The CEDRA Corporation's

COMMAND OF THE MONTH

A monthly information bulletin   **May 2005**

FEATURED COMMAND
Annotation
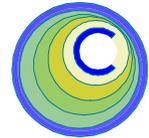
Application Description

Users who create maps and/or drawings will appreciate that a map isn't a map until it has some text on it. Looking at just points, lines and polygons can only go so far. Given this, the question becomes, what text should be placed on the map (drawing), and what is the best means of creating it.

The CEDRA Solution

To address this issue, the user can utilize the CEDRA Annotation commands, which provide the ability to create annotation or text strings using *geometric* or *attribute* data. The CEDRA Annotation commands may be displayed as indicated below depending upon the GIS system in use:

(a) ArcGIS® users should activate the CEDRA-AVcad-Menus toolbar that contains the CEDRA Annotation combo-box, and from which the desired annotation command can be selected. Shown in Figure 1 are the available annotation commands within this combo-box.

Additionally, the user can activate the CEDRA-Text-Tools toolbar. Shown in Figure 2 is the annotation tool offered by this toolbar. Note that this tool is also available in the CEDRA Tool Palette.

(b) ArcView® GIS users should select the {Annotate} menu item from which the appropriate annotation command can be selected. Shown in Figure 3 are the available anno-
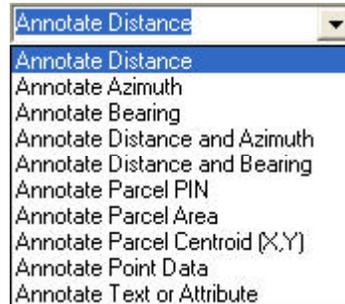
Figure 1
CEDRA Annotation Combo-Box

Figure 2
CEDRA-Text-Tools Toolbar

Command Of The Month bulletin

This month's issue addresses how to create various types of annotation.

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tation commands offered by the Annotate menu item.

CEDRA Annotation - Overview

Depending upon the GIS system in use, annotation is stored differently. In the ArcGIS environment, annotation is stored in a personal or enterprise geodatabase as an annotation feature, while in the ArcView GIS environment, annotation is stored in a point shapefile with a reference to a graphic text element, which is stored in the project file. This difference does not effect the way the CEDRA Annotation commands operate, but it does have an effect on how the user modifies the annotation.

Figure 3
Annotate Menu Items

In both ArcGIS and ArcView GIS, attribute data is stored describing the annotation (location, size, text string, font, etc.) In ArcGIS, these attributes are stored in the geodatabase, while in ArcView GIS these attributes are stored in the point shapefile. Appendix A of the User's Manual contains a list of these attributes.

The methodology of creating annotation with the various CEDRA Annotation commands consists of:
(a) Defining the layer or theme in which the annotation is to be placed,
(b) Specifying the annotation properties (font, size, offset, etc.), and
(c) Selecting the annotation command to generate the text.

The [Set Active Layer] command can be used to define the layer or theme in which the annotation is to be placed in, while the [Change Text Properties] com-
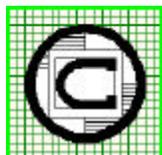
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mand can be used to define the appropriate annotation property values.

In the ArcGIS environment, the [Change Text Properties] command can be found in the CEDRA-Properties combo-box, as shown in Figure 4.
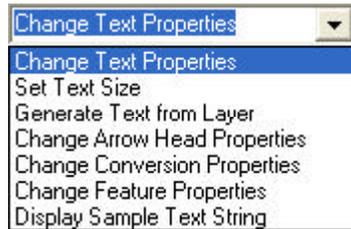
Figure 4
CEDRA Properties Combo-Box

In the ArcView GIS environment, the [Change Text Properties] command can be found under the {Text Properties} menu item, as shown in Figure 5.
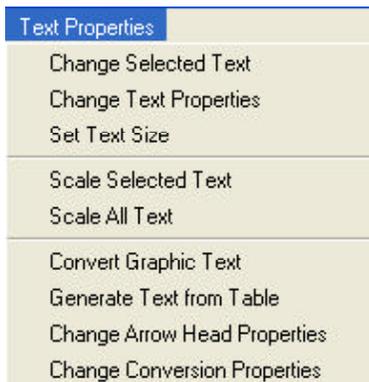
Figure 5
Text Properties Menu Items

GeoDatabase Considerations

Unlike ArcView GIS users who do not have to concern themselves with geodatabases, ArcGIS users prior to creating annotation, or for that matter any feature type which will be stored in a geodatabase, will need to specify the layer's False X and Y coordinates, as well as, the layer's False XY units. These parameters are used in storing coordinate data within the geodatabase.

Since annotation in the ArcGIS environment is stored in a geodatabase, the user needs to be aware of the coordinate

system that is in use. Specifically, the total number of digits that appear in a coordinate (left and right of the decimal point).

For example, state plane coordinates will typically contain six or seven digits to the left of the decimal point. When data is stored in a geodatabase, regardless if it is a personal geodatabase or an enterprise geodatabase, the coordinates are biased. That is, they are converted into an integer value. In order to preserve the integrity of the original coordinate, the user specifies minimum False X and Y coordinates along with a False XY units value. Using these false values, ArcGIS computes the maximum X and Y coordinate values, thus determining the allowable coordinate extent of the project.

In determining the values for these parameters, the user takes into consideration the scope or extent of the project (the minimum and maximum coordinate values to be encountered in the project), and the desired precision (number of digits to the right of the decimal point).

(a)   Determining the False X and Y coordinates: Using the minimum coordinates as the governing values, the user rounds down the minimum X and Y coordinates. These values then become the layer's False X and Y coordinates. For example, if the smallest X and Y coordinate values that would appear in a project were:

$$X = 2,169,789, \text{ and}$$
$$Y = 634,564,$$

the user could set the layer's false coordinates as: False X = 2,100,000, and   False Y = 630,000.

In so doing, the user provides a little margin, so that, if a coordinate were to be smaller than the expected minimum, it would still be acceptable to the geodatabase.

The focus in determining the layer's False X and Y coordinates is that they should be less than any coordinate that would appear in the layer. If a coordinate that is less than the False X and Y

coordinate is to be introduced in the layer, the error message *"The coordinates or measures are out of bounds"* will be displayed. Likewise, the same error message would be generated if a coordinate that is larger than the maximum allowable coordinate (as computed by ArcGIS), was attempted to be introduced in the layer.

Note that it is not possible to specify too small of a False X and Y coordinate, such as a False X = 0.0 and a False Y = 0.0. The False X and Y coordinates must be within the general domain of the project extent.

(b)   Determining the False XY units:
The False XY units property is used to determine the:
- Precision or number of digits to the right of the decimal, and
- Maximum coordinate that can appear in the layer.

The larger the False XY units value, the smaller the maximum allowable coordinates.

