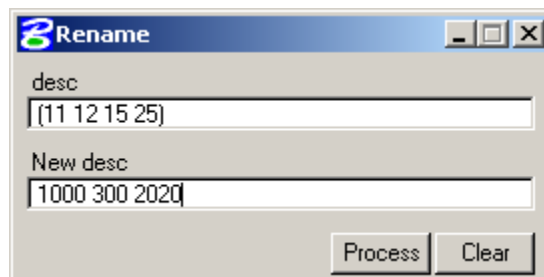


Figure 13.16: Rename Dialogue Box

Example:

| | |
|----------------------------|---------------|
| Points to be renamed (des) | (11 12 15 25) |
| New ID's (n) | 1000 300 2020 |

In this example, point 11 will be renamed 1000, 12 will be renamed 300 and 15 will be renamed 2020. As no ID has been specified for point 25, its' ID will be auto-incremented from the last specified new ID (which in this case is 2020) and therefore will be renamed 2021

Related Commands:

Copy, Move.

13.12 Extract

Description:

This command will extract the coordinates of existing graphic elements of the design file and store the coordinates in the coordinate file.

Elements on the displayed level within the fence area will be extracted.

Element types that will be extracted include lines, line strings, shapes, curves, cells, text strings and arcs.

The ID of the first point will be defined by the user "n" and subsequent point ID's will be auto-incremented from that number.

As new points are created during the process, no points within the distance "norTOL" of their location will be created. This is not the case in respect to the points previously existing within the coordinate file.

Procedure:

1. Either keyin to the command window keyin field "**Extract**" or select the pulldown [**Store/Delete**] and pick the [**Extract**] command.
2. Enter the ID "n" that will be used for the first of the points to be created in this process.
3. Enter the proximity tolerance "norTOL". (optional)
4. Place a fence around the elements you wish to extract. An error will occur if no fence present when process is clicked.

Input Items:

| | |
|--------|--|
| n | ID of first point to be created. |
| norTOL | Proximity tolerance for point creation. (optional) |

Dialogue Box:

The Extract dialogue box will appear as shown in Figure 13.17 following.

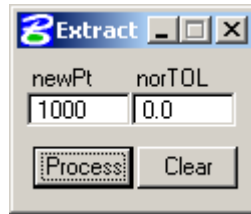


Figure 13.17: Extract Dialogue Box

Example:

First point ID (n) 1000
Tolerance (norTOL) (optional)

Figure 13.19 following shows the results of the “Extract” command on an arc, line, line string and text. The point created will be of the active feature and drawn according to the autoplot settings.

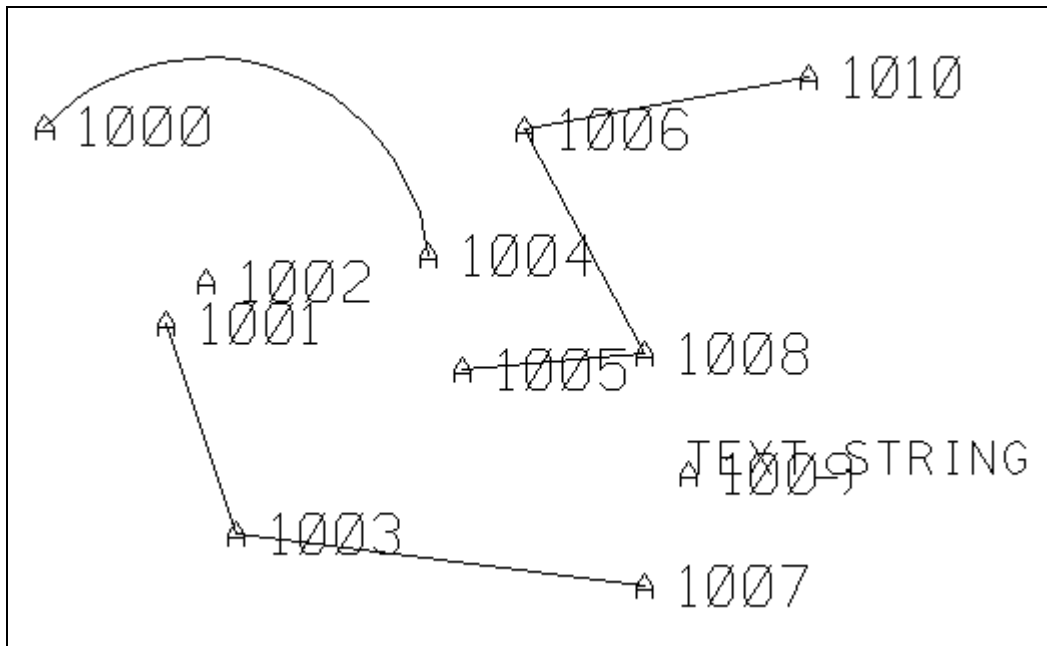


Figure 13.19: Extract Example Results



The point symbol in the above example is the letter “A”. Do not confuse this letter symbol for the point for the text ID associated with that point. Any symbol may be used as determined in the Parameter File by the user.

Related Commands:

Store Point.

13.13 Set Distance Correction

Description:

This command sets the distance correction without leaving the GWN-COGO environment.

This is a real value to adjust distances such as elevation corrections for earth curvature, etc..

Procedure:

1. Either keyin to the command window keyin field "**Set Distance Correction**" or select the pulldown [**Store/Delete**] and pick the [**Set Distance Correction**] command.
2. Enter the correction factor "disCORRECT".

Input Items:

disCORRECT Distance correction factor.

Dialogue Box:

None.

Example:

Correction Factor (disCORRECT) .99996

This correction factor might be used to correct for earth curvature at elevations above sea level.

13.14 Edit Figure Table

Description:

This command allows the user to edit the existing figure descriptions as stored in the figure table file.

Procedure:

1. Select the pulldown [**Store/Delete**] and pick the [**Edit Figure Table**] command.
2. Choose from the listbox of figure ID's and their descriptions by picking it directly with the cursor and it will appear in the text box at the bottom of the dialogue box.
3. Edit the text field to the desired description (figure number cannot be edited) then press the "**Enter**" key on the keyboard to return the new description to the list box.
4. From the "**File**" pulldown on the dialogue box, select "**Save**" before closing the box or the changes will not be made.

Input Items:

New figure description.

Dialogue Box:

The Edit Figure Table dialogue box will appear as shown in Figure 13.20.

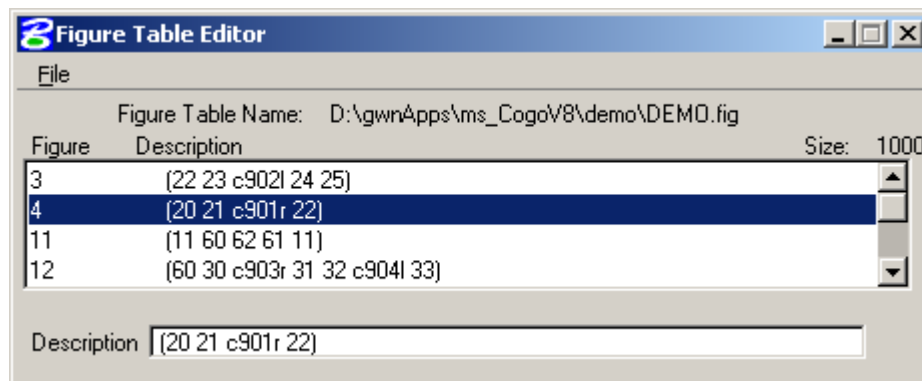


Figure 13.20: Edit Figure Table Dialogue Box

Related Commands:

None.

14.0 INTERSECT

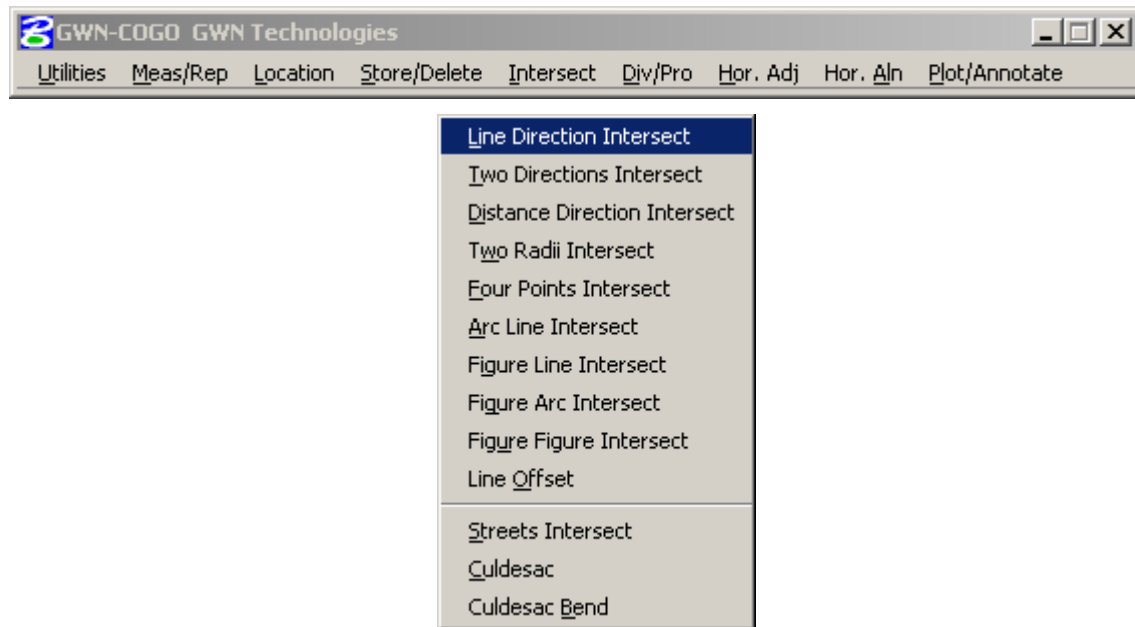


Figure 14.1: Define/Delete Pulldown Menu

This chapter deals with the commands found on the Define/Delete pulldown menu in reference format.

14.1 Line Direction Intersection

Description:

This command calculates the coordinates of point “n” as defined by the intersection of a line through points “p1” and “p2” with another line originating at point “p3” which goes in the direction “dir”.

If plot line is enabled, a line will be drawn from “p3” to the new point “n”.

Procedure:

1. Either select the **[Intersect] - [Line Direction]** on the main pulldown menu or keyin the command “**Line Direction** <cr>”.
2. Enter the ID to be assigned to the newly created point.
3. Either keyin or graphically pick from the view the ID “p1” of the first point of the defined line.
4. Either keyin or graphically pick from the view the ID “p2” of the second point defining the line.
5. Either keyin or graphically pick from the view the ID “p3” of the point from which the direction originates.
6. Either keyin or graphically pick from the view the direction “dir” from “p3” to define the intersection point.
7. Either keyin or graphically pick from the view the offset distance “disOFF1” of line one. A positive distance will offset to the right in reference to “p1” facing “p2”.
8. Either keyin or graphically pick from the view the offset distance “disOFF2” of the direction line. A positive distance will offset to the right in reference to “p3” facing the direction indicated.

Input Items:

| | |
|---------|--|
| n | Point defined by the intersection. |
| p1 | First point of the first line. |
| p2 | Second point of the first line. |
| p3 | Point of origin for the direction. |
| dir | Direction originating from “p3”. |
| disOFF1 | Offset distance of first line. |
| disOFF2 | Offset distance of the direction line. |

Dialogue Box:

The Line Direction dialogue box will appear as shown in Figure 14.2.

Figure 14.2: Line Direction Intersection Dialogue Box

Example:

| | |
|--|------|
| New ID (n) | 25 |
| End of line one (p1) | 20 |
| End of line two(p2) | 21 |
| Point of origin for the direction (p3) | 23 |
| Direction from "p3" (dir) | 110. |
| Offset of first line (disOFF1) | none |
| Offset of the direction line (disOFF2) | none |

From this input, the resulting new point will be created at the intersection of the direction originating from point 23 where it crosses the line defined by points 20 and 21 as shown in Figure 14.3 below. There does not need to be any existing co-relation between any of these points prior to this command.

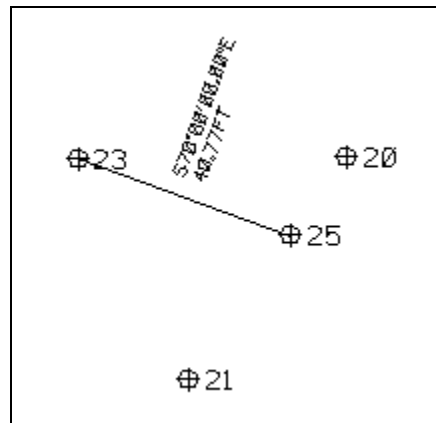


Figure 14.3: Line Direction Example Results

Related Commands:

Four Points, Distance Direction, Two Directions

14.2 Two Directions Intersection

Description:

This command calculates the coordinates of a new point “n” by the intersection of two directions “dir1” and “dir2” which originate from two existing points “p1” and “p2”.

If the plot line is enabled, a line will be drawn from “p1” to the new point “n” as well as a second line from “p2” to the new point “n”.

Procedure:

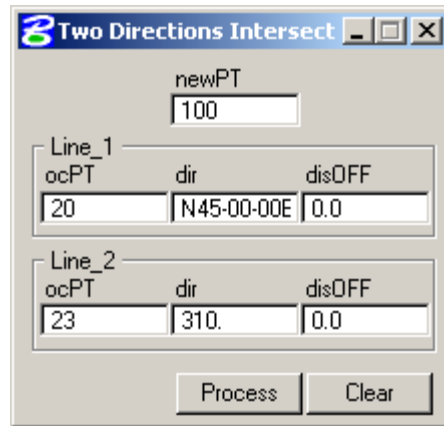
1. Either select the **[Intersect] - [Two Directions]** on the main pulldown menu or keyin the command **“Two Directions <cr>”**.
2. Enter the ID of the point to be created.
3. Either keyin or graphically pick from the view the point “p1” defining the origin of the first direction.
4. Either keyin or graphically pick from the view the direction of the line “dir1” which originates from point “p1”.
5. Either keyin or graphically pick from the view the point “p2” defining the origin of the first direction.
6. Either keyin or graphically pick from the view the direction of the line “dir2” which originates from point “p2”.
7. Either keyin or graphically pick from the view the offset distance “disOFF1” of the first direction line “disOFF1”. A positive input will offset to the right as referenced from “p1” facing in the direction “dir1”.
8. Either keyin or graphically pick from the view the offset distance “disOFF2” of the second direction line “disOFF2”. A positive input will offset to the right as referenced from “p2” facing in the direction “dir2”.

Input Items:

| | |
|---------|---|
| n | ID of the newly created point. |
| p1 | Point of origin of the first direction. |
| dir1 | Direction originating from “p1”. |
| p2 | Point of origin of the second direction. |
| dir2 | Direction originating from “p2”. |
| disOFF1 | Offset distance of the first direction line. |
| disOFF2 | Offset distance of the second direction line. |

Dialogue Box:

The Two Directions dialogue box will appear as shown in Figure 14.4.



The dialog box titled "Two Directions Intersect" contains the following fields and buttons:

- newPT**: 100
- Line_1** section:
 - ocPT**: 20
 - dir**: N45-00-00E
 - disOFF**: 0.0
- Line_2** section:
 - ocPT**: 23
 - dir**: 310.
 - disOFF**: 0.0
- Buttons**: Process, Clear

Figure 14.4: Two Directions Intersection Dialogue Box

Example:

| | |
|--|------------|
| New ID (n) | 100 |
| Start of first line (p1) | 20 |
| Direction from "p1" (dir) | N45-00-00E |
| Start of second line (p2) | 23 |
| Direction from "p2" (dir) | 310. |
| Offset of first line (disOFF1) | none |
| Offset of the direction line (disOFF2) | none |

In this example, a new point "100" will be created at the intersection of two directions which originate from points 20 and 23. If there is no intersection, a warning will be given. Figure 14.5 below illustrates the result of this input.

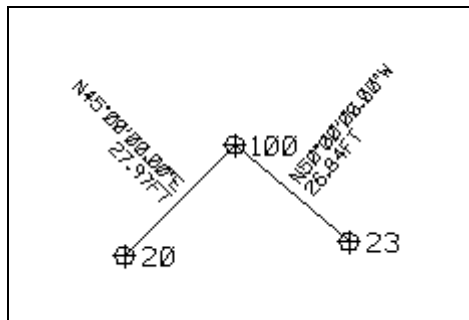


Figure 14.5: Two Directions Intersection Example Results

Related Commands:

Four Points, Distance Direction, Arc Line, Line Direction.

14.3 Distance Direction Intersection

Description:

This command calculates the coordinates of the newly created point “n” as defined by the intersection of an arc centered at “pCC” with radius “r” and a line through point “p” in a direction “dir”.

The point of intersection closest to point “pID” is picked as the intersection point where the new point will be defined.

If the plot line is enabled, a line will be drawn from “p” to the new point “n”.

Procedure:

1. Either select the **[Intersect] - [Distance Direction]** on the main pulldown menu or keyin the command “**Distance Direction <cr>**”.
2. Enter the ID of the newly created point “n”.
3. Either keyin or graphically pick from the view the point “pCC” which will define the centre of the arc.
4. Either keyin or graphically pick from the view the radius “r” of the arc.
5. Either keyin or graphically pick from the view the first point “p” defining the line of intersection.
6. Either keyin or graphically pick from the view the direction “dir” of the line of intersection.
7. Either keyin or graphically pick from the view the point “pID” nearest the intersection point to indicate which intersection point (two would be caused in this scenario otherwise) for the new point to be created.
8. Either keyin or graphically pick from the view the distance “disOFF” of offset the line indicating the intersection with the arc. A positive distance will offset to the right as referenced from point “p” facing the direction “dir”.

Input Items:

| | |
|--------|---|
| n | ID of the newly created point. |
| pCC | Point defining the arc centre. |
| r | The radius of the arc. |
| p | The point on the line of the direction. |
| dir | The direction passing through “p”. |
| disOFF | The offset distance for the direction line. |



The point “p” does not have to be outside of the radius of the arc for this command. Care should be taken in determining the best point indicating which intersection is to be used for the new point creation.

Dialogue Box:

The Distance Direction dialogue box will appear as shown in Figure 14.6.

| | |
|---------------|--------|
| newPT | |
| 100 | |
| Arc | |
| ccPT | rDIS |
| 23 | 55 |
| Line | |
| ocPT | dir |
| 17 | 80. |
| dirPT | disOFF |
| 90 | 0.0 |
| Process Clear | |

Figure 14.6: Distance Direction Intersection Dialogue Box

Example:

| | |
|---|------|
| ID of the new point (n) | 100 |
| Arc centre point (pCC) | 23 |
| Radius of Arc (r) | 55 |
| Point on the direction line (p) | 17 |
| Direction of intersecting line (dir) | 80. |
| Point indicating intersection point (pID) | 90 |
| Offset distance (disOFF) | none |

In this example, a new point “n” will be created on the side of the arc (circle) defined by its’ centre and radius using point 90. If there were no point to indicate the intersection, there would be two possible intersection points on the circle. One where it originally intersected and another where it exited the circle. This example is illustrated in Figure 14.7 following.

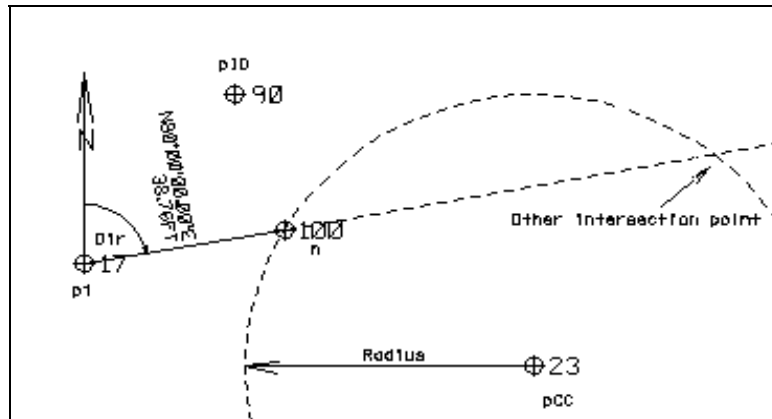


Figure 14.7: Distance Direction Intersection Example Results

Related Commands:

Two Radii, Arc Line.

14.4 Two Radii Intersection

Description:

This command calculates the coordinates of point “n” defined by the intersection of two lines of defined lengths.

The first line is centered at point “pCC1” with a length of “r1” while the second line is centered at point “pCC2” with a length of “r2”.

As there are two possible intersections for such a command, another point “pID” is required to distinguish which intersection is intended to be the one where the new point “n” is to be placed.

Procedure:

1. Either select the **[Intersect] - [Two Radii]** on the main pulldown menu or keyin the command “**Two Radii** <cr>”.
2. Enter the ID of the point to be created.
3. Either keyin or graphically pick from the view the point “pCC1” which will be the centre of the *arc* of the first distance.
4. Either keyin or graphically pick from the view the distance “r1” from the point “pCC1” where the intersection is to take place.
5. Either keyin or graphically pick from the view the point “pCC2” which will be the centre of the *arc* of the second distance.
6. Either keyin or graphically pick from the view the distance “r2” from the point “pCC2” where the intersection is to take place.
7. Either keyin or graphically pick from the view the point “pID” which is nearest the intersection intended for the creation of the new point “n”.
8. Select from the option bar (dialogue box) the direction “sign” of the offset. CW for clockwise and -CCW for counter-clockwise. (optional)

Input Items:

| | |
|------|--|
| n | ID of the newly created point. |
| pCC1 | Point from which the first distance originates. |
| r1 | Distance of intersection from point “pCC1”. |
| pCC2 | Point from which the second distance originates. |
| r2 | Distance of intersection from point “pCC2”. |
| pID | Point nearest the desired intersection. |
| Sign | Select option CW or CCW |

Dialogue Box:

The Two Radii Intersection dialogue box will appear as shown in Figure 14.8.

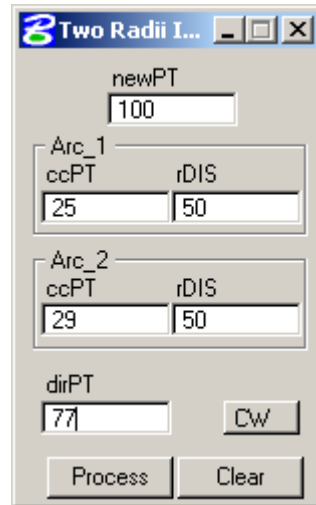


Figure 14.8: Two Radii Intersection Dialogue Box

Example:

| | |
|---|-----|
| ID of the new point (n) | 100 |
| Origin point of first line (pCC1) | 25 |
| Distance from first point (r1) | 50 |
| Origin point of second line (pCC2) | 29 |
| Distance from second point (r2) | 50 |
| Point indicating desired intersection (pID) | 77 |
| Direction of offset (sign) | CW |

Using the above data, the results are shown in Figure 14.9 below. An offset sign of -1 or CCW would result in the positioning of the new point 100 where point 101 is shown.

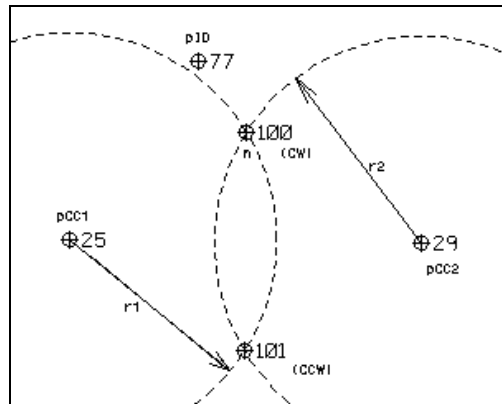


Figure 14.9: Two Radii Intersection Example Result

Related Commands:

Two Directions Intersection

14.5 Four Points Intersection

Description:

This command calculates the coordinates of a new point “n” as defined by the intersection of two lines defined by two points each (four points total).

The first line is defined by points “p1” and “p2” while the second line is defined by points “p3” and p4”.

An offset distance for the first line “disOFF1” and the second line “disOFF2” will be to the right of the line as referenced by points “p1” and “p3” facing points “p2” and “p4” respectively. A negative will offset to the left.

Procedure:

1. Either select the **[Intersect] - [Four Points]** on the main pulldown menu or keyin the command “**Four Points** <cr>”.
2. Enter the ID of the point to be created.
3. Either keyin or graphically pick from the view the point “p1” defining one end of the first line.
4. Either keyin or graphically pick from the view the point “p2” defining one end of the first line.
5. Either keyin or graphically pick from the view the point “p3” defining one end of the second line.
6. Either keyin or graphically pick from the view the point “p4” defining one end of the second line.
7. Either keyin or graphically pick from the view the offset distance “disOFF1” for the first line.
8. Either keyin or graphically pick from the view the offset distance “disOFF2” for the second line.

Input Items:

| | |
|---------|---------------------------------------|
| n | ID of the newly created point. |
| p1 | First end of the first line. |
| p2 | Second end of the first line. |
| p3 | First end of the second line. |
| p4 | Second end of the second line. |
| disOFF1 | Offset for the first line, (optional) |
| disOFF2 | Offset of the second line. (optional) |

Dialogue Box:

The Four Points dialogue box will appear as shown in Figure 14.10.

Figure 14.10: Four Points Intersection Dialogue Box

Example:

| | |
|-------------------------------------|------|
| ID of the new point (n) | 100 |
| First end of the first line (p1) | 25 |
| Second end of the first line (p2) | 26 |
| First end of the second line (p3) | 55 |
| Second end of the second line (p4) | 56 |
| Offset for first line (disOFF1) | none |
| Offset of the second line (disOFF2) | none |

In this example, the new point 100 will be created where the two lines, each defined by two points, cross. If there is no intersection, an alert box will appear. The results of the example input are shown in Figure 14.11 below.

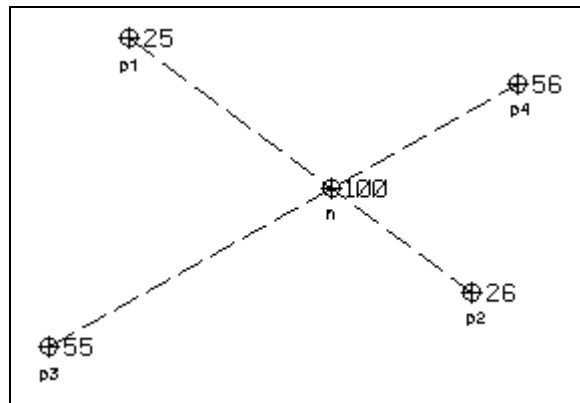


Figure 14.11: Four Points Intersection Example Results

Related Commands:

Line Direction, Direction Direction.

14.6 Arc Line Intersection

Description:

This command calculates the coordinates of the new point “n” as defined by the intersection of the circle (arc) centered at point “pCC” with a radius “r” and a line which passes through points “p1” and “p2”.

The intersection closest to point “pID” will be used to place the new point as there are two possible intersection points with this command.

Procedure:

1. Either select the **[Intersect] - [Arc Line]** on the main pulldown menu or keyin the command “**Arc Line** <cr>”.
2. Enter the ID of the newly created point “n”.
3. Either keyin or graphically pick from the view the point “pCC” defining the centre of the arc.
4. Either keyin or graphically pick from the view the radius “r” of the arc.
5. Either keyin or graphically pick from the view the starting point “p1” of the intersecting line.
6. Either keyin or graphically pick from the view the ending point “p2” of the intersecting line.
7. Either keyin or graphically pick from the view the point “pID” which will indicate which of the two intersections to be used to place the new point “n”.
8. Either keyin or graphically pick from the view the distance “disOFF” to offset the line. A positive distance will offset to the right in reference to “p1” facing “p2”.

Input Items:

| | |
|--------|---|
| n | The ID of the newly created point. |
| pCC | The centre point of the arc. |
| r | The radius of the arc. |
| p1 | The first point of the line. |
| p2 | The second point of the line. |
| pID | The point indicating the proper intersection. |
| disOFF | The offset of the line. (optional) |

Dialogue Box:

The Arc Line dialogue box will appear as shown in Figure 14.12.

Figure 14.12: Arc Line Intersection Dialogue Box

Example:

| | |
|--|------|
| ID of the new point (n) | 100 |
| Arc centre point (pCC) | 10 |
| Radius of arc (n) | 65 |
| Start point of the line (p1) | 15 |
| End point of the line (p2) | 16 |
| Point defining the proper intersection (pID) | 99 |
| Distance to offset the new point (disOFF) | none |

This data results in the placement of point 100 as illustrated below in Figure 14.13.

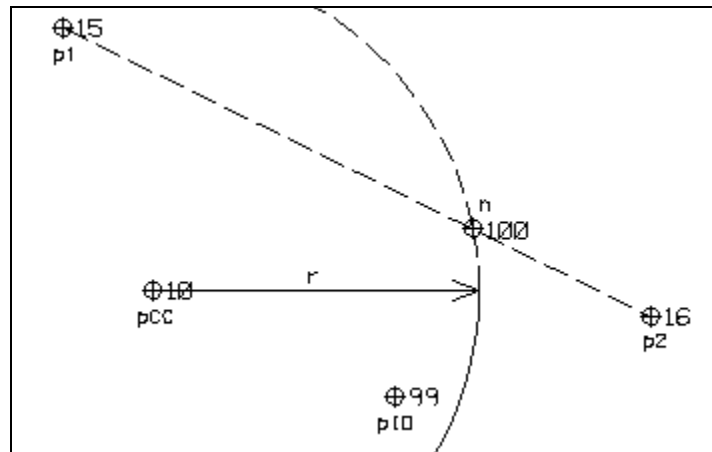


Figure 14.13: Arc Line Intersection Example Results

Related Commands:

14.7 Figure Line Intersection

Description:

This command calculates the coordinates of point “n” as defined by the intersection of the figure “des” and a line originating from point “p” in the direction “dir”.

As two possible intersections (or more) are possible for the figure intersection, a point “pID” is required to define whether it is the nearest or farthest intersection point that is desired using the switch “sign”.

An offset distance from the specified figure “disOFG” and from the specified line “disOLN” may be input.

If there is no intersection found, the line segments closest or farthest to point “pID” will be extended to form an intersection.

Procedure:

1. Either select the **[Intersect] - [Figure Line]** on the main pulldown menu or keyin the command “**Figure Line** <cr>”.
2. Enter the ID of the newly created point “n”.
3. Either keyin or graphically pick from the view the figure description “des” for the intersection.
4. Either keyin or graphically pick from the view the point “p” defining the origin of the direction line used to find the intersection.
5. Either keyin or graphically pick from the view the direction “dir” of the intersecting line which originates at point “p”.
6. Either keyin or graphically pick from the view the point “pID” used to determine the intersection to be used for the placement of the new point “n”. Near or Far from the “pID” is determined in step 9.
7. Either keyin or graphically pick from the view the offset distance “disOFG” from the figure along the direction line from point “p”. A positive input will offset to the right relative to the order of the points. (optional)
8. Either keyin or graphically pick from the view the offset distance “disOLN” from the line. A positive input will offset to the right relative to the first point and facing the direction indicated. (optional)
9. Indicate whether to use the near or far intersection with point “pID” of the intersection point.

Input Items:

| | |
|--------|---|
| n | ID of the newly created point. |
| des | Description of the figure to intersect. |
| p | Point defining the origin of the intersecting line. |
| dir | Direction of the intersecting line originating at point "p". |
| pID | ID of the point used to determine the proper intersection to use. |
| disOFG | Offset distance from the figure. (optional) |
| disOLN | Offset distance from the line. (optional) |
| sign | Switch used to indicate if the intersection is near/far from "pID". |

Dialogue Box:

The Figure Line dialogue box will appear as shown in Figure 14.14.

Figure 14.14: Figure Line Intersection Dialogue Box

Example:

| | |
|--|--------------------------|
| New point ID (n) | 100 |
| Figure to intersect (des) | (20 23 25 22 21 19 20) |
| Point at beginning of line (p) | 50 |
| Direction from line to intersection (dir) | 270. |
| Point on figure nearest intersection (pID) | 21 |
| Offset distance from figure (disOFG) | 10 |
| Offset distance from line (disOLN) | none |
| Intersection direction (sign) | 1 (Near on dialogue box) |

This example as shown in Figure 14.15 below, uses an offset of 10 units from the figure to illustrate the difference such an input could make. Point 101 will show where the point would have fallen without an offset and point 102 shows where a negative 10 unit offset would fall.

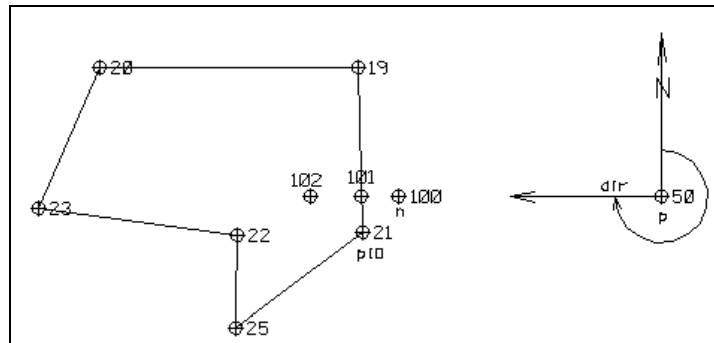


Figure 14.15: Figure Line Intersection Example Results

Related Commands:

Figure Figure, Figure Arc.

14.8 Figure Arc Intersection

Description:

This command calculates the coordinates of a new point “n” as defined by the intersection of the figure “des” with an arc based on a radius “r” and the centre of the arc at point “pCC”.

As there are at least two possible intersection points possible with this command, a point “pID” is necessary to determine which intersection is the intended target for the new point “n”. Also, the nearest or farthest intersection could be used by indicating with the switch “sign” using 1 (near) for the nearest intersection and -1 (far) for the farthest.

An offset from the projected intersection is possible using “disOFF” as an option. A positive input will offset to the right of the figure relative to the order of the points in the description. A negative input will do the opposite.

If no actual intersection exists, the intersection of the projection of the closest/farthest line of the figure “des” and the arc to the point “pID” will be calculated.

Procedure:

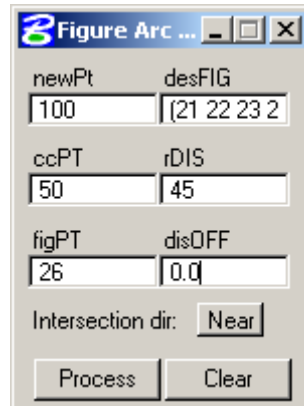
1. Either select the **[Intersect] - [Figure Arc]** on the main pulldown menu or keyin the command “**Figure Line** <cr>”.
2. Enter the ID of the newly created point “n”.
3. Either keyin or graphically pick from the view the figure “des” to be intersected with.
4. Either keyin or graphically pick from the view the centre point “pCC” of the arc.
5. Either keyin or graphically pick from the view the radius “r” of the arc.
6. Either keyin or graphically pick from the view the point “pID” used to define which intersection is the desired one.
7. Either keyin or graphically pick from the view the offset “disOFF” of the point.
8. Either keyin or graphically pick from the view the switch “sign” used to determine whether the point will be created at the nearest or farthest possible intersection from the point “pID”.

