GIS by ESRI™

USER'S GUIDE

PC ARCEDIT™

Interactive database creation, update, and management™

ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE, INC.

Contents

Chapter 1 Introduction

Introduction

1 PC ARCEDIT is one of the specialized PC ARC/INFO products designed to add interactive coordinate and attribute editing capabilities to an existing PC ARC/INFO workstation. PC ARCEDIT provides advanced capabilities for interactive, sophisticated graphics editing for coverage creation and update, and for final cartographic production.

What is PC ARCEDIT?

PC ARCEDIT is a unique graphics and database editor. It combines the sophisticated capabilities of computer-aided design (CAD) functions with the power of a geographic database. Both locational as well as descriptive data can be edited and manipulated within PC ARCEDIT. These capabilities are important not only for automating and maintaining geographic databases, but for the creation of high quality maps produced as a product of PC ARC/INFO's analytical capabilities.

PC ARCEDIT provides all of the facilities for digitizing coverages with a more comprehensive set of graphic editing commands. You can edit feature attributes; add high quality text annotation; use other database layers as background displays or attribute transfer; and you can easily diagnose and correct digitizing errors.

PC ARCEDIT takes advantage of feature-based editing. You can move, copy, delete, reshape and undelete arcs, label points, map annotation, tics and nodes. Even individual vertices within a line can be moved, added or deleted. Because arcs represent important spatial features and are the most difficult to represent accurately, PC ARCEDIT has numerous functions for arc coordinate editing. Arcs can be reshaped, splined, aligned and split; corners can be squared, and lines copied and moved. Cartographic annotation can be created and edited in PC ARCEDIT to produce high quality maps. Annotation text can be scaled, rotated, spaced proportionally between two points or shaped to follow curvilinear features.

Feature attribute tables can be created and updated with PC ARCEDIT. In addition to calculating new values for selected features, you can transfer attributes from one coverage to another and interactively update attributes for selected features.

PC ARCEDIT design

PC ARCEDIT has a simple and consistent user interface. This user interface allows maximum flexibility with the minimum of command entry and redundancy. The implementation is based on the concepts of 'edit environments' and 'feature-oriented editing'.

Edit environments

Commands are available to set various edit environments which determine conditions in which the session occurs. For example, environment-setting commands are used to tell PC ARCEDIT which hardware devices you will use, the coverages you want to work with, the kinds of features you want to edit and, in general, how you want to interact with PC ARCEDIT. They are intended to provide maximum versatility for how PC ARCEDIT can be used while minimizing the amount of work for the user. Environment-setting commands let you tailor a PC ARCEDIT work session to meet your immediate needs.

Feature-oriented editing

PC ARCEDIT employs feature-oriented editing procedures to increase the speed and efficiency of an editing session. Feature-oriented editing is a three-stage process:

First specify the feature class to edit. Choices are tic, arc, node, label or annotation.

Then select specific features within the edit feature class to be edited.

Last edit the selected features using various editing commands (e.g., copy, move, rotate, delete, etc.).

The feature class and the selected features remain until explicitly changed. Therefore, you don't have to respecify them each time you enter an edit command. In contrast, command-oriented editing requires the command and the features to be respecified each time.

Database integrity

With PC ARCEDIT, you are always editing a copy of your database. Your changes are never permanent until you save them into the original coverage or specify a new coverage to hold your edits.

Chapter 2 Functions and capabilities

Functions and capabilities

2 PC ARCEDIT can be used to add new features to a coverage and to edit existing features. PC ARCEDIT also allows you to add and update the tabular attribute data associated with coverage features. This chapter introduces you to the editing functions which can be performed on each class of coverage features. The basic editing commands used to modify coverages are identified.

Editing is performed by first selecting a set of coverage features. Subsequent editing commands will only operate on the set of coverage features you have selected. Features can be selected interactively with the screen or digitizer cursor by pointing at them individually or indicating areas inside which groups of features will be selected. Features can also be selected according to their tabular attribute values. The various ways of making feature selections and setting other PC ARCEDIT environments, such as edit tolerances, are introduced in the chapter 'Steps for using PC ARCEDIT' which describes a typical PC ARCEDIT session.

Editing tics

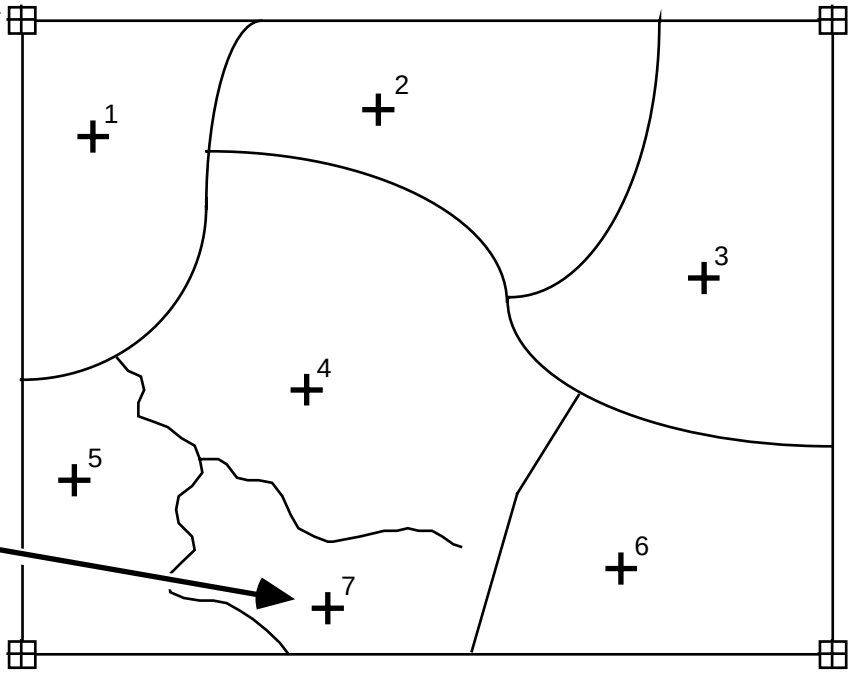
Use these commands to edit tics:

ADD
COPY
DELETE
MOVE

Editing label points

Use these commands to edit label points:

ADD
COPY
DELETE
MOVE



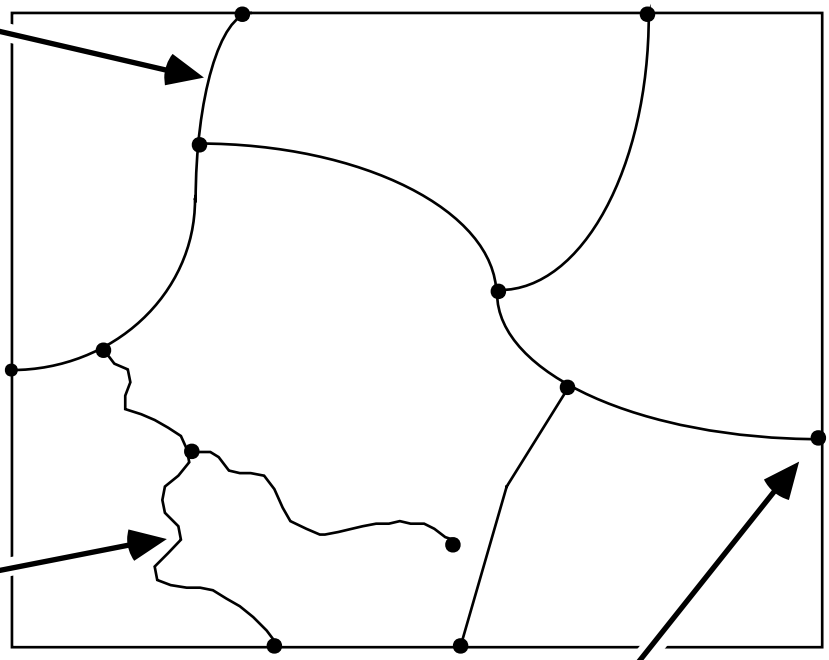
Editing arcs

Use these commands to edit arcs:

ADD
ARCTYPE
COPY
DELETE
FLIP
MOVE
ROTATE
SPLIT
UNSPLIT

Use these commands to manipulate coordinates:

RESHAPE
SPLINE
VERTEX
WEED



Use this command to edit nodes:

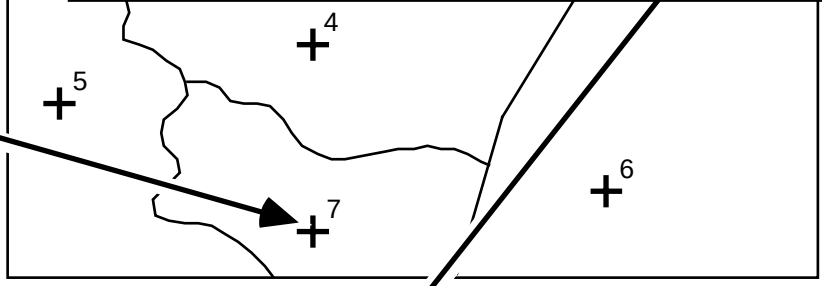
MOVE

Editing feature attributes

Use these commands to edit feature attributes:

CALCULATE
FORMS
JOIN
LOOKUP
MOVEITEM
UPDATE

AREA	PERIMETER	SOILS_	SOILS_ ID	CLASS	SUITABILITY
8.0	9.0	2	1	113	HIGH
11.5	8.5	3	2	95	LOW
13.0	15.0	4	3	212	MODERATE
16.0	8.5	5	4	201	MODERATE
7.0	4.5	6	5	86	LOW
9.5	12.0	7	6	77	HIGH
4.0	7.0	8	7	117	LOW



Use this command to transfer attributes between features:

TRANSFER

Use these commands to list feature attribute names and values:

COLUMNS
ITEMS
LIST
SHOW

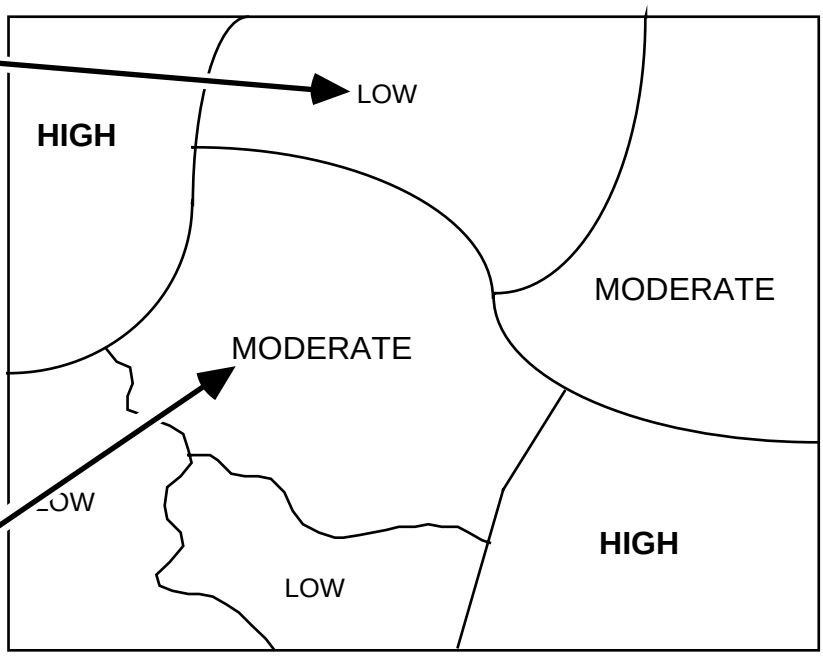
Editing annotation

Use these commands to edit annotation:

ADD
COPY
DELETE
DELETEARROW
JOIN
MOVE
REPOSITION
ROTATE
SETARROW

Use these commands to set the annotation environment:

ANNOFIT
ANNOITEM
ANNOLEVEL
ANNOPOSITION
ANNOSIZE
ANNOSYMBOL
ANNOTYPE

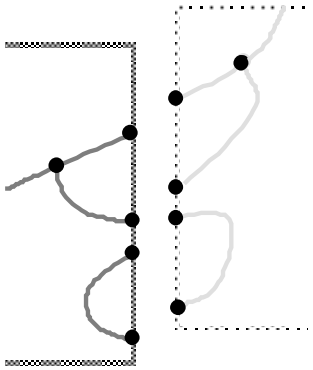


Edgematching adjacent arcs of two coverages

Use this command to match arcs along the adjacent sides of two coverages:

EDGEMATCH

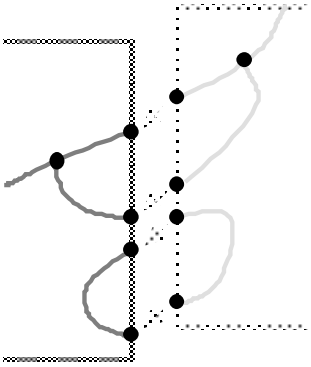
1. Begin



[match_cover] [cover]

Node

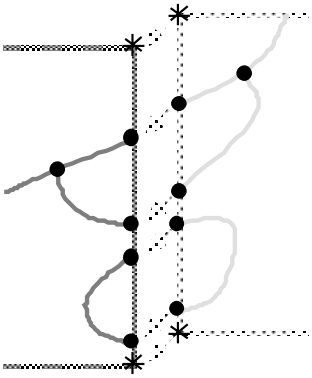
2. Use AUTOMATCH



AUTOMATCH tolerance

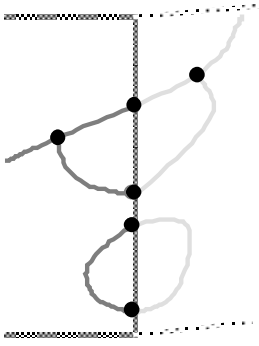
Link between nodes matched by AUTOMATCH

3. Match Corners



Arcs split at coordinates and linked

4. ADJUST



Edges after ADJUST

Chapter 3 Getting started

Getting started

3 The purpose of this chapter is to introduce the basic operating procedures for PC ARCEDIT and refer to particular PC ARCEDIT chapters for performing specific steps. It also introduces the special editing environments which can be established in PC ARCEDIT and refers you to other chapters for guidance on how to define and modify the special environments.

Starting and stopping PC ARCEDIT

PC ARC/INFO must be properly installed on your PC before PC ARCEDIT can be started:

To start PC ARCEDIT, type **ARC ARCEDIT** at the command prompt:

```
(C:\) ARC ARCEDIT
```

If you are already in the ARC system, just type **ARCEDIT** at the ARC prompt:

```
(C:\) [ARC] ARCEDIT
```

As PC ARCEDIT starts, you will see a version number and a copyright statement. Then, as soon as you see the PC ARCEDIT prompt, which [ARCEDIT], you can begin typing PC ARCEDIT commands.

Note that if you have an SML macro named ARCEDIT.SML, either in the current directory or in ARCEXE\PTOOL\UTOOL, ARCEDIT will automatically run the macro when you start ARCEDIT. If you want ARCEDIT to start an SML macro that is not named ARCEDIT.SML, specify its name on the command line with ARCEDIT.

```
[ARC] ARCEDIT STARTUP.SML
```

To exit PC ARCEDIT, type **QUIT** (or **Q**) at the PC ARCEDIT prompt. You will be returned to the command prompt, or to the ARC system if you were in the ARC system when you started PC ARCEDIT. Typing **RESET** instead of **QUIT** will reinitialize the PC ARCEDIT session. This is the same as quitting and restarting PC ARCEDIT.

How to get help in PC ARCEDIT

To get more help on a command, use the PC ARC/INFO's on-line help system found in the Start menu under PC ARC/INFO:

The information in the on-line help for a command is the same as can be found in the command reference section in this guide. Each command reference includes the command usage, a description of what the command does, a description of the arguments and notes on using the command.

How to get a list of commands in PC ARCEDIT

Use the COMMANDS command if you want to get a list of the PC ARCEDIT commands. Typing COMMANDS by itself will list all of the commands. Typing COMMANDS with a few letters will list only those commands that start with those letters:

```
[Arcedit] COMMANDS UN
UNDELETE   UNSELECT   UNSPLIT
```

Using DOS pathnames in PC ARCEDIT

You can give DOS pathnames in PC ARCEDIT commands when you specify the names of the coverages, lookup tables, text files and any other files used by PC ARCEDIT. So, if you wanted to edit coverages from more than one workspace, you could give pathnames to these coverages:

```
[Arcedit] EDITCOVERAGE A:\COUNTY\PLAN\ZONES
[Arcedit] BACKCOVERAGE C:\UPDATE\NEWZONES
```

If you wish to issue an operating system command from within PC ARCEDIT, use the SML &SYS command or the PC ARCEDIT SYSTEM command.

Workstation setup

Once a PC ARCEDIT session begins, you must put the PC monitor into graphics mode and establish the method to be used for coordinate input. You should also specify how commands will be entered for the PC ARCEDIT session.

Establish the graphics environment

When PC ARCEDIT is started, put the PC monitor into graphics mode with the DISPLAY command:

```
[Arcedit] DISPLAY 4
```

The graphics window will appear, and the PC ARCEDIT prompt will reappear in the command dialog (text windows) area. This area is where you will enter your commands. By default, the command dialog area is four lines long. DIALOGCLEAR will clear all text from the dialog area. CLEAR will clear all text and graphics from the screen. The DIALOGCOLOR command lets you specify the color of text and bar in the dialog area.

Establish the dialog display environment

You can also control the display area for computer dialog. For example, you can change the number of dialog lines appearing on your screen, cause attribute lists and help file listings to pop up as a full-screen display, and then return to graphics mode when you are

finished viewing them. The following commands are used to establish the dialog display environment:

DIALOGCLEAR
DIALOGCOLOR
DISPLAY

These are described in more detail in the command reference section.

Specifying how coordinates will be entered

PC ARCEDIT has three primary methods for coordinate input. The first method uses the display screen cursor and is controlled by the PC's arrow keys on the keyboard or a mouse if one is installed; the second method involves the use of a digitizer; and the third method is to key enter coordinates at the keyboard or to read them from a file. The coordinate input method is specified with the COORDINATE command and can be changed any number of times during a PC ARCEDIT session. For coordinate entry with a digitizer or mouse, PC ARCEDIT supports two input options: point mode and stream mode.

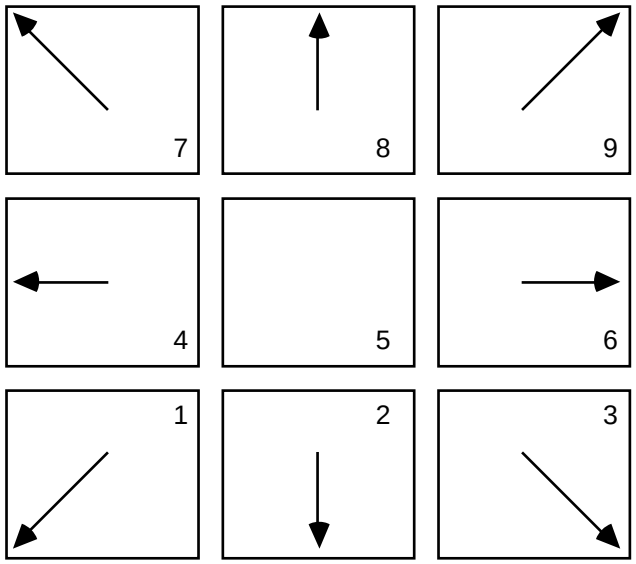
PC ARC/INFO expects two important pieces of information from the coordinate input device: the x,y location and the key value used to register the coordinate point. The key value is used to specify particular digitizing options. For example, when adding arcs, the first point on an arc is digitized by pressing the 2 key; points along the arc are entered using the 1 key; and the last point on the arc is entered using the 2 key. Usually, digitizer cursors with 12 buttons are preferred for most operations. The twelve keys are used for key values 0, 1, 2, ..., 9, plus a backspace key and an (ENTER) key.

Coordinate entry using the screen cursor

COORDINATE CURSOR - this method specifies that the screen cursor will be used to indicate coordinate locations. This is the default setting for COORDINATE when PC ARCEDIT begins execution. How you control the screen cursor is dependent upon the type of graphics input capabilities you have installed on your PC. The screen cursor can be controlled by the arrow keys on the keyboard or a mouse if you have one installed.

Using the screen cursor - many PC ARCEDIT commands are interactive in nature and allow you to use the screen cursor to specify coverage or page locations. For example, you may want to SELECT a feature by pointing to it on the screen, or draw a BOX by indicating its lower-left and upper-right corners. PC ARCEDIT lets you do this by positioning the screen cursor using the arrow keys on the numeric keypad. Any command which has the * option allows you to use the screen cursor. Use the keyboard arrow keys to move the cursor. Make sure that the Num Lock key is off before attempting to use the arrow keys.

There are eight directions in which you can move: up, down, left, right, and the four diagonal directions. Here are the directions controlled by each numeric keypad key:



Once you have positioned the cursor in the desired place, pressing any alphanumeric key on the keyboard (not the keys on the numeric keypad) will enter the position of the cursor. If the command requires a second location, for example, the position of the opposite corner of the box that you are drawing, the prompt will reappear. You can then reposition the cursor and enter the second location.

The screen cursor can be moved in finer or coarser modes. The default cursor movement is 9 screen pixels. To change to a coarser mode, press the '+' key located beside the direction keys on the numeric keypad. Each time the '+' key is pressed, the number of pixels the cursor travels in one movement is increased three times. To change to a finer cursor movement, press the '-' key. This will decrease the number of pixels the cursor travels in one movement by a third.

Coordinate entry using a mouse

PC ARCEDIT also supports graphic input from a mouse. If a mouse is installed, the screen cursor can be positioned by moving the mouse rather than using the keyboard arrow keys. Once the cursor is positioned, pushing a button on the mouse will enter the cursor position.

Certain commands, such as ADD, use an on-screen menu and require a value to be recorded when entering the cursor position. If you are using a mouse, pushing button one (the left-most button) will record a value of '1'; pushing button two will record a value of '2'; and so on. To record a value not available on the device, press the appropriate key on the keyboard, and then push any button on the device. If you are adding arcs using stream mode digitizing, press button one and hold it down while tracing the shape of the arc.

Coordinate entry using a digitizer

Specifying a digitizer - digitizers can be used in PC ARCEDIT for point or stream mode coordinate entry. In fact, most coordinate entry is performed on digitizers to ensure that acceptable map accuracy is maintained. In the *PC ARC/INFO User's Guide* you learned how to identify the digitizer and serial port to be used for coordinate entry with the CON-DIG command. Unless you have changed the serial port or digitizer, you do not have to give the CON-DIG command again.

```
[ARC] CON-DIG LIST
```

Specifying coordinate input using a digitizer - to specify that coordinate locations will be entered from a digitizer, use the following command line:

```
COORDINATE DIGITIZER {cover / DEFAULT}
```

Before adding features to a new or existing coverage, you will be requested to register the coverage's tics by digitizing at least four tic locations on the digitizer. These are used to orient the map on the digitizer so that coverage coordinates are entered in the appropriate units and at the proper locations (i.e., to permit the transformation between the edit coverage and the digitizing board).

This example demonstrates the use of the COORDINATE command with the DIGITIZER option.

```
[Arcedit] DISPLAY 4
[Arcedit] EDITCOVERAGE SHANDON
The edit coverage is now SHANDON
WARNING the Map extent is not defined
Defaulting the map extent to the BND of SHANDON
[Arcedit] DRAWENVIRONMENT ALL ON
[Arcedit] DRAW
[Arcedit] COORDINATE DIGITIZER SHANDON
DIGITIZER TRANSFORMATION
Digitize a minimum of 4 tics.
Signal end of tic input with Tic-ID = 0
Tic-ID: 1*
Tic-ID: 2*
Tic-ID: 3*
Tic-ID: 4*
Tic-ID: 0*
```

To establish a digitizer transformation, you must enter the Tic-IDs and locations for at least four tics. PC ARCEDIT requires that at least four tics be digitized so that a transformation can be established between the coverage and the device on which the map is being digitized. To digitize the tics, first enter the Tic-ID followed by a carriage return (usually the A key on the digitizer cursor), then center the cursor crosshairs over the tic location and press any numeric key except 0. If you make a mistake in entering the Tic-ID, you can usually use the B key to backspace over the error. Then just enter the correct Tic-ID followed by a carriage return. To stop digitizing tics, enter 0 as the Tic-ID followed by a carriage return.

```
Digitizer transformation scale: 0.9989173
                     RMS error: 0.0068336
Is this RMS error acceptable? <1=Y/2=N>
```

Once all of the tics are entered, PC ARCEDIT will display a transformation scale and the RMS error. The transformation scale indicates how much the coverage being digitized will be scaled to match the coordinates already digitized. The Root Mean Square (RMS) error indicates how much error there is in establishing the transformation. Ordinarily, if the RMS error is greater than .003, you would probably want to reregister the map by entering a 2 on the digitizer keypad. The most common cause of a large RMS error is not having the cursor crosshairs centered on the tic when the location is digitized, or careless placement of tic locations on a map sheet. Digitizing the tics in the wrong order or digitizing from a map that is wrinkled can also cause a larger than expected RMS error. In this example, the RMS error is greater than our acceptable limit of .003, so the edit coverage should be reregistered.

```
Digitizer transformation scale: 0.9989173
                      RMS error: 0.0068336
Is this RMS error acceptable? <1=Y/2=N> N
DIGITIZER TRANSFORMATION
Digitize a minimum of 4 tics.
Signal end of tic input with Tic-ID = 0
Tic-ID: 1*
Tic-ID: 2*
Tic-ID: 3*
Tic-ID: 4*
Tic-ID: 0*
Digitizer transformation scale: 0.9981629
                      RMS error: 0.0022055
Is this RMS error acceptable? <1=Y/2=N>
```

If you are editing an existing coverage on the digitizing table, you must register its tic locations regardless of how its coordinates are stored. For example, suppose you digitize a portion of a large coverage in digitizer inches and save the results; then later during another PC ARCEDIT session you want to finish digitizing the coverage. When you remount the map on the digitizer, it will be in a new location and rotated differently than the first time. The coordinate transformation will help ensure that the new coordinates will be correctly oriented with the existing coverage coordinates.

Additional details regarding the use of COORDINATE DIGITIZER are described in the COORDINATE command reference.

Entering coordinates at the keyboard

COORDINATE KEYBOARD - coordinates can be key entered at the PC keyboard as x,y values in coverage units. When a command which requires coordinate input is used, you will key enter the coordinates on the monitor keyboard.

When COORDINATE is set to KEYBOARD, enter coordinate values on the command line when issuing a command which requires interactive coordinate entry. For example, to set MAPEXTENT at 1,2 for the lower-left x,y and 6.8, 4.2 for the upper-right corner, enter:

```
[Arcedit] COORDINATE KEYBOARD
[Arcedit] MAPEXTENT 1 2 6.8 4.2
```

This example shows how coordinates can be entered from the keyboard to add arcs:

```
[Arcedit] EDITFEATURE ARC
Please wait...
2293 element(s) for edit feature ARC
[Arcedit] DRAWENVIRONMENT ARC
[Arcedit] DRAW
[Arcedit] COORDINATE KEYBOARD
[Arcedit] ADD 1050 3225 1050 3175 1100 3225
```

Entering coordinates from a file

If you choose to enter coordinates from a file, first establish the coordinate input method as COORDINATE KEYBOARD. The file containing coordinates must be in the same format as would be expected if coordinates were key entered on the keyboard.

Coordinate input from a file is performed using the SML &RUN command. The chapter 'Adding coverage features' shows an example of how coordinates can be entered from a file.

Specifying the method used for command entry

As in all of PC ARC/INFO, there are various methods which can be used for command entry in PC ARCEDIT. You can type commands at the monitor keyboard, specify that commands be read from a text file such as an SML macro (even from other directories), or enter commands from a menu mounted on a digitizer. The COMMAND command is used to establish the method of command entry in

PC ARCEDIT. The default method used for command entry is to type them in one at a time on the keyboard. SML controls command entry from a text file and is established by entering COMMAND FILE. For details on creating and using digitizer menus, refer to the appendix 'Developing custom digitizer menus'.

Using SML macros

You can create ASCII text files containing PC ARCEDIT commands. These PC ARCEDIT macros can be used to store groups of commands that you use frequently. For example, you might create one basic macro containing commands that establish the graphics and dialog display environments for your editing sessions. You can then run this macro at the start of each PC ARCEDIT session instead of typing each of the commands in every time.

You can also use PC ARCEDIT macros to create interactive applications and customized user interfaces. PC ARC/INFO includes the Simple Macro Language (SML). SML is a special set of commands which enable you to build sophisticated macros featuring definition of variables, evaluation of expressions, user input, and so on. SML is the programming language for PC ARCEDIT. For example, you can create customized programs that let people draw and edit coverages even though they don't know how to use ARCEDIT. Your macros can do the ARCEDIT work for them. In addition, if you have an SML named ARCEDIT.SML, either in the current directory or in ARCEXE\PTOOL\UTOOL, ARCEDIT will automatically run the macro when you start ARCEDIT. If you want ARCEDIT to start an SML macro that is not named ARCEDIT.SML, specify its name on the command line with ARCEDIT.

```
[ARC] ARCEDIT STARTUP.SML
```

The SML command &RUN is used to initiate SML macros.

For further details on SML macros, refer to the PC ARC/INFO on-line help file.

PC ARCEDIT environments

There are a number of environments which can be controlled in PC ARCEDIT, and they can be changed at any time during a session. For example, you can change the feature type being edited or select a different coverage to edit, change the list of features you wish to have drawn, add a background display, and so on. Once you set each of the environments, they will remain in effect until you change them. Here are some of the most important edit environments.

The DRAW environment

Drawing coverage displays in PC ARCEDIT is a very simple two-step process. First, specify the set of feature types you wish to display using the DRAWENVIRONMENT command. Then, issue the DRAW command to draw the coverage. In addition to being able to specify any feature class to be drawn from the edit coverage, you can also identify a background coverage to be displayed. This can facilitate a number of data entry operations, for example, to serve as a reference coverage.

Once the draw environment is established, you can easily redraw your display. For example, you can change your map extent to window in on a portion of the coverage and then simply issue the DRAW command to zoom in. The commands used to establish the draw environment include:

EDITCOVERAGE
DRAWENVIRONMENT
BACKENVIRONMENT
BACKCOVERAGE

Features can be selected and drawn with different colors and other special symbols. For example, you may wish to draw arcs with symbols assigned using one of their attributes, change the color of a label after you have edited it, or highlight the set of selected features by drawing them with a different symbol. The chapter 'Drawing coverage features' presents the capabilities and procedures which can be used to establish special drawing symbols.

The EDIT environments

Edit coverages - up to two edit coverages may be open at a time in a

PC ARCEDIT session. Edits can be made to the current edit coverage only. To specify the current edit coverage, use the command EDITCOVERAGE. The command REMOVEEDIT is used to remove a coverage from the edit environment. Use the CREATECOVERAGE command to create a new coverage and make it the current edit coverage.

Edit features - to add or edit coverage features, you must first establish the feature class to be edited and, optionally, a set of special edit feature characteristics. Feature classes include arcs, nodes, label points, tics and annotation. Once you specify a feature class (such as arcs), you can add and edit arcs continuously until you specify a new feature class. Feature classes are specified with the EDITFEATURE command. Before you begin editing features, you can define the rules by which User-IDs will be assigned to features, special annotation characteristics and the editing tolerances and shapes for arc features. These special edit environments are discussed in the following three sections.

User-ID assignment

You can establish special rules for automatically assigning User-IDs to added features by specifying a starting value and an increment to be added to the User-ID as each new feature is added. For example, you can specify a starting User-ID value of 1,001 and increment each additional feature's User-ID by one (e.g., 1,001; 1,002; 1,003; 1,004; and so on). The chapter 'Adding coverage features' provides guidance on establishing a User-ID environment.

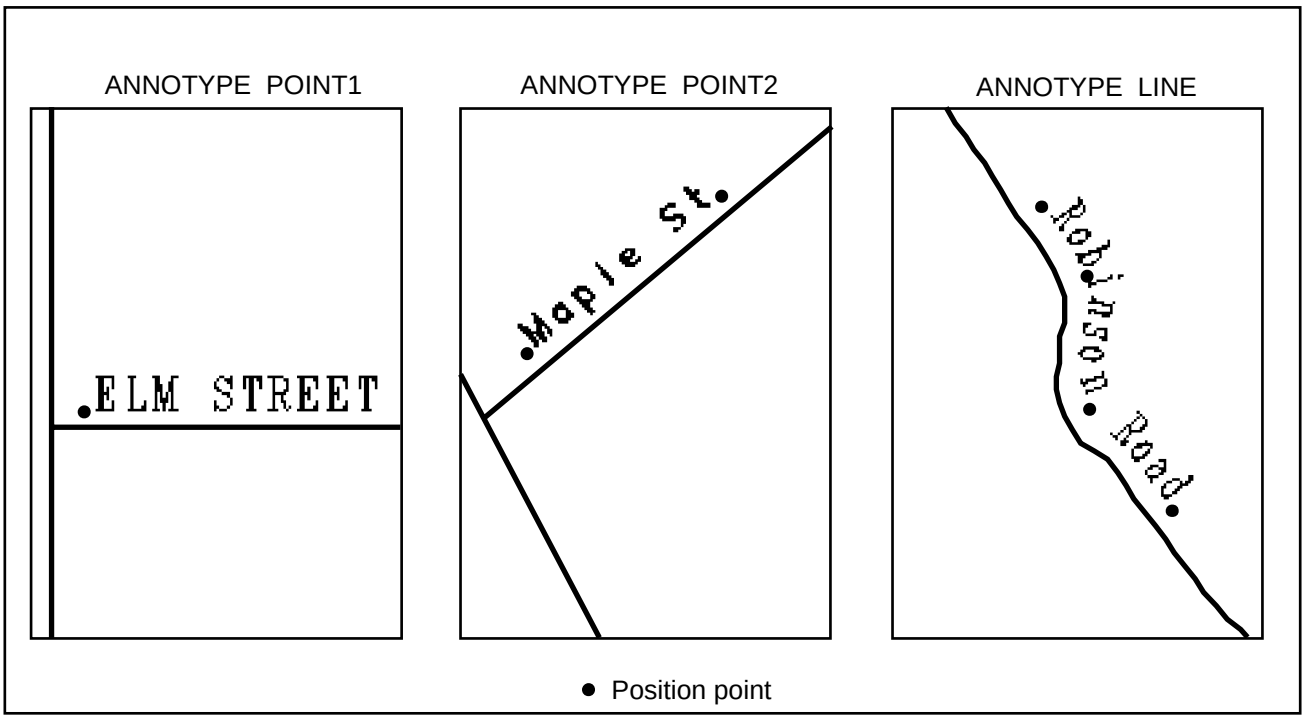
Annotation characteristics

Annotation is special text drawn on coverages to label features. You can locate and place annotation along arcs, center text on points, spline text along curves, and so on. You can also control the text symbols and sizes with which annotation is drawn. Before adding or editing annotation, a number of special characteristics can be established for annotation to define the appearance of annotation when it is drawn and to organize, or group, annotation into a set of levels. The following characteristics can be established:

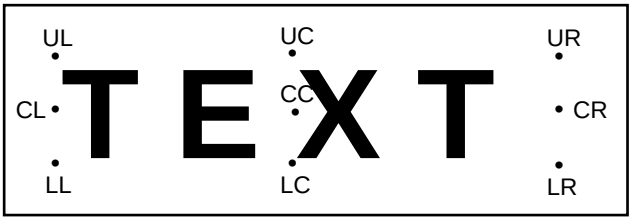
Size - specifies the height in coverage units for drawing annotation.