For example, a False XY units value of 1,000 will allow for three digits to the right of the decimal point. This value can be used when precision is not a priority. If precision is a priority then it is recommended that a False XY units value of 10,000 or larger be used. A False XY units value of 10,000 will provide for four digits to the right of the decimal point.

(c)   Determining the maximum coordinate value: To compute the maximum allowable coordinate values, the user:
- Determines the maximum integer value that can be accommodated by the geodatabase,
- Divides this value by the False XY units value, and
- Adds the result to the False X and Y coordinate values.

Note that the largest integer value is:
- 2,147,483,647 for 32 bit computers, and
- 9,223,372,036,854,775,807 for 64 bit computers.

Since most PCs have 32 bit processors, a False XY units value of 10,000, would generate maximum coordinate values by adding 214,748.3647 to each of the False X and Y coordinates.

The procedure for specifying the False X and Y coordinates, and the False XY units value is discussed below.

Set Active Layer

Before creating any annotation, the user should first define the layer or theme in which the annotation is to be stored. The [Set Active Layer] command can be used to accomplish this task.

ArcView GIS users will find the [Set Active Layer] command under the {AVcad Tools} menu item, shown in Figure 6.

ArcGIS users will find the [Set Active Layer] command in the CEDRA Commands combo-box, shown in Figure 7.

The [Set Active Layer] command enables the user to control in which layer or theme new features are to be intro-
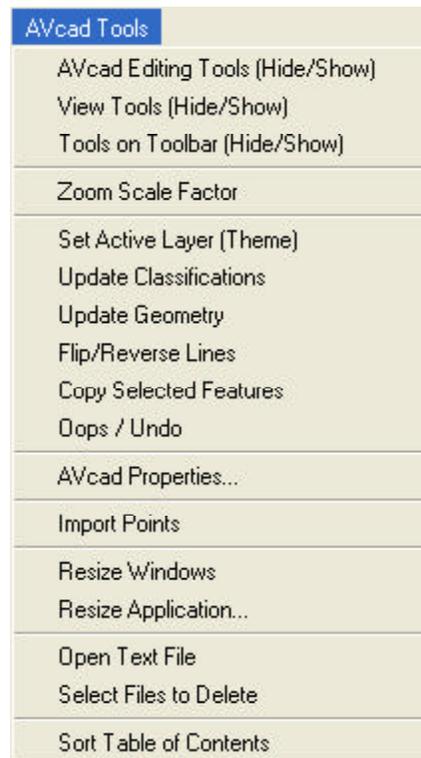
Figure 6
AVcad Tools Menu Item List
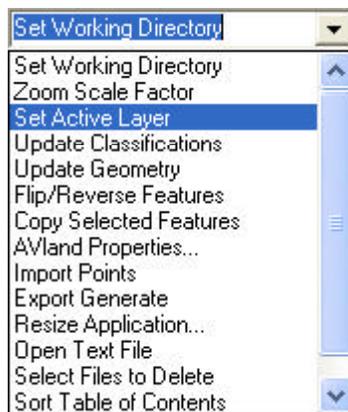
Figure 7
Set Active Layer Dialog Box

duced. Shown in Figure 8 is the dialog box that ArcView GIS users will see when the command is activated. Using the second item in the drop-down list, *Enter New Layer Name*, the user is able to specify a new layer or theme that the annotation features can be stored in.
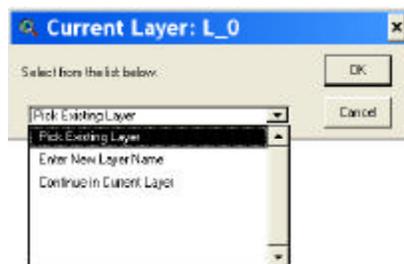
Figure 8
ArcView GIS
Set Active Layer Dialog Box

ArcGIS users, on the other hand, will see a dialog box similar to that of Figure 9. Prior to creating annotation for the first time in a new layer, the user will need to specify the layer's False X and Y coordinates, as well as, the layer's False XY units in addition to the name of the new layer or theme.
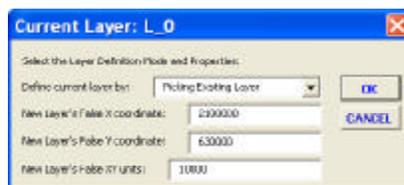
Figure 9
ArcGIS
Set Active Layer Dialog Box

Change Text Properties

Once the layer or theme has been identified for storing the annotation, the user should specify the desired annotation properties (font, size, offset, etc.). To accomplish this, the [Change Text Properties] command should be used.

Shown in Figure 10 is the dialog box which is displayed by the [Change Text Properties] command. As can be seen from the figure, there are a number of properties that the user can control by entering the desired value in the property's data field. Depending upon the annotation command that is selected, only certain of these properties are used. That is to say, not all of the CEDRA Annotation commands utilize all of the properties displayed in Figure 10.
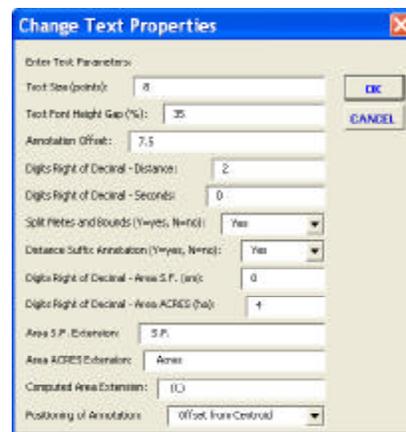
Figure 10
Change Text Properties Dialog Box

A discussion of these properties is presented below.

1.   Text Size property

This property controls the size of the annotation to be created. This value should be entered in terms of Points, and not in terms of world or distance units.
•   In the U. S. A., one inch = 72 Points. As such, a text size of 9 would produce 1/8" annotation (9/72 = 1/8 = 0.125).
•   In Europe, one DIDOT point = 0.375mm, thus 72 points would be equal to 27mm, or 1.063" (27mm/25.4/in/mm).

In determining a text size to use, the general formula to compute a text size in terms of Points is:

$$TextSize = (H / SCL) * 72 * 12$$

where:

H   : is the height of the annotation in world units (in this example feet),

SCL : is the current map scale as shown in the Map Scale area. The Map Scale area appears: (i) in the upper left corner of the ArcMap application window, to the right of the Add Data icon, and (ii) in the upper right corner of the ArcView application window, to the left of where the current cursor coordinates are displayed.

72   : is the conversion from Points to Inches.

12   : is the conversion from Inches to Feet.

As an example, let us assume we desire our annotation to be 1/8" in size. Furthermore, we wish to produce a 1"=200' scale map. Our text in world or distance units would be 1/8" or 0.125 times 200 which yields 25'.