Input Items:

| | |
|--------|--|
| n | ID of the newly created point. |
| des | Figure to intersect with. |
| pCC | Centre point of the arc. |
| r | Radius of the arc. |
| pID | The ID of a point nearest/farthest from the intersection. |
| disOFF | The offset distance from the determined intersection. |
| sign | The switch for using the nearest or farthest intersection point. |

Dialogue Box:

The Figure Arc dialogue box will appear as shown in Figure 14.16.



The dialogue box titled "Figure Arc ..." contains the following fields and buttons:

| | |
|---|-------------|
| newPt | desFIG |
| 100 | (21 22 23 2 |
| ccPT | rDIS |
| 50 | 45 |
| figPT | disOFF |
| 26 | 0.0 |
| Intersection dir: <input type="button" value="Near"/> | |
| <input type="button" value="Process"/> <input type="button" value="Clear"/> | |

Figure 14.16: Figure Arc Intersection Dialogue Box

Example:

| | |
|---|---------------------|
| ID of the new point (n) | 100 |
| Figure to intersect (des) | (21 22 23 24 25 26) |
| Centre point of the arc (pCC) | 50 |
| Radius of the arc (r) | 45 |
| ID of point near intersection (pID) | 26 |
| Offset to intersection (disOFF) | none |
| Intersection direction(sign) (near/far) | NEAR |

This input creates the point 100 at the nearest intersection to the "pID" point. Point 101 shows the same input with a sign set to "Far". Point 102 illustrates "Far" with an offset of +10. Figure 14.17 below illustrates these inputs.

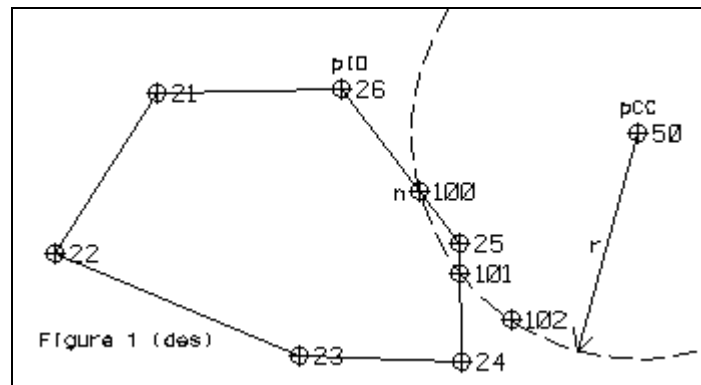


Figure 14.17: Figure Arc Intersection Example Results

Related Commands:

Figure Line.

14.9 Figure Figure Intersection

Description:

This command calculates the coordinates of point “n” as defined by the intersection of figure 1 “des” and figure 2 “des”.

As more than one point of intersection may be possible, a point “pID” is required to indicate whether to use the nearest or farthest intersection point as the target for the new point. The switch “sign” is used to indicate the use of the nearest or farthest point.

An offset along figure 1 and 2 is possible using “disOFF1” and “disOFF2” respectively. A positive input offsets to the right based on the order of points in the description and a negative input does the opposite.

If no actual intersection is found, the intersection of the projection of the closest (or farthest as per the switch “sign”) line of the figure 1 “des” and the projection of the closest (or farthest as per the switch “sign”) line on figure 2 in respect to the point “dID” will be used.

Spiral intersections are not supported.

Procedure:

1. Either select the **[Intersect] - [Figure Figure]** on the main pulldown menu or keyin the command **“Figure Figure <cr>”**.
2. Enter the ID for the new point “n”.
3. Either keyin or graphically pick from the view the figure 1 description “des”.
4. Either keyin or graphically pick from the view the figure 2 description “des”.
5. Either keyin or graphically pick from the view the point “pID” to be used in combination to the switch “sign” to determine the intersection to be used.
6. Either keyin or graphically pick from the view the offset “disOFF1” for the first figure.
7. Either keyin or graphically pick from the view the offset “disOFF2” for the second figure.
8. Use option bar with Near and Far indicators in relation to the intersection desired and the point “pID”.

Input Items:

| | |
|---------|---|
| n | ID of the new point to be created. |
| des | Description of the first figure. |
| des | Description of the second figure. |
| pID | Point to use to determine the intersection desired. |
| disOFF1 | Offset distance from figure 1. |
| disOFF2 | Offset distance from figure 2. |
| sign | Switch indicating the nearest or farthest intersection point. |

Dialogue Box:

The Figure Figure dialogue box will appear as shown in Figure 14.18.

The switch for 1 and -1 is the option bar with the Near (default) or Far indicators.

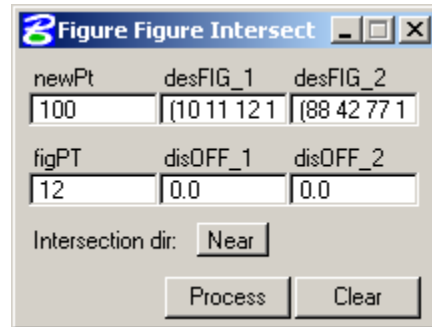


Figure 14.18: Figure Figure Intersection Dialogue Box

Example:

| | |
|---|---------------------|
| ID of the new point (n) | 100 |
| Figure 1 (des) | (10 11 12 13 14 15) |
| Figure 2 (des) | (88 42 77 16) |
| Nearest figure intersection point (pID) | 12 |
| Offset from figure 1 (disOFF1) | none |
| Offset from figure 2 (disOFF2) | none |
| Intersection direction | NEAR |

This example shows the use of two figures that do not intersect. The line which is projected is the closest which may be used to create an intersection point to the point "pID". The results are shown in Figure 14.19 below.

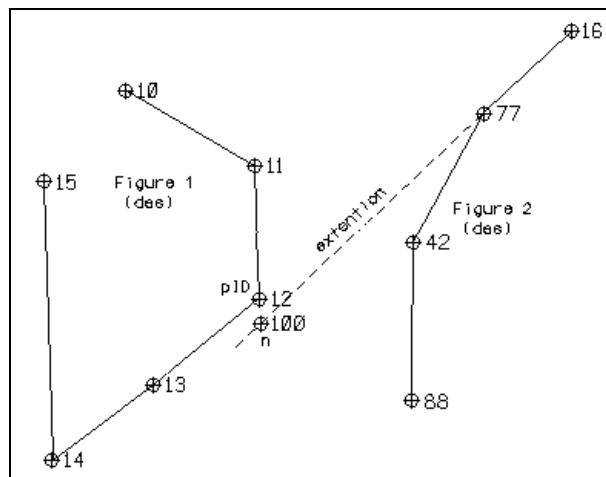


Figure 14.19: Figure Figure Intersection Example Results

Related Commands:

Figure Arc, Figure Line.

14.10 Line Offset Intersection

Description:

This command calculates the coordinates of point “n” defined by the intersection of the line through “p1” and “p2” with the perpendicular line through point “pOF”.

If the plot line is enabled, a line will be drawn from “pOF” to “n”.

Procedure:

1. Either select the **[Intersect] - [Line Offset]** on the main pulldown menu or keyin the command “**Line Offset** <cr>”.
2. Enter the ID for the new point “n”.
3. Either keyin or graphically pick from the view the point “pOF” defining the perpendicular line.
4. Either keyin or graphically pick from the view the point “p1” defining one end of the line.
5. Either keyin or graphically pick from the view the point “p2” defining the other end of the line.

Input Items:

| | |
|-----|--|
| n | ID of the new point to be created. |
| pOF | Point defining the perpendicular line. |
| p1 | First point defining the line. |
| p2 | Second point defining the line. |

Dialogue Box:

The Line Offset dialogue box will appear as shown in Figure 14.20.



The image shows a software dialog box titled "Line Offset". It contains two main input sections. The first section has labels "newPT" and "pOFF" above input fields containing the values "100" and "12" respectively. The second section is titled "Line" and contains labels "ocPT" and "fsPT" above input fields containing the values "20" and "21" respectively. At the bottom of the dialog box are two buttons labeled "Process" and "Clear".

Figure 14.20: Line Offset Intersection Dialogue Box

Example:

| | |
|---|-----|
| ID of the point to create (n) | 100 |
| Point defining perpendicular line (pOF) | 12 |

| | |
|---------------------------------|----|
| First point defining line (p1) | 20 |
| Second point defining line (p2) | 21 |

This input will create a point 100 in line with the points 20 and 21 at a position perpendicular to that line and point 12 position. This example demonstrates that the new point does not have to be between the two points defining the line but in fact the points only define the line plane and not the limits of the line. This is shown in Figure 14.21 below.

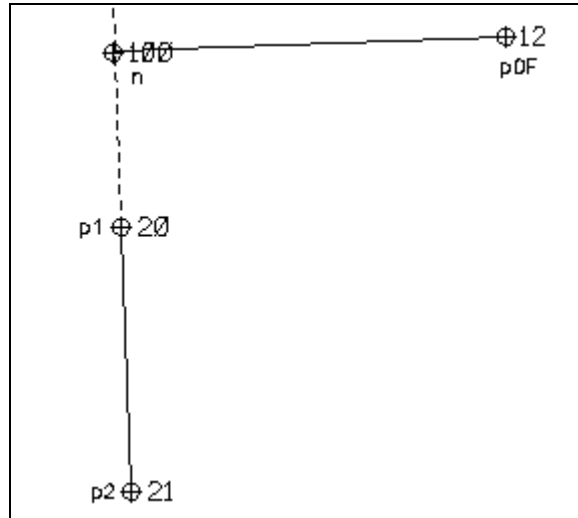


Figure 14.21: Line Offset Example Results

Related Commands:

Four Points Intersect.

14.11 Streets Intersect

Description:

This command calculates the coordinates of a new point “n” as defined by the intersection of alignment 1 “des” with a road width “dis” and alignment 2 “des” with a road width “dis” closest (or farthest as per the switch “sign” setting) to the point “pID”.

If a radius is specified, the intersection return curves are calculated for the specified quadrants (RR, RL, LR, LL)

Point ID's must be explicitly specified.

Dots “.” mean that no calculations are to be done in that quadrant.

You may define one or both alignments as the street edge by setting the street width to zero.

Procedure:

1. Either select the [Intersect] - [Streets Intersect] on the main pulldown menu or keyin the command “**Streets Intersect** <cr>”.
2. Either keyin or graphically pick from the view the figure or group of points describing the alignment 1 “des”.
3. Either keyin or graphically pick from the view the road width “dis” of alignment 1.
4. Either keyin or graphically pick from the view the figure or group of points describing the alignment 2 “des”.
5. Either keyin or graphically pick from the view the road width “dis” of alignment 2.
6. Either keyin or graphically pick from the view the point “pID” near the intersection.
7. Keyin the point ID “n” of the intersection.
8. Keyin the point ID “n” of the centre of the return curve RR.
9. Keyin the point ID “n” of the centre of the return curve RL.
10. Keyin the point ID “n” of the centre of the return curve LR.
11. Keyin the point ID “n” of the centre of the return curve LL.
12. Select the “sign” (Near) for the nearest or (Far) for the farthest intersection from point “pID”. (optional)
13. Either keyin or graphically pick from the view the radius “r” of the return curves. (optional)

Input Items:

| | |
|------|---|
| des | Figure or group of points describing alignment. |
| dis | Road width of alignment 1. |
| des | Figure or group of points describing alignment 2. |
| dis | Road width of alignment 2. |
| pID | ID of a point near the intersection. |
| n | ID of the point of intersection. |
| n | ID of the centre of the return curve RR. |
| n | ID of the centre of the return curve RL. |
| n | ID of the centre of the return curve LR. |
| n | ID of the centre of the return curve LL. |
| sign | Near/Far switch. (optional) |
| r | Radius of return curves. (optional) |

Dialogue Box:

The Streets dialogue box will appear as shown in Figure 14.22.

Figure 14.22: Streets Intersection Dialogue Box

Example:

| | |
|---|------------|
| Description of alignment 1 (des) | (1 2 3 4) |
| Road width of alignment 1 (dis) | 35 |
| Description of alignment 2 (des) | (10 11 12) |
| Road width of alignment 2 (dis) | 35 |
| ID of point near intersection (pID) | 11 |
| ID of the intersection point (n) | 100 |
| ID of the centre of return curve RR (n) | 101 |
| ID of the centre of return curve RL (n) | 104 |
| ID of the centre of return curve LR (n) | 107 |
| ID of the centre of return curve LL (n) | 110 |
| Intersection direction | NEAR |
| Radius of return curve (r) | 35 |

This example will place the point 100 at the middle of the intersection. Note that the return curve points are at least three numbers apart to prevent duplicating the point numbers placed at the end of the curves drawn. The results of this example are shown in Figure 14.23 below.

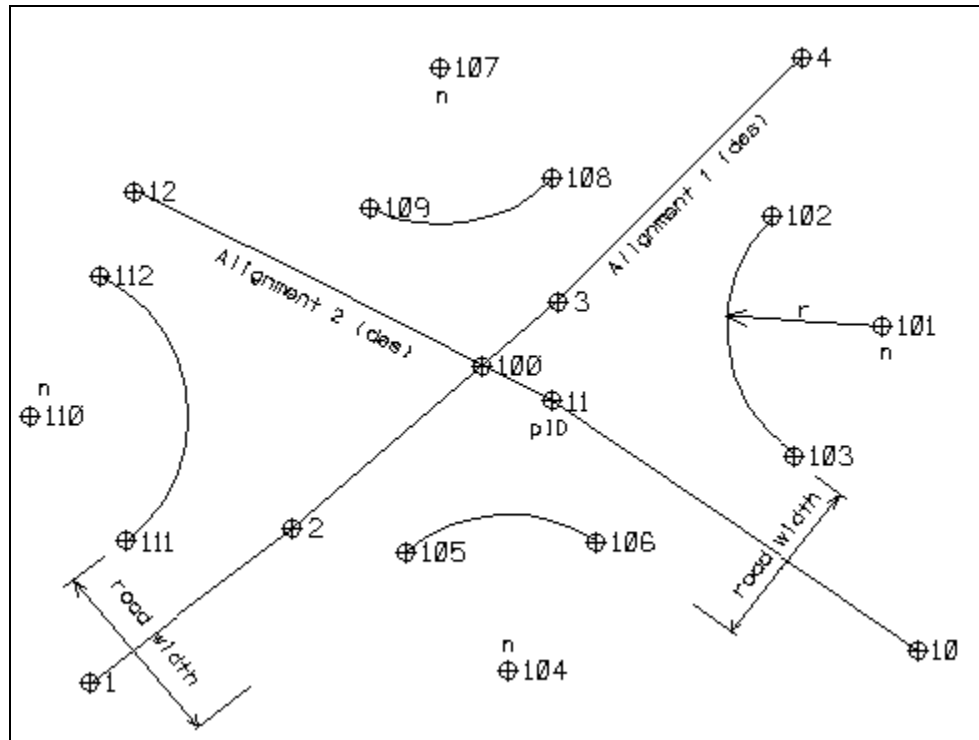


Figure 14.23: Streets Intersection Example Intersect

If the radius of the return curve was left blank (not "0.0"), the points 101, 104, 107 and 110 would be placed at the intersection points of the road widths as in the corners of a rectangle, each side a road width.

Related Commands:

Culdesac, Culdesac Bend.

14.12 Culdesac

Description:

This command defines a cul-de-sac with a radius “rCC”, a road width of “dis” and a direction of “dir” from point “p”.

An offset “disOFF” to place the new point “n” from point “p” is optional. A positive input offsets to the right of point “p” relative to the road entrance facing the point “p”.

Coordinates for CC, BC and EC of the return curves to fit the road width “dis” and radius “r1” and “r2” (optional) are calculated by auto-incrementing from the point “n”.

Procedure:

1. Either select the **[Intersect]** - **[Culdesac]** on the main pulldown menu or keyin the command “**Culdesac** <cr>”.
2. Either keyin or graphically pick from the view the point “p” from which to define the cul-de-sac.
3. Either keyin or graphically pick from the view the bearing “dir” of the line looking into the cul-de-sac.
4. Either keyin or graphically pick from the view the radius “rCS” of the cul-de-sac.
5. Either keyin or graphically pick from the view the road width “dis” at the entry to the cul-de-sac.
6. Either keyin or graphically pick from the view the radius “r1” of the return curve to the right.
7. Keyin the ID “n” of the centre of the return curve to the right.
8. Either keyin or graphically pick from the view the radius “r2” of the return curve to the left (optional).
9. Either keyin or graphically pick from the view the offset “disOFF” from point “p” to the point “n” relative to the entrance of the cul-de-sac looking in to point “p”.

Input Items:

| | |
|--------|---|
| p | Point from which to define the cul-de-sac. |
| dir | Bearing looking into cul-de-sac from entrance. |
| rCS | Radius of the cul-de-sac. |
| dis | Road width at the entry to the cul-de-sac. |
| r1 | Radius of the return curve to the right. |
| n | ID of the centre of the return curve to the right. |
| r2 | Radius of the return curve to the left. (optional) |
| disOFF | Offset distance from point “p” to point “n”. (optional) |

Dialogue Box:

The Culdesac dialogue box will appear as shown in Figure 14.24.

| pPT | dir | rCS | dis |
|----------|------|---------|--------|
| 50 | 45. | 50 | 35 |
| right_r1 | ccPT | left_r2 | disOFF |
| 30 | 100 | default | 10 |

Process Clear

Figure 14.24: Culdesac Dialogue Box

Example:

| | |
|---|---------|
| Point from which to define the cul-de-sac (p) | 50 |
| Bearing looking into cul-de-sac (dir) | 45. |
| Radius of cul-de-sac (rCS) | 50 |
| Road width at cul-de-sac entry (dis) | 35 |
| Radius or return curve right (r1) | 30 |
| ID of centre of return curve right (n) | 100 |
| Radius of return curve left (r2) | default |
| Offset of point "n" from point "p" (disOFF) | 10 |

This example shows a cul-de-sac related to the point 50 in an orientation of 45 degrees from North (looking into the cul-de-sac). An offset of 10 units has been added to the input to illustrate the output of such data. The curve left will be the same as the curve right. This is shown in Figure 14.25 below.

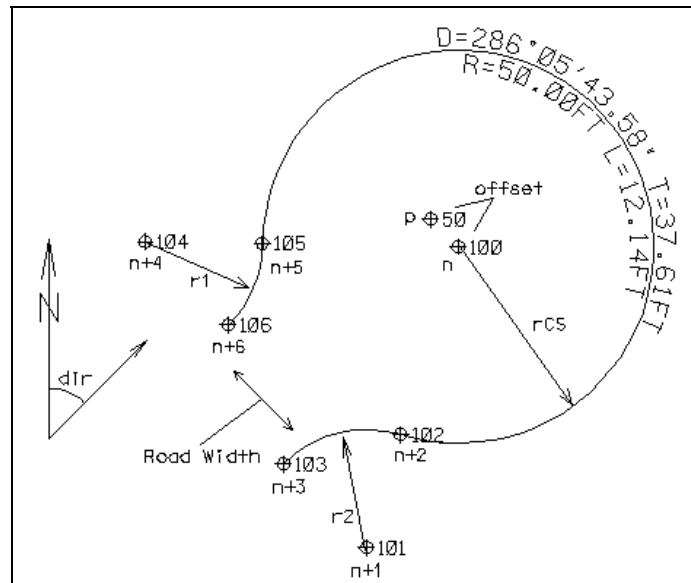


Figure 14.25: Culdesac Example Results

Related Commands:

Culdesac Bend, Streets Intersect.

14.13 Culdesac Bend

Description:

This command defines a cul-de-sac to the right of a bend in a road with; a road width of "dis1" and a direction "dir1" into the bend, a road width of "dis2" and a direction "dir2" out of the bend, a radius of "rCS", a radius of return curve "r1" into the cul-de-sac and "r2" (optional) out of the cul-de-sac from point "p" at centerline intersection.

Coordinates for CC, EC and BC's of the return curves are calculated to fit road width and radii.

Auto-incrementing begins from point "n".

Procedure:

1. Either select the **[Intersect] - [Culdesac Bend]** on the main pulldown menu or keyin the command **"Culdesac Bend <cr>"**.
2. Either keyin or graphically pick from the view the point "p" on the centerline of the road which defines the centre of the cul-de-sac.
3. Either keyin or graphically pick from the view the bearing "dir1" of the line looking into the cul-de-sac.
4. Either keyin or graphically pick from the view the bearing "dir2" of the line looking out of the cul-de-sac.
5. Either keyin or graphically pick from the view the radius "rCS" of the central curve of the cul-de-sac.
6. Either keyin or graphically pick from the view the road width "dis1" at the entry to the cul-de-sac.
7. Either keyin or graphically pick from the view the road width "dis2" at the exit of the cul-de-sac.
8. Either keyin or graphically pick from the view the radius "r1" of the return curve in.
9. Key in the ID "n" of the centre of the return curve in (to be created).
10. Either keyin or graphically pick from the view the radius "r2" of the return curve out. This will duplicate the curve in if left blank. (optional)

Input Items:

| | |
|------|---|
| p | Point on centerline at center of the cul-de-sac. |
| dir1 | Bearing of the line looking into the cul-de-sac. |
| dir2 | Bearing of the line looking out of the cul-de-sac. |
| rCS | Radius of the main central curve of the cul-de-sac. |
| dis1 | Road width at entrance. |
| dis2 | Road width at exit. |

| | |
|----|---|
| r1 | Radius of return curve at entrance. |
| n | ID to assign to centre of return curve at entrance. |
| r2 | Radius of return curve at exit. (optional) |

Dialogue Box:

The Culdesac Bend dialogue box will appear as shown in Figure 14.26.

Figure 14.26: Culdesac Bend Dialogue Box

Example:

| | |
|--|--------------------|
| Centerline point (p) | 21 |
| Bearing looking into cul-de-sac (dir1) | A 20 21 |
| Bearing looking out of cul-de-sac (dir2) | A 21 22 |
| Radius of central curve (rCS) | 45 |
| Road width at entry to cul-de-sac (dis1) | 25 |
| Road width at exit to cul-de-sac (dir2) | 25 |
| Radius of return curve in (r1) | 10 |
| ID assigned to centre of return curve in | 100 |
| Radius of return curve out (r2) | default (optional) |

This example uses graphic selection for the bearings of entry and exit from the cul-de-sac. The return curve out uses the default value of the return curve in if left blank. The results are demonstrated in Figure 14.27 below.

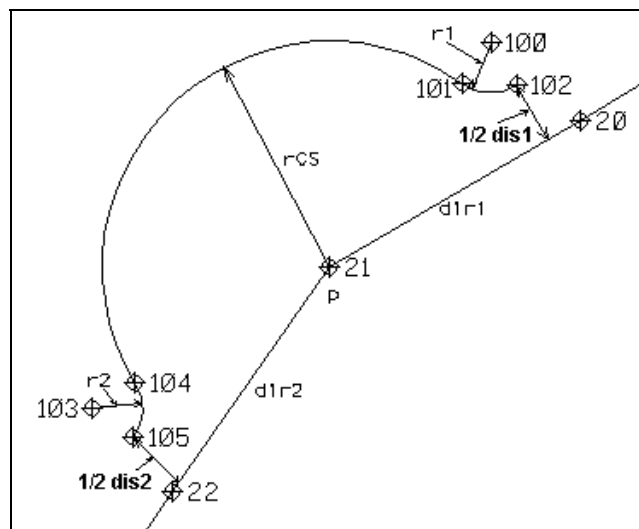


Figure 14.27: Culdesac Bend Example Results

Only the center line and cul-de-sac curve are shown here and as a result, only 1/2 the road width is indicated. Also, note that the road center line does not need to be "bent" as shown as this function would work exactly the same on a straight section.

Related Commands

- Culdesac, Streets Intersect

15.0 DIVIDE / PROPORTION

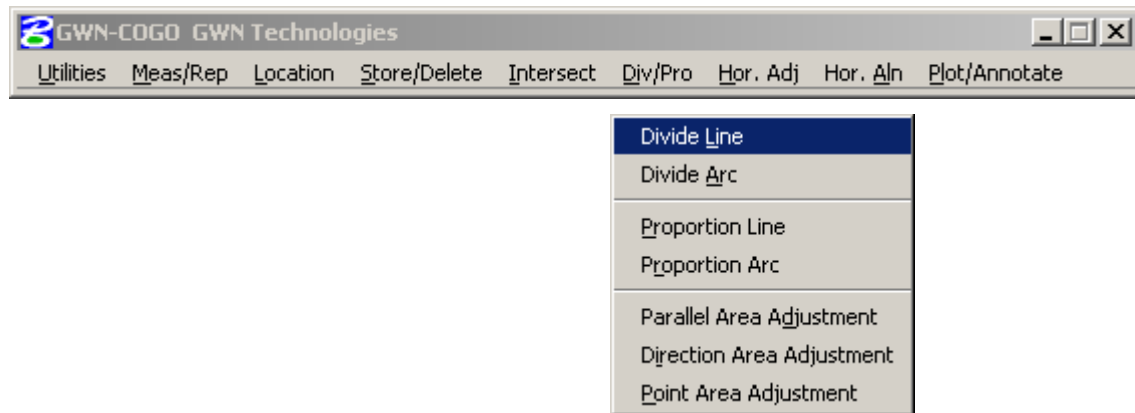


Figure 15.1: Divide/Proportion Pulldown Menu

This chapter deals with the commands found on the Divide/Proportion (Div/Pro) pulldown menu, as shown in Figure 15.1 above, in reference format.

15.1 Divide Line

Description:

This command divides the straight line distance between points “p1” and “p2” into a number of equal sections (divisions).

The point ID's for the intermediate points begin with the ID given “n” and increase by one until the last intermediate point is given the ID of “n+(div-2)”. e.g.: 6 divisions starting with the ID 10; $10+(6-2) = 14$ (last ID assigned)

If “n” is omitted, the intermediate points are defined by incrementing the last point ID by one, if possible.

If plot line is enabled, a line will be placed for each division “div” according to the appropriate ID's.

Procedure:

1. Either select the [Div/Pro] - [Divide Line] on the main pulldown menu or keyin the command “**Divide Line** <cr>”.
2. Either keyin or graphically pick from the view the starting point “p1” of the line to be divided.
3. Either keyin or graphically pick from the view the ending point “p2” of the line to be divided.
4. Enter the number of divisions “div” desired.
5. Enter the ID “n” of the first point to be placed at the end of the first section (which will begin at the start point indicated in step 2).

Input Items:

| | |
|-----|-------------------------------------|
| p1 | Starting point of line for division |
| p2 | Ending point of line for division |
| div | Number of divisions |
| n | ID of first point created |

Dialogue Box:

The Divide Line dialogue box will appear as shown in Figure 15.2.

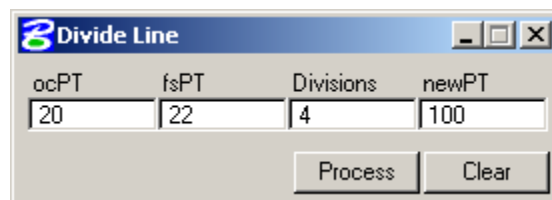


Figure 15.2: Divide Line Dialogue Box

Example:

| | |
|-------------------------------------|-----|
| Starting point ID (p1) | 20 |
| Ending point ID (p2) | 22 |
| Number of sections (div) | 4 |
| ID of first point to be created (n) | 100 |

This example input will divide the line into four equal sections and therefore will create three points starting with ID 100 at the end of the line nearest point 20. This is shown in Figure 15.3 below.

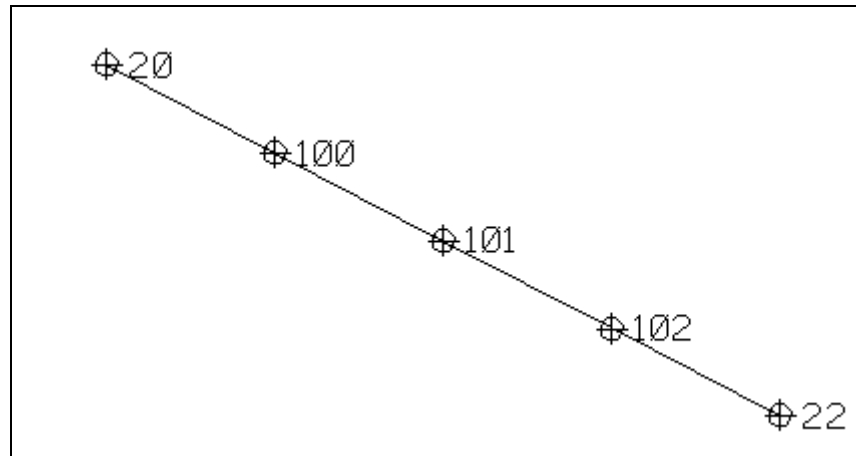


Figure 15.3: Divide Line Example Results

Related Commands:

Divide Arc, Proportion Line, Proportion Arc.

15.2 Divide Arc

Description:

This command divides an arc with its' centre at point "pCC" and ends at points "pPC" to "pPT" into equal length sections (divisions).

The first point "n" is created at the end of the first section (nearest point "pCC").

Point ID's increase by one until the last intermediate point which is given the ID as calculated by " $n + (div - 2)$ ". e.g.: First ID 10 and 4 divisions; $10 + (4 - 2) = 12$

If the point ID "n" is omitted, the intermediate points are defined by incrementing the last point ID by one, if possible

If plot line is enabled, an arc will be placed for each "div" (division) according to the appropriate ID's.

Procedure:

1. Either select the **[Div/Pro]** - **[Divide Arc]** on the main pulldown menu or keyin the command "**Divide Arc** <cr>".
2. Either keyin or graphically pick from the view the first point "pPC" known on the arc.
3. Either keyin or graphically pick from the view the last known point "pPT" on the arc.
4. Either keyin or graphically pick from the view the arc centre point "pCC".
5. Enter the number of sections "div" the arc is to be divided into.
6. Enter the ID of the first point "n" to be created. (optional)
7. Indicate either by a 1 (clockwise) or -1 (counter-clockwise) the direction "sign" of the arc. e.g.: Arc goes from pPT to pPC (CCW) or vice versa (CW).

Input Items:

| | |
|------|---|
| pPC | ID of arc's first known point |
| pPT | ID of arc's last known point |
| pCC | ID of arc's centre |
| div | Number of division to be created |
| n | ID to be assigned to the first point created (optional) |
| sign | Switch indicating direction of arc sweep (optional) |

Dialogue Box:

The Divide Arc dialogue box will appear as shown in Figure 15.4.

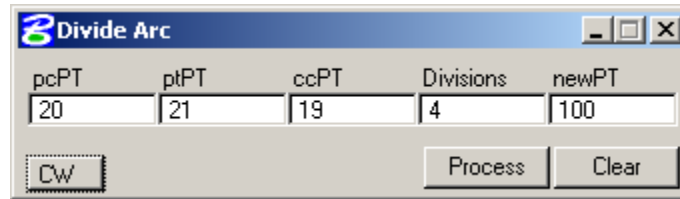


Figure 15.4: Divide Arc Dialogue Box

Example:

| | |
|------------------------------------|------------------------|
| Arc starting point (pPC) | 20 |
| Arc ending point (pPT) | 21 |
| Arc centre (pCC) | 19 |
| Number of divisions (div) | 4 |
| ID of first point created (n) | 100 |
| Switch indicating arc sweep (sign) | 1 (CW on dialogue box) |

This example will divide an arc into four equal parts and create three points starting with the ID 100. The results are shown below in Figure 15.5.

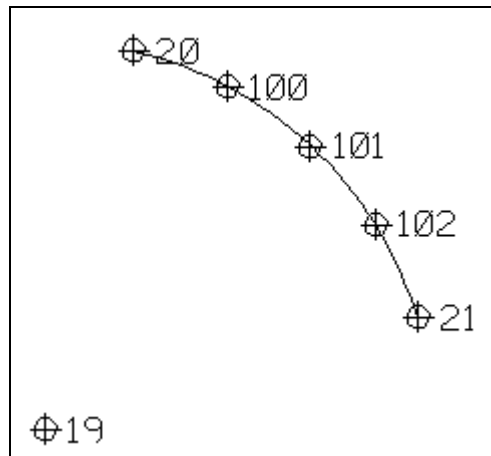


Figure 15.5: Divide Arc Example Results

Related Commands:

Divide Line, Proportion Line, Proportion Arc.

15.3 Proportion Line

Description:

This command proportions a line between points “p1” and “p2” according to specified distances

Any error is proportioned among the specified distances according to the magnitude of the distance. e.g.: A 50 unit distance will get proportionally more error added to it than a 10 unit distance.

Distances may be specified as a constant without error added to it by prefixing the distance with the pound symbol “#”.

Intermediate point ID’s begin with “n” and increase by one until the last intermediate point is plotted.

If plot line is enabled, a line will be placed for each distance segment according to the appropriate ID.

A closure summary report will be output to the screen (as per Parameter File settings) and the user will have the option of accepting or rejecting the proportion command.

Procedure:

1. Either select the **[Div/Pro] - [Proportion Line]** on the main pulldown menu or keyin the command “**Proportion Line** <cr>”.
2. Either keyin or graphically pick from the view the starting point “p1” of the line to be proportioned.
3. Either keyin or graphically pick from the view the end point “p2” of the line to be proportioned.
4. Enter the ID to be assigned to the first created intermediate point “n”.
5. Enter the distances “dsd” (not graphically picked) to be used in order and enclosed in brackets.
6. Enter the ID of the second created intermediate point “n” (optional). The following created points would increment by one from this ID.
7. Either select Continue (<cr>) or Abort (Q in keyin mode) when the adjustment summary appears (if set in Parameter File) to complete or exit the Proportion Line processes.

Input Items:

| | |
|-----|-----------------------------|
| p1 | Starting point |
| p2 | End point |
| n | ID of first created point |
| dsd | Group of distances |
| n | ID of next point (optional) |

Dialogue Box:

The Proportion Line dialogue box will appear as shown in Figure 15.6. An example of the Adjustment Summary dialogue is shown in Figure 15.8.