Symbol - the text symbol number whose characteristics (font, style, slant, etc.) are used to draw annotation.

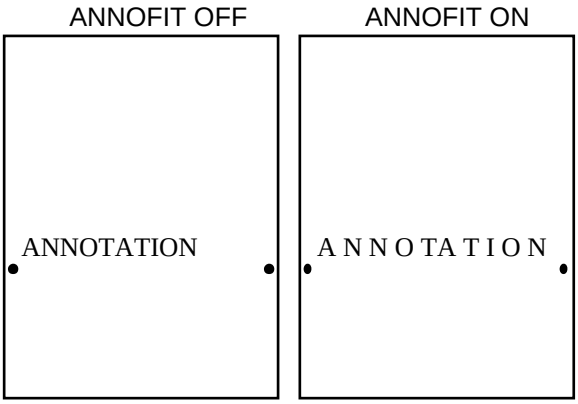
Type - establishes the annotation as one of three types: one-point, where one coordinate is used to locate the text; two-point, which locates and rotates each annotation; and line, where three or four points are used to define a curve along which annotation is splined.



Position - positions one-point and two-point annotation around a point.



Fit - stretches or shrinks the spacing between characters for two-point annotation.



Item - specifies the source for annotation text. Text can be an item value for a selected feature, or it can be entered at the keyboard.

Level - specifies a level number to store with annotation. This allows you to group sets of annotation in the same level and then, to selectively edit or draw only desired levels.

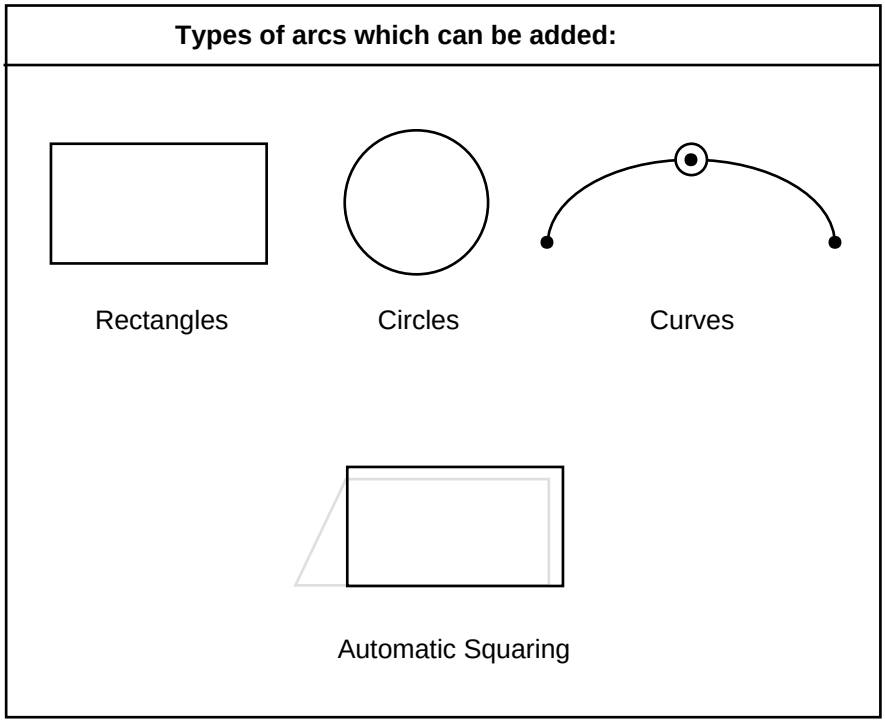
The chapter 'Editing annotation' presents details on establishing and using the annotation environment.

Editing tolerances and shapes for arc features

Accurately depicting the location and shape of arcs is perhaps the most difficult task in map automation. Additionally, it is important for arcs to correctly connect, for polygons to close, and so on. PC ARCEDIT provides a number of special editing tolerances for arc features and lets you add arcs of various types, including circles,

rectangles and curves. These are described below. Additional information on these topics is also included in the chapters 'Adding coverage features' and 'Editing coordinates'.

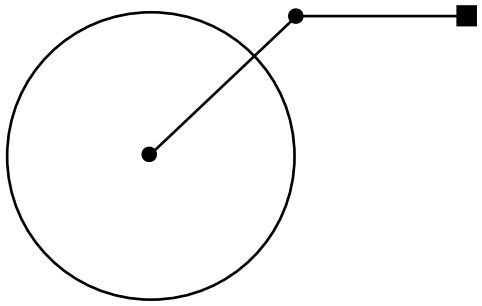
In addition to line segments used to define arcs, all of these shapes can be created.



Weed tolerance

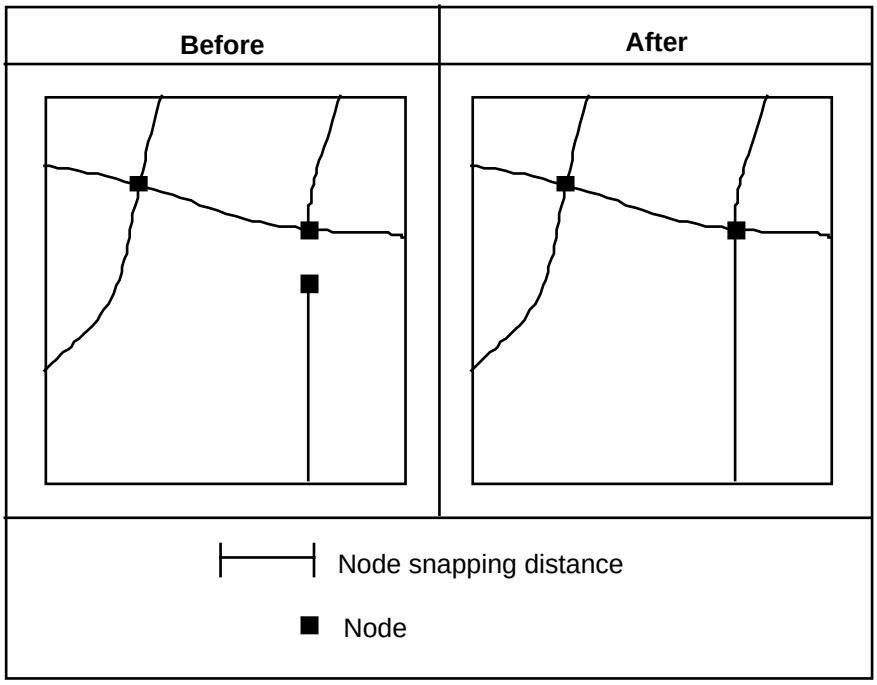
The weed tolerance specifies the minimum distance between vertices for added arcs.

The circle represents the WEED tolerance: the next vertex added must be outside the circle.

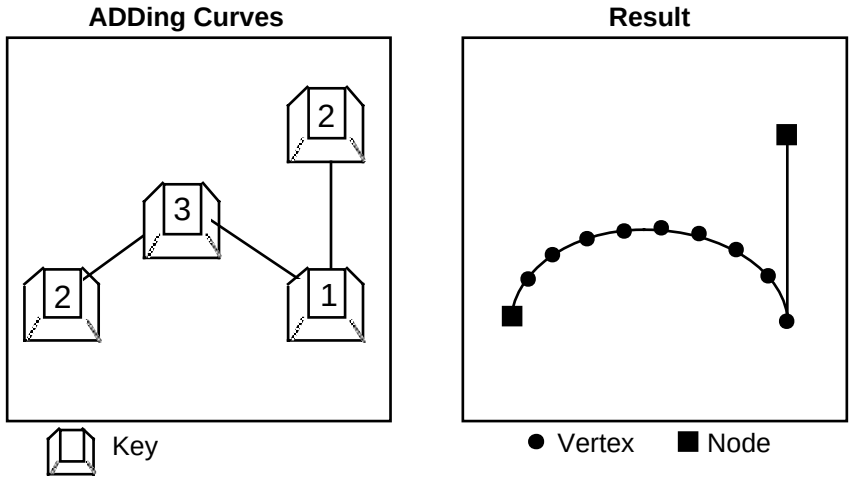


● Vertex ■ Node ⊢—⊣ WEED tolerance

Snap distance This is used to snap a node of an arc being added to an existing node during ADD.



Grain tolerance This is used for spacing points on circles and curves.



Saving your changes

Changes you make to a coverage during your PC ARCEDIT session are not stored permanently until you save them. The SAVE command saves the changes you have made to the current edit coverage back into this coverage. The SAVE command can also be used to save the current edit coverage into a new coverage. If you have made changes but do not want to save them, you can QUIT from PC ARCEDIT without saving and your coverage will not be modified.

Saving changes back into the edit coverage

Giving the SAVE command by itself

```
[Arcedit] SAVE
Saving changes for ROADS
194 arc(s) written to ROADS
  BND replaced into ROADS
Re-establishing edit feature ROADS
```

will save all the changes you have made to the current edit coverage back into this coverage. You can SAVE in this way any number of times during your session. It is a good idea to SAVE regularly during a long editing session. This will protect you against loss of work in case of accidental system failure. Note that the SAVE command always clears the selected set of features.

Saving changes into a new coverage

Giving the SAVE command with a new coverage name

```
[Arcedit] SAVE NEWROADS
Saving changes for ROADS
Copying ROADS to NEWROADS ...
194 arc(s) written to NEWROADS
4 tic(s) written to NEWROADS
  BND replaced into NEWROADS
Re-establishing edit feature ARC
```

will save the current edit coverage with all the changes you have made to it into this new coverage. The coverage you name in SAVE must not already exist. To put coverage features from your current edit coverage into an existing coverage, use the PUT command (discussed in the chapter 'Adding coverage features').

If you save the current edit coverage as a new coverage, the new coverage will become the current edit coverage. The edit feature will be the same as it was before SAVE although the selected set will be cleared.

You can save the changes for a coverage that is not the current edit coverage into a new coverage. Give the SAVE command with the name of the coverage that has been edited and the name of the new coverage you want to save it into. For example,

```
[Arcedit] STATUS EDIT
Current edit coverage: LANDUSE
Edit coverages: LANDUSE,PARCELS
[Arcedit] SAVE PARCELS SECT12
Saving changes for PARCELS
Copying PARCELS to SECT12
1293 arc(s) written to SECT12
   BND replaced into SECT12
Re-establishing edit feature ARC
[Arcedit] STATUS EDIT
Current edit coverage: LANDUSE
Edit coverages: LANDUSE,SECT12
```

The current edit coverage will remain the same after SAVE, unless the first coverage given in the SAVE command is the current edit coverage. In this case, the new coverage will become the current edit coverage.

Saving all your changes at once

Giving the SAVE command with the ALL option

```
[Arcedit] STATUS EDIT
Current edit coverage: USA
Edit coverages: USA,CANADA
[Arcedit] SAVE ALL
This will replace all changes back into the original coverage(s)
Do you really want to do this <Y/N>: Y
Saving changes for USA
210 arc(s) written to USA
   BND replaced into USA
Saving changes for CANADA
162 arc(s) written to CANADA
53 annotation written to CANADA
   BND replaced into CANADA
Re-establishing edit feature LABEL
```

will save the changes for all the edit coverages in the session back into these coverages. You are always prompted to confirm whether you really want to SAVE ALL.

Using the QUIT command

The QUIT command terminates the current PC ARCEDIT session. QUIT checks to see if you have made changes to an edit coverage without saving them. If you have already saved all your changes, the PC ARCEDIT session will immediately terminate. If there are changes which have not been saved, you will be prompted to save them:

```
[Arcedit] QUIT
Keep all edit changes (Y/N):
```

If you type **N**, the PC ARCEDIT session will be terminated, and your changes will not be saved. If you type **Y**, you will get another message:

```
This will replace all changes back into the original coverage(s).
Do you really want to do this (Y/N):
```

If you answer **Y** to the prompt, the changes for all the edit coverages in the session will be saved back into these coverages. This is the same as a SAVE ALL. If you type **N**, the PC ARCEDIT session will continue.

This example demonstrates the use of QUIT to save all the changes and leave PC ARCEDIT:

```
[Arcedit] QUIT
Keep all edit changes (Y/N): Y
This will replace all changes back into the original coverage(s).
Do you really want to do this (Y/N): Y
Saving changes for USA
   BND replaced into USA
Saving changes for CANADA
53 annotation written to CANADA
   BND replaced into CANADA
Leaving the ARC EDITOR...
```

Managing coverage topology after editing

It is not necessary to BUILD or CLEAN a coverage between PC ARCEDIT sessions. In the course of preparing a database, you might perform editing in a number of PC ARCEDIT sessions before you are finally ready to run BUILD or CLEAN on the coverages.

However, coverage topology must be built with BUILD or CLEAN before the coverage can be used in PC ARC/INFO processing or analysis. In addition, many important ARCPLOT operations, such as polygon shading and query, will not work unless coverage topology is present and up-to-date.

You will need to CLEAN the coverage if you have done any coordinate editing of arcs. You may only have to BUILD the coverage if you are certain that all of the arc intersections which were created during the session have been resolved. If you only edited the attributes of the arcs, you will not have to BUILD or CLEAN the coverage.

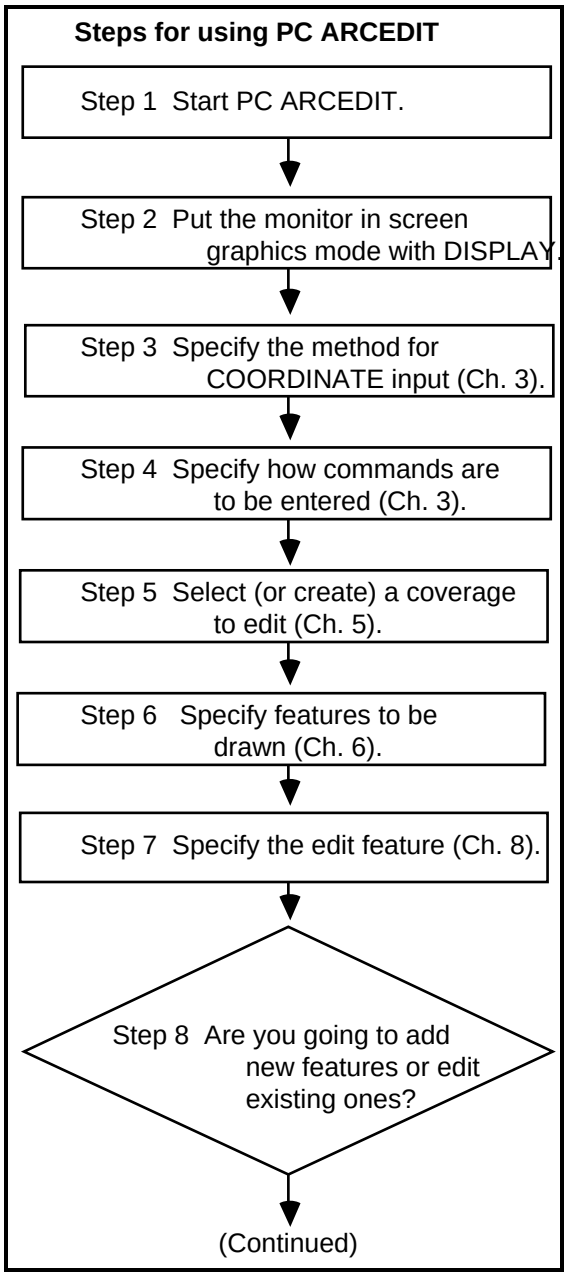
You will need to BUILD the coverage if you have edited the coordinates of any of the label points. If you only edited the attributes of the label points, you will not have to BUILD or CLEAN the coverage.

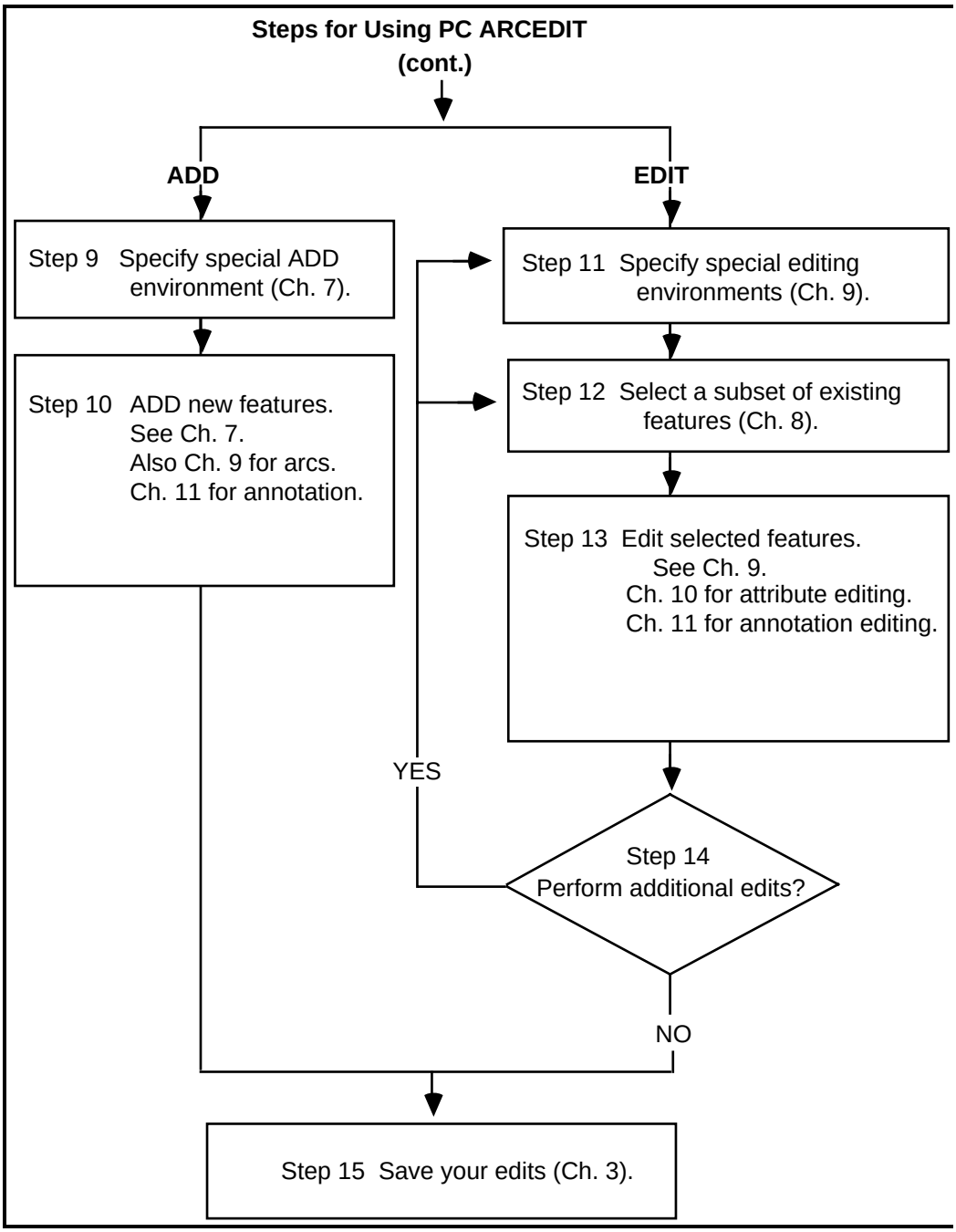
Chapter 4 Steps for using PC ARCEDIT

Steps for using PC ARCEDIT

4 The PC ARCEDIT user interface has two important facets. First, editing operations are feature based. You select a particular type of feature and edit that feature class. Secondly, commands are used to specify a series of special editing environments which influence coverage display, the method used for coordinate input, processing tolerances, and so on.

When edits are performed, their actions are controlled by the editing environments. For example, you can specify a node snapping tolerance to snap all nodes which are within that distance of another node. Then, node snapping will occur anytime arcs are added, copied, or moved.


Steps for using PC ARCEDIT
Step 1 Start PC ARCEDIT.
Step 2 Put the monitor in screen graphics mode with DISPLAY.
Step 3 Specify the method for COORDINATE input (Ch. 3).
Step 4 Specify how commands are to be entered (Ch. 3).
Step 5 Select (or create) a coverage to edit (Ch. 5).
Step 6 Specify features to be drawn (Ch. 6).
Step 7 Specify the edit feature (Ch. 8).
Step 8 Are you going to add new features or edit existing ones?
(Continued)


Steps for Using PC ARCEDIT
(cont.)
ADD
EDIT
Step 9 Specify special ADD environment (Ch. 7).
Step 10 ADD new features.
See Ch. 7.
Also Ch. 9 for arcs.
Ch. 11 for annotation.
Step 11 Specify special editing environments (Ch. 9).
Step 12 Select a subset of existing features (Ch. 8).
Step 13 Edit selected features.
See Ch. 9.
Ch. 10 for attribute editing.
Ch. 11 for annotation editing.
YES
Step 14
Perform additional edits?
NO
Step 15 Save your edits (Ch. 3).

PC ARCEDIT example

The following is an example of a simple PC ARCEDIT session to create and edit a new coverage. It follows the steps in the flowchart presented on the previous page.

Step 1

Start PC ARCEDIT

The following banner will appear:

```
[ARC] ARCEDIT
[PC ARC/INFO ARCEDIT]
Copyright (C) by
  Environmental Systems Research Institute, Inc.
  380 New York Street
  Redlands, CA 92373
All Rights Reserved Worldwide
:
```

Step 2

Put the monitor in screen graphics mode with DISPLAY

Use the DISPLAY command to put the PC monitor into screen graphics mode. The section 'Workstation setup' in the chapter 'Getting started' discusses the screen graphics options available.

```
[Arcedit] DISPLAY 4
```

Step 3

Specify the method for COORDINATE input

```
[Arcedit] COORDINATE DIGITIZER
```

Step 4

Specify how commands are to be entered

If you simply wish to key enter commands at the keyboard, you can skip this step. Otherwise, you might want to use the COMMAND command or execute an SML file containing several setup commands, for example:

```
[Arcedit] COMMAND FILE SETUP
or
[Arcedit] &RUN SETUP.SML
```

However, in this example, commands will be entered at the keyboard, so the COMMAND command is not issued.

Step 5

Select (or create) a coverage to edit

Here, a new coverage named EXCOV is created:

```
[Arcedit] CREATECOVERAGE EXCOV
Creating EXCOV
DIGITIZER TRANSFORMATION
Digitize a minimum of 4 tics.
Signal end of tic input with Tic-ID = 0

Tic-ID: 1*                    (Begin by entering the Tic-ID on
                               the digitizer cursor followed by
                               (ENTER). Then digitize the tic
                               location.)
Tic-ID: 2*
Tic-ID: 3*
Tic-ID: 4*
Tic-ID: 0*

Enter corner point of boundary    (Enter the lower-left and
                                   upper-right corners of the map
                                   on the digitizer.)

Enter opposite corner of boundary.
The edit coverage is now EXCOV
```

Step 6

Specify features to be drawn

```
[Arcedit] DRAWENVIRONMENT ARC TIC LABEL NODE DANGLE
```

You may also wish to draw the tics before digitizing by issuing the DRAW command:

```
[Arcedit] DRAW
```

Step 7

Specify the edit feature

```
[Arcedit] EDITFEATURE ARC
0 element(s) for edit feature ARC
```

Step 8

Are you going to ADD new features or edit existing ones

Here, arcs will be added.

Step 9

Specify special ADD environment

For example, you may wish to establish a node snapping tolerance to snap nodes of added arcs to existing coverage nodes.

```
[Arcedit] SNAPTYPE FIRST
```

The SNAPTYPE command is used to specify how PC ARCEDIT will find a feature with which to snap.

Step 10

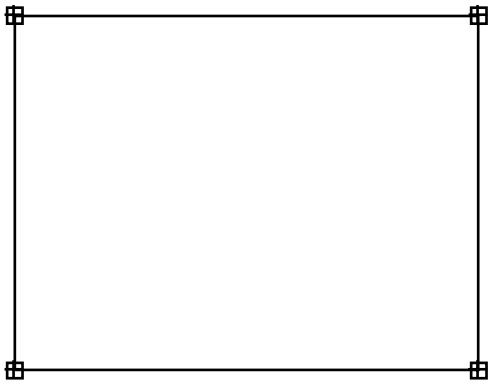
Add new features

```
[Arcedit] ADD

1) Vertex          2) Node               3) Curve
4) Delete vertex   5) Delete arc         6) Spline on/off
7) Square on/off   8) Digitizing Options 9) Quit     *Stream on/off
(Line) User Id:    1  Points =  0
```

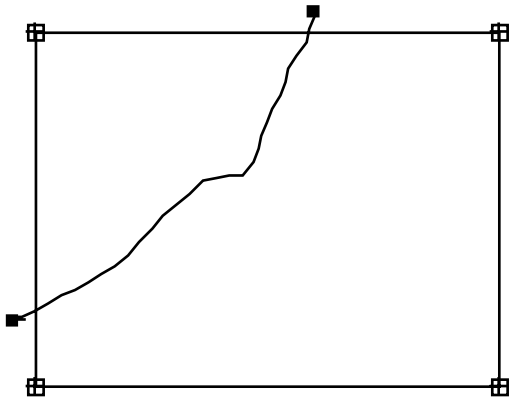
As soon as you issue ADD, you will see the Options menu and the prompt for the first arc to be added. The Options menu shows you which cursor key options are available for adding arcs.

Start digitizing by entering the first node on the arc with the 2 key on the digitizer cursor followed by a series of 1 keys to enter points along the arc, and then press 2 to enter the last node on the arc. The number of points shown in the dialog indicates the current number of points on the arc being digitized.

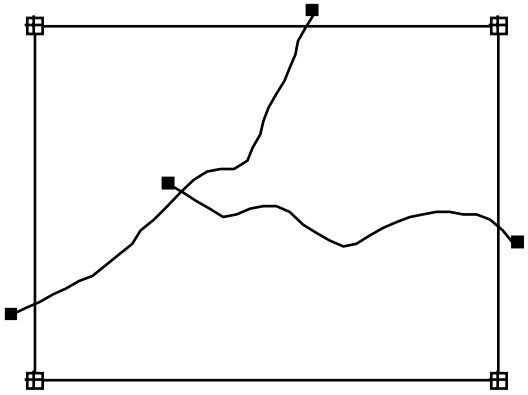
```
(Line) User-ID: 1 Points 0   1  2  3  4  5
```



```
(Line) User-ID: 2 Points 0   1  2  3  4  5  6  7  8  9 10
```



```
(Line) User-ID: 3 Points 0   1  2  3  4  5  6  7
```



```
(Line) User-ID: 4 Points 0 (9)
3 arc(s) added to EXCOV
```

The number of points displayed changes as each new point is added to an arc. In this example, three arcs are added to EXCOV. Then the 9 key is used to quit adding arcs. At this point, you can continue to add new arcs or other features or edit the existing coverage features. In this case, we will edit the existing arcs in the coverage.

Step 11

Specify special editing environments

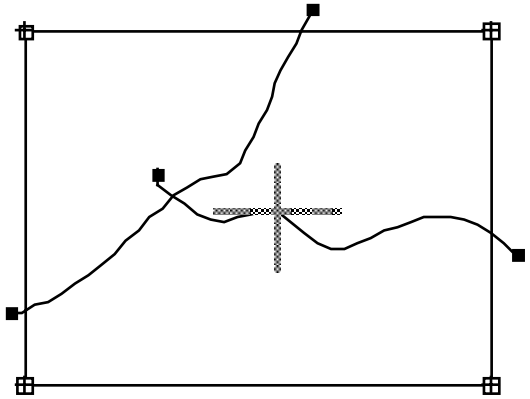
These are discussed in the chapter 'Getting started'. No special environments will be established here.

Step 12

Select a subset of existing features

One arc will be selected:

```
[Arcedit] SELECT ONE
Point to the feature to select
Arc 3 User-ID: 3 with 7 points selected
1 element(s) now selected
```



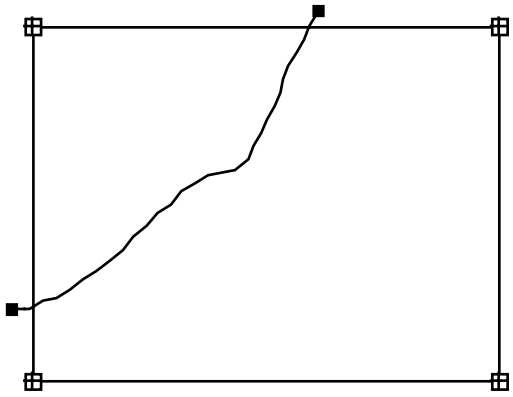
Step 13

Edit selected feature(s)

In this case, the selected arc will be deleted:

```
[Arcedit] DELETE
1 arc(s) deleted
```

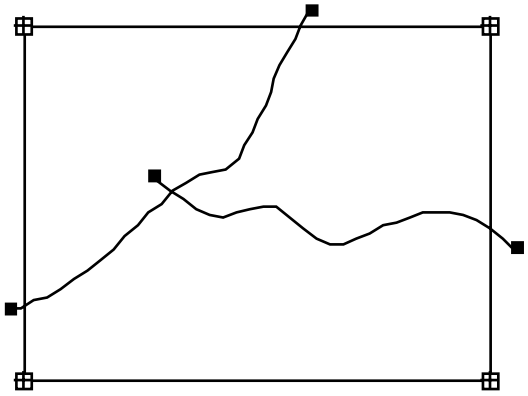
The deleted arc will be erased from the screen:



The UNDELETE command can be used to restore deleted features.

```
[Arcedit] UNDELETE
1 arc(s) restored
```

The restored arc is drawn on the screen.



Step 14

Perform additional edits

Now you can continue editing arcs by repeating Steps 12 and 13. For example, you can select a number of arcs and change their User-IDs:

```
[Arcedit] SELECT MANY
```

In this operation, a menu appears asking you to point at the features to select and press the appropriate cursor button:

```
1 = Select     2 = Next     3 = Who     9 = Quit
```

Move the cursor to point at the feature you wish to select. Use the 1 key to select the feature. It will flash on the screen and be identified by the following text:

```
Arc 2 User-ID: 2 with 10 points selected

1 = Select     2 = Next     3 = Who     9 = Quit
```

Now use the 1 key again to select another feature.

```
Arc 1 User-ID: 1 with 5 points selected

1 = Select     2 = Next     3 = Who     9 = Quit
```

Finally, use the 9 key to stop selecting features.

```
2 element(s) now selected
```

Two arcs were selected. WHO can be used to flash them on the display:

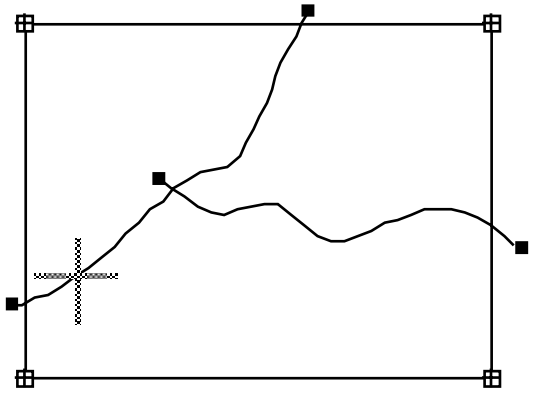
```
[Arcedit] WHO
Arc 2 User-ID: 2 Symbol: 1 with 10 points selected
Arc 1 User-ID: 1 Symbol: 1 with 5 points selected
```

Now, a new User-ID can be calculated for both arcs. Note the use of the $ID pseudo item. Pseudo items are discussed in the chapter 'Editing feature attributes'.

```
[Arcedit] CALCULATE $ID = 22
```

Other edits can be continued:

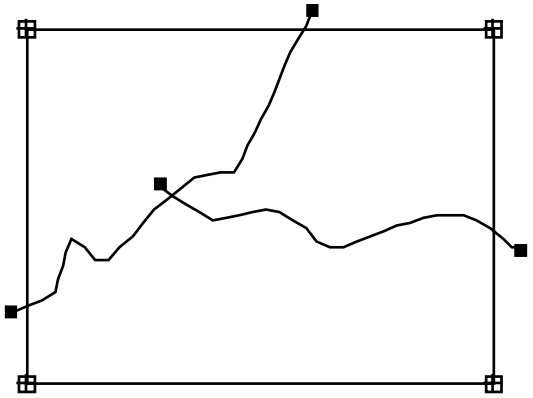
```
[Arcedit] SELECT ONE
Point to the feature to select
```



```
Arc 5 User-ID: 22 with 10 points selected
1 element(s) now selected
```

For example, a new vertex can be added to a selected arc:

```
[Arcedit] VERTEX ADD
Enter new vertex (9 to quit)
```

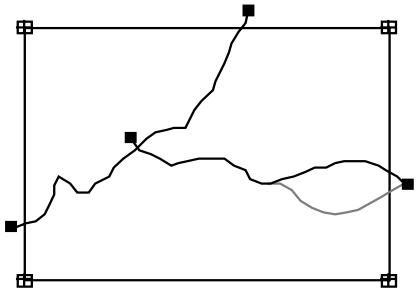


```
Vertex (-25.22886,354.4881) added to arc 5 User-ID: 22
Enter new vertex (9 to quit) (9)
1 vertices added to arc 5 User-ID: 22 points =11
```

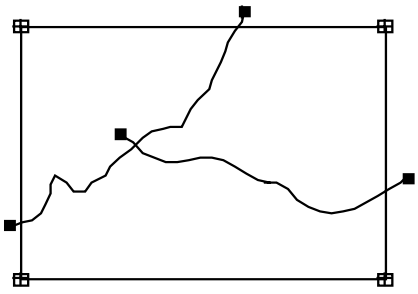
Or, an arc can be reshaped by redigitizing a portion of the arc:

```
[Arcedit] SELECT
Point to the feature to select
Arc 3 User-ID: 3 with 7 points selected
1 element(s) now selected

[Arcedit] RESHAPE
Enter the new segment (9 to Quit)
* toggles stream mode (Its OFF)
```

During RESHAPE



After RESHAPE



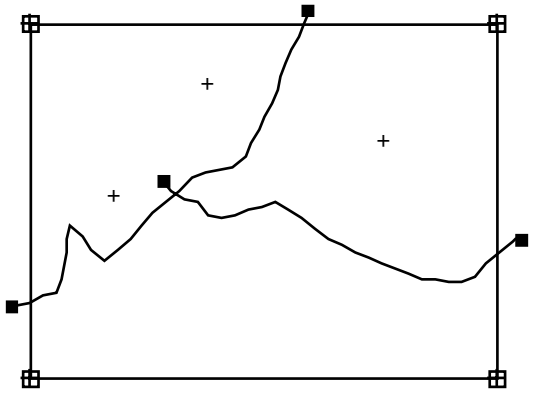
Once all desired edits to arcs have been made, you can add or edit another feature class, in this case, label points:

```
[Arcedit] EDITFEATURE LABEL
0 element(s) for edit feature LABEL

[Arcedit] ADD

Options:   1) Add Label            5) Delete last label
           8) Digitizing options   9) Quit
(Label) User-ID:   1 Coordinate=
```

If you want to redisplay this menu during label entry, press the A or B key on the digitizer cursor.

