

# **TOPOGRAPHER OVERVIEW**

## **A Brief Discussion about ARICAD Topographer**

### CHAPTER OVERVIEW:

The TOPOGRAPHER system is designed to create contour maps and 3D surface models from raw XYZ data. Data may originate as surveying data, USGS data, or be generated by the user. Also, once a “before and after” model has been created of a particular site, it is possible to perform cut and fill calculations.

Practical applications are in analyzing, designing, or modifying terrain models to create accurate contour maps and to perform cut and fill calculations.

ARICAD Topographer includes a demonstration which does an excellent job of describing the typical sequence of events used to perform all calculations and operations available. The last chapter in this manual fully describes each step of the demonstration. To run the demonstration, enter ARRIS, load the application ‘ARICAD Topographer’, and finally, execute the the Topographer main menu function titled ‘DEMO’.

***Note:** It is important to note that ARRIS database layers are created automatically within the ARICAD Topographer application. Due to the nature of this application it is necessary for layers to have pre-defined names. To most easily accomplish this task, layers will be created and named as necessary (other user-created layers will co-exist without conflict).*

## **Menus contained in the TOPOGRAPHER OVERVIEW section**

- MAIN...Main menu for TOPOGRAPHER
- IMPORT...Import a custom data file menu
- LAYER...Layer edit menu
- LAYMOD...Layer mode selection menu
- DISP...Select views and display menu
- STAT...Status menu

## ◇ MAIN

Main menu for TOPOGRAPHER

**TOPO -> MAIN**    **TOPO TO MAIN**

Load the MAIN ARRIS menu, ‘\_MAIN’.

### POINT DATA

Loads the Point Data Overwrite Menu - TP\_DATA. Allows input of data reference points (spot elevations) into the point data layer. This is typically the first step in the construction process within Topographer. Functions located on the POINT DATA menu which allow for importing point data from a variety of sources.

### CONSTRUCT

Loads the Construction Overwrite Menu. Construction options are presented, such as 2D & 3D grids, and contour ring generation.

### CUT & FILL

Loads Cut & Fill Overwrite Menu. Allows selection of cut & fill features.

### CONTOURS

Loads Contour Overwrite Menu. Functions located on this menu provide for manually drawing contours, editing and labeling contour lines. Typically, contour lines are generated as part of the CONSTRUCT process but it is also possible to draw contour lines manually.

### SURVEY

Loads Survey Overwrite Menu. Functions located on this menu provide for adding survey lines to your drawing.

### FILE IMPORT

Convert data from a Custom File and output to a standard Topographer XYZ Data File. Custom Files may have been generated from a data collector or from other sources.

### LAYER

Loads the Topographer Layer Edit Menu. Allows selection of layer names and modification of layer status. This menu also allows for copying all the ORIGINAL data to

ARICAD	
TOPO -> MAIN	
POINT DATA	
CONSTRUCT	
CUT & FILL	
CONTOURS	
FILE IMPORT	LAYER
DISP	SURVEY
UTIL	DEMO

the CUT & FILL layers. Once copied, the CUT & FILL data points can be modified or added to as the start to performing cut and fill calculations.

## **DISP**

Loads the Display Overwrite Menu. Selection of display modes are presented.

## **UTIL**

Loads the Topographer Utility Overwrite Menu. Functions currently located on this menu provide for elevating ARRIS repeated items to their respective Z-height (based on topography) and querying the Z-height at any location on the processed topo model.

## **DEMO**

Enter demonstration mode. A sample set of random data reference points will be generated. See the DEMONSTRATION chapter for further information.

***Note:** For the demonstration to run, the current database will be unloaded.*

## ◇ **IMPORT**

### Import a custom data file menu

*Menu IMPORT - Convert data from a Custom File and output to a standard Topographer XYZ Data File. Custom Files may have been generated from a data collector, or obtained from other sources.*

**Note:** IMPORT FILES (Custom Files) being read by this feature must be in an ASCII format.

TOPOGRAPHER FILE IMPORT	
IMPORT FILE PARAMETERS	
FIELD DELIMITER	,
LABEL LOCATION	N/A
X LOCATION	FIELD 2
Y LOCATION	FIELD 3
Z LOCATION	FIELD 4
FILE NAMES	
IMPORT FILE	NONE
OUTPUT FILE	NONE
COMMANDS	
SAVE PARAMETERS	PROCESS FILE

## **IMPORT FILE PARAMETERS**

### **FIELD DELIMITER**

Define the delimiter for the custom import file. The delimiter is the character(s) used to separate fields of data. Blank spaces and tabs preceding or following a delimiter need not be included as part of the delimiter.

WHITE SPACE refers to a delimiter composed of spaces and tabs only, either single or multiple. This will appear as a delimiter option on the menu.

### **LABEL LOCATION**

Define the field number in the custom import file representing the label (reference number) for each co-ordinate. This is an optional field. 'N/A' stands for NOT APPLICABLE.

### **X LOCATION**

Define the field number in the custom import file representing the X co-ordinate data.

### **Y LOCATION**

Define the field number in the custom import file representing the Y co-ordinate data.

### **Z LOCATION**

Define the field number in the custom import file representing the Z co-ordinate data.

## **FILE NAMES**

### **IMPORT FILE**

Specify the custom import file name.

Custom Files used for this feature should be given the prefix 'tx.tpc'. Custom Files with this prefix are presented as menu choices.

### **OUTPUT FILE**

Specify the TOPOGRAPHER data file to be created.

This OUTPUT FILE name will automatically update whenever the IMPORT FILE name is specified.

The OUTPUT FILE name will be based on the IMPORT FILE name with 'tpi' replacing 'tpc'.

If 'tpc' does not appear in the IMPORT FILE name, 'tpi' will be inserted into the OUTPUT FILE name.

Examples:

IMPORT FILE Name — Data File Name created by system

---

tx.tpcname — tx.tpiname

tx.name — tx.tpiname

TOPOGRAPHER recognizes files with the 'tx.tpi' prefix as being XYZ Data Files of the correct format, although it is not absolutely necessary for processing. The user may rename the OUTPUT FILE if some other naming convention is desired.

## **COMMANDS**

### **SAVE PARAMETERS**

The parameters on this menu will be saved and will become the system defaults.

This information is saved in the user's directory in the file: '/dir.topo/tx.tp\_convert'.

## **PROCESS FILE**

This command performs the actual data conversion. The graphics screen may go blank for the duration of the file conversion.

Once a Custom File has been converted, use the newly created OUTPUT FILE for the TOPOGRAPHER options.

## ◇ LAYER

### Layer edit menu

*Menu LAYER - Edit Topographer processing layers, layer names, and layer modes.*

## PROCESSING COMMANDS

### PROCESSING LAYERS

TOPOGRAPHER LAYER EDIT		
PROCESSING LAYERS	ORIGINAL	DATA COPY TO CUT & FILL
DESCRIPTION	ORIGINAL LAYERS	CUT & FILL LAYERS
POINT DATA	tp_data	tp_mdata
2D GRID	tp_2dgrd	tp_m2dgr
3D GRID	tp_3dgrd	tp_m3dgr
CONTOUR	tp_topo	tp_mtopo
LAYER MODE	EXIT	EXIT W/DISP

Select one of two layer sets to process, either 'original' or 'cut & fill'. Original is selected by default and should be chosen for normal processing. After the original data has been processed, the cut & fill layer set may be chosen, modified as necessary, and processed.

### DATA COPY TO CUT & FILL

Copies the original data points from the original point data layer to the cut & fill point data layer. The cut & fill point data layer may then be modified as necessary.

## LAYER DESCRIPTIONS

### POINT DATA

The Point Data layer contains user definable XYZ reference points. When Point Data is chosen as the construction method, Topographer will use these points for processing.

This layer is unused when construction methods other than Point Data are used. These other methods obtain their data directly from a file or some other data base layer.

### 2D GRID

This layer contains the 2D grid if chosen for construction. The 2D grid is primarily used as a visual aid for scale reference. This may enhance the viewing of the topo rings.

### 3D GRID

This layer contains the 3D grid, if chosen for construction. The generated 3D grid represents the bicubic interpolated surface, as generated from the original set of data points. This may be viewed as a wire frame or opaqued surface. Use the options on the Display menu for view selection.

Various coloring schemes are available for the 3D grid construction, such as normal opaquing, color by orientation, and color by inclination. All choices will output to this layer. To save all individual choices, change this layer name between 3D grid selections.

## **CONTOUR**

This layer contains the generated contour lines, if chosen for construction. The contour intervals are determined from the Construction Menus. All contour rings will be constructed in the XY plane. The elevations are stored as flag settings.

This layer may be imported into the ARRIS Site package as a contour layer.

## **LAYER COMMANDS**

### **LAYER MODE**

This command brings up the Layer Modes menu. From here it is possible to view all database layers. The main use of this menu is to turn layer modes on and off.

This feature is also accessible via the 3D Display menu.

### **EXIT W/DISP**

Exit menu and re-display the database.



## **ALL LAYERS**

### **ON**

Turn all layer modes on. The search, edit, and display masks are all modified.

### **OFF**

Turn all layer modes off. The search, edit, and display masks are all modified.

## **EXIT**

### **NO DISPLAY**

Exit the Layer Mode menu with no re-display.

### **RE-DISPLAY**

Exit the Layer Mode menu and re-display the database.

## ◇DISP

Select views and display menu

*Menu DISP - Select views and display options.*

### LAYER

#### LAYER MODE

This command brings up the Layer Modes menu. From here it is possible to view all database layers. The main use of this menu is to turn layer modes on and off.

This feature is also accessible via the Layer Edit menu.

### SET VIEW

#### PLAN

Set plan view. Zoom out on currently selected layers.

#### ISOMETRIC

Set isometric view. Zoom out on currently selected layers.

#### PERSPECTIVE

Set a perspective view.

#### ZOOM WINDOW

Zoom in on a windowed area.

### 3D DISPLAY

#### 3D OPAQUE

Opaque the current view.

**Note:** This function requires the authorization of ARRIS M&R when using ARICAD Topographer with versions of ARRIS prior to v6.0.



### **3D SHADOW**

Opaque and shadow the current view.

***This** function requires the authorization of ARRIS M&R.*

### **HIDDEN LINE**

Create a hidden line display of the current view.

***This** function requires the authorization of ARRIS M&R when using ARICAD Topographer with versions of ARRIS prior to v6.0.*

## ◇STAT

### Status menu

XYF	Rel	Pan	Col	MODE	DATA LAY	CUR HGT	INTERVAL	BASE	HGT FAC	DATA SIZE	EL	LAB	LABEL	DATA	MAP
on	on	1	1	ORIGINAL	tp_data	280'-0"	20'-0"	0"	1'-0"	3'-0"	DFF	DFF	NONE	SYM	MAP

*Menu STAT - Status display menu for Topographer. Fields in this menu are user editable.*

### **CUT AND FILL MODE**

Current mode for cut and fill applications.

Original indicates that the original data is being edited. Modified indicates that the cut & fill data is being edited.

Mode selection may also be made directly from the LAYER menu.

### **DATA LAYER NAME**

Currently selected data layer. The system default is 'tp\_data'. If current processing layers are switched to cut & fill, the current data layer will automatically update to 'tp\_mdata'.

This layer is unused when construction methods other than Point Data are used. These other methods obtain their data directly from a file or some other data base layer.

### **REFERENCE HEIGHT**

Current elevation reference height for digitized/running data input and point edit options.

This feature is also accessible from the Point Data Setup menu.

### **CONTOUR INTERVAL**

Current contour interval for digitized/running data input and point edit options.

This feature is also accessible from the Point Data Setup menu.

### **BASE ELEVATION**

Current base elevation for 3D grid.

This value only effects the 3D grid displays. It does NOT effect actual contour elevations nor cut & fill volume calculations.

This feature is also accessible from the 3D Grid Options menu.

## **HEIGHT SCALE FACTOR**

Current height scale factor for 3D grid. Default value is 1. This value is used to enhance the visual relief of 3D grids.