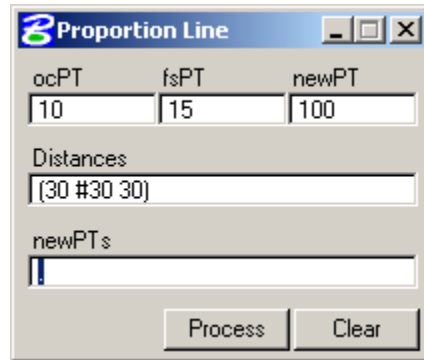


Figure 15.6: Proportion Line Dialogue Box

Example:

| | |
|--------------------------|-------------|
| Start point (p1) | 10 |
| End point (p2) | 15 |
| ID of first point (n) | 100 |
| Group of distances (dsd) | (30 #30 30) |
| ID of the next point (n) | none |

From this example input, three divisions will be created of 10 units each. As the length of the line is longer than 30 units, the first and last section will have the “error” added to them while the middle distance (with the # sign) will remain constant. This is shown in Figure 15.7 below. The summary report is shown in Figure 15.8 following.

Also shown are examples where the group of distances are each held constant and the line is longer (middle line) and shorter than the sum of the distances (bottom line). In each case, the first sections are exactly the 30 units and the last takes all the error.

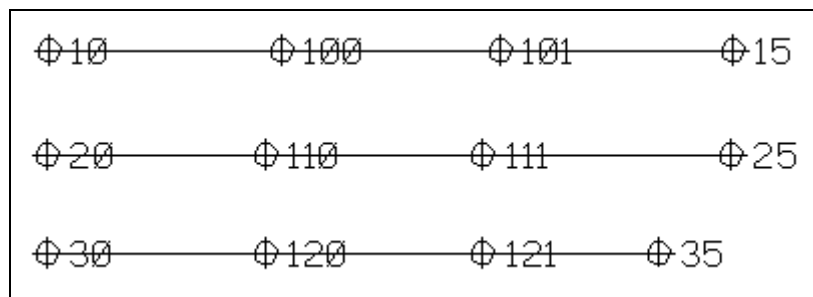


Figure 15.7: Proportion Line Example Results

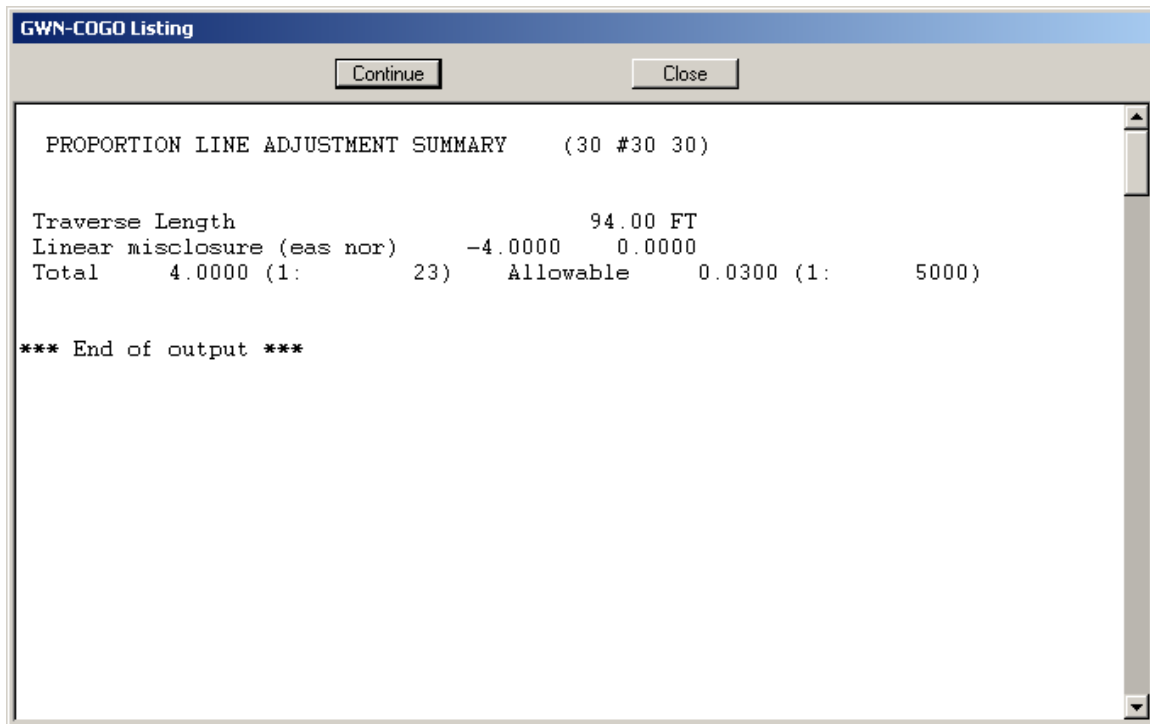


Figure 15.8: Proportion Line Adjustment Summary Dialogue Box

Related Commands:

Proportion Arc, Divide Line, Divide Arc.

15.4 Proportion Arc

Description:

This command proportions an arc with the centre point “pCC” and endpoints “pPC” and “pPT” according to distances specified by the user.

Any error between the sum of distances and length of arc are distributed proportionally between the segments according to the magnitude of each.

Constant distances may be specified with a pound sign “#” before that distance. This will be held constant and not used for error distribution.

The point ID’s for the intermediate points will begin with the point “n” and each following point will increase by one.

If the plot line is enabled, a line will be drawn along the arc through each distance segment from the start point “pPC” to the end point “pPT”.

A closure summary report will be output to the screen (according to Parameter File settings) and the user will have the option of accepting or rejecting the proportion command.

Procedure:

1. Either select the [Div/Pro] - [Proportion Arc] on the main pulldown menu or keyin the command “**Proportion Arc** <cr>”.
2. Either keyin or graphically pick from the view the start point “pPC” of the arc.
3. Either keyin or graphically pick from the view the end point “pPT” of the arc.
4. Either keyin or graphically pick from the view the arc centre point “pCC”.
5. Enter the ID of the first intermediate point “n”.
6. Enter a group of distances “dsd” (not graphically picked) in order and enclosed in brackets.
7. Enter the ID of the second intermediate point “n” from which all following points will be incremented by one.
8. Indicate the switch “sign” indicating the direction of the arc.

Input Items:

| | |
|-----|-------------------------------------|
| pPC | Arc start point |
| pPT | Arc end point |
| pCC | Arc centre point |
| n | ID of first intermediate point |
| dsd | Group of distances |
| n | ID of the second intermediate point |

sign Switch indicating direction (default is CW)

Dialogue Box:

The Proportion Arc dialogue box will appear as shown in Figure 15.9. An example of the Adjustment Summary dialogue is shown in Figure 15.11.

Figure 15.9: Proportion Arc Dialogue Box

Example:

| | |
|---|-------------------|
| Arc start point (pPC) | 10 |
| Arc end point (pPT) | 15 |
| Arc centre point (pPC) | 9 |
| ID of first intermediate point (n) | 100 |
| Group of distances (dsd) | (30 #30 30) |
| ID of second incrementing point (n) | none |
| Switch indicating direction of arc (sign) | default (CW or 1) |

The results of the example input is illustrated in Figure 15.11 below. For situations where all the distances are held constant for longer and shorter arcs, the first distances will hold the constant length but the last will take all the error. The summary report is shown in Figure 15.10. A summary report is shown in Figure 15.11.

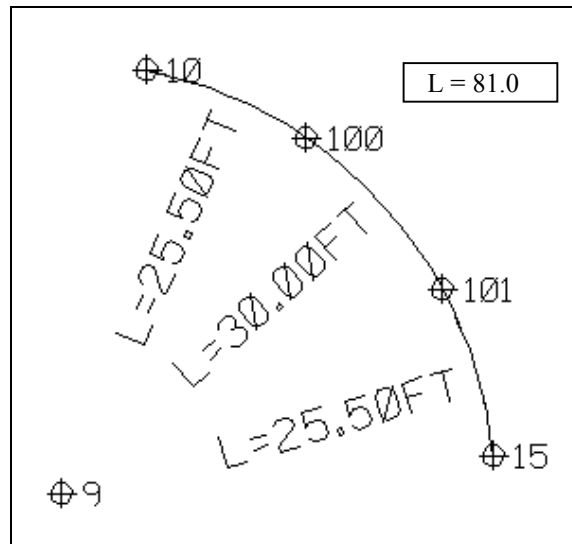


Figure 15.10: Proportion Arc Example Results

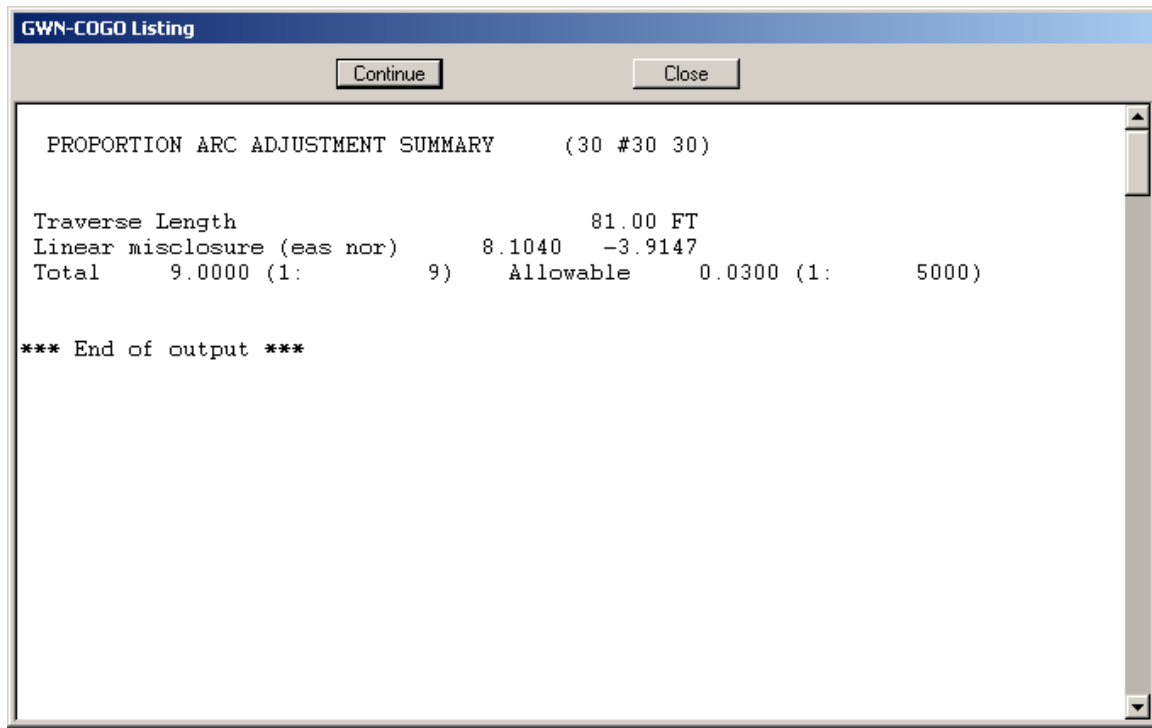


Figure 15.11: Proportion Arc Adjustment Summary Dialogue Box

Related Commands:

Proportion Line, Divide Arc, Divide Line.

15.5 Parallel Area Adjustment

Description:

This command locates points parallel to a group of points beginning with “pBEG” and ending with “pEND” in a such a way as to maintain the relative placement of the original points to one another to form a new polygon with the area “area”.

The points “pBEG” and “pEND” must be part of the polygon description “des”.

This command handles all convex shapes of polygons but does not handle imbedded curves or spirals.

If plot line is enabled, lines will be drawn to complete the new polygon.

The first point ID will be “n” and each succeeding point will be auto-incremented.

Angles of the polygon will be held constant.

Procedure:

1. Either select the [Div/Pro] - [Parallel Area Adj.] on the main pulldown menu or keyin the command “**Parallel Area Adjustment** <cr>”.
2. Enter the ID “n” of the first new point to be defined.
3. Either keyin or graphically pick from the view the figure or group of points describing “des” the polygon.
4. Enter the area “area” to be cut off.
5. Either keyin or graphically pick from the view the beginning point “pBEG” of the cut off area.
6. Either keyin or graphically pick from the view the ending point “pEND” of the cut off area.
7. Indicate the rotation desired to determine from the “pBEG” to calculate the cut off area clockwise (CW) and counter-clockwise (CCW).

Input Items:

| | |
|------|---|
| n | ID of point to be defined |
| des | Figure or group of points describing the polygon |
| area | Area to be cut off |
| pBEG | Beginning point of area |
| pEND | End point of area |
| sign | Switch indicating direction of rotation of calculation for area |

Dialogue Box:

The Parallel Area Adjustment dialogue box will appear as shown in Figure 15.12.

Figure 15.12: Parallel Area Adjustment Dialogue Box

Example:

| | |
|------------------------------|---------------------|
| ID of new point (n) | 100 |
| Description of polygon (des) | (12 11 10 15 14 13) |
| Area to cut off (area) | 2500 |
| Beginning point (pBEG) | 10 |
| Ending point (pEND) | 12 |
| Switch (sign) | CW |

The data used in this example will form a set of lines parallel to those at points 10, 11 and 12 creating new points 100, 101 and 102. This example also uses a clockwise direction for calculation of the area to determine the position of the new points (starting at point 12 “pBEG”).

If this same data were to be input with a CCW “sign”, the polygon would be drawn around the other points 12, 13 14 15 and 10, just outside their present position which would represent the 500 or so square units remaining after cutting out the 2500 square units.

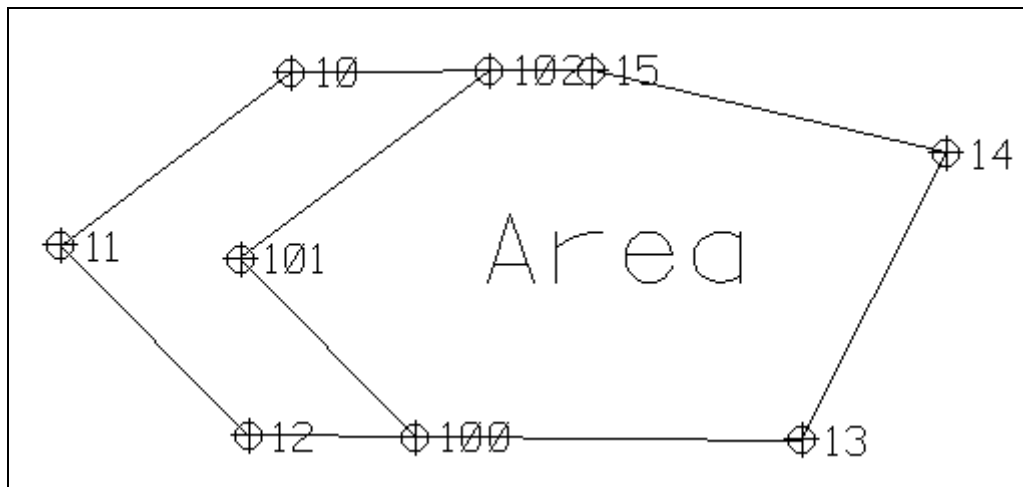


Figure 15.13: Parallel Area Example Results

Related Commands:

Point Area Adjustment, Direction Area Adjustment.

15.6 Direction Area Adjustment

Description:

This command locates the two cut off points “n” such that a new polygon with the specified direction “dir” will be generated from the polygon descriptor “des” with and area “area”.

This command handles all convex shapes of polygons but does not handle imbedded curves or spirals.

If the plot line is enabled, a line will be drawn with the two cut off points.

If an area larger than that contained within the description of the polygon, unexpected results will occur.

Procedure:

1. Either select the [Div/Pro] - [Direction Area Adj.] on the main pulldown menu or keyin the command “**Direction Area Adjustment** <cr>”.
2. Enter the ID of the first point “n” to be created.
3. Either keyin or graphically pick from the view the figure or group of points describing “des” the polygon.
4. Either keyin or graphically pick from the view the direction “dir” of the cut off line.
5. Indicate the switch “sign” determining which section will be adjusted by area.

Input Items:

| | |
|------|--|
| n | ID of first new point |
| des | Figure or group of points describing the polygon |
| area | Area desired to be cut off |
| dir | Direction of the cut off line |
| sign | Section of area desired (RHS or LHS) |

Dialogue Box:

The Direction Area Adjustment dialogue box will appear as shown in Figure 15.14.

Figure 15.14: Directional Area Adjustment Dialogue Box

Example:

| | |
|---------------------------------|---------------|
| ID of the first new point (n) | 100 |
| Figure or group of points (des) | (1 2 3 4 5 6) |
| Area to cut off (area) | 500 |
| Direction (dir) | 50. |
| Section desired (sign) | RHS |

This input is shown after processing in Figure 15.15 below.

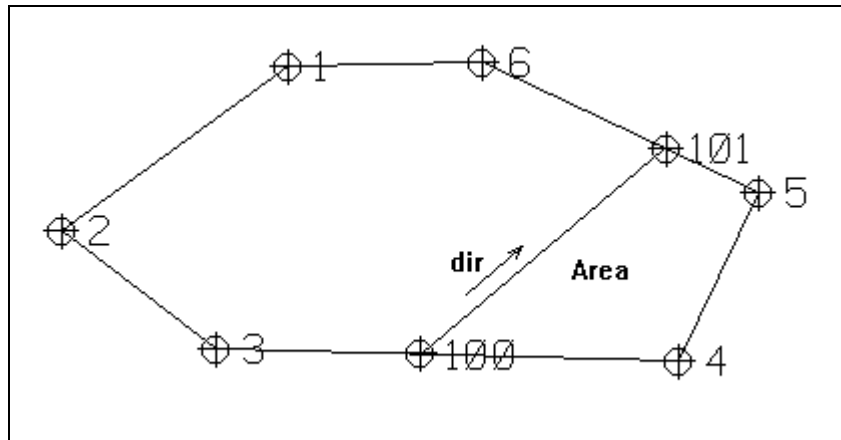


Figure 15.15: Direction Area Adjustment Example Results

Related Commands:

Parallel Area Adjustment, Point Area Adjustment.

15.7 Point Area Adjustment

Description:

This command locates the cutoff point “n” such that a new polygon will be generated from the polygon descriptor “des” with an area “area”.

The second cutoff point “pCO” must be part of the polygon description “des”.

This command handles all convex shapes of polygons but does not handle imbedded curves or spirals.

If the plot line is enabled, a line will be drawn from “pCO” to “n”.

Procedure:

1. Either select the **[Div/Pro] - [Point Area Adj.]** on the main pulldown menu or keyin the command **“Point Area Adjustment <cr>”**.
2. Enter the new ID “n” for the point to be created.
3. Either keyin or graphically pick from the view the figure or group of points describing “des” the polygon.
4. Enter the area “area” desired.
5. Either keyin or graphically pick from the view the specified cutoff point “pCO”.
6. Indicate the switch “sign” designating the rotation of the order of points to be used to calculate the new area clockwise (CW) or counter-clockwise (CCW).

Input Items:

| | |
|------|---|
| n | ID of new point |
| des | Description of figure or group of points |
| area | Area measurement |
| pCO | ID of cutoff point |
| sign | Switch indicating section desired (CW or CCW) |

Dialogue Box:

The Point Area Adjustment dialogue box will appear as shown in Figure 15.16.

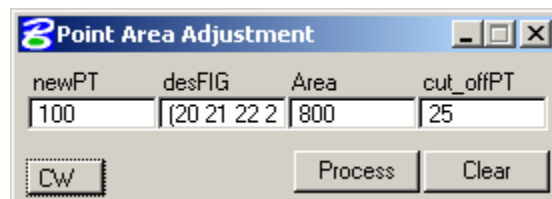


Figure 15.16: Point Area Adjustment Dialogue Box

Example:

| | |
|---------------------------------|------------------------|
| ID of new point (n) | 100 |
| Figure or group of points (des) | (20 21 22 23 24 25 20) |
| Area to cutoff (area) | 800 |
| Switch for rotation (sign) | CW |
| Specified cutoff point (pCO) | 25 |

This example adds the new point "100" and draws a new line to point "25" to contain an area of 500 square units. This is shown in figure 15.17 below. The "sign" of clockwise indicates that the new point is to be found along one of the legs of the polygon clockwise in direction from the cutoff point.

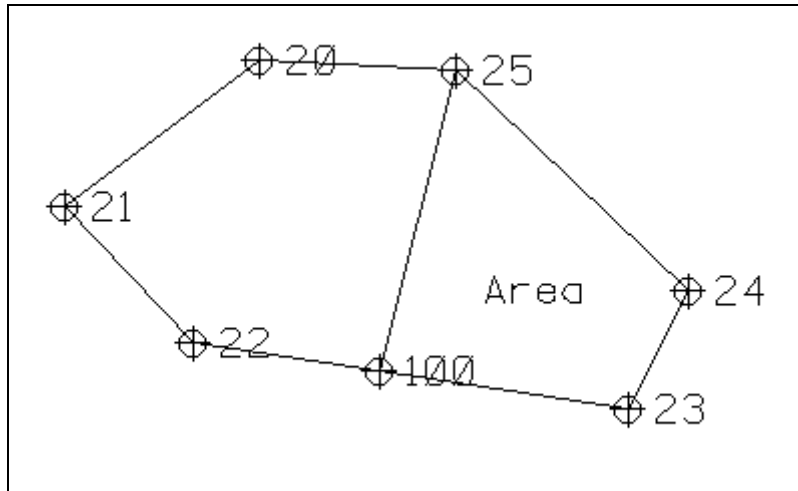


Figure 15.17: Point Area Adjustment Example Results

Related Commands:

- Parallel Area Adjustment, Direction Area Adjustment.

16.0 HORIZONTAL ADJUSTMENT

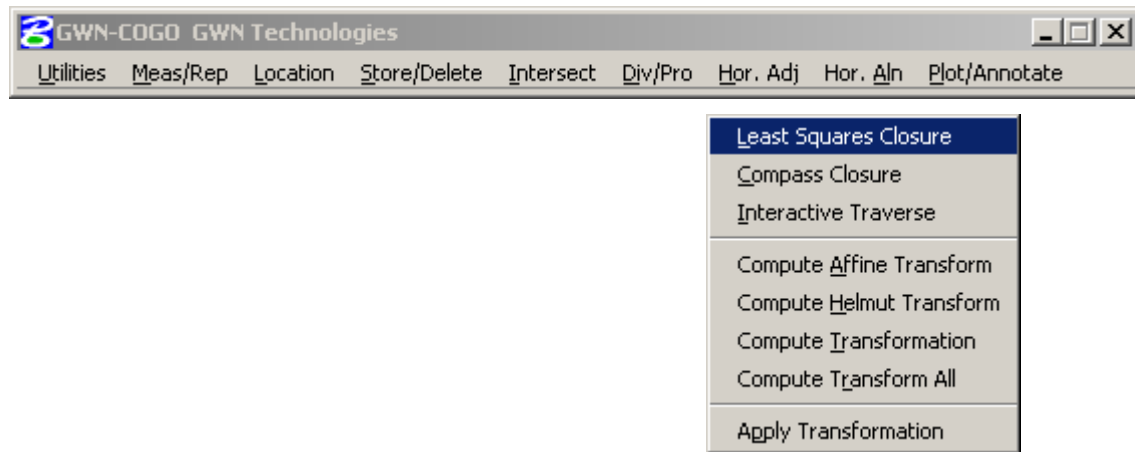


Figure 16.1: Horizontal Adjustment Pulldown Menu

This chapter deals with the commands found on the Horizontal Adjustment (Hor. Adj.) pulldown menu, as shown in Figure 16.1 above, in reference format.

16.1 Least Squares Closure

Description:

The least squares closure command adjusts or closes traverses up to 100 legs long using least squares adjustment techniques.

The command calculates the positional error between two points expected to occupy the same position. One being the closing point "pOC" describing the traverse and the other point "pFOC" as the field observation point.

The point "pFOC" is the point calculated to be the closing point based on the observations taken along the traverse and exhibits the combined errors in the difference between its' position as compared to the true position of the point "pOC".

The first two points of the description "des" are assumed to be fixed in position (Bench marks, or other unadjusted points).

The first of the points in the description "des" is the backsight point.

The closure command distributes the error among the other points of the traverse using the technique of least squares of indirect observations. All observations are assumed to be uncorrelated.

Standard deviation for observations are read from the Parameter File with default values for angles of 5 mm +/- 5 ppm for a 5 inch distance.

The maximum allowable linear closures are as set in the [Parameter File] - [Non-Feature Data] - [Tolerance Values].

The points are listed to the screen (as set in Parameter File for reporting) before adjustment. The actual closures are displayed with the summary of adjustments. At this time, the user has the option of accepting or rejecting the new adjusted traverse.



Even if the positional test is not met, the user has the option to process the traverse in case parameter tolerances were not correctly set before the traverse is processed.

If the adjustment is accepted, a corrected traverse is displayed graphically (according to autoplot settings) and the user has screen display commands available to analyze it.

If the graphic traverse is accepted, the current points are updated in the database and graphically (according to autoplot settings). The point "pFOC" will be deleted completely and thus, the original coordinates will no longer exist. Also, legal annotation cannot be placed after the traverse is adjusted.

If reasonably small corrections were made, legal distance annotation already placed should little, if any, positional or rotational modifications.

GWN-COGO protects against division by zero and integer overflow errors in traverse closure calculations. Therefore, if closure is minimal or equal to zero, an error is not generated.

The highest precision displayed is 1 in 2 billion (1 : 2,000,000,000).

The number of iterations is limited to four to limit processing time in non-converging situations.

Procedure:

1. Before execution of this command, plot out the approximate locations of the points using the suitable point plotting command such as Store Point, Locate Direction, etc..
2. Either select the **[Hor. Adj.] - [Least Squares Closure]** on the main pulldown menu or keyin the command "**Least Squares Closure** <cr>".
3. Either keyin or graphically pick from the view the description "des" using either a figure or group of points defining the traverse to be adjusted. The last point in the description "des" will be the point the traverse is adjusted around "pOC". The first point in the description "des" must be the back-sight point and the second point must be the first point of the traverse (which is also fixed). e.g.: Positioned over a Bench Mark and back-sighting on a Bench Mark.
4. Either keyin or graphically pick from the view the point "pFOC" for the last station. This is a computed location from the field observation data.
5. A report will be generated to the screen and file (if set for such in the [Parameter File] - [Output Options]) for the Traverse Directions as shown in Figure 16.2 below. Accept or Reject the output.
6. A report will be generated to the screen and a file (or as set in the [Parameter File] - [Output Options]) for the Least Squares Closure as shown in Figure 16.3 below. Accept or Reject the output.

Input Items:

des The figure / group of points defining the traverse to be adjusted.
pFOC The ID of the last station as calculated from field data.



The last point in the "des" is the "pOC" around which the traverse is adjusted. The first point in the "des" is the backsight point and the second point must be a "fixed" point.

Dialogue Box

The Least Squares Adjustment dialogue box will appear as shown in Figure 16.2 below

Figure 16.2: Least Squares Dialogue Box

Example 1:

Description of traverse (des) (BM1 BM2 TP1-TP8 BM2)
 Calculated last point of traverse (pFOC) TPX

From this input, the traverse as described will be adjusted around point BM2. This closed loop traverse is expected to close again on point BM2 and from the field observations, the location of TPX is expected to fall on the same location as BM2. This is shown in Figure 16.3 below.

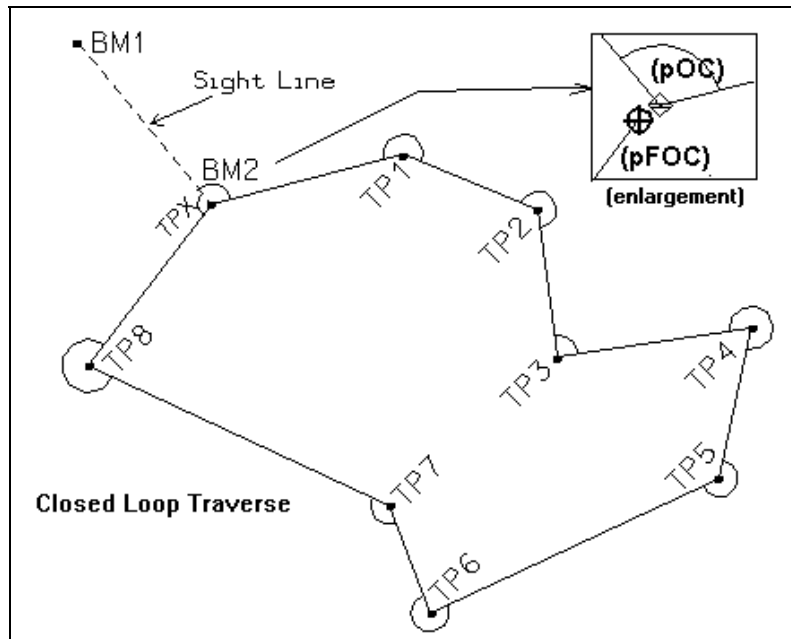


Figure 16.3: Least Squares Adjustment Example 1 Traverse

The following reports would be displayed for acceptance / rejection by the user (if set to appear on the screen from the [Parameter File] - [Output Options] settings). Figure 16.4 is the report of the traverse displaying the bearings, distances between points before adjustment.

| TRAVERSE DIRECTIONS | | (BM1 BM2 TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 BM2) | TP |
|---------------------|-----------|---|----------|
| ID | Northing | Easting Bearing | Distance |
| BM1 | 100863.20 | 100262.58 | |
| | | S39°41'05.96"E | 155.08FT |
| BM2 | 100743.86 | 100361.60 | |
| | | N75°34'01.42"E | 146.08FT |
| TP1 | 100780.26 | 100503.07 | |
| | | S67°46'44.59"E | 106.97FT |
| TP2 | 100739.81 | 100602.09 | |
| | | S07°22'47.61"E | 110.14FT |
| TP3 | 100630.58 | 100616.24 | |
| | | N81°11'09.41"E | 145.20FT |
| TP4 | 100652.83 | 100759.73 | |
| | | S12°17'50.79"W | 113.86FT |

| | | | |
|-----|-----------|----------------|----------|
| TP5 | 100541.58 | 100735.48 | |
| | | S64°57'49.91"W | 234.20FT |
| TP6 | 100442.47 | 100523.28 | |
| | | N21°01'14.06"W | 84.51FT |
| TP7 | 100521.36 | 100492.96 | |
| | | N65°06'24.49"W | 245.07FT |
| TP8 | 100624.52 | 100270.66 | |
| | | N37°18'32.02"E | 150.04FT |
| BM2 | 100743.86 | 100361.60 | |
| | | S61°39'56.73"W | 0.12FT |
| TPX | 100743.80 | 100361.50 | |

Figure 16.4: Least Squares Pre-Adjustment Report

The next report displays the results of the adjustment to the points as shown in Figure 16.5.

| LEAST SQUARES ADJUSTMENT SUMMARY | | | |
|----------------------------------|-----------|--------------------|----------|
| ID | Northing | Easting Bearing | Distance |
| BM1 | 100863.20 | 100262.58 | |
| | | S39°41'05.96"E | 155.08FT |
| BM2 | 100743.86 | 100361.60 | |
| | | N75°34'01.42"E | 146.09FT |
| TP1 | 100780.27 | 100503.08 | |
| | | S67°46'46.08"E | 106.98FT |
| TP2 | 100739.81 | 100602.11 | |
| | | S07°22'48.51"E | 110.14FT |
| TP3 | 100630.58 | 100616.26 | |
| | | N81°11'14.30"E | 145.21FT |
| TP4 | 100652.83 | 100759.76 | |
| | | S12°18'00.66"W | 113.86FT |
| TP5 | 100541.58 | 100735.50 | |
| | | S64°58'10.00"W | 234.20FT |
| TP6 | 100442.50 | 100523.30 | |
| | | N21°00'39.41"W | 84.51FT |
| TP7 | 100521.38 | 100493.00 | |
| | | N65°05'39.07"W | 245.06FT |
| TP8 | 100624.59 | 100270.73 | |
| | | N37°18'17.20"E | 149.94FT |
| BM2 | 100743.86 | 100361.60 | |

Figure 16.5: Least Squares Adjustment Report

The final screen reports on the closure error and ratio of precision of the observations. This is shown in Figure 16.6 following.

| LEAST SQUARES ADJUSTMENT SUMMARY | | | |
|----------------------------------|-------------------|--------------------|------------------|
| ID | Northing | Easting Bearing | Distance |
| Traverse Length | | 1335.88FT | |
| Linear misclosure (eas nor) | | 0.1020 | 0.0550 |
| Total | 0.1159 (1: 11527) | Allowable | 0.0300 (1: 5000) |

Figure 16.6: Least Squares Final Report

Example 2:

Traverse description (des) (BM1 BM2 TP1-TP8 BM1)
 Calculated last point of traverse (pFOC) TPY

This example is also a closed loop but does not close on the same point as it began. It also uses the end point for the backsight (not necessary) as both are fixed in position. The point TPY is the calculated position of BM1 according to field data. This traverse is adjusted around BM2 and is shown in Figure 16.7 below.