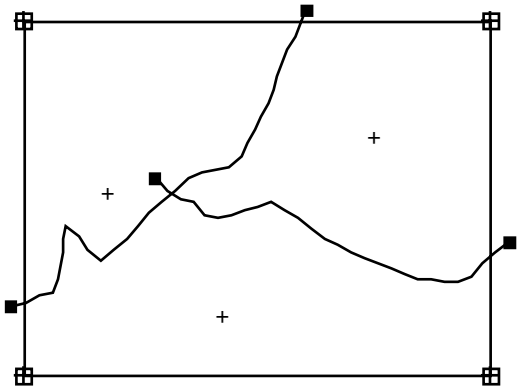
After this menu appears, you can add labels by moving the digitizer cursor to the desired location and pressing the 1 key. Here, three labels are added:

```
(Label) User-ID:   1  Coordinate  =  76.85213,285.9918
(Label) User-ID:   2  Coordinate  =  160.5891,485.0917
(Label) User-ID:   3  Coordinate  =  360.5771,420.3024
(Label) User-ID:   4  Coordinate  =  (9)
 3 label(s) added to EXCOV
```



Once you have added labels, you can also select and edit them. For example,

```
[Arcedit] SELECT ONE
Point to the feature to select
Label 1 User-ID: 1 (160.5891,485.0917) selected
1 element(s) now selected
[Arcedit] MOVE
Point to the coordinate to move from
Point to the coordinate to move to
1 label(s) moved
```



And, you can also decide to edit arcs again:

```
[Arcedit] EDITFEATURE ARC
3 element(s) for edit feature ARC
```

Step 15

Save your edits

After all edits have been made, save your changes.

```
[Arcedit] SAVE
Saving changes for EXCOV
     11 arc attribute(s) written to EXCOV
     3 arc(s) written to EXCOV
     3 label(s) written to EXCOV
     4 tic(s) written to EXCOV
   BND replaced into EXCOV
Re-establishing edit feature ARC

[Arcedit] QUIT
Leaving the ARC EDITOR ...
C>[ARC]
```

Chapter 5 Selecting a coverage to edit

Selecting a coverage to edit

5 Before you do any editing with PC ARCEDIT, the coverage on which the edits will be made must be specified. You can do this in one of two ways: by specifying an existing coverage with the EDITCOVERAGE command or by creating a new coverage with the CREATECOVERAGE command. This chapter discusses the procedures you can follow to edit an existing coverage or to create a new coverage.

Steps for selecting an edit coverage

The process used to select a coverage to edit includes these four steps.

Step 1. Establish the tic locations and the coordinate system to be used for coordinate entry.

Step 2. Start PC ARCEDIT and establish the workstation environment.

Step 3. Specify the digitizer transformation.

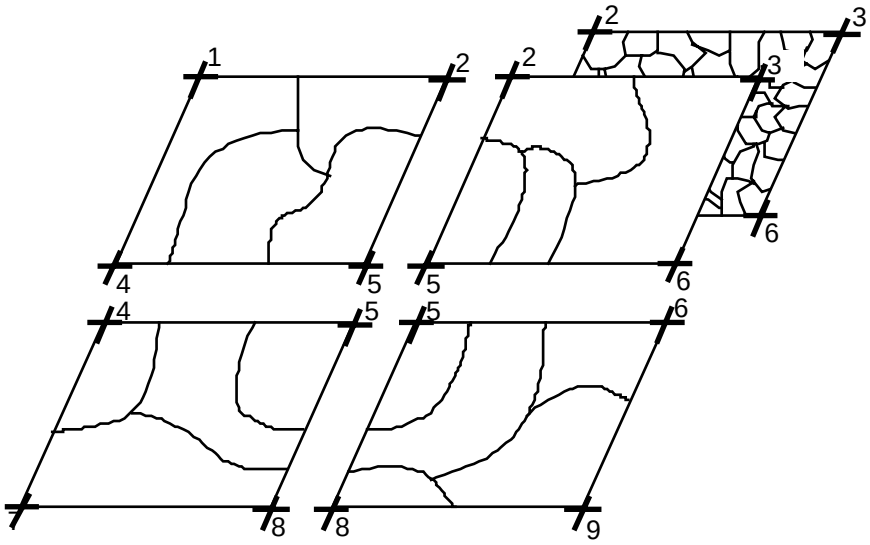
Step 4. Create a new coverage or select an existing one to edit.

Step 1

Establish the tic locations and the coordinate system to be used for coordinate entry

The coordinates in which a coverage is stored are controlled by the coordinates of the tics. Tic features serve as the common basis for registering a coverage to ground coordinates as well as to register coverages to each other. Therefore, it is important that the locations of the tics be accurately and carefully recorded and registered to a common coordinate system (e.g., UTM or State Plane coordinates). Other coverages, such as another layer of the same area or adjacent coverages, can be spatially related using the same tics as geographic control.

If the coverage that you will be digitizing is part of a large project study area which involves the creation of a number of coverages, it is important for registration purposes that all of the tics for the study area be identified and the projected x,y coordinates for each tic recorded. These tics are then used to create one large tic coverage which contains all of the tics for the entire study area. For the utmost accuracy, these tic locations should be key entered at the keyboard. Coverages for each of the individual map modules, or portions of the study area, can then be created from the 'template' tic coverage. Once arcs and label points are added to each individual coverage, the PC ARC/INFO command REBOX can be used to reduce the tics to those that are within the coverage's boundary. For more information, see the CREATE and REBOX command references in the *PC ARC/INFO Command Reference* in the on-line help.



Common Tics can be used to register adjacent coverages as well as 'layers' of coverages for the same area.

Step 2

Start PC ARCEDIT and establish the workstation environment

This is described in the chapter 'Getting started'.

Step 3

Specify the digitizer transformation

Each time a source map or edit plot of a coverage is mounted on a digitizing board, the map is registered by digitizing the Tic-IDs and locations. Tics should be entered precisely so that it will be possible to accurately add arcs and label points to the coverage. To reduce error in tic registration, you should try to use source maps drafted onto a stable base, such as MYLAR®, so that you do not have to contend with folds and stretching or shrinking which can be a problem with paper maps. The map should be securely fastened to the digitizing board so that there are no ripples or wrinkles in it. Once the map is mounted on the digitizer and the tic locations are identified on the source map, begin PC ARCEDIT by invoking it from the `[ARC]` prompt as follows:

```
[ARC] ARCEDIT
[PC ARC/INFO ARCEDIT]

ARCEDIT
Copyright (C) by
  Environmental Systems Research Institute, Inc.
  380 New York Street
  Redlands, CA 92373
All Rights Reserved Worldwide
```

At this point, the graphic hardware and command input environments must be established. (These procedures are detailed in the chapters 'Steps for using PC ARCEDIT' and 'Getting started'.)

```
[Arcedit] DISPLAY 4
[Arcedit] COORDINATE DIGITIZER
No transformation (Straight table coordinates)
:
```

To establish a digitizer transformation – that is, to convert digitizer units into actual coverage coordinates as they are digitized – use the COORDINATE command as follows:

```
[Arcedit] COORDINATE DIGITIZER coverage
```

where coverage is the name of an existing coverage which has the same tics as the coverage that is being created.

You are then prompted to enter the Tic-IDs and tic locations for at least four of the tics. Follow the instructions outlined in the chapter 'Steps for using PC ARCEDIT' for entering tics. Once the digitizer transformation is established, all coordinates input by the digitizer will be automatically transformed from digitizer units to coverage units.

Step 4

Create a new coverage or select an existing one to edit

Creating a new coverage in PC ARCEDIT

To create a new coverage in PC ARCEDIT, use the CREATECOVERAGE command. The usage for the CREATECOVERAGE command is as follows:

CREATECOVERAGE [cover] {tic_bnd_cover}

where [cover] is the name of the coverage to be created. If a {tic_bnd_cover} is specified, the TIC and BND files from that coverage are copied to the new coverage. You should use the same coverage for the {tic_bnd_cover} that was used to establish the digitizer transformation above with COORDINATE DIGITIZER [cover]. If required, you can give COORDINATE DIGITIZER DEFAULT to orient the coverage.

Creating a new coverage without a {tic_bnd_cover}

When the name of a {tic_bnd_cover} is omitted from CREATECOVERAGE, you will be prompted to enter the Tic-IDs and digitize x,y locations for at least four of the coverage's tics. The coverage feature coordinates will be created using the current digitizer transformation.

In this example, a {tic_bnd_cover} is not specified when creating a new coverage. Since no {tic_bnd_cover} is specified, PC ARCEDIT will prompt you for the new Tic-IDs and locations. They will be recorded in the current digitizer units.

```
[Arcedit] CREATECOVERAGE SCOTIA
Creating SCOTIA
DIGITIZER TRANSFORMATION
Digitize a minimum of 4 tics (from digitizer)
Signal end of tic input with Tic-ID = 0
```

To digitize the coverage tics, you must first enter the Tic-ID. In most cases, this is done from the digitizer cursor. Press the number keys which represent the ID number of the tic about to be digitized. On most digitizers you can press the B or # key to backspace if you make a mistake. Press the A or * key to indicate a carriage return. This will place an asterisk (*) after the ID number on the graphic display. You may now digitize the tic location by centering the digitizer cursor's crosshairs exactly over the center of the tic and pressing the 1 key. You must digitize at least four tics, though using more than four tics can increase the accuracy of map registration.

```
Tic-ID: 1*
Tic-ID: 2*
Tic-ID: 3*
Tic-ID: 4*
```

When you have digitized all of the tics, enter a 0, followed by the A or * key at the `Tic-ID:` prompt. This indicates that you are finished entering tics.

```
Tic-ID: 0*
```

PC ARCEDIT will now prompt you to enter the corner points of the boundary for the coverage to be digitized.

```
Enter corner point of boundary
Enter opposite corner of boundary
```

The coverage boundary tells PC ARCEDIT two things: what area will be displayed on the graphics screen and what the minimum and maximum x,y extent of new coverage features will be. The minimum and maximum x,y extent of a coverage's features are stored in the BND file. Do not be overly concerned about getting the boundary exactly coincident with the features of the map since the BND will change as features are added and deleted. Ordinarily, you would make the BND slightly larger than the area to be digitized for the particular coverage you are creating. To enter the initial coverage boundary, position the digitizer cursor at the lower-left extreme of the coverage and press any numeric key other than 0. Move the cursor to the upper-right extreme of the coverage and again press any numeric key other than 0 to enter that location as the upper-right extreme of the coverage.

The CREATECOVERAGE command will replace the current edit coverage with the specified [cover]. If a map extent exists, it will remain in effect until the MAPEXTENT command is issued. If there is no map extent in effect, the map extent will default to the boundary just entered. For example,

```
The edit coverage is now SCOTIA
The Map extent is not defined
Defaulting the map extent to the BND of SCOTIA
```

Editing an existing coverage in PC ARCEDIT

To edit an existing coverage, you would issue the EDITCOVERAGE command followed by the name of the coverage to be edited. There may be up to two edit coverages open in any PC ARCEDIT session, but only the current edit coverage can be edited.

To open an existing coverage for editing, use the EDITCOVERAGE command as follows:

```
[Arcedit] EDITCOVERAGE ALBANY
The edit coverage is now ALBANY
```

If there is no previous setting for the map extent, it will default to the BND of the specified edit coverage. For example,

```
[Arcedit] EDITCOVERAGE TROY
The edit coverage is now TROY
The Map extent is not defined
Defaulting the map extent to the BND of TROY
```

Displaying the edit coverage environment

To display a list of the current as well as all open edit coverages, use the STATUS command with the EDIT option:

```
[Arcedit] STATUS EDIT
Current edit coverage: TROY
Edit coverages: ALBANY,TROY
```

Changing the edit coverage

To change the current edit coverage, just issue the EDITCOVERAGE command with the name of the coverage which will become the current edit coverage. The previous edit coverage will be retained as an open edit coverage. For example,

```
[Arcedit] STATUS EDIT
Current edit coverage: TROY
Edit coverages: ALBANY,TROY
[Arcedit] EDITCOVERAGE ALBANY
The edit coverage is now ALBANY
[Arcedit] STATUS EDIT
Current edit coverage: ALBANY
Edit coverages: ALBANY,TROY
```

TROY is retained as an open edit coverage, and ALBANY becomes the current edit coverage. Note that changing the edit coverage will not save the results of edits. Use SAVE at any time to save the edit changes. See the SAVE command reference for further details.

Removing edit coverages from the session

To remove an open edit coverage from the PC ARCEDIT session, use the REMOVEEDIT command. The REMOVEEDIT command will warn you that changes made to the edit coverage since the last SAVE will be lost. This prompt is given regardless of whether the

changes made to the coverage have been saved or not. If you have not saved the changes made to the edit coverage, answer **N** at the prompt:

```
All changes will be lost! Continue <Y/N>: N
```

Then issue the SAVE command to save any changes made to the edit coverage.

If you do not want the changes made to the edit coverage to be saved, enter **Y** at the prompt. The coverage will be removed from the PC ARCEDIT session without any changes being made.

Transforming coordinates after digitizing

If a coverage is digitized in digitizer units (such as inches), the coverage can be transformed from the digitizer units to another coordinate system such as UTM or State Plane coordinates. The PC ARC/INFO STARTER KIT command TRANSFORM is used to perform this task. To use TRANSFORM, you must be able to identify at least four tics in your coverage for which you know the new map system coordinates.

In the following example, the coordinates for the coverage SCOTIA are transformed from digitizer inches to State Plane coordinates. First, the coverage TRANSCOV is created based upon the TIC and BND files of SCOTIA. Next, the tic coordinates of TRANSCOV are updated to reflect the known tic coordinates in State Plane coordinates. Then, the coordinates of SCOTIA are transformed to State Plane coordinates based upon the TIC file of TRANSCOV.

In this first step, TRANSCOV is created with the PC ARC/INFO command CREATE. It is created with the TIC and BND files of the SCOTIA coverage.

```
[ARC] CREATE
Usage: CREATE [out_cover] {tic_bnd_cover}
[ARC] CREATE TRANSCOV SCOTIA
Creating coverage TRANSCOV
```

TABLES is then used to change the x,y tic values of TRANSCOV.TIC to the known x,y tic locations in State Plane coordinates.

```
[ARC] TABLES
[ARC] ECHO OFF
[PC ARC/INFO TABLES]

TABLES
Copyright (C) by
  Environmental Systems Research Institute, Inc.
  380 New York Street
  Redlands, CA 92373
All Rights Reserved Worldwide

Enter Command: SELECT SCOTIA.TIC
       4 Records Selected.
```

The TIC file for SCOTIA is selected and the x,y tic locations in digitizer inches are then listed.

```
Enter Command: LIST
$RECNO   IDTIC         XTIC         YTIC
     1       1       6.0420      24.8460
     2       2       6.1280       4.7760
     3       3      36.2280       4.8820
     4       4      36.1500      24.9490
```

The TIC file for the coverage TRANSCOV is then selected and listed. Since TRANSCOV was created based upon the TIC and BND files of SCOTIA, they are exactly the same as SCOTIA.

```
Enter Command: SELECT TRANSCOV.TIC
       4 Records Selected.

Enter Command: LIST
$RECNO   IDTIC         XTIC         YTIC
     1       1       6.0420      24.8460
     2       2       6.1280       4.7760
     3       3      36.2280       4.8820
     4       4      36.1500      24.9490
```

The UPDATE command can be used to type in new values for the tics of TRANSCOV. The values typed in represent the x,y State Plane coordinates for these tic locations.

```
Enter Command: FORMS UPDATE
Enter Record Number, C(Current), N(Next) or P(Previous): C

IDTIC                 1
XTIC      0.6042000E+01  (6.042000)
YTIC      0.2484600E+02 (24.846000)
```

```
Abort update
Update record     1
```

Items which are highlighted in the input form can be updated. Values for any item can be updated by moving the cursor to the item, and entering the desired values. In the following example, the values for XTIC and YTIC have been updated to State Plane coordinates.

```
IDTIC                1
XTIC      0.6030000E+06   (603000.000000)
YTIC      0.1044000E+07  (1044000.000000)

Abort update
Update record     1
```

The update will not actually occur until you highlight the `Update record` option and **(press ENTER)**. FORMS will then prompt you to update additional records:

```
Enter Record Number, C(Current), N(Next) or P(Previous): N
```

Enter N to update the next record. Repeat the process above until all tics have been changed to their proper State Plane Coordinates. After you have updated all tics, **(press ENTER)** at the FORMS prompt to quit updating records.

Note that the values for the tics of TRANSCOV.TIC are now in State Plane coordinates.

```
Enter Command: LIST
$RECNO   IDTIC          XTIC          YTIC
     1       1      603000.0000  1044000.0000
     2       2      603000.0000  1042000.0000
     3       3      606000.0000  1042000.0000
     4       4      606000.0000  1044000.0000
Enter Command: QUIT
```

The PC ARC/INFO STARTER KIT command TRANSFORM is now used to transform the digitizer inch coordinates of SCOTIA to the State Plane coordinates of TRANSCOV. For further details about transforming coverage coordinates, see the TRANSFORM command reference in the *PC ARC/INFO Command Reference* in the on-line help.

```
[ARC] TRANSFORM
Usage: TRANSFORM [in_cover] [out_cover] {AFFINE / PROJECTIVE}
[ARC] TRANSFORM SCOTIA TRANSCOV
Transforming coordinates for coverage SCOTIA
```

Chapter 6 Drawing coverage features

Drawing coverage features

6 Before you begin editing a coverage in PC ARCEDIT, you must decide which coverage features should be displayed. You can draw all of the edit coverage features or just a subset of the feature types. You may also specify that only certain features of a feature type be drawn.

With PC ARCEDIT, you can draw coverage features with special symbols. Additionally, you may specify that features of coverages other than the current edit coverage be drawn as a background display. The draw environment is defined by the coverages, features, map extent and symbols with which features are drawn.

There are a number of issues that need to be addressed before drawing coverage features. Foremost is the consideration of which features should be drawn. For example, if you are only going to be editing arcs in a session, you may only want to display arcs. Arcs, nodes, label points, tics and annotation can all be drawn for a coverage. Displaying unneeded coverage features, in terms of spatial extent or feature class, can hinder the efficiency of a PC ARCEDIT session. The time that it takes to draw coverage features is increased as more features are added to the draw environment. The problems you will encounter with a cluttered screen display may also slow your editing session. Drawing the entire edit coverage when you are only interested in a small portion of it can also make it difficult to select the features you want to edit.

Five steps are required for drawing coverage features on the graphic display:

Step 1. Specify the area of the edit coverage that will be drawn.

Step 2. Specify the symbolsets to be used for feature drawing.

Step 3. Choose the feature classes to be drawn.

Step 4. Set a background coverage and draw environment.

Step 5. Draw the coverage features.

Steps for drawing coverage features

In the steps outlined below, it is assumed that the display device and edit coverage have already been established.

Step 1

Specify the area of the edit coverage that will be drawn

The map extent specifies the geographic area to be displayed which, as a result, determines the scale at which features are displayed. PC ARCEDIT scales the edit coverage to fit on the graphics display based on the map extent. The map extent is a rectangle which defines the minimum and maximum coordinates to be displayed. You can specify the map extent in one of several ways:

Set the default map extent to the current edit coverage. For example,

```
[Arcedit] EDITCOVERAGE IOWA
The edit coverage is now IOWA
[Arcedit] MAPEXTENT DEFAULT
```

If the EDITCOVERAGE command is entered before a map extent is set in a PC ARCEDIT session, the map extent will default to the edit coverage's BND.

Enter the names of one or more coverages. Their limits become the new map extent. For example,

```
[Arcedit] MAPEXTENT FONTANA
```
or
```
[Arcedit] MAPEXTENT MEXICO BELIZE GUATEMALA
```

Enter the minimum and maximum x,y coordinates at the keyboard to define the map extent. For example,

```
[Arcedit] MAPEXTENT 602801 1042004 603756 1044234
```

Window in on a portion of a coverage by using the current COORDINATE input device to point to the corners of a rectangle on the currently displayed coverage. For example,

```
[Arcedit] MAPEXTENT *
Define the box
```

Set the map extent to the rectangle defined by the minimum and maximum x,y coordinates of the coverage BND or TIC. For example,

```
[Arcedit] MAPEXTENT BND FONTANA
```

Once a map extent is established, specifying a different edit coverage will not change the current map extent. Use MAPEXTENT DEFAULT or MAPEXTENT with the name of the edit coverage to reset the map extent to the limits of the current edit coverage if the new edit coverage is in a different geographic area. The MAPEXTENT command can be given any number of times during a PC ARCEDIT session. Reenter the DRAW command to see the effects of a change in map extent.

Note that some tolerances and distances used by PC ARCEDIT will vary with changes in the map extent if they are not explicitly set. The following tolerances and distances are affected by changes in the map extent unless they are explicitly set: ANNOSIZE, EDITDISTANCE, GRAIN, SNAPDISTANCE and WEED. See the 'Command reference' section for more details about these tolerances.

You should be aware of the relationship between the graphic display and the map extent when you set tolerances graphically. Be sure that you have redrawn the coverage features after changing the map extent so you know exactly where features are and the current scale.

Step 2

Specify the symbolsets to be used for feature drawing

Use the LINESET, MARKERSET and TEXTSET or SYMBOLSET commands.

The following figure graphically represents the default symbols used to draw coverage features.

Default drawing symbols for features

ARC	Line symbol 1 from the current lineset file
NODE Pseudo Dangle	■ (magenta) ◇ (red) □ (red)
LABEL	Marker symbol 33 from the current markerset file
TIC	⊞ (green)

The symbols used to represent nodes are permanently defined. The symbols used to represent tics are also unalterable, though the color of the symbol can be changed.

The symbols used to draw arcs, labels and annotation are defined in symbolset files. Each of these feature types has a different symbolset file. Arcs are drawn with the line symbols defined in the lineset file; labels are drawn with the point symbols defined in the markerset file; and annotation is drawn with the text symbols defined in the textset file.

There are a number of symbolset files provided with PC ARC/INFO as well as the necessary programs to create your own symbolset files. When features are drawn in PC ARCEDIT, the symbol number associated with the feature is used to determine which symbol from the current symbolset files to use. For example, if an arc is coded with symbol 5, the arc is drawn with the characteristics defined by line symbol 5 in the current lineset file. Drawing features using special symbols is described later in this chapter.

Default symbolsets

The manner in which coverage features are drawn is controlled through the manipulation of either the feature's symbol or the symbolset files used by PC ARCEDIT. A symbol is a set of characteristics defining a certain color, font, pattern, and so on, for drawing a feature. A symbolset file is a file which contains the symbol definition for a set of symbols. PC ARCEDIT contains default symbolset files for arcs, labels and annotation. The default symbols are contained in the following symbolset files:

LINESET

Defines the line symbols for drawing arcs. The default lineset file, COLOR.LIN, is designed for use with your color display device. This lineset allows arcs to be drawn quickly with up to 16 different colors. The other lineset files provided with PC ARCEDIT are intended for use with monochrome monitors (BW.LIN) and to produce high-quality paper plots (PLOTTER.LIN). The LINEEDIT program can be used to create customized lineset files. See the PC ARCPLOT on-line help for more information about creating specialized lineset files. To display the line symbols of the current lineset file, use the LINEINDEX command.

MARKERSET

Defines the point symbols for drawing labels. The default markerset file, COLOR.MRK, is designed for use with a color display device. This markerset allows label points to be drawn quickly with up to

16 different colors. The other markerset files provided with PC ARCEDIT (PLOTTER.MRK and BW.MRK) can be used for specialized applications including hydrology, topographic mapping, urban mapping, oil and gas mapping and more. The FONTEDIT program can be used to create customized markerset files. See the PC ARCPLOT on-line help for more information about creating specialized markerset files. To display the marker symbols of the currently selected markerset file, use the MARKINDEX command.

TEXTSET Defines the text symbols for drawing annotation. The default textset file, PLOTTER.TXT, is designed for use with a hardcopy plotting device, such as a pen plotter. This is because PC ARCEDIT is typically used to create and edit coverage annotation. This same annotation can then be plotted in PC ARCPLOT. Since only the text symbol number is stored for each annotation, the annotation to be plotted in PC ARCPLOT should use the same symbolset used to create the annotation in PC ARCEDIT. This will ensure that the annotation plotted in PC ARCPLOT will be properly placed with respect to other feature locations on a map generated in PC ARCPLOT. For example, you may want to ensure that street names on a parcel map always appear within their road casings. The FONTEDIT program can be used to create customized textset files. See the PC ARCPLOT on-line help for more information about creating specialized textset files.

Step 3

Choose the feature classes to be drawn

The DRAWENVIRONMENT command is used to specify which edit coverage features are drawn when the DRAW command is issued. The DRAWENVIRONMENT command has as its arguments each of the feature types that can be edited in PC ARCEDIT. Each feature type can be turned on or off, which will either include or exclude it from the types of features that will be drawn. Additionally, a number of the feature types have special options which let you draw the feature's User-ID number next to it or draw only features of that type which meet certain criteria. For example, you can specify that you only want dangling nodes drawn rather than all nodes.

The draw environment determines which features are displayed. Once a draw environment has been specified, you can use the DRAW command repeatedly without having to reenter the desired feature type(s) to be drawn. You can change the draw environment when you wish to display different feature classes by reissuing the DRAWENVIRONMENT command.

If, for a particular session, you want to edit the arcs in the edit coverage and add some annotation, you might set the draw environment as follows:

```
[Arcedit] DRAWENVIRONMENT ARC ANNO ON
```

When the DRAW command is issued, all of the arcs will be displayed. Also, all of the edit coverage's annotation will be drawn.

The following examples demonstrate the result of a series of DRAWENVIRONMENT commands. Note that the coverage currently displayed on your screen will not change just because the draw environment is altered. You must issue the DRAW command for the graphic display to reflect your current draw environment.

To include all arcs with their IDs and all TIC marks, enter:

```
[Arcedit] DRAWENVIRONMENT ARC IDS TIC
```

To change the draw environment, reissue the DRAWENVIRONMENT command. To add labels and pseudo nodes to the draw environment, enter:

```
[Arcedit] DRAWENVIRONMENT LABEL NODE PSEUDO
```

To add only those nodes with errors (dangling and pseudo) to the draw environment, enter:

```
[Arcedit] DRAWENVIRONMENT NODE ERRORS
```

Step 4

Set a background coverage and draw environment

If a background display is desired, set a background coverage and draw environment with the BACKCOVERAGE and

BACKENVIRONMENT commands.

Displaying the current draw environment

To display the current settings for the draw environment, use the STATUS command as follows:

```
[Arcedit] STATUS DRAW
Environments         Drawselect symbol: 1
Draw: ARC ON, NODE ERRORS, LABEL ON, TIC ON, ANNO OFF
Back: ARC ON, NODE OFF, LABEL OFF, TIC OFF, ANNO OFF
```

Adding features to the draw environment

There are times during a PC ARCEDIT session when you may want to add a feature to the draw environment. To accomplish this, simply issue the DRAWENVIRONMENT command with the feature type and desired option. For example, to add label points with their User-IDs to the draw environment, you would enter the following command:

```
[Arcedit] DRAWENVIRONMENT LABEL IDS
```

You can also change the way a feature is displayed by issuing the DRAWENVIRONMENT command. For example, to draw the label points without their User-IDs, you would enter:

```
[Arcedit] DRAWENVIRONMENT LABEL ON
```

When the DRAW command is issued, the label points will be drawn without their User-IDs.

Removing features from the draw environment

There are times during a PC ARCEDIT session when you may want to remove features from the draw environment. To accomplish this, simply issue the DRAWENVIRONMENT command with the feature type and the OFF option. For example, to remove label points from the draw environment, you would enter the following command:

```
[Arcedit] DRAWENVIRONMENT LABEL OFF
```

Using background coverages

A coverage can also be defined to provide context for the features in the edit coverage. A coverage used for this purpose acts as a 'background' for the edit coverage and is displayed to show the relative locations of features between coverages. Features from the current background coverage, specified by the BACKENVIRONMENT command, will be displayed with the current edit coverage when the DRAW command is issued. A background coverage can be displayed in a different symbol color and pattern. The BACKCOVERAGE command is used to specify a background coverage and a symbol for that coverage. For example,

```
[Arcedit] BACKCOVERAGE CANADA 5
CANADA
is now the background coverage with a draw symbol 5
```

Setting the background draw environment

The BACKENVIRONMENT command is used to specify which features are to be drawn from the background coverage. Note that the features of each background coverage are drawn with the same symbol. This excludes annotation which is always drawn with its own symbol. The BACKENVIRONMENT command is used in conjunction with the BACKCOVERAGE command. If the background draw environment is set as follows:

```
[Arcedit] BACKENVIRONMENT LABEL ARC
```

the arcs and labels of the background coverage will be drawn when the DRAW command is issued.

Adding features to the background draw environment

There are times during a PC ARCEDIT session when you may want to add a feature to the background draw environment. To accomplish this, simply issue the BACKENVIRONMENT command with the feature type and desired option. For example, to add arcs with IDs to the background draw environment, you would enter the following command:

```
[Arcedit] BACKENVIRONMENT ARC IDS
```

You can also change the way a feature is displayed by issuing the BACKENVIRONMENT command. For example, to draw the background coverage arcs without IDs, you would enter:

```
[Arcedit] BACKENVIRONMENT ARC ON
```

When the DRAW command is issued, the background coverage arcs will be drawn without IDs.

Removing features from the background draw environment

There are times during a PC ARCEDIT session when you may want to remove features from the background draw environment. To accomplish this, simply issue the BACKENVIRONMENT command with the feature type and the OFF option. For example, to remove arcs from the background draw environment, you would enter the following command:

```
[Arcedit] BACKENVIRONMENT ARC OFF
```

Removing background coverages

During the PC ARCEDIT session, coverages can be continually switched between functioning as edit coverages and background coverages. To remove the background coverage, use the REMOVEBACK command as follows:

```
[Arcedit] REMOVEBACK
Removing CANADA
```

Using the DRAW command

To display coverage features, the DRAW command must be issued. All features specified for the draw environment are then drawn with the characteristics defined by their symbol in the current symbolset file.

In this example, the draw environments are set with the DRAWENVIRONMENT and BACKENVIRONMENT commands. The specified features are then displayed when the DRAW command is issued:

```
[Arcedit] DISPLAY 4
[Arcedit] EDITCOVERAGE USA
The edit coverage is now USA
The Map extent is not defined
Defaulting the map extent to the BND of USA
[Arcedit] MAPEXTENT USA CANADA
[Arcedit] DRAWENVIRONMENT ARC IDS LABELS ON
```

```
[Arcedit] BACKCOVERAGE CANADA 2
CANADA
is now the background coverage with a draw symbol 2
[Arcedit] BACKENVIRONMENT ANNO ON ARC IDS
[Arcedit] DRAW
```

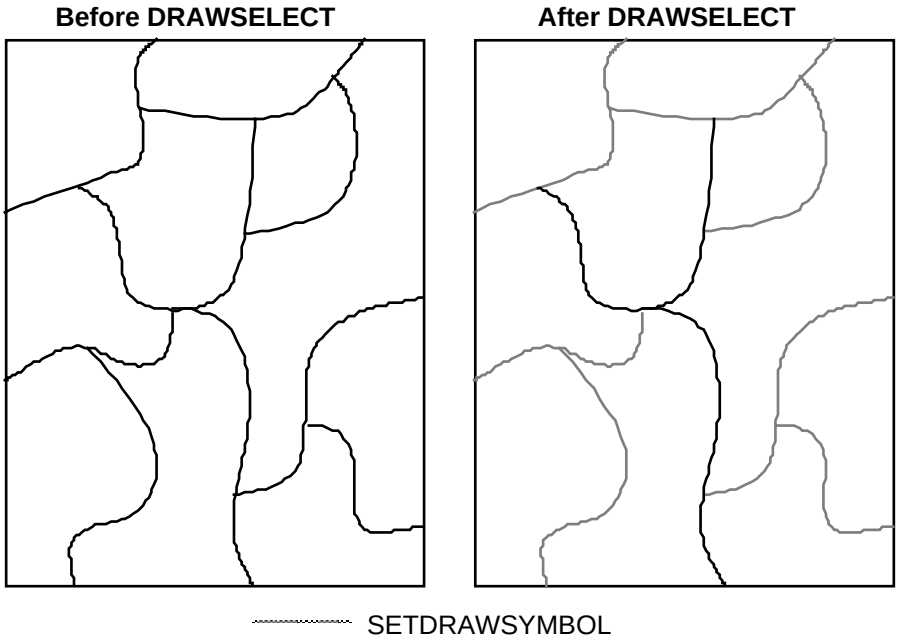
Step 5

Draw the coverage features

```
[Arcedit] EDITFEATURE ANNOTATION
217 element(s) for edit feature ANNOTATION

[Arcedit] SELECT $SIZE GT 23.5
3 element(s) now selected
```

The selected annotation are then redrawn with their own symbol using the WHO command:

```
[Arcedit] WHO
Anno 34 Level: 2 Symbol: 45 Size: 23.5 Gap: -100 selected
Anno 56 Level: 8 Symbol: 23 Size: 24.3 Gap: -100 selected
Anno 89 Level: 2 Symbol: 45 Size: 23.5 Gap: -100 selected
[Arcedit] EDITFEATURE ARC
17 element(s) for edit feature ARC
[Arcedit] SELECT $ID GT 4
13 element(s) now selected
[Arcedit] SETDRAWSYMBOL 2
[Arcedit] DRAWSELECT
```



Drawing features using special symbols

Features can be drawn using specially assigned symbols in PC ARCEDIT. For example, arcs representing roads can be drawn with a different symbol, depending on the road class; a different symbol number can be used to draw features being added versus existing features; and so on. Since every feature can have a symbol number in PC ARCEDIT, you can assign each a different symbol number as well as change the symbol number at any time during a session.