This value only effects the 3D grid displays. It does NOT effect actual contour elevations nor cut & fill volume calculations.

This feature is also accessible from the 3D Grid Options menu.

## **SYMBOL/TEXT SIZE**

Current symbol/text size for data point display. This value is used for the symbol display size, elevation display text size, and the label display text size.

This feature is also accessible from the Point Data Setup menu.

## **ELEV TEXT DISPLAY**

Elevation text display ON or OFF.

The elevation of each data point may be displayed next to its location. The elevation will be displayed to the right of the data point.

This feature is also accessible from the Point Data Setup menu.

## **LABEL DISPLAY**

Label display ON or OFF.

The label of each data point may be displayed next to its location. The label will be displayed to the left of the data point.

This feature is also accessible from the Point Data Setup menu.

## **LABEL**

This selection defines the label for xyz data points. A label must be a positive integer value, such as 1, 2, 3, 500, etc. NONE means that no label value is defined.

This feature is also accessible from the Point Data Setup menu.

## SEARCH DATA TYPE

This box selects the type of data to be searched for when using the DATA LAYER option under the POINT DATA or CONSTRUCT Overwrite menus. Selections toggle between symbols and repeated items.

See sections 2.1(DATA) and 3.1(CONST) for more information on DATA LAYER.

## MAP TOPO

Selecting this box allows you to place the this application directly on a COMMON menu box.

After mapping the application to the COMMON MENU, you can re-load the application quickly by selecting this box.

**Note:** *If you ever hit the TOPO\APP box and get the message ':tp\_start not found', then you need to load the application directly from the LOAD APP button. This means the SIGMAC file for the application has not been loaded yet.*

**Note:** *There are more than 10 ARCAD applications packages. If you map them ALL to your COMMON menu, you may run out of boxes.*

ARCAD UTILITIES provides a handy function for FLIP/FLOP-ing between sets of COMMON menu functions allowing you 26 or 39 functions on your COMMON MENU.

See your ARCAD dealer if you are interested in using this feature to expand the capabilities of your COMMON MENU.



# **POINT DATA**

## **Point Data Input**

### CHAPTER OVERVIEW:

TOPOGRAPHER Construction allows various methods for data input. One of these is direct graphics input by the user. This method is referred to as POINT DATA and is covered in this chapter.

Other methods include input from a user generated text file, input from an existing layer, USGS data, and input from automated data collectors. These methods are covered in the CONSTRUCTION Chapter.

## **Menus contained in the POINT DATA section**

- DATA...Point Data Overwrite menu
- DSYM...Select symbol for data display

## ◇DATA

### Point Data Overwrite menu

*Menu DATA - Enter X,Y,Z data for spot elevations.*

*Options for generating data points on the Point Data Layer. This layer is one of several ways to input data for Topographer construction. See the Construction Menu section for information on the other input techniques.*

### POINT DATA OPTIONS



#### SET UP

Loads the menu DSYM, the Point Data parameter setup menu. Allows user selection of data point symbol, size, color, and elevation defaults.

#### ERASE

Erase data points and associated labels. You will be prompted to indicated whether to erase an area or all data points.

### POINT INPUT

#### SINGLE

Accept random XYZ co-ordinates directly from the user. The user will be prompted for a new elevation as each point is entered. These co-ordinates will be placed on the Point Data layer.

#### RUN

Accept sequential XYZ co-ordinates directly from the user. The elevation is assumed to be constant and is equal to the current height. Use the F10 key to modify the current height. These co-ordinates will be placed on the Point Data layer.

#### XYZ DATA FILE

Read XYZ co-ordinates from a user definable text file. and place them on the Point Data layer. Text files may have the following entries:

XYZ;(point) - Point value

PNT;(point);label - Point value with label. Labels must be positive integer values.

#:comment - Comment

END - Stops processing, even if additional point values occur after this point.

Data file example:

XYZ;3,4,6

XYZ;3,5,6.5

#: comment line

PNT;5,2,5; 6

END

Text data files used for this feature should be given the prefix 'tx.tpi'. Text files with this prefix are presented as menu choices.

## **DATA LAYER**

Reads entity locations from an existing database layer and uses these locations as XYZ data values. The user will be prompted for an existing layer name. Topographer will accept either all symbol or repeated item locations found on this layer, and generate XYZ data values on the Point Data Layer.

The choice of selecting either repeated items or symbols is controlled from the status menu, under the DATA box.

## **CONTOUR LAYER**

Import an existing ARRIS Contour Layer for input data. The user will be prompted for the Contour Layer name and a minimum tolerance. Values will be transferred to the Point Data Layer.

Any reference point having an XY delta (from the previous reference point) that is less than the minimum tolerance will be ignored.

***Note:** The contour layer must have been created using either the ARRIS Site Design Application or ARICAD Topographer application.*

## **SLOPE DATA**

Loads the menu SLOPE. Functions on the menu are used to quickly enter a user-defined number of data points evenly spaced between two existing points. Z height values will be interpolated between the two points entered.

## **POINT EDIT**

### **ELEV EDIT**

Modify the elevation of reference points to the current height. The user is prompted for choice of single edit or area edit. The current height value appears on the status menu. This value may be modified with the F10 key.








### **LABEL EDIT**

Modify the label of reference points to the current label. The user is prompted for choice of single edit or area edit. The current label appears on the status menu. This value may be modified with the F10 key.

## ◇DSYM

Select symbol for data display

*Menu DSYM - Define data point symbol, size, color, and elevation parameters.*

POINT DATA SETUP				
POINT DATA		ELEVATION		
			CURRENT	280'-0"
			INTERVAL	20'-0"
	USE CURRENT		DISPLAY	
SIZE	3'-0"		ELEVATION	OFF
COLOR	3		LABEL	OFF
LABEL	NONE		DISPLAY REGEN	
			REGEN AREA	REGEN ALL

## POINT DATA

### POINT DATA SYMBOL

Select a symbol (repeated item) to use as a spot elevation indicator. You may choose from those displayed or select the 'USE CURRENT' choice to use the current repeated item as the spot elevation symbol.

### USE CURRENT

Use the currently selected symbol (repeated item) for the spot elevation indicator. Any repeated item may be used as a spot elevation data point.

### SIZE

Select the size for symbol and text display. This value is used for the symbol display size, elevation display text size, and the label display text size.

This feature is also accessible from the Status menu.

### COLOR

Select the color for the symbol, text, and label display.

### LABEL

This selection defines the label for xyz data points. A label must be a positive integer value, such as 1, 2, 3, 500, etc. NONE means that no label value is defined.

This value appears on (and may be modified from) the status menu.

## ELEVATION

### CURRENT

Define the current elevation reference height value. It is used by digitized and running input, and the Point Edit options.

This value appears on the status menu.

## **INTERVAL**

Define the current contour interval. It is used when presenting the user with choices for the next highest and lowest values.

This value appears on the status menu.

## **DISPLAY**

### **ELEVATION**

The elevation of each data point may be displayed next to its location. Text size and color of the elevation display are based on the Point Data SIZE and COLOR options defined above.

This feature toggles ON and OFF.

This value appears on (and may be modified from) the status menu.

### **LABEL**

This feature is used for labeling each xyz data point. Labels must be a non-negative integer value, such as 0, 1, 300, etc. The label will be displayed to the left of the data point. OFF means that no label will appear.

This value appears on (and may be modified from) the status menu.

### **REGEN AREA**

Regenerate elevation and label display for all data points within a user-defined area. All selected data points will be updated to match current parameters.

### **REGEN ALL**

Regenerate elevation and label display for all data points. All data points will be updated to match current parameters.

# **CONSTRUCTION**

## **Construct Grid**

### CHAPTER OVERVIEW:

Topographer construction is based on a set of data points (spot elevations). Various methods for data point collection have been built into the Topographer Package. These include direct graphics input by the user, input from a user generated text file, input from an existing database layer, import from an existing contour layer, USGS 3 second and 30 second data, and direct input from automated data collectors.

## **Menus contained in the CONSTRUCTION section**

- CONST...Construct overwrite menu
- CONXYZ...Construct from Point Data Layer
- CONFIL...Construct directly from data file
- CONLAY...Construct directly from existing layer
- CONSIT...Construct from ARRIS site contour layer
- CON3DE...Construct directly from 3 second data
- CON30D...Construct directly from 30 second data
- GRIDOP...Set 3D Grid display and parameter options
- SLOPE...Add slope lines to point data

## ◇CONST

### Construct overwrite menu

*Menu CONST - Choose input option for Topographer construction.*

## CONSTRUCTION OPTIONS

### POINT DATA

Use the Point Data layer for construction. This layer contains XYZ data values (spot elevations) entered by the user. Creation of this layer is covered in the previous chapter, POINT DATA.

### XYZ DATA FILE

Accepts direct input from a user definable text file containing XYZ data co-ordinates. Text files may have the following entries:

XYZ;(point) - Point value

PNT;(point);label - Point value with label. Labels must be positive integer values.

#;comment - Comment

END - Stops processing, even if additional point values occur after this point.

Text data files used for this feature should be given the prefix 'tx.tpi'. Text files with this prefix are presented as menu choices.

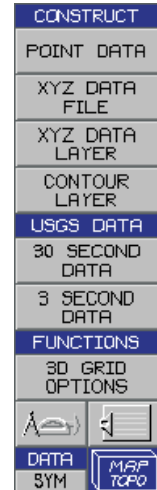
### XYZ DATA LAYER

Direct use of entity locations from an existing database layer. The user will be prompted for an existing layer name. Topographer will search for either repeated items or symbols on that layer, and use these entity locations as the XYZ data values (spot elevations).

The choice of selecting either repeated items or symbols is controlled from the status menu, under the DATA box.

### CONTOUR LAYER

Direct use of an existing contour lines. Contour lines must have been created using either the ARRIS Site Design Application or the ARICAD Topographer Application. The user will be prompted for the contour layer name and a minimum tolerance.



Any reference point having an XY delta (from the previous reference point) that is less than the minimum tolerance will be ignored.

### 30 SECOND DATA FILE

Direct use of 30 degree data file for construction.

Contact your ARRIS dealer for further information.

### 3 SECOND DATA FILE

Direct use of 3 degree data file for construction.

Contact your ARRIS dealer for further information.

## **FUNCTIONS**

### **3D GRID OPTIONS**

Loads the 3D Grid Display Options Menu (GRIDOP). Allows user selection of 3D grid display type, colors, and parameters.

## ◇ CONXYZ

Construct from Point Data Layer

*Menu CONXYZ - Control construction options from Data File Layer.*

## FEATURES

### CONTROL DATA

Allow creation/modification of the Control Data. Control Data is an initial grid of reference points that is generated based on bicubic analysis of the original point data.

The Control Data is not displayed. It is used for construction of the other features, namely the 2D grid, 3D grid, and contours. The Control Data must be generated first, before the other construction features.

### 2D GRID

Allow creation/modification of the 2D grid. The 2D grid is placed in a unique layer. It is primarily used as a visual aid for scale reference, and may enhance the viewing of the topo rings.

### 3D GRID

Allow creation/modification of the 3D grid. The 3D grid is placed in a unique layer. The generated 3D grid represents the bicubic interpolated surface, as generated from the Control Data. This may be viewed as a wire frame or opaqued surface. Use the options on the Display menu.

### CONTOUR

Allow creation/modification of the contour rings. These are generated from the Control Data. The contour rings are placed in a unique layer. Contour intervals are determined by the SPACING function below.

All contour rings will be constructed in the XY plane. The elevations are stored as flag settings. This layer may be imported into the ARRIS Site package as a contour layer.