Given the size of the text in world or distance units, 25', we now need to review the current map scale. As such, let's assume a map scale of 2400 is active. Substituting 25 for H and 2400 for SCL in the above equation:

$$TextSize = (25 / 2400) * 72 * 12, \text{ or}$$
$$TextSize = 9.$$

One final comment regarding text size and the difference between ArcGIS and ArcViewGIS.

•   When creating annotation in ArcView GIS, whenever the view is changed and new annotation is to be generated, a new text size has to be computed, regardless whether the annotation is being placed in an existing layer, or in a new layer.

•   In the ArcGIS environment, a new text size has to be computed only when the annotation is to be placed in a new layer. This is due to the fact that ArcGIS stores in the layer a reference scale. As such, a text size of 9 will produce the

same size annotation, regardless of the current map's extent.

So that, following up on our example above, where we determined that a text size of 9 should be used, let us assume that we change the view by zooming in to another area, and we now wish to add annotation of identical size into the existing layer. In ArcGIS we do not need to recompute a new text size, but rather, we can continue to use the same text size of 9. However, in ArcView GIS, since the view has changed, we would need to recompute a new text size.

ArcView GIS users should note that the [Set Text Size] command shown in Figure 5 can be used to recompute a new text size for the user. To do so, the user:

•   Selects with the ArcView Select Feature tool an existing graphic element that has the desired text size,

•   Alters the view as desired, and

•   Selects the [Set Text Size] command.

The [Set Text Size] command will then recompute a new text size, and the user can proceed to generate new annotation, which will be of the same size as that of the existing graphic element that was selected.

2.   Text Font Height Gap property

Shown in Figure 11 is a text string enclosed by an imaginary dashed rectangle. Depending upon the font that is being used, the text may not extend fully from the bottom of the rectangle to the top. Rather, it will be centered inside the rectangle. The space between the top of the text to the top of the rectangle, as well as the space from the bottom of the text to the bottom of the rectangle is referred to as the text font height gap. This value is used by all of the annotation commands so as to properly position the annotation.

Figure 11 Enclosing Text Rectangle

From our own experience it has been determined that the default value, which is specified in terms of a percentage and is displayed in this property's data field, works best. However, the user has the option to alter this default, if desired.

3.   Annotation Offset property

This property represents the distance, in world or distance units, from the feature to be annotated to the bottom or top of the annotation. The sign of the annotation offset value controls on which side of the feature the annotation is to be positioned. Note that in addition to being able to enter negative and positive values, it is also possible for the user to enter a value of zero for this property.

As an example, take the case of a line feature which has a:

•   Southwest (SW) direction. A positive offset would position the annotation above the line with the annotation bottom being the specified offset above the line.

A negative offset would position the annotation below the line with the annotation top being the specified offset below the line.

•   Northeast (NE) direction. A positive offset would position the annotation below the line with the annotation top being the specified offset below the line.

A negative offset would position the annotation above the line, with the annotation bottom being the specified offset above the line.

4.   Digit Right of Decimal - Distance property

This property controls the number of digits to be displayed to the right of the annotation's decimal point when annotating distances, lengths or coordinates. Valid values are 0 to 6, inclusive. Decimal values are rounded to the nearest specified digit.

5. Digit Right of Decimal - Seconds property

This property controls the number of digits to be displayed to the right of the annotation's decimal point when annotating the seconds component in an angle or direction. Valid values are 0 to 1, inclusive. Decimal values are rounded to the nearest second or tenth thereof.

6. Split Metes and Bounds property

This property is used to indicate whether the distance and the direction (azimuth or bearing) are to appear as one annotation, or as two individual annotations. This property is used by the commands, [Annotate Distance and Azimuth] and [Annotate Distance and Bearing]. Valid values are either *Yes* to denote that the distance and direction are to appear as two separate pieces of annotation, or *No* to indicate that the distance and direction are to appear as one single annotation.

Note that when splitting the annotation, if the annotation offset value is positive, the distance is positioned above the line, and the direction below the line, and if said offset is negative, the order is reversed.

7. Distance Suffix Annotation property

This property controls whether the distance suffix extension (' for US units, m for SI units) is to be included, or not in the annotation that is created. Valid values are either *Yes* to indicate that the suffix is to be included, or *No* to indicate the suffix is not to be included in the annotation.

8. Digit Right of Decimal - Area S.F. (sm) property

This property controls the number of digits that appear to the right of the deci-

mal point when creating annotation for areas in terms of square feet or square meters. Valid values are 0 to 6, inclusive. Decimal values are rounded to the nearest specified digit.

9. Digit Right of Decimal - Area ACRES (ha) property

This property controls the number of digits that appear to the right of the decimal point when creating annotation for areas in terms of acres or hectares. Valid values are 0 to 6, inclusive. Decimal values are rounded to the nearest specified digit.

10. Area S.F. Extension property

This property controls whether the suffix extension is to be included, or not in the annotation that is created. Appropriate values could be S.F. for US units, or S.M. for SI units. If no suffix is desired, a single blank character should be specified.

11. Area ACRES Extension property

Controls the area suffix extension when creating annotation for areas in terms of acres or hectares. Appropriate values could be AC or Acres for US units, Ha for SI units. If no suffix is desired, a single blank character should be specified.

12. Computed Area Extension property

This property is used by the [Annotate Parcel Area] command when any of the following options are selected:
> "S.F. and Deed S.F."
> "S.F. and Deed ACRES"
> "ACRES and Deed S.F."
> "ACRES and Deed ACRES"

The computed area extension will appear as the suffix to the area value which is computed using the geometry of the polygon. The Deed values are extracted

from the attribute table of the polygon being processed using the "SQFTdeed" and "ACREdeed" fields.

13. Positioning of Annotation property

This property is used by the [Annotate Parcel PIN], [Annotate Parcel Area] and [Annotate Parcel Centroid (X,Y)] commands to control the positioning of the annotation within a polygon feature. Valid values includes the following:
> "Offset from Centroid"
> "Centroid"
> "Centroid - Above"
> "Centroid - Below"

Depending upon the command being used, the "Offset from Centroid" option positions the annotation in a certain location. Shown in Figure 23, and identified below are the commands, which recognize this property, and where the annotation is positioned if the "Offset from Centroid" option is in effect:
> [Annotate Parcel PIN] - offset to the right of the centroid.
> [Annotate Parcel Area] - centered and above the centroid.
> [Annotate Parcel Centroid (X,Y)] - centered and below the centroid.

The remaining options, when active, result in the above mentioned commands positioning the annotation: (a) centered about, (b) above, or (c) below the approximate polygon centroid.

Additional Font Attributes

ArcGIS users can control the font and its style (bold or italic) by using the appropriate tool in the Draw toolbar, as shown in Figure 12. These settings should be made prior to generating any annotation.