It is important to note that the assignment of a particular value to $SYMBOL for label points and arcs is a temporary assignment. It remains in effect only for the current PC ARCEDIT session. However, since the symbol associated with annotation is a permanent attribute of the annotation, care must be taken in changing the symbol associated with the annotation string.

Changing the symbol with which features are drawn can be performed in a number of ways. Most of these methods utilize the pseudo item $SYMBOL to manipulate the symbol number associated with coverage features. The amount of the flexibility you

have in changing a feature's drawing symbol varies with each feature type.

Assigning symbols to features before ADD

There are three approaches you can take to assign a drawing symbol to a coverage feature being added. The first approach utilizes the NEW command to establish the initial attribute buffer before features are added. The attribute buffer can be set equal to the desired drawing symbol using the CALCULATE command. Then, any features added after the attribute buffer is initialized will receive the symbol value stored in the attribute buffer. For example,

```
[Arcedit] EDITFEATURE LABEL
67 element(s) for edit feature LABEL
[Arcedit] NEW
```

By calculating the pseudo item $SYMBOL equal to 4, all labels added in this sequence will be assigned and drawn with symbol 4 as they are added. Press the 9 key to stop adding label points.

```
[Arcedit] CALCULATE $SYMBOL = 4
Updating the initial attribute buffer only
[Arcedit] ADD

Options:   1) Add Label             5) Delete last label
           8) Digitizing options    9) Quit
(Label)    User-ID: 1 Coordinate = 25.012548,    3.071453
(Label)    User-ID: 2 Coordinate = 9
1 label(s) added to USA
```

Immediately after features are added, they are in the selected set. You can use the WHO command to determine each feature's symbol number. For example,

```
[Arcedit] WHO
Label 68 User-ID: 1 Symbol: 4 (   25.012548,    3.071453)
```

Assigning symbols to features during ADD

The second approach to assigning symbols to features being added allows much more flexibility since it occurs inside of the ADD command. The symbol assigned to added features can be changed using one of the digitizing options for arc or label. When you are adding tics, the option to change the symbol of the next feature

added is contained in the options menu. The following example demonstrates the use of the digitizing options menu to change the symbol assigned to the next label added:

```
[Arcedit] EDITFEATURE LABEL
68 element(s) for edit feature LABEL
[Arcedit] NEW
```

The pseudo item $SYMBOL is calculated equal to 4 so that label points added in this sequence will be assigned symbol 4:

```
[Arcedit] CALCULATE $SYMBOL = 4
Updating the initial attribute buffer only
[Arcedit] ADD

Options:   1) Add Label            5) Delete last label
           8) Digitizing options   9) Quit
(Label)    User-ID: 69 Coordinate = 18.386421,    3.109647
```

After adding one label with User-ID = 69, you can press the 8 key to display the Digitizing Options menu:

```
1) New User-ID          2)New Symbol      3) Autoincrement off
4) Autoincrement on     9) Quit
----------------- Enter Option
```

Press the 2 key to change the symbol assigned to the next label point to be added. You will be prompted to enter the symbol as follows:

```
New label symbol: 13
```

Then, continue adding label points, each of which will be assigned the new symbol 13:

```
(Label) User-ID: 70 Coordinate = 21.474327,    7.145325
```

Press the 9 key to stop digitizing label points.

```
2 label(s) added to USA
[Arcedit] WHO
Label 69 User-ID: 69 Symbol:  4 (   18.386421,    3.109647)
Label 70 User-ID: 70 Symbol: 13 (   21.474327,    7.145325)
```

Assigning symbols to features after ADD

The third approach to assign symbols to features being added takes advantage of the fact that the features just added are in the selected set:

```
[Arcedit] EDITFEATURE LABEL
68 element(s) for edit feature LABEL
[Arcedit] ADD

Options:   1) Add Label             5) Delete last label
           8) Digitizing options    9) Quit
(Label)    User-ID: 71 Coordinate =  1.332442,   14.020796
(Label)    User-ID: 72 Coordinate =  8.926755,   18.203362
(Label)    User-ID: 73 Coordinate = 17.686997,    3.101112
(Label)    User-ID: 74 Coordinate = 9
3 label(s) added to USA
[Arcedit] WHO
Label 71 User-ID: 71 Symbol: 13 (    1.332442,   14.020796)
Label 72 User-ID: 72 Symbol: 13 (    8.926755,   18.203362)
Label 73 User-ID: 73 Symbol: 13 (   17.686997,    3.101112)
```

Since the features just added are selected, their symbol can be changed using the CALCULATE command with the $SYMBOL pseudo item. For example,

```
[Arcedit] CALCULATE $SYMBOL = 66
```

You can list the current symbol for the selected label points using the WHO command:

```
[Arcedit] WHO
Label 71 User-ID: 71 Symbol: 66 (    1.332440,   14.020796)
Label 72 User-ID: 72 Symbol: 66 (    8.926755,   18.203362)
Label 73 User-ID: 73 Symbol: 66 (   17.686997,    3.101112)
```

Assigning symbols to existing features

To associate a particular symbol with an existing feature, you might use the CALCULATE command with the $SYMBOL pseudo item. To assign a symbol to an existing feature, first select the feature. Then use CALCULATE with the $SYMBOL pseudo item. For example, to calculate the symbol for all the arcs with a common value for an item named ROAD_TYPE, you might follow this procedure:

```
[Arcedit] EDITFEATURE ARC
4212 element(s) for edit feature ARC
```

Now select all arcs with ROAD_TYPE equal to 3:

```
[Arcedit] SELECT ROAD_TYPE = 3
167 element(s) now selected
```

For the selected arcs, calculate the symbol number equal to 23. The pseudo item $SYMBOL is used as the target item.

```
[Arcedit] CALCULATE $SYMBOL = 23
```

All arcs with ROAD_TYPE = 3 will be drawn with symbol 23 from the current lineset file when they are next redrawn.

The LOOKUP command can also be used to assign symbol numbers to features. The advantage of LOOKUP over CALCULATE is that, with LOOKUP, a lookup table can be used to assign different symbols to all edit features with one command. This can be much easier than issuing a number of commands to select subsets of features and change their symbols with CALCULATE. The same lookup table used in plotting labels or arcs in PC ARCPLOT can be used to assign a specific symbol to each arc or label in PC ARCEDIT. This allows you to easily change the symbol with which the arcs are drawn in PC ARCEDIT. Instead of selecting each group of arcs by their common attribute, you can select all of the arcs and let LOOKUP classify the arcs by type. In the following example, all of the arcs will have their symbols calculated equal to the value of the item SYMBOL in the lookup table ROADS.LUT, which is defined as follows:

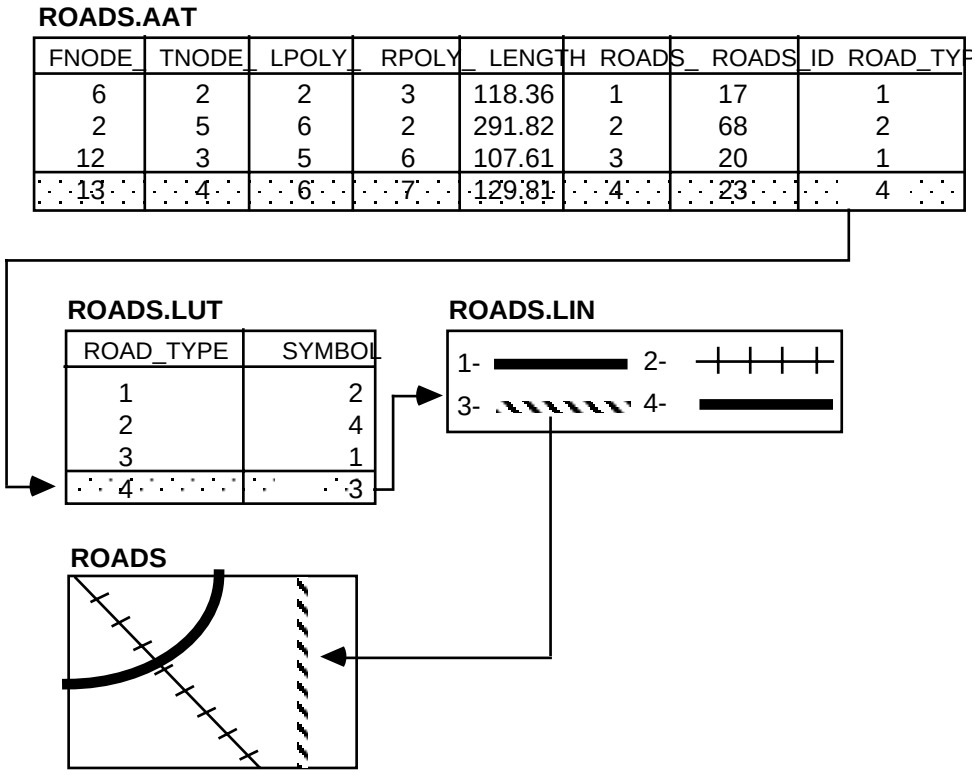
```
ROAD_TYPE   SYMBOL
     1          2
     2          4
     3          1
     4          3
```

In this case, all arcs with a value of 1 for ROAD_TYPE will be assigned symbol 3; all arcs with a value of 2 for ROAD_TYPE will be assigned symbol 4, and so on. To calculate each arc's symbol according to the value specified by ROADS.LUT, the pseudo item $SYMBOL is used as the target item. First, select the arcs whose symbol you want to change:

```
[Arcedit] EDITFEATURE ARC
256 element(s) for edit feature ARC
[Arcedit] SELECT ALL
256 element(s) now selected
```

Now use the LOOKUP command to change the arc's symbol number by looking up the value in the symbol table:

```
[Arcedit] LOOKUP $SYMBOL SYMBOL ROADS.LUT ROAD_TYPE
```



Now use the LINESET command to access the customized line symbols for the ROADS coverage.

[Arcedit] **LINESET ROADS.LIN**

The selected arcs can then be drawn with the calculated symbol until you exit PC ARCEDIT or perform a SAVE. Since the symbols associated with all features except annotation are temporary, they are reset to their default values whenever you perform a QUIT or SAVE.

Chapter 7 Adding coverage features

Adding coverage features

7 PC ARCEDIT provides a complete set of tools for adding coverage features including arcs, labels, tics, and annotation. In addition, the attribute values for new features can be added as each feature is digitized. Coordinates for new features can be input using a digitizer, screen cursor, mouse, typed at the keyboard, or read from a file as a series of x,y values. You can display particular digitizing errors, use background displays, or draw added features with special symbols.

Steps for adding coverage features

A number of steps are used for adding features to the edit coverage. In the steps outlined below, it is assumed that the device

environment, edit coverage and draw environment have already been established.

Step 1. Specify the type of feature to be added.

Step 2. Specify the method used for coordinate input.

Step 3. Specify any feature-specific draw environments.

Step 4. Determine how User-IDs will be assigned if the edit feature to be added is arc, label or tic.

Step 5. Establish any feature-specific add environments.

Step 6. Add new features.

Step 1

Specify the type of feature to be added

The first step in adding features is to specify the feature you will be adding with the EDITFEATURE command. This is how PC ARCEDIT knows that you want to add labels rather than arcs when you enter the ADD command. The features which can be added include arcs, labels, tics and annotation. The EDITFEATURE command is used as follows:

```
[Arcedit] EDITFEATURE LABEL
267 element(s) for edit feature LABEL
```

Use the STATUS ADD command to display the current edit feature environment:

```
[Arcedit] STATUS ADD
Edit feature: LABEL  Total= 267  A/D= 0,0 Original= 267
User-ID:   1   SETINCREMENT:   1   AUTOINCREMENT:   ON
Symbol=   33
```

Step 2

Specify the method used for coordinate input

The next step is to specify the means of coordinate input with the COORDINATE command. The coordinate input device is used to enter the coordinate locations and shapes of the features being added.

The COORDINATE command might be given as follows:

[Arcedit] **COORDINATE CURSOR**

A number of options are available for the coordinate input method:

CURSOR - specifies that the keyboard cursor will be used to enter coordinate locations. If you have enabled a mouse driver for your PC, the mouse is used to enter coordinate locations when you specify this option.

DIGITIZER - specifies that a digitizing board will be used to enter coordinate locations.

KEYBOARD - specifies that coordinate locations will be entered from the keyboard. You will be prompted for the necessary x,y coordinate location, or you can put coordinates for features in a file. Please note that the ADD command will not prompt you for x,y coordinates; the x,y coordinates must be specified on the command line.

The options available for coordinate input are presented in the chapter 'Getting started' as well as in the COORDINATE command reference.

Typically, you will be adding new arcs and label points using a map mounted on a digitizer. Linear features are traced on the map using the digitizer cursor, and a series of digitizer cursor keys are pressed to enter coordinates to represent each arc. Enter labels by positioning the cursor at the label position and pressing the 1 key.

When using a digitizer, you should be aware of the coordinate system and units in which the coverage is being digitized. This is helpful for setting special edit tolerances. Refer to the COORDINATE command reference, or the chapter 'Getting started', for the process used to register maps on the digitizer.

Step 3

Specify any feature-specific draw environments

Before features are added, the draw environment should be set such that when the DRAW command is issued, the feature to be added is drawn. For example, if you want to add arcs, you should specify that arcs are drawn:

[Arcedit] **DRAWENVIRONMENT ARC ON**

Note that other features and background coverages can be drawn to facilitate adding features. See the chapter 'Drawing coverage features' for more information.

Step 4

Determine how User-IDs will be assigned if the edit feature to be added is arc, label or tic

Specifying the increment for User-IDs

Many times when you are adding arcs, labels or tics, you may want the User-IDs to be incremented by a certain value from one feature to the next. This can ensure that the User-ID assigned to each added feature is unique. A unique User-ID may be important for a number of reasons. If you want features of the same type to have unique attributes, the User-IDs for the feature must be unique for that feature type. User-IDs are used in PC ARC/INFO for relating coverage features and the corresponding feature attributes during BUILD and CLEAN and when updating a coverage. Features not sharing the identical set of attributes must have unique User-IDs. If the same User-ID is assigned to more than one feature, then all of those features will have the same attributes. However, there may be times when you might want to add a number of features with the same User-ID (e.g., for attribute coding during initial data entry).

There are three ways to change User-IDs when adding features:

- Establish the starting User-ID, and specify an increment before ADD
- Change the User-ID, or turn increment on or off during ADD
- Calculate the User-ID after ADD

Before ADD, the SETINCREMENT and AUTOINCREMENT commands can be used to control the increment value added to User-IDs as each new feature is added.

By default, when you begin adding features, the User-ID of each new feature is automatically incremented by one. If you want to add features with unique User-IDs, the automatic increment of User-IDs should remain on. To turn off the automatic increment of User-IDs, use the AUTOINCREMENT command as follows:

[Arcedit] **AUTOINCREMENT OFF**

To turn automatic increment on again, enter:

[Arcedit] **AUTOINCREMENT ON**

As each new feature is added, its User-ID will be one greater than the previously added feature. To change the increment from one, use the SETINCREMENT command. AUTOINCREMENT must be ON for User-IDs to be incremented by the SETINCREMENT amount. For example, to add arcs whose User-IDs are incremented by 3, enter

```
[Arcedit] EDITFEATURE ARC
271 element(s) for edit feature ARC
[Arcedit] AUTOINCREMENT ON
[Arcedit] SETINCREMENT 3
[Arcedit] ADD
```

Note that the settings for AUTOINCREMENT and SETINCREMENT are feature specific. For example, if you turn AUTOINCREMENT OFF for labels, you can still have AUTOINCREMENT ON for arcs. This also holds true for SETINCREMENT; arcs, labels and tics can all have different settings for SETINCREMENT.

Specifying the User-ID and increment before ADD

The NEW command sets the initial attribute buffer for features to be added. A starting User-ID can be specified for that attribute buffer by issuing the CALCULATE command with the $ID pseudo item. The SETINCREMENT command controls the increment of User-IDs. In the following example, the User-ID assigned to the first

feature added will be set to 100, and subsequent User-IDs will be incremented by 10.

```
[Arcedit] EDITFEATURE ARC
162 element(s) for edit feature ARC
[Arcedit] NEW
[Arcedit] CALCULATE $ID = 100
Updating the initial attribute buffer only
[Arcedit] SETINCREMENT 10
[Arcedit] ADD
1) Vertex         2) Node               3) Curve
4) Delete vertex  5) Delete arc         6) Spline on/off
7) Square on/off  8) Digitizing Options 9) Quit     *Steam on/off
(Line) User-ID: 100 Points  26
(Line) User-ID: 110 Points  34
(Line) User-ID: 120 Points (9)
2 arc(s) added to LEICESTER
```

Many times when you are adding features which have User-IDs, you will want to continue adding features with consecutive User-IDs. To determine the largest User-ID assigned to an existing arc, you might do the following:

```
[Arcedit] EDITFEATURE ARC
162 element(s) for edit feature ARC
```

Select all of the existing arcs:

```
[Arcedit] SELECT ALL
162 element(s) now selected
```

You can use the LIST command to inspect the feature attribute table to determine the largest User-ID. In our example, the maximum User-ID already assigned to an arc is 243. To ensure that the next arc will have a unique User-ID greater than the largest User-ID, you can use the NEW command as described above or use the New User-ID option from the Digitizing options menu:

```
[Arcedit] ADD

1) Vertex         2) Node               3) Curve
4) Delete vertex  5) Delete arc         6) Spline on/off
7) Square on/off  8) Digitizing Options 9) Quit     *Stream on/off
(Line) User-ID: 1 Points 0
```

Press the 8 key to display the Digitizing options menu:

```
1) New User-ID          2) New Symbol      3) Autoincrement OFF
4) Autoincrement ON     5) Arctype line    6) Arctype box
7) Arctype circle       9) Quit
---------------- Enter Option
```

To change the User-ID assigned to the next feature, press the 1 key. You are then prompted to enter the User-ID to be assigned to the next added feature:

```
New User-ID: 244
(Line) User-ID: 244 Points  56
(Line) User-ID: 245 Points (9)
1 arc(s) added to COLTON
```

Changing the User-ID and increment during ADD

The AUTOINCREMENT and User-ID can be changed from within the ADD command. For example, to turn the automatic increment of arc User-IDs off from within ADD, follow this procedure:

```
[Arcedit] EDITFEATURE ARC
271 element(s) for edit feature ARC
[Arcedit] AUTOINCREMENT ON
[Arcedit] ADD
1) Vertex         2) Node              3) Curve
4) Delete vertex  5) Delete arc        6) Spline on/off
7) Square on/off  8) Digitizing Options 9) Quit     *Stream on/off
(Line) User-ID: 272 Points 0
```

Press the 8 key to display the Digitizing options menu:

```
1) New User-ID          2) New Symbol      3) Autoincrement OFF
4) Autoincrement ON     5) Arctype line    6) Arctype box
7) Arctype circle       9) Quit
---------------- Enter Option
```

Press the 3 key to turn AUTOINCREMENT OFF.

This next example demonstrates the procedure used to change the User-ID assigned to the next feature added.

```
[Arcedit] EDITFEATURE ARC
271 element(s) for edit feature ARC
[Arcedit] AUTOINCREMENT ON
[Arcedit] SETINCREMENT 10
[Arcedit] ADD
```

```
1) Vertex         2) Node              3) Curve
4) Delete vertex  5) Delete arc        6) Spline on/off
7) Square on/off  8) Digitizing Options 9) Quit     *Stream on/off
(Line) User-ID: 272 Points 0
```

Press the 8 key to display the Digitizing options menu:

```
1) New User-ID            2) New Symbol      3) Autoincrement OFF
4) Autoincrement ON       5) Arctype line    6) Arctype box
7) Arctype circle         9) Quit
---------------- Enter Option
```

Then press the 1 key to be prompted for the User-ID to be assigned to the next added feature:

```
New User-ID: 500
(Line) User-ID: 500 Points  78
(Line) User-ID: 510 Points  34
(Line) User-ID: 520 Points (9)
2 arc(s) added to BOISE
```

Changing the User-ID after ADD

The User-ID assigned to added features can be easily changed immediately after ADD, as features just added comprise the selected set. For example, to change the User-ID assigned to a number of features just added, you might follow this procedure:

```
[Arcedit] EDITFEATURE ARC
178 element(s) for edit feature ARC
[Arcedit] AUTOINCREMENT ON
[Arcedit] ADD

1) Vertex         2) Node              3) Curve
4) Delete vertex  5) Delete arc        6) Spline on/off
7) Square on/off  8) Digitizing Options 9) Quit     *Stream on/off
(Line) User-ID: 1 Points  25
(Line) User-ID: 2 Points  72
(Line) User-ID: 3 Points  15
(Line) User-ID: 4 Points  81
(Line) User-ID: 5 Points (9)
4 arc(s) added to CLINTON
```

Since the arcs just added are selected, the User-IDs can be changed by calculating the pseudo item $ID equal to the desired value, in this case, 100.

```
[Arcedit] CALCULATE $ID = 100
```

```
[Arcedit] WHO
Arc 182 User-ID: 100 Symbol: 1 with 25 points selected
Arc 183 User-ID: 100 Symbol: 1 with 72 points selected
Arc 184 User-ID: 100 Symbol: 1 with 15 points selected
Arc 185 User-ID: 100 Symbol: 1 with 81 points selected
```

Step 5

Establish any feature-specific add environments

Beyond the use of SETINCREMENT and AUTOINCREMENT there are a number of commands which affect how each of the feature types are added. The following sections describe the different commands that can be used to specify how each of the features will be added.

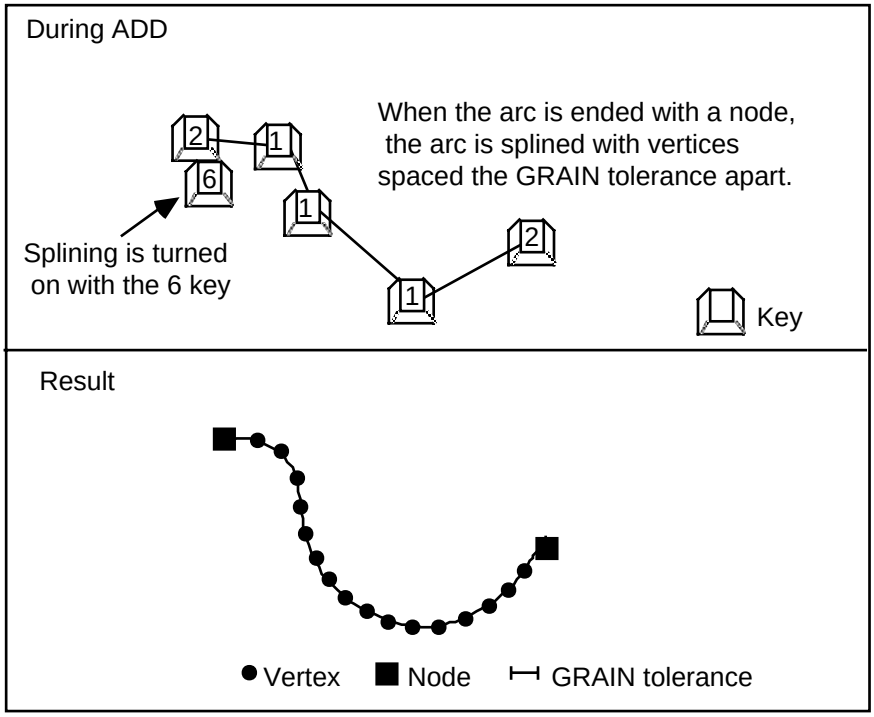
Specifying feature-specific ADD environments

Before you begin adding arcs, you may need to set several tolerances and environments. Tolerances that are used in adding arcs include: GRAIN and WEED.

Grain tolerance

The grain tolerance controls the distance between vertices when you add an arc with a curve in it, add a circle, or spline an arc during ADD. The grain tolerance is set with the GRAIN command. This tolerance is given in coverage units or indicated by using the cursor to specify two points on the coverage, the distance between which is the grain tolerance. For example,

```
[Arcedit] EDITFEATURE ARC
271 element(s) for edit feature ARC
[Arcedit] GRAIN 20

[Arcedit] ADD

1) Vertex  2) Node                       3) Curve
4) Delete vertex   5) Delete arc         6) Spline on/off
7) Square on/off   8) Digitizing Options 9) Quit     *Stream on/off
(Line) User-ID:  1  Points =  0
```



Weed tolerance

The WEED command controls the minimum allowable distance between vertices on an added arc. A vertex cannot be added if the distance between it and the previous vertex is less than the distance specified with WEED. If a vertex is located within the weed tolerance, the vertex is not added to the arc and this message is displayed on the screen:

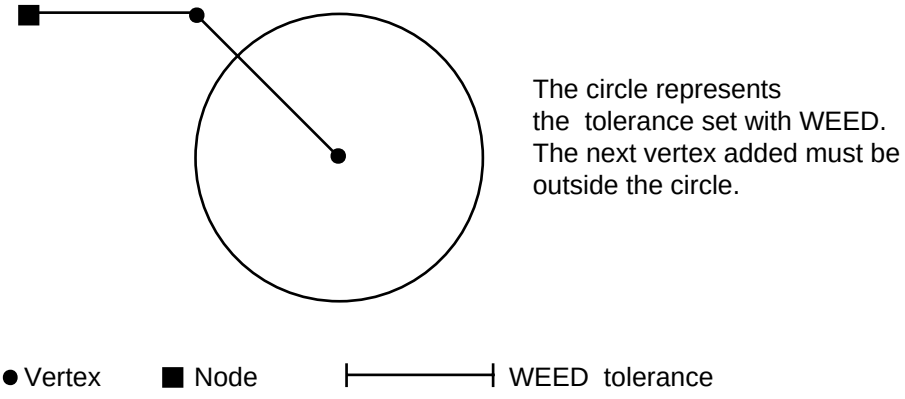
```
Last vertex within weed tolerance
```

If you are in stream mode, this message is not displayed because many points may fall within the weed tolerance. The weed tolerance can be used to prevent an arc from being digitized with more points than are required to accurately represent it. This tolerance is given in map units or indicated by using the cursor to specify two points on the coverage, the distance between which is the weed distance. For example,

[Arcedit] **WEED 20**
or
[Arcedit] **WEED ***

```
Enter 2 points defining the distance
```

When the * option is specified, the current COORDINATE input device is used to enter the two points.



Adding annotation

Before you begin adding annotation to the edit coverage, the annotation environment should be defined using ANNOFIT, ANNOITEM, ANNOLEVEL, ANNOPOSITION, ANNOSIZE, ANNOSYMBOL and ANNOTYPE.

The procedures used for establishing the annotation environment and for adding annotation are discussed fully in the chapter 'Editing annotation'. The command references section also contains valuable information about each of the commands used to specify the annotation environment. Relevant commands and their use are briefly described below:

ANNOFIT — controls the stretching of the text gap to fit annotation between two points for ANNOTYPE POINT2. ANNOFIT can be turned ON to stretch annotation to fit between the two points.

ANNOITEM — specifies the source of annotation added to the edit coverage. The source can be either the keyboard or an item value from the edit coverage's feature attribute table or a related file.

ANNOLEVEL — specifies in which level annotation will be stored. Annotation can be stored in any number of different levels to allow for selective plotting later in PC ARCPLOT.

ANNOPOSITION	sets the control position for POINT1 and POINT2 annotation.
ANNOSIZE	specifies the height of annotation to be added.
ANNOSYMBOL	specifies that annotation will be saved and drawn using the specified text symbol.
ANNOTYPE	specifies the type of annotation to be added or repositioned. Annotation can be anchored to one point, oriented between two points or curved to fit along the contour of three or four points.

Step 6

Add new features

Adding features with attributes

The NEW command can be used to assign attributes to features as they are added, rather than coding the attributes later in PC ARCEDIT or through some other means. NEW uses an attribute buffer to assign attributes to added features. The attribute buffer can be set equal to the attributes of a selected feature or it can be manipulated using the CALCULATE and MOVEITEM commands. Then, any features added after the attribute buffer is initialized will receive the values stored in the attribute buffer.

The following example demonstrates how you can add labels with associated attribute values using the NEW command. The coverage FARM already has polygon topology. A special item named CROP has been added to its PAT to store information regarding the primary crops represented by each polygon.

```
[Arcedit] DISPLAY 4
[Arcedit] EDITCOVERAGE FARM
The edit coverage is now FARM
The Map extent is not defined
Defaulting the map extent to the BND of FARM
[Arcedit] DRAWENVIRONMENT ARC LABEL
[Arcedit] DRAW
```

The edit feature is set to label and the NEW command is then issued. This allows you to establish the initial attribute buffer. When NEW is issued, the attribute values for features to be added can be specified. In this case, MOVEITEM is used because the item that the initial value will be assigned to (CROP) is a character item.

```
[Arcedit] COORDINATE CURSOR
[Arcedit] EDITFEATURE LABEL
0 element(s) for edit feature LABEL
[Arcedit] ITEMS

COLUMN   ITEM NAME        WIDTH   TYPE  N.DEC
   1     AREA                13      N      6
  14     PERIMETER           13      N      6
  27     FARM_               11      N      0
  38     FARM_ID             11      N      0
  49     CROP                20      N      0

[Arcedit] NEW
[Arcedit] MOVEITEM 'CORN' to CROP
Updating the initial attribute buffer only
```

By placing the character string 'CORN' into the CROP item label, points that are subsequently added will be coded with CORN for the item CROP.

```
[Arcedit] LIST
Listing the initial attribute buffer only
$RECNO          AREA    PERIMETER FARM_ FARM_ID CROP
   1           0.000      0.000     0      1    CORN
[Arcedit] ADD

1) Add Label              5) Delete last label
8) Digitizing options     9) Quit

(Label) User-ID: 1 Coordinate =  708636.123654,   4647035.069271
(Label) User-ID: 2 Coordinate =  710397.463512,   4646361.129706
(Label) User-ID: 3 Coordinate = (9)
2 label(s) added to FARM
```

Two label points are added and their item values listed. Furthermore, the CROP item is automatically assigned the value 'CORN' from the initial attribute buffer. See the NEW command reference for further details about using the initial attribute buffer.

```
[Arcedit] LIST
$RECNO          AREA    PERIMETER FARM_ FARM_ID CROP
   1          0.0000     0.0000     0      1    CORN
   2          0.0000     0.0000     0      2    CORN
```

This next example demonstrates the use of the NEW command to update the annotation environment by selecting an existing annotation and entering the NEW command.

```
[Arcedit] EDITFEATURE ANNOTATION
```

```
1 element(s) for edit feature ANNOTATION
```

Display the current annotation environment with the STATUS command along with the ADD option.

```
[Arcedit] STATUS ADD
Edit feature: ANNOTATION Total= 1 A/D= 1, 0 Original= 0
ANNOLEVEL= 1   ANNOSYMBOL= 1      ANNOSIZE= 0.000
ANNOFIT: OFF   ANNOPOSITION: LL   ANNOTYPE: ONE POINT
```

Select the annotation that will be used to set the annotation environment.

```
[Arcedit] SELECT ALL
1 element(s) now selected
```

The selected annotation is from level 3, is drawn with symbol 7, and has a size of 2.3 coverage units.

```
[Arcedit] WHO
Anno 1 Level: 3 Symbol: 7 Size: 2.3 Gap: -100 0 selected
```

When the NEW command is entered, the annotation environment is updated to match the level, symbol and size of the selected annotation.

```
[Arcedit] NEW
[Arcedit] STATUS ADD
Edit feature: ANNOTATION Total= 1 A/D= 1, 0 Original= 0
ANNOLEVEL= 3   ANNOSYMBOL= 7      ANNOSIZE= 2.300
ANNOFIT: OFF   ANNOPOSITION: LL   ANNOTYPE: ONE POINT
```

Using pseudo items with the NEW command

A number of pseudo items can also be used to manipulate the initial attribute buffer. These items, and the features with which they can be used, are described in the following chart.

	Pseudo items			
Feature	$ID	$SYMBOL	$SIZE	$LEVEL
ARC	✓	✓		
LABEL	✓	✓		
TIC	✓	✓		
ANNOTATION		✓	✓	✓

$ID - can be used to specify the User-ID assigned to added features.

$SYMBOL - can be used to specify the drawing symbol assigned to added features. In the case of annotation, the symbol becomes a permanent attribute of the annotation. The draw symbol associated with all other edit features is, in effect, only for the current PC ARCEDIT session, as the symbol number is reset to the default value when you exit PC ARCEDIT or SAVE the edit coverage.

$SIZE - specifies, in coverage units, the height with which added annotation will be drawn. The specified height becomes a permanent attribute of the annotation.

$LEVEL - specifies the level in which added annotation will be stored. Annotation can be classed into different levels to ease editing and to allow selective drawing in PC ARCPLOT and PC ARCEDIT. The specified level becomes a permanent attribute of the annotation.

Notes about ADD using COORDINATE KEYBOARD

It is possible to add features by entering the coordinate location(s) from the terminal keyboard or a file. You may want to specify the coordinates from the keyboard or a file when you already know the exact location of the feature.

When you have specified the keyboard as the input device for entering coordinates by giving COORDINATE KEYBOARD, you can enter the appropriate coordinates for new features on the

command line. None of the special digitizing options can be used when coordinates are typed at the keyboard.

The following example demonstrates the use of a file containing coordinate values to add several arcs to the edit coverage.