POINT DATA CONSTRUCTION					
CONTROL DATA		2D GRID	3D GRID	CONTOUR	MAJOR CONTOUR
YES	CREATE	YES	YES	YES	YES
10'-0"	SPACING	10'-0"	5'-0"	10'-0"	100'-0"
	COLOR	28	41	6	24
	PEN	1	6	2	3
METHOD OF CONTROL DATA CREATION					
AVERAGING			STANDARD		
3D GRID DISPLAY MODE : 8 LEVEL SLOPE					
PROCESS AREA			PROCESS ALL		
COMPARE					

## **FUNCTIONS**

### **CREATE**

Create specified entity, YES or NO. The Control Data should be set to YES if the is the first pass, as the other features are generated from this data.

### **SPACING**

#### **CONTROL DATA**

Sets the spacing of one grid unit for the initial Control Data. Keep in mind that the Control Data is not displayed. It is used for construction of the other features.

Spacing that allows anything from approximately a 25X25 to a 50X50 grid will generate reasonable results. The greater the grid resolution, the more accurate the final results will be. The lesser the grid resolution, the more fluid the 3D Grid will appear. The user may want to experiment with this value.

#### **2D & 3D GRID**

Sets the grid spacing of 1 grid unit. A value of 25' would make each grid unit 25' square.

#### **CONTOUR**

Sets the contour interval. A value of 200' would display contour rings at 200' intervals.

### **COLOR**

Sets the color for the function. Note that this does not apply to the Control Data.

## **METHODS**

Method to use for creation of control data.

### **AVERAGING**

Method of control data creation that uses a weighted average to determine the z heights.

### **STANDARD**

Original method of control data creation.

## **COMMANDS**

### **PROCESS AREA**

Proceed with processing for user defined area. The user will be prompted for a rectangular area.

### **PROCESS ALL**

Proceed with processing.

If the Control Data CREATE function is set to 'YES', the processing area will be determined by the rectangular area enclosing all of the data reference points.

If the Control Data CREATE function is set to 'NO', the previously used rectangular area will be used.

***Note:** The processing area defined above determines the physical area that the features will display in. These features include the 2D grid, the 3D grid, and the contour rings.*

All original data reference points entered are always analyzed, even those that may fall outside the processing area. This allows for a more accurate interpretation of the border areas.

### **COMPARE**

Compare the methods of contour creation by looking at the z heights of each point in the original data. The original point is mapped onto the new surface and the difference in that z height from the original z height is added so that an average difference can be determined.

## ◇ CONFIL

### Construct directly from data file

*Menu CONFIL - Control construction options for direct Data File input.*

#### **FILE:**

Select XYZ Data File for direct processing.  
Text files may have the following entries:

XYZ;(point) - Point value

#;comment - Comment

END - Stops processing, even if additional point values occur after this point.

Text data files used for this feature should be given the prefix 'tx.tpi'. Text files with this prefix are presented as menu choices.

XYZ DATA FILE CONSTRUCTION					
FILE:	c:\program files\arris 80\ap\ar10.vn\topo.ap\tp_samp50.tpi				
CONTROL DATA		2D GRID	3D GRID	CONTOUR	MAJOR CONTOUR
YES	CREATE	YES	YES	YES	YES
10'-0"	SPACING	10'-0"	5'-0"	10'-0"	100'-0"
	COLOR	28	41	6	24
	PEN	1	6	2	3
METHOD OF CONTROL DATA CREATION					
AVERAGING			STANDARD		
3D GRID DISPLAY MODE : 8 LEVEL SLOPE					
PROCESS AREA			PROCESS ALL		

## FEATURES

See previous description of CONXYZ Menu for complete details.

### **CONTROL DATA**

Allow creation/modification of the Control Data. Control Data is an initial grid of reference points that is generated based on bicubic analysis of the original point data.

The Control Data is not displayed. It is used for construction of the other features, namely the 2D grid, 3D grid, and contours. The Control Data must be generated first, before the other construction features.

### **2D GRID**

Allow creation/modification of the 2D grid. The 2D grid is placed in a unique layer. It is primarily used as a visual aid for scale reference, and may enhance the viewing of the topo rings.

### **3D GRID**

Allow creation/modification of the 3D grid. The 3D grid is placed in a unique layer. The generated 3D grid represents the bicubic interpolated surface, as generated from the Control

Data. This may be viewed as a wire frame or opaqued surface. Use the options on the Display menu.

## **CONTOUR**

Allow creation/modification of the contour rings. These are generated from the Control Data. The contour rings are placed in a unique layer. Contour intervals are determined by the SPACING function below.

All contour rings will be constructed in the XY plane. The elevations are stored as flag settings. This layer may be imported into the ARRIS Site package as a contour layer.

## **FUNCTIONS**

### **CREATE**

Create specified entity, YES or NO. The Control Data should be set to YES if the is the first pass, as the other features are generated from this data.

### **SPACING**

#### **CONTROL DATA**

Sets the spacing of one grid unit for the initial Control Data. Keep in mind that the Control Data is not displayed. It is used for construction of the other features.

Spacing that allows anything from approximately a 25X25 to a 50X50 grid will generate reasonable results. The greater the grid resolution, the more accurate the final results will be. The lesser the grid resolution, the more fluid the 3D Grid will appear. The user may want to experiment with this value.

#### **2D & 3D GRID**

Sets the grid spacing of 1 grid unit. A value of 25' would make each grid unit 25' square.

#### **CONTOUR**

Sets the contour interval. A value of 200' would display contour rings at 200' intervals.

### **COLOR**

Sets the color for the function. Note that this does not apply to the Control Data.

## **METHODS**

Method to use for creation of control data.

## **AVERAGING**

Method of control data creation that uses a weighted average to determine the z heights.

## **STANDARD**

Original method of control data creation.

## **COMMANDS**

See previous description of CONXYZ Menu for complete details.

## **PROCESS AREA**

Proceed with processing for user defined area.

## **PROCESS ALL**

Proceed with processing.

## ◇ CONLAY

### Construct directly from existing layer

*Menu CONLAY - Control construction options for direct Layer input.*

#### **LAYER:**

Select Data Layer for direct processing.

All points existing on this layer will be extracted and used as Topographer data values for direct processing.

XYZ DATA LAYER CONSTRUCTION					
LAYER :	NONE				
CONTROL DATA		2D GRID	3D GRID	CONTOUR	MAJOR CONTOUR
YES	CREATE	YES	YES	YES	YES
10'-0"	SPACING	10'-0"	5'-0"	10'-0"	100'-0"
	COLOR	28	41	6	24
	PEN	1	6	2	3
METHOD OF CONTROL DATA CREATION					
AVERAGING			STANDARD		
3D GRID DISPLAY MODE : 8 LEVEL SLOPE					
PROCESS AREA			PROCESS ALL		

## FEATURES

### **CONTROL DATA**

Allow creation/modification of the Control Data. Control Data is an initial grid of reference points that is generated based on bicubic analysis of the original point data.

The Control Data is not displayed. It is used for construction of the other features, namely the 2D grid, 3D grid, and contours. The Control Data must be generated first, before the other construction features.

### **2D GRID**

Allow creation/modification of the 2D grid. The 2D grid is placed in a unique layer. It is primarily used as a visual aid for scale reference, and may enhance the viewing of the topo rings.

### **3D GRID**

Allow creation/modification of the 3D grid. The 3D grid is placed in a unique layer. The generated 3D grid represents the bicubic interpolated surface, as generated from the Control Data. This may be viewed as a wire frame or opaqued surface. Use the options on the Display menu. Allow creation/modification of the contour rings. These are generated from the Control Data. The contour rings are placed in a unique layer. Contour intervals are determined by the SPACING function below.

All contour rings will be constructed in the XY plane. The elevations are stored as flag settings. This layer may be imported into the ARRIS Site package as a contour layer.

## **FUNCTIONS**

### **CREATE**

Create specified entity, YES or NO. The Control Data should be set to YES if the is the first pass, as the other features are generated from this data.

### **SPACING**

#### **CONTROL DATA**

Sets the spacing of one grid unit for the initial Control Data. Keep in mind that the Control Data is not displayed. It is used for construction of the other features.

Spacing that allows anything from approximately a 25X25 to a 50X50 grid will generate reasonable results. The greater the grid resolution, the more accurate the final results will be. The lesser the grid resolution, the more fluid the 3D Grid will appear. The user may want to experiment with this value.

#### **2D & 3D GRID**

Sets the grid spacing of 1 grid unit. A value of 25' would make each grid unit 25' square.

#### **CONTOUR**

Sets the contour interval. A value of 200' would display contour rings at 200' intervals.

### **COLOR**

Sets the color for the function. Note that this does not apply to the Control Data.

## **METHODS**

Method to use for creation of control data.

### **AVERAGING**

Method of control data creation that uses a weighted average to determine the z heights.

### **STANDARD**

Original method of control data creation.

## COMMANDS

See previous description of CONXYZ menu for complete details.

### PROCESS AREA

Proceed with processing for user defined area.

### PROCESS ALL

Proceed with processing.

## ◇ **CONSIT**

Construct from ARRIS site contour layer

*Menu CONSIT - Control construction options for direct ARRIS Site Contour Layer input.*

## CONTOUR LAYER

### CONTOUR LAYER

Select Contour Layer for direct processing.  
Contours must have been created using the  
ARRIS Site Design Application or the ARICAD Topographer application.

CONTOUR LAYER CONSTRUCTION					
CONTOUR LAYER	NONE				
CONTROL DATA		2D GRID	3D GRID	CONTOUR	MAJOR CONTOUR
YES	CREATE	YES	YES	YES	YES
10'-0"	SPACING	10'-0"	5'-0"	10'-0"	100'-0"
	COLOR	28	41	6	24
	PEN	1	6	2	3
METHOD OF CONTROL DATA CREATION					
AVERAGING			STANDARD		
3D GRID DISPLAY MODE : 8 LEVEL SLOPE					
TOLERANCE	COMMAND				
10'-0"	PROCESS AREA		PROCESS ALL		

## FEATURES

### CONTROL DATA

Allow creation/modification of the Control Data. Control Data is an initial grid of reference points that is generated based on bicubic analysis of the original point data.

The Control Data is not displayed. It is used for construction of the other features, namely the 2D grid, 3D grid, and contours. The Control Data must be generated first, before the other construction features.

## **2D GRID**

Allow creation/modification of the 2D grid. The 2D grid is placed in a unique layer. It is primarily used as a visual aid for scale reference, and may enhance the viewing of the topo rings.

## **3D GRID**

Allow creation/modification of the 3D grid. The 3D grid is placed in a unique layer. The generated 3D grid represents the bicubic interpolated surface, as generated from the Control Data. This may be viewed as a wire frame or opaqued surface. Use the options on the Display menu.

## **CONTOUR**

Allow creation/modification of the contour rings. These are generated from the Control Data. The contour rings are placed in a unique layer. Contour intervals are determined by the SPACING function below.

All contour rings will be constructed in the XY plane. The elevations are stored as flag settings. This layer may be imported into the ARRIS Site package as a contour layer.

## **FUNCTIONS**

### **CREATE**

Create specified entity, YES or NO. The Control Data should be set to YES if the is the first pass, as the other features are generated from this data.

### **SPACING**

#### **CONTROL DATA**

Sets the spacing of one grid unit for the initial Control Data. Keep in mind that the Control Data is not displayed. It is used for construction of the other features.

Spacing that allows anything from approximately a 25X25 to a 50X50 grid will generate reasonable results. The greater the grid resolution, the more accurate the final results will be. The lesser the grid resolution, the more fluid the 3D Grid will appear. The user may want to experiment with this value.

#### **2D & 3D GRID**

Sets the grid spacing of 1 grid unit. A value of 25' would make each grid unit 25' square.

## CONTOUR

Sets the contour interval. A value of 200' would display contour rings at 200' intervals.

## COLOR

Sets the color for the function. Note that this does not apply to the Control Data.

## METHODS

Method to use for creation of control data.

## AVERAGING

Method of control data creation that uses a weighted average to determine the z heights.

## STANDARD

Original method of control data creation.

## COMMANDS

### TOLERANCE

Minimum tolerance for ARRIS Contour Site layer import. Any reference point having an XY delta (from the previous point on the current contour) less than this value will be ignored.