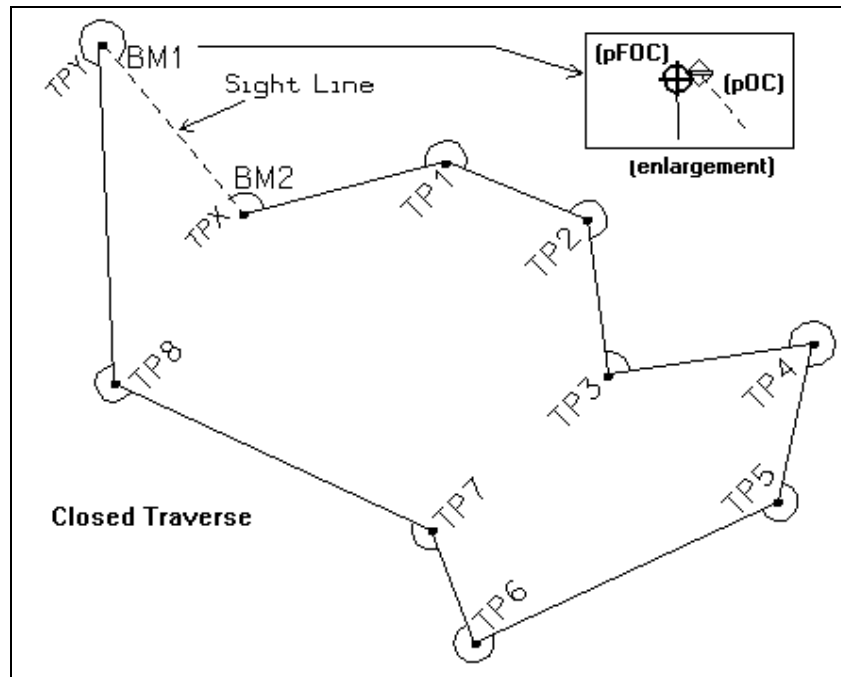


Figure 16.7: Least Squares Adjustment Example 2 Traverse

As in the previous example, the following Figure 16.8, 16.9 and 16.10 are the reports of the traverse and its' adjustment.

| TRAVERSE DIRECTIONS | | (BM1 BM2 TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 BM1) TP |
|---------------------|-----------|--|
| ID | Northing | Easting Bearing Distance |
| BM1 | 100863.20 | 100262.58 |
| | | S39°41'05.96"E 155.08FT |
| BM2 | 100743.86 | 100361.60 |
| | | N75°34'01.42"E 146.08FT |
| TP1 | 100780.26 | 100503.07 |
| | | S67°46'44.59"E 106.97FT |
| TP2 | 100739.81 | 100602.09 |
| | | S07°22'47.61"E 110.14FT |
| TP3 | 100630.58 | 100616.24 |
| | | N81°11'09.41"E 145.20FT |
| TP4 | 100652.83 | 100759.73 |
| | | S12°17'50.79"W 113.86FT |
| TP5 | 100541.58 | 100735.48 |
| | | S64°57'49.91"W 234.20FT |
| TP6 | 100442.47 | 100523.28 |
| | | N21°01'14.06"W 84.51FT |
| TP7 | 100521.36 | 100492.96 |
| | | N65°06'24.49"W 245.07FT |
| TP8 | 100624.52 | 100270.66 |
| | | N01°56'23.41"W 238.82FT |
| BM1 | 100863.20 | 100262.58 |

| | | | |
|-----|-----------|----------------|--------|
| | | S61°23'22.35"W | 0.20FT |
| TPY | 100863.10 | 100262.40 | |

Figure 16.8: Least Squares Pre-Adjustment Report

LEAST SQUARES ADJUSTMENT SUMMARY

| ID | Northing | Easting Bearing | Distance |
|-----|-----------|--------------------|----------|
| BM1 | 100863.20 | 100262.58 | |
| | | S39°41'05.96"E | 155.08FT |
| BM2 | 100743.86 | 100361.60 | |
| | | N75°34'06.78"E | 146.09FT |
| TP1 | 100780.26 | 100503.08 | |
| | | S67°46'37.46"E | 106.98FT |
| TP2 | 100739.80 | 100602.11 | |
| | | S07°22'37.63"E | 110.14FT |
| TP3 | 100630.57 | 100616.26 | |
| | | N81°11'28.01"E | 145.21FT |
| TP4 | 100652.81 | 100759.76 | |
| | | S12°18'15.16"W | 113.86FT |
| TP5 | 100541.56 | 100735.49 | |
| | | S64°58'26.39"W | 234.19FT |
| TP6 | 100442.49 | 100523.28 | |
| | | N21°00'17.65"W | 84.50FT |
| TP7 | 100521.38 | 100492.99 | |
| | | N65°05'12.10"W | 245.06FT |
| TP8 | 100624.61 | 100270.74 | |
| | | N01°57'32.91"W | 238.73FT |
| BM1 | 100863.20 | 100262.58 | |

Figure 16.9: Least Squares Adjustment Report

LEAST SQUARES ADJUSTMENT SUMMARY

| ID | Northing | Easting Bearing | Distance |
|-----------------------------|------------------|--------------------|------------------|
| Traverse Length | | 1424.68FT | |
| Linear misclosure (eas nor) | 0.1760 | 0.0960 | |
| Total | 0.2005 (1: 7106) | Allowable | 0.0300 (1: 5000) |

Figure 16.10: Least Squares Adjustment Final Report

Related Commands:

Compass Closure, Interactive Traverse.

16.2 Compass Closure

Description:

The Compass Closure command adjusts or closes traverses (up to 300 legs long) using the Compass Adjustment Rule.

The command calculates the positional error between two points known to occupy the same position. The first is the known closing point "pOC" and the other is the field observation point "pFOC".

The closure command distributes the error among the other points of the traverse using the Compass Adj. Rule.

A linear misclosure is displayed in the final report screen if the last sighted point "pLS" and its' calculated field location point "pFLS" is included in the input.

Allowable maximum linear closures are read from the Parameter File.

Pre-adjusted, post-adjusted and summary reports are generated and the user has the option of rejecting or accepting each.



Even if the positional test is not met, the user has the option to process the traverse in case parameter tolerances were not correctly set before the traverse is processed.

If the adjustment is accepted, the traverse will be displayed graphically according to autoplot settings and points will be graphically displayed and recorded in the database for each station of the traverse (these may be manipulated by other GWN-COGO commands and reports).

If the graphic traverse is accepted, the current points will be updated in the database as well as graphically and the "pFOC" and "pFLS" (if input) will be deleted completely. Therefore, the original coordinates will no longer exist and legal annotation cannot be placed.



If only a small adjustment is necessary, pre-plot the legal annotation and adjust its' position as necessary to the new lines generated.

GWN-COGO protects against division by zero and integer overflow errors in traverse closure calculations. Therefore, if the closure is minimal or equal to zero, an error is not generated.

The highest precision displayed is 1 in 2 billion (1:2,000,000,000).

Procedure:

1. Before execution of this command, plot out the points used in the adjustment using the appropriate commands. Also, set the desired tolerances for absolute and relative linear closure in the [Parameter File] - [Tolerance Values] dialogue.
2. Either select the [**Hor. Adj.**] - [**Compass Closure**] on the main pulldown menu or keyin the command "**Compass Closure** <cr>".

3. Either keyin or graphically pick from the view the figure or group of points “des” defining the traverse to be adjusted. The last point in the description is the point from which the traverse will be adjusted (pOC).
4. Either keyin or graphically pick from the view the last station as computed from the field data “pFOC”.
5. Either keyin or graphically pick from the view the last sighted point “pLS”. This is the fixed coordinate point used to calculate the linear misclosure.
6. Either keyin or graphically pick from the view the calculated field location “pFLS” of the last sighted point “pLS”.
7. Accept or reject the report displayed (as set in the [Parameter File] - [Output Options]) displaying the traverse directions of the points. This is shown in Figure 16.12 in the Example section.
8. Accept or reject the Compass Closure adjustment report. An example follows in Figure 16.3 of the Example section.
9. Accept or reject the graphic redraw of the traverse with the adjusted points. Rejection will delete the graphic as placed just prior to this step.

Input Items:

| | |
|------|---|
| des | Figure or group of points describing the traverse. |
| pFOC | The ID of the last station as computed from field data. |
| pLS | The ID of the last sighted fixed point. |
| pFLS | The ID of the calculated field location of the “pLS” point. |



The last point in the “des” is the “pOC” around which the traverse is adjusted.

Dialogue Box

The Least Squares Adjustment dialogue box will appear as shown in Figure 16.11 below

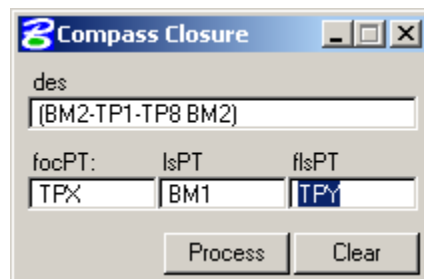


Figure 16.11: Compass Closure Dialogue Box

Example 1:

| | |
|---------------------------------|-------------------|
| Traverse description (des) | (BM2 TP1-TP8 BM2) |
| ID of last station (pFOC) | TPX |
| Last point sighted (pLS) | BM1 |
| Field location for "pLS" (pFLS) | TPY |

This example uses a closed loop traverse and a sight taken on a fixed point "BM1" to find linear misclosure. The points TPX and TPY are the calculated positions of BM2 and BM1 respectively. The traverse is shown in Figure 16.12 below.

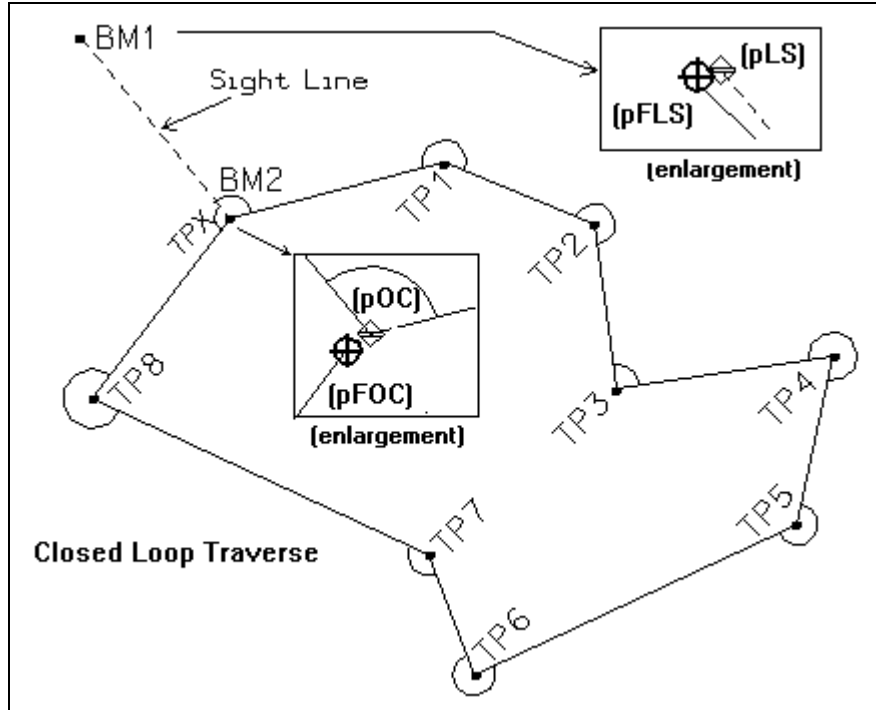


Figure 16.12: Compass Closure Example 1 Traverse

The first report generated will be to display the directions and distances between the points of the traverse as they exist before adjustment. This is shown in Figure 16.13 below.

| TRAVERSE DIRECTIONS (BM2 TP1-TP8 BM2) TPX | | | |
|---|-----------|--------------------|----------|
| ID | Northing | Easting Bearing | Distance |
| BM2 | 100743.86 | 100361.60 | |
| TP1 | 100780.26 | N75°34'01.42"E | 146.08FT |
| TP2 | 100739.81 | S67°46'44.59"E | 106.97FT |
| TP3 | 100630.58 | S07°22'47.61"E | 110.14FT |
| TP4 | 100652.83 | N81°11'09.41"E | 145.20FT |
| TP5 | | | |
| TP6 | | | |
| TP7 | | | |
| TP8 | | | |
| BM2 | | | |

| | | | |
|-----|-----------|----------------|----------|
| | | S12°17'50.79"W | 113.86FT |
| TP5 | 100541.58 | 100735.48 | |
| | | S64°57'49.91"W | 234.20FT |
| TP6 | 100442.47 | 100523.28 | |
| | | N21°01'14.06"W | 84.51FT |
| TP7 | 100521.36 | 100492.96 | |
| | | N65°06'24.49"W | 245.07FT |
| TP8 | 100624.52 | 100270.66 | |
| | | N37°17'26.27"E | 149.94FT |
| TPX | 100743.80 | 100361.50 | |
| | | N61°39'56.73"E | 0.12FT |
| BM2 | 100743.86 | 100361.60 | |

Figure 16.13: Compass Closure Pre-Adjustment Report (1)

If accepted, the next report generated will be the directions and positions of the points after the Compass Closure Rule has been applied. This is shown in Figure 16.14 below.

| COMPASS ANGULAR ADJUSTMENT | | | |
|----------------------------|-----------|--------------------|----------|
| ID | Northing | Easting Bearing | Distance |
| BM2 | 100743.86 | 100361.60 | |
| | | N75°34'12.47"E | 146.08FT |
| TP1 | 100780.26 | 100503.07 | |
| | | S67°46'22.48"E | 106.97FT |
| TP2 | 100739.79 | 100602.09 | |
| | | S07°22'14.44"E | 110.14FT |
| TP3 | 100630.56 | 100616.22 | |
| | | N81°11'53.63"E | 145.20FT |
| TP4 | 100652.78 | 100759.71 | |
| | | S12°18'46.07"W | 113.86FT |
| TP5 | 100541.54 | 100735.43 | |
| | | S64°58'56.25"W | 234.20FT |
| TP6 | 100442.49 | 100523.20 | |
| | | N20°59'56.67"W | 84.51FT |
| TP7 | 100521.39 | 100492.92 | |
| | | N65°04'56.04"W | 245.07FT |
| TP8 | 100624.65 | 100270.66 | |
| | | N37°20'23.87"E | 149.94FT |
| BM2 | 100743.86 | 100361.60 | |

Figure 16.14: Compass Closure Adjusted Data Report (1)

The last two reports display a summary of the closure and the other of the linear and angular misclosure for the traverse. This is shown in Figure 16.15 and 16.16 below.

| COMPASS CLOSURE SUMMARY | | | |
|-------------------------|-----------|--------------------|----------|
| ID | Northing | Easting Bearing | Distance |
| BM2 | 100743.86 | 100361.60 | |
| | | N75°34'18.99"E | 146.08FT |
| TP1 | 100780.25 | 100503.08 | |
| | | S67°46'20.77"E | 106.97FT |
| TP2 | 100739.79 | 100602.10 | |
| | | S07°22'21.09"E | 110.14FT |

| | | | |
|-----|-----------|----------------|----------|
| TP3 | 100630.56 | 100616.23 | |
| | | N81°11'59.54"E | 145.21FT |
| TP4 | 100652.77 | 100759.73 | |
| | | S12°18'37.87"W | 113.86FT |
| TP5 | 100541.52 | 100735.45 | |
| | | S64°58'48.76"W | 234.20FT |
| TP6 | 100442.47 | 100523.23 | |
| | | N20°59'51.56"W | 84.51FT |
| TP7 | 100521.37 | 100492.95 | |
| | | N65°04'57.35"W | 245.06FT |
| TP8 | 100624.62 | 100270.70 | |
| | | N37°19'14.54"E | 149.94FT |
| BM2 | 100743.86 | 100361.60 | |

Figure 16.15: Compass Closure Summary Report (1)

| COMPASS CLOSURE SUMMARY | | | |
|-----------------------------|-------------------|-----------|------------------|
| ID | Northing | Easting | Distance |
| | | Bearing | |
| Angular misclosure | 359°58'09.44" | | |
| Correction | 359°59'48.94" | | |
| Traverse Length | 1335.97FT | | |
| Linear misclosure (eas nor) | 0.0475 | -0.0314 | |
| Total | 0.0569 (1: 23480) | Allowable | 0.0300 (1: 5000) |

Figure 16.16: Compass Closure Final Report (1)

The graphic representation of the traverse is drawn and may be accepted or rejected at this time.

Example 2:

| | |
|---------------------------------|-------------------|
| Traverse description (des) | (BM2 TP1-TP8 BM1) |
| ID of last station (pFOC) | TPY |
| Last point sighted (pLS) | BM2 |
| Field location for "pLS" (pFLS) | TPX |

This input is for a closed traverse that does not end on the same point as it began. This example also uses the two points BM1 and BM2 as the fixed points used to tie down the traverse (Any other fixed points may be used as this scenario may not always be possible). The traverse is shown in Figure 16.16 following.

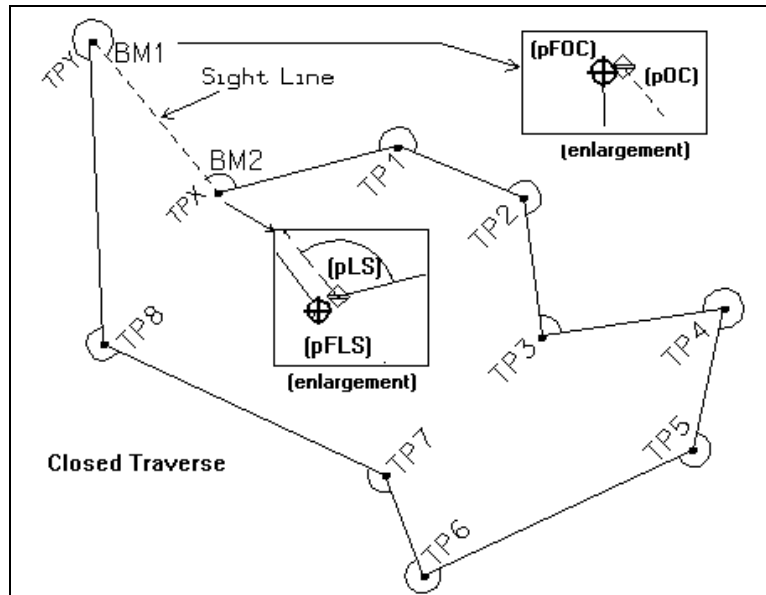


Figure 16.16: Compass Closure Example 2 Traverse

The reports as generated from this traverse are displayed in Figures 16.17 through to 16.20 and are described in more detail in Example 1 (previous example).

| TRAVERSE DIRECTIONS (BM2 TP1-TP8 BM1) TPY | | | |
|---|-----------|--------------------|----------|
| ID | Northing | Easting Bearing | Distance |
| BM2 | 100743.86 | 100361.60 | |
| | | N75°34'01.42"E | 146.08FT |
| TP1 | 100780.26 | 100503.07 | |
| | | S67°46'44.59"E | 106.97FT |
| TP2 | 100739.81 | 100602.09 | |
| | | S07°22'47.61"E | 110.14FT |
| TP3 | 100630.58 | 100616.24 | |
| | | N81°11'09.41"E | 145.20FT |
| TP4 | 100652.83 | 100759.73 | |
| | | S12°17'50.79"W | 113.86FT |
| TP5 | 100541.58 | 100735.48 | |
| | | S64°57'49.91"W | 234.20FT |
| TP6 | 100442.47 | 100523.28 | |
| | | N21°01'14.06"W | 84.51FT |
| TP7 | 100521.36 | 100492.96 | |
| | | N65°06'24.49"W | 245.07FT |
| TP8 | 100624.52 | 100270.66 | |
| | | N01°58'58.20"W | 238.73FT |
| TPY | 100863.10 | 100262.40 | |
| | | N61°23'22.35"E | 0.20FT |
| BM1 | 100863.20 | 100262.58 | |

Figure 16.17: Compass Closure Pre-Adjustment Report (2)

| COMPASS ANGULAR ADJUSTMENT | | | |
|----------------------------|-----------|--------------------|----------|
| ID | Northing | Easting Bearing | Distance |
| BM2 | 100743.86 | 100361.60 | |
| | | N75°34'12.47"E | 146.08FT |

| | | | |
|-----|-----------|----------------|----------|
| TP1 | 100780.26 | 100503.07 | |
| | | S67°46'22.48"E | 106.97FT |
| TP2 | 100739.79 | 100602.09 | |
| | | S07°22'14.44"E | 110.14FT |
| TP3 | 100630.56 | 100616.22 | |
| | | N81°11'53.63"E | 145.20FT |
| TP4 | 100652.78 | 100759.71 | |
| | | S12°18'46.07"W | 113.86FT |
| TP5 | 100541.54 | 100735.43 | |
| | | S64°58'56.25"W | 234.20FT |
| TP6 | 100442.49 | 100523.20 | |
| | | N20°59'56.67"W | 84.51FT |
| TP7 | 100521.39 | 100492.92 | |
| | | N65°04'56.04"W | 245.07FT |
| TP8 | 100624.65 | 100270.66 | |
| | | N01°56'24.62"W | 238.69FT |
| BM1 | 100863.20 | 100262.58 | |

Figure 16.18: Compass Closure Adjusted Data Report (2)

| COMPASS CLOSURE SUMMARY | | | |
|-------------------------|-----------|--------------------|----------|
| ID | Northing | Easting Bearing | Distance |
| BM2 | 100743.86 | 100361.60 | |
| | | N75°34'20.13"E | 146.08FT |
| TP1 | 100780.25 | 100503.08 | |
| | | S67°46'20.87"E | 106.98FT |
| TP2 | 100739.79 | 100602.10 | |
| | | S07°22'22.91"E | 110.14FT |
| TP3 | 100630.55 | 100616.24 | |
| | | N81°12'00.51"E | 145.21FT |
| TP4 | 100652.77 | 100759.74 | |
| | | S12°18'35.85"W | 113.86FT |
| TP5 | 100541.52 | 100735.46 | |
| | | S64°58'47.33"W | 234.20FT |
| TP6 | 100442.47 | 100523.24 | |
| | | N20°59'50.01"W | 84.51FT |
| TP7 | 100521.37 | 100492.96 | |
| | | N65°04'57.16"W | 245.06FT |
| TP8 | 100624.61 | 100270.71 | |
| | | N01°57'09.64"W | 238.72FT |
| BM1 | 100863.20 | 100262.58 | |

Figure 16.19: Compass Closure Summary Report (2)

| COMPASS CLOSURE SUMMARY | | | |
|-----------------------------|-------------------|--------------------|------------------|
| ID | Northing | Easting Bearing | Distance |
| Angular misclosure | | 359°58'09.44" | |
| Correction | | 359°59'48.94" | |
| Traverse Length | | 1424.76FT | |
| Linear misclosure (eas nor) | | 0.0639 -0.0382 | |
| Total | 0.0744 (1: 19141) | Allowable | 0.0300 (1: 5000) |

Figure 16.20: Compass Closure Final Report (2)

16.3 Interactive Traverse

Description:

This command allows for creating, editing, adjusting and plotting traverses (up to 300 legs long) using the Compass Closure Rule.

In this mode, the user is free to enter and maintain observations of traverse data (distances and directions) and adjust the data without having to generate the intermediate coordinate points or graphic elements associated to them. An editor dialogue box has been designed specifically for this purpose.

Original measurements are maintained and legal annotation can be plotted out at any time, even after adjustment.

The adjustment command calculates the positional error given two fixed points and a number of observations (legs).

Error is distributed among the other points of the traverse using the Compass Adjustment Rule.

Allowable maximum linear closures are read from the [Parameter File] - [Tolerance Values] settings.

Reports are generated to the screen and file as per set in the [Parameter File] - [Output Options] settings. If reported to the screen, there is an option to reject or accept the data and adjusted traverse.



Even if the positional test is not met, the user has the option to process the traverse in case parameter tolerances were not correctly set before the traverse is processed.

If the adjustment is accepted, the traverse may be plotted graphically (according to autoplot settings) if desired. The points generated may be manipulated by GWN-COGO commands as normal.

GWN-COGO protects against divide by zero and integer overflow errors in traverse closure calculations. Therefore, if the closure is minimal or equal to zero, an error is not generated.

The highest precision displayed is 1 in 2 billion (1 : 2,000,000,000).

Curves may be included in the traverse. The first character in the direction field must then be "c". This field will be used to store the central angle of the curve (interior angle). The distance field will store the radius of the curve. A positive radius creates a curve to the right and vice versa. The next record (line) will contain the point ID of the centre of the curve (direction and distance fields on this line are ignored).

The chord segment of the curve (BC to EC) will be used during adjustment with traverses using curves. The centre point of the curve will be calculated after adjustment using the radius only and not the angle.

If the first character in the direction field is “b”, the field will be parsed as a three point angle.

If the last character in the direction field is “d”, the field will be parsed as a deflection angle.

Procedure:

1. Either select the **[Hor. Adj.] - [Interactive Traverse]** on the main pulldown menu or keyin the command “**Interactive Traverse** <cr>”.
2. Either keyin or graphically pick from the view the first station ID “pBEG” of the traverse.
3. Either keyin or graphically pick from the view the last station ID “pEND” of the traverse and activate the “**Process**” button.
4. A dialogue box as illustrated in Figure 16.22 will appear with seven buttons. Each of the seven commands are described in the Dialogue Box section following. At this time, specify the file used to store the traverse data by selecting the first button “**Specify Traverse File**”.
5. Enter the name of the file to store the traverse data, accept the default name appearing or press the small button at the end of the text field to select an existing file. A dialogue for file selection will appear.
6. If the file from the previous step already exists and the data from that file is to be used, skip this step. Otherwise, select the button “Initialize” to clear out any garbage data contained in the file.
7. If the data in the file called in step 5 is to be used without editing, skip this step. Otherwise, select “Edit” to bring up the specialized editor box. See the Dialogue Box section for details on this editor box operations. It is at this time that the traverse data is input/appended/changed.
8. Select the “Build” button from the seven button dialogue box to generate the intermediate coordinate points for the traverse.
9. Select the “Process” button to perform the Compass Closure Rule to the data generated by the “Build” command.
10. A report will be generated on the Traverse Directions for each point of the traverse. Accept or Reject this data.
11. A report on the Compass Closure will be generated for the data. Accept or reject this data.
12. At this time, the user may select the “Plot” button from the seven button dialogue box to graphically generate the traverse to the adjusted coordinates. Graphic representation is determined by the autoplot settings.

Input Items:

pBEG ID of the first station of the traverse (fixed point)
pEND ID of the last station of the traverse (fixed point)
Field observation data will be needed in the subsequent steps using the Edit dialogue box as described in the Procedure steps.

Dialogue Boxes:

The Interactive Traverse dialogue box will appear as shown in Figure 16.21 below

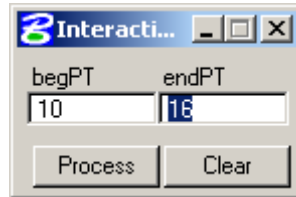


Figure 16.21: Interactive Traverse Dialogue Box

After the data has been entered (use the “Process” button on the dialogue box in Figure 16.21 above), a sub menu dialogue will appear as shown in Figure 16.22 below.

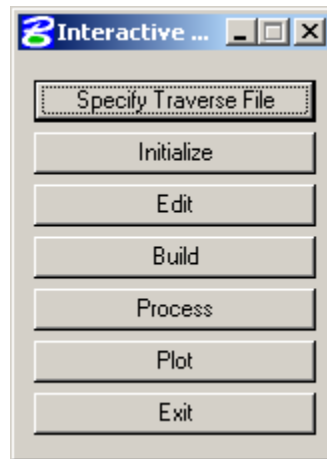


Figure 16.22: Interactive Traverse Sub-Menu Dialogue Box

The seven buttons on the sub-menu dialogue box will perform distinct functions as described below with the appropriate figures illustrating the dialogue box associated with that particular button selection.

Specify Traverse File

A dialogue box as shown in Figure 16.23 below, will appear. A string of 39 characters may be entered to specify the traverse filename. The default "TRAV.TMP" will appear and may be accepted to create or use the file with that name. (Without a directory path, the file will reside in whatever the DOS default drive is located, usually this will be your project directory)

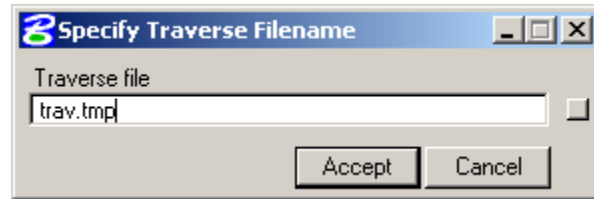


Figure 16.23: Interactive Traverse Specify File Dialogue Box

To select an existing file of another name or in another directory other than the default, press the small button at the end of the text field to create the file manager dialogue box as shown in Figure 16.24 below.

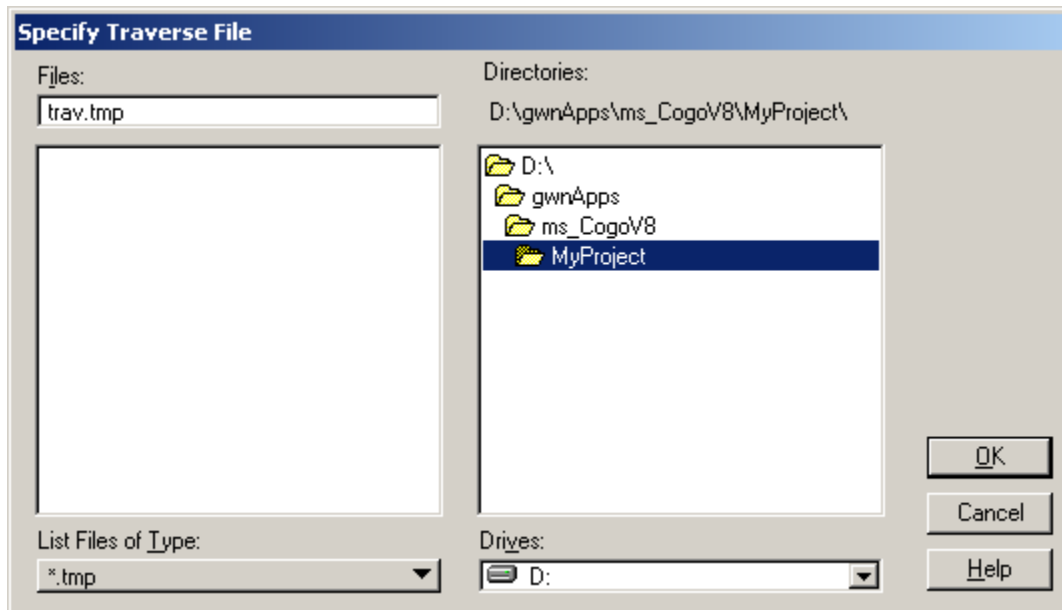


Figure 16.24: Interactive Traverse File Manager Dialogue Box

Initialize

This button will cause all data presently residing in the traverse file to be overwritten and all garbage removed.



DO NOT use this button if using data that had been previously entered or it will be destroyed!

A warning box will appear to confirm your action before proceeding As shown in Figure 16.25 below.

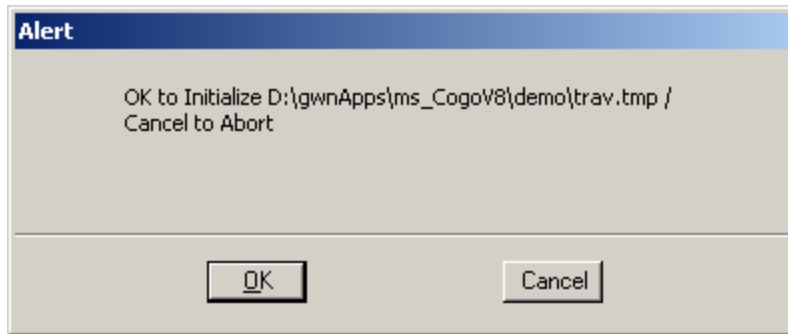


Figure 16.25: Interactive Traverse Initialize File Warning Dialogue Box

Edit

This button creates a dialogue box for editing the data stored in the traverse file. This is shown in Figure 16.26 below. Do not use this button before specifying a traverse file or GWN-COGO will likely unload unexpectedly.

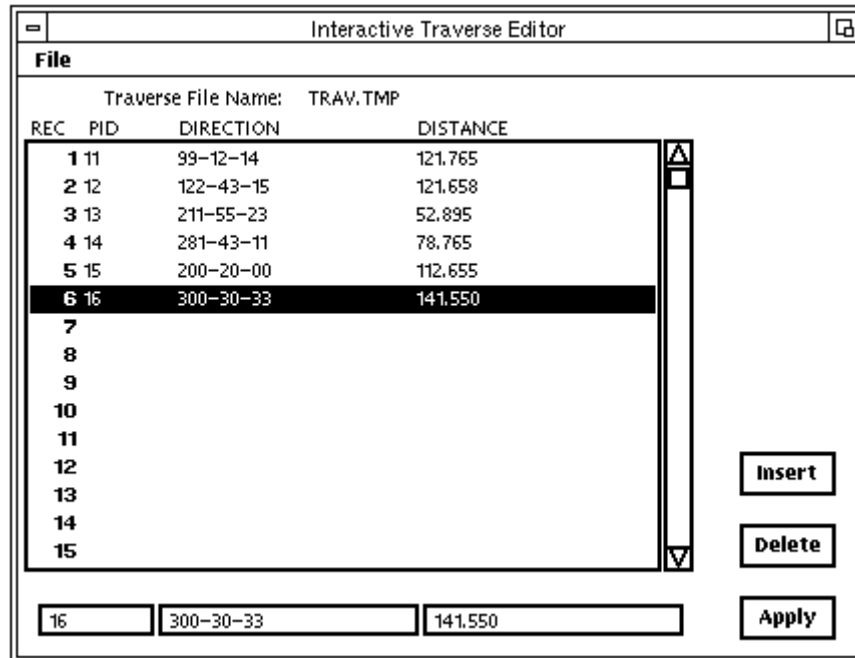


Figure 16.26: Interactive Traverse Editor Dialogue Box

To **Input** data enter the ID of the traverse "station" in the left text field (at the bottom of the dialogue box). The rules for naming are the same for all regular GWN-COGO ID's. The next field is for the direction. This may be in either Azimuth, angle or Bearing format. The last field is for the distance. Press the "Enter" key on the keyboard or click on the "Apply" button to load the data into the list box.

To **Insert** a line of data between existing lines, position the hi-lite bar in the list box over the position desired. Click on the "Insert" button and enter the data in the lower text fields as usual.

To **Delete** a line of data, place the hi-lite bar in the list box over the leg to be deleted and click on the “Delete” button.

Before closing the dialogue box, select [**File**] from the pulldown menu and select [**Save**] to write the data to file.

Build

This is the function that takes the data stored in the traverse file and calculates the coordinates for the ends of each leg. Coordinates are stored in traverse file. This step must be performed before either “Process” or “Plot” commands are executed. A report is generated as shown in Figure 16.28 following.

Process

This function executes the Compass Rule process to the coordinates of the legs of the traverse as calculated in the “Build” command. The coordinate listings and adjustment summaries are output as set forth in the Parameter File.

Example:

First station (pBEG) 10
Last station (pEND) 16

The directions and distances for the legs are as listed in the dialogue box illustrated in Figure 16.26.

The data used in this example is displayed in Figure 16.27 below. The illustration shows two sets of lines. One is of the traverse and is shown only to compare the adjustment of the new positions of the points as adjusted. The second line is the one plotted by the “Plot” command and in this example, does not show the points generated by the “Build” step. These are plotted as per autoplot settings and will be shown after accepting the plot as illustrated.