Initially, a text file is created that contains the x,y coordinates of the arc to be added. For example, the arc must begin with a node, so the first and last points of each arc are assumed to be node locations. In this example, a file is created that will add two arcs. The text file called XYCOORD.SML appears as follows:

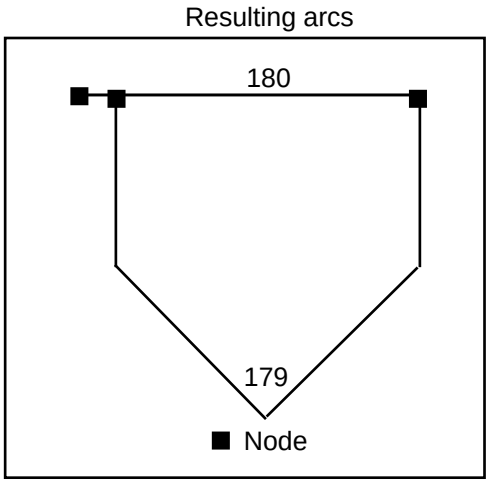
```
ARCTYPE LINE
ADD 1050 3225 1050 3175 1075 3150 1100 3175 1100 3225
ADD 1025 3225 1100 3225
```

To use the coordinates stored in this file, COORDINATE must first be set to KEYBOARD.

```
[Arcedit] DISPLAY 4
[Arcedit] COORDINATE KEYBOARD
[Arcedit] MAPEXTENT BELTON
[Arcedit] EDITCOVERAGE BELTON
The edit coverage is now BELTON
[Arcedit] DRAWENVIRONMENT ARC ON
[Arcedit] DRAW
:[Arcedit] EDITFEATURE ARC
178 element(s) for edit feature ARC
[Arcedit] NEW
[Arcedit] CALCULATE $ID = 179
```

To actually use the coordinates from the file, use the SML directive &RUN.

[Arcedit] **&RUN XYCOORD**



Note that using COORDINATE KEYBOARD precludes the interactive use of the ADD menus and the special digitizing function keys. Use PC ARCEDIT command lines to adjust the edit environment, as necessary, such as CALCULATE $ID, CALCULATE $SYMBOL and AUTOINCREMENT.

Using COPY

The following is a general procedure for using the COPY command. First select the features you want to copy and redraw them using the current symbolset by SETDRAWSYMBOL. For example,

[Arcedit] **SELECT NAME CN 'MAIN'**
2 element(s) now selected
[Arcedit] **DRAWSELECT**

Next enter the COPY command.

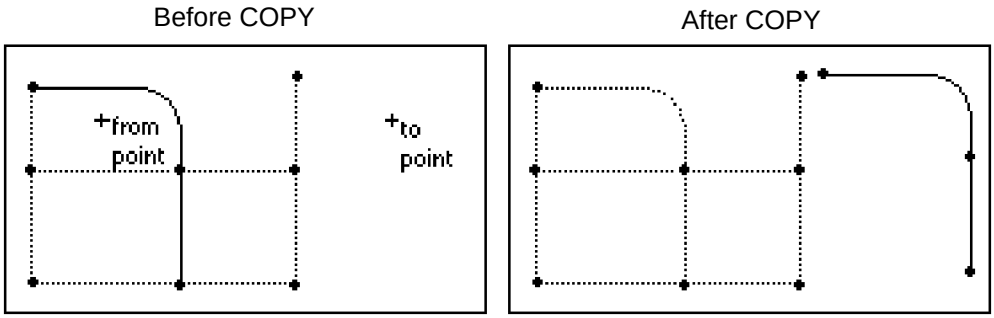
[Arcedit] **COPY**
Point to the coordinate to copy from

COPY will first prompt you to point to a coordinate at the original feature location. Position the cursor at the desired location and press any alphanumeric key.

Point to the coordinate to copy to

You are then prompted to enter the location where you want the selected features copied. Move the cursor to a coordinate at the new location, and press any alphanumeric key.

2 arc(s) copied



The next example demonstrates the use of the COPY command to copy selected annotation to another location.

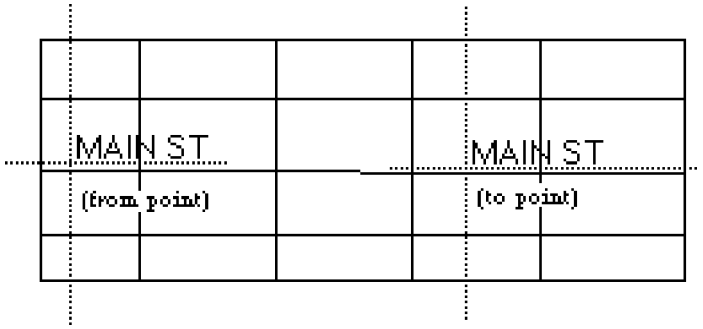
[Arcedit] **EDITFEATURE ANNOTATION**
67 element(s) for edit feature ANNOTATION

First select the annotation to be copied.

[Arcedit] **SELECT ONE**
Point to the feature to select
Annotation 3 Level: 1 with 7 characters selected
1 element(s) now selected

Then issue the COPY command. COPY will prompt you to enter two points with the current COORDINATE input device which will define the direction and distance to copy the selected features. A good technique is to enter the from-point on the feature to be copied so that you can have a better idea of where it will be copied to when you enter the to-point.

```
[Arcedit] COPY
Point to the coordinate to copy from
Point to the coordinate to copy to
1 annotation copied
```



Copying features from another coverage with GET

GET copies all features of the current edit feature class from the specified coverage into the current edit coverage. The current edit feature determines the feature class to be copied. For example, if the current edit feature is LABEL, only labels will be copied. GET does not copy feature attributes; only the coordinates and the User-ID are copied to the edit coverage.

In this example, all of the arcs are copied from the coverage RIVERS.

```
[Arcedit] EDITCOVERAGE USA
The edit coverage is now USA
: EDITFEATURE ARC
21 element(s) for edit feature ARC
[Arcedit] GET RIVERS
Copying the arcs from RIVERS
 into USA ...
60 arc(s) copied to USA
```

Copying features to another coverage with PUT

PUT copies selected edit features from the current edit coverage into another coverage. The selected features remain in the edit coverage. PUT does not copy feature attributes. Only coordinates and the User-ID for the selected features are copied. If the output coverage is new, its BND is set to the x,y extremes of the PUT features. If the output coverage already exists, you will be prompted as to whether you want to append these features to the coverage.

In this example, all selected arcs are copied to a new coverage named MIDWEST.

```
[Arcedit] EDITFEATURE ARC
13 element(s) for edit feature ARC
[Arcedit] SELECT ALL
13 element(s) now selected
[Arcedit] PUT MIDWEST
Creating MIDwEST
Copying the arc(s) into MIDWEST ...
13 arc(s) copied
```

In this example, all of the label points are copied to the coverage named SOUTHWEST which already exists. PUT will prompt you to see if the selected features should be appended to the existing coverage:

```
[Arcedit] EDITFEATURE LABEL
67 element(s) for edit feature LABEL
[Arcedit] SELECT ALL
67 element(s) now selected
[Arcedit] PUT SOUTHWEST
Coverage SOUTHWEST
 already exists.  Do you want to append <Y/N>: Y
Copying the label(s) into SOUTHWEST ...
67 label(s) copied
```

Chapter 8 Selecting features to edit

Selecting features to edit

8 PC ARCEDIT makes use of feature-oriented editing. In other words, most editing commands operate on what is referred to as the selected set of features. This makes it possible to perform the same operation on a number of features rather than feature by feature.

Feature editing is performed as a two-step process. First you select a subset of features. Then you edit the selected features (e.g., copy them, move them, update their attribute values, and so on). Also, a series of operations can be performed on the same selected set. For example, you may edit selected arcs, update their attribute values and then SAVE them into a new coverage. This chapter describes how to select a set of features for editing and how to add or remove features from the selected set.

Once you have selected a set of features, you can edit them. Subsequent chapters describe various editing operations which you can perform on selected features.

There are two ways of selecting features: either graphically or by attribute values. Graphic selection occurs by pointing at or 'surrounding' a set of features. For example, you can select a group of features which fall inside of a box. Another way to select features is by means of a logical expression which is used to evaluate feature attributes. Features are selected when their attributes match the logical expression(s) entered. For example, select all arcs whose STREET_NAM is 'MAIN' and LENGTH is greater than 2,000 feet. Then the selected set can have features either added to it, removed from it, or the set can be replaced with a new set.

Selection commands

Features are selected for editing using the following commands:

SELECT	initializes a selected set of features.
ASELECT	adds more features to the currently selected set.
NSELECT	removes all of the features currently in the selected set and selects all of the currently unselected features.
RESELECT	selects a subset of the currently selected set.
UNSELECT	removes specified features from the currently selected set.

The feature selection commands ASELECT, RESELECT, SELECT and UNSELECT all have the same options. SELECT has one additional option that permits all the arcs that define a polygon boundary to be selected at one time.

Commands that affect feature selection

Other PC ARCEDIT commands related to the specification of a selected set include:

EDITDISTANCE	specifies how far the cursor can be from a feature to select. The first feature found within the edit distance of a location entered with the cursor is selected.
NEXT	when specified after SELECT ONE unselects the feature just selected and selects the next feature within the edit distance of the location used to select the previous feature.
WHO	flashes the currently selected features on the graphic display and lists information about the features.
SETDRAWSYMBOL	specifies the symbol used to draw selected features when the DRAWSELECT command is issued.
DRAWSELECT	draws the currently selected set of features with the symbol specified by SETDRAWSYMBOL.

Graphic selection

The graphic means of selecting features allows you to either point at one feature or a number of features. In this case, the edit distance is used to determine if the location entered is near any existing feature. You can also draw a box around the features to select. Features must be wholly contained in the box to become selected. Features may also be selected according to the current screen display. In this case, all features that are wholly or partially contained within the current map extent are selected. An additional option, ALL, allows you to select all features of the current edit feature type.

Logical selection

Using a logical expression to select coverage features can be useful when the features share a common attribute, but are graphically dispersed. When you use ASELECT, RESELECT, SELECT, or UNSELECT with a logical expression, all features which have attributes that satisfy the criteria specified in the logical expression will be selected or removed from the selected set. For example, to select all arcs of length greater than 5, enter the logical expression:

[Arcedit] **SELECT LENGTH GT 5**

where LENGTH is the item in the AAT, GT is a logical operator, and 5 is the value to be operated upon. Each arc that meets this criteria is included in the currently selected set. You can combine several logical expressions using the keywords AND, OR and XOR. For example,

[Arcedit] **SELECT LENGTH GT 5 AND DEPTH GT 3**

selects all of the arcs with a length greater than 5 and a depth greater than 3.

Pseudo items

In addition to the items in a feature attribute table and in related files, there are a number of *pseudo* items which may be used in logical expressions.

$RECNO - specifies the record number for each feature in the file. Note that as records are modified during a PC ARCEDIT session, they are appended to the end of the file being modified. Their record numbers are therefore different the next time you try to select them with $RECNO.

$SYMBOL - specifies the symbol number for each feature. This is often useful for selecting annotation to edit.

$ID - specifies the User-ID of the feature. This is useful for feature selection of arcs and labels for which no feature attribute tables have been created.

$LEVEL - specifies the annotation level for annotation.

$SIZE - specifies the height that annotation is drawn with.

The use of pseudo items in logical selection expressions are illustrated in the examples later in this chapter.

Logical expressions

The general form of a logical expression used in ASELECT, RESELECT, SELECT or UNSELECT is:

```
[operand_1] [logical_operator] [operand_2]
```

Each [operand] can be: the name of an item from a coverage feature attribute table or a related file; one or up to 20 numeric constants; one or up to 20 character strings, each enclosed in single quotation marks; or an arithmetic expression, for which the following operators are permitted: +, -, /, *, ** (exponentiation), LN (natural logarithm), and WD (finds the number of characters in the subsequent character string).

The [logical_operator] is one of the following:

EQ	or =	[operand_1] is equal to [operand_2].
NE	or <>	[operand_1] is not equal to [operand_2].
GE	or >=	[operand_1] is greater than or equal to [operand_2].
LE	or <=	[operand_1] is less than or equal to [operand_2].
GT	or >	[operand_1] is greater than [operand_2].
LT	or <	[operand_1] is less than [operand_2].
CN		[operand_1] contains the single character string specified in [operand_2].
NC		[operand_1] does not contain the single character string specified in [operand_2].
IN		[operand_1] is contained in the set of numeric constants or character strings specified in [operand_2].

This set of constants or character strings must be enclosed in { } brackets. The individuals in the set must be separated by commas, unless they are being used to express a range, in which case, -> is used to separate the individuals forming the lower and upper inclusive limits of the range. A range defined between two character strings is based on the ASCII number sequence, which is alphabetical.

Logical expressions can also be connected using these keywords:

AND	For the features to be selected the logical expressions on both sides of AND must be true.
OR	For the features to be selected the logical expression on one or both sides of OR must be true.
XOR	For the features to be selected the logical expression on one and only one side of XOR must be true.

There is no limit to the number of [operand_1] [logical_operator] [operand_2] combinations and connectors which can be used in a single ASELECT, RESELECT, SELECT or UNSELECT. However, the command string must be no longer than 320 characters in length, including blanks. Operations are performed in sequence from left to right. Parentheses can be used to specify that logic within the parentheses be performed first. Operations inside the innermost set of parentheses have the highest precedence. Here are some more examples of ASELECT, RESELECT, SELECT and UNSELECT given with logical expressions:

[Arcedit] **ASELECT FLOW GE 10 AND WIDTH LE 34.5**
[Arcedit] **RESELECT TAX <= 89 AND TAX > 12 OR ZONE = 'RW2'**
[Arcedit] **SELECT VALUE GT YIELD * (CLASS + 18)**
[Arcedit] **SELECT DEPTH IN {90,120,400,600->900}**
[Arcedit] **UNSELECT NAME IN {'MAIN','OAK','15TH'}**

Steps for selecting coverage features

A number of steps are used for specifying a set of selected features to edit. In the five steps outlined below, it is assumed that the device environment and edit coverage have already been established.

Step 1. Specify the feature class to edit.

Step 2. Specify the method used for coordinate input.

Step 3. Specify the edit distance.

Step 4. Select a set of features to edit.

Step 5. Add to or modify the selected set.

Step 1

Specify the feature class to edit

The first step in selecting features to edit is to specify the feature class you will be editing with the EDITFEATURE command. This tells PC ARCEDIT that all of the selection commands issued will apply to the current edit feature class. This is how PC ARCEDIT knows that you want to select labels rather than arcs when you enter any of the selection commands. The feature classes which can be selected include: arcs, labels, tics and annotation. The EDITFEATURE command is used as follows:

```
[Arcedit] EDITFEATURE LABEL
267 element(s) for edit feature LABEL
```

Note that the EDITFEATURE command is only used to specify a feature class, not to select features. There are no features selected until you explicitly use one of the selection commands (i.e., SELECT, ASELECT, etc.).

Step 2

Specify the method used for coordinate input

The next step required to select features to edit is to specify the means of coordinate input with the COORDINATE command. This step is only required if you will be selecting features graphically rather than by a logical expression. By default, the graphic monitor's cursor is the coordinate input device when PC ARCEDIT begins

execution. The COORDINATE command might be given as follows:

[Arcedit] **COORDINATE CURSOR**

Step 3

Specify the edit distance

The edit distance is used in conjunction with the coordinate input device to graphically select features. The feature you are attempting to select must be within the edit distance of the crosshairs of the current coordinate input device to be selected. The edit distance is specified with the EDITDISTANCE command. For example, to specify that features within 30 coverage units of the cursor can be selected, enter EDITDISTANCE as follows:

[Arcedit] **EDITDISTANCE 30**

Step 4

Select a set of features to edit

The SELECT command can be used to select, either graphically or by means of a logical expression, a set of features to edit. When the EDITFEATURE command is issued, the selected set is reset to zero.

SELECT options

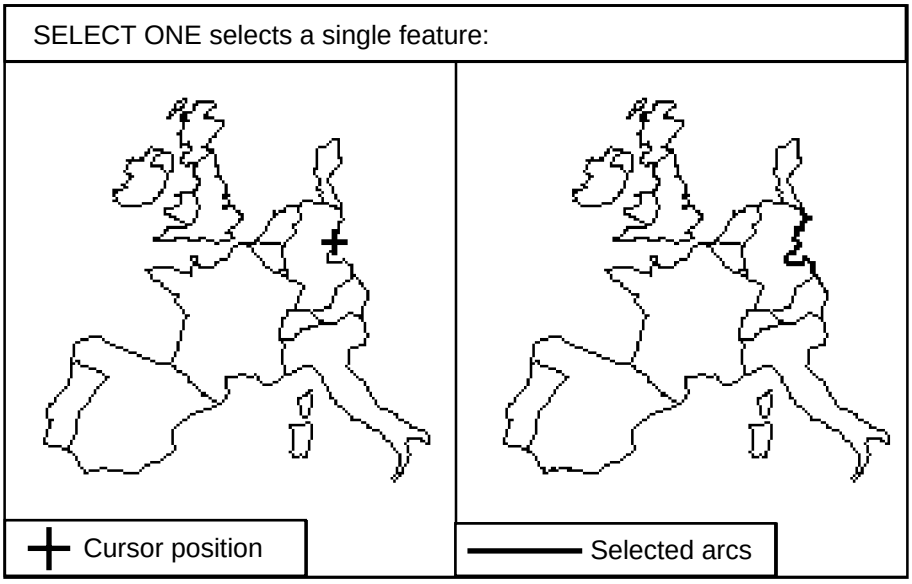
SELECT has a number of options that are common to the other selection commands. These options are:

ONE Specifies that a single feature will be selected. Position the current COORDINATE input device at the location of the desired feature and press any alphanumeric key on the keyboard (if COORDINATE CURSOR), press any key on the digitizer keypad (if COORDINATE DIGITIZER), or press any button on the mouse (if COORDINATE CURSOR with a mouse installed). If the location specified is within the edit distance of the desired feature, it will be selected. If there is more than one feature within the edit distance of the specified location, the desired feature may not be selected because SELECT ONE selects the first feature found. You can use the NEXT command to search within the edit distance of the location specified

for the desired feature. ONE is the default option for SELECT and need not be entered as an argument to SELECT.

When using COORDINATE KEYBOARD, you will be prompted to enter the feature's x,y coordinate location. For example,

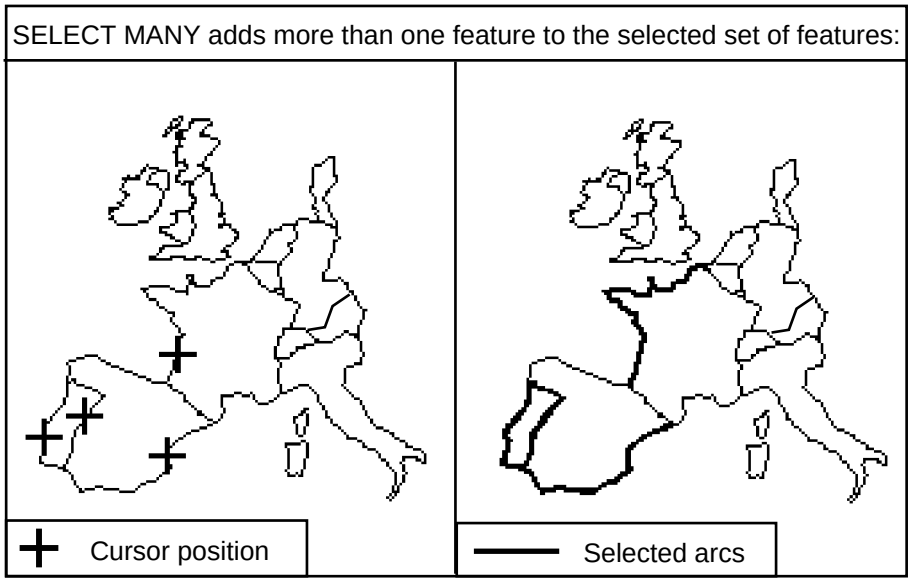
```
[Arcedit] EDITFEATURE ARC
312 element(s) for edit feature ARC
[Arcedit] COORDINATE KEYBOARD
[Arcedit] EDITDISTANCE .2
[Arcedit] SELECT ONE
Point to the feature to select
Keyboard <X,Y>: 29.6,9.15
Arc 126 User-ID: 106 with 23 points selected
1 element(s) now selected
```



MANY Specifies that more than one feature will be selected. When you enter SELECT MANY, the following menu will appear on the graphic display:

```
1 = Select     2 = Next     3 = Who     9 = Quit
```

Use the numbers (1, 2, 3, or 9) to enter the desired option. After you enter the SELECT MANY command, position the cursor at the location of the feature you wish to add to the selected set, and press the 1 key. The feature selected will then blink. To continue adding features to the selected set, move the cursor to another desired feature, and press the 1 key. When all of the desired features are selected, press the 9 key to exit the SELECT MANY command. If an undesired feature blinks when you point at it, press the 2 key to search for another feature within the edit distance of the previous cursor location. If, after pressing the 2 key, another undesired feature blinks, you can press the 2 key again to search for the correct feature. You can continue until the correct feature blinks or until the message `No match found` appears, in which case, the cursor is not within the edit distance of the desired feature. If you press the 2 key immediately after a desired feature is selected, that feature will be unselected, and the next feature within the edit distance of the cursor will be chosen. To blink the most recently selected feature, press the 3 key.




```
[Arcedit] EDITFEATURE ARC
312 element(s) for edit feature ARC
[Arcedit] EDITDISTANCE 15
```

```
[Arcedit] SELECT MANY
1 = Select     2 = Next     3 = Who     9 = Quit
```

Position the cursor near the desired arc, and press the 1 key to select the arc.

```
Arc 231 User-ID: 231 with 96 points selected
1 = Select     2 = Next     3 = Who     9 = Quit
```

Select more arcs by repositioning the cursor and pressing the 1 key.

```
Arc 13 User-ID: 13 with 186 points selected
1 = Select     2 = Next     3 = Who     9 = Quit
Arc 15 User-ID: 15 with 128 points selected
1 = Select     2 = Next     3 = Who     9 = Quit
Arc 134 User-ID: 134 with 204 points selected
1 = Select     2 = Next     3 = Who     9 = Quit
```

Press the 9 key to stop selecting arcs.

```
4 element(s) now selected
```

You can SELECT MANY with COORDINATE KEYBOARD as well. You will be prompted to enter the appropriate key and the X,Y coordinate location. For example,

```
[Arcedit] EDITFEATURE ARC
312 element(s) for edit feature ARC
[Arcedit] EDITDISTANCE 15
[Arcedit] COORDINATE KEYBOARD
[Arcedit] SELECT MANY
1 = Select     2 = Next     3 = Who     9 = Quit
Keyboard <key,X,Y>: 1,29.6,9.15
Arc 126 User-ID: 106 with 23 points selected
1 = Select     2 = Next     3 = Who     9 = Quit
Keyboard <key,X,Y>: 9
```

ALL Specifies that all features in the edit coverage will be selected. PC ARCEDIT will then inform you of the number of features currently selected. For example,

```
[Arcedit] EDITFEATURE ARC
356 element(s) for edit feature ARC
[Arcedit] SELECT ALL
356 element(s) now selected
```

SCREEN Specifies that all of the features that fall wholly or at least partially within the current map extent will be selected. For example,

```
[Arcedit] EDITFEATURE LABEL
1227 element(s) for edit feature LABEL
[Arcedit] COORDINATE CURSOR
```

Use the current COORDINATE input device to define the limits of the map extent. Therefore, you can zoom in on an area of interest.

```
[Arcedit] MAPEXTENT *
Define the box

[Arcedit] DRAW
```

All of the features that appear wholly or partially on the display screen will be selected using the following command:

```
[Arcedit] SELECT SCREEN
182 element(s) now selected
```

BOX Specifies that the features which fall completely within a specified box will be selected. For example,

```
[Arcedit] EDITFEATURE ANNOTATION
255 element(s) for edit feature ANNOTATION
[Arcedit] COORDINATE CURSOR
```

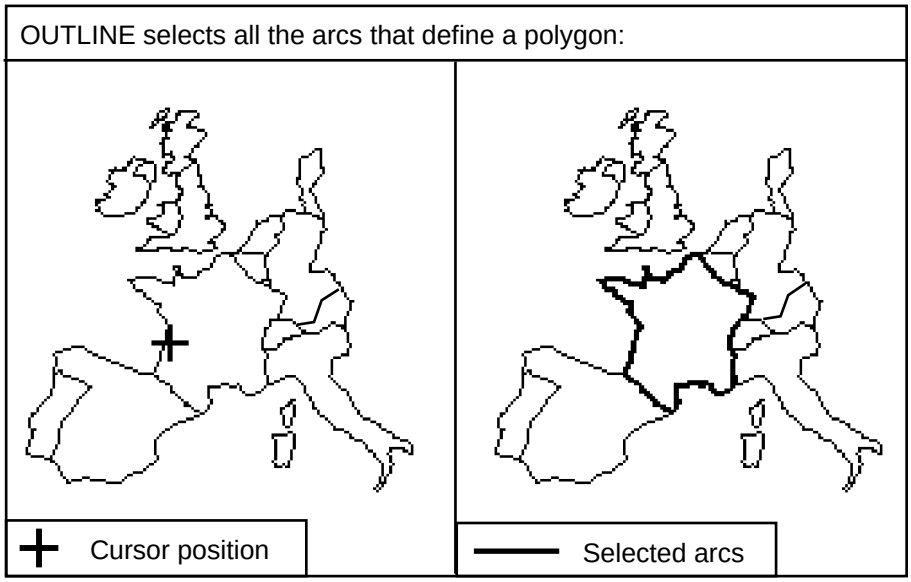
After you enter the command,

```
[Arcedit] SELECT BOX
```

the message `Define the box` is displayed. Position the current COORDINATE input device at the location of one corner of the selection box, and press any alphanumeric key. Then move to the opposite corner and again press any alphanumeric key. The number of features selected is then displayed.

```
32 element(s) now selected
```

OUTLINE Specifies that all of the arcs which define a selected polygon will become the selected set. Position the cursor at a location within the edit distance of one of the arcs inside of the polygon and press any alphanumeric key. The arcs that define the polygon are then selected. This option is only valid for the SELECT command when the edit feature is arc.



[Arcedit] **EDITFEATURE ARC**
312 element(s) for edit feature ARC
[Arcedit] **COORDINATE CURSOR**
[Arcedit] **EDITDISTANCE 15**
[Arcedit] **SELECT OUTLINE**
Point to the outline to select
8 arc(s) selected with a perimeter of 498.324252

Step 5

Add to or modify the selected set

Once a selected set is established, you can use the ASELECT, RESELECT, UNSELECT and NSELECT commands to add to or modify the selected set. Except for OUTLINE, the same options described above are available for the ASELECT, RESELECT and UNSELECT commands. The NSELECT command has no options.

It simply unselects all of the features currently selected and selects all of the features not selected.

Special considerations for selecting features

A number of special considerations must be taken into account when selecting each of the different feature types. These affect selection by both graphic means or by logical expression.

Selecting arcs

To graphically select an arc, you can point anywhere in the edit coverage within the edit distance of the desired arc. You do not have to point at a node or a vertex; the point specified must be within the edit distance of a segment in the arc.

When selecting arcs with the BOX option, the desired arc must be completely contained within the selection box to become selected.

Items within the feature attribute table, the pseudo items $ID, $RECNO and $SYMBOL, or items in a related database data file can be used in a logical expression to select arcs. For example,

```
[Arcedit] SELECT $ID GT 100
266 element(s) now selected
```

Selecting labels

To graphically select a label, you must point to a location in the edit coverage within the edit distance of the desired label.

Items within the feature attribute table, the pseudo items $ID, $RECNO and $SYMBOL, or items in a related database data file can be used in a logical expression to select labels.

Selecting tics

To graphically select a tic, you must point to a location in the edit coverage within the edit distance of the desired tic.

The pseudo items $ID, $RECNO and $SYMBOL can be used in a logical expression to select tics.

Selecting annotation

To graphically select one-point or two-point annotation, you must

point to a location in the edit coverage within the edit distance of the lower-left corner of the first letter of the desired annotation, regardless of the annotation type or position used to create the annotation.

When selecting line type annotation, you can point anywhere in the edit coverage within the edit distance of the annotation string to select the annotation.

The pseudo items $LEVEL, $RECNO, $SIZE and $SYMBOL can be used in a logical expression to select annotation.

Examples

```
[Arcedit] EDITFEATURE ARC
1256 element(s) for edit feature ARC
[Arcedit] COORDINATE CURSOR
```

First, all of the arcs that fall completely within a digitized box are selected:

```
[Arcedit] SELECT BOX
Define the box
134 element(s) now selected
```

Of the selected arcs, the arcs that have a User-ID of 34 are selected:

```
[Arcedit] RESELECT $ID EQ 34
7 element(s) now selected
```

The arcs which are drawn with symbol 13 are added:

```
[Arcedit] ASELECT $SYMBOL EQ 13
34 element(s) now selected
```

When the NSELECT command is issued, all of the currently selected arcs are unselected, and the arcs that were previously unselected are then selected. This basically flips the selected set:

```
[Arcedit] NSELECT
1122 element(s) now selected
```

In this series of examples, annotation are selected by use of pseudo items and by pointing at the desired features:

```
[Arcedit] EDITFEATURE ANNOTATION
97 element(s) for edit feature ANNOTATION
[Arcedit] COORDINATE CURSOR
[Arcedit] EDITDISTANCE 50
```

The desired annotation features are selected using the screen cursor or mouse crosshairs to point at them. Press the 1 key to select the annotation whose lower-left position point is closest to the crosshair. When all of the desired annotation are selected, press the 9 key to quit:

```
[Arcedit] SELECT MANY
1 = Select     2 = Next     3 = Who     9 = Quit
```

One annotation is selected by positioning the crosshairs and pressing the 1 key, and the following message is displayed:

```
Annotation 5 Level: 2 with 6 characters selected
1 = Select   2 = Next     3 = Who     9 = Quit
```

Two more annotation features are selected in the same way:

```
Annotation 24 Level: 7 with 13 characters selected
1 = Select   2 = Next     3 = Who     9 = Quit
Annotation 65 Level: 1 with 10 characters selected
1 = Select   2 = Next     3 = Who     9 = Quit
```

Press the 9 key to quit selecting features and the following message appears:

```
3 element(s) now selected
```

In this example, all of the annotation which are in annotation level 2 are selected using the $LEVEL pseudo item:

```
[Arcedit] SELECT $LEVEL = 2
14 element(s) now selected
```

Of the currently selected annotation, all those annotation features whose size is greater than 100 coverage units and less than 150 coverage units are removed from the selected set:

```
[Arcedit] UNSELECT $SIZE GT 100 AND $SIZE LT 150
```

```
5 element(s) now selected
```

Of the currently selected annotation features, only those annotation features that are drawn with symbol 4 are retained in the selected set:

```
[Arcedit] RESELECT $SYMBOL = 4
3 element(s) now selected
```

Drawing selected features

Selected features can be drawn in either of two ways: with the WHO command or with the DRAWSELECT command. The difference between these two methods is that selected features are redrawn with their assigned symbol when WHO is issued but drawn with the symbol specified in the SETDRAWSYMBOL command when DRAWSELECT is issued. DRAWSELECT is particularly useful when you wish to highlight selected features. WHO is used mainly when you want to flash selected features and list a subset of their attributes. See the chapter 'Drawing coverage features' for example uses of these commands.

Listing the attributes of selected features

The attributes of selected arcs or labels can be listed on the terminal with the LIST command. A feature attribute table (AAT or PAT) must be present in the edit coverage. You can list all attributes of selected features or just a subset of their items. For example,

```
[Arcedit] EDITFEATURE ARC
113 element(s) for edit feature ARC
```

Arcs with length greater than 300 are selected:

```
[Arcedit] SELECT LENGTH GT 300
3 element(s) now selected
```

The attributes of the selected arcs are then listed with the LIST command:

```
[Arcedit] LIST
$RECNO FNODE_ TNODE_ LPOLY_ RPOLY_ LENGTH    TROY_ TROY_ID
    76     53     32      1     21  303.4420     76      76
   111     75     67      1     40  303.4370    111     111
   113     71     74      1     41  320.0970    113     113
```

A subset of attributes can be listed by specifying the item names on the command line:

```
[Arcedit] LIST LENGTH TROY_ID
  LENGTH        TROY_ID
303.4420             76
303.4370            111
320.0970            113
```

Effects on the selected set after an edit operation

As a general rule, the same set of features remain selected after an edit operation as before the edit operation. This allows a series of operations to be performed on the same set of selected features. For example, a set of arcs could be selected, their attributes edited with CALCULATE and MOVEITEM then the features could be moved to another location without having to reselect them between edits.

Exceptions to this rule include:

- Features are added to the selected set when an arc is split with the SPLIT command
- The selected set is reduced to zero when the selected features are deleted with the DELETE command
- Features added with the ADD command replace the existing selected set if there was one
- New features become the selected set when a COPY is performed

A special note on polygon editing

There are some factors which you should consider when editing attributes for polygons using edit feature label. During BUILD or CLEAN, each polygon is assigned a User-ID from a label point which falls within the polygon. It is possible for a polygon to contain more than one label point. However, only one of the label points is used to assign the User-ID to the polygon. Therefore, it is possible for the other label point to have a different User-ID than the polygon, which can cause confusion during attribute editing. For example, if you select a polygon with multiple label points via its User-ID and list the selected feature with WHO, two labels will blink – each with different User-IDs. Then, if you list the PAT values, you will see the same attributes listed for two label points:

```
[Arcedit] EDITCOVERAGE SEATTLE
The edit coverage is now SEATTLE
```

```
[Arcedit] EDITFEATURE LABEL
3364 element(s) for edit feature LABEL
[Arcedit] SELECT SEATTLE_ID = 1465
2 element(s) now selected
[Arcedit] WHO
Label 2462 User-ID: 1465 Symbol: 33 ( 2106.472611,   4719.001003)
Label 2463 User-ID: 1502 Symbol: 33 ( 2108.681492,   4719.001621)

: LIST
$RECNO                =  2462
AREA                  =       339038.750
PERIMETER             =         5515.213
SEATTLE_              =      2462
SEATTLE_ID            =      1465
TRACT                 =       45
COUNTY                =  KING
$RECNO                =  2463
AREA                  =       339038.750
PERIMETER             =         5515.213
SEATTLE_              =      2463
SEATTLE_ID            =      1465
TRACT                 =       45
COUNTY                =  KING
```

Because of this problem, edited attributes may not be correctly assigned to polygons containing multiple label points. If your coverage has multiple label points, you must remove the extra label points before editing attributes for those polygons.

Chapter 9 Editing coordinates

Editing coordinates

9 PC ARCEDIT has excellent coordinate editing capabilities which let you perform a number of editing operations on features. Once you have selected a set of features to edit, you can issue one command to perform the desired editing action, such as MOVE, COPY, ROTATE or DELETE. Each edit is shown graphically on the screen as the change is made. After an edit is performed, the edited features become the selected set of features. This means that you can perform any number of editing operations on the same selected set without having to select a set of features each time.