See description in CONXYZ menu for details on the following:

### PROCESS AREA

Proceed with processing for selected area.

### PROCESS ALL

Proceed with processing.

## ◇ CON3DEG

Construct directly from 3 second data

*Menu CON3DEG - Control construction options for direct 3 second data input.*

### FILE:

Select 3 second data file for data input.

### LONGITUDE EQUIVALENCE

Equivalent feet of 1 longitudinal minute. This value remains constant as the degree of data changes. This value may be modified by the user.

### LATITUDE EQUIVALENCE

Equivalent feet of 1 latitude minute. This value is modified to reflect the degree of data that has been chosen. This value may be modified by the user.

## PROCESSING PARAMETERS

### PROCESSING OFFSET

Select offset of actual starting position from lower left corner of the degree of data. Values specified in minutes.

Specify both NORTH and EAST offsets.

### PROCESSING SIZE

Actual area size of data to be processed. Value is specified in minutes.

Specify both NORTH and EAST areas.

## FEATURES

Unlike other construction techniques, 3 & 30 second data files do not have a Control Data FEATURE listed on the menu. This is because 3 & 30 second data is already in grid format. It is not necessary to pre-process the data.

3 SECOND DATA CONSTRUCTION				
FILE:	NONE			
LON MN ED	6080.65'	LAT MN ED	4691.98'	
PROCESSING OFFSET		PROCESSING SIZE		
N	0.05 MIN	N	7.50 MIN	
E	0.05 MIN	E	7.50 MIN	
	2D GRID	3D GRID	CONTOUR	MAJOR CONTOUR
CREATE	YES	YES	YES	YES
SPACING	10'-0"	5'-0"	10'-0"	100'-0"
COLOR	28	41	6	24
PEN	1	6	2	3
3D GRID DISPLAY MODE : 8 LEVEL SLOPE				
RESOLUTION	COMMAND			
10'-0"	PROCESS			

## **2D GRID**

Allow creation/modification of the 2D grid. The 2D grid is placed in a unique layer. It is primarily used as a visual aid for scale reference, and may enhance the viewing of the topo rings.

## **3D GRID**

Allow creation/modification of the 3D grid. The 3D grid is placed in a unique layer. The generated 3D grid represents the bicubic interpolated surface, as generated from the Control Data. This may be viewed as a wire frame or opaqued surface. Use the options on the Display menu.

## **CONTOUR**

Allow creation/modification of the contour rings. These are generated from the Control Data. The contour rings are placed in a unique layer. Contour intervals are determined by the SPACING function below.

All contour rings will be constructed in the XY plane. The elevations are stored as flag settings. This layer may be imported into the ARRIS Site package as a contour layer.

## **FUNCTIONS**

### **CREATE**

Create specified entity, YES or NO. The Control Data should be set to YES if the is the first pass, as the other features are generated from this data.

### **SPACING**

#### **CONTROL DATA**

Sets the spacing of one grid unit for the initial Control Data. Keep in mind that the Control Data is not displayed. It is used for construction of the other features.

Spacing that allows anything from approximately a 25X25 to a 50X50 grid will generate reasonable results. The greater the grid resolution, the more accurate the final results will be. The lesser the grid resolution, the more fluid the 3D Grid will appear. The user may want to experiment with this value.

#### **2D & 3D GRID**

Sets the grid spacing of 1 grid unit. A value of 25' would make each grid unit 25' square.

## CONTOUR

Sets the contour interval. A value of 200' would display contour rings at 200' intervals.

## COLOR

Sets the color for the function. Note that this does not apply to the Control Data.

## COMMANDS

### RESOLUTION

Increment per unit for control data. Spacing that allows anything from approximately a 25X25 to a 50X50 grid will generate reasonable results. Try values from 1/4 to 1/8 mile. The greater the grid resolution, the more accurate the final results will be. The lesser the grid resolution, the more fluid the 3D Grid will appear. The user may want to experiment with this value.

### PROCESS

Proceed with processing.

The size of the area will be equal to the Processing Size, entered in minutes, above.

## ◇ CON30DEG

Construct directly from 30 second data

*Menu CON30DEG (Fig. 3-7) Control construction options for direct 30 second data input.*

Select 30 second data file for data input.

### LONGITUDE EQUIVALENCE

Equivalent feet of 1 longitudinal minute. This value remains constant as the degree of data changes. This value may be modified by the user.

### LATITUDE EQUIVALENCE

Equivalent feet of 1 latitude minute. This value is modified to reflect the degree of data that has been chosen. This value may be modified by the user.

## PROCESSING PARAMETERS

### PROCESSING OFFSET

Select offset of actual starting position from lower left corner of the degree of data. Values specified in minutes.

Specify both NORTH and EAST offsets.

### PROCESSING SIZE

Actual area size of data to be processed. Value is specified in minutes.

Specify both NORTH and EAST areas.

## FEATURES

Unlike other construction techniques, 3 & 30 second data files do not have a Control Data FEATURE listed on the menu. This is because 3 & 30 second data is already in grid format. It is not necessary to pre-process the data.

See description in CONXYZ menu for details on the following:

30 SECOND DATA CONSTRUCTION				
FILE :	NONE			
LDN MN ED	6080.65'	LAT MN ED	4691.98'	
PROCESSING OFFSET		PROCESSING SIZE		
N	0.05 MIN	N	7.50 MIN	
E	0.05 MIN	E	7.50 MIN	
	2D GRID	3D GRID	CONTOUR	MAJOR CONTOUR
CREATE	YES	YES	YES	YES
SPACING	10'-0"	5'-0"	10'-0"	100'-0"
COLOR				
PEN	1	6	2	3
3D GRID DISPLAY MODE : B LEVEL SLOPE				
RESOLUTION		COMMAND		
10'-0"		PROCESS		

## **2D GRID**

Allow creation/modification of the 2D grid. The 2D grid is placed in a unique layer. It is primarily used as a visual aid for scale reference, and may enhance the viewing of the topo rings.

## **3D GRID**

Allow creation/modification of the 3D grid. The 3D grid is placed in a unique layer. The generated 3D grid represents the bicubic interpolated surface, as generated from the Control Data. This may be viewed as a wire frame or opaqued surface. Use the options on the Display menu.

## **CONTOUR**

Allow creation/modification of the contour rings. These are generated from the Control Data. The contour rings are placed in a unique layer. Contour intervals are determined by the SPACING function below.

All contour rings will be constructed in the XY plane. The elevations are stored as flag settings. This layer may be imported into the ARRIS Site package as a contour layer.

## **FUNCTIONS**

### **CREATE**

Create specified entity, YES or NO. The Control Data should be set to YES if the is the first pass, as the other features are generated from this data.

### **SPACING**

#### **CONTROL DATA**

Sets the spacing of one grid unit for the initial Control Data. Keep in mind that the Control Data is not displayed. It is used for construction of the other features.

Spacing that allows anything from approximately a 25X25 to a 50X50 grid will generate reasonable results. The greater the grid resolution, the more accurate the final results will be. The lesser the grid resolution, the more fluid the 3D Grid will appear. The user may want to experiment with this value.

#### **2D & 3D GRID**

Sets the grid spacing of 1 grid unit. A value of 25' would make each grid unit 25' square.

## CONTOUR

Sets the contour interval. A value of 200' would display contour rings at 200' intervals.

## COLOR

Sets the color for the function. Note that this does not apply to the Control Data.

## COMMANDS

### RESOLUTION

Increment per unit for control data. Spacing that allows anything from approximately a 25X25 to a 50X50 grid will generate reasonable results. Try values of 1 mile or so. The greater the grid resolution, the more accurate the final results will be. The lesser the grid resolution, the more fluid the 3D Grid will appear. The user may want to experiment with this value.

### PROCESS

Proceed with processing.

The size of the area will be equal to the Processing Size, entered in minutes, above.

## ◇ GRIDOP

### Set 3D Grid display and parameter options

Menu GRIDOP (Fig. 3-8) Define options for 3D Grid displays.

## DISPLAY MODES

### **OPAQUE**

Sets the 3D Grid display to be one opaque color. The entire grid, sides included, will be displayed in the chosen color.

Entity color: Entire entity.

This display mode is the system default.

### **4 LEVEL SLOPE**

Selects 3D Grid display based on the inclination of the surface. This option selects 4 pre-defined ranges. The slope of individual grid units is determined by averaging the slope over each grid unit. Surfaces within each range are displayed in its associated color.

Side color: Sides (if selected for display).

Color 1: = 0% through 2%

Color 2: 2% through 8%

Color 3: 8% through 15%

Color 4: 15%

### **8 LEVEL SLOPE**

This option selects 8 pre-defined slope ranges.

Side color: Sides (if selected for display).

Color 1: =0% through 1%

Color 2: 1% through 2%

3D GRID DISPLAY OPTIONS						
DISPLAY MODES						
OPAQUE	4 LEVEL SLOPE	8 LEVEL SLOPE	16 LEVEL SLOPE			
HEIGHT	4 LEVEL EXPOSURE	8 LEVEL EXPOSURE	9 SLOPE & EXPOSURE			
COLOR & PEN SELECTION						
SIDE	41	6	RESET STANDARD COLORS			
DESCRIPTION	COLOR	PEN	DESCRIPTION	COLOR	PEN	
0 - 1%	33	1		49	1	
>1 - 2%	35	1		51	1	
>2 - 4%	37	1		53	1	
>4 - 8%	39	1		55	1	
>8 - 12%	41	1		57	1	
>12 - 15%	43	1		59	1	
>15 - 30%	45	1		61	1	
>30%	47	1		63	1	
DISPLAY PARAMETERS						
SIDE DISPLAY	YES	BASE ELEVATION		0"		
		HEIGHT FACTOR		1.00		

Color 3:	2% through 4%
Color 4:	4% through 8%
Color 5:	8% through 12%
Color 6:	12% through 15%
Color 7:	15% through 30%
Color 8:	30%

### **16 LEVEL SLOPE**

This option selects 16 pre-defined slope ranges.

Side color:	Sides (if selected for display).
Color 1:	=0% through 1%
Color 2:	1% through 2%
Color 3:	2% through 3%
Color 4:	3% through 4%
Color 5:	4% through 6%
Color 6:	6% through 8%
Color 7:	8% through 10%
Color 8:	10% through 12%
Color 9:	12% through 14%
Color 10:	14% through 16%
Color 11:	16% through 20%
Color 12:	20% through 24%
Color 13:	24% through 28%
Color 14:	28% through 32%

Color 15: 32% through 36%

Color 16: 36%

## **HEIGHT**

Selects 3D Grid display based on the height of the surface.

The overall height range will be divided into 8 equal elevation ranges. Color choices 1 through 8 will be used to display these ranges. The lowest range will display in color 1 and the highest range in color 8. Color choice 'side' is used for the side display.

The average height of each grid unit is determined when selecting the color band to use.

## **4 LEVEL EXPOSURE**

Selects 3D Grid display based on the surface compass orientation. The 4 pre-defined orientations are: NORTH, SOUTH, EAST, and WEST. Each orientation encompasses a 90 degree sector.

The exposure of individual grid units is determined by averaging the exposure over each grid unit. Surfaces within each orientation are displayed in its associated color.

North is the direction along the positive Y axis. East is the direction along the positive X axis.

Side color: Sides and zero sloped surfaces.

Color 1: NORTH sector

Color 2: EAST sector

Color 3: SOUTH sector

Color 4: WEST sector

## **8 LEVEL EXPOSURE**

Selects 3D Grid display based on the surface compass orientation. 8 pre-defined orientations exist: N, NE, E, SE, S, SW, W, and NW. Each orientation encompasses a 45 degree sector. Surfaces within each orientation are displayed in its associated color.

North is the direction along the positive Y axis. East is the direction along the positive X axis.

Side color: Sides and zero sloped surfaces.