ArcView GIS users can control the font and its style (bold or italic) by using the Font Palette window as shown in Figure 13. The Font Palette is displayed

Figure 12 Draw Toolbar

using the {Window} [Show Symbol Window...] command. Note that these attributes can be changed after the annotation has been created, not before. So that, once the annotation has been established, the user selects the annotation(s) to be modified, and then invokes the Font Palette, from which, the appropriate font and style can be selected, and subsequently assigned to the selected graphic text elements.

Figure 13 ArcView GIS Font Palette

Annotate Distance

This command generates annotation representing the geometric length of a line, placing the annotation centered along the line, and either on the left or right side of the line depending upon the sign of the Annotation Offset property.

A positive annotation offset value places the annotation to the right of the line, while a negative value places the annotation on the left. The direction of the line is used to determine left and right.

In addition to processing lines features, this command will also process polygon features. In processing a polygon feature, each course or edge of the polygon is treated as an individual line.

When using this command, the user:

• Selects the feature(s) to be processed.
• Selects this command, at which point, the command will check if there are any selected features. If there are not, an error message is displayed. If there are selected features, the user should:
• Confirms whether the feature(s) are to be annotated, or not. Figure 14 illustrates a typical query message box posing the query.
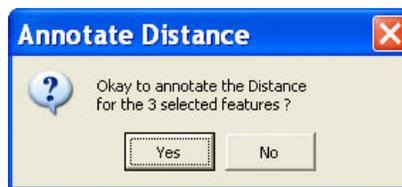
Figure 14 Yes/No Query Message Box

Selecting the *No* button will abort the command, while selecting the *Yes* button will result in the command generating the appropriate annotation, see Figure 15, placing the annotation in the current active layer as specified with the [Set Active Layer] command.
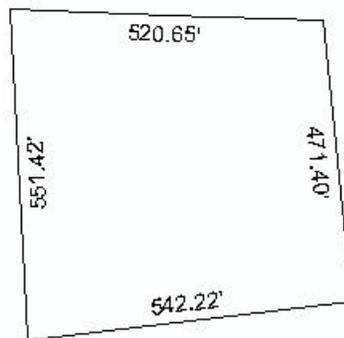
Figure 15
Annotate Distance Results

The Digits Right of Decimal - Distance property enables the user to control the number of digits, which should appear, to the right of the decimal point.

Annotate Azimuth

This command is the same as the [Annotate Distance] command except that

the azimuth of the feature is annotated, rather than the distance, see Figure 16.
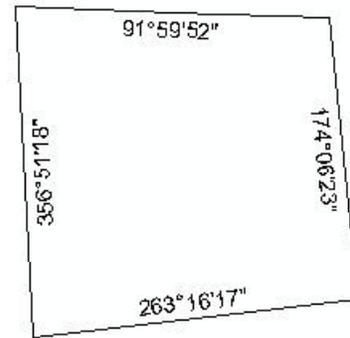
Figure 16
Annotate Azimuth Results

Annotate Bearing

This command is the same as the [Annotate Distance] command except that the bearing of the feature is annotated, rather than the distance, see Figure 17.
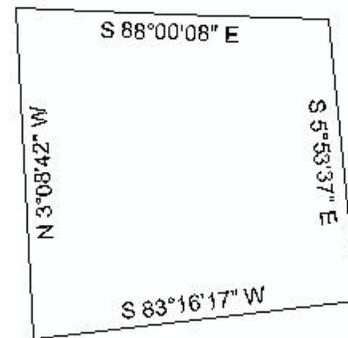
Figure 17
Annotate Bearing Results

Annotate Distance and Azimuth

This command is the same as the [Annotate Distance] command except that the distance and the azimuth of the feature are annotated, see Figure 18. Depending upon the setting of the Split Metes and Bounds property, either one or two annotations will be generated, and depending upon the Digits Right of Decimal - Seconds property, the seconds component of the direction will either be a whole number, or will have one digit to the right of the decimal point.
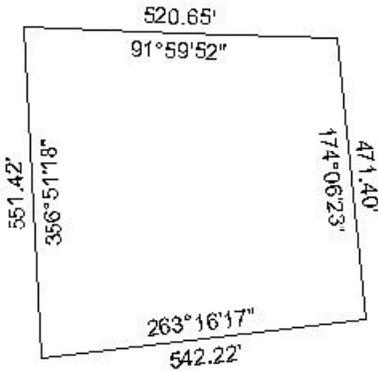
Figure 18
Annotate Distance and Azimuth
Results

Annotate Distance and Bearing

This command is the same as the [Annotate Distance and Azimuth] command except that the bearing of the feature, instead of the bearing, is annotated, see Figures 19 and 20. Note that in:

• Figure 19 the Split Metes and Bounds property is set to *Yes,* and the Digits Right of Decimal - Seconds property is set to *0.*

• Figure 20 the Split Metes and Bounds property is set to *No,* and the Digits Right of Decimal - Seconds property is set to *1.*
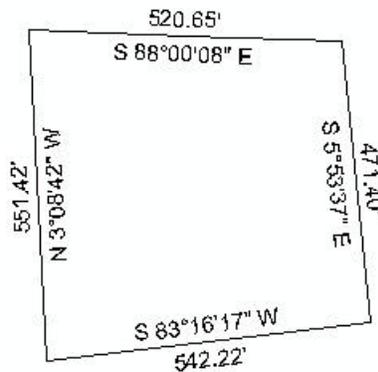
Figure 19
Annotate Distance and Bearing
Results

Annotate Parcel PIN

This command generates annotation denoting the Parcel Identification Number (PIN) of the polygon being processed.
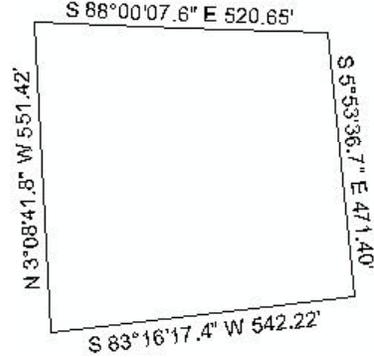
Figure 20
Annotate Distance and Bearing
Results

This value is a string which is taken from the attribute table of the polygon using the PRINT_KEY field. This field or its alias must exist in the polygon's attribute table in order for this command to generate any annotation.

The *pin.txt* file, which is located in the CEDRA distribution directory, can be modified to establish an alias for the PRINT_KEY field if desired. By changing the name from PRINT_KEY, on line 10 of the file, to a more appropriate name, the user is able to establish an alias for the PRINT_KEY field. Any text editor or word processor can be used to modify the *pin.txt* file. This file should be modified prior to invoking ArcMap or ArcView since this file is read only once upon invocation of the program.

In using this command, the user:

• Selects the polygon feature(s) to be processed.
• Selects this command, at which point, the command checks if there are any selected features. If there are not, an error message is displayed, and the command aborts.

Figure 21
Annotate Parcel PIN
Yes/No Query Message Box

• Confirms whether the feature(s) are to be annotated, or not. Figure 21 illustrates the query message box that is displayed posing the query.