The commands which perform editing actions have very simple usages. Most often, you can issue a command without arguments to

perform editing actions; and you can often enhance the editing operation using special command arguments.

Each session operates on a copy of your coverage; the original coverage is not changed until you SAVE your edits. PC ARCEDIT also keeps track of every operation. This means that you can recover from errors made during a session by restoring deleted features.

You can edit arcs, labels, tics, nodes and annotation. These feature classes can be edited using the same basic editing commands and procedures. A different process, however, is used when the edit feature is node. The only command discussed in this chapter that can be used to edit nodes is the MOVE command. In addition, this chapter also presents arc-specific editing operations such as RESHAPE, SPLINE and SPLIT. There are a number of advanced editing commands presented in other chapters. Here is a guide on where else to look:

The chapter 'Adding coverage features' includes a description of adding new features and copying features between coverages.

The chapter 'Editing feature attributes' describes how to edit feature attributes.

The chapter 'Editing annotation' describes how to add and edit annotation, including how to use some of the special annotation editing operations such as rotating annotation text and positioning text along arcs.

Basic editing commands

The following basic editing commands are described in this chapter:

DELETE	deletes selected features.
MOVE	moves selected features to a new location.
ROTATE	rotates selected features around a specified pivot point.
UNDELETE	restores deleted features.

These commands can be classified into two groups based upon their types of editing actions. DELETE, MOVE and ROTATE edit selected features, while UNDELETE corrects user mistakes.

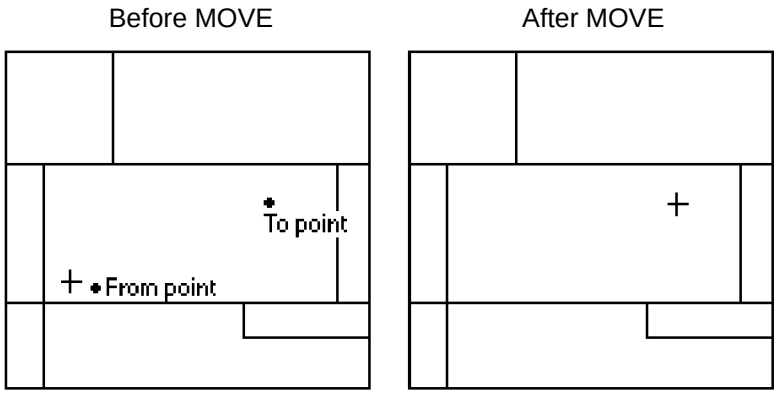
Using MOVE

This example demonstrates the basic use of the MOVE command. First select the features to be moved using any combination of selection methods.

```
[Arcedit] SELECT USA_ID = 24
1 element(s) now selected
```

Enter the MOVE command. You will be prompted for two locations: a point to move from and a destination point. Enter these points with the current COORDINATE input device. MOVE calculates the relative distance and direction between these two points and then moves the selected features accordingly.

```
[Arcedit] MOVE
Point to the coordinate to move from
Point to the coordinate to move to
1 label(s) moved
```



The moved features still make up the selected set. So, you can perform other edits on the same features without having to select them again.

Moving node features

One special edit feature class (node) requires a different editing procedure. Nodes cannot be selected like other features. You can only move them with the MOVE command. However, a different prompt appears. The procedure for moving nodes is as follows:

```
[Arcedit] EDITFEATURE NODE
123 element(s) for edit feature NODE
[Arcedit] MOVE
Point to the node to move (9 to Quit)
```

Point to the node to be moved and press any alphanumeric key. The x,y coordinates of the selected node are displayed along with a selection menu:

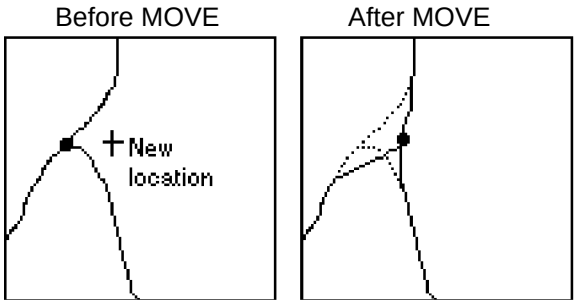
```
Node (25.377629,9.709999) selected
1 = Select  2 = Next  3 = Who  4 = Restart  9 = Quit
```

Press the 1 key to confirm your selection.
Press the 2 key to select the next node within the edit distance.
Press the 3 key to display the currently selected node.
Press the 4 key to start the process over (you will be prompted to select another node).
Press the 9 key to quit moving nodes.

Once the node to be moved is selected with the 1 key, the following prompt will appear:

```
Point to where to move the node (9 to Quit)
```

Position the cursor at the location where you want the selected node moved to, and press any alphanumeric key. The selected node will then be moved to the indicated position.



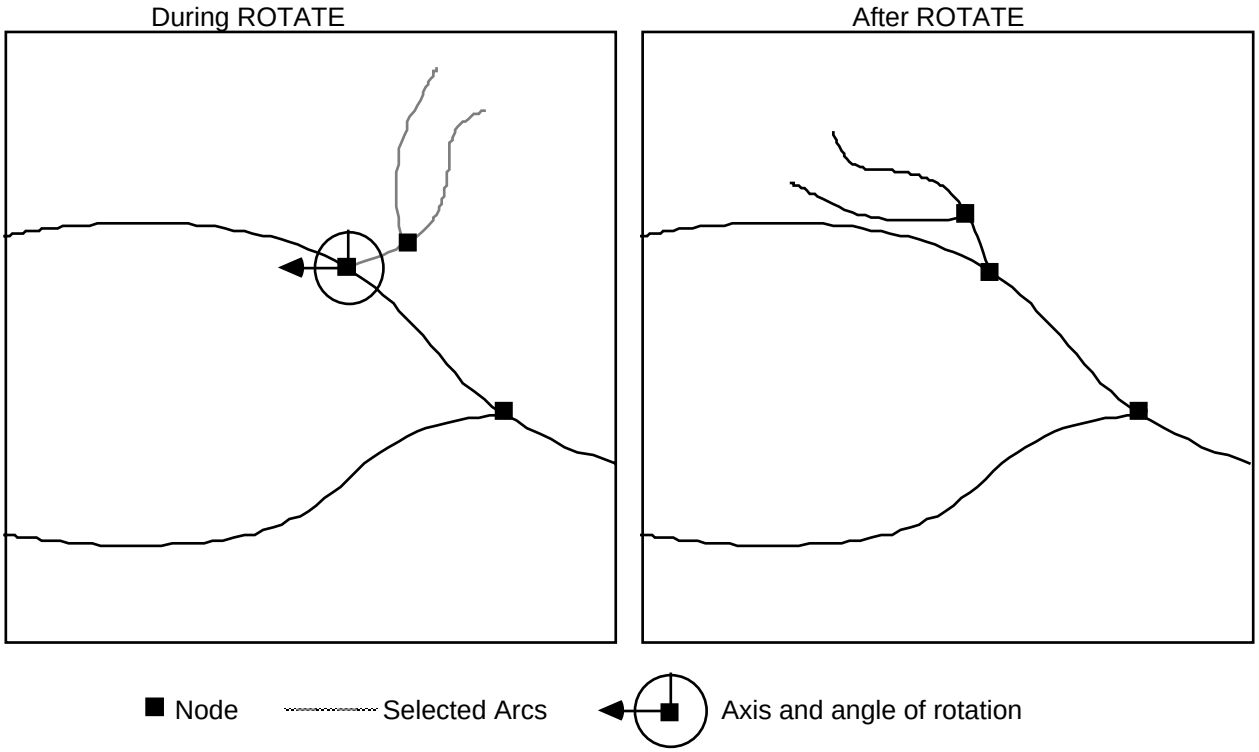

```
Moved node (25.377629,9.70999) to (25.455017,10.005359)
```

Using ROTATE

The ROTATE command will rotate selected features around a pivot point. You can specify the desired rotation angle with the SETANGLE command, or you can let ROTATE prompt you to digitize the rotation angle. Positive angles represent counterclockwise rotation, and negative angles represent clockwise rotation. When PC ARCEDIT first begins, the default SETANGLE is set to 0.

When SETANGLE is 0, ROTATE will prompt you to enter the rotation angle. If SETANGLE is other than 0, the selected features will be rotated using the specified angle.

ROTATE will first prompt you to enter a pivot point and, if necessary, the rotation angle. For example,


During ROTATE
After ROTATE
Node
Selected Arcs
Axis and angle of rotation

Using DELETE

The DELETE command can be used to remove features from the edit coverage. DELETE does not require any arguments and will delete all currently selected features. For example,

```
[Arcedit] EDITFEATURE LABEL
5 element(s) for edit feature LABEL
[Arcedit] SELECT ALL
5 element(s) now selected
[Arcedit] DELETE
5 label(s) deleted
```

The deleted features will also be removed from the graphic display if GRAPHIC is ON.

Correcting edit errors with UNDELETE

To help you undo mistakes made during a session, PC ARCEDIT provides the UNDELETE command. UNDELETE restores features which were changed or deleted. UNDELETE has three possible usages: UNDELETE without any arguments, UNDELETE ALL and UNDELETE with a logical expression.

UNDELETE without any arguments restores only those features that were just deleted with the DELETE command. UNDELETE ALL restores any feature of the current edit feature class that was changed or deleted since the beginning of the session or the last SAVE. Restoration is not limited to features that were explicitly deleted. The features which are to be restored must be contained within the current map extent. As each feature is restored, it is drawn on the graphic display. Information about the feature, as well as a menu of options, is displayed. For example,

```
[Arcedit] EDITFEATURE ARC
23 element(s) for edit feature ARC
[Arcedit] UNDELETE ALL
Arc 24 User-ID: 1 Symbol: 1 Points = 2
Keep this arc (Y/N/Q/R):
```

The options (Y/N/Q/R) operate as follows:

Y - restore this feature.
N - don't restore this feature.

Q - don't restore this feature or any other remaining changed or deleted features. Quits the UNDELETE command.
R - restore this feature and all other previously changed or deleted features without additional prompting.

UNDELETE ALL continues to restore features and to prompt for an option until **Q** or **R** are entered.
If there are features you wish to restore from another feature class, change the edit feature to the desired class; then enter UNDELETE ALL to begin the restoration process. Note that only those features contained within the current map extent are restored.

UNDELETE with a logical expression restores any feature of the current edit feature class that was changed or deleted since the beginning of the session or the last SAVE that satisfies the criteria specified in the logical expression. Restoration is not limited to features that were explicitly deleted. For example, to restore all of the arcs with a length greater than 5, enter the following logical expression:

```
[Arcedit] UNDELETE LENGTH GT 5
```

where LENGTH is the item in the AAT, GT is a logical operator, and 5 is the value to be operated upon. Each deleted arc that meets this criteria is restored. You can combine several logical expressions using the keywords AND, OR and XOR. For example,

```
[Arcedit] UNDELETE LENGTH GT 5 AND DEPTH GT 3
```

Pseudo items may be used in the logical expression. See the chapter 'Selecting features to edit' for additional details on specifying logical expressions.

Turning graphics off during feature editing

Execution time can be lengthy for some editing operations because of the time required for display. For example, if you wanted to GET 1,000 arcs from another coverage, you may not want to wait for them to be displayed on your screen while they are copied. A special command named GRAPHICS can be used to turn graphics off during some editing operations:

```
[Arcedit] GRAPHICS OFF
[Arcedit] GET STREETS
Copying the arcs from STREETS
 into CITY...
1000 arc(s) copied to CITY
[Arcedit] GRAPHICS ON
[Arcedit] MAPEXTENT *
Define the box
[Arcedit] DRAW
```

Once the arcs are copied, graphics can be turned back on and editing continued.

Special arc coordinate editing functions

As the feature most often used to represent map elements, arcs present special editing problems. Arcs represent lines and polygon boundaries. Arcs have both a location and a shape, which may often be complex. The goal in digitizing arcs is to perfectly overlay lines on the map manuscript being digitized. Because of these special needs, a number of arc-specific editing tools have been developed. The majority of these commands can be used to make an arc exactly follow an arc on a map or in another coverage.

Creating and editing arcs in PC ARCEDIT is similar in many respects to handling other coverage features. For example, arcs, like other features, can be selected, deleted, copied, and so on. There are, however, a number of concepts and capabilities unique to arcs.

The purpose of the following sections is to introduce the special arc editing capabilities, including arc processing tolerances, arc editing functions and procedures used. However, this section does not describe in detail the steps required to use any individual command. Consult the command references section for additional details on any particular command.

Steps for editing arc coordinates

There are four basic steps required to perform arc-specific editing functions. This set of steps is based on the assumption that the device environment and edit coverage have been specified.

Step 1. Specify ARC as the edit feature.

Step 2. Select the arc(s) to be edited.

Step 3. Set any required tolerances.

Step 4. Perform the edit action.

Step 1

Specify ARC as the edit feature

Use the EDITFEATURE command to specify arc as the feature to be edited. The EDITFEATURE command will display the total number of arcs in the edit coverage and signifies that all following operations will be directed toward arcs:

```
[Arcedit] EDITFEATURE ARC
281 element(s) for edit feature ARC
```

Step 2

Select the arc(s) to be edited

Whether one or more arcs can be selected prior to issuing the coordinate editing command depends on the particular editing function being invoked. The arc coordinate editing commands could be divided into two groups according to the selected set when the command is issued.

The first group of commands requires that only one arc be selected. This group includes RESHAPE, SPLIT and VERTEX.

The second group of commands allows you to have any number of arcs selected and performs the editing operation on the set simultaneously. The majority of arc coordinate editing commands can be used in this way. These include: SPLINE and UNSPLIT.

See the chapter 'Selecting features to edit' for details on selecting coverage features. Note that either graphical selection or logical selection based upon arc attributes can be employed to select arcs for coordinate editing. For example,

Selecting features by graphic means:

```
[Arcedit] COORDINATE CURSOR
[Arcedit] EDITFEATURE ARC
281 element(s) for edit feature ARC
```

```
[Arcedit] SELECT MANY
1 = Select    2 = Next    3 = Who    9 = Quit
Arc 100 User-ID: 100 with 8 points selected
1 = Select    2 = Next    3 = Who    9 = Quit
1 element(s) now selected
```

Selecting features by logical selection:

```
[Arcedit] EDITFEATURE ARC
678 element(s) for edit feature ARC
[Arcedit] SELECT ROAD_TYPE = 56
236 element(s) now selected
```

Step 3

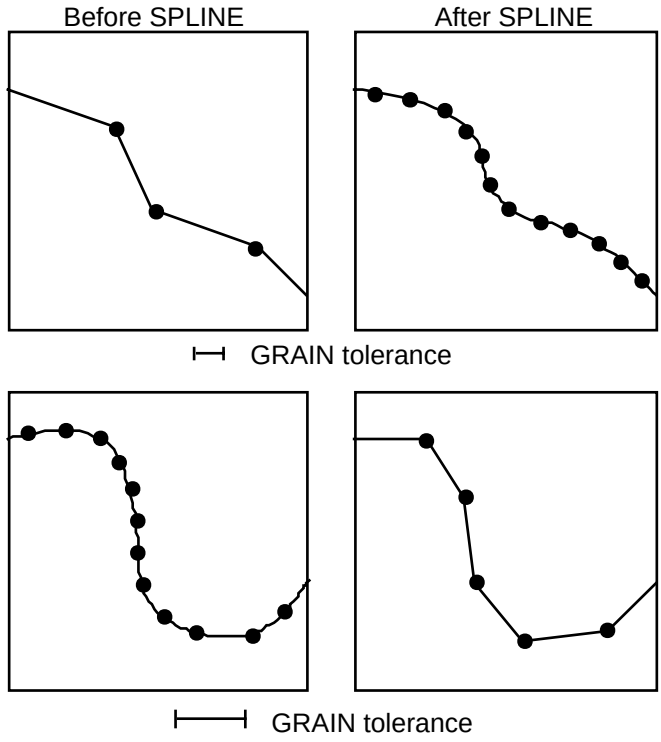
Set any required tolerances

A number of tolerances and settings can be used in arc coordinate editing. The tolerances used and the commands that use them are detailed below. The tolerances and their uses are fully described in the appropriate command reference.

Grain tolerance

The grain tolerance controls the distance between vertices when you add an arc with a curve in it, add a circle, or spline an arc during ADD. The SPLINE command uses the grain tolerance to generalize or smooth selected arcs. The grain tolerance is set with the GRAIN command. For example,

```
[Arcedit] GRAIN 20
[Arcedit] SPLINE
```



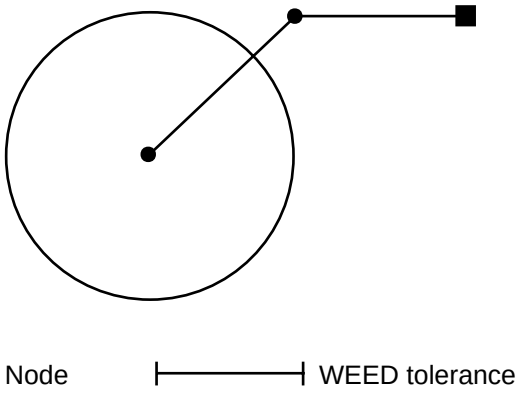
Weed tolerance

The weed tolerance controls the minimum allowable distance between vertices on an added arc. A vertex cannot be added if the distance between it and the previous vertex is less than the weed tolerance. This can be used to prevent an arc from being digitized with more points than are required to accurately represent it. The weed tolerance is set with the WEED command. For example,

```
[Arcedit] WEED 20
or
[Arcedit] WEED *
Enter 2 points defining the distance
```

When the * option is specified, the current COORDINATE input device is used to enter two points, the difference between them becomes the WEED tolerance.

The circle represents the WEED tolerance. The next vertex added must be outside the circle.



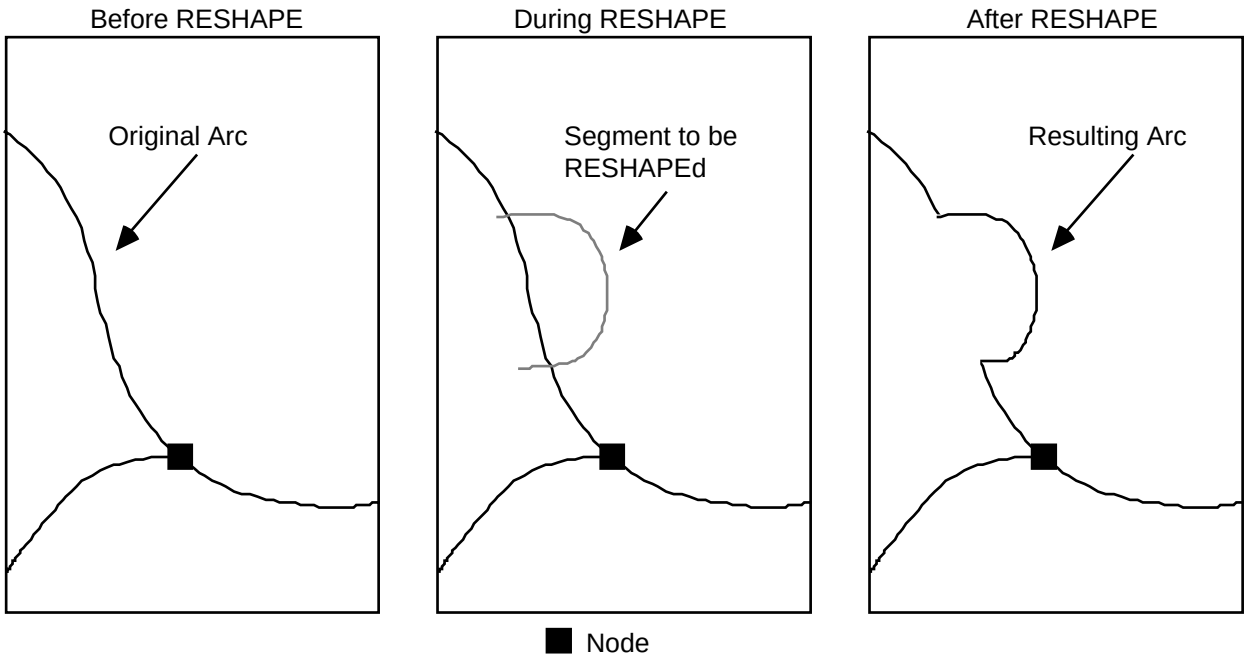
Step 4

Perform the edit action

Following is a brief description of each special arc editing command and an example of each.

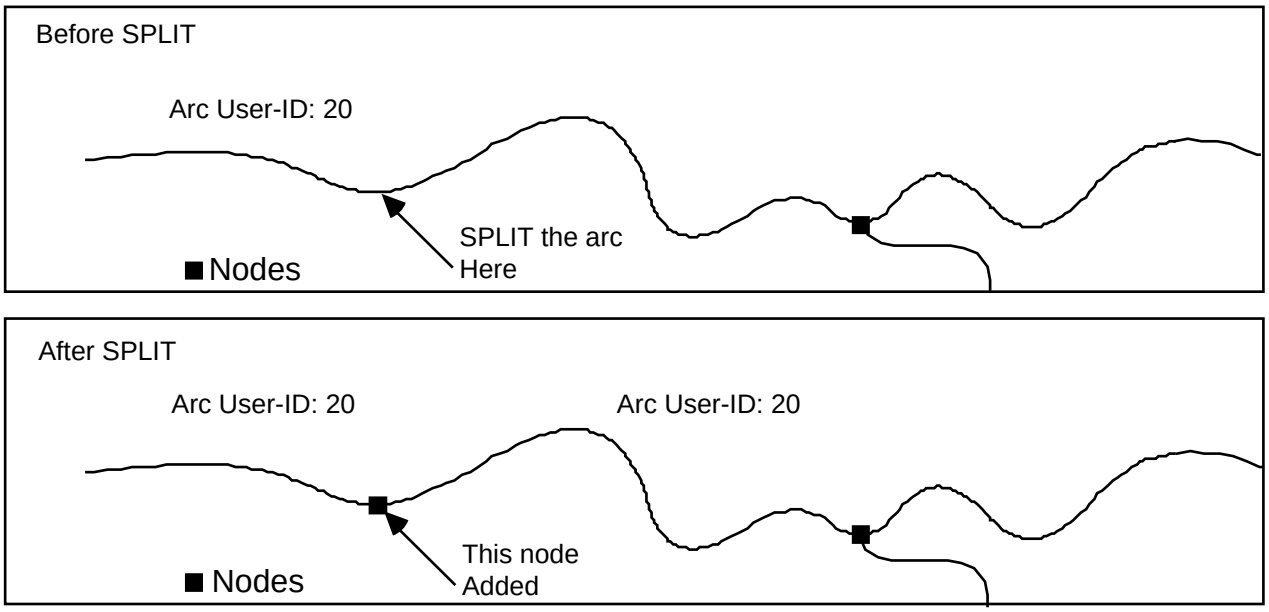
RESHAPE

The RESHAPE command can be used to alter the shape of a selected arc. The existing portion is replaced by the digitized portion. RESHAPE is useful when you want to change a small portion of a long, detailed arc. Note that only one arc can be selected when RESHAPE is issued. The selected arc can be reshaped in the middle or at either end.


Before RESHAPE
During RESHAPE
After RESHAPE
Original Arc
Segment to be RESHAPEd
Resulting Arc
Node

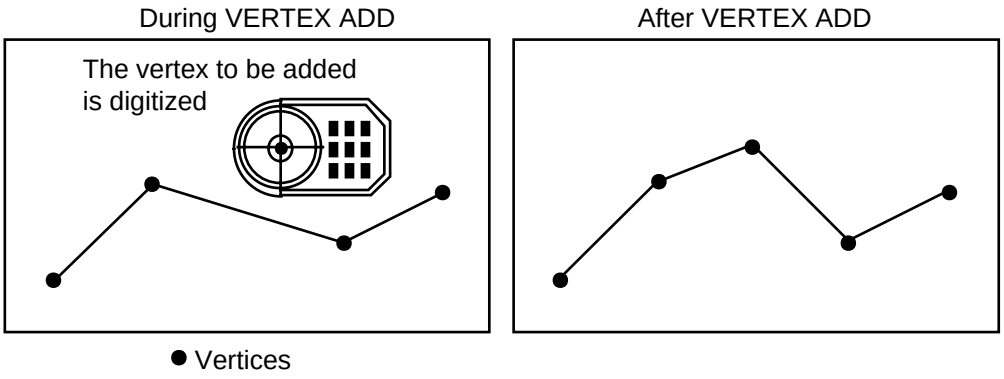
SPLIT

The SPLIT command can be used to divide a selected arc into two arcs. The resulting arcs have the same User-ID and attributes as the original arc. The split point becomes a pseudo node. SPLIT can be useful to delete only a portion of an arc and to create a new intersection point to which other arcs will connect. Only one arc can be selected when the SPLIT command is issued.



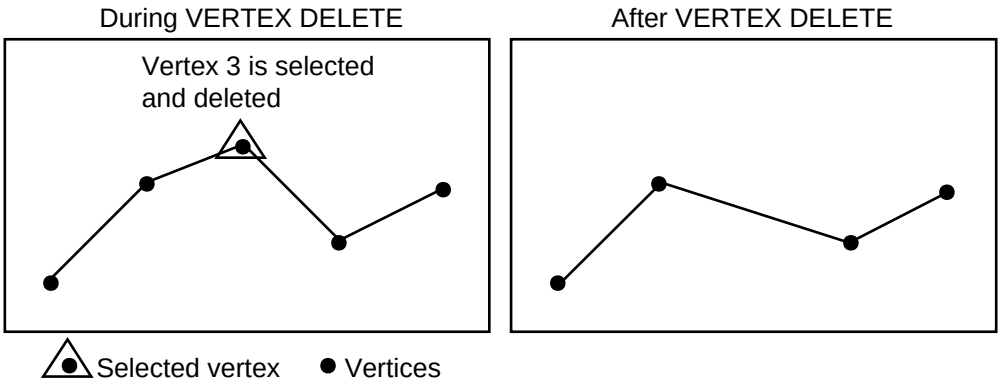
VERTEX ADD

The VERTEX ADD command can be used to add vertices to a selected arc. This function can be useful for selectively changing the shape of a selected arc. Only one arc can be selected when the VERTEX ADD command is issued.



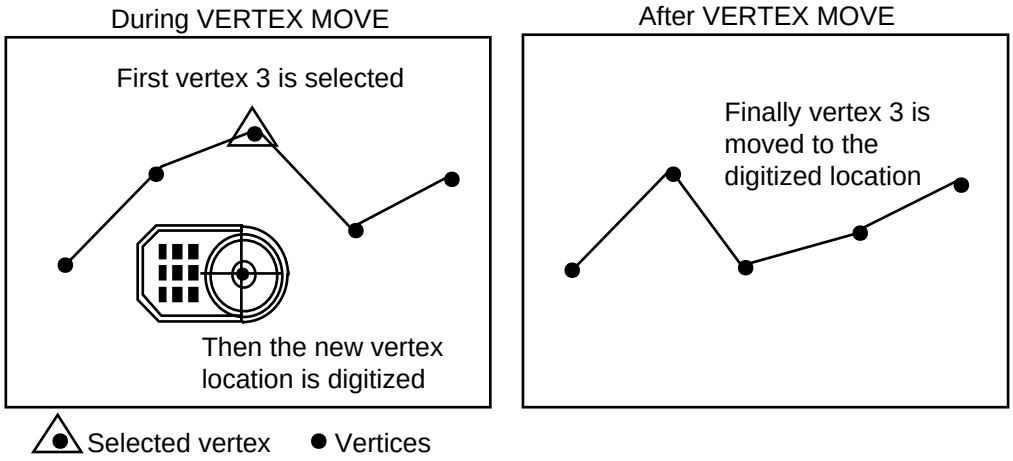
VERTEX DELETE

The VERTEX DELETE command can be used to delete vertices from a selected arc. This capability can be particularly useful for removing mistakenly digitized vertices without redigitizing the entire arc and for selectively generalizing an arc. Only one arc can be selected when the VERTEX DELETE command is issued.



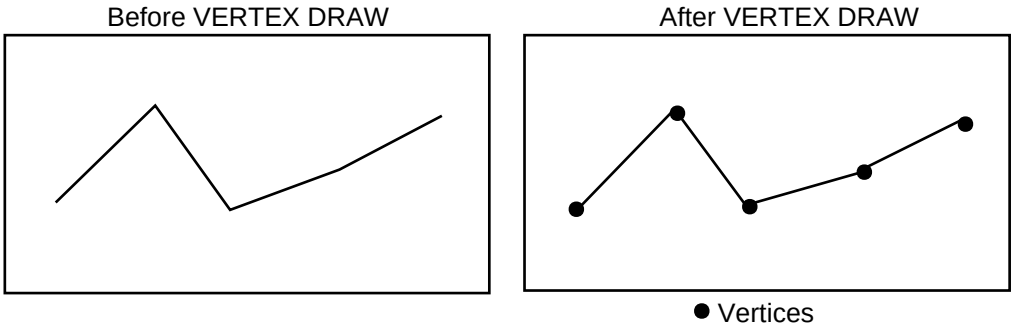
VERTEX MOVE

The VERTEX MOVE command can be used to move vertices within an arc. This command allows maximum flexibility in coordinate editing of a selected arc. Vertices can be moved to any location and still retain their association to the other vertices on the arc. Only one arc can be selected when the VERTEX MOVE command is issued.



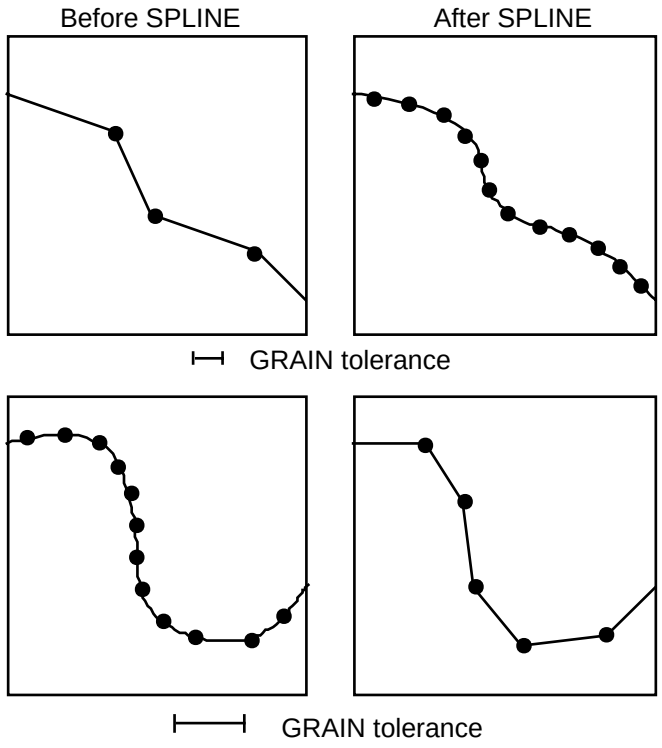
VERTEX DRAW

VERTEX DRAW can be used to graphically display the vertices of a selected arc. This can be quite useful in conjunction with the other VERTEX commands. Once arc vertices are highlighted with VERTEX DRAW, they can be identified and edited individually with the VERTEX DELETE and VERTEX MOVE commands. Only one arc can be selected when the VERTEX DRAW command is issued. Vertices are drawn using the current marker symbol specified by the current setting of SETDRAWSYMBOL.



SPLINE

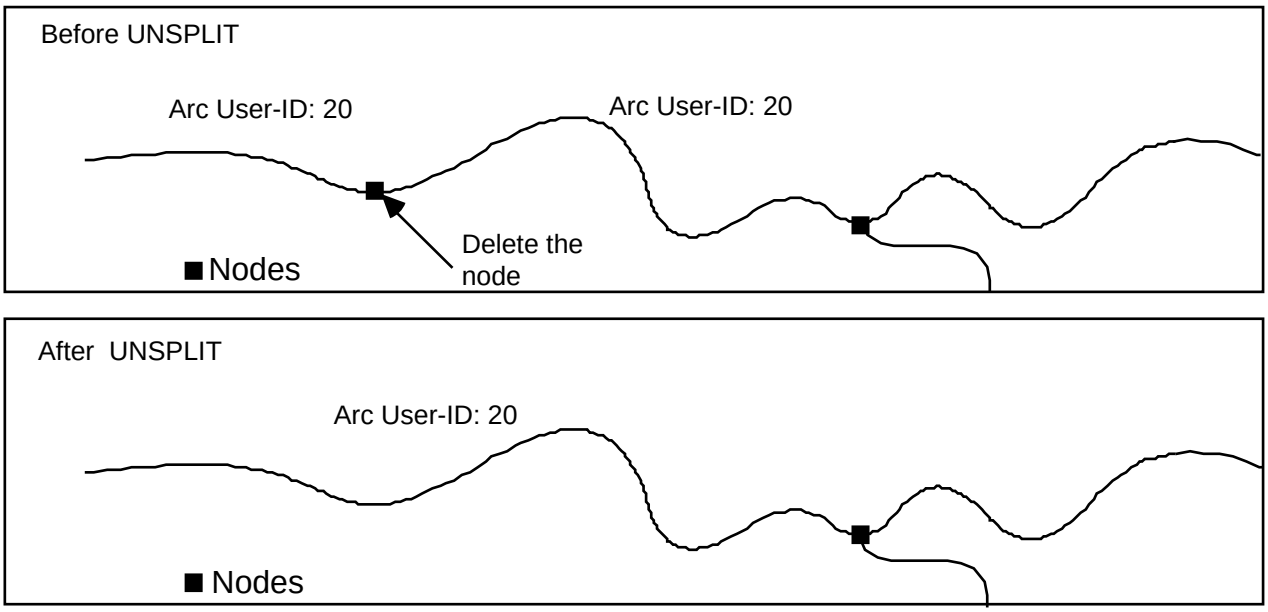
SPLINE can be used to smooth or generalize selected arcs based upon the grain tolerance. This is useful for smoothing the shape of jagged arcs. SPLINE will also reduce the number of vertices used to represent an arc if the grain tolerance is greater than the spacing between the vertices on the selected arc.



The SPLINE command uses an equation to fit a curve through the vertices on the arc. Then, new vertices are added at the specified grain tolerance along the selected arc. The arc can potentially change its shape.