Color 1:	NORTH sector
Color 2:	NE sector
Color 3:	EAST sector
Color 4:	SE sector
Color 5:	SOUTH sector
Color 6:	SW sector
Color 7:	WEST sector
Color 8:	NW sector

## **SLOPE & EXPOSURE**

Selects 3D Grid display based on a combined inclination and exposure. 4 pre-defined inclination ranges are combined with 4 pre-defined surface orientations.

Surfaces within each grouping are displayed in its associated color.

Side color:	Sides and zero sloped surfaces.
Color 1:	=0% through 2% with NORTH exposure
Color 2:	=0% through 2% with EAST exposure
Color 3:	=0% through 2% with SOUTH exposure
Color 4:	=0% through 2% with WEST exposure
Color 5:	2% through 8% with NORTH exposure
Color 6:	2% through 8% with EAST exposure
Color 7:	2% through 8% with SOUTH exposure
Color 8:	2% through 15% with WEST exposure
Color 9:	8% through 15% with NORTH exposure
Color 10:	8% through 15% with EAST exposure
Color 11:	8% through 15% with SOUTH exposure

Color 12:	8% through 15% with WEST exposure
Color 13:	15% with NORTH exposure
Color 14:	15% with EAST exposure
Color 15:	15% with SOUTH exposure
Color 16:	15% with WEST exposure

## **COLOR SELECTION**

Color Selection is based on the above color schemes. The color descriptions will appear, based on the current display mode selected.

### **RESET STANDARD COLORS**

Reset standard colors. This option does not effect the ENTITY or SIDE color selection. Only the 16 variable colors are reset to standard color selections, based on the default ARRIS color map (sys.colormap). The 1st selection is set to opaquable color 33; the 16th selection to opaquable color 63.

## **DISPLAY PARAMETERS**

### **SIDE DISPLAY**

Display the sides when displaying the 3d grid, YES or NO. The side display is for visual enhancement only. The side depth is not based on base elevation, but is determined by the computer.

### **BASE ELEVATION**

Define the current base elevation for 3D grid. A base elevation of 1000 would subtract 1000 units from each reference point before displaying the grid.

This value only effects the 3D grid displays. It does NOT effect actual contour elevations nor cut & fill volume calculations.

This value also appears on the status menu.

### **HEIGHT FACTOR**

Current height scale factor for 3D grid. Default value is 1. This value is used to enhance the visual relief of 3D grids.

This value only effects the 3D grid displays. It does NOT effect actual contour elevations nor cut & fill volume calculations.

This value also appears on the status menu.

## ◇ **SLOPE**

Add slope lines to point data

*Menu SLOPE (Fig. 3-9) Add data points along the slope of a line.*

SLOPE DATA	
POINTS	10
ADD SLOPE DATA	
ERASE SINGLE	
ERASE AREA	
ERASE ALL	

### **POINTS**

Number of points to add along the line.

### **ADD SLOPE DATA**

This will add the slope data. It will ask for the two points that define the slope and then place the points along that line. This will be helpful when there are areas that seem to be flat, even though they should not be.

### **ERASE SINGLE**

Erase a single slope data point.

### **ERASE AREA**

Erase the slope points within a specified area.

### **ERASE ALL**

Erase all the slope points.

# **CUT & FILL**

## **Cut and Fill functions**

### CHAPTER OVERVIEW:

Topographer includes various cut & fill features. These are based on comparisons between the original data set with a modified (cut & fill) data set. Section graphs, volume calculations, and 3D graphical representations are generated.

## **Menus contained in the CUT & FILL section**

- SECT...Cut & Fill overwrite menu
- SECSHE...Select sectioning sheet parameters
- SECPAR...Select sectioning line parameters
- CUTVOL...Select cut & fill volume parameters
- CUTFIL...Display and format volume calculations
- VOLTXT...Place volume data as ARRIS text

## ◇SECT

### Cut & Fill overwrite menu

*Menu SECT (Fig. 4-1) Cut & Fill functions*

*Cut & Fill routines are dependent on previous processing of both the Original and the Cut & Fill set of layers. Original layers are selected by default and should have been previously processed. After the original data has been processed, the Cut & Fill layers may be selected via the Topographer Layer Edit Menu. After this set of layers has been modified and processed, the Cut & Fill routines on this menu may be accessed.*

CUT & FILL
SHEET SETUP
SECTION SETUP
SECTION CUT
DISPLAY SECTIONS
CLEAR SEC LAYERS
VOLUME

## CUT & FILL

### **SHEET SETUP**

Loads the menu SECSHEET which allows the user to set up sheet specifications for sectioning.

This includes section size and number per sheet.

### **SECTION SETUP**

Loads the menu SECPARM which allows the user to set up sectioning parameters.

This includes section width, frequency, scale, color, and line type.

### **SECTION CUT**

This option will generate the cut sections based on comparisons between the original and cut & fill data.

The user will be prompted for a path line for the section cuts. The path line is thought of as a single line, but may actually be composed of multiple line segments, connected end to end.

This allows for non-linear paths.

### **DISPLAY SECTIONS**

Display current section sheets.

## CLEAR SEC LAYERS

Clear current section and path layers.

## VOLUME

Brings up Volume menu. Volume comparisons of original and cut & fill data are generated. 3D displays by color or volume are also generated.

*Note: Both original and cut & fill processing areas must have been identical. If not, volume comparisons are not possible.*

## ◇ SECSHEET

Select sectioning sheet parameters

Menu SECSHEET (Fig. 4-2) Define sheet parameters for sections.

SHEET SETUP		
	X-AXIS	Y-AXIS
SECTIONS PER SHEET	3	2
SECTION SIZE	12'	8'
SECTION SEPARATION	∅ 1/2"	∅ 1/2"

## SHEET SETUP

### SECTIONS PER SHEET

Define the number of sections to appear per sheet.

X-Axis represents horizontal count.

Y-Axis represents vertical count.

### SECTION SIZE

Size in real world units of individual sections.

X-Axis represents horizontal size. Y-Axis represents vertical count.

Entries of X=12" and Y=8" would generate individual sections of that size.

### SECTION SEPARATION

Separation between sections in real world units.

X-Axis represents horizontal separation. Y-Axis represents vertical separation.

## ◇SECPARM

### Select sectioning line parameters

*Menu SECPARM (Fig. 4-3) Define parameters for creating a contour section line.*

## DRAWING PARAMETERS

### PAPER GRID INCREMENT

Define the number of real world increments that will be used for scale representation. Typically this will be set to 1 inch.

Separate X & Y AXIS values may be specified.

### REPRESENTS

Define number of database units that the above PAPER GRID INCREMENT will represent.

Example:

If the PAPER GRID INCREMENT is set to 1" for both X & Y axis, and REPRESENTS is set to 50' for both X & Y axis, then 1 real world plotable inch will equal 50 database feet.

Separate X & Y AXIS values may be specified.

### TIC SPACE

Define the frequency of grid tic spacing.

Separate X & Y AXIS values may be specified.

## SECTION PARAMETERS

### WIDTH

Define the width (in database units) of the section line.

SECTION SETUP					
DRAWING PARAMETERS			SECTION PARAMETERS		
PAPER GRID INCREMENT	X-AXIS 0 5/64"	Y-AXIS 0 5/64"	WIDTH	500.000	
REPRESENTS	50.000	50.000	INTERVAL	100.000	
TIC SPACE	50.000	50.000			
CONSTRUCTION PARAMETERS					
NUMBER OF DIVISIONS	1	CONSTRUCTION METHOD			
		CONTROL DATA	CONTOURS ONLY		
ELEVATION RANGE					
STARTING ELEVATION	AUTO	ELEVATION RANGE	300.000		
DISPLAY PARAMETERS					
DISPLAY LABELS	yes	COLOR PATH	3	PEN PATH	1
GRID	yes	GRID	29	GRID	1
				TEXT SIZE	0.455
SECTION LINE PARAMETERS					
	COLOR	PEN	LINE		
ORIGINAL	7	1	0		
CUT & FILL	9	1	0		
SECTION TITLE					
			SECTION **		
PATH LAYER			tp_path		
SECTION LAYER			tp_sect		

## **INTERVAL**

Define the interval (in database units) between the section lines.

If the INTERVAL is set to 300' and the section path line is 1000' long, 3 sections will be generated: at 0', 300', and 900' along the section line.

The section line is specified from the main cut & fill menu SECT.

## **CONSTRUCTION PARAMETERS**

### **NUMBER OF DIVISIONS**

Define the number of divisions to do in between each contour line when generating the section cuts. This will only work if the method of construction is set to control data, it does not work with contour only construction.

### **CONSTRUCTION METHOD**

Define the method of construction for the section cuts. This is a choice between: contours only - which will only use the contours to generate the section cuts, and control data - which will use the unit data file as well as the contour lines to generate the section cuts.

## **ELEVATION RANGE**

### **STARTING ELEVATION**

Define the minimum elevation to display on the section graphs. If set to AUTO, the system will figure the necessary minimum elevation.

### **ELEVATION RANGE**

Define the delta elevation range to be displayed on the section graphs. The maximum elevation will be the Starting Elevation plus the elevation range.

## **DISPLAY PARAMETERS**

### **DISPLAY**

Display the grid labels, YES or NO.

Display the grid, YES or NO.

## **COLOR**

Select color for the section path display.

Select the color for the section grid display.

## **PEN**

Select pen number for the section path.

Select pen number for the section grid.

## **TEXT SIZE**

Select the text size for the grid display labels.

## **SECTION LINE PARAMETERS**

### **COLOR**

Select color for section line display. Original and cut & fill data may have different colors.

### **PEN**

Select pen for section line. Original and cut & fill data may have different pens.

### **LINE**

Select line type for section line. Original and cut & fill data may have different line types.

## **TITLE AND LAYER NAMES**

### **SECTION TITLE**

Used to describe the titles for the sections.

A '##' appearing in the title will generate sequential numbering.

Example: 'Section ## - Parcel 8'

This will generate the following sequence of titles:

Section 01 - Parcel 8

Section 02 - Parcel 8

Section 03 - Parcel 8

etc.

## **PATH LAYER**

Layer in which the contour section path will be placed.

## **SECTION LAYER**

Layer in which the contour section lines will be placed.

## **◇ CUTVOL**

### Select cut & fill volume parameters

*Menu CUTVOL (Fig. 4-4) Used to generate volume calculations and volume displays.*

*The commands on this menu work by comparing the original data information with the cut & fill data information. The original area being processed and the cut & fill area must occupy equal X-Y space. That is to say if the original area process was 1000' on a side, the cut & fill area must also be 1000' on a side. Attempting to compare the volume of two models which have different X-Y dimensions would be meaningless.*

*This means that when the control data was constructed, the processing areas selected should have been identical. The control data spacings should also have been identical.*

*An error message will occur if the original and cut & fill processing areas differ.*

### **LAYER NAME**

Define the volume layer name.

This layer is used to construct 3D volume displays.

### **COLORS**

#### **CUT**

Define colors for display of cut areas.

VOLUME GRID			
LAYER NAME			
tp_volumb			
COLORS			
CUT	57	55	49
BASE	39		
FILL	37	35	33
SPACING			
50.000			
COMMAND			
VOLUME CALC	VOLUME DISP		
GRID BY COLOR	GRID BY VOLUME		

3 colors are defined. The depth of cut areas are divided into thirds and mapped to the 3 colors. The first color represents the deepest third.

## **BASE**

Define color for display of base area. This is the region where less than 2% difference occurs.

## **FILL**

Define colors for display of filled areas.

3 colors are defined. The height of filled areas are divided into thirds and mapped to the 3 colors. The last color represents the highest third.

## **SPACING**

Define grid unit spacing for volume displays and calculations.

A spacing of 10' will create grid units 10' square.

## **COMMANDS**

### **FILL**

Calculate volume differential between original and cut & fill data.

Volume calculations are generated based on the SPACING field above. Finer spacing resolution will produce volume calculations of greater precision.

### **VOLUME DISP**

Display cut & fill volume calculations.