Selecting the *No* button will abort the command, while selecting the *Yes* button will generate the appropriate annotation for the selected features, placing the annotation in the current active layer as specified with the [Set Active Layer] command.

Shown in Figure 22, is the typical annotation that would be generated by this command when the Positioning of Annotation property is set to "Centroid". Notice in Figure 23 the positioning of the same annotation with the Positioning of Annotation property set to "Offset from Centroid".

Annotate Parcel Area

This command generates annotation representing: (a) the geometric area and/or (b) the attributed area for the polygon being processed. The area at-
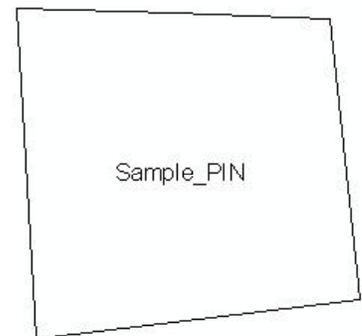
Figure 22
Annotate Parcel PIN Result

Figure 23
Annotation w/ Offset from Centroid

tributes are taken from the attribute table of the polygon being processed using the "SQFTdeed" and "ACREdeed" fields. The geometric area is computed "on-the-fly" during the processing of the command.

In using this command, the user:

• Selects the polygon feature(s) to be processed.

• Selects this command, at which point, the command checks if there are any selected features. If there are not, an error message is displayed, and the command aborts.

• Specifies the type of area annotation to be generated. Figure 24 illustrates the choice list message box that is displayed posing the query. Selecting the *Cancel* button will abort the command, while selecting the *OK* button will display the dialog box of Figure 25.
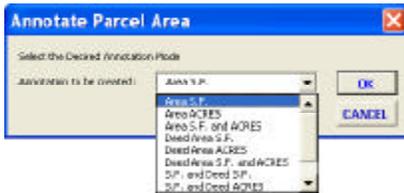
Figure 24
Area Annotation Type Choice List

• Enters the various annotation parameters shown in Figure 25. Selecting the *Cancel* button will abort the command, while selecting the *OK* button will generate the annotation.

Shown in Figure 26(a), is the typical annotation that would be generated by this command using the area annotation type

Figure 25
Area Multi-Input Message Box

Figure 26(a)
Annotate Parcel AREA Result
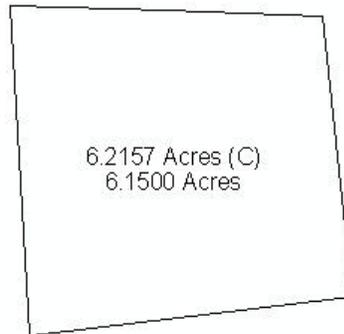
Figure 26(b)
Annotate Parcel AREA Result

of "Area S.F. and ACRES" and when the Positioning of Annotation property is set to "Centroid". Figure 26(b) illustrates the annotation that would be generated when using the "ACRES and Deed ACRES" option. Note that the computed area carries the Computed Area extension, (C), while the deed value does not.

Annotate Parcel Centroid (X,Y)

This command is the same as the [Annotate Parcel PIN] command except that the polygon's centroid coordinates are annotated, rather than the Parcel Identification Number (PIN). Shown in Figure 27 is an example of the annotation that is generated.

Note that the X coordinate appears first in the annotation followed by the Y coordinate value. The dash character separates the two values.

Annotate Point Data

This command enables the user to generate annotation pertaining to various
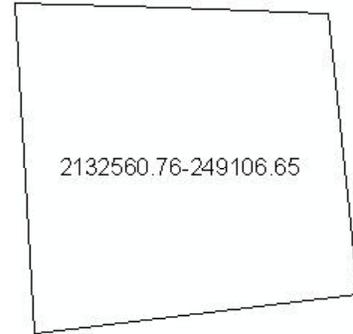
Figure 27
Annotate Parcel Centroid Result

attributes which are associated with point features. Shown in Figure 28 is the multi-input dialog box that is displayed by the command.
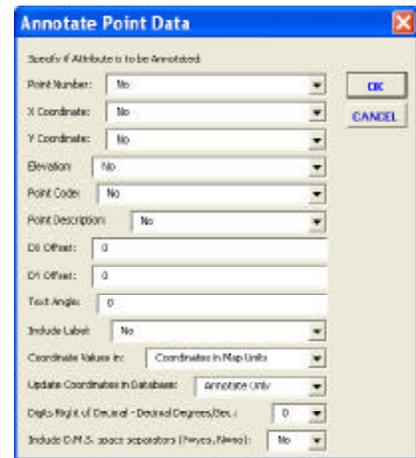
Figure 28
Annotate Point Data Dialog Box

In using this command, the user:

• Selects the point feature(s) to be processed.

• Selects this command, at which point, the command checks if there are any selected features. If there are not, an error message is displayed, and the command aborts.

• Enters the desired annotation parameters as listed in Figure 28. Selecting the *Cancel* button will abort the command.

• Confirms whether the feature(s) are to be annotated, or not. Figure 29 illustrates the query message box that is displayed posing the confirmation query.
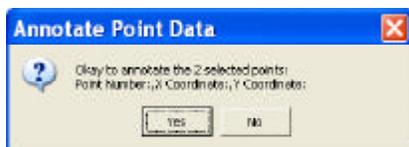
Figure 29 Yes/No Query Message Box

Selecting the *No* button will abort the command, while selecting the *Yes* button will generate the appropriate annotation of the selected features, placing the annotation in the current active layer as specified with the [Set Active Layer] command.

In creating the annotation, the command extracts data from the attribute table for the point being processed. Specifically, the fields that are used, and the labels to which they correspond to in Figure 28 are as follows:

Field	Label
PNT	Point Number
X	X coordinate
Y	Y coordinate
Z	Elevation
PTCODE	Point Code
PTDESC	Point Description

If the field does not exist, or if the field has not been populated a value of 0 or a single blank character will be used depending upon the field type. Note that all fields are assumed to be numeric with the exception of PTCODE and PTDESC, which are assumed to be of type string.

In creating the annotation, the user can control the offset from the point feature and the angle of inclination of the annotation via the DX Offset, DY Offset and Text Angle parameters, respectively. The user is also able to specify if a label is to precede the annotation via the Include Label parameter. If a response of *Yes* is given for the Include Label parameter, the following labels will appear to the left of the annotation:

Field	Label
PNT	Pt. #
X	xLabel
Y	yLabel
Z	Z=
PTCODE	Code=
PTDESC	Desc=

where *xLabel* and *yLabel* will vary depending upon the Direction Orientation property and the Coordinate Values in parameter. The Direction Orientation property is set using the [AVcad Properties...] command.

Note that:
• ArcView GIS users will find the [AVcad Properties...] command under the {AVcad Tools} menu item, shown in Figure 6.