UNSPLIT

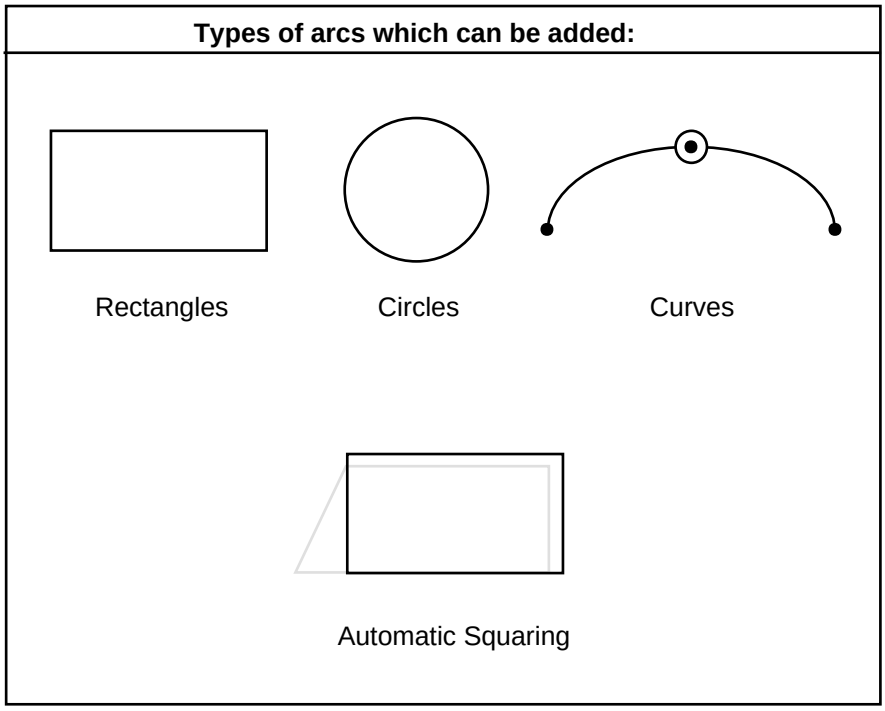
UNSPLIT can be used to join a number of arcs separated by pseudo nodes into one continuous arc. The arcs to be joined must all have the same User-ID. After UNSPLIT, the resulting arc will have the attributes of the arc with the lowest record number.



Special capabilities for adding arcs

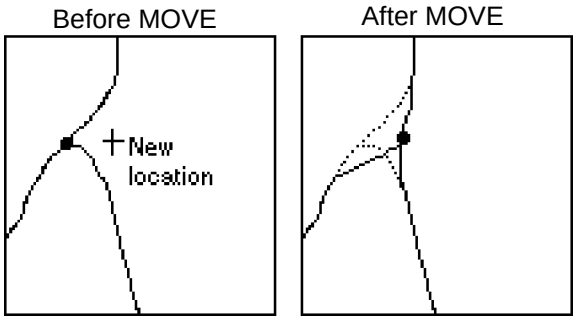
The ADD command has a number of special functions for adding arcs. Arcs can be added as lines, curves, circles and rectangles. Additionally, arcs can be squared or splined while they are added. See the ADD command reference for details on adding arcs.

In addition to line segments used to define arcs, all of these shapes can be created.



Node feature editing

Arcs can also be edited by moving nodes. See 'Moving node features' in this chapter for a discussion of node editing operations.



Effects on the selected set after an edit operation

As a general rule, the same set of features remain selected after an edit operation as before the edit operation. This allows a series of operations to be performed on the same set of selected features. For example, a set of arcs could be selected, their attributes edited with CALCULATE and MOVEITEM, then the features could be moved to another location without having to reselect them between edits.

Here are some exceptions:

- Features are added to the selected set when an arc is split with the SPLIT command
- New features become the selected set when a COPY is performed
- After UNSPLIT, the resulting arc is selected

Matching arcs along the adjacent sides of two coverages

EDGEMATCH is an [ARC] level command used to interactively match adjacent sides of two coverages. The command uses a 'rubber sheeting' algorithm to move coverage coordinates. Because coverage arc coordinates will change when EDGEMATCH is used, make a copy of the original coverage if you want to preserve its original form. EDGEMATCH is discussed in the appendix 'Using EDGEMATCH', which includes its usage and command reference.

Chapter 10 Editing feature attributes

Editing feature attributes

10

In PC ARC/INFO®, feature attributes can be created and modified for points, arcs and polygons. PC ARCEDIT contains a number of facilities for editing these feature attributes. Attribute edits can be made to items in feature attribute tables and to special pseudo items which affect feature drawing symbols and annotation characteristics.

PC ARCEDIT is ideal for many types of attribute editing because of its sophisticated selection capabilities. Once you have selected a set of features (either through logical expressions or graphically), you can list and edit their attributes.

This chapter presents the basic attribute editing operations which can be performed in PC ARCEDIT. Additional capabilities are available for transferring attributes between coverages (presented in the chapter 'Adding coverage features') and for modifying annotation characteristics (presented in the chapter 'Editing annotation'). You may also wish to review the use of item values in logical expressions for feature selection presented in the chapter 'Selecting features to edit'.

Commands used to edit feature attributes

The following commands can be used to edit feature attributes:

CALCULATE	calculates and assigns values to an item.
COLUMNS	lists the database item definitions contained within the currently related data file.
FORMS	interactive modification of a selected feature's attribute record or a related database record using an input form.
ITEMS	lists the database item definitions of the feature attribute table for the current edit feature or for the specified database data file.
JOIN	temporarily relates the current feature attribute table to another database data file using a common item.
LIST	displays the attributes of the currently selected features or the records of a specified database data file.
LOOKUP	allows the use of a lookup table to edit attributes based on categories listed in the lookup table.
MOVEITEM	moves the contents of a character string or a source item to a target item in the feature attribute table for the selected features.
TRANSFER	copies the attributes from one feature to another feature.
UPDATE	edits the attributes of a feature.

Steps for editing feature attributes

There are three basic steps required for editing feature attributes. In the steps outlined below, it is assumed that the device environment and edit coverage have already been specified. There should be a feature attribute table for the feature that you will be editing (i.e., the coverage should have been CLEANed or built and any additional item attributes added before editing. Pseudo items can be used to edit symbols and User-IDs.

Step 1. Specify the edit feature.

Step 2. Select features to edit.

Step 3. Perform the attribute edits.

Step 1

Specify the edit feature

Before you can begin editing features, you must specify the feature class you want to edit with the EDITFEATURE command.

If you want to edit arc attributes, you should have an arc attribute table (AAT).

If you will be editing polygon attributes, you should have a polygon attribute table (PAT). Polygon attributes are accessed through the label point located inside the chain of arcs that define the polygon. Therefore, you must specify LABEL as the edit feature.

If you want to edit point attributes, you should have a point attribute table (PAT). Point attributes are also accessed through label points, so LABEL would be specified as the edit feature.

If you want to edit tics, you must specify TIC as the edit feature.

If you want to edit annotation, you must specify ANNOTATION as the edit feature.

Step 2

Select features to edit

The attribute editing commands can be divided into two groups: those commands that work on the selected set and those which are used to interactively select features and edit their attributes in the same operation. The commands that work on the selected set are: CALCULATE, MOVEITEM and LOOKUP. FORMS, UPDATE and TRANSFER are used to interactively select and edit feature attributes as one operation. That is, a single feature's attributes are individually edited as each feature is selected.

The commands that operate on the selected set can be classified according to the item type they are used to edit. The following chart displays the commands that can be used with the different item types:

Item Type		
Numeric	Character	Either
CALCULATE	MOVEITEM	FORMS LOOKUP TRANSFER UPDATE

The chapter 'Selecting features to edit' describes the procedures you can use to select a set of features to edit. The SELECT command is used to initialize a selected set. Then the commands ASELECT, NSELECT, RESELECT and UNSELECT are used to add to or remove features from the selected set.

Step 3

Perform the attribute edits

The following examples demonstrate how the attribute editing commands can be used.

ITEMS

The ITEMS command lists the database item definitions of the feature attribute table for the current edit feature. This can be useful for determining the items to be updated.

The following examples demonstrate the use of the ITEMS command with edit feature ARC and LABEL.

```
[Arcedit] EDITCOVERAGE SEATTLE
The edit coverage is now SEATTLE
[Arcedit] EDITFEATURE ARC
56 element(s) for edit feature ARC
: ITEMS

COLUMN   ITEM NAME       WIDTH   TYPE  N.DEC
     1   FNODE_              11      N      0
    12   TNODE_              11      N      0
    23   LPOLY_              11      N      0
    34   RPOLY_              11      N      0
    45   LENGTH              13      N      6
    58   SEATTLE_ID          11      N      0
    69   SEATTLE_            11      N      0


[Arcedit] EDITFEATURE LABEL
50 element(s) for edit feature LABEL
[Arcedit] ITEMS ITEMS

AREA    PERIMETER    SEATTLE_    SEATTLE_ID
```

LIST

The LIST command can be used to display the attributes of the currently selected features.

This example demonstrates the use of the LIST command to display the attributes of a selected polygon. Polygon attributes are accessed using label points.

```
[Arcedit] EDITCOVERAGE USA
The edit coverage is now USA
[Arcedit] EDITFEATURE LABEL
62 element(s) for edit feature LABEL
[Arcedit] SELECT $ID = 32
1 element(s) now selected

[Arcedit] LIST

$RECNO        =  32
AREA          =            16.776
PERIMETER     =            16.551
USA_          =        33
USA_ID        =        32
FIPS          =         8
NAME          =    COLORADO
POP_83        =      3139.
POP_80        =      2890.
P83_80        =     249.
PCT83_80      =      8.6

[Arcedit] LIST FIPS NAME
  FIPS     NAME
     8     COLORADO
```

JOIN

The JOIN command relates the current feature attribute table with another database data file using an item which is contained in both files. Once the files are joined, attribute editing can be performed on both the feature attribute table and the related file.

The following example shows how an arc attribute table can be related with an ACODE file.

The LIST command lists items from the current feature attribute table and the related file. The items preceded by a pound sign (#) are items contained in the related file.

```
[Arcedit] EDITCOVERAGE DXFCOV
The edit coverage is now DXFCOV
[Arcedit] EDITFEATURE ARC
245 element(s) for edit feature ARC

[Arcedit] ITEMS
COLUMN   ITEM NAME       WIDTH   TYPE   N.DEC
     1   FNODE_              11      N       0
    12   TNODE_              11      N       0
    23   LPOLY_              11      N       0
    34   RPOLY_              11      N       0
    45   LENGTH              13      N       6
    58   DXFCOV_             11      N       0
    69   DXFCOV_ID           11      N       0


[Arcedit] JOIN DXFCOV.ACODE DXFCOV_ID LINEAR
[Arcedit] COLUMNS

COLUMN   ITEM NAME       WIDTH   TYPE   N.DEC
     1   #DXFCOV_ID          11      N       0
    12   #DXF_LAYER          16      C       0
    28   #DXF_COLOR           3      N       0
    31   #DXF_THICKN         13      N       6
    44   #DXF_TYPE           10      C       0
    54   #DXF_CURVE           1      N       0
```

After a JOIN, the LIST command will list both the item values for the selected set for both the current feature attribute table and from a related file.

```
[Arcedit] SEL DXFCOV_ID = 5
       1 element(s) now selected.
[Arcedit] LIST

$RECNO     =        4
FNODE_     =        4
TNODE_     =        9
LPOLY_     =       14
RPOLY_     =        1
LENGTH     =   110.000000
DXFCOV_    =        4
DXFCOV_ID  =        5
#DXFCOV_ID =        5
#DXF_LAYER = LAYER1
#DXF_COLOR = 0
#DXF_THICKN=     1.000000
#DXF_TYPE  =
#DXF_CURVE = 0
```

```
[Arcedit] LIST DXFCOV_ID #DXF_LAYER  #DXF_COLOR
DXFCOV_ID   #DXF_LAYER    #DXF_COLOR
        5   LAYER3        6
```

COLUMNS

The COLUMNS command lists the database item definitions of the currently related database data file. This can be useful for determining the items to be updated.

The following examples demonstrate the use of the COLUMNS command to list items in an ACODE file which is related with an AAT.

```
[Arcedit] EDITCOVERAGE DXFCOV
The edit coverage is now DXFCOV
[Arcedit] EDITFEATURE ARC
245 element(s) for edit feature ARC
[Arcedit] ITEMS

COLUMN   ITEM NAME       WIDTH   TYPE   N.DEC
     1   FNODE_              11     N       0
    12   TNODE_              11     N       0
    23   LPOLY_              11     N       0
    34   RPOLY_              11     N       0
    45   LENGTH              13     N       6
    58   DXFCOV_             11     N       0
    69   DXFCOV_ID           11     N       0


[Arcedit] JOIN DXFCOV.ACODE DXFCOV_ID LINEAR
[Arcedit] COLUMNS

COLUMN   ITEM NAME       WIDTH   TYPE   N.DEC
     1   #DXFCOV_ID          11     N       0
    12   #DXF_LAYER          16     C       0
    28   #DXF_COLOR           3     N       0
    31   #DXF_THICK          13     N       6
    44   #DXF_TYPE           10     C       0
    54   #DXF_CURVE           1     N       0

: COLUMNS ITEMS

#DXFCOV_ID   #DXF_LAYER   #DXF_COLOR   #DXF_THICKN
#DXF_TYPE    #DXF_CURVE
```

CALCULATE

The CALCULATE command requires a target item and an arithmetic expression. The target item specifies the item in the feature attribute table or a related file to which values are assigned. An equal sign (=) is used to separate the two sides of the

CALCULATE equation. Note that a space must precede and follow the = sign. An arithmetic expression defines a computation to be performed for every selected record. The result of the arithmetic expression is then assigned to the target item. The format of the expression is:

```
target_item = operand  operator  operand
```

An operand can be a numeric item name, a constant, or an SML variable. The operator is a 1- or 2-character keyword that defines the operation to be performed on the operands. Operators and their functions are listed below.

Operator	Description
**	Exponentiation
*	Multiplication
/	Division
+	Addition
-	Subtraction
LN	Logarithm
WD	Width (of a character string)

To calculate the population density of polygons in a coverage for an existing item called POPDENSITY, use the following procedure:

Select the label points of the polygons for which you wish to calculate the population density. The PAT file for the label points contains items defined for the POPULATION and AREA of each polygon, as well as a new item, POPDENSITY. Use the following command to perform the calculation:

```
[Arcedit] CALCULATE POPDENSITY = POPULATION / AREA
```

where POPDENSITY, POPULATION and AREA are items in the PAT file. For each selected label point, the population density is calculated and inserted into the POPDENSITY item.

To change the item value for the VOLUME for arcs representing rivers, select the arcs which are to receive the same value, then enter the CALCULATE command:

```
[Arcedit] CALCULATE VOLUME = 5.5
```

All currently selected arcs now have the value of 5.5 for the item VOLUME.

To calculate the total number of vehicles using a road in a day, given the volume of cars and the volume of trucks, select the arcs which are to have the total number of vehicles calculated, then enter:

```
[Arcedit] CALCULATE TRAFFIC = ( CVOL * 24 ) + ( TVOL * 24 )
```

CVOL is the item containing the average number of cars passing a certain point in an hour.
TVOL is the item containing the average number of trucks passing a certain point in an hour.

TRAFFIC is an item which will contain the value calculated in the arithmetic expression.

MOVEITEM

The MOVEITEM command can be used to assign values to character items. MOVEITEM moves the contents of a character string or a source item to a target item in the feature attribute table or related file for the selected features (see the MOVEITEM command reference).

This example demonstrates how the MOVEITEM command can be used to change the value of the character item NAME.

```
[Arcedit] EDITFEATURE LABEL
67 element(s) for edit feature LABEL
[Arcedit] SELECT
Point to the feature to select
Label 72 User-ID: 12 (32.97362,18.08949) selected
1 element(s) now selected
[Arcedit] LIST NAME
NAME
PENNSYLVANIA
```

The value of NAME can be changed from PENNSYLVANIA to COLORADO using MOVEITEM.

```
[Arcedit] MOVEITEM 'COLORADO' TO NAME
```

```
[Arcedit] LIST NAME
NAME
COLORADO
```

MOVEITEM can also be used to assign the value of one character item to another character item.

```
[Arcedit] EDITFEATURE LABEL
191 element(s) for edit feature LABEL
[Arcedit] ITEMS

COLUMN   ITEM NAME        WIDTH   TYPE  N.DEC
     1   AREA                 13      N      6
    14   PERIMETER            13      N      6
    27   WELLS_               11      N      0
    38   WELLS_ID             11      N      0
    49   CITY                 20      C      0
    69   COUNTY               20      C      0
    89   STATE                20      C      0

[Arcedit] SELECT ONE
Point to the feature to select
Label 17 User-ID: 17 (602967.5,1043557) selected
1 element(s) now selected
: LIST CITY, COUNTY
CITY                COUNTY
SCHENECTADY
```

The value of CITY can be placed into COUNTY using the MOVEITEM command.

```
[Arcedit] MOVEITEM CITY TO COUNTY
[Arcedit] LIST CITY, COUNTY
CITY                COUNTY
SCHENECTADY         SCHENECTADY
```

LOOKUP

The LOOKUP command can be used to assign values to both character and numeric items. LOOKUP allows the use of a lookup table to edit attributes based on categories listed in the lookup table. At a minimum, you must specify the name of the item in the feature attribute table or related file to be edited, the target item, and the name of the source item whose values will be copied to the target item.

If a lookup table is specified, the source item is the item in the lookup table whose values will be copied to the target item. The

lookup table is a database data file. The lookup table must contain at least the relate item and the source item. See the PC ARC/INFO on-line help for information about creating lookup tables. A relate item must be specified if a lookup table is used. The relate item is the item to be used as the key to the feature attribute table or related file. The relate item must exist in both the feature attribute table and the lookup table.

Consider the following example. An item named VELOCITY in a line coverage's attribute table contains the values for the velocity of each stream segment in feet per second. Character descriptions of the streams are to be added to the feature attribute table in an item called SPEED based on the velocity of the streams.

Originally, the attribute table looked like this:

```
[Arcedit] LIST VELOCITY SPEED
VELOCITY  SPEED
     .9
    1.2
    6.8
    5.8
    1.5
    3.7
    2.5
    4.0
    4.9
     .9
    3.2
```

Descriptions of the streams will be based on the following criteria:

- Streams flowing at less than or equal to 2.0 feet per second will be described as 'SLOW'
- Streams flowing at greater than 2.0 and less than or equal to 4.0 feet per second will be described as 'MEDIUM'
- Streams flowing at greater than 4.0 feet per second will be described as 'SWIFT'

A lookup table, STREAMS.LUT, is created which contains these items:

```
VELOCITY  DESCRIPTION
   2.0      SLOW
```

```
4.0      MEDIUM
6.8      SWIFT
```

The item VELOCITY is the relate item and exists in both the lookup table and feature attribute table or related file. The item DESCRIPTION is the source item. LOOKUP reads the lookup table as follows: any feature that has a velocity less than or equal to 2.0 feet per second receives the 'SLOW' description; any feature that has a velocity greater than 2.0 and less than or equal to 4.0 feet per second receives a 'MEDIUM' description; any feature that has a velocity greater than 4.0 feet per second receives a 'SWIFT' description.

The LOOKUP command is entered as follows:

```
[Arcedit] LOOKUP SPEED DESCRIPTION STREAMS.LUT VELOCITY
```

where SPEED is the target item in the edit coverage's feature attribute table or related file, DESCRIPTION is the source item in the lookup table, STREAMS.LUT is the name of the lookup table, and VELOCITY is the relate item contained in both the feature attribute table and the lookup table.

After the LOOKUP operation is completed, the feature attribute table will look like this:

```
[Arcedit] LIST VELOCITY SPEED
VELOCITY    SPEED
      .9    SLOW
     1.2    SLOW
     6.8    SWIFT
     5.8    SWIFT
     1.5    SLOW
     3.7    MEDIUM
     2.5    MEDIUM
     4.0    MEDIUM
     4.9    SWIFT
      .9    SLOW
     3.2    MEDIUM
```

FORMS

The FORMS command allows you to edit all or part of a feature's attribute record, or attributes in a related file, through the use of a popup input form. When using forms, the desired features are

selected interactively. The FORMS command uses options similar to the SELECT MANY command.

```
1 = Select   2 = Next   3 = Who   4 = Change   9 = Quit
```

Select a feature using 1, and then use the 4 key to display the feature attribute record in the popup form. The form allows each item to be edited. The update of the feature's attribute record occurs when the Update record button is selected at the bottom of the form. The Abort update button can be selected to leave the popup form without updating the feature attribute record.

The FORMS command is useful for adding attributes to particular features or assigning new User-IDs after a map has been digitized.

The following examples demonstrate the use of the FORMS command to edit a polygon attribute table.

First specify the feature to be edited:

```
[Arcedit] EDITFEATURE LABEL
67 element(s) for edit feature LABEL
```

List the items contained in the feature attribute table:

```
[Arcedit] ITEMS

COLUMN   ITEM NAME     WIDTH    TYPE  N.DEC
     1   AREA              13       N      6
    14   PERIMETER         13       N      6
    27   LANDUSE_          11       N      0
    38   LANDUSE_ID        11       N      0
    49   CLASS             11       N      0
    60   TYPE              11       N      0
```

The items that are to be edited are CLASS and TYPE. It is also useful to see the User-ID of the features being updated, so the FORMS command is entered as follows:

```
[Arcedit] FORMS LANDUSE_ID CLASS TYPE

1 = Select   2 = Next   3 = Who   4 = Change   9 = Quit
```

The above menu will then appear. Use the numbers (1, 2, 3, 4 or 9) to enter the desired option. After you enter the FORMS command, position the cursor at the location of the feature whose values you wish to edit and press the 1 key. The feature selected will then flash, and its record number and User-ID will appear in the dialog area. To pop up the attribute update form, press the 4 key. Press the 9 key to quit the FORMS command.

The 1 key is pressed to select label 22.

```
Label 22 User-ID: 22 (21.546497,15.665543) selected
```

The 4 key is then pressed to pop up the feature attribute update form.

```
LANDUSE_ID          2
CLASS               3
TYPE


Abort update
Update record   22
```

The values of LANDUSE_ID, CLASS and TYPE can be edited by highlighting them and entering the new information. To perform the update, move the cursor to the `Update record` button and hit any key or a mouse button. `Abort update` can be chosen to exit the popup form without changing the feature attribute record.
The 9 key is pressed to quit FORMS. Immediately after using FORMS, the last selected feature is the selected set.

UPDATE

UPDATE works much like CALCULATE or MOVEITEM except that the desired features are selected interactively during UPDATE. CALCULATE manipulates features already selected or features to be added. For feature selection, UPDATE uses the same options as the SELECT MANY command:

```
1 = Select    2 = Next    3 = Who    9 = Quit
```

As each feature is selected, the value of the target item is changed to the value or character string. The target item and its new value are

then displayed. The actual update of the target item occurs when the next feature is selected with the 1 key or when the 9 key is entered.

One useful application of the UPDATE command is to control the assignment of User-IDs to features after a map has been digitized. To UPDATE arc User-IDs, you can enter:

```
[Arcedit] EDITFEATURE ARC
162 element(s) for edit feature ARC
[Arcedit] UPDATE
Usage: UPDATE [target_item] ['character_string' / value]
       {value_increment}
[Arcedit] UPDATE $ID 1 1
```

Then select each arc in the coverage by positioning the cursor at a location on the arc. Since the {value_increment} option is on, the first arc selected will receive User-ID of 1, the second arc selected receives a User-ID of 2, and so on, until the User-IDs for all of the desired arcs have been updated.

This example demonstrates the use of the UPDATE command to change the value of a target item by graphically selecting the features to be updated.

First specify the feature type to be edited.

```
[Arcedit] EDITFEATURE LABEL
613 element(s) for edit feature LABEL
```

List the items contained in the feature attribute table.

```
[Arcedit] ITEMS

COLUMN   ITEM NAME      WIDTH  TYPE  N.DEC
     1   AREA               13     N      6
    14   PERIMETER          13     N      6
    27   LANDUSE_           11     N      0
    38   LANDUSE_ID         11     N      0
    49   CLASS               4     N      0
```

Since all label points that should have a value of 34 for CLASS will be updated, the UPDATE command is entered as follows:

```
[Arcedit] UPDATE CLASS 34
```

The item being updated will be listed with the value which will be assigned to the next feature selected.

```
CLASS = 34

1 = Select    2 = Next    3 = Who    9 = Quit
```

The above menu will then appear. Use the numbers (1, 2, 3 or 9) to select each feature. After you enter the UPDATE command, position the cursor at the location of the first feature whose value you wish to update and press the 1 key. The feature selected will then blink. To actually perform the attribute update, select another feature with the 1 key, or press the 9 key to perform the update and quit the UPDATE command. If an undesired feature blinks when you point at the desired feature, press the 2 key to search for another feature within the edit distance of the entered cursor location. If after pressing the 2 key another undesired feature blinks, you can press the 2 key again to search for the correct feature. You can continue until the correct feature blinks or until the message `No match found` appears, in which case, the cursor is not within the edit distance of the desired feature. Pressing the 2 key immediately after a feature is selected will unselect the feature. The next feature within the edit distance will be chosen. To blink the most recently selected feature, press the 3 key. Press the 9 key to update the last selected feature and quit the UPDATE command.

The 1 key is pressed to select label 22:

```
Label 22 User-ID: 22 (21.546497,15.665543) selected
CLASS = 34
1 = Select    2 = Next    3 = Who    9 = Quit
```

The 1 key is pressed to select label 28. At this time, the value 34 is placed in the item CLASS for label 22:

```
Label 28 User-ID: 28 (24.108743,13.872649) selected
CLASS = 34
1 = Select    2 = Next    3 = Who    9 = Quit
```

The 9 key is pressed to quit UPDATE. The value 34 is placed in the item CLASS for label 28.

Immediately after using UPDATE, the updated features are in the selected set. List the selected features to show that the 34 has been placed in the item CLASS.

```
[Arcedit] LIST

$RECNO          =   68
AREA            =        9.020
PERIMETER       =       12.847
LANDUSE_        =   -22
LANDUSE_ID      =    22
CLASS           =    34

$RECNO          =   69
AREA            =        9.072
PERIMETER       =       14.670
LANDUSE_        =   -28
LANDUSE_ID      =    28
CLASS           =    34
```

TRANSFER

The TRANSFER command can be used to copy the attributes from one feature to another. It can be useful in two ways. One is to match the attribute values of features in a coverage having the same attributes. A second use is to transfer the attribute values of one feature type to the items of another feature type. Attribute transfer can only be performed on label and arc edit feature classes.

When you begin execution of TRANSFER, the following menu will appear on the graphic display:

```
1 = Source   2 = Target   3 = Next   4 = Who   9 = Quit
```

First using the cursor, point to the Source feature whose attributes are to be copied. Press the 1 key to select it. The selected feature will flash on the graphic display. If the wrong feature is selected, press the 3 key to select the next feature within the edit distance of the cursor. Press the 4 key to display the currently selected Source feature. Once the Source feature is selected, identify the feature you want to copy attributes to by pointing the cursor at it and pressing the 2 key. Again, the 3 key can be used to select the next feature within the edit distance of the cursor, if necessary. Press the 4 key to display the currently selected Target feature. Attribute values are copied whenever you begin the process again by selecting a new

Source feature with the 1 key, or by exiting TRANSFER with the 9 key. A message will appear on the graphic display identifying the internal numbers of the feature whose attributes were copied and the feature which received the new attribute values:

```
Transferred attributes for arc 22 to arc 7
```

To copy attributes from a single feature to many features, first copy attributes to a target feature. Then, select the target feature as the new Source by pressing the 1 key. Repeat this process until all desired features have received the attributes. To exit TRANSFER without performing attribute transfer, press the 9 key after selecting a Source feature. If you already have a Target feature selected but do not want to perform attribute transfer, press the 3 key until you receive the message `No match found`. You can then press the 9 key to exit TRANSFER without performing attribute transfer.

Using pseudo items for attribute editing

A number of pseudo items are available for feature attribute editing using any of the attribute editing commands. Here is a list of the available pseudo items and the edit feature classes on which they can be used.

$ID

$ID is another name for the feature User-ID. $ID and User-ID can be used interchangeably. There is one difference. $ID can be used even if a feature attribute table has not yet been created. The following statements are equivalent for a coverage named STREETS:

```
[Arcedit] CALCULATE STREETS_ID = 17
```

```
[Arcedit] CALCULATE $ID = 17
```

Either of these calculate a new User-ID value for selected features equal to 17.

$ID can be used when the edit feature class is arc, label or tic.

$SYMBOL

$SYMBOL is used to calculate a display symbol for the selected edit features. For example, you can change the symbol used to display selected arcs as follows:

```
[Arcedit] LINESET BW
[Arcedit] SELECT BOX
Define the box
3 element(s) now selected
[Arcedit] CALCULATE $SYMBOL = 2
[Arcedit] DRAW
```

As soon as DRAW is given, the selected features will be redrawn with symbol 2 (dashed lines).

$SYMBOL can be used to change the display symbols for tics, labels, arcs and annotation features. However, there are some important considerations when the edit feature is tic. $SYMBOL will only change the color of the tic symbol. Tics are always drawn as (⊞) in PC ARCEDIT.

For annotation, use of $SYMBOL makes a permanent change to the stored symbol value of the selected annotation. ANNOSYMBOL can also be used to establish the symbol number stored for annotation. This is different from other edit features in PC ARCEDIT where $SYMBOL is only a temporary assignment for drawing coverage features.

$LEVEL

$LEVEL is used to change the annotation level for selected annotation. The annotation level is permanently stored with each annotation. The annotation level is used to organize subsets of annotation as separate levels. The ANNOLEVEL command can also be used to change the annotation level.

$LEVEL has no effect on other edit feature classes.

$SIZE

$SIZE is used to change the height of annotation. $SIZE should be given in coverage units. Another way to change the size of annotation is with the ANNOSIZE command. The size value is permanently stored with each annotation.
$SIZE has no effect on other edit feature classes.

$RECNO

$RECNO is a pseudo item which accesses the record number of each feature. It is most often used in selection expressions. For example,

```
[Arcedit] RESELECT $RECNO LT 100
101 element(s) now selected
```

When calculating new attribute values, you cannot calculate $RECNO equal to another value. However, you can use $RECNO as part of an expression to calculate other items. For example,

```
[Arcedit] EDITFEATURE ARC
2293 element(s) for edit feature ARC
[Arcedit] SELECT ALL
2293 element(s) now selected
[Arcedit] CALCULATE $ID = $RECNO
```

This expression can be used to calculate a new User-ID for each arc equal to its record number.

$RECNO can be used when the edit feature class is tic, arc, label or annotation.

Note that as records are modified during a PC ARCEDIT session, they are appended to the end of the file being modified. Their record numbers will be different the next time you try to select them.

Chapter 11 Editing annotation

Editing annotation

11

PC ARCEDIT provides a number of tools for creating and editing text associated with a coverage. Such text is called annotation and can be used to label coverage features such as streets, land use polygons or rivers. Annotation can be created from text keyed in by the user or from coverage attributes. The appearance and position of annotation can also be defined and modified in a number of ways.

Creating and editing annotation in PC ARCEDIT is similar in many respects to handling other coverage features. For example, annotation, like other features, can be selected, deleted, copied, and so on. There are, however, a number of concepts and capabilities unique to annotation.

Annotation editing can be performed in the context of a user-definable annotation environment that determines the characteristics

of added and modified annotation. Generic PC ARCEDIT commands, used with annotation-specific pseudo items, can also be used to edit annotation.

What is annotation?

Annotation are text strings used to label maps. Annotation may be derived from coverage features. For example, the source for annotation text can be any feature attribute as well as text entered at the keyboard. Once created, annotation is not linked to coverage features and is not automatically updated when feature coordinates, topology or attributes change.

Annotation need not be located with respect to coverage features. For example, annotation can be used for reference text (e.g., labeling a stream coverage with the names of mountain peaks and ranges). Annotation is usually stored as part of the coverage to which it is associated. It is possible to have a coverage that has no features other than annotation.

Typical annotation editing tasks

The following lists typical annotation editing tasks:

- Adding text to annotate features (e.g., arcs or label points) with techniques that position the annotation along specific position points
- Adding text to annotate features with techniques that use feature attribute items to supply the annotation text
- Modifying annotation characteristics after annotation has been created
- Organizing annotation storage through the use of levels

Annotation characteristics

A number of characteristics are used to define annotation. In PC ARCEDIT, annotation can be added with these characteristics, and the characteristics of existing annotation can be changed. Here is a list of the important characteristics.

Annotation level

Annotation can be categorized within a coverage. These storage categories are called levels. Levels are a convenient way to organize annotation. For example, in a coverage of roads it might be useful

to store annotation for major highways in one level and annotation for secondary roads in another. PC ARCEDIT and other PC ARC/INFO® programs allow you to access annotation by level.

Annotation size

Annotation is stored in coverage units. This means that as the output scale of the coverage changes, the size of the annotation will change along with it (e.g., annotation that appears .25 inches high at 1:100,000 scale will appear .5 inches high at 1:50,000 scale). Size is stored as a real number.

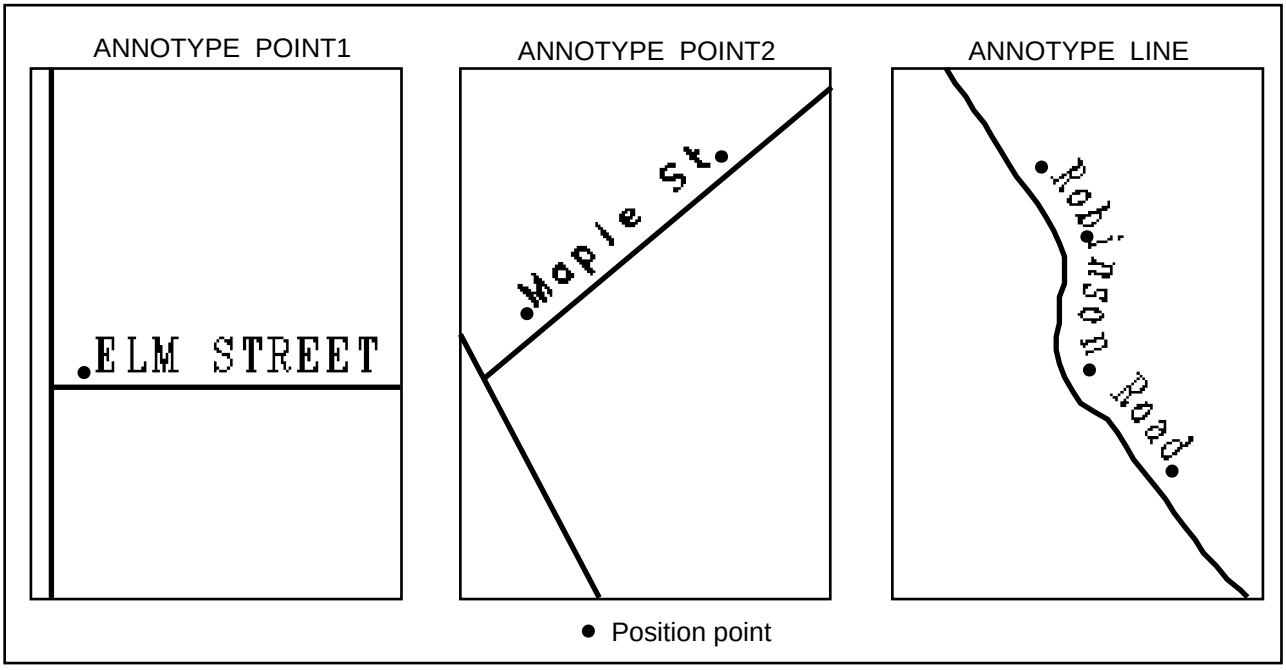
Annotation symbol

Annotation stores a text symbol number. The definition of that symbol in the current textset file determines the display characteristics of the annotation for font, color, style, slant and quality. The display characteristics of size and spacing are stored as part of the annotation feature. They override the corresponding display characteristics in the textset file for size and spacing. If using default values for annotation size and spacing, annotation will be created and drawn using values from the textset file.