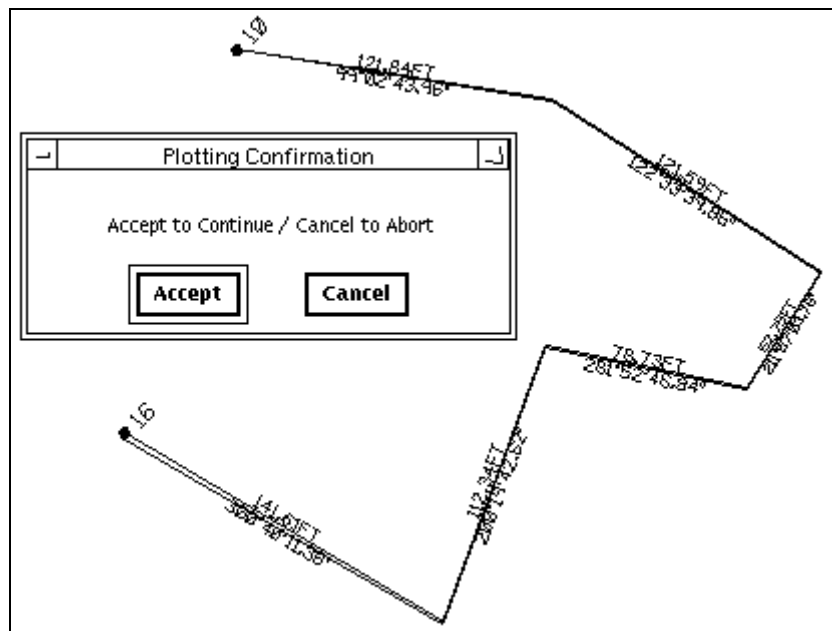


Figure 16.27: Interactive Traverse Example Illustration

Figure 16.28 is the report screen for the “Build” processing of the traverse data.



Figure 16.28: Interactive Traverse (Build) Example Report

The next illustration in Figure 16.29 shows the report screen generated after the "Process" button is activated. This screen displays the calculated traverse data with the coordinates of the intermediate points generated in "Build".

GWN-COGO Listing

Continue

Abort

TRAVERSE DIRECTIONS

| ID | Northing | Easting | Azimuth | Distance |
|----|-----------|-----------|---------------|----------|
| 10 | 100851.95 | 101096.20 | | |
| | | | 99°12'14.00" | 121.76FT |
| 11 | 100832.47 | 101216.39 | | |
| | | | 122°43'15.00" | 121.66FT |
| 12 | 100766.71 | 101318.75 | | |
| | | | 211°55'23.00" | 52.89FT |
| 13 | 100721.81 | 101290.78 | | |
| | | | 281°43'11.00" | 78.77FT |
| 14 | 100737.81 | 101213.65 | | |
| | | | 200°20'00.00" | 112.65FT |
| 15 | 100632.18 | 101174.51 | | |
| | | | 300°30'33.00" | 141.55FT |
| | 100704.04 | 101052.56 | | |
| | | | 22°01'50.32" | 1.78FT |
| 16 | 100705.69 | 101053.23 | | |

Figure 16.29: Interactive Traverse Process Example Report

The next illustration in Figure 16.30 shows the report screen after adjustment using the Compass Closure Rule.

GWN-COGO Listing

Continue

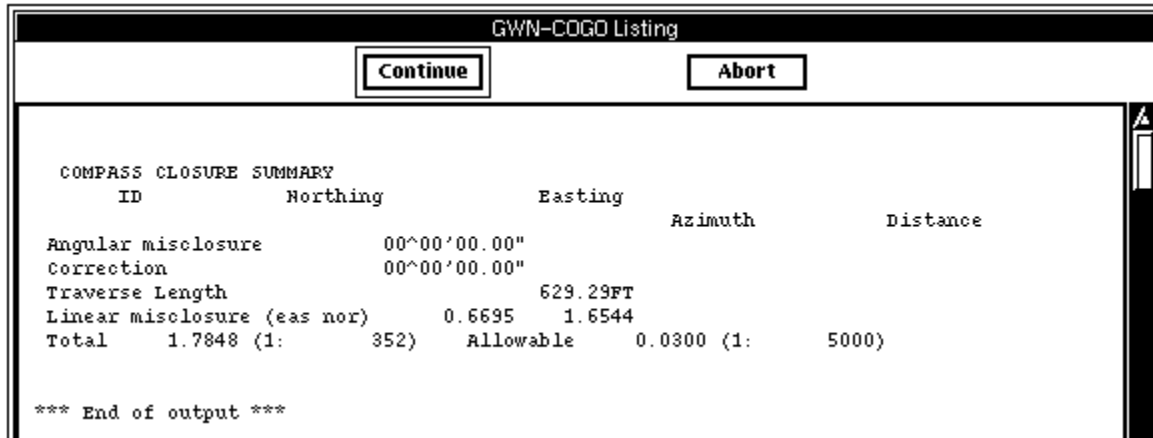
Abort

| COMPASS CLOSURE SUMMARY | | | | |
|-------------------------|-----------|-----------|---------------|----------|
| ID | Northing | Easting | Azimuth | Distance |
| 10 | 100851.95 | 101096.20 | | |
| | | | 99°02'43.96" | 121.84FT |
| 11 | 100832.79 | 101216.52 | | |
| | | | 122°33'39.85" | 121.59FT |
| 12 | 100767.35 | 101319.00 | | |
| | | | 211°57'03.78" | 52.75FT |
| 13 | 100722.59 | 101291.09 | | |
| | | | 281°52'46.84" | 78.73FT |
| 14 | 100738.80 | 101214.05 | | |
| | | | 200°19'42.62" | 112.34FT |
| 15 | 100633.46 | 101175.03 | | |
| | | | 300°40'11.36" | 141.61FT |
| 16 | 100705.69 | 101053.23 | | |

*** End of output ***

Figure 16.30: Interactive Traverse Adjustment Example Report

The last screen is of the closure summary information in Figure 16.31. This details the misclosure in both linear and angular aspects.



The screenshot shows a software window titled "GWN-COGO Listing". At the top, there are two buttons: "Continue" and "Abort". The main area displays a "COMPASS CLOSURE SUMMARY" report. The report includes a table with columns for ID, Northing, Easting, Azimuth, and Distance. The data shows an angular misclosure of 00°00'00.00", a correction of 00°00'00.00", a traverse length of 629.29FT, and a linear misclosure of 0.6695 (East) and 1.6544 (North). The total misclosure is 1.7848 (1:352), which is within the allowable range of 0.0300 (1:5000). The report ends with "*** End of output ***".

| ID | Northing | Easting | Azimuth | Distance |
|-----------------------------|----------------|-----------|-----------------|----------|
| Angular misclosure | 00°00'00.00" | | | |
| Correction | 00°00'00.00" | | | |
| Traverse Length | | 629.29FT | | |
| Linear misclosure (eas nor) | 0.6695 | 1.6544 | | |
| Total | 1.7848 (1:352) | Allowable | 0.0300 (1:5000) | |

*** End of output ***

Figure 16.31: Interactive Traverse Adjustment Summary Example Report

Related Commands:

Compass Closure, Least Squares Closure.

16.4 Compute Affine Transformation

Description:

This command computes a two dimensional coordinate transformation based upon a set of coordinates (x,y).

Three coordinates will produce an exact affine transformation. Four or more points will result in a least squares adjustment and the residuals of this will be reported.

The transformation matrix is stored in the Parameter File and saved between runs.

Procedure:

1. Either select the **[Hor. Adj.] - [Compute Affine Transformation]** on the main pulldown menu or keyin the command **"Compute Affine Transformation <cr>"**.
2. Either keyin or graphically pick from the view the figure or point ID's "desIN" defining the existing coordinate system. (minimum three points)
3. Either keyin or graphically pick from the view the figure or point ID's "desOUT" defining the new coordinate system. (minimum three points)
4. To apply the transformation, select **[Hor.Adj.] - [Apply Transformation]** command.

Input Items:

- desIN The group of points defining the existing coordinate system. (minimum three points)
- desOUT The group of points defining the new coordinate system. (minimum three points)

Dialogue Box

The Compute Affine Transformation dialogue box will appear as shown in Figure 16.31a below

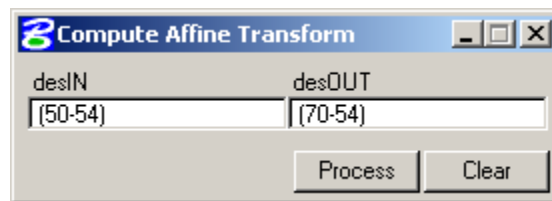


Figure 16.31a Compute Affine Transformation Dialogue Box

Example:

Existing coord system sample (desIN) (50-54)
New coord system sample (desOUT) (70-74)

This example takes the points from figure 1 and uses the Affine Transformation command to compute a transformation matrix to match the coordinate system as defined by the points found in Figure 2 as shown in Figure 16.32 below.

Figure 16.33 displays the least squares report which is generated since more than the minimum points required were used for the calculation. As the two samples used were identical copies (actually one was generated using this same command), no error is found in any of the points. Otherwise, the average error and the greatest single error would be shown.

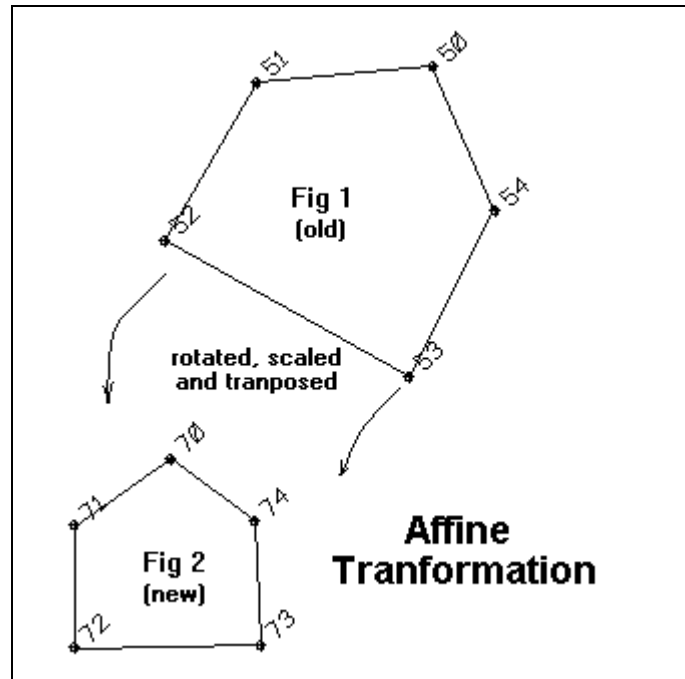


Figure 16.32: Compute Affine Transformation Example Illustration

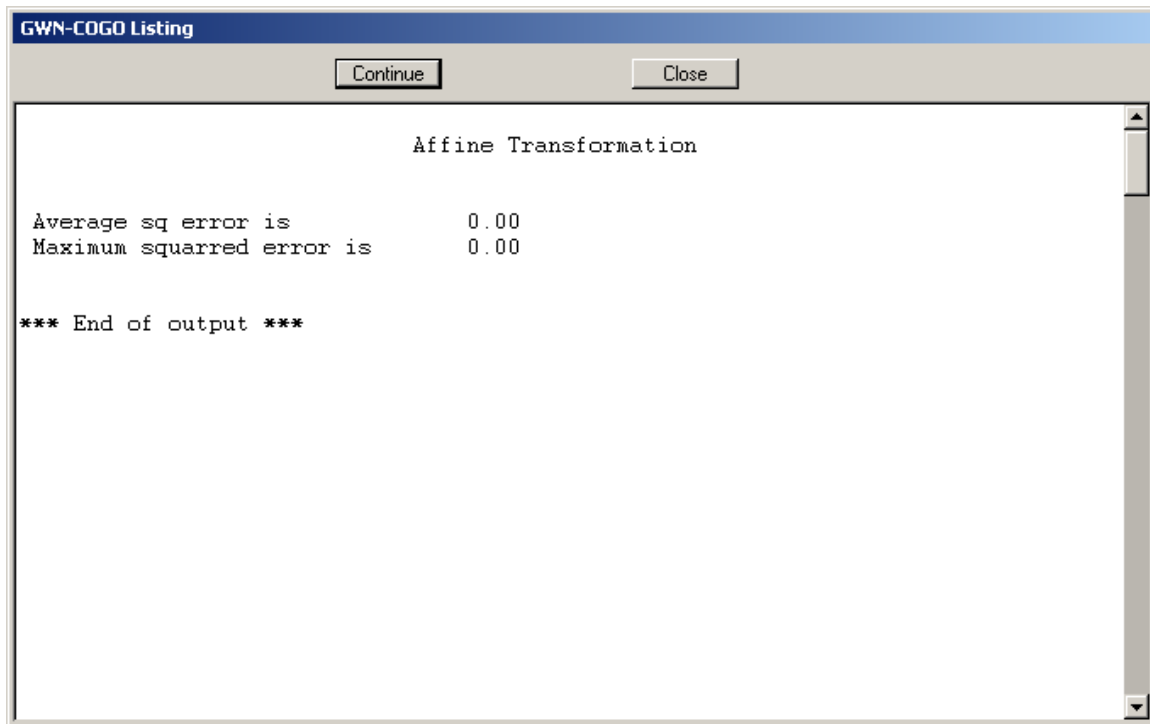


Figure 16.33: Compute Affine Transformation Least Squares Example Report

Related Commands:

Compute Helmut Transformation, Apply Transformation.

16.5 Compute Helmut Transformation

Description:

This command computes a two dimensional coordinate transformation based upon a set of coordinates from two coordinate systems.

Two coordinates (x,y) will produce an exact Helmut transformation. Three or more points will result in a least squares adjustment and the residuals of this will be reported.

The transformation matrix is stored in the Parameter File and saved between runs.

Procedure:

1. Either select the [**Hor. Adj.**] - [**Compute Helmut Transformation**] on the main pulldown menu or keyin the command "**Compute Helmut Transformation** <cr>".
2. Either keyin or graphically pick from the view the figure or point ID's "desIN" defining the existing coordinate system (minimum two points).
3. Either keyin or graphically pick from the view the figure or point ID's "desOUT" defining the new coordinate system (minimum two points).
4. To apply the transformation, select [**Hor.Adj.**] - [**Apply Transformation**] command.

Input Items:

| | |
|--------|---|
| desIN | The group of points defining the existing coordinate system. (minimum two points) |
| desOUT | The group of points defining the new coordinate system. (minimum two points) |

Dialogue Box

The Compute Helmut Transformation dialogue box will appear as shown in Figure 16.33a below

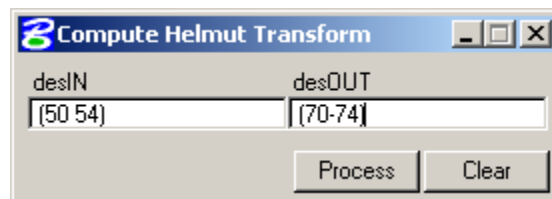


Figure 16.33a Compute Helmut Transformation Dialogue Box

Example:

| | |
|--------------------------------------|---------|
| Existing coord system sample (desIN) | (50-54) |
| New coord system sample (desOUT) | (70-74) |

This example uses the points found in figure 1 to define the old coordinate system and those in figure 2 to define the new system as shown in Figure 16.34 below.

Figure 16.35 displays the least squares report which is generated since more than the minimum points required were used for the calculation. As the two samples used were identical copies (actually one was generated using this same command), no error is found in any of the points. Otherwise, the average error and the greatest single error would be shown.

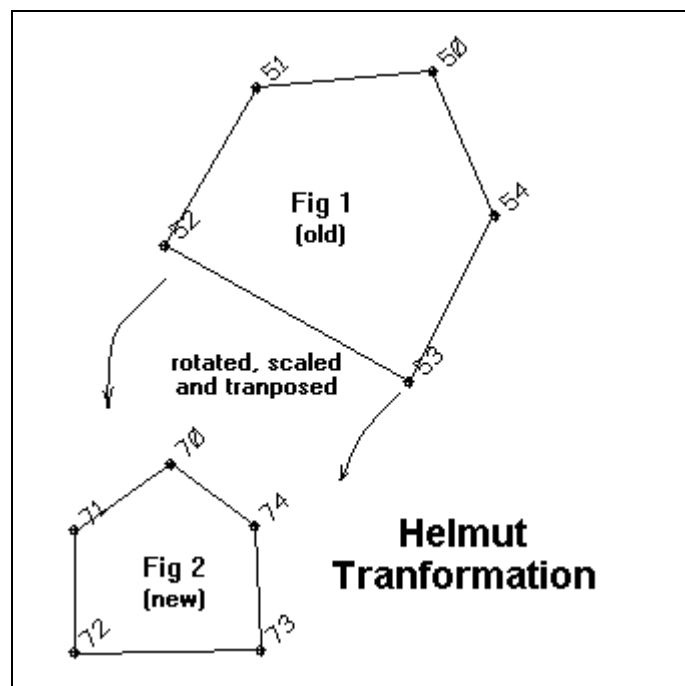


Figure 16.34: Compute Helmut Transformation Example Illustration

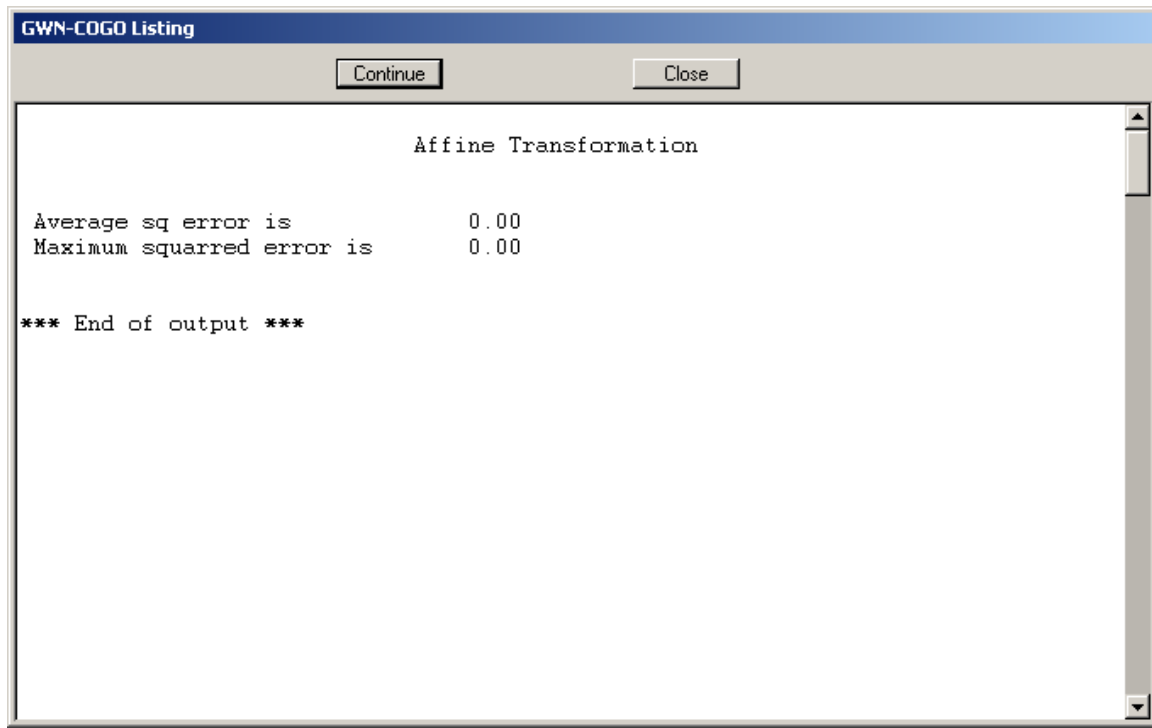


Figure 16.35: Compute Helmut Transformation Least Squares Example Report

Related Commands:

Compute Affine Transformation, Apply Transformation.

16.6 Compute Transformation

Description:

This command computes a coordinate transformation around a point “p” based on an angle (based on Z axis) and an offset distance along each of the three axis.

This is a two dimensional transformation.

The transformation matrix is stored in the Parameter File and saved between work sessions.

This command only creates and stores a data matrix, it does not invoke any action that would cause the transformation of points in the design or data files.

To use the transformation, use “Apply Transformation” on the desired points and/or figures.

Procedure:

1. Either select the [**Hor. Adj.**] - [**Compute Transformation**] on the main pulldown menu or keyin the command “**Compute Transformation** <cr>”.
2. Either keyin or graphically pick from the view the ID “p” of the point to base the Z axis about.
3. Either keyin or graphically pick from the view the angular rotation “ang”.
4. Input the scale factor “disSCLXY” for both the X and Y directions (together). (optional)
5. Either keyin or graphically pick from the view the offset “offEAS” along the X axis. (optional)
6. Either keyin or graphically pick from the view the offset “offNOR” along the Y axis. (optional)
7. Either keyin or graphically pick from the view the offset “offELV” along the Z axis. (optional)

Input Items:

| | |
|----------|--------------------------------------|
| p | ID of point to base Z axis position |
| ang | Angular rotation (clockwise) |
| disSCLXY | X and Y axis scale factor (optional) |
| offEAS | Offset along X axis (optional) |
| offNOR | Offset along Y axis (optional) |
| offELV | Offset along Z axis (optional) |

Dialogue Box:

The Compute Transformation dialogue box will appear as shown in Figure 16.36 below.

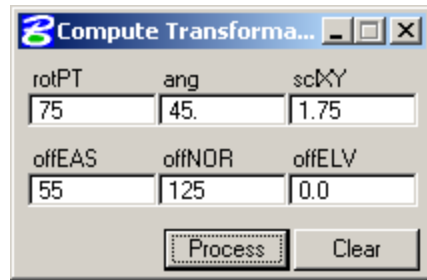


Figure 16.36: Compute Transformation Dialogue Box

Example:

| | |
|---------------------------------------|-------|
| ID of point to be Z axis position (p) | 75 |
| Angle of rotation (ang) | 45.00 |
| X\Y scale factor (disSCLXY) | 1.75 |
| Offset on X axis (offEAS) | 55 |
| Offset on Y axis (offNOR) | 125 |
| Offset on Z axis (offELV) | 0 |

This example will calculate a transformation matrix to be used by “Apply Transformation” based on the rotations, offsets and scale. To use this matrix, use the [Hor.Adj.] - [Apply Transformation] command.

Related Commands:

Compute Transformation, Apply Transformation.

16.7 Compute Transformation All

Description:

This command computes a coordinate transformation around a point “p” in three axis.

The angles specified provide for a clockwise rotation about any or all of the three axis.

Used for three dimensional transformations.

The transformation matrix is stored in the Parameter File and saved between working sessions.

Use “Apply Transformation” command to employ the saved matrix.

Procedure:

1. Either select the [Hor. Adj.] - [Compute Transformation All] on the main pulldown menu or keyin the command “**Compute Transformation All** <cr>”.
2. Either keyin or graphically pick from the view the ID of the point “p” to base the rotations about.
3. Either keyin or graphically pick from the view the angular rotation for the Z axis “angZ”.
4. Either keyin or graphically pick from the view the angular rotation for the Y axis “angY”.
5. Either keyin or graphically pick from the view the angular rotation for the X axis “angX”.
6. Input the scale factor “dis” for the X direction.
7. Input the scale factor “dis” for the Y direction.
8. Input the scale factor “dis” for the Z direction.
9. Either keyin or graphically pick from the view the offset “off” along the X axis. (optional)
10. Either keyin or graphically pick from the view the offset “off” along the Y axis. (optional)
11. Either keyin or graphically pick from the view the offset “off” along the Z axis. (optional)

Input Items:

| | |
|------|---|
| p | ID of point to base the rotations about |
| angZ | Clockwise rotation about the Z axis |
| angY | Clockwise rotation about the Y axis |

| | |
|------|--|
| angX | Clockwise rotation about the X axis |
| dis | Scale along X axis |
| dis | Scale along Y axis |
| dis | Scale along Z axis |
| off | Offset from origin in direction of X axis. |
| off | Offset from origin in direction of Y axis. |
| off | Offset from origin in direction of Z axis. |

Dialogue Box:

The Compute Transformation All dialogue box will appear as shown in Figure 16.37 below.



Figure 16.37: Compute Transformation All Dialogue Box

Example:

| | |
|--|-------|
| ID of point to be Z axis position (p) | 75 |
| Angle of rotation around Z axis (angZ) | 45.00 |
| Angle of rotation around Y axis (angY) | 45.00 |
| Angle of rotation around X axis (angX) | 45.00 |
| Scale on X axis (dis) | 1 |
| Scale on Y axis (dis) | 1 |
| Scale on Z axis (dis) | 1 |
| Offset on X axis (off) | 55 |
| Offset on Y axis (off) | 125 |
| Offset on Z axis (off) | 0 |

This example will calculate a transformation matrix to be used by "Apply Transformation".

Related Commands:

Compute Transformation, Apply Transformation.

16.8 Apply Transformation

Description:

This command applies a coordinate transformation to a set of points.

The transformation used is the one stored in the Parameter File as calculated previously by one of the “Compute” transformation commands in this chapter.

The points are recalculated and re-plotted with the original text strings being deleted.



It is recommended that a backup of the original coordinate data be made before applying a transformation in case the results achieved are not as desired. Use the [Utilities] - [Backup/Restore] - [Backup] command to save these important files.

Procedure:

1. Either select the **[Hor. Adj.] - [Apply Transformation]** on the main pulldown menu or keyin the command “**Apply Transformation** <cr>”.
2. Either keyin or graphically pick from the view the points or figure ID “des” to apply the transformation matrix to.

Input Items:

des Figure or point ID's to apply transformation to.

Dialogue Box:

The Apply Transformation dialogue box will appear as shown in Figure 16.38 below.

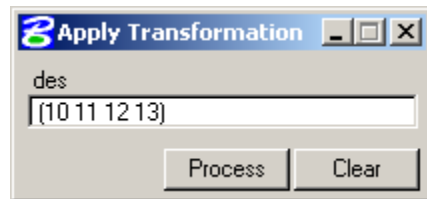


Figure 16.38: Apply Transformation Dialogue Box

Example:

Group of points to transform (des) (10 11 12 13)

In this example, the points 10, 11, 12 and 13 are transformed using the transformation stored in the Parameter File using one of the previous “Compute” transformation commands. No scale or offset is used in this transformation as was the case in the Affine and Helmut examples.

The rotation was computed around the origin at point 10. The points 21, 22, 23 and 24 are the original locations of the points before transformation. This is illustrated in Figure 16.39 following.

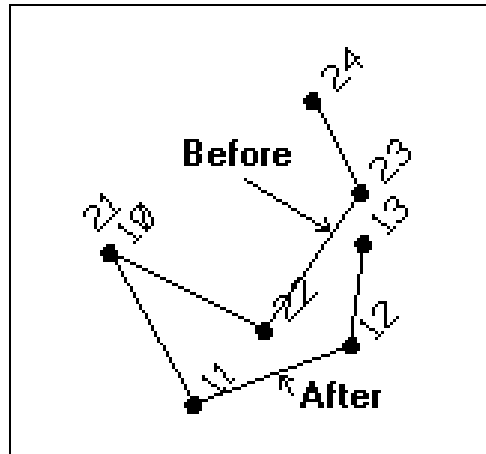


Figure 16.39: Apply Transformation Example Results

Related Commands:

Compute Transformation, Compute Transformation All, Compute Affine Transformation, Compute Helmut Transformation

17.0 HORIZONTAL ALIGNMENT

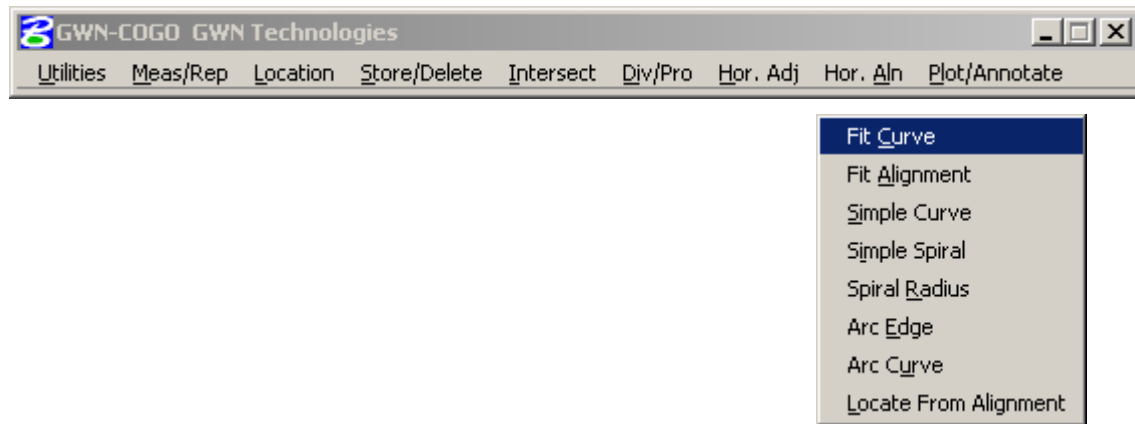


Figure 17.1: Horizontal Alignment Pulldown Menu

This chapter deals with the commands found on the Horizontal Alignment (Hor. Aln.) pulldown menu, as shown in Figure 17.1 above, in reference format.

17.1 Fit Curve

Description:

This command locates a circular curve with radius “r” and tangent to the line connecting “pBT” (point before tangent) to “pPI” (point of intersection) with the line connecting “pPI” to “pAT” (point after tangent).

Points “nPC” and “nPT” are the two points of tangency and point “nCC” is the centre of the curve.

The radius can be omitted if “pBT” equals “nPC”.

This command can also be used to locate the centre of the curve.

If plot line is enabled, an arc will be drawn from “nPC” to “nPT” using “nCC” as the centre of the arc.

Points “nPC” and “nPT” are located by GWN-COGO and are not defined by the user. Their ID's are incremented by one from the centre of the curve “nCC” respectively.

Procedure:

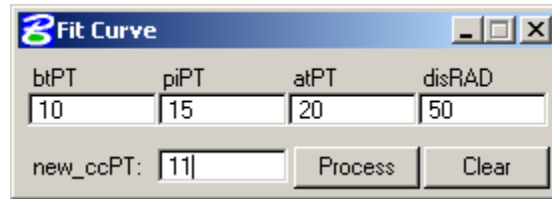
1. Either select the [Hor.Aln.] - [Fit Curve] on the main pulldown menu or keyin the command “**Fit Curve** <cr>”.
2. Either keyin or graphically pick from the view the point “pBT” defining the back tangent.
3. Either keyin or graphically pick from the view the point “pPI” defining the point of intersection of the tangents.
4. Either keyin or graphically pick from the view the point “pAT” defining the ahead tangent.
5. Either keyin or graphically pick from the view the radius “r” distance of the curve (optional). If not entered, the points “pBT” and “pAT” will be used to calculate the curve.
6. Enter the ID of the point “nCC” defining the centre of the curve.

Input Items:

| | |
|-----|---------------------------------------|
| pBT | Point on back tangent |
| pPI | Point of intersection of the tangents |
| pAT | Point on ahead tangent |
| nCC | ID of point defining centre of curve |
| r | Radius of curve (optional) |

Dialogue Box:

The Fit Curve dialogue box will appear as shown in Figure 17.2.



The image shows a software window titled "Fit Curve". It contains four input fields for "btPT", "piPT", "atPT", and "disRAD" with values 10, 15, 20, and 50 respectively. Below these is a field for "new_ccPT" with the value 11. To the right of the "new_ccPT" field are two buttons labeled "Process" and "Clear".

Figure 17.2: Fit Curve Dialogue Box

Example:

| | |
|------------------------------|----|
| Point on back tangent (pBT) | 10 |
| Point of intersection (pPI) | 15 |
| Point on ahead tangent (pAT) | 20 |
| Radius of curve (r). | 50 |
| ID of centre point (nCC) | 11 |

This example will create three points (11, 12 and 13) at the curve centre, beginning and end of the curve respectively. This is shown in Figure 17.3 below.

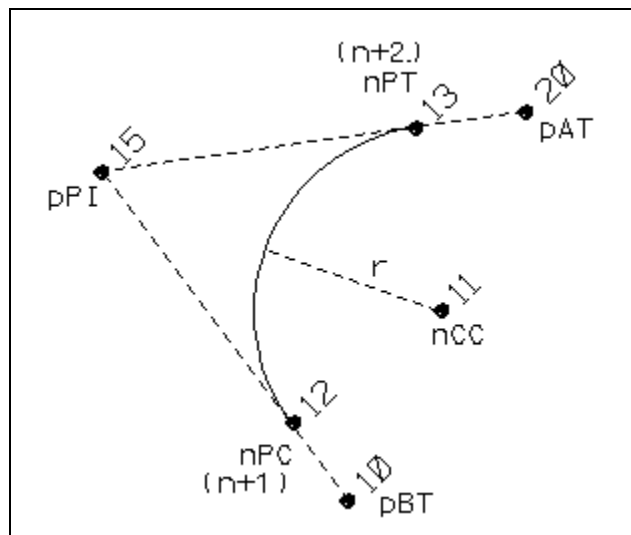


Figure 17.3: Fit Curve Example Results

Related Commands:

Simple Curve, Arc Edge, Arc Curve, Fit Alignment.

17.2 Fit Alignment

Description:

This command locates a circular curve with a centre point “nCC” with radius “r” embedded in a spiral in with a length “ls1” and a spiral out with a length “ls2” to fit within an alignment.

The alignment uses a deflection angle at “pPI”, a point on the back tangent “pBT” and a direction switch “sign”.

The centre of the circular curve, transition to spiral, spiral tangent intersection, spiral to curve intersection of curve tangents, curve to spiral, intersection of spiral tangents and spiral to line transition points are calculated.

Procedure:

1. Either select the **[Hor.Aln.] - [Fit Alignment]** on the main pulldown menu or keyin the command **“Fit Alignment <cr>”**.
2. Either keyin or graphically pick from the view the point “nCC” defining the centre of the curve.
3. Either keyin or graphically pick from the view a point “pBT” on the back tangent.
4. Enter the ID for the point “pPI” defining the point of intersection of the tangents.
5. Either keyin or graphically pick from the view the radius “r” of the curve.
6. Either keyin or graphically pick from the view the length of the spiral in “ls1”.
7. Either keyin or graphically pick from the view the length of the spiral out “ls2”.
8. Either keyin or graphically pick from the view the deflection angle “defl” at the point of intersection.
9. Indicate the direction of curvature using the switch clockwise (CW) or counter-clockwise (CCW).

Input Items:

| | |
|------|--|
| nCC | Centre of curve. |
| pBT | A point on the back tangent. |
| pPI | ID of the intersection of tangents |
| r | Radius of the curve. |
| ls1 | Length of spiral in. |
| ls2 | Length of spiral out. |
| defl | Deflection angle at point of intersection. |
| sign | direction of curvature (CW or CCW) |

Dialogue Box:

The Fit Alignment dialogue box will appear as shown in Figure 17.4.