• ArcGIS users will find the [AVcad Properties...] command in the CEDRA Commands combo-box, shown in Figure 7.

The labels, depending on the Direction Orientation property are as follows:

Direction Orientation Property	Field		Label	
Azimuth	X	Y	E=	N=
Bearing	X	Y	E=	N=
Cartesian	X	Y	X=	Y=

If the Coordinate Values in parameter is set to "Decimal Degrees", or any of the "DMS" options (see top of next column), the labels are as follows:

Field	Label
X	Lon.=
Y	Lat.=

In creating the annotation for the coordinates, the user can control the number of digits that should appear to the right of the decimal point via the Digits Right of Decimal - Distance property under the [Change Text Properties] command.

Using the Coordinate Values in parameter, the user is able to annotate a point feature's coordinates in:

• the layer's map units,
• the map's distance units, or
• degrees, minutes and seconds (latitude and longitude).

The options offered by this parameter include:

"Coordinates in Map Units"
"Coordinates in Distance Units"
"Decimal Degrees - 80.4321"
"DMS no Direction - 80°5'6"
"DMS no Direction - 80°05'6"
"DMS no Direction - 80°5'06"
"DMS no Direction - 80°05'06"
"DMS with Direction - 80°5'6"E"
"DMS with Direction - 80°05'6"E"
"DMS with Direction - 80°5'06"E"
"DMS with Direction - 80°05'06"E"

The eight DMS options, which pertain to the latitude and longitude annotations, vary in terms of:
• Whether the direction is included in the annotation, or not, and
• The formatting of the degree, minute and seconds value.

That is, whether leading zeros are to be introduced in the various components of a degree, minute and seconds value, or not.

Shown in Figure 30 are various types of annotation created with the [Annotate Point Data] command. In reviewing Figure 30, note that the annotation:

• At point 3314 illustrates the annotation of the Point Number, X coordinate and Y coordinate attributes with no label preceding the annotation.

• At point 3313 is similar to that of 3314 with the exception that the Digits Right of Decimal - Distance property has been changed from 2 to 3.

• At point 3312 is similar to that of 3313 with the exception that the Include Label parameter has been set to *Yes*.

• At 3321 is similar to that of 3312 with the exception that the Coordinate Values in parameter has been set to "Coordinates in Distance Units", rather than "Coordinates in Map Units". In this example we have projected the coordinates from its source of meters into the distance units setting of feet.
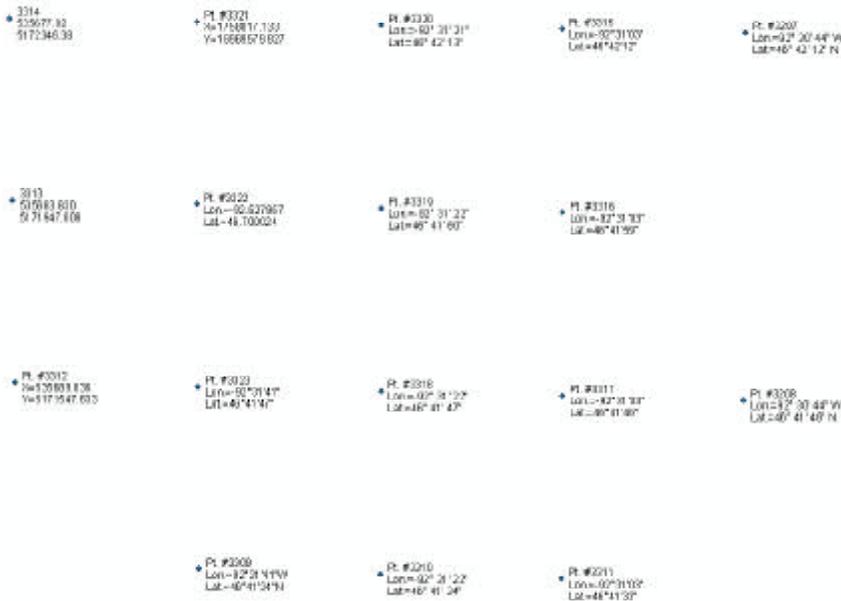
Figure 30 Various Types of Annotation using Annotate Point Data

- At 3322 illustrates the results when the Coordinate Values in parameter has been set to the option "Decimal Degrees - 80.4321" and the Digits Right of Decimal - Decimal Degrees/Sec. parameter set to 6.

- At 3323 illustrates the results when the Coordinate Values in parameter has been set to the option DMS no Direction - 80°5'6" and the Right of Decimal - Decimal Degrees/ Sec. parameter set to 0.

- At 3309 is similar to that of 3323 with the exception that the Coordinate Values in parameter has been set to the DMS with Direction - 80°5'6"E option.

- At 3320 is similar to that of 3323 with the exception that the Include D.M.S. space separators parameter has been set to *Yes*.

The remaining annotations in Figure 30 illustrate the various formatting options that are available. Specifically, the ability to introduce leading zeros in the various components of a Degree, Minute and Seconds value.

In addition to being able to generate various types of annotation, the user is also able to update the coordinate values in the layer's attribute table via the Update Coordinates in Database parameter.

The options offered by the Update Coordinates in Database parameter include the following:

    "Annotate Only"
    "Update Only"

Selecting the "Annotate Only" option creates only the annotation. The attributes associated with the processed features remain intact.

Selecting the "Update Only" option, on the other hand, does not generate any annotation, but instead updates the attributes associated with the processed features. The reader is reminded that when using native ArcView functionality to move a point feature, the coordinate fields are not automatically updated. This command provides the opportunity to carry out this update.

Depending upon the Coordinate Values in parameter setting, certain fields

are updated with the geometric coordinates of the point. Shown below are the Coordinate Values in parameter settings, underneath which, are the fields that are updated.

"Coordinates in Map Units"
        X
        Y

"Coordinates in Distance Units"
        X
        Y

"Decimal Degrees - 80.4321"
        X_Long
        Y_Lat

"DMS no Direction - 80°5'6""
"DMS no Direction - 80°05'6""
"DMS no Direction - 80°5'06""
"DMS no Direction - 80°05'06""
"DMS with Direction - 80°5'6"E"
"DMS with Direction - 80°05'6"E"
"DMS with Direction - 80°5'06"E"
"DMS with Direction - 80°05'06"E"
        Longitude
        Latitude

If these fields do not exist, the command will add them to the point feature's attribute table. All fields will be numeric, with the exception of the Longitude and Latitude fields, which will be defined as string fields of 25 characters in width.

Annotate Text or Attribute

This command enables the user to generate annotation, for a selected set of features, in four different modes. The available modes and the type of annotation created are as follows:

1. A user-defined annotation,
2. Annotation that reflects the value of an attribute,
3. Annotation that reflects the value of an attribute, appended with a user-specified suffix, or
4. Annotation reflecting the value of a group of attributes, with the ability to specify, on an attribute by attribute basis, the: font, font style, font size, prefix, suffix and location.