Displayed values reflect the most current execution of the VOLUME CALC Command.

### **GRID BY COLOR**

Generate 3D grid showing cut & fill as colors.

The original 3D grid is re-generated, over-layed with the above color values showing the cut & fill areas.

## GRID BY VOLUME

Generate 3D grid showing cut & fill volume by blocks.

Blocks are colored based on the above color values.

## ◇ CUTFIL

Display and format volume calculations

*Menu CUTFIL (Fig. 4-5) Display of Volume Calculation results*

CUT & FILL CALCULATIONS		
CUT VOLUME	511	
FILL VOLUME	0	
NET VOLUME	EXPORT	
	511	
DISPLAY FORMAT		
CUBIC FEET	CUBIC YARDS	CUBIC METERS
COMMANDS		
EXIT	PLACE AS ARRIS TEXT	

## VOLUME

### CUT VOLUME

Display cubic volume of cut area.

### FILL VOLUME

Display cubic Volume of fill area.

### NET VOLUME

Display net volume difference.

IMPORT value indicates a negative net - amount to be imported to the site.

EXPORT value indicates a positive net - amount to be exported from the site.

## COMMANDS

The user may change the units of volume display with the following menu commands. The displayed units will be updated.

### CUBIC FEET

Display output in cubic feet.

### CUBIC YARDS

Display output in cubic yards.

## CUBIC METERS

Display output in cubic meters.

## PLACE AS ARRIS TEXT

Loads the menu VOLTXT. This menu is used to add the volume data to the ARRIS database in the form of ARRIS text.

## ◇VOLTXT

Place volume data as ARRIS text

*Menu VOLTXT (Fig. 4-6) Place Volume Calculation data as ARRIS text*

PLACE VOLUME TEXT		
CUT VOLUME	YES	NO
FILL VOLUME	YES	NO
NET VOLUME	YES	NO
TEXT SIZE	0.465	
PLACE	EXIT	

## CUT VOLUME

Set this parameter to YES or NO to control whether or not the cut volume data will be included when placing the ARRIS text in the current work layer.

## FILL VOLUME

Set this parameter to YES or NO to control whether or not the fill volume data will be included when placing the ARRIS text in the current work layer.

## NET VOLUME

Set this parameter to YES or NO to control whether or not the net volume data will be included when placing the ARRIS text in the current work layer.

## TEXT SIZE

Set the text size, in drafting units, for the text.

## PLACE

Place the selected text strings in the current work layer. The cross hair will be displayed as a box representing the overall size of the text being placed. Position the cross hair and press the F1 key to place the text, press the F10 key to cancel the operation.

# **MANUAL CONTOURS**

## **MANUAL CONTOURS**

Manually input contour data.

### CHAPTER OVERVIEW:

Typically, contours are created as part of the CONSTRUCT process and it is not necessary to input contour data manually. This menu does however provide a number of functions used to both draw and label contour lines.

Contour lines drawn using these functions can be used by the function 'CONTOUR LAYER', located on the CONST menu, as the basis for remaining topographer functions.

Point input is used to construct contour lines. Data is stored with each contour line to be used when labeling the line and when generating either a 3D model or section of a the site.

Functions to label contour lines (whether created automatically or manually) are also located on this menu.

### **Menus contained in the MANUAL CONTOURS section**

- CONT...Manual Contour overwrite menu
- CONLIN...Contour line setup
- CONHGT...Initial contour Z-elevation selection
- CONOP...Contour draw options
- CONLAB...Contour labeling functions
- CONED...Contour and contour label edits
- S\_CONT...Contour status menu

## ◇CONT

### Manual Contour overwrite menu

*Menu CONT (Fig. 5-1) Draw and label contour lines*

#### **SETUP**

Loads the menu CONLIN. The CONLIN menu is used to perform setups prior to drawing contour lines.

#### **DRAW**

Draw contour lines. Prior to entering any contour line end points, the menu CONHGT will be presented. Use this menu to set the height of next contour line drawn.

#### **LABEL**

Loads the menu CONLAB, use this menu to label contour lines.

#### **EDIT**

Edit contour lines and labels. The menu CONED will be loaded upon selection of this function. Located on the CONED menu are a variety of functions used to modify contour lines and labels.

#### **QUERY**



Query a contour line and display the contour data stored with that line. Data includes contour base height and z-elevation.



## ◇ CONLIN

### Contour line setup

Menu CONLIN (Fig. 5-2) Contour line setup.

CONTOUR LINE SETUP		
LINE TYPE		ELEVATION
		CURRENT
	OTHER	0.000
DASH 1	SPACE 1	BASE
0.125	0.125	0.000
DASH TYPE		INTERVAL
normal		10.000

## LINE TYPE

### SOLID LINE

Sets line type 0 as the current line type.

### DASHED LINE

Sets line type 1 as the current line type.

### ANY LINE

Set the line type to any of the available ARRIS line types.

## ELEVATION

### CURRENT

Current elevation for contour lines added to the database. Contour lines are input into the ARRIS database at Z-elevation 0. Actual elevation data is stored on each contour line segment in the format of attributal data.

### BASE

Base height for the contour line. The base height is typically set to a value equal to or less than the lowest contour line in the drawing.

### INTERVAL

The interval value is used to facilitate quick input of contour lines. Options presented while drawing contour lines will use this increment value to provide 'likely' choices for the next contour line drawn.

## ◇ CONHGT

Initial contour Z-elevation selection

*Menu CONHGT (Fig. 5-3) Set contour elevation*

SET ELEVATION	
△	10.000
▽	10.000
CURR	0.000
BASE	0.000
INTR	10.000

### UP ARROW

Increment the CURRENT elevation by the amount represented by the INTERVAL value.

### DOWN ARROW

Decrement the CURRENT elevation by the amount represented by the INTERVAL value.

### CURR

Select the current contour elevation as the elevation to use for the next contour line. Contour lines are input into the ARRIS database at Z-elevation 0. Actual elevation data is stored on each contour line segment in the format of attributal data.

### BASE

Select the base contour elevation as the elevation to use for the next contour line. Base height for the contour line. The base height is typically set to a value equal to or less than the lowest contour line in the drawing.

### INTR

Change the contour elevation interval value. The interval value is used to facilitate quick input of contour lines. Options presented while drawing contour lines will use this increment value to provide 'likely' choices for the next contour line drawn.

## ◇ CONOP

### Contour draw options

*Menu CONOP (Fig. 5-4) Mid-contour draw options*

### NEW LINE ELEV

#### UP ARROW

Increment the CURRENT elevation by the amount represented by the INTERVAL value.

#### DOWN ARROW

Decrement the CURRENT elevation by the amount represented by the INTERVAL value.

#### CURR

Begin drawing a new contour line with an elevation equal to the current elevation.

#### BASE

Begin drawing a new contour line with an elevation equal to the base elevation.

#### INTR

Change the contour elevation interval value. The interval value is used to facilitate quick input of contour lines. Options presented while drawing contour lines will use this increment value to provide 'likely' choices for the next contour line drawn.

### CURRENT LINE

#### CONTINUE

Exit this menu and continue drawing the current contour line.

#### CLOSE

Close the current contour line by connecting the first point of the current series of contour lines with the last point entered.

DRAW OPTIONS	
NEW LINE ELEV	
▲	310.00
▼	
CURR	300.00
BASE	0.00
INTR	10.00
CURRENT LINE	
CONTINUE	
CLOSE	
EXIT	

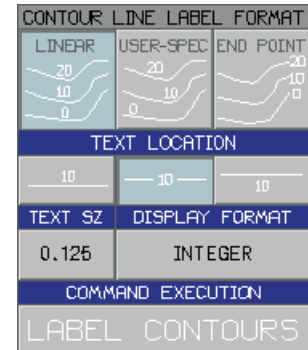
## EXIT

Stop drawing contour lines.

## ◇ CONLAB

### Contour labeling functions

*Menu CONLAB (Fig. 5-5) Label contour lines*



## CONTOUR LINE LABEL FORMAT

### LINEAR

Elevation labels generated in a straight line across contour lines. You will be prompted to enter the end points of a line defining the location of the contour labels. Contour labels will be generated at each intersection between contour lines and the line entered.

### USER-SPECIFIED

Elevation labels placed in a user defined location. You will be prompted to indicate the location for each contour height label location.

### END POINT

Elevation labels generated at endpoints of contour lines. You will be prompted to window in the area containing the contour line end points to be labeled.

## TEXT LOCATION

### ABOVE

Contour elevation text placed above contour line.

### CENTER

Contour elevation text placed centered within contour line. This mode involves 'breaking' the contour line and placing text in this gap. The actual contour lines are not removed from this gap but are instead modified to not display.

## BELOW

Contour elevation text placed below contour line.

## TEXT SZ

Set contour label text size.

## DISPLAY FORMAT

Two display formats are available. This first, INTEGER, will round the contour height to the nearest integer value and display this number with NO formatting. The second option, ARRIS FORMAT, will format the contour elevation label using the current ARRIS display format options. Real numbers will NOT be rounded to integer values when using the ARRIS FORMAT labels.

## LABEL CONTOURS

Initiate the contour labeling process using current parameters. You will be prompted accordingly based on these parameters.

## ◇ CONED

### Contour and contour label edits

*Menu CONED (Fig. 5-6) Edit contour line elevations and labels.*

CONTOUR EDIT				
SEARCH TYPE				
SINGLE	AREA IN	AREA OUT	ALL	
EDIT TYPE				
DELETE CONTOUR LABELS	CHANGE CONTOUR ELEV	DELETE CONTOUR LINES	CHANGE TO CONTOUR	FLIP CONTOUR LABEL

## SEARCH TYPE

### SINGLE

Limit edit search to a single contour label or line.

### AREA IN

Limit edit search to all contour labels or lines inside a user defined edit window.

### AREA OUT

Limit edit search to all contour labels or lines outside a user defined edit window.

## ALL

Edit all contour labels or lines.

## EDIT TYPE

### DELETE CONTOUR LABELS

Erase specified contour elevation labels.

### CHANGE CONTOUR ELEV

Change the elevation of specified contour lines.

### DELETE CONTOUR LINES

Delete specified contour lines and associated labels

### CHANGE TO CONTOUR

Changes specified lines to contour lines.

### FLIP CONTOUR LABEL

Increments the rotation of specified contour labels 180 degrees. When contour labels are automatically placed, label rotation is calculated based on contour line orientation. There are situations where this rotation may be 180 degrees out from the desired rotation.

## ◇ S\_CONT

### Contour status menu

XYF	Rel	Pen	Col	WORK LAYER	CURR HEIGHT	BASE HEIGHT	INTERVAL	LN CLASS	LN TYPE	TEXT FONT	TEXT SIZE
off	off	1	1	tp_mdata	300.00	0.00	10.00		0	gen	0.125

*Menu S\_CONT (Fig. 5-7) Contour line status menu*

### WORK LAYER

Set the current work layer.

**CURR HEIGHT**

Set the current height for contour lines.

**BASE HEIGHT**

Sets the base height (starting height) for contour lines.

**INTERVAL**

Sets the interval between successive contour lines.

**LN CLASS**

Used to set the current line class.

**LN TYPE**

Used to set the current line type.

**TEXT FONT**

Used to set the current text font.

**TEXT SIZE**

Used to set the current text size.

# **SURVEY BOUNDARY**

## **Draw survey boundary lines**

### CHAPTER OVERVIEW:

Functions located on this overwrite menu are used to define and edit the metes and bounds of a site. Additional functions allow for the extraction of survey information to data files and for creating tangent and curve data.