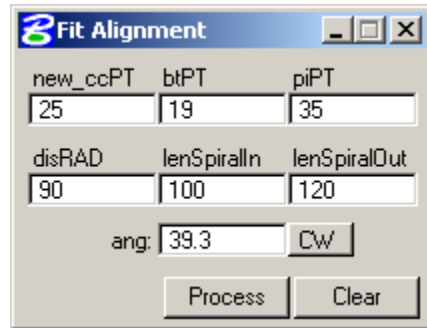


Figure 17.4: Fit Alignment Dialogue Box

Example:

| | |
|-----------------------------------|-------|
| Centre of curve (nCC) | 25 |
| Point on back tangent (pBT) | 19 |
| ID of point of intersection (pPI) | 35 |
| Radius of curve (r). | 120 |
| Length of spiral in (ls1) | 100 |
| Length of spiral out (ls2) | 120 |
| Deflection angle at PI (defl) | 39.30 |
| Direction of curvature (sign) | CW |

This example, as shown in Figure 17.5 below, finds the point of intersection (35) of the back and ahead tangent, beginning (36) and end of the curve (42), points of intersection between the spiral and curve (38, 39) and point of intersection of each spiral (37 and 41).

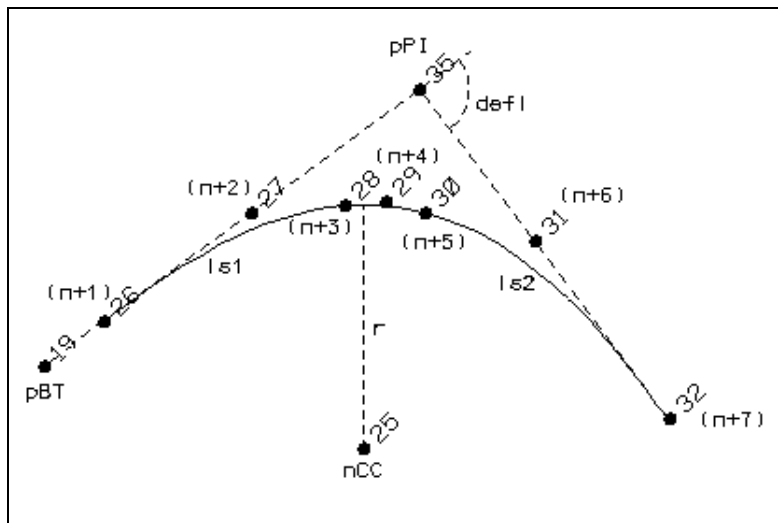


Figure 17.5: Fit Alignment Example Results

Related Commands:

Fit Curve, Simple Curve, Arc Edge, Arc Curve.

17.3 Simple Curve

Description:

This command locates a curve with radius “r” tangent to the line connecting point “pBT” to “pPC” and the central angle “ang”.

This command locates the curve centre “nCC”, the point of intersection “PI” and the point where the curve ends “PT”.

If the radius is specified as positive, the arc is located to the right of the line connecting “pBT” to “pPC”. If negative, the arc is located to the left.

If plot line is enabled, an arc will be drawn from “nPC” to “nPT” using “nCC” as the centre of the arc.

The point ID’s for “PI” or “PT” cannot be user defined in “Simple Curve”. These are automatically defined. Also, the line connecting “PI” and “PT” does not have to exist graphically.

Procedure:

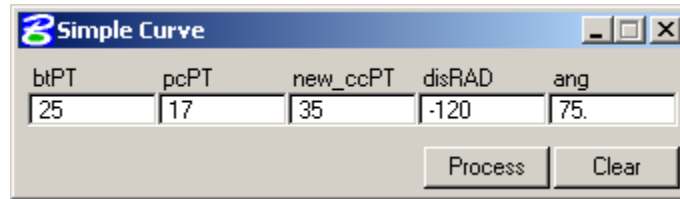
1. Either select the [Hor.Aln.] - [Simple Curve] on the main pulldown menu or keyin the command “Simple Curve <cr>”.
2. Either keyin or graphically pick from the view the point “pBT” located on the back tangent.
3. Either keyin or graphically pick from the view the point “pPC” defining the tangency between the curve and the back tangent.
4. Enter the ID to be used to define the point “nCC” at the centre of the curve.
5. Either keyin or graphically pick from the view the radius distance “r” of the curve.
6. Either keyin or graphically pick from the view the central angle (ang) of the curve.

Input Items:

| | |
|-----|---|
| pBT | Point on the back tangent. |
| pPC | Point of tangency between curve and the back tangent. |
| nCC | ID of the curve centre point. |
| r | Radius of the curve. |
| ang | Central angle of the curve. |

Dialogue Box:

The Simple Curve dialogue box will appear as shown in Figure 17.6.



A screenshot of a software dialog box titled "Simple Curve". It contains five input fields with the following values: btPT (25), pcPT (17), new_ccPT (35), disRAD (-120), and ang (75). Below the fields are two buttons: "Process" and "Clear".

| btPT | pcPT | new_ccPT | disRAD | ang |
|------|------|----------|--------|-----|
| 25 | 17 | 35 | -120 | 75 |

Figure 17.6: Simple Curve Dialogue Box

Example:

| | |
|------------------------------|------|
| Point on back tangent (pBT) | 25 |
| Point of tangency (pPC) | 17 |
| ID of curve centre (nCC) | 35 |
| Radius of curve (r). | -120 |
| Central angle of curve (ang) | 75. |

This example will plot a curve as shown in Figure 17.7 below. The negative radius will plot the curve to the left. The points "nPI" and "nPT" are calculated and plotted.

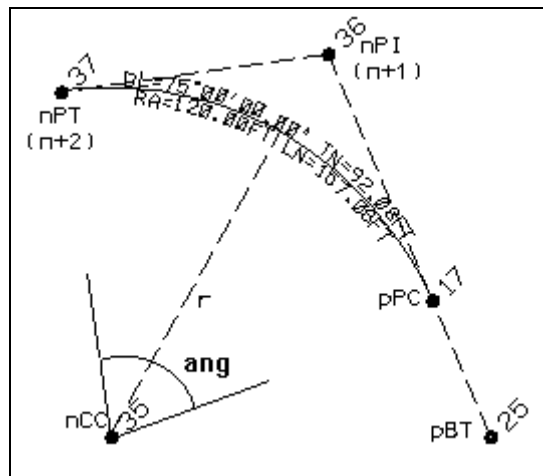


Figure 17.7: Simple Curve Example Results

Related Commands:

Arc Curve, Fit Curve, Fit Alignment.

17.4 Simple Spiral

Description:

This command locates a simple spiral defined by the back tangent “pBT” tangent to spiral “pTS”, with a length of “ls”, delta angle “ang” and a direction “sign”.

The point of intersection of the spiral “nPI” and the spiral to curve “nSC” are also calculated.

If plot line is enabled, a simple spiral will be placed graphically.

The points “nSC” ID cannot be defined by the user in “Simple Spiral”. This will be done automatically by GWN-COGO.

Procedure:

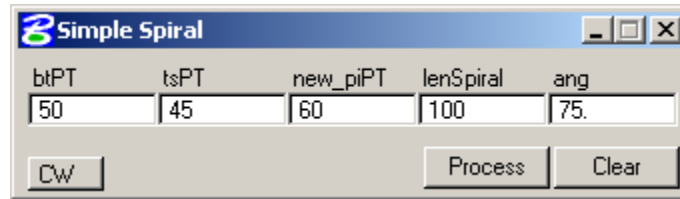
1. Either select the [Hor.Aln.] - [Simple Spiral] on the main pulldown menu or keyin the command “**Simple Spiral** <cr>”.
2. Either keyin or graphically pick from the view the back tangent point “pBT”.
3. Either keyin or graphically pick from the view the point tangent to spiral or curve to spiral point “pTS”.
4. Enter the ID to be assigned to the point of intersection “nPI”.
5. Either keyin or graphically pick from the view the length of the spiral “ls”. A positive distance indicates a spiral from “pTS” to “pSC” (spiral in) and a negative distance indicates a spiral from “pCS” to “pST” (spiral out).
6. Either keyin or graphically pick from the view the delta angle “ang” of the spiral in degrees.
7. Indicate the direction of the spiral “sign” using 1 for clockwise (CW) or -1 for counter-clockwise (CCW).

Input Items:

| | |
|------|--|
| pBT | Back tangent point. |
| pTS | Tangent to spiral or curve to spiral point. |
| nPI | ID of the point of intersection. |
| ls | The length of spiral. (+ spiral in (pTS to pSC) and - for reverse) |
| ang | The delta of the spiral in degrees. |
| sign | The direction of the spiral. (CW or CCW) |

Dialogue Box:

The Simple Spiral dialogue box will appear as shown in Figure 17.8.



The image shows a software dialog box titled "Simple Spiral". It contains five input fields with the following values: btPT (50), tsPT (45), new_piPT (60), lenSpiral (100), and ang (75). Below the fields are three buttons: "CW", "Process", and "Clear".

| btPT | tsPT | new_piPT | lenSpiral | ang |
|------|------|----------|-----------|-----|
| 50 | 45 | 60 | 100 | 75 |

CW Process Clear

Figure 17.8: Simple Spiral Dialogue Box

Example:

| | |
|------------------------------------|-----|
| Back tangent point (pBT) | 50 |
| Tangent to spiral (pTS) | 45 |
| ID for point of intersection (nPI) | 60 |
| Length of spiral (ls) | 100 |
| Delta angle of spiral (ang) | 75. |
| Direction of spiral (sign) | CW |

In this example, a spiral is drawn clockwise from the tangent to the spiral toward the spiral to curve point. The point of intersection is calculated and plotted as well. This is all shown in Figure 17.9 following.

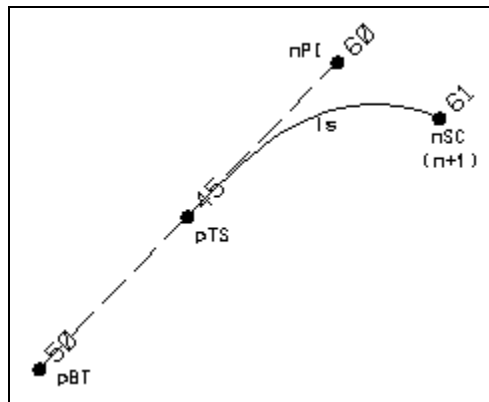


Figure 17.9: Simple Spiral Example Results

Related Commands:

Fit Alignment, Simple Curve.

17.5 Spiral Radius

Description:

This command locates a spiral curve defined by the back tangent “pBT”, the transition to spiral point “pTS”, length of spiral “ls”, radius of curve at the end of the spiral “r” and the direction switch “sign”.

The point of intersection of the spiral “nPI” and the spiral to curve points “nPI+1” are calculated.

Procedure:

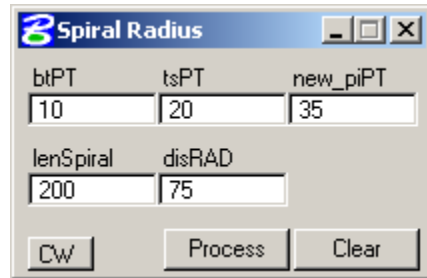
1. Either select the [Hor.Aln.] - [Spiral Radius] on the main pulldown menu or keyin the command “**Spiral Radius** <cr>”.
2. Either keyin or graphically pick from the view the point on the back tangent “pBT”.
3. Either keyin or graphically pick from the view the point of transition to the spiral “pTS”.
4. Enter the ID of the intersection of tangents “nPI”.
5. Either keyin or graphically pick from the view the length of spiral “ls”.
6. Either keyin or graphically pick from the view the radius distance “r” of the circular curve at the end of the spiral.
7. Indicate the direction of the spiral with clockwise (CW) or counter-clockwise (CCW).

Input Items:

| | |
|------|--|
| pBT | A point on the back tangent. |
| pTS | The point of transition to the spiral. |
| nPI | The ID of the intersection of tangents. |
| ls | The length of the spiral curve. |
| r | The radius of the circular curve. |
| sign | The direction of the spiral. (CW or CCW) |

Dialogue Box:

The Spiral Radius dialogue box will appear as shown in Figure 17.10.



The image shows a software dialog box titled "Spiral Radius". It contains several input fields and buttons. The fields are arranged in two rows: the first row has "btPT" (10), "tsPT" (20), and "new_piPT" (35); the second row has "lenSpiral" (200) and "disRAD" (75). Below these fields are three buttons: "CW", "Process", and "Clear".

| btPT | tsPT | new_piPT |
|------|------|----------|
| 10 | 20 | 35 |

| lenSpiral | disRAD |
|-----------|--------|
| 200 | 75 |

CW Process Clear

Figure 17.10: Spiral Radius Dialogue Box

Example:

| | |
|--|-----|
| Point on back tangent (pBT) | 10 |
| Point of transition to spiral (pTS) | 20 |
| ID of the intersection of tangents (nPI) | 35 |
| Length of spiral (ls) | 200 |
| Radius of circular curve (r). | 75 |
| Direction of spiral (sign) | CW |

This example uses a clockwise spiral and also exhibits three spiral lengths including the one listed to show the effects of length differences. These are shown and identified in Figure 17.11 following.

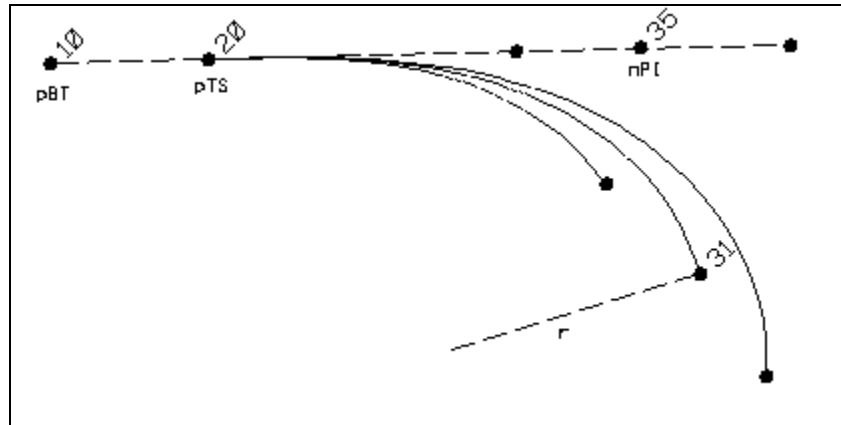


Figure 17.11: Spiral Radius Example Results

Related Commands:

Simple Spiral.

17.6 Arc Edge

Description:

This command locates a curve defined by three points “pPC”, “pOC” and “pPT” where “pOC” is a point on the arc and the other points are the ends..

The centre of the curve “nCC” is also calculated.

If plot line is enabled, an arc will be drawn from “pPC” to “pPT” using “nCC” as the centre of the arc.

Procedure:

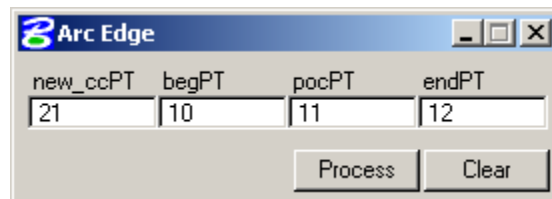
1. Either select the [Hor.Aln.] - [Arc Edge] on the main pulldown menu or keyin the command “**Arc Edge** <cr>”.
2. Enter the ID of the point which will be calculated at the centre of the curve “nCC”.
3. Either keyin or graphically pick from the view the ID of the point “pPC” at the beginning of the curve.
4. Either keyin or graphically pick from the view the ID of the point “pOC” on the curve.
5. Either keyin or graphically pick from the view the ID of the point “pPT” at the end of the curve.

Input Items:

| | |
|-----|---|
| nCC | The ID of the point defined by the centre of the curve. |
| pPC | The beginning point of the curve. |
| pOC | A point on the curve. |
| pPT | The end point of the curve. |

Dialogue Box:

The Arc Edge dialogue box will appear as shown in Figure 17.12.



| new_ccPT | begPT | pocPT | endPT |
|----------|-------|-------|-------|
| 21 | 10 | 11 | 12 |

Process Clear

Figure 17.12: Arc Edge Dialogue Box

Example:

| | |
|--------------------------------------|----|
| ID of point at centre of curve (nCC) | 21 |
| ID of beginning of curve (pPC) | 10 |
| ID of point on curve (pOC) | 11 |
| ID of point at end of curve (pPT) | 12 |

This example will calculate the centre point of a curve defined by three points. The centre point will be drawn as well as the arc. This is shown in Figure 17.13 following.

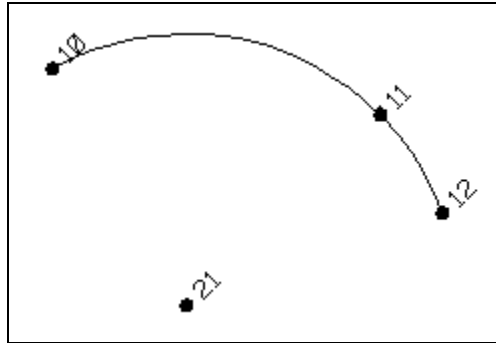


Figure 17.13: Arc Edge Example Results

Related Commands:

MicroStation command "Place Arc by Edge".

17.7 Arc Curve

Description:

This command locates a curve with radius “r” tangent to the line connecting “pBT” to “pPC” and the arc length “arc”.

This command locates the curve centre “nCC”, the point of intersection “PI” and the point “PT” where the curve ends.

If the radius is specified as positive, the arc is located to the right of the line connecting “pBT” to “pPC”. If the radius is negative, the arc is located to the left.

If plot line is enabled, an arc will be drawn from “nPC” to “nPT” using “nCC” as the centre of the arc.

Procedure:

1. Either select the [Hor.Aln.] - [Arc Curve] on the main pulldown menu or keyin the command “**Arc Curve** <cr>”.
2. Either keyin or graphically pick from the view the point “pBT” on the back tangent.
3. Either keyin or graphically pick from the view the point “pPC” of tangency between the curve and the back tangent.
4. Enter the ID of the point defined by the centre of the curve “nCC”.
5. Either keyin or graphically pick from the view the radius “r” of the curve.
6. Either keyin or graphically pick from the view the arc length “arc” of the curve.

Input Items:

| | |
|-----|---|
| pBT | The point on the back tangent. |
| pPC | The point of tangency between the curve and the back tangent. |
| nCC | The ID of the centre of the curve to be calculated. |
| r | The radius of the curve. |
| arc | The arc length of the curve. |

Dialogue Box:

the Arc Curve dialogue box will appear as shown in Figure 17.14.

| btPT | pcPT | new_ccPT | disRAD | arcLEN |
|------|------|----------|--------|--------|
| 20 | 25 | 30 | 100 | 130 |

Process Clear

Figure 17.14: Arc Curve Dialogue Box

Example:

| | |
|-------------------------------|-----|
| Point on back tangent (pBT) | 20 |
| Point of tangency (pPC) | 25 |
| Centre of curve (nCC) | 30 |
| Radius (r). | 100 |
| Arc length of the curve (arc) | 130 |

This example draws a curve from point "pPC" to the calculated point "nPT" based on radius and arc length. The results of this input is shown in Figure 17.15 below.

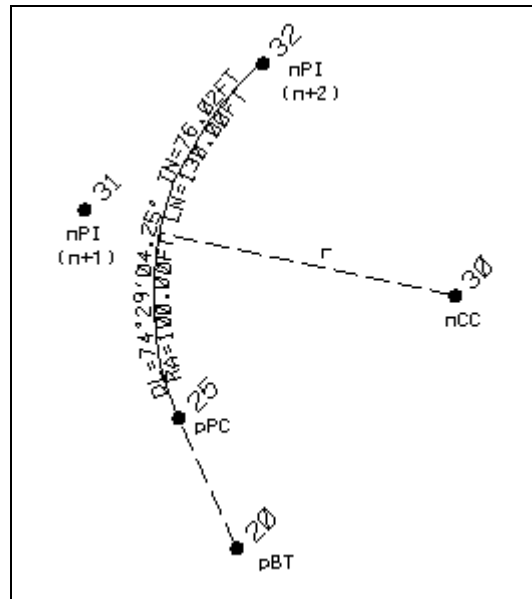


Figure 17.15: Arc Curve Example Results

Related Commands:

Simple Curve.

17.8 Locate From Alignment

Description:

This command locates a point perpendicular to an existing alignment.

A positive offset will locate a point perpendicular and to the right of the centre line while a negative offset will do the same but to the left of centre.

Procedure:

1. Either select the **[Hor.Aln.] - [Locate From Alignment]** on the main pulldown menu or keyin the command **"Locate From Alignment <cr>"**.
2. Either keyin or graphically pick from the view the description "des" of the alignment to be used.
3. Enter the ID "n" of the newly created point.
4. Either keyin or graphically pick from the view the station "sN" to base the offset on.
5. Keyin the distance of the offset "disOFF" from the station "sN" on the alignment "des". (optional)
6. Keyin the station "sBEG" at the beginning of the alignment. If no station is entered, the start of the alignment (according to the description used) will be considered to be station 00+00. The station "sN" will then be that distance from the start of the alignment and therefore, not necessarily the actual station of the alignment should the alignment not start at station 00+00. (optional)

Input Items:

| | |
|--------|--|
| des | The description of the alignment to be used. |
| n | The ID of the newly created point. |
| sN | The station to base the offset on. |
| disOFF | The distance offset from the alignment. (optional) |
| sBEG | The station for the beginning of the alignment. (optional) |

Dialogue Box:

The Locate From Alignment dialogue box will appear as shown in Figure 17.16.

Figure 17.16: Locate From Alignment Dialogue Box

Example:

| | |
|--|------|
| Description of the alignment (des) | 12 |
| ID of new point (n) | 105 |
| Station to base offset on (sN) | 1200 |
| Offset distance (disOFF) | 25 |
| Station at beginning of alignment (sBEG) | 1100 |

NOTE: Figure 12 is described by (100 101 102)

This example uses a positive offset on an alignment running from South to North. Therefore, the point will fall on the right relative to the direction of travel along the alignment and to the viewers right as well.

If the station "sBEG" is not used, the beginning of the alignment is considered to be station 00+00. The station for the defined point "sN" will then be that amount of distance along the alignment from the beginning.

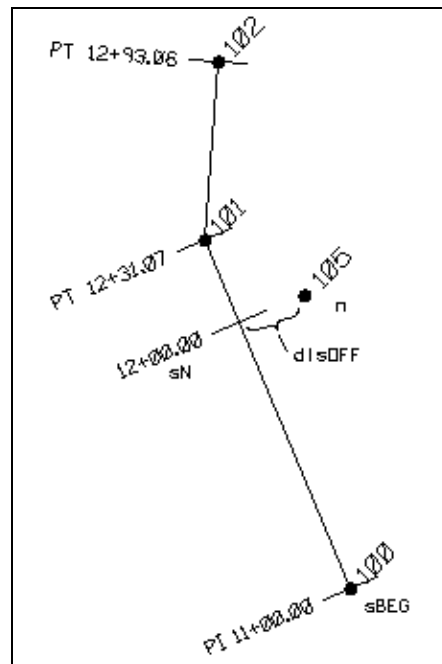


Figure 17.17: Locate From Alignment Example Results

Related Commands:

- Line Offset.

18.0 PLOT / ANNOTATION

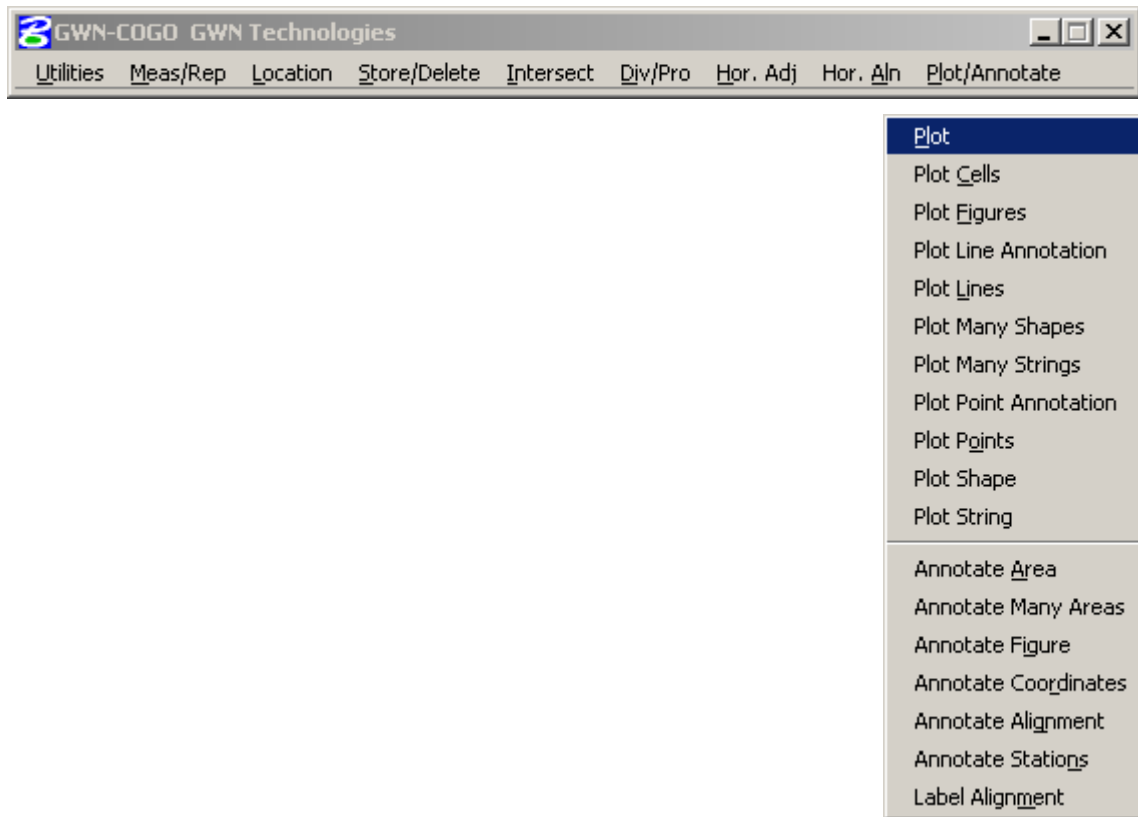


Figure 18.1: Plot / Annotation Pulldown Menu

This chapter deals with the commands found on the Measure / Report pulldown menu in a reference format.

18.1 Plot Figures

Description:

This command plots a figure or a group of figures.

Point ID's, point symbols, lines (or arcs, spirals) and all annotation will be plotted according to autoplot settings in the Parameter File.



All figure numbers must be enclosed in rounded brackets “()” and not the usual square ones “[]”. This command does not accept point numbers.

Procedure:

1. Either select the **[Plot/Anno] - [Plot Figures]** on the main pulldown menu or keyin the command **“Plot Figures <cr>”**.
2. Enter the figure ID or group of ID's “des” in rounded brackets “()”.

Input Items:

des

Figure or group of figure ID's enclosed in rounded brackets “()”.

Dialogue Box:

The Plot Figures dialogue box will appear as shown in Figure 18.2.

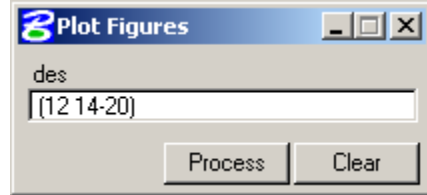


Figure 18.2: Plot Figures Dialogue Box

Example:

Group of figure ID's (des) (12 14-20)

This example plots figure 12 as well as those ranging from 14 through to 20. The annotation has been turned off for clarity. These figures are shown in Figure 18.3 below.

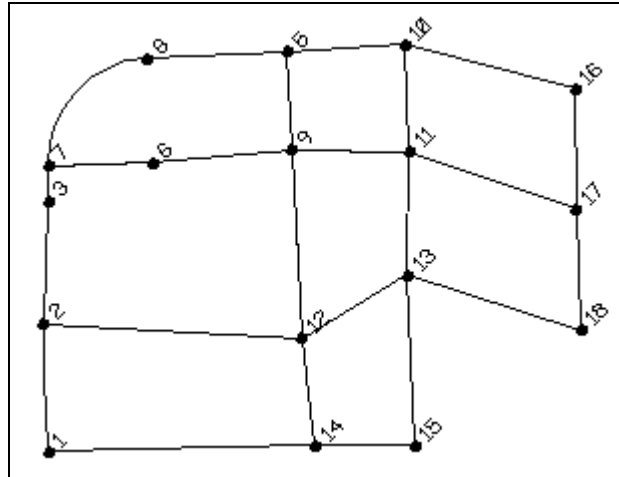


Figure 18.3: Plot Figures Example Results

Related Commands:

Plot Points, Plot, Plot Cells.

18.2 Plot Points

Description:

This command plots a group of points or a figure.

Point ID's and point symbols will be plotted.



All point numbers must be enclosed in rounded brackets "()". The figure number will not use any brackets and therefore not in combination with points.

Procedure:

1. Either select the [Plot/Anno] - [Plot Points] on the main pulldown menu or keyin the command "**Plot Points** <cr>".
2. Enter the point or group of point ID's "des" in rounded brackets "()" or a figure number without brackets.

Input Items:

des Point or group of point ID's enclosed in brackets or a figure ID.

Dialogue Box:

The Plot Points dialogue box will appear as shown in Figure 18.4.

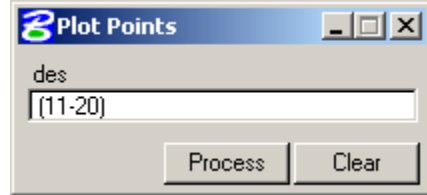


Figure 18.4: Plot Points Dialogue Box

Example:

Group of point ID's (des) (11-20)

This example would plot point 12 as well as those ranging from 14 through to 20. The results are as shown in Figure 18.5 below.

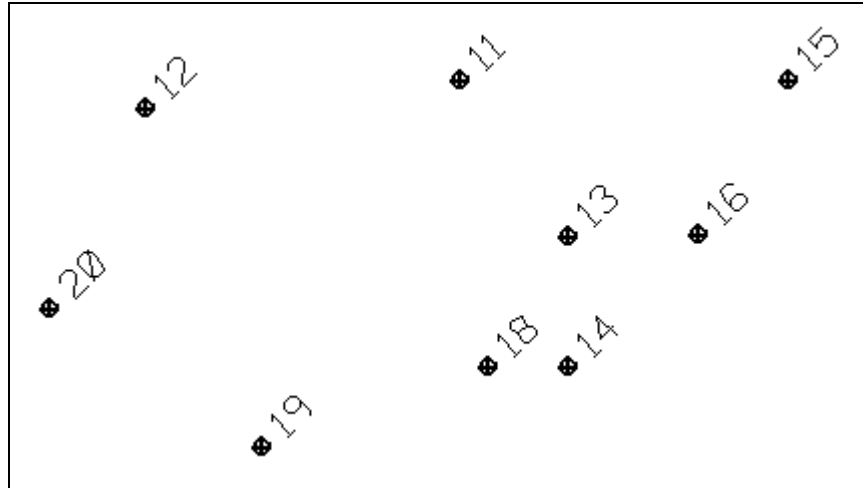


Figure 18.5: Plot Points Example Results

Related Commands:

Plot Figures, Plot, Plot Cells.

18.3 Plot Lines

Description:

This command plots a group of points or a figure (all point ID's in brackets "()").

The point ID's, point symbols, lines (or arcs, spirals) and all annotation will get plotted depending upon the autoplot settings.

Procedure:

1. Either select the **[Plot/Anno]** - **[Plot Lines]** on the main pulldown menu or keyin the command "**Plot Lines** <cr>".
2. Enter the group of point ID's "des" in rounded brackets "()" or a figure number without brackets.

Input Items:

des A group of point ID's enclosed in brackets or a figure ID.

Dialogue Box:

The Plot Lines dialogue box will appear as shown in Figure 18.6.

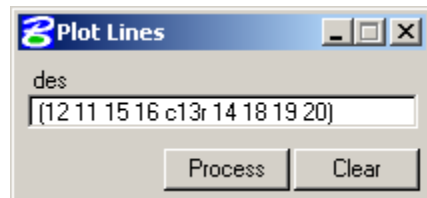


Figure 18.6: Plot Lines Dialogue Box

Example:

Group of point ID's (des) (12 11 15 16 C13R 14 18 19 20)

This example would plot the lines between points 12, 11, 15, 16 then a curve to 14 and continuing on to 18, 19 and 20. The results are shown in Figure 18.7 below with the annotation turned off for clarity.

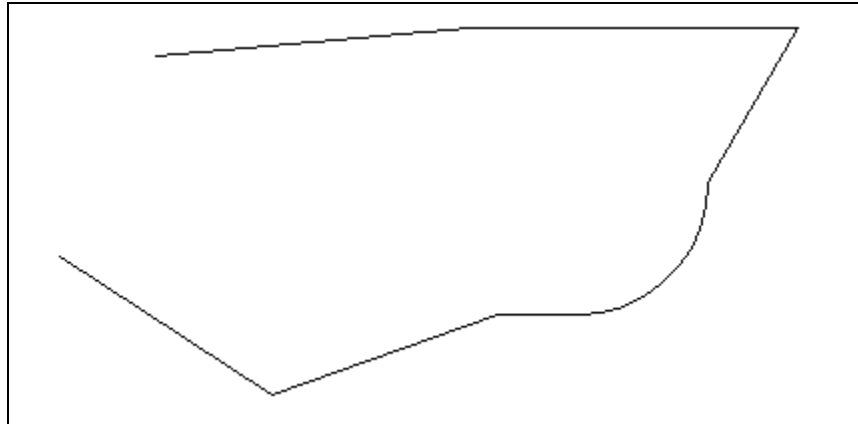


Figure 18.7: Plot Lines Example Results

Related Commands:

Plot Figures, Plot Points, Plot Cells, Plot.

18.4 Plot

Description:

This command plots a group of points or a figure.

The point ID's, point symbols, lines (or arcs, spirals) and all annotation will get plotted depending upon the autoplot settings.

The main difference between Plot and Plot Figures or Plot Points is that it does both plotting of points and add lines with annotation connecting the points in the order specified in the description.

Procedure:

1. Either select the **[Plot/Anno]** - **[Plot]** on the main pulldown menu or keyin the command "**Plot** <cr>".
2. Enter the group of point ID's "des" in rounded brackets "()" or a figure number without brackets.

Input Items:

des A group of point ID's enclosed in brackets or a figure ID.

Dialogue Box:

The Plot dialogue box will appear as shown in Figure 18.8.

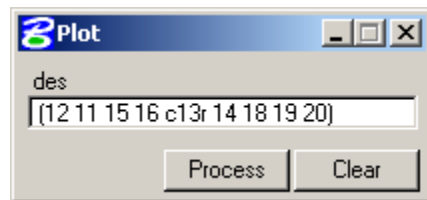


Figure 18.8: Plot Dialogue Box

Example:

Group of point ID's (des) (12 11 15 16 C13R 14 18 19 20)

This example would plot these points as well as the lines and (if turned on) the annotation. The results are as shown in Figure 18.9 following.