The set of features which can be processed may contain a mixture of different feature types. That is, it is possible for this command to process, point, polyline and polygon features all at the same time.

In using this command, the user:
- Selects the feature(s) to be processed.
- Selects this command, at which point, the command will check if there are any selected features. If there are not, an error message is displayed, and the command aborts.
- Selects the mode of operation and thereby the type of annotation to be created. A choice list message box, as shown in Figure 31, will appear offering 4 choices as to what type of annotation is to be created.
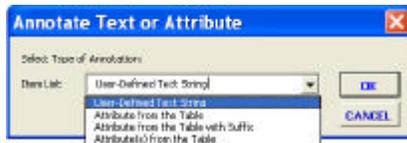
Figure 31
Annotation Type Message Box

Selecting the *Cancel* button will abort the command, while selecting the *OK* button will result in the command prompting the user for further information, depending upon the option that was selected.

The first three options shown in Figure 31 enable the user to generate annotation for one attribute within the attribute table for each of the selected features. The last option enables the user to generate annotation for an unlimited number of attributes at a time.

In positioning the annotation for the said three options, the command positions the annotation for:

Points	offset to the right from the point
Polylines	centered along the polyline, and offset therefrom
Polygon	centered at the centroid

For the fourth option, the user specifies the quadrant (N,S,E,W) in which the annotation is to appear.

The offset value used in the positioning of the annotation can be controlled via the Annotation Offset property under the [Change Text Properties] command.

Shown in Figure 32 is an example where both point and polyline features were selected and processed with this command. After the point and line features were selected, using native ArcView or ArcMap functionality, this command was selected twice.
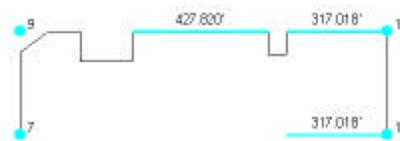
Figure 32
Annotation Positioning

The first time, the "Attribute from Table" option was selected specifying the PNT attribute, which we knew existed in the point attribute table as the field to be processed. This operation resulted in the annotation of the point numbers as shown in Figure 32.

The second time, the option "Attribute from Table with Suffix" was selected in conjunction with the line attribute LEN. The user-specified suffix was the ' character denoting feet. This operation resulted in the annotation of the line lengths as shown in Figure 32.

Depending upon the type of annotation selected from Figure 31, the user will be asked to enter certain information.

1   User-Defined Text String

- Enter the text string that is to appear next to the feature and click the *OK* button to begin the annotation generation or the *Cancel* button to abort the command.

2   Attribute from the Table

- Select the field or attribute that is to be processed and click the *OK* button to begin the annotation generation or the *Cancel* button to abort the command.

The command presents an alphabetically sorted list of unique field names using the attribute tables of the selected features. The user simply selects the desired field. Annotation is created only for those features which have the specified field in their attribute table. If the specified field does not exist in the attribute table, for the feature being processed, no annotation will be generated for that feature.

3   Attribute from the Table with Suffix

- Select the field or attribute that is to be processed and click the *OK* button to continue or the *Cancel* button to abort the command.
- Enter the suffix to be appended to the annotation and click the *OK* button to begin the annotation generation or the *Cancel* button to abort the command.

The command presents an alphabetically sorted list of unique field names using the attribute tables of the selected features. The user simply selects the desired field. Annotation is created only for those features which have the specified field in their attribute table. If the specified field does not exist in the attribute table, for the feature being processed, no annotation will be generated for that feature.

Note that if a space or blank character is to separate the value from the suffix, the user should insert the space or blank character in the suffix that is specified. When processing the suffix, this command will append the user-specified suffix to the attribute value without any separating character.

4   Attribute(s) from the Table

• Select the field(s) or attribute(s) that are to be processed from the choice list message box, similar to the one shown in Figure 33 and click the *OK* button to continue or the *Cancel* button to abort the command.
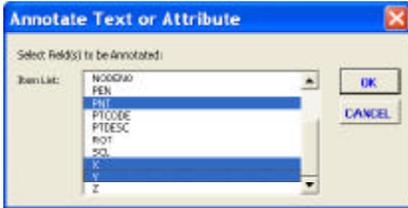
Figure 33
Attribute Choice List Message Box

Shown in Figure 33 is an attribute choice list message box where 3 attributes have been selected for processing. To deselect an attribute which has already been selected, simply re-select the attribute. Re-selecting a selected attribute will result in the attribute being deselected.

• Fill in the dialog box, similar to the one shown in Figure 34 and click the *OK* button to begin the annotation generation or the *Cancel* button to abort the command.

Figure 34
Annotation Attribute Dialog box
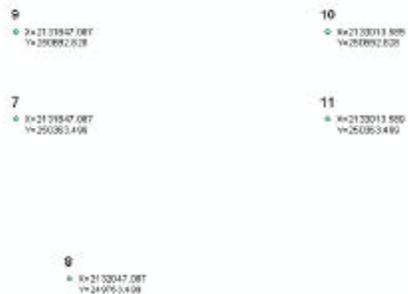
Figure 35
Attribute(s) from the Table Sample

From Figure 34, it can be seen that the user is able to control the order and position of the attributes, as well as, the font, font style and font size of the annotation to be used. The user is also able to specify a prefix and/or suffix for the annotation, all of which, on an attribute by attribute basis.

Shown in Figure 35 is an example of the annotation that would be generated using the data specified in Figure 34. Note that the Point Number attribute appears in the North quadrant and in a Bold font style, while the X and Y coordinates appear in the East quadrant in a smaller font size. All of this annotation was created in one operation.

CEDRA-Text-Tools Toolbar

The Create a Text String tool, ⊞, located in the CEDRA-Text-Tools toolbar and the CEDRA Tool Palette, enables the user to create an annotation that is positioned:

• at a user-specified location,
• centered and offset about two picked points, or
• centered and offset about a line.

In using this command, the user:

(a) Selects this command, at which point, depending upon how the annotation is to be positioned, the user will make a pick in the map area. The location where the annotation is placed is controlled via the Text Positioning parameter., as shown in Figure 36. The Text Po-
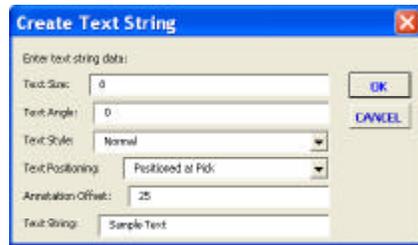
Figure 36
Create a Text String Dialog Box

sitioning parameter offers three options:
"Positioned at Pick"
"Centered about 2 Points"
"Centered about a Line"

(b) Depending upon which of the above options is selected, the user should if the option:

• "Positioned at Pick" option is selected, pick the location where the low left corner of the annotation is to appear,

• "Centered about 2 Points" option is selected, pick the first point of a virtual line in which the annotation is to be centered and offset about, or

• "Centered about a Line" option is selected, pick the line feature that the annotation is to be centered and offset about.