## **Menus contained in the SURVEY BOUNDARY section**

- SVSET...Survey Boundary overwrite menu
- LINSEG...Select survey line segment draw mode
- ARCSEG...Select survey arc segment draw mode
- LINLAB...Set line segment label parameters
- ARCLAB...Set arc segment label parameters
- SRVOUT...Output survey data to a file
- SURVED...Edit survey segments and labels
- SURVST...Survey status menu

## ◇SVSET

### Survey Boundary overwrite menu

*Menu SVSET (Fig. 6-1) Set parameters for survey segments.*

SURVEY SETUP					
LINE			END POINT		
———	-----	- - - - -	○	×	◇
———	OTHER		□	⊕	⊙
DASH 1	SPACE 1		●	⊗	⊕
0.125	0.125		USE CURRENT	NONE	
DASH 2	SPACE 2		ENDPT SIZE	TEXT SZ	
0.125	0.125		0	0.125	
DASH TYPE			ENDPT ROT'N	CIR DIR	
normal			0.0	CW	

## SURVEY SEGMENT LINE TYPE

### **SOLID LINE**

Uses Solid Lines

### **DASHED LINE**

Uses DASH 1 and SPACE 1 for dash parameters

### **DASHED LINE**

Uses DASH 1, DASH 2, and SPACE 1 for dash parameters

### **DASHED LINE**

Uses all dash parameters

### **OTHER**

Select any ARRIS line type

## DASH PARAMETERS

### **DASH 1**

Set broken line parameters when current line type selected is a dashed line.

## END POINT SELECTION

### **END POINT**

Used to set the end point (repeated item) that will be placed on the end points of each survey segment. Selection of 'USE CURRENT' will use the current repeated item, regardless of whether or not it appears on the setup menu, as the current survey segment end point. Selection of 'NONE' will omit survey segment end points.

**USE CURRENT**

Use the current repeated item (regardless of where it came from) as the current survey segment end point symbol.

**NONE**

Do not place any repeated item on survey segment end points.

**END POINT SIZE**

Used to set the size, in drafting units, of the current end point.

**END POINT ROTATION**

Used to set the rotation, in degrees, of the current end point.

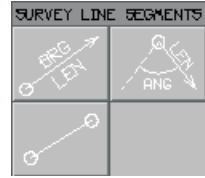
**TEXT SIZE**

Used to set the size, in drafting units, of the text placed as survey segment labels.

**CIRCLE DIRECTION**

Used to set whether an arc will be drawn clockwise or counter-clockwise.

## ◇ LINSEG



Select survey line segment draw mode

*Menu LINSEG (Fig. 6-2) Draw labeled survey line segments.*

## DRAW SURVEY LINE SEGMENTS

### DRAW SURVEY LINE SEGMENTS

#### BEARING AND LENGTH

Survey line segments are generated based on segment bearing, and segment length. Segment bearings can be expressed as either a number of degrees of rotation, e.g. 315, or as northings and eastings, e.g. S 45 23 30 E.

#### BEARING FROM PREVIOUS SEGMENT AND LENGTH

Use this function to continue drawing from an existing survey line or arc segment. You will be prompted to indicate the existing segment from which to start (select the line or arc closest to end for continuation). Subsequent prompts will ask for segment bearing from the specified line or arc (continuing from an existing arc will allow for 'tangent' as a bearing option). Segment bearings can be expressed as either a number of degrees of rotation, e.g. 315, or as northings and eastings, e.g. S 45 23 30 E.

#### CROSS HAIR INPUT

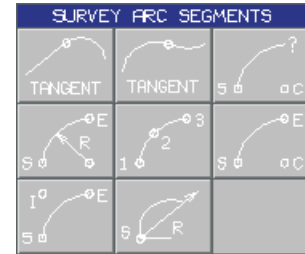
Line segment end points are designated through use of either the ARRIS cross hair or keyboard.

**Note:** Set line segment label parameters from the LINSEG menu.

## ◇ARCSEG

Select survey arc segment draw mode

Menu ARCSEG (Fig. 6-3) Draw labeled survey arc segments.



## DRAW SURVEY ARC SEGMENTS

### TANGENT TO LINE

Generates an arc survey segment tangent to an existing line. You will be prompted to select an existing survey line segment from which the arc will extend.

**Note:** Select the line by positioning the cross hair closest to the line end point from which the arc segment will extend.

### TANGENT TO ARC

Generates an arc survey segment tangent to an existing arc. You will be prompted to select an existing survey arc segment from which the new arc will extend.

**Note:** Select the arc by positioning the cross hair closest to the arc end point from which the new arc segment will extend.

### START, CENTER, ?

Generates an arc when the start and center points are known along with any one of the following: arc length, chord length, delta angle, tangent length or tangent intersect point.

### START, END, RADIUS

Generates an arc when both the start and end points are known along with the arc radius.

### START, END, POINT ON RADIUS

Generates an arc when both the start and end points are known along with a point located anywhere on the arc.

### START, END, CENTER

Generates an arc when both the start and end points are known along with the center point of the arc.

## START, END, TANGENT INTERSECTION

Generates an arc when both the start and end points are known along with the tangent intersect point.

## START, CHORD BEARING, RADIUS AND ?

Generates an arc when the arc start point, chord bearing and arc radius are known. Chord bearing can be expressed as either a number of degrees of rotation, e.g. 315, or as northings and eastings, e.g. S 45 23 30 E.

*Note:* Set arc segment label parameters from the ARCSEG menu or from the status menu SURVST.

*Note:* Arc direction (clockwise or counter-clockwise) is set from the menu SVSET or from the status menu SURVST.

## ◇ LINLAB

Set line segment label parameters

LINE SEGMENT LABEL FORMAT			
BRG LEN	BRG LEN	TAN No.	NONE
AUTO LABEL	NEXT TAN NO.	DEC. PLCS	TEXT SZ
DN	T 1	4	0.125

Menu LINLAB (Fig. 6-4) Define parameters for labeling of Survey line segments and selecting TANGENT TABLE display parameters.

## LABEL POSITION

### OVER / UNDER

Displays survey line data with the segment length above line, and the segment bearing below line.

### ABOVE

Displays the survey line data above the line segment. The segment bearing will follow the segment length.

### TANGENT

If highlighted, the system will stop and ask for a tangent number any time a survey line segment is added to the drawing. The specified tangent number will be used as a reference when generating the Tangent table. The Tangent number will be placed above the Line segment.

## **NONE**

No Survey Segment Label desired.

## **LABEL DISPLAY PARAMETERS**

### **AUTO LABEL**

Determines whether the system will fill the Line label text with data entered to generate the line or stop and ask the user to enter the data to be displayed.

### **NEXT TAN NO.**

Displays the next label that will be placed on a line when labeling lines with a tangent number. Values for this parameter must be set to a string ending with a numeric value e.g. 'T1'. This string is then used as a reference between any tangent table generated and the actual line in the drawing. Each time a survey line segment is added to the ARRIS database, this value will automatically be incremented.

### **TEXT SZ**

Set the text size for labels. This parameter reflects the current system text size.

### **DEC. PLCS**

Set the number of decimal places displayed. Floating point numbers will be round (not truncated) to the specified number of decimal places.

## ◇ ARCLAB

Set arc segment label parameters

*Menu ARCLAB (Fig. 6-5) Define parameters for labeling of Survey arcs and selecting CURVE TABLE display parameters.*

ARC SEGMENT LABEL FORMAT						
			NONE			
ARC DATA TO DISPLAY						
ARC LENGTH	CHORD LENGTH	RADIUS	TAN LENGTH	DELTA	CHORD BEARING	CURVE NUMBER
AUTOMATIC DATA FILL	NEXT CURVE NUMBER	DECIMAL PLACES	TEXT SIZE			
ON	C1	4	0.467			

## LABEL POSITION

### INSIDE

Define arc label position as the inside of the survey arc.

### OUTSIDE

Define arc label position as the outside of the survey arc.

### LABEL W/LEADER

Places selected curve data at a user specified location, including placement of a leader. Upon placing an arc segment, you will be prompted to indicate the position for the leader end point, the bend point, and the text location.

### NONE

No Survey Segment Label.

## ARC DATA TO DISPLAY

Choose data fields to display as part of each arc label.

### ARC LENGTH

When highlighted, the Arc Length will be displayed on any new arc segment or curve table.

### CHORD LENGTH

When highlighted, the Chord Length will be displayed on any new arc segment or curve table.

### RADIUS

When highlighted, the Radius will be displayed on any new arc segment or curve table.

## **TAN LENGTH**

When highlighted, the Tangent Length will be displayed on any new arc segment or curve table.

## **DELTA**

When highlighted, the Arc Delta Angle will be displayed on any new arc segment or curve table.

## **CHORD BEARING**

When highlighted, the Chord Bearing will be displayed on any new arc segment or curve table.

## **CURVE NUMBER**

If highlighted, the system will stop and ask for a curve number any time an Arc survey segment is added to the drawing. The specified curve number will be used as a reference when generating the Curve table. The position of the curve number will be based on the current current label format.

## **AUTOMATIC DATA FILL**

Determines whether the system will fill the Arc label with data entered to generate the arc or stop and ask the user to type in the data to be displayed.

## **NEXT CURVE NUMBER**

Displays the next label that will be placed on a curve when labeling arcs with a curve number. Values for this parameter must be set to a string ending with a numeric value e.g. 'C1'. This string is then used as a reference between any curve table generated and the actual curve in the drawing. Each time a curve is added to the ARRIS database, this value will automatically be incremented.

## **TEXT SIZE**

Set the text size for labels. This parameter reflects the current system text size.

## **DECIMAL PLACES**

Set the number of decimal places displayed. Floating point numbers will be round (not truncated) to the specified number of decimal places.

## ◇SRVOUT

Output survey data to a file

*Menu SRVOUT (Fig. 6-6) Write survey segment data to a file*

### **FILE NAME**

Indicates the name of the data file to which specified survey segment data will be written. The data written to the file concerning arc segments is controlled by the 'DATA TO DISPLAY' parameters located on the menu ARCLAB.

### **SEARCH ALL**

Search all layers currently turned on for search.

### **SEARCH AREA**

Search a user-specified area of all layers currently turned on for search.

## ◇SURVED

Edit survey segments and labels

*Menu SURVED (Fig. 6-7) Edit survey segment labels.*

### **ITEM TO EDIT**

#### **LINES/ LABELS**

Limit edits to survey line segments and associated labels.

#### **ARCS/ LABELS**

Limit edits to survey arc segments and associated labels.

#### **BOTH**

Edit both survey line and arc segments.

SEGMENT / LABEL EDIT			
ITEM TO EDIT			SINGLE EDITS
LINES/ LABELS	ARCS/ LABELS	BOTH	
SEARCH TYPE			CHANGE LINE TEXT
SINGLE	AREA IN	AREA OUT	ALL
EDIT TYPE			CHANGE ARC TEXT
ERASE LABEL	ADD LABEL	CHANGE LABEL	FLIP LABEL
ERASE END PT	ADD END PT	CHANGE END PT	ERASE SEGMNT
CHANGE COLOR	CHANGE PEN	CHANGE LAYER	

## **SEARCH TYPE**

### **SINGLE**

Limit edit search to a single segment or label.

### **AREA IN**

Limit edit search to all survey segments or labels INSIDE a user defined edit window.

### **AREA OUT**

Limit edit search to all survey segments or labels OUTSIDE a user defined edit window.

### **ALL**

Limit edit search to ALL survey segments or labels in layers currently turned on for edit.

## **EDIT TYPE**

### **ERASE LABEL**

Erase specified survey segment labels.

### **ADD LABEL**

Add survey segment labels (using current parameters) to any line or arc segments not currently labeled.

### **CHANGE LABEL**

Change the format of existing specified survey segment labels to the currently selected format.

### **FLIP LABEL**

Flip segment label text 180 degrees.

### **ERASE END PT**

Erase survey segment end point repeated items.

**ADD END PT**

Add survey segment end point repeated items.

**CHANGE END PT**

Change survey segment end point repeated items.

**ERASE SEGMNT**

Erase survey segments.

**CHANGE COLOR**

Change the color of survey segments.

**CHANGE PEN**

Change the pen use to draw survey segments.

**CHANGE LAYER**

Change survey segment layer.

**SINGLE EDITS****CHANGE LINE TEXT**

Change the text label associated with a survey line segment.