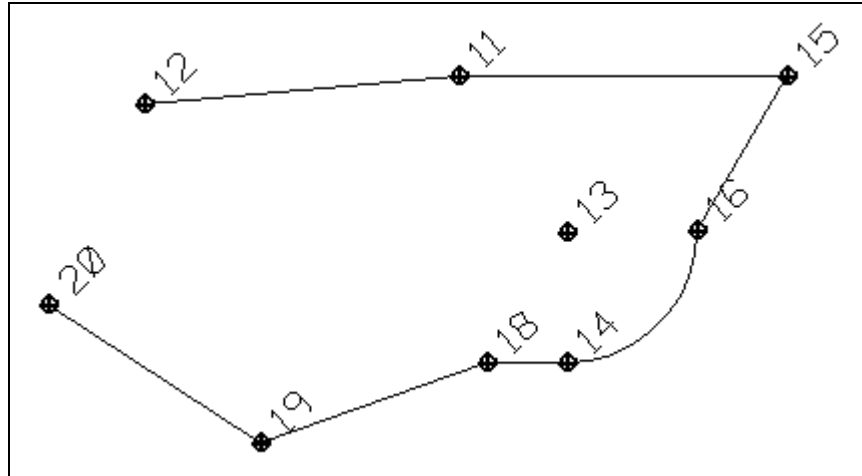


Figure 18.9: Plot Example Results

Related Commands:

Plot Figures, Plot Points, Plot Cells.

18.5 Plot Cells

Description:

This command plots cells for a given set of coordinates.

The cell plotted will be the cell defined by the specified feature in the Parameter File (and Feature Table).

A cell library must be attached to the design file.

Procedure:

1. Either select the **[Plot/Anno] - [Plot Cells]** on the main pulldown menu or keyin the command "**Plot Cells** <cr>".
2. Either keyin or graphically pick from the view the group of points or figure "des" to plot the cells to.
3. Enter the name of the feature "feat" for whose cell is to be plotted.

Input Items:

| | |
|------|---|
| des | The figure or group of points to be considered. |
| feat | The feature for whose cell is to be plotted. |

Dialogue Box:

The Plot Cells dialogue box will appear as shown in Figure 18.10.

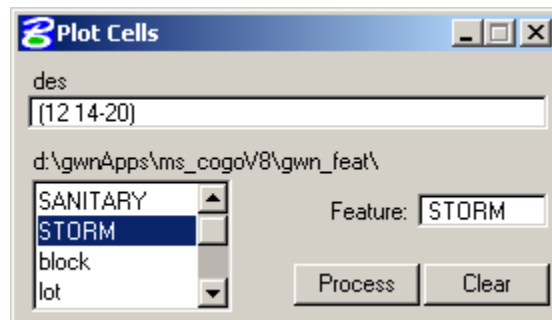


Figure 18.10: Plot Cells Dialogue Box

Example:

Group of point ID's (des) (12 14-20)
Feature (feat) STORM

This example would plot point 12 as well as those ranging from 14 through to 20 with the cell preset for that feature. The result of this input is shown in Figure 18.11 following.

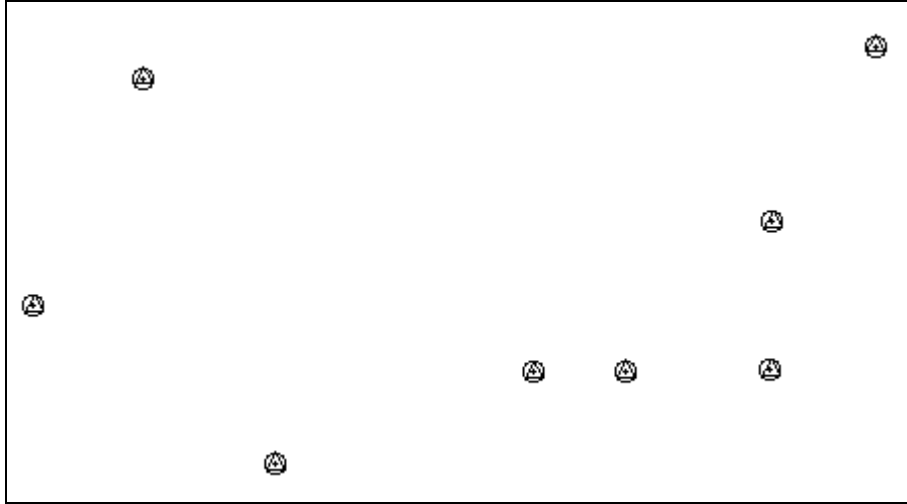


Figure 18.11: Plot Cells Example Results

Related Commands:

Plot Figures, Plot Points, Plot.

18.6 Plot Shape

Description:

This command plots a group of points or a figure as a shape (as defined by MicroStation types).

Procedure:

1. Either select the **[Plot/Anno] - [Plot Shape]** on the main pulldown menu or keyin the command "**Plot Shape** <cr>".
2. Either keyin or graphically pick from the view the figure or group of points "des" to be plotted as a shape.

Input Items:

des The figure or group of points to be plotted.

Dialogue Box:

The Plot Shape dialogue box will appear as shown in Figure 18.12.

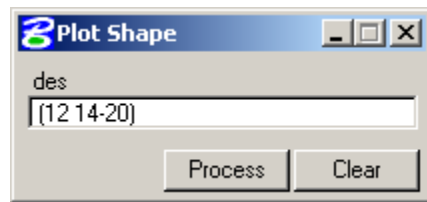


Figure 18.12: Plot Shape Dialogue Box

Example:

Group of point ID's (des) (12 14-20)

Related Commands:

Plot Many Shapes, Plot String, Plot Many Strings.

18.7 Plot Many Shapes

Description:

This command plots a figure or a group of figures as shape(s) (as defined by MicroStation types).

Procedure:

1. Either select the **[Plot/Anno] - [Plot Many Shapes]** on the main pulldown menu or keyin the command "**Plot Many Shapes** <cr>".
2. Either keyin or graphically pick from the view the figure or group of figures "des" to be plotted as a shape(s).

Input Items:

des The figure or group of figures to be plotted.

Dialogue Box:

If the dialogue box option has been selected in the [Parameter File] - [Processing Options], the Plot Many Shapes dialogue box will appear as shown in Figure 18.13.

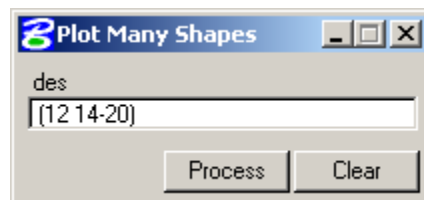


Figure 18.13: Plot Many Shapes Dialogue Box

Example:

Group of figure's (des) (12 14-20)

This example would plot figures 11 and 14 through to 20 as shapes.

Related Commands:

Plot Shape, Plot String, Plot Many Strings.

18.8 Plot Line Annotation

Description:

This command plots a text string as annotation according to line distance placement specifications on the line specified by two points.

Procedure:

1. Either select the **[Plot/Anno] - [Plot Line Annotation]** on the main pulldown menu or keyin the command **"Plot Line Annotation <cr>"**.
2. Either keyin or graphically pick from the view the first point "p1" of the line.
3. Either keyin or graphically pick from the view the second point "p2" of the line.
4. Enter the text string the line will be annotated with.

Input Items:

| | |
|---------|--|
| p1 | First point of the line. |
| p2 | Second point of the line. |
| desTEXT | The text string to be annotated on the line. |

Dialogue Box:

The Plot Line Annotation dialogue box will appear as shown in Figure 18.14.

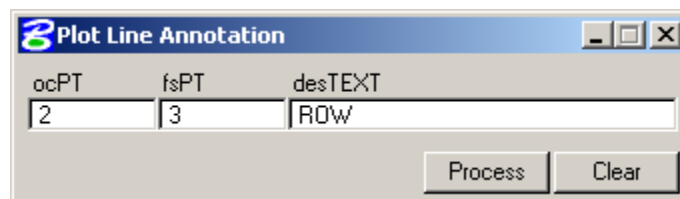


Figure 18.14: Plot Line Annotation Dialogue Box

Example:

| | |
|---------------------------|-----|
| First point of line (p1) | 2 |
| Second point of line (p2) | 3 |
| Text string (desTEXT) | ROW |

This example would plot text annotation "ROW" on the line from point "2" to point "3".

Related Commands:

Plot Point Annotation, Annotate Figure.

18.9 Plot String

Description:

This command plots a group of points or a figure as a line string.

Procedure:

1. Either select the **[Plot/Anno] - [Plot String]** on the main pulldown menu or keyin the command "**Plot String** <cr>".
2. Either keyin or graphically pick from the view the figure or group of points "des" to be plotted as a line string.

Input Items:

des The figure or group of points to be plotted.

Dialogue Box:

The Plot String dialogue box will appear as shown in Figure 18.15.

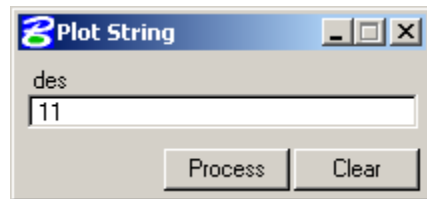


Figure 18.15: Plot String Dialogue Box

Example:

figure (des) 11

This example would plot a linestring connecting points in figure 11 as defined in MicroStation.

Related Commands:

Plot Shape, Plot Many Shapes, Plot Many Strings.

18.10 Plot Many Strings

Description:

This command plots a figure or a group of figures as linestring(s) (as defined by MicroStation types).

Procedure:

1. Either select the **[Plot/Anno] - [Plot Many Strings]** on the main pulldown menu or keyin the command "**Plot Many Strings** <cr>".
2. Either keyin or graphically pick from the view the figure or group of figures "des" to be plotted as a linestring(s).

Input Items:

des The figure or group of figures to be plotted.

Dialogue Box:

If the dialogue box option has been selected in the [Parameter File] - [Processing Options], the Plot Many Strings dialogue box will appear as shown in Figure 18.16.

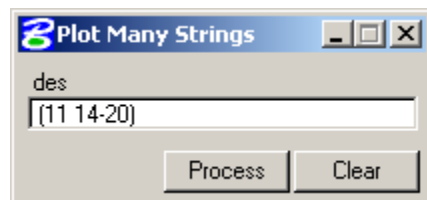


Figure 18.16: Plot Many Strings Dialogue Box

Example:

Group of figure's (des) (11 14-20)

This example would plot figures 11 and 14 through to 20 as linestrings.

Related Commands:

Plot Shape, Plot Many Shapes, Plot String.

18.11 Plot Point Annotation

Description:

This command plots a text string as annotation by the specified point.

Procedure:

1. Either select the **[Plot/Anno] - [Plot Point Annotation]** on the main pulldown menu or keyin the command "**Plot Point Annotation** <cr>".
2. Either keyin or graphically pick from the view the point "p" to be annotated.
3. Enter the text string the point will be annotated with.

Input Items:

| | |
|---------|---|
| p | Point to be annotated. |
| desTEXT | The text string to be annotated on the point. |

Dialogue Box:

The Plot Point Annotation dialogue box will appear as shown in Figure 18.17.

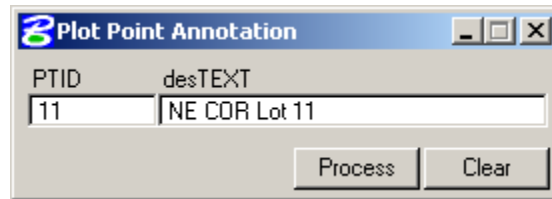


Figure 18.17: Plot Point Annotation Dialogue Box

Example:

| | |
|-----------------------|---------------|
| Point (p) | 11 |
| Text string (desTEXT) | NE COR Lot 11 |

This example would plot text annotation "NE COR Lot 11" on the point "11".

Related Commands:

Plot Point Annotation, Annotate Figure.



GWN-COGO has the ability to store, maintain and plot point information with each point.

18.12 Annotate Area

Description:

This command computes the area defined by consecutive points in the description “des” and plots the area annotation text string, placed at the centroid of the polygon.

Plotting characteristics depend on text annotation parameters. e.g.:size, font, etc..

Imbedded curves are handled but spirals are not.

Multiple figures will be treated as a single figure if they are enclosed in square brackets.

Procedure:

1. Either select the [Plot/Anno] - [Annotate Area] on the main pulldown menu or keyin the command “**Annotate Area** <cr>”.
2. Either keyin or graphically pick from the view the figure or group of points “des” to be annotated.

Input Items:

des The figure or group of points to be annotated.

Dialogue Box:

The Annotate Area dialogue box will appear as shown in Figure 18.18.

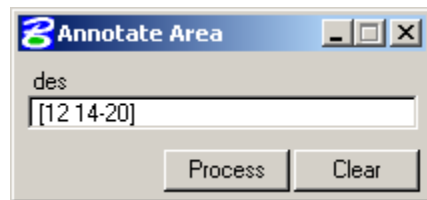


Figure 18.18: Annotate Area Dialogue Box

Example:

Group of figure ID's (des)

[12 14-20]

This example would calculate the area contained in the figures indicated then annotate the area in the center of these figures. This is shown in Figure 18.19 following.

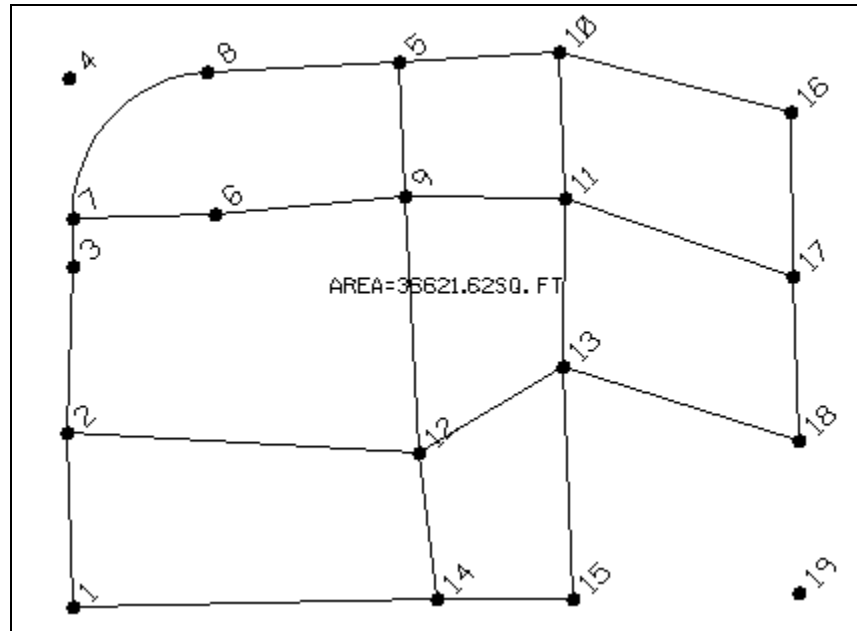


Figure 18.19: Annotate Area Example Results

Related Commands:

Annotate Figure, Annotate Many Areas, List Area.

18.13 Annotate Many Areas

Description:

This command computes the area(s) defined by a figure or group of figures in the description “des” and plots the area annotation text string(s), placed at the centroid of the polygon(s).

Plotting characteristics depend on text annotation parameters. e.g.:size, font, etc..

Imbedded curves are handled but spirals are not.

Multiple figures will be treated as a single figure if they are enclosed in square brackets.

Procedure:

3. Either select the **[Plot/Anno] - [Annotate Many Areas]** on the main pulldown menu or keyin the command “**Annotate Many Areas** <cr>”.
4. Either keyin or graphically pick from the view the figure or group of figures “des” to be annotated.

Input Items:

des The figure or group of figures to be annotated.

Dialogue Box:

The Annotate Many Areas dialogue box will appear as shown in Figure 18.20.

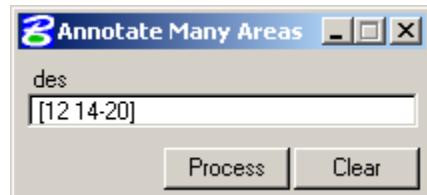


Figure 18.20: Annotate Many Areas Dialogue Box

Example:

Group of figure ID's (des) [12 14-20]

This example would calculate the area contained in the figures indicated then annotate the area in the center of these figures

Related Commands:

Annotate Figure, Annotate Area, List Many Areas.

18.14 Annotate Figure

Description:

This command plots the figure description “des” at the centroid of the figure “fgn”.

Plotting characteristics depend on the text annotation parameters.

Procedure:

1. Either select the **[Plot/Anno] - [Annotate Figure]** on the main pulldown menu or keyin the command “**Annotate Figure** <cr>”.
2. Either keyin or graphically pick from the view the figure “fgn” to be annotated.
3. Enter the text string the figure will be annotated with.

Input Items:

| | |
|-----|--|
| fgn | Figure to be annotated. |
| des | The text string to use for annotation at the centroid of the figure. |

Dialogue Box:

The Annotate Figure dialogue box will appear as shown in Figure 18.21.

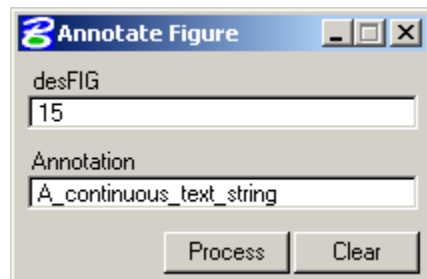


Figure 18.21: Annotate Figure Dialogue Box

Example:

Figure ID (fqn) 15
Text string (des) A_continuous_text_string

Figure 15 will be annotated at its centroid with the text string indicated. This is shown in Figure 18.22 following.

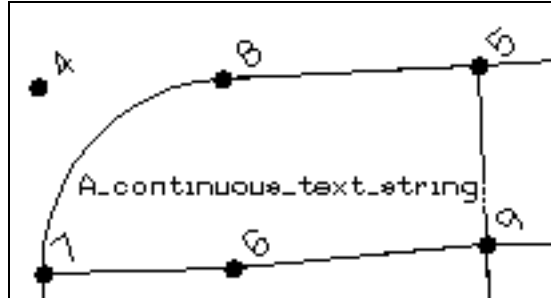


Figure 18.22: Annotate Figure Example Results

Related Commands:

Annotate Area, Annotate Coordinates.

18.15 Annotate Coordinates

Description:

This command plots point coordinates annotation as specified by the user.

The user can control output by setting the coordinates sequence parameters to one of those as listed in Table 18.1 below.

| | | |
|-----|-------|---|
| 1. | NE | Northing followed by Easting |
| 2. | EN | Easting followed by Northing |
| 3. | Z | Elevation only |
| 4. | NEZ | Northing followed by Easting and Elevation |
| 5. | ENZ | Easting followed by Northing and Elevation |
| 6. | NE I | Northing followed by Easting and Point Information |
| 7. | EN I | Easting followed by Northing and Point Information |
| 8. | Z I | Elevation followed by Point Information |
| 9. | NEZ I | Northing followed by Easting, Elevation and Point Information |
| 10. | ENZ I | Easting followed by Northing, Elevation and Point Information |
| 11. | I | Point Information |

Table 18.1: Annotation Coordinate Order

Those settings with “Point Information” must have the length of the Point Information as set in the Feature Table prior to running “New Job” at a number divisible by 4.

Plotting characteristics depend on text annotation parameters.

A suggested setting for justification would be LB, LC or LT when the text annotation rotation is from 0 to 90 degrees or 270 to 360 degrees.

Text annotation justifications RB, RC or RT should be used when text rotation angles are from 90 to 270 degrees.

The coordinate precision may be specified by the “Coordinate Annotation Format”.

The coordinate text will be prefaced by text as specified in “Parameter Annotation Units”. (i.e.:Northing will be prefaced by text in the twelve character “Northing Annotation Prefix”)

Procedure:

1. Either select the **[Plot/Anno] - [Annotate Coordinates]** on the main pulldown menu or keyin the command **“Annotate Coordinates <cr>”**.
2. Either keyin or graphically pick from the view the figure or group of points “des” to annotate.

Input Items:

des Figure or group of points to annotate.

Dialogue Box:

The Annotate Coordinates dialogue box will appear as shown in Figure 18.23.

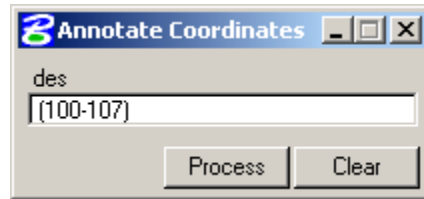


Figure 18.23: Annotate Coordinates Dialogue Box

Example:

Group of points to annotate (des) (100-107)

The points 100 through to 107 will be annotated as set in the [Utilities] - [Parameter File] - [Annotation Formats] - [Text Annotation] dialogue box. For this example, each of the points will be annotated in one of a variety of the formats as listed in Table 18.1. These can be seen in Figure 18.24 below.

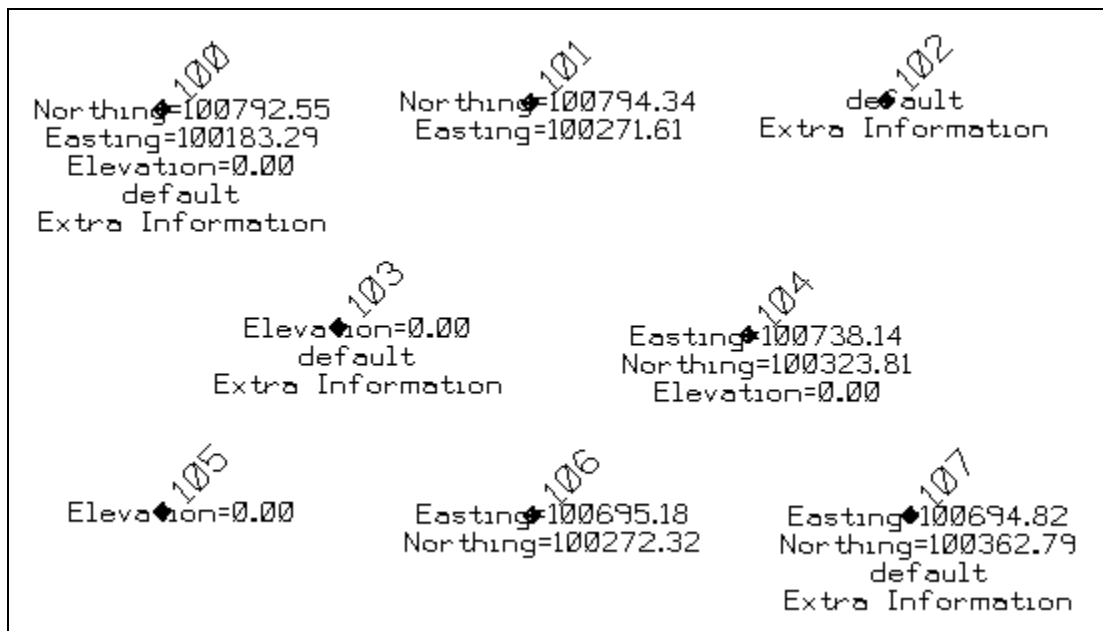


Figure 18.24: Annotate Coordinates Example Results

Related Commands:

None.

18.16 Annotate Alignment

Description:

This command plots tic marks and text labels for each station as well as the transition points on the alignment.

The alignment may consist of straight lines, circular curves and spirals.

The plotting of tics will depend on the autoplot line setting.

Text will always be perpendicular to the alignment unless the "Always Rotate Annotation" option in the Parameter File has been set to "Yes" which would then cause it to be parallel with the alignment.

Transition points will always be annotated. If the user wants only transition points, specify a large distance interval "dis" that is greater than the entire alignment distance.

All points are enclosed in rounded brackets "()".

Procedure:

1. Either select the **[Plot/Anno] - [Annotate Alignment]** on the main pulldown menu or keyin the command **"Annotate Alignment <cr>"**.
2. Either keyin or graphically pick from the view the figure or group of points "des" describing the alignment.
3. Either keyin or graphically pick from the view the distance "dis" for the interval between the stations.
4. Enter the beginning station "sBEG" of the alignment. (e.g.: 1000 is annotated as 10+00) If not specified, the default is 00+00. (optional)
5. Either keyin or graphically pick from the view the length "disTIC" of the tic marks to be placed. If not entered, the default will be 10% the length of the interval. (optional)

Input Items:

| | |
|--------|--|
| des | The figure or group of points forming the alignment. |
| dis | The interval between stations. |
| sBEG | The beginning station of the alignment. (optional) |
| disTIC | The length of the tic. (optional) |

Dialogue Box:

The Annotate Alignment dialogue box will appear as shown in Figure 18.25.

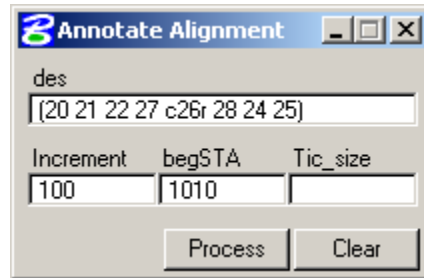


Figure 18.25: Annotate Alignment Dialogue Box

Example:

| | |
|---|-----------------------------|
| Group of points forming the alignment (des) | (20 21 22 27 c26r 28 24 25) |
| Interval between stations (dis) | 100 |
| Beginning station (sBEG) | 1010 |
| Tick length (disTIC) | default of 10% interval |

The points 36 though to 40 will be used as the alignment and stationing, beginning at 0+75, will be placed at 100 unit intervals. This can be seen in Figure 18.26 below.

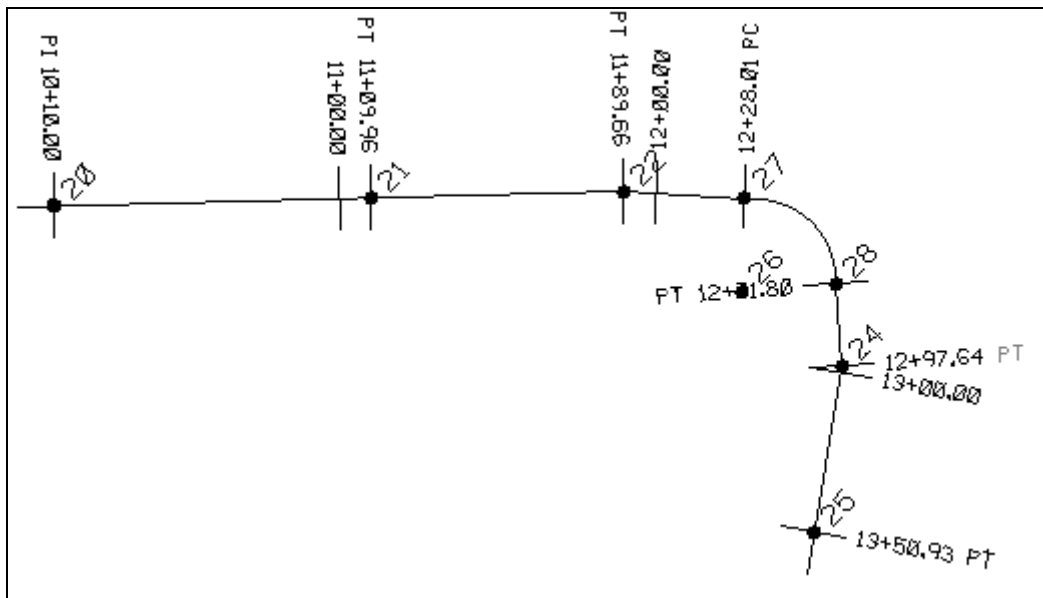


Figure 18.26: Annotate Alignment Example Results

Related Commands:

Annotate Stations, Label Alignment

18.17 Annotate Stations

Description:

This command plots station annotation on points in reference to a base alignment.

The Offset from the base alignment will be included in the annotation.

Plotting characteristics depend on text annotation parameters.

A suggested setting for justification would be LB, LC or LT when the text annotation rotation is from 0 to 90 degrees or 270 to 360 degrees.

Text annotation justifications RB, RC or RT should be used when text rotation angles are from 90 to 270 degrees.

All point ID's must be included in rounded brackets "()".

Procedure:

1. Either select the **[Plot/Anno] - [Annotate Stations]** on the main pulldown menu or keyin the command "**Annotate Stations** <cr>".
2. Either keyin or graphically pick from the view the figure or group of points "desAL" of the alignment (upon which all following parameters are based).
3. Enter the station number of the first station "sAL" on the alignment. (e.g.: 1500 will be annotated as 15+00 depending on units of measurement used)
4. Either keyin or graphically pick from the view the figure or group of points "desBASE" which are to be annotated and which must exist in the design file.

Input Items:

| | |
|---------|---|
| desAL | Figure or group of points used as the base alignment. |
| SAL | First station of the first point in the description "desAL" |
| DesBASE | The figure or group of points to be annotated in reference to the base alignment. |

Dialogue Box:

The Annotate Stations dialogue box will appear as shown in Figure 18.27.

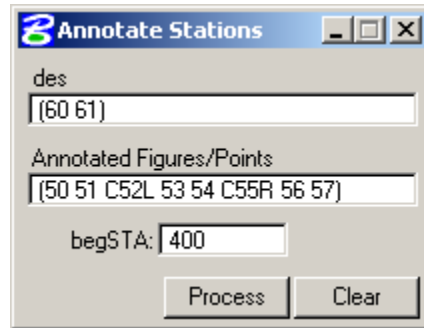


Figure 18.27: Annotate Stations Dialogue Box

Example:

Group of points forming the alignment (des) (60 61)
 First station of the base alignment (sAL) 400
 Group of points to annotate (desBASE) (50 51 C52L 53 54 C55R 56 57)

The points 60 and 61 will be used as the base alignment starting at 04+00. Points 50 to 57 will be annotated in reference to their position (perpendicular) to the base alignment. The offset distance will also be plotted as a negative as it is all to the left of the alignment (in reference to the base description). This can be seen in Figure 18.28 below.

Note that the description need only be those points to be annotated and the curve centers used in this example therefore are not necessary.

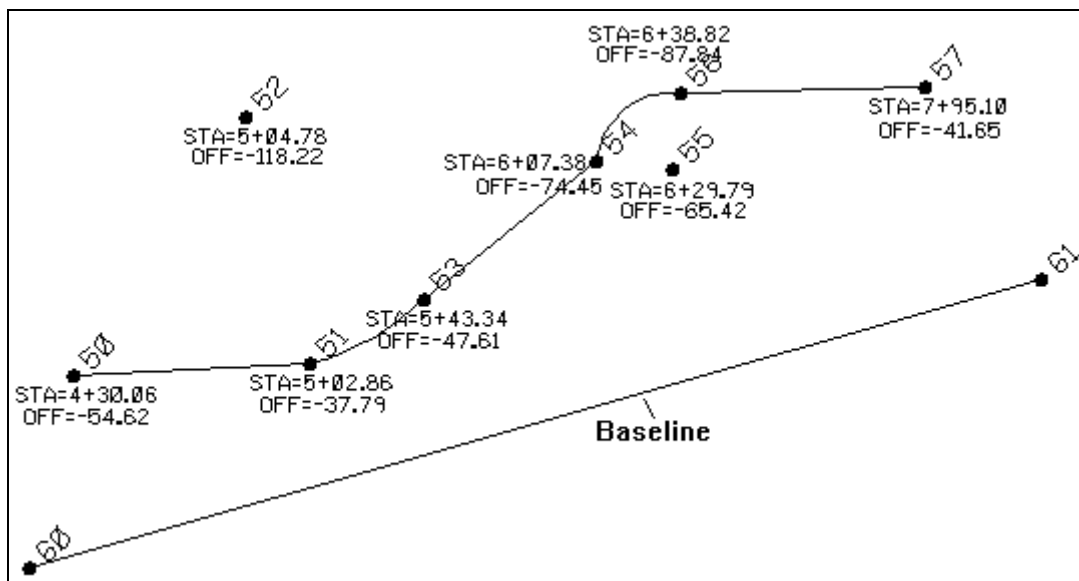


Figure 18.28: Annotate Stations Example Results

Related Commands:

Annotate Alignment.

18.18 Label Alignment

Description:

This command labels a figure or group of points “des” as an alignment with labels at tic marks, interval tic marks at distance “disINT”, the beginning station “sBEG” and length of the tick marks “disTICL”.

If no tic length is specified, the length is 10% of “disLAB”.

Even stations are labels with primary annotation.

Transition points are not labeled.

The plotting of tics will depend on the auto plot line settings.

Text will be perpendicular to the alignment unless the “Always Rotate Annotation” option is set to “Yes” in which case the annotation will be parallel to the alignment.

A negative tic length will place the tic marks on one side of the alignment only.

Minor tics are one half the size of major tics.

All point ID's are included in round brackets “()”.

Procedure:

1. Either select the **[Plot/Anno] - [Label Alignment]** on the main pulldown menu or keyin the command “**Label Alignment** <cr>”.
2. Either keyin or graphically pick from the view the figure or group of points “des” to be labeled.
3. Either keyin or graphically pick from the view the distance “disLAB” between stations.
4. Either keyin or graphically pick from the view the distance “disINT” between minor tic marks.
5. Enter the beginning station number “sBEG”. (e.g.: 500 will be 5+00 depending on units of measurement) (Optional)
6. Either keyin or graphically pick from the view the tick length “disTICL”. (Optional)

Input Items:

| | |
|---------|--|
| des | Figure or group of points to be labeled. |
| disLAB | Distance between stations. |
| disINT | Distance between minor tic marks. |
| sBEG | Beginning station of the alignment. (Optional) |
| disTICL | Length of tic marks to be placed. (Optional) |

Dialogue Box:

If the dialogue box option has been selected in the [Parameter File - Processing Options], the Label Alignment dialogue box will appear as shown in Figure 18.29.

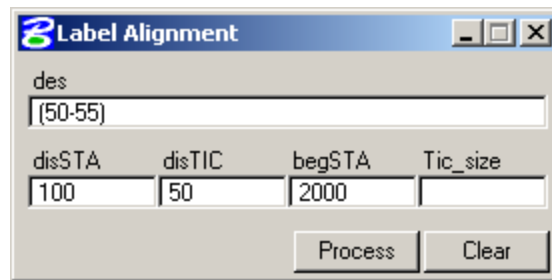


Figure 18.29: Label Alignment Dialogue Box

Example:

| | |
|---|---------|
| Group of points to be labeled (des) | (50-55) |
| Distance between labels (disLAB) | 100 |
| Distance between minor tic marks (disINT) | 50 |
| Beginning station of the alignment (sBEG) | 2000 |
| Length of tic marks (disTICL) | default |

This example uses an interval for label of 100 and one tic between these stations. This can be seen in Figure 18.30 below.