(c) Once the pick has been made, the command will ask the user to fill-in a dialog box, similar to the one shown in Figure 36, after which, the user can click the *OK* button to continue, or the *Cancel* button to abort the command.

Depending upon the Text Positioning parameter setting, the user may need to provide additional information.

If the user selects the "Positioned at Pick" option, the command will create and display the annotation, placing the annotation in the current active layer as specified with the [Set Active Layer] command. The user is then able to make another "pick".

Shown in Figure 37 is an example of the annotation that is created when the "Positioned at Pick" option is selected. The

Figure 37
Positioned at Pick Result

red plus sign represents the location that the user "picked" in Step b. In this example the text angle has been set to 45 degrees, counterclockwise being positive in sign.

If the "Centered about 2 Points" option is selected, the user will be asked to:

(d) Pick the endpoint of the line. Once the pick has been made, the annotation will be created and displayed, placing the annotation in the current active layer as specified with the [Set Active Layer] command. The user is then able to make another "pick".

Shown in Figure 38 is an example of the annotation that is created when the "Centered about 2 Points" option is selected. The red plus signs represent the locations which the user "picks" in Steps (b) and (d). In this example the red plus sign on the left was selected first and the one on the right, second. As such, a negative Annotation Offset value was specified to place the annotation on the left side or above the imaginary line.

Figure 38
Centered about 2 Points Result

If the "Centered about a Line" option is selected, the user will be asked to:

(d) Confirm the selection of the feature that was found, if any. Based upon the initial "pick", if a feature can not be found no annotation will be created and the user prompted to make another "pick". If a feature was found, a message box similar to that of Figure 39 will appear.

Selecting the *Yes* button results in the annotation being created and displayed, placing the annotation in the current active layer as specified with the [Set Active Layer]

Figure 39
Feature Confirmation Query

command. The user is then able to make another "pick".

Selecting the *No* button causes the command to search for another feature within the proximity of the initial "pick". If a feature can be found, the feature confirmation query box of Figure 39 will reappear and the confirmation process repeated. If a feature can not be found, no annotation will be created and the user will be asked to make another "pick".

Selecting the *Cancel* button will abort the command.

Shown in Figure 40 is an example of the annotation that is created when the "Centered about a Line" option is selected. The horizontal black line represents the feature that the user "picks" in Step b. In this example the direction of the line is left to right. As such, a negative Annotation Offset value was specified to place the annotation on the left side or above the line.

Figure 40
Centered about a Line Result

In reviewing the multi-input message box of Figure 36, the user is able to control the font size, angle and font style. The Annotation Offset parameter is only used when the "Centered about 2 Points" and "Centered about a Line" options are selected. This parameter has no effect when the "Positioned at Pick" option is selected.

Modifying Annotation

Annotation which is created using the CEDRA Annotation commands is automatically positioned for the user. However, it may be necessary to reposition or modify the annotation after its initial placement. The user should feel free to perform such modifications as desired. There is nothing that restricts the user from editing any of the CEDRA generated annotation.

The CEDRA Relocation 1 tool, and the Utility 1 tool, can be used by the user to change the annotation's position and angle of inclination. However, other types of annotation modification will require the use of native ArcMap or ArcView functionality.

When using native ArcMap or ArcView functionality to modify CEDRA generated annotation, the user should realize that behind the CEDRA annotation there are attributes, which are stored, that describe the annotation (location, font, style, size, etc.). Native ArcMap or ArcView functionality will not update these attributes.

To update these attributes, the Relocation 1 tool, can be used, as can the [Update Geometry] command, see Figure 6 or 7 depending upon the GIS environment being used. The Relocation 1 tool should be used when dealing with a small number of annotations. When a large number of annotations are to be updated, the [Update Geometry] is a more efficient means of performing the updating.

In using the Relocation 1 tool, the user simply clicks on the annotation which was modified and confirms the selection. After confirmation has been made, the user simply clicks in the same location, so as not to relocate the annotation. In so doing, the annotation remains in its position and the attributes which describe the annotation are updated.

The [Update Geometry] command processes features from either:

(a) the active or selected themes, or
(b) all of the visible themes.

The user decides the appropriate mode of operation. Upon selection of this command, a choice list message box will be displayed enabling the user the specify the desired mode of operation.

During the command's processing, if the theme being processed contains selected features, then only the selected features in the theme will be processed, otherwise, all features in the theme will be processed.

In the ArcView GIS environment, both the Relocation 1 tool, and the [Update Geometry] command will update, for a point feature, the annotation attributes, such that, they properly reflect the graphic text element referenced by the point feature.

In the ArcGIS environment, the annotation attributes, which are updated, correspond to the attributes of the annotation feature being updated.

In the ArcGIS environment, the need to update the annotation attributes is not as great as in the ArcView GIS environment. The reason being is that annotation in ArcGIS is stored as an annotation feature. This enables the user to easily move annotation from document file to document file. Simply by using the Add Data tool, the user adds the dataset, in which the annotation resides in. Once loaded, the annotation is displayed and available for processing.

In ArcView GIS, however, it is not as easy. As stated at the beginning of this bulletin, annotation in the ArcView GIS environment is represented by a point feature, that is stored in a shapefile, which references a graphic text element, which is stored in the ArcView project file. As such, there are two separate and distinct files containing the annotation.

When annotation is created, in ArcView GIS, a point feature is generated, as well as a graphic text element. The point feature is assigned annotation attributes describing the graphic text element. The default symbology for the point feature is a small circle of point size 2, drawn in the color white. As such, the user will not see the point feature, only the graphic text element will be visible.

If the user were to add the point shapefile into another ArcView project file, the point features will be visible but the graphic text elements will not. This is because the graphic text elements are stored in the ArcView project file. By making sure the annotation attributes, which are stored in the point shapefile, are up to date. The graphic text elements can be regenerated with the [Generate Text from Table] command.

The [Generate Text from Table] command enables the user to create graphic text elements using the annotation attribute data that is stored in the point shapefile. In so doing, should the ArcView GIS project file become corrupted, or the user wishes to migrate the annotation to another project file, the user has the ability to use this command, processing the appropriate point shapefile, so as to regenerate the graphic text elements.

Summary

The CEDRA Annotation commands provide a great deal of functionality in generating annotation in a variety of forms and in a mass production or individual manner. If you have not used these commands, we invite you to try the functionality described in this bulletin. The operation of these commands is fairly straightforward, but if you would like some assistance or have any questions, please feel free to contact us.

If you have a request for Command Of The Month, feel free to phone, fax or e-mail your request to The CEDRA Corporation.