**CHANGE ARC TEXT**

Change the text label associated with a survey arc segment.

## ◇SURVST

### Survey status menu

XYF	Rel	Pen	Col	WORK	LAY	LN CLASS	LN TYPE	DASH 1	SPACE 1	DASH 2	SPACE 2	DSH TYPE	TXT SZ	CR	DIR	PROMPT
off	off	1	1		0		0	0.125	0.125	0.125	0.125	normal	0.467	cr		full

*Menu SURVST (Fig. 6-8) Survey status menu.*

### **WORK LAY**

Used to set current working layer.

### **LN CLASS**

Used to set current line class.

### **LN TYPE**

Used to set current line type.

### **DASH 1**

Used to set size of first dash on broken line types.

### **SPACE 1**

Used to set size of first space on broken line types.

### **DASH 2**

Used to set size of second dash on broken line types.

### **SPACE 2**

Used to set size of second space on broken line types.

### **DSH TYPE**

Dash type. Used to set the current dash type, running, normal, etc.

### **TXT SZ**

Text size. Used to set current text size.

## **CR DIR**

Circle direction. Used to set whether an arc will be drawn clockwise or counter-clockwise.

## **PROMPT**

Used to set whether full prompt menus will appear or abbreviated prompts will be displayed on prompter line.

## **MAP TOPO**

Selecting this box allows you to place the this application directly on a COMMON menu box.

After mapping the application to the COMMON MENU, you can re-load the application quickly by selecting this box.

**Note:** *If you ever hit the TOPO|APP box and get the message ':tp\_start not found', then you need to load the application directly from the LOAD APP button. This means the SIGMAC file for the application has not been loaded yet.*

# MISCELLANEOUS UTILITIES

## Elevate ri's to 3D surface and query elevation

### CHAPTER OVERVIEW:

Two utilities are located on this overwrite menu. The first will elevate ARRIS repeated items to the appropriate Z-height based on the 3D surface model. The second is used to query the elevation at a given X,Y coordinate.

## Menus contained in the MISCELLANEOUS UTILITIES section

- UTIL...Utility overwrite menu

### ◇UTIL

#### Utility overwrite menu

*Menu UTIL (Fig. 7-1) Elevate RI's and query elevation*

#### **ELEVATE TO**

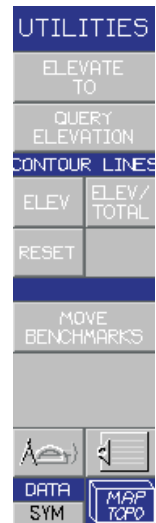
Elevate repeated items to the generated 3D grid surface. Using this function, you're able to place 3D repeated items such as cars and trees in plan view at Z-elevation 0 and then elevate these repeated items to the ARRIS triangle (3D surface) immediately above the item.

#### **QUERY ELEVATION**

Takes the x and y values of an indicated point and returns the z value at that location based on the control data. The z value returned is based on the current method of control data calculation.

#### **CONTOUR LINES**

When contour lines are generated, they are drawn with a Z height of 0, although they are flagged with a base height and contour height so that a 3D grid can be created.



The following functions can be used to raise the contour lines in a layer to the flagged Z height.

## **ELEV**

Raise all contour lines in a layer to their CONTOUR height.

You will be asked for which layer to elevate. Typically, the contour line layer is called 'ly.tp\_topo'.

If you would like the lines to be drawn in a particular color and pen based on their elevation, those values must be specified by color and pen number in a file called 'tx.tp\_elcols' in your USER directory. A sample color file can be found in our application directory: \$ARRIS/ap/vn.ari0/ap.topo.

***Note:** This function was written to be used with layers containing only contour lines. It has not been tested with other entities.*

## **ELEV/ TOTAL**

Raise all contour lines in a layer to their BASE + CONTOUR height.

## **RESET**

Reset all contour lines in a layer to a Z height of 0.

## **MOVE BENCHMARKS**

Move all points found in the data layer, lp.tp\_data, which have an elevation height below a certain threshold, to a layer called ly.tp\_bench. This will remove 'benchmark' points which may be included in the data but should not be used to create contour lines.

You will be prompted for the threshold for the benchmark points to be moved.

# **DEMONSTRATION**

## **Demonstration Overview**

By selecting 'DEMO' on the main menu, the major features may be quickly viewed and demonstrated.

In the upper right corner of the Main Menu is a selection labeled 'DEMO'. Select this option. Respond

or 'BEGIN' to the prompt '  
to begin demo?'

At each step, you will be asked to press  
to proceed. This prompt will appear throughout the demonstration. This allows the user as much time as necessary to view the features. Selecting 'CANCEL' at any time will cancel the demonstration. Selecting 'CONTINUOUS' at any time will run through the demo without any user prompts.

## **GENERATE X,Y,Z, POINTS**

Appearing on the screen will be 50 XYZ data points. These are random values generated by the software. Different data points are generated each time the demo is run. Each demonstration is unique. Color, symbol type and size are user selectable when not in demo mode.

## **DISPLAY CONSTRUCTION MENU**

The Construction Menu will now appear on the screen. Values have been pre-set for the demonstration and cannot be modified. After the demonstration, you can bring up the menu again, make changes and re-process the data.

The main features of this menu are:

### **CONTROL DATA**

The original data point values are analyzed and a control grid is generated. The control grid is an evenly spaced mesh of reference points, based on the original data. The spacing of this mesh is defined by the 'CONTROL DATA SPACING'. Although this mesh is never displayed, it is used in subsequent calculations for the 3D grid and contour generation.

## **2D GRID**

Generates a 2D grid of lines. This feature is primarily used for visual reference. Grid spacing and color are determined from this menu. The 2D grid is drawn on the XY plane, at  $Z=0$ .

## **3D GRID**

Generates a 3D opaquable grid of the generated surface. Grid spacing and color are determined from this menu. The 3D grid is drawn at the actual height of the surface.

## **CONTOUR**

Generates the contour lines. Contour interval spacing and color are determined from this menu.

At this stage in the demo, notice that the CONTROL DATA, 2D GRID and CONTOUR are selected(YES) for creation on the menu. The 3D GRID will be selected later.

## **CREATE INITIAL GRID AND CONTOURS**

The original data points will now be analyzed. The control data, 2D grid and contours will be created.

### **Analyzing Data**

- The control data is generated.

### **Creating 2D Grid**

- The 2D grid is created and displayed.

### **Creating Contours**

- The contour rings are created and displayed. The current contour elevation being generated is displayed at the lower left.

## **RE-DISPLAY CONSTRUCTION MENU**

The construction menu will now re-appear on the screen. This time only the 3D Grid is selected for creation. Note that the PROCESS ALL option is chosen. Once the CONTROL DATA has been generated, PROCESS ALL will analyze the entire CONTROL DATA area. PROCESS AREA will analyze a user-specified area of the CONTROL DATA.

## **CREATE 3D GRID**

The 3D grid is created. Note that the view switches to isometric. This was done through the DISP menu, but was not displayed as part of this demo.

The 3D opaquable grid is created and displayed in wire frame.

## **CREATE OPAQUED IMAGE**

The surface is now opaqued and displayed. Again, this option is on the DISP menu but was not displayed.

At this point you may want to exit the demonstration and try some of the features shown directly. Select the 'CANCEL DEMO' option to exit.

Continuing the demonstration at this point will display the following cut and fill features:

## **DISPLAY LAYER MENU - SELECT CUT & FILL LAYERS**

This menu allows the user to select between the original set and the cut & fill set of layers. Processing Layers have been set to CUT & FILL. Note the MODE on the Status Menu is now set to CUT & FILL.

## **DATA COPY TO CUT & FILL LAYERS**

This box on the Display Layer Menu copies the original set of data points in the layer 'tp\_data' to the cut & fill data layer 'tp\_mdata'. At this point, both original and cut & fill data layers are identical.

## **DISPLAY LAYER MODE MENU**

All layers created are listed in this menu. The right hand column on this menu displays the current layer status, ON or OFF.

Note that our original data layer 'tp\_data' is OFF and our new cut & fill layer 'tp\_mdata' is ON. Note that only three layers have a mode value set to 'ON'

## **DISPLAY SELECTED LAYERS**

The selected layers are displayed. (Those having their mode set to ON.)

Note that the view is set back to plan. Again, view options are located on the DISP menu.

## **DISPLAY POINT DATA SETUP MENU**

The Setup menu is now displayed. It is here that the user has control over the display features of the data points. The color is modified to color 4.

## **ADD/MODIFY CUT & FILL DATA POINTS**

New data points are added in color 4. Keep in mind that this new data is being added to the cut & fill data layer only. Again, note the MODE on the Status Menu is set to CUT & FILL. If MODE was set to ORIGINAL, then the new data points would have been added to the original set of data.

## **RE-DISPLAY CONSTRUCTION MENU**

The construction menu is re-displayed. The control data, 2D grid, and contours are chosen for processing. We are now going to process the new data associated with the cut & fill layer set. Note that a new color was chosen for the contours.

## **CREATE CUT & FILL GRID + CONTOURS**

New 3D grid and contour layers are generated. These layers represent the cut & fill changes. The original contours are still displayed. Note the new set of contours being generated. Where reference points were added, the contours are much different. Where the reference points are the same, so are the contours.

## **DISPLAY SHEET SETUP SECTION MENU**

In preparation for generating sections, various parameters must be set. This menu allows the user to specify how many sections per sheet to print, section sizes, and spacing between sections. For more information refer to section 4.2 of this manual.

## **DISPLAY SECTION SETUP MENU**

Section parameters are chosen. For more information refer to section 4.3 of this manual.

## **SECTION CUT**

Section comparisons of the original and cut & fill data are now performed. Sections size and frequency are based on the information defined on the Section Setup menu. The section path line is defined when the SECTION CUT option from the Cut & Fill Menu is chosen. Charts are generated, one for each section, and placed in appropriate layers.

## **DISPLAY SECTION CUT LAYER**

5 sections were generated. Our sheet setup menu specified to place 6 sections per sheet. Therefore only one sheet (or layer) was necessary.

## **DISPLAY VOLUME GRID MENU**

The Volume Grid menu has options for cut & fill calculations and various volume grid display routines. For more information, refer to section 4.4 of this manual.

## **PERFORM VOLUME CALC**

VOLUME CALC was selected from the previous menu. Cut, fill, and net volumes are shown. The display is shown in cubic yards. Cubic meters and feet may also be selected.

## **RE-DISPLAY VOLUME MENU**

This time we select the GRID BY VOLUME option.

## **CREATE GRID BY VOLUME DISPLAY**

The grid by volume display is being generated. This 3D display is a graphical representation of the volume differences between the original and cut & fill data. Color selections have been previously defined on the Volume Grid Menu.

## **CREATE OPAQUED IMAGE**

Opaque the grid volume display grid.

## **TOPOGRAPHER DEMO DONE - RESTORE PLAN VIEW**

This concludes the demonstration. ARICAD TOPOGRAPHER is still loaded as the current application and you may wish to try some of its features directly.

ARICAD Topographer was written by:

**Render Plus Systems, Inc.**

3989 E. Arapahoe Rd. Suite #100  
Centennial, Colorado 80122

For product information, please contact your ARRIS dealer:

Gary Thill

**Sigma Consulting Services, Inc.**

18440 E. Linvale Dr.  
Aurora, Co 80013  
303.400.1301  
fax 303.400.1388  
email: gary@sigmaserv.com  
www.sigmaserv.com

Sherry & Reggie Brewer

**Helping Hands Services, Inc**

111 Waterfront Drive  
Eutawville, SC 29048  
803.492.7286  
fax: 803.492.3272  
email: sales@hhsinc.com  
www.hhsinc.com

John Molenaar

**Wellington I.T. Inc.**

69 Leacock Avenue  
Guelph, ON N1E 6P9  
Canada  
519.824.4717  
fax: 519.824.1479  
email: wellington.it@sympatico.ca