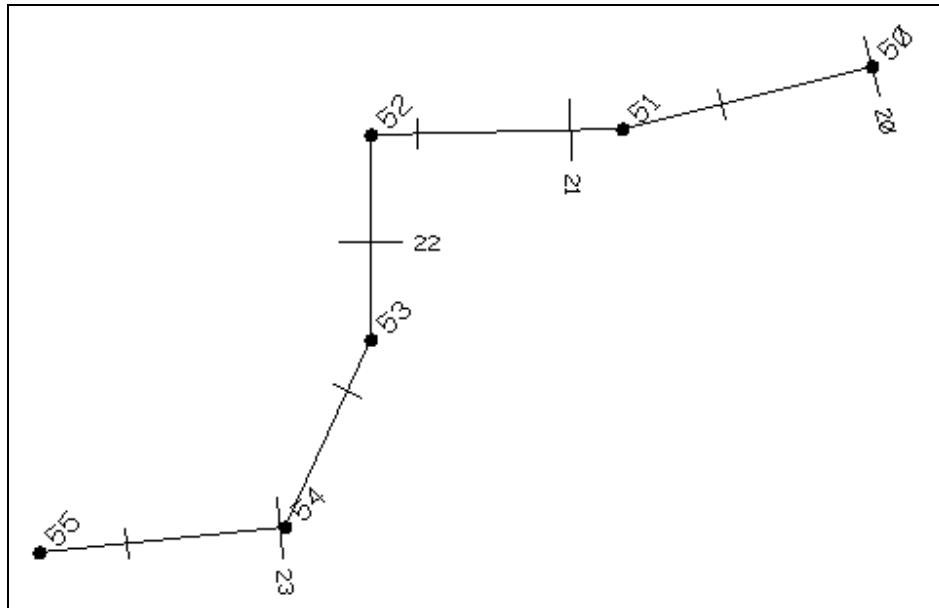


Figure 18.30: Label Alignment Example Results

Related Commands:

Annotate Stations, Annotate Alignment.

18.19 Label Curves

Description:

This command labels curves in a figure or group of points “des” with a curve number starting at “sCurveNum”. This command also produces a curve table report text file, which can be inserted into the drawing file. Text annotation parameters will be used with curve radius placement options.

All point ID's are included in round brackets “()”.

Procedure:

1. Either select the **[Plot/Anno] - [Label Curves]** on the main pulldown menu or keyin the command “**Label Curves** <cr>”.
2. Either keyin or graphically pick from the view the figure or group of points “des” to be labeled.
3. Enter the number of the first curve (subsequent curves will be incremented).

Input Items:

| | |
|-----------|---|
| des | Figure or group of points to have curves labeled. |
| sCurveNum | Number of first curve. |

Dialogue Box:

If the dialogue box option has been selected in the [Parameter File - Processing Options], the Label Curves dialogue box will appear as shown in Figure 18.31.

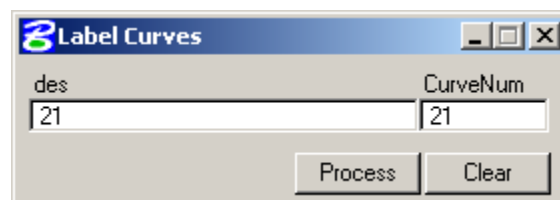
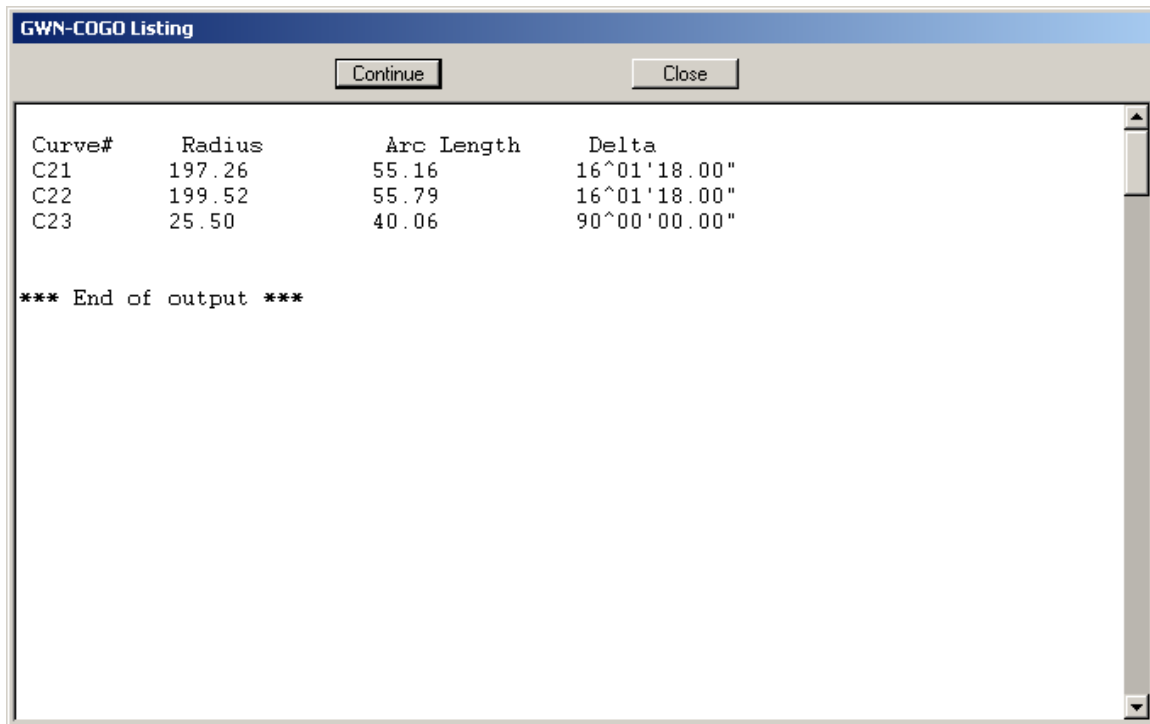


Figure 18.31: Label Curves Dialogue Box

Example:

Figure to be labeled (des) 21
Number of first curve (sCurveNum) 21

The curve report can be seen in Figure 18.32 below.



| Curve# | Radius | Arc Length | Delta |
|--------|--------|------------|--------------|
| C21 | 197.26 | 55.16 | 16^01'18.00" |
| C22 | 199.52 | 55.79 | 16^01'18.00" |
| C23 | 25.50 | 40.06 | 90^00'00.00" |

*** End of output ***

Figure 18.32: Label Curves Example Results

Related Commands:

Describe Alignment, Annotate Alignment.

APPENDIX

A.1 Commands.dat

| | | | |
|------------------------------|----|-----|---|
| Add Point RW | 31 | 926 | n nor eas disLFT disRGT ang |
| Angle Resection | 21 | 68 | n p1 p2 p3 ang1 ang2 |
| Annotate Alignment | 21 | 921 | des dis /sBEG /disTIC |
| Annotate Area | 21 | 911 | des |
| Annotate Coordinates | 21 | 914 | des |
| Annotate Figure | 21 | 915 | fgn desTEXT |
| Annotate Stations | 21 | 922 | desAL sAL desBASE |
| Apply Transformation | 21 | 937 | des |
| Arc Curve | 21 | 26 | pBT pPC nCC r arc |
| Arc Edge | 21 | 905 | nCC pPC pOC pPT |
| Arc Line Intersect | 31 | 22 | n pCC r p1 p2 pID /disOFF /sign |
| Area Directions | 21 | 27 | des |
| Audit Comment | 21 | 930 | des |
| Chord Offset | 21 | 63 | sta sign ang r /dis |
| Compass Closure | 21 | 6 | des pFOC /pLS /pFLS |
| Compute Affine Transform | 31 | 970 | desIN desOUT |
| Compute Helmut Transform | 31 | 971 | desIN desOUT |
| Compute Transformation | 21 | 935 | p ang /disSCLXY /offEAS /offNOR |
| Compute Transform All | 31 | 835 | /offELV |
| Copy | 11 | 906 | p ang angY angX dis dis dis off off off |
| Culdesac | 11 | 966 | des n |
| Culdesac Bend | 21 | 967 | p dir rCS dis r1 n /r2 /disOFF |
| Curve Parts | 21 | 37 | p dir1 dir2 rCS dis1 dis2 r1 n /r2 |
| Deflection Angle | 21 | 76 | disRAD ang disARC disTAN disCHO |
| Delete Point | 21 | 87 | sta sign ang r /dis |
| Delete Figure | 21 | 88 | des |
| Delete Figure Graphically | 31 | 912 | des |
| Describe Alignment | 21 | 69 | des |
| Direction Area Adjustment | 31 | 86 | des dis /sBEG |
| Distance Direction Intersect | 31 | 46 | n p1 dir1 p2 dir2 /disOFF1 /disOFF2 |
| Divide Arc | 21 | 41 | n pCC1 r1 pCC2 r2 pID /sign |
| Divide Line | 21 | 40 | pPC pPT pCC div /n /sign |
| End RW | 21 | 927 | p1 p2 div /n |
| Extend Arc | 21 | 67 | n nor eas disLFT disRGT ang |
| Extract | 1C | 956 | pPC pCC n arc |
| Figure Arc Intersect | 31 | 99 | n /norTOL |
| Figure Figure Intersect | 31 | 100 | n des pCC r pID /disOFF /sign |
| Figure Line Intersect | 31 | 98 | n des des pID /disOFF1 /disOFF2 /sign |
| Figure Table | 2E | 998 | n des p dir pID /disOFG /disOLN /sign |
| Find | 1D | 999 | |

| | | | |
|--------------------------|----|-----|--|
| Fit Alignment | 21 | 968 | |
| Fit Curve | 21 | 106 | nCC pBT pPI r ls1 ls2 defl sign |
| Four Points Intersect | 31 | 19 | pBT pPI pAT nCC /r |
| Interactive Traverse | 21 | 916 | n p1 p2 p3 p4 /disOFF1 /disOFF2 |
| Inverse Directions | 21 | 16 | pBEG pEND |
| Label Alignment | 21 | 957 | des |
| Layout Ties | 21 | 62 | des disLAB disINT /sBEG /disTICL |
| Least Squares Closure | 31 | 7 | pBS pTP des |
| Line Direction Intersect | 31 | 92 | des pFOC |
| Line Offset | 21 | 52 | n p1 p2 p3 dir /disOFF1 /disOFF2 |
| List Alignment TA | 31 | 920 | n pOF p1 p2 |
| List Area | 21 | 933 | des |
| List All Coordinates | 31 | 928 | des |
| List Command Names | 31 | 931 | |
| List Coordinates | 21 | 81 | |
| List Coordinates TA | 31 | 919 | des |
| List Features | 21 | 913 | des |
| List Feature Names | 31 | 932 | feat |
| List Figures | 21 | 82 | |
| List Point Extremes | 31 | 929 | des |
| List Stations | 21 | 964 | |
| List Unused Points | 31 | 965 | desAL sAL desBASE |
| Locate Angle | 21 | 13 | des |
| Locate Deflection | 21 | 14 | pBS pOC nFS ang dis /va /disOFF |
| Locate Direction | 21 | 51 | pBS pOC nFS defl dis /va /disOFF |
| Locate Direction RW | 31 | 924 | dir dis /p /n /va /disOFF |
| Locate From Alignment | 31 | 934 | n dir dis disRGT disLFT |
| Locate Line | 21 | 15 | des n sN /disOFF /sBEG |
| Move | 11 | 907 | p1 p2 n dis /va /disOFF |
| Parallel Area Adjustment | 31 | 923 | des nor eas /z |
| Parallel Line | 21 | 18 | n des area sign pBEG pEND |
| Parallel Figure | 21 | 101 | p1 p2 dis /n |
| Plot | 11 | 901 | des dis n /nfg /angBEG /angEND |
| Plot Cells | 21 | 953 | des |
| Plot Figures | 21 | 902 | des feat |
| Plot Lines | 21 | 903 | des |
| Plot Line Strings | 31 | 955 | des |
| Plot Points | 21 | 904 | des |
| Plot Shapes | 21 | 954 | des |
| Point Area Adjustment | 31 | 78 | des |
| Proportion Arc | 21 | 910 | n des area sign pCO |
| Proportion Line | 21 | 909 | pPC pPT pCC n dsd /sign /n /n /n /n /n |
| Rename | 11 | 908 | p1 p2 n dsd /n /n /n /n /n /n /n /n |
| Reverse Curve | 21 | 124 | des n /n /n /n /n /n /n /n /n |
| Set Angle Correction | 31 | 949 | p1 dir r1 p2 dir r2 nRC /nCT /nC1 /nC2 |
| Set Angle Format Azimuth | 41 | 960 | ang |

| | | | |
|-----------------------------|----|-----|--|
| Set Angle Format Bearing | 41 | 961 | |
| Set Dist Unit Conversion | 41 | 950 | |
| Set Distance Correction | 31 | 951 | disUNIT_CONV |
| Set Echo Off | 31 | 963 | disCORRECTION |
| Set Echo On | 31 | 962 | |
| Set Feature | 21 | 917 | |
| Set Height | 21 | 952 | feat |
| Set List File | 31 | 958 | htINST htTARGET |
| Set Plot Angle Off | 41 | 938 | des |
| Set Plot Angle On | 41 | 936 | |
| Set Plot Arc Annotation Off | 51 | 940 | |
| Set Plot Arc Annotation On | 51 | 939 | |
| Set Plot Distance Off | 41 | 942 | |
| Set Plot Distance On | 41 | 941 | |
| Set Plot Id Off | 41 | 944 | |
| Set Plot Id On | 41 | 943 | |
| Set Plot Line Off | 41 | 946 | |
| Set Plot Line On | 41 | 945 | |
| Set Plot Symbol Off | 41 | 948 | |
| Set Plot Symbol On | 41 | 947 | |
| Simple Curve | 21 | 33 | pBT pPC nCC r ang |
| Simple Spiral | 21 | 53 | pBT pTS nPI ls ang sign |
| Spiral Radius | 21 | 959 | pBT pTS nPI ls r sign |
| Station Offsets | 21 | 66 | desBASE sBASE desCL dis sBEG /sEND |
| Store Elevation | 21 | 900 | p z |
| Store Point | 21 | 5 | n nor eas /z /desINFO |
| Store Point Information | 31 | 987 | p desINFO |
| Store Figure | 21 | 70 | nfg des |
| Store Point Feature | 31 | 925 | n nor eas feat /z /desINFO |
| Store Point RW | 31 | 918 | n nor eas disRGT disLFT ang div |
| Streets Intersect | 21 | 102 | des dis des dis pID n n n n n /sign /r |
| Tangent | 11 | 32 | pCC1 r1 pCC2 r2 /n |
| Tangent Offset | 21 | 56 | sta sign ang r /dis |
| Traverse Directions | 21 | 72 | des |
| Two Directions Intersect | 31 | 48 | n des area sign dir |
| Two Radii Intersect | 31 | 25 | n pCC r p dir pID /disOFF /sign |

A.2 Commands.old

| | | | |
|---------------------------|----|-----|---|
| add point rw | 31 | 926 | n nor eas disLFT disRGT ang |
| angle resection | 21 | 68 | n p1 p2 p3 ang1 ang2 |
| annotate alignment | 21 | 921 | des dis /sBEG /disTIC |
| annotate area | 21 | 911 | des |
| annotate coordinates | 21 | 914 | des |
| annotate figure | 21 | 915 | fgn desTEXT |
| annotate stations | 21 | 922 | desAL sAL desBASE |
| apply transformation | 21 | 937 | des |
| arc arc intersect | 31 | 25 | n pCC1 r1 pCC2 r2 pID /sign |
| arc curve | 21 | 26 | pBT pPC nCC r arc |
| arc edge | 21 | 905 | nCC pPC pOC pPT |
| arc line direction | 31 | 46 | n pCC r p dir pID /disOFF /sign |
| arc line points | 31 | 22 | n pCC r p1 p2 pID /disOFF /sign |
| area directions | 21 | 27 | des |
| audit comment | 21 | 930 | des |
| chord offset | 21 | 63 | sta sign ang r /dis |
| compass closure | 21 | 6 | des pFOC /pLS /pFLS |
| compute affine transform | 31 | 970 | desIN desOUT |
| compute helmut transform | 31 | 971 | desIN desOUT |
| compute transformation | 21 | 935 | p ang /disSCLXY /offEAS /offNOR /offELV |
| compute transform all | 31 | 835 | p ang angY angX dis dis dis off off off |
| copy | 11 | 906 | des n |
| culdesac | 11 | 966 | p dir rCS dis r1 n /r2 /disOFF |
| culdesac bend | 21 | 967 | p dir1 dir2 rCS dis1 dis2 r1 n /r2 |
| curve parts | 21 | 37 | disRAD ang disARC disTAN disCHO |
| define elevation | 21 | 900 | p z |
| deflection angle | 21 | 76 | sta sign ang r /dis |
| delete coordinates | 21 | 87 | des |
| delete figure | 21 | 88 | des |
| delete figure graphically | 31 | 912 | des |
| describe alignment | 21 | 69 | des dis /sBEG |
| direction area adjustment | 31 | 86 | n des area sign dir |
| direction intersect | 21 | 48 | n p1 dir1 p2 dir2 /disOFF1 /disOFF2 |
| divide arc | 21 | 41 | pPC pPT pCC div /n /sign |
| divide line | 21 | 40 | p1 p2 div /n |
| end rw | 21 | 927 | n nor eas disLFT disRGT ang |
| extend arc | 21 | 67 | pPC pCC n arc |
| extract | 1C | 956 | n /norTOL |
| figure arc intersect | 31 | 99 | n des pCC r pID /disOFF /sign |
| figure figure intersect | 31 | 100 | n des des pID /disOFF1 /disOFF2 /sign |
| figure line intersect | 31 | 98 | n des p dir pID /disOFG /disOLN /sign |
| figure table | 2E | 998 | |
| find | 1D | 999 | |
| fit alignment | 21 | 968 | nCC pBT pPI r ls1 ls2 defl sign |

| | | | |
|----------------------------|----|-----|--|
| fit curve | 21 | 106 | pBT pPI pAT nCC /r |
| interactive traverse | 21 | 916 | pBEG pEND |
| inverse directions | 21 | 16 | des |
| label alignment | 21 | 957 | des disLAB disINT /sBEG /disTICL |
| layout ties | 21 | 62 | pBS pTP des |
| least squares closure | 31 | 7 | des pFOC |
| line perpendicular | 21 | 52 | n pOF p1 p2 |
| list alignment ta | 31 | 920 | des |
| list area | 21 | 933 | des |
| list all coordinates | 31 | 928 | |
| list command names | 31 | 931 | |
| list coordinates | 21 | 81 | des |
| list coordinates ta | 31 | 919 | des |
| list features | 21 | 913 | feat |
| list feature names | 31 | 932 | |
| list figures | 21 | 82 | des |
| list point extremes | 31 | 929 | |
| list stations | 21 | 964 | desAL sAL desBASE |
| list unused points | 31 | 965 | des |
| locate angle | 21 | 13 | pBS pOC nFS ang dis /feat /va /disOFF |
| locate deflection | 21 | 14 | pBS pOC nFS defl dis /va /disOFF |
| locate direction | 21 | 51 | dir dis /p /n /va /disOFF |
| locate direction rw | 31 | 924 | n dir dis disRGT disLFT |
| locate from alignment | 31 | 934 | des n sN /disOFF /sBEG |
| locate line | 21 | 15 | p1 p2 n dis /va /disOFF |
| move | 11 | 907 | des nor eas /z |
| parallel area adjustment | 31 | 923 | n des area sign pBEG pEND |
| parallel line | 21 | 18 | p1 p2 dis /n |
| parallel figure | 21 | 101 | des dis n /nfg /angBEG /angEND |
| plot | 11 | 901 | des |
| plot cells | 21 | 953 | des feat |
| plot figures | 21 | 902 | des |
| plot lines | 21 | 903 | des |
| plot line strings | 31 | 955 | des |
| plot points | 21 | 904 | des |
| plot shapes | 21 | 954 | des |
| point area adjustment | 31 | 78 | n des area sign pCO |
| points direction intersect | 31 | 92 | n p1 p2 p3 dir /disOFF1 /disOFF2 |
| points intersect | 21 | 19 | n p1 p2 p3 p4 /disOFF1 /disOFF2 |
| proportion arc | 21 | 910 | pPC pPT pCC n dsd /sign /n /n /n /n /n |
| proportion line | 21 | 909 | p1 p2 n dsd /n /n /n /n /n /n /n /n /n |
| rename | 11 | 908 | des n /n /n /n /n /n /n /n /n /n |
| reverse curve | 21 | 124 | p1 dir r1 p2 dir r2 nRC /nCT /nC1 /nC2 |
| set angle correction | 31 | 949 | ang |
| set angle format azimuth | 41 | 960 | |
| set angle format bearing | 41 | 961 | |

| | | | |
|-----------------------------|----|-----|--------------------------------------|
| set dist unit conversion | 41 | 950 | disUNIT_CONV |
| set distance correction | 31 | 951 | disCORRECTION |
| set echo off | 31 | 963 | |
| set echo on | 31 | 962 | |
| set feature | 21 | 917 | feat |
| set height | 21 | 952 | htINST htTARGET |
| set list file | 31 | 958 | des |
| set plot angle off | 41 | 938 | |
| set plot angle on | 41 | 936 | |
| set plot arc annotation off | 51 | 940 | |
| set plot arc annotation on | 51 | 939 | |
| set plot distance off | 41 | 942 | |
| set plot distance on | 41 | 941 | |
| set plot id off | 41 | 944 | |
| set plot id on | 41 | 943 | |
| set plot line off | 41 | 946 | |
| set plot line on | 41 | 945 | |
| set plot symbol off | 41 | 948 | |
| set plot symbol on | 41 | 947 | |
| set point info | 31 | 987 | p desINFO |
| simple curve | 21 | 33 | pBT pPC nCC r ang |
| simple spiral | 21 | 53 | pBT pTS nPI ls ang sign |
| spiral radius | 21 | 959 | pBT pTS nPI ls r sign |
| station offsets | 21 | 66 | desBASE sBASE desCL dis sBEG /sEND |
| store | 11 | 5 | n nor eas /z /desINFO |
| store figure | 21 | 70 | nfg des |
| store point feature | 31 | 925 | n nor eas feat /z /desINFO |
| store point rw | 31 | 918 | n nor eas disRGT disLFT ang div |
| streets intersect | 21 | 102 | des dis des dis pID n n n n /sign /r |
| tangent | 11 | 32 | pCC1 r1 pCC2 r2 /n |
| tangent offset | 21 | 56 | sta sign ang r /dis |
| traverse directions | 21 | 72 | des |

A.3 Changes To Command Names

In an effort to simplify the GWN-COGO learning process and streamline all of GWN's product line, some changes have been made to certain command line names, both in the pulldown menu as well as the key-in command. This necessitates the need for the alternative to allow users to be able to select which process they would prefer; to adjust to the new standard set with Version 4 GWN-COGO or to retain the original command name selection to allow old batch files and associated information to be retained in an unchanged format.

To aid the user in the changeover, this section details the changes made so that the process will be more painless.

Commands:

| Old Command Name | New Command Name |
|----------------------------|------------------------------|
| arc arc intersect | Two Radii Intersect |
| arc line direction | Distance Direction Intersect |
| arc line points | Arc Line Intersect |
| define elevation | Store Elevation |
| delete coordinates | Delete Point |
| direction intersect | Two Directions Intersect |
| line perpendicular | Line Offset |
| points direction intersect | Line Direction Intersect |
| points intersect | Four Points Intersect |
| set point info | Store Point Information |

To revert to the old version of the command names (GWN-COGO Version 4 is sent with the new commands as the default), simply copy the file "Commands.old" in the "\GWN_COGO " subdirectory to the new default name "Commands.dat". A copy of the new commands may be saved prior to this by copying them to another name such as "Commands.new".

```
e.g.: C:\GWN_COGO\> copy commands.dat commands.new <cr>
      C:\GWN_COGO\> copy commands.old commands.dat <cr>
```

A.4 Manual Restore Of Backed Up Files

To perform a DOS environment restoration of files backed up using either the [Parameter File] - [Processing Options] - [Automatic File Backup] option or the [Utilities] - [Backup] command on the pulldown bar.

If the pulldown "Backup" command is used, the design file will be copied to another file name. The design file is not copied with the "Automatic File Backup" option.

Table A1 compares the backed up file names with their original names. To perform the restore of each individual file, enter the following at the DOS command line while in the directory where the files reside.

```
C:\GWN_COGO> copy <backup filename>.<ext> <original name>.<ext> <cr>
```

where "<backup filename>.<ext>" is the backed up version of the file and "<original name>.<ext>" is the file name used by GWN-COGO in it's operations.

| Backup file | Original File |
|---------------|---------------|
| <dgnfile>.pbk | <dgnfile>.par |
| <dgnfile>.fbk | <dgnfile>.fig |
| <dgnfile>.dbk | <dgnfile>.dgn |
| <dgnfile>.abk | * audit.fil |
| <dgnfile>.lbk | * list.fil |

Table A1: Backup File Descriptions

"<dgnfile>" is the name of the active design file to which these files are associated. Those files with the "*" are the default file names from the original installation of GWN-COGO. These names will be as defined in the [Parameter File] - [Output Options] dialogue box instead of those listed in the table.

To Restore these files from within the MicroStation - GWN-COGO environment, see Section 10.5 "Backup / Restore".

A.5 Problem Diagnostic Procedures

When encountering processing problems with GWN-COGO, it is likely that one of the following problems has occurred. Before contacting GWN for technical support, it may be to the advantage of the user to find the solution on their own. This will aid in the solution of any repeat occurrences as well as gaining a better understanding of MicroStation and GWN-COGO in their processing of data.

Q: Has this problem ever occurred before?

-If not:?

Recent upgrade in a software package?
New installation of GWN-COGO or MicroStation?
Has the machine used changed?
Has the software been customized?
What has changed in the meantime?

-if so:

What did you do to solve the problem before?
Is the input valid for that text field? (i.e.: angle in distance input)
Have you ever used this command before?

Q: Are you a new user?

-if so:

Has the software been properly installed?
Are the environment variables correctly set up?

Q: Do you suspect a hardware lock problem?

Try a different printer port or remove all other locks temporarily.
Does "DEMO" appear somewhere in the dialogue box?
Try storing a point at xy=0,0 (will not work in demo mode)
Test the lock on a different machine.
If using an evaluation version, evaluation period may have expired.

For Technical Support:

GWN Systems Inc.
Phone: (403) 452-0090
Fax: (403) 453-5207
email: support@gwnsys.ca
Website: www.gwnsys.ca

(Edmonton, Alberta hours of 08:00 to 17:00 Monday to Friday)

A.6 Common Error List And Solutions

Many errors are simply due to the form of the input. That is to say, GWN-COGO expects an angle to be input in any number of ways but forgetting to add a dot "." to the end of a simple input would cause the system to display an error. The order of the data input is defined in the file "Commands.dat" and if modified, the order must match that modification for that command. In such a case, the dialogue boxes may become useless for that same command.

Error reading/writing to a file

- If starting on a project, has "New Job" been run already?
- Are the environment variables which dictate the proper directory to look for files set correctly?
- Has the default directory changed? The Parameter File, figure and point files must exist in the same directory as the design file and that directory must be the default directory from where you start MicroStation.
- Has the Autoexec.bat file been altered? (Path line)
- Are you operating on the same design file that the Parameter File, point and figure table are associated to? (same filename with a different extension)
- If the Parameter File has been corrupted, rename the *.cds, *.fig files, delete the parameter file, run the "Newjob" command then copy the *.cds and *.fig file back to the original name (overwriting the ones created by the "Newjob" command. Finally, set up the parameter file as desired before continuing.

Data parse error with an input

- Check the input string for syntax. (proper prefix if using existing points to determine distance, angle or direction)
- Are the inputs in the right order?
- Is the data valid for such an input?
- Has the "Commands.dat" file been altered in any way?

Unable to "pick" an element from the screen for input

- Was the element drawn with GWN-COGO?
- If trying to pick a figure, was the figure plotted by GWN-COGO? (Try the [Plot Figure] command first then pick from it.)
- Are there more than one element on top of one another? (Try rejecting input as MicroStation scrolls through the data found at that point)
- Try zooming into that area to better define which element is desired.

"Unrecognized Command" error

- Are the environment variables in MicroStation set correctly (either "Uconfig.dat" or "Default.ucf" and check for the proper "\" or "/" slashes.)
- Is there a Parameter File, figure and coordinate file which would be created by the "New Job" command?
- Is the file used in "Batch Processing" from an earlier version of GWN-COGO where some commands had different names?

Graphic info not found

Is the point or figure drawn on the screen? (by GWN-COGO operations)

Is the proper data being deleted?

GLOSSARY

| Item | Description |
|-------------------------|---|
| A | Prefix letter used when defining a direction in combination with two existing point IDs. (i.e.: A 23 45) Lower case letter is also valid. |
| ahead tangent | The point of tangent which is away from a curve. |
| ang | The angle of the measurement |
| angle | An angular measurement taken (CW or CCW) where two lines intersect. |
| audit trail file | A file generated by GWN-COGO containing all valid COGO commands which have been executed along with the input data for that command. |
| arc | Distance along the arc |
| back tangent | The point of tangent which is towards a curve. |
| batch mode | A non-graphic processing mode using an ASCII text file for input. |
| CL | Curve to the left. (used as a prefix and suffix for data input i.e.: C23L) |
| COGO | Coordinate geometry based program. |
| <cr> | Symbol used in manual to indicate a carriage return through use of the "Enter" key. |
| CR | Curve to the right. (used as a prefix and suffix for data input i.e.: C23R) |
| CW | Clockwise direction of rotation. |
| CCW | Counter-clockwise direction of rotation. |
| D | Prefix letter used when defining a distance in between (and in combination with) two existing point IDs. (i.e.: D 23 45) Lower case letter is also valid. |
| data field | The component of a command in which the user can specify the data to be used. |
| defl | The angle of the deflection |
| deflection angle | The angle between a line and the extension of the preceding line. |
| des | The figure or group of points used |
| desAL | The figure or group of points for the alignment |

| | |
|-----------------------------|--|
| desBASE | The figure or group of points for the baseline |
| desINFO | The text description field optionally used with the “Store Point” command. |
| desTEXT | The text to be used in the annotation |
| dir | The direction of a line |
| dis | The specified distance between stations |
| disARC | The arc distance subtended by the delta and radius. |
| disCHO | The chord distance subtended by the delta and radius |
| disCORRECT | The distance correction factor. |
| disLFT | The distance left from the right of way point. |
| disRGT | The distance right from the right of way point. |
| disSCLXY | The scale factor in X and Y direction |
| disTAN | The tangent of a curve. |
| disUNIT_CONV | The unit conversion factor to be used. |
| div | The number of divisions desired. |
| dsd | A group of distances. |
| eas | The easting of a coordinate |
| far | Sign to select the farthest possible point location for that command. |
| feat | The feature or features to be listed. |
| figure | A list of point numbers which can be used to define a number of points which are to be manipulated together rather than specifying the list of points individually in repeated inputs. |
| forward tangent | The point of tangency where a circular curve ends. |
| G | Prefix letter used when defining an angle in combination with three existing point IDs. (i.e.: G 23 45 17) Lower case letter is also valid. |
| graphics environment | The MicroStation workspace where the design file may be graphically manipulated. |
| GWN | Your best MicroStation application solution company. |

| | |
|-------------------------|--|
| htINST | The height of the instrument. |
| htTARGET | The height of the target. |
| interactive mode | Keyboard input by the user rather than by data files. |
| listbox | A MicroStation dialogue item from which a user may scroll through to select one of a number of items. |
| ls | The length of the spiral: either from pTS to pSC (ls) or from pCS to pST (-ls). |
| n | The ID assigned to the new point that will be defined. |
| nCC | The ID of the point defined by the curve of the curve. |
| near | Sign to select the closest possible location for the point for that command. |
| nfg | The ID of the new figure |
| nor | The northing of a coordinate |
| norTOL | The proximity tolerance for defining points with the "EXTRACT" command. |
| nFS | The ID for the foresight point. |
| nPI | The ID assigned to the point of intersection. |
| occupied point | A turning point from which measurements and calculations are taken and based. |
| option bar | A MicroStation dialogue box item which when selected, presents the user with a number of preset items much in the same way as a pulldown menu works. |
| off | The perpendicular distance from a point in a particular direction. |
| offEAS | Offset in the Easting direction. |
| offEL | Offset in the elevation. |
| offNOR | Offset in the Northing direction. |
| offset | A perpendicular distance from a point on the baseline (or curve) to another point. |
| p | The ID of an existing point. |
| pAT | The ahead tangent that is away from the curve. |

| | |
|--------------------|--|
| pBS | The point used as the backsight. |
| pBT | The back tangent that is towards the curve. |
| PI | Point of intersection. |
| PT | Point of tangency. |
| pCC | The centre of the curve. |
| pCS | The point of the transition from a curve to the spiral. |
| pFLS | The point ID for the field location for pLS. |
| pFOC | The point ID for the last station which is computed from field observation data. |
| pID | The poin indicates the intersection to be selected when there is more than one possible. |
| pLS | The point ID for the known las sighted point. |
| pOC | The point on a curve from which the measurements are taken |
| pOF | The point of offset perpendicular to a line. |
| pPC | The starting point of a curve from the tangent. |
| pPI | The point of intersection of the tangents. |
| pPT | The turning point. |
| pTS | The tangent to spiral. |
| r | Radius of the curve. |
| report file | A file which records all output results from GWN-COGO execution and which optionally, may record input and errors. |
| s | A station designation. |
| sAL | The first station ending the center line alignment. |
| sBEG | The station beginning the center line alignment. |
| SCL | Spiral curve left. (used in the prefix/suffix description with a point ID i.e.: SC24L) |
| SCR | Spiral curve right. (used in the prefix/suffix description with a point ID i.e.: SC24R) |

| | |
|-------------------------|--|
| sEND | The station ending the center line alignment. |
| sign(1) | The direction of the curve (1 for clockwise and -1 for counter clock wise) |
| sign(2) | The option of input for the OFFSET command (1 for PI and 2 for PC) |
| slope distance | The distance between any two poinjts in a 3D space. |
| spiral in | A transition spiral going from a line to a circle by a decreasing radius. |
| spiral out | A transition spiral going from a circle to a line by an increasing radius. |
| tangent distance | The horizontal distance along the baseline from a turning point to another point. |
| text field | A MicroStation dialogue box item where a user may insert alphanumeric inputs to be processed. |
| TSL | Tangent to the spiral left. (used in the prefix/suffix description with a point ID i.e.: TS25L) |
| TSR | Tangent to the spiral right. (used in the prefix/suffix description with a point ID i.e.: TS25R) |
| Va | The vertical angle |
| Z | The elevation of a point. |

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