Because some of the display characteristics (i.e., font, color and style) are set by the textset file, you should be careful to edit annotation using the same textset file that will be used for final display. This will ensure that you will draw annotation in PC ARCPLOT using the same text display characteristics which you used when creating and placing the annotation in PC ARCEDIT.

Annotation type and location

There are three types of annotation: POINT1, POINT2 and LINE. POINT1 annotation is located with one position point and is always horizontal (i.e., it cannot be rotated). POINT2 annotation is located with two position points and positions text at the angle specified by the position points. LINE annotation uses three or four points to spline annotation along a curve.

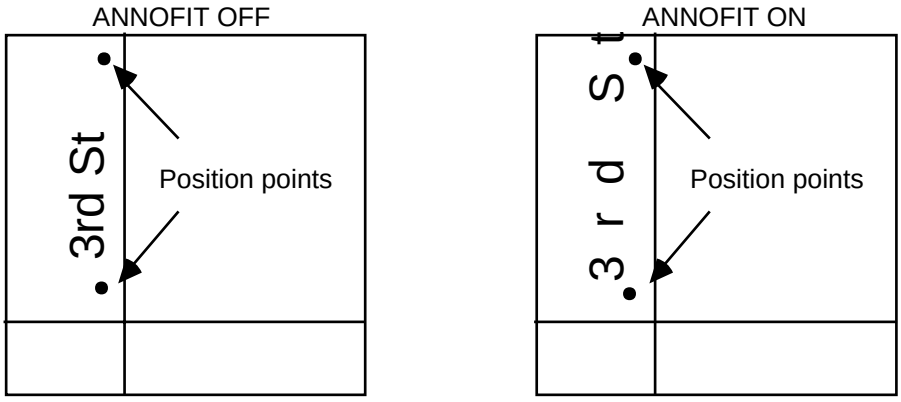


Annotation text

The text string that is drawn using the annotation characteristics can be created from text entered at the keyboard or from an item in a coverage feature attribute table or a related file. It may have between 1 and 320 characters.

Annotation spacing

POINT2 annotation can also be stretched to fit between its position points. When ANNOFIT is ON, POINT2 annotation is the only kind of annotation that has the spacing characteristic set in the annotation itself. Other types of annotation take the spacing characteristic from the textset file through the text symbol's spacing characteristics. Fitted, two-point annotation will override the text quality characteristic in the textset file.



Annotation editing commands

The PC ARCEDIT commands directly related to establishing annotation characteristics are:

ANNOFIT	stretches the text gap to fit annotation between two points for ANNOTYPE POINT2. It sets the text spacing.
ANNOITEM	specifies the source of annotation to be added to the edit coverage. It can be used to create annotation from item values in a feature attribute table or a related file.
ANNOLEVEL	specifies in which level annotation will be stored.
ANNOPOSITION	sets the position for POINT1 and POINT2 annotation and therefore influences the location of the annotation.
ANNOSIZE	specifies the height of annotation in coverage units.
ANNOSYMBOL	specifies that annotation will be saved and drawn using the specified text symbol.
ANNOTYPE	specifies the annotation type (i.e., POINT1, POINT2 or LINE) and therefore influences the location of the annotation.

Special commands used to edit annotation include:

ADD	ADD is not used solely with annotation but it offers special features when adding annotation. Annotation is added using the current annotation environment.
REPOSITION	moves annotation and updates the characteristics of existing annotation to conform to the characteristics of the current annotation environment.
SETARROW	adds a graphic arrow to a selected annotation.
DELETEARROWS	deletes the graphic arrow from selected annotation.

Other PC ARCEDIT commands which affect annotation editing include:

TEXTSET	specifies the textset file that will be used.

Annotation editing in PC ARCEDIT can work in concert with other PC ARC/INFO commands. Because annotation editing in PC ARCEDIT is a manual process, other PC ARC/INFO commands can be useful when large numbers of annotation must be created. PC ARCPLOT and GENERATE can be used to facilitate initial annotation creation. GENERATE can produce one-point and two-point annotation. PC ARCPLOT can also produce line type annotation. For certain annotation applications, it may be more efficient to create annotation outside of PC ARCEDIT and then use PC ARCEDIT for final placement. See the *PC ARC/INFO STARTER KIT User's Guide* for more information on GENERATE. See the *PC ARCPLOT User's Guide* for more information on annotation creation in PC ARCPLOT.

Steps for adding and editing annotation in PC ARCEDIT

There are six steps used when adding and editing annotation in PC ARCEDIT.

Step 1. Specify the display environment.

Step 2. Specify the editing environment.

Step 3. Set the annotation characteristics with the annotation environment commands.

Step 4. Add or edit annotation.

Step 5. Specify the source for annotation text using the ANNOITEM command.

Step 6. Add annotation.

Step 1

Specify the display environment

You can display annotation with DRAWENVIRONMENT ANNO. Selective display of annotation by level can also be controlled by selecting annotation by level and then using the DRAWSELECT or WHO commands.

In addition, you may want to display arc and label features when annotation is added in relation to them. You may also want to specify a textset file, typically, the one that will be used later to plot the annotation in PC ARCPLOT.

Step 2

Specify the editing environment

This includes setting the edit coverage, the edit feature (i.e., annotation), the map extent and the background coverage(s), if any.

Step 3

Set the annotation characteristics with the annotation environment commands

These commands include: ANNOSYMBOL, ANNOSIZE, ANNOLEVEL, ANNOPOSITION, ANNOTYPE and ANNOFIT. These characteristics can be previewed with the STATUS ADD command. The annotation characteristics set in this step will be active when adding or editing annotation with the ADD or REPOSITION commands. This step is not necessary when changing annotation locations with other editing commands. These commands do not affect edits performed with pseudo items. See the command references section for more information on these commands.

Step 4

Add or edit annotation

The capabilities offered by PC ARCEDIT and the variety of situations you can encounter make it impossible to suggest one 'best' command sequence. Some annotation editing sequences could require resetting the annotation environment as described in Step 3.

Before adding annotation there may also be additional steps you wish to perform.

Step 5

Specify the source for annotation text using the ANNOITEM command

Possible sources include entry of text at the keyboard and use of item values for selected features from a feature attribute table or a related file. For example, street names might be read from an item in a coverage AAT to annotate streets in a street coverage.

Step 6

Add annotation

This example demonstrates the basic method for adding annotation to the edit coverage. Assume you have a street network coverage and you want to add street names as annotation. First set up the PC ARCEDIT environment.

```
[Arcedit] DISPLAY 4
[Arcedit] EDITCOVERAGE STREETS
The edit coverage is now STREETS
The Map extent is not defined
Defaulting the map extent to the BND of STREETS
[Arcedit] DRAWENVIRONMENT ARC ANNO
[Arcedit] DRAW
[Arcedit] EDITFEATURE ANNOTATION
0 element(s) for edit feature ANNOTATION
```

The DRAWENVIRONMENT is set to ARC and ANNO because you want to see both the street arcs and the annotation added to them. EDITFEATURE ANNOTATION tells PC ARCEDIT that the feature class you will be editing is annotation. At this point, you may use the default annotation characteristics to add annotation to

the street network coverage. To determine the default characteristics, use the STATUS command with the ADD option.

```
[Arcedit] STATUS ADD
Edit feature: ANNOTATION Total= 0 A/D= 0,0 Original= 0
ANNOLEVEL= 1   ANNOSYMBOL= 1      ANNOSIZE= 0.000
ANNOFIT: OFF   ANNOPOSITION: LL   ANNOTYPE: ONE POINT
```

When the ADD command is issued, one-point annotation will be added to level one with symbol one from the keyboard. Any of the above characteristics can be changed to create the desired annotation environment.

Setting annotation size

Notice that the size parameter above is zero, the default value. Since you have not explicitly set an annotation size with the ANNOSIZE command, PC ARCEDIT will calculate the annotation size for you. PC ARCEDIT will calculate the annotation size (in coverage units) needed to produce annotation on the terminal screen using the size specified in the textset file for the current symbol. The annotation size will be scaled from the size of text symbol 1 using the current map extent and page size.

This example uses the default textset file for PC ARCEDIT, PLOTTER.TXT. When annotation size is left at its default value, the resulting annotation size given to added annotation can vary. If you zoom in to add annotation, the annotation added will be given a size value that is smaller than that given to annotation when zoomed out. Note that this will produce annotation of the same apparent height on the terminal screen. However, when annotation produced at the different map extents are viewed together they will have different sizes. This is why it is important to specify annotation size explicitly.

Annotation size is always specified in coverage units. Often, the choice of size is determined by its preferred size in page units at a common output scale. In such cases, you can perform a simple calculation in order to determine the annotation size needed to produce output of a certain height. The annotation size is the product of the output scale, the ratio between coverage and page units, and the desired letter height of the annotation at the output

scale. For example, if the coverage units are feet, the page units are inches, the output scale is 1:24000 and you want the annotation to be .25 inches high, here is how you can derive the annotation size:

- The output scale is 24000 coverage units to 1 page unit.
- The ratio of coverage units to page units is 1/12 (where 1/12 is the ratio between feet and inches expressed as a fraction).
- The desired annotation height is .25 inches.

ANNOSIZE = 24000 * 1/12 * .25
ANNOSIZE = 500

```
[Arcedit] ANNOSIZE 500
```

Now begin adding annotation:

```
[Arcedit] ADD
```

At this point, you will be prompted to enter text from the keyboard:

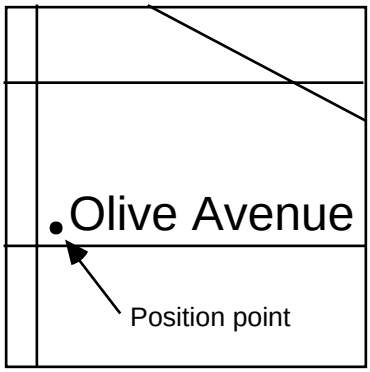
```
Text: Olive Avenue
```

Next enter the position point for the annotation. Since ANNOTYPE is POINT1, only one position point is required. Use the cursor to select a position:

```
Enter position (1)
```

Once the annotation is positioned, the `Text:` prompt returns. You may add more annotation, or stop adding annotation by entering a carriage return at the `Text:` prompt:

```
Text: (press ENTER)
1 annotation(s) added to STREETS
```



Adding POINT2 annotation

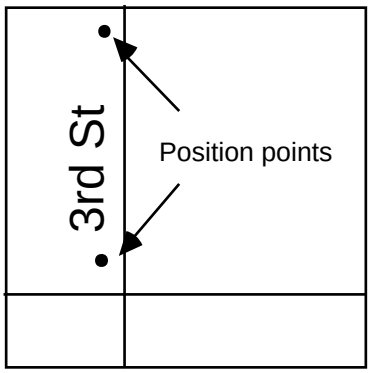
Annotation can be added using two positioning points by setting ANNOTYPE to POINT2. This specifies that the added annotation will be placed along the line defined by the two position points. With two-point annotation, the first point locates the annotation, and the second point orients the annotation. Annotation can be placed in the edit coverage at any angle. Since the default annotation type is one point, ANNOTYPE is set to POINT2 before annotation is added.

```
[Arcedit] ANNOTYPE POINT2
[Arcedit] ADD
```

After the ADD command is issued, you are prompted to enter a text string from the keyboard:

```
Text: 3rd St
Enter position (2)
```

Enter two position points to locate the annotation on the coverage.




```
Text: (press ENTER)
1 annotation(s) added to STREETS
```

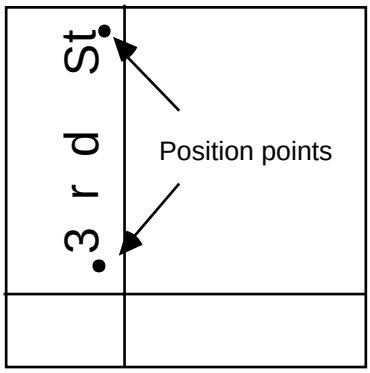
A carriage return is entered at the `Text:` prompt to end annotation entry.

ANNOTYPE POINT2 places the text string on the line defined by the two positioning points. When ANNOFIT is turned ON, the distance between the two points will affect the appearance of the annotation. ANNOFIT uses the distance between the first and second point to decide whether the text gap (space between characters) will be increased or decreased to fit the text between the two points. ANNOFIT will not compress annotation to fit between two points whose distance is less than the total character width of the annotation.

ANNOFIT affects only two-point annotation. If ANNOFIT is turned ON, the resulting two-point annotation string may look like this:

```
[Arcedit] ANNOFIT ON
[Arcedit] ADD
Text: 3rd St
Enter position (2)
```

Enter two position points to locate the annotation in the edit coverage. The annotation is drawn to fit between the position points:




```
Text: (press ENTER)
1 annotation(s) added to STREETS
```

A carriage return is entered at the `Text:` prompt to end annotation entry.

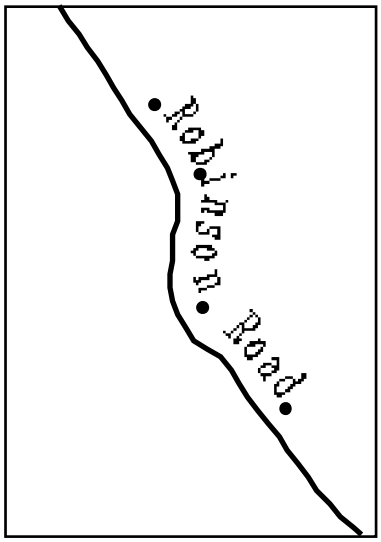
Adding LINE annotation

You can change the set of characteristics defining the annotation environment at any time during the PC ARCEDIT session. If, for example, you wanted to spline street names along streets, change ANNOTYPE to LINE. PC ARCEDIT will then ask you for up to four points along which the annotation string will be splined:

```
[Arcedit] ANNOTYPE LINE
[Arcedit] ADD
Text: Robinson Road
Enter position (up to 4, 9 to stop)
```

Use the cursor to select up to four position points. If less than four shape points are desired, use the 9 key to end coordinate input after entering the desired shape points. The position of the cursor when you enter the 9 key is recorded as the last position point for the annotation.

```
Text: (press ENTER)
1 annotation(s) added to STREETS
```



Editing annotation

All general PC ARCEDIT editing commands can be used to edit annotation. Annotation can be selected, rotated, deleted, copied and moved just as other features are edited. For example, if you had mistakenly added annotation along the wrong street, you could SELECT it and MOVE it to the correct one:

```
[Arcedit] SELECT
Point to the feature to select
1 element(s) now selected
[Arcedit] MOVE
Point to the coordinate to move from
Point to the coordinate to move to
1 annotation moved
```

You can also COPY the annotation string and place the copy at another point along the street:

```
[Arcedit] COPY
Point to the coordinate to copy from
Point to the coordinate to copy to
1 annotation copied
```

PC ARCEDIT also provides a set of annotation-specific editing tools to change annotation location and annotation characteristics.

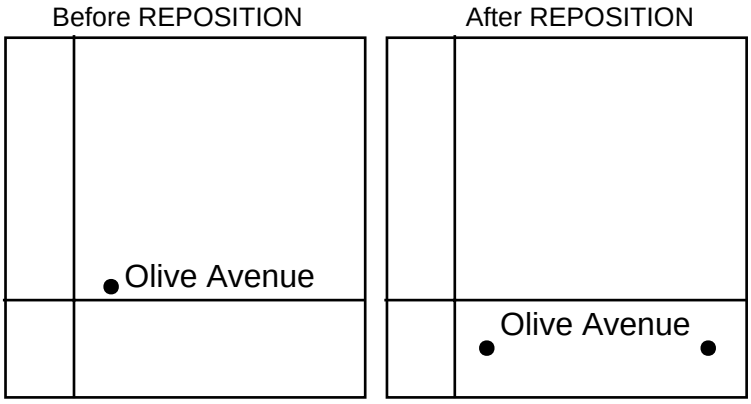
The REPOSITION command is an annotation-specific editing command that not only moves annotation but uses the current annotation environment to change the characteristics of the selected annotation. REPOSITION works on only one annotation string at a time.
In an earlier example, annotation was added using the default characteristics. Assuming some of the annotation characteristics need to be changed, you can check the status of the current annotation environment to make sure the desired characteristics are set. Then REPOSITION can be used to relocate a text string and change its characteristics to those of the current annotation environment:

```
[Arcedit] ANNOSIZE 500
[Arcedit] ANNOLEVEL 10
[Arcedit] ANNOSYMBOL 16
[Arcedit] ANNOTYPE POINT2
[Arcedit] ANNOFIT ON
[Arcedit] STATUS ADD
Edit feature: ANNOTATION Total= 10 A/D= 10,0 Original= 0
ANNOLEVEL= 10  ANNOSYMBOL= 16     ANNOSIZE= 500.000
ANNOFIT: ON    ANNOPOSITION: LL   ANNOTYPE: TWO POINT
```

Now, when you reposition the selected annotation, it will become two-point annotation in level 10, drawn 500 coverage units high with the characteristics of text symbol 16:

```
[Arcedit] SELECT
Point to the feature to select
Annotation 6 Level: 1 with 10 characters selected
1 element(s) now selected

[Arcedit] REPOSITION
Enter new position (2)
```

The current COORDINATE input device is used to enter two locations, indicating the distance and angle to reposition the annotation.



Annotation pseudo items

The size, level and symbol characteristics of selected annotation can be accessed in PC ARCEDIT through the $SIZE, $LEVEL and $SYMBOL pseudo items. The size, level and symbol characteristics of selected annotation can be modified using CALCULATE to assign values to the pseudo items $SIZE, $LEVEL and $SYMBOL. The spacing and location characteristics cannot be edited using pseudo items.

$SYMBOL is used differently with annotation than with other feature types. The symbol characteristic is a permanent part of the annotation feature definition. Changing the value of $SYMBOL for annotation will make a permanent change. A change to $SYMBOL for other feature types is only in effect during the current PC ARCEDIT session. $LEVEL and $SIZE are also saved as permanent parts of the annotation feature definition.

The $RECNO pseudo item can be used to select annotation in the same way as it is used with other feature types. Note that as records are modified during a PC ARCEDIT session, they are appended to the end of the file being modified. Their record numbers are therefore different the next time you try to select them with $RECNO. The $ID pseudo item is not used with annotation.

$LEVEL can be used to display only one level of annotation during an ARCEDIT session. First select a particular level:

```
[Arcedit] SELECT $LEVEL = 1
```

Then use the DRAWSELECT command to display the selected annotation on the screen.

Through the use of pseudo items, you can change characteristics of selected annotation. Pseudo items can be used to modify the size, level and symbol characteristics. You can use this editing tool to ensure uniform annotation characteristics. For example, you can use the CALCULATE command, along with the appropriate pseudo item, $SYMBOL, to change the symbol for selected annotation:

```
[Arcedit] SELECT ALL
689 element(s) now selected
[Arcedit] CALCULATE $SYMBOL = 16
```

Use the DRAW command to redraw the selected annotation with the new symbol.

If you want the annotation along highways to be distinguished from the annotation along city streets, you could increase the size of the highway annotation and store it in a different annotation level. In this case, use the $SIZE and $LEVEL pseudo items. Storing annotation in different levels allows you to access and display only the annotation stored in that level. Again, select the desired annotation and CALCULATE the appropriate pseudo items. In this case, the annotation used to label the arcs representing highway features are selected, modified and stored in level 2.

```
[Arcedit] SELECT ROAD_TYPE = 4
10 element(s) now selected
[Arcedit] CALCULATE $SIZE = 750
[Arcedit] CALCULATE $LEVEL = 2
[Arcedit] DRAW
```

Adding annotation from a feature attribute table

In many instances, it is useful to graphically associate the value of an item in a feature attribute table or a related file with the feature that spatially defines it in the coverage. The following example shows how annotation can be added to a coverage from an item in the feature attribute table or a related file using the ANNOITEM command.

Assume you have a coverage of the United States and you want to add the state names as annotation. You could conceivably type in every state name and place them in the appropriate states. ANNOITEM offers a better solution. If you had an item in the polygon attribute table that contained the name of each state, you could add annotation more quickly by creating it from that item. To demonstrate how this is done, you first must establish the PC ARCEDIT environment.

```
[Arcedit] DISPLAY 4
[Arcedit] MAPEXTENT USA
[Arcedit] EDITCOVERAGE USA
[Arcedit] DRAWENVIRONMENT ARC ANNO LABEL
[Arcedit] DRAW
[Arcedit] EDITFEATURE ANNOTATION
0 element(s) for edit feature ANNOTATION
```

Next set up the annotation environment:

```
[Arcedit] ANNOTYPE POINT1
[Arcedit] ANNOSYMBOL 2
[Arcedit] ANNOSIZE 60000
[Arcedit] ANNOPOSITION CC
[Arcedit] ANNOLEVEL 1
[Arcedit] STATUS ADD
Edit feature: ANNOTATION Total= 0 A/D= 0,0 Original= 0
ANNOLEVEL= 1   ANNOSYMBOL= 2      ANNOSIZE= 60000.000
ANNOFIT: OFF   ANNOPOSITION: CC   ANNOTYPE: ONE POINT
```

ANNOITEM is used to establish the source of the added annotation. When PC ARCEDIT begins execution, it expects the annotation text strings to come from the keyboard. The POLY, POINT or LINE keywords of ANNOITEM tell PC ARCEDIT to add annotation using the specified item from the corresponding feature attribute table. Since USA is a polygon coverage, the POLY option is used. The source of the added annotation will be the value of the item NAME in the polygon attribute table, which contains the name of each state.

```
[Arcedit] ANNOITEM POLY NAME
```

Now add annotation:

```
[Arcedit] ADD
```

Attributes of a polygon coverage are accessed through the label point of each polygon. Since you want to add the text string using the values from the PAT item NAME, you must select the label point that contains the desired annotation string and then position the text in the coverage. ADD prompts you as follows:

```
Point to the feature for the annotation
TEXT=
1 = Select   2 = Next   3 = Keep   9 = Quit
```

The 1 key is used to select the desired label point.

```
Label 43 User-ID: 43 (89587.862947,977049.889123) selected
TEXT= CALIFORNIA
1 = Select   2 = Next   3 = Keep   9 = Quit
```

One label is selected from the coverage; it has CALIFORNIA as the value in the item NAME. If CALIFORNIA is the desired text string, the 3 key is used to keep it. If, however, it is not the desired text string, the 2 key can be used to find other label points within the edit distance. In this case, the correct label point was selected, so the 3 key is pressed.

You now must position the annotation string. Depending upon the ANNOTYPE specified, PC ARCEDIT will prompt for the appropriate number of position points – in this case, one. PC ARCEDIT will locate the annotation using this point. Since ANNOPOSITION is CC, the annotation text will be centered on this point.

```
Enter position (1)
```

After positioning the annotation, you may select another label point to continue adding annotation (press 1), use the same text for another annotation (press 3), or you may use the 9 key to terminate the ADD session. Here, the 9 key is used to end annotation entry.

```
Point to the feature for the annotation
TEXT= CALIFORNIA
1 = Select   2 = Next   3 = Keep   9 = Quit
1 annotation(s) added to USA
```

Adding arrows to annotation

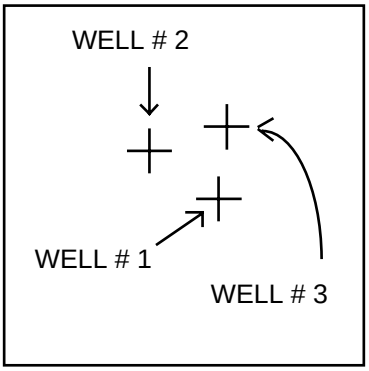
The SETARROW command allows you to add a graphic arrow to a selected annotation. This is particularly useful when the density of other coverage features makes it impossible to associate the annotation with the desired feature. SETARROW prompts you to enter two or three points which will define the annotation arrow. Arrows can only be added to annotation, one arrow per text string. To associate an arrow with an annotation string, first select the desired annotation.

```
[Arcedit] SELECT
Point to the feature to select
```

Select the annotation to which an arrow will be added with the current COORDINATE input device.

```
Annotation 1 Level: 1 with 6 characters selected
1 element(s) now selected
[Arcedit] SETARROW
Enter 2 or 3 coordinates <From-To> (9 to quit)
```

The first arrow point is located at the annotation text, and the last arrow point is located at the feature it annotates. The last arrow point entered receives the arrowhead. Enter two or three points for the arrow. If you want a straight arrow, press the 9 key to locate the position of the second arrow point. The DELETEARROWS command can be used to delete arrows from selected annotation.



Maintaining annotation proportions between display devices

Special care should be taken when using annotation symbols 1 through 20 of the default textset PLOTTER.TXT. These text symbols use the hardware default font provided by the graphic device being used for display. This means that proportions of the characters will probably vary between devices, even when the annotation symbol being used has a specific text width value. This causes problems if you position annotation relative to other features on the screen because when this graphic is plotted, the plotter's default hardware text font may have different proportions than the graphics monitor on which you created the annotation, thus altering your layout. Keep this in mind when specifying symbols from PLOTTER.TXT with either the ANNOSYMBOL command or the CALCULATE $SYMBOL command.

Appendix A Key values used in digitizing features

Key values when adding arcs using ADD

	ARCTYPE LINE	ARCTYPE BOX	ARCTYPE CIRCLE	DIGITIZING OPTIONS (Press the 8 key to activate)
KEY	FUNCTION	FUNCTION	FUNCTION	FUNCTION
0	Display cursor location on screen	Display cursor location on screen	Display cursor location on screen	
1	Add vertex			New User-ID
2	Add node	Box corner	Center/radius point	New Symbol
3	Curve			Autoincrement OFF
4	Delete vertex			Autoincrement ON
5	Delete arc	Delete box	Delete circle	Arctype line
6	Spline on/off			Arctype box
7	Square on/off			Arctype circle
8	Digitizing Options	Digitizing Options	Digitizing Options	Arctype centerline
9	Quit	Quit	Quit	Quit
*	Stream on/off			

Key values when adding:

	LABELS	DIGITIZING OPTIONS (Press the 8 key to activate)
KEY	FUNCTION	FUNCTION
0	Display cursor location on screen	Display cursor location on screen
1	Add Label	New User-ID
2		New Symbol
3		Autoincrement OFF
4		Autoincrement ON
5	Delete last label	
6		
7		
8	Digitizing Options	
9	Quit	Quit

	TICS
KEY	FUNCTION
0	Display cursor location on screen
1	Add Tic
2	
3	New User-ID
4	
5	Delete last tic
6	New symbol
7	Autoincrement OFF
8	Autoincrement ON
9	Quit

Appendix B Developing custom digitizer menus

A command menu consists of a physical menu of commands written on a piece of paper and a database data file containing the commands and command options. The physical menu and the menu file work together to input commands to PC ARCEDIT. The physical menu is divided into grid cells. The cells are numbered by column and row so that each cell has a unique number. Each record in the database data file contains a row and column number corresponding to a row and column number of a cell on the physical menu. The row and column number is the link between the location of a cell on the menu and a record in the database data file containing a command.

The menu is mounted on a tablet or digitizer for use. When you specify that commands are to be input from a menu, you will be prompted to digitize the lower-left and upper-right corners of the grid. By calculating the area of the menu and by knowing how many rows and columns there are (from the database data file), PC ARCEDIT determines the size of each individual cell on the menu. When you position the cursor at a location on the menu, PC ARCEDIT is able to determine which cell it falls in, find the record in the database data file with the same row and column number, and input the command listed on the same record. Note that there is a limit of 1000 records in the menu file.

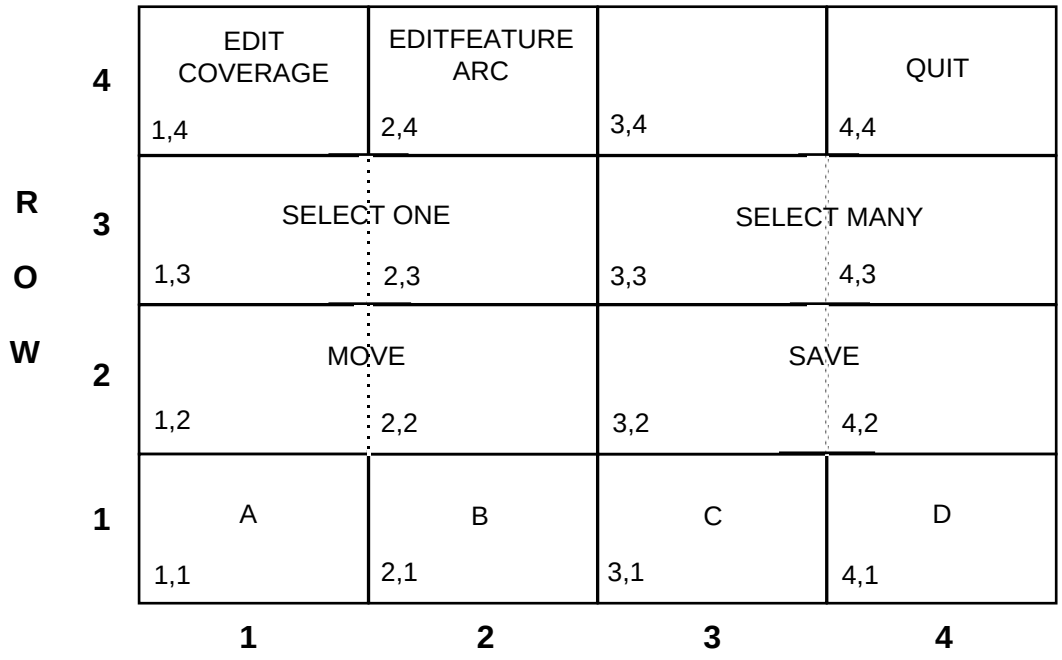
The menu file has the following definition:

Item Name	Width	Type
Column	2	N
Row	2	N
Option	1	N
Command	80	C

Figure 1 illustrates a simple menu and its associated INFO menu file. The menu is annotated with row and column numbers for each cell. Every cell in the menu has an associated record in the menu

file. This is mandatory for proper operation of the menu. The lower-left corner of the menu is the origin for the numbering system. Column numbers ascend in a positive 'x' direction from the origin; row numbers ascend in a positive 'y' direction.

Figure 1: A simple menu and its associated database data file



Listing of the corresponding database data file.

Column	Row	Option	Command
1	1	1	A
1	2	3	MOVE
1	3	3	SELECT ONE
1	4	2	EDITCOVERAGE
2	1	1	B
2	2	3	MOVE
2	3	3	SELECT ONE
2	4	3	EDITFEATURE ARC
3	1	3	C
3	2	3	SAVE
3	3	3	SELECT MANY
3	4	0	
4	1	3	D
4	2	3	SAVE
4	3	3	SELECT MANY
4	4	3	QUIT

Records are entered in the menu file by specifying all rows in a column before moving to the next column. The maximum number of records in the menu file is 1000.

Grid cells can be rectangular.

The text in each cell corresponds exactly with the text in the corresponding menu file record. Text can consist of:

commands (MOVE, SAVE, QUIT)
commands and keywords (SELECT ONE, EDITFEATURE ARC)
non-commands (A, B, C, D).

Some commands use two cells (SELECT ONE, SELECT MANY, MOVE, SAVE). In this case, both records in the menu file contain the same command and option. For example, the MOVE command encompasses cells 1,2 and 2,2. In the menu file, the records specified by these cell numbers contain the same command (MOVE) and the same option (3). You can position the cursor on either of these cells to input the MOVE command. Commands can encompass as many cells as you wish.

Even though cell 3,4 has no command, it still has a record in the menu file.

Option codes

The Option is a number corresponding to an action which is to be taken upon the text for each cell. There are cases where the text can be input immediately as a command (e.g., MOVE), where the text should not be input until a carriage return is explicitly entered, and where a command can be input as a combination of menu input and keyboard input. There are nine option codes available to specify a variety of options for menu text:

Option code 0 — No operation
Used for cells which do not have an associated command.

Option code 1 — Put text in buffer

Used when more than one additional piece of text is going to be input at the menu. For example, individual letters might have option code 1 so you can enter a string of letters to spell a word.

Option code 2 — Put text in buffer with a trailing blank

Used when a command requires additional input, such as a keyword. For example, the command EDITFEATURE requires a feature class. You might use option code 2 so that a keyword can be entered along with the command.

Option code 3 — Put text in buffer with a trailing carriage return

Used for commands which are complete and can be entered to PC ARCEDIT as they are. An example might be the MOVE command which requires no other input.

Option code 4 — Receive text from keyboard

When you point to a cell with this option code, control will return to the keyboard for a single command. This is useful if you need to enter a command which is not on your menu.

Option code 5 — Kill input

Deletes a partially entered command.

Option code 6 — Backspace

Used just like the backspace key on the keyboard.

Option code 7 — Add menu text then transfer control to keyboard input

This option allows you to complete a partially entered menu command at the keyboard. For example, if you wanted to input the full pathname of a command file, you might have the directory pathname as the menu command, then input the file name at the keyboard. Command control returns to the menu after a carriage return at the keyboard.

Option code 8 — Add menu text with trailing blank then transfer control to keyboard input

Allows you to type a command keyword at the keyboard. For example, you may have a cell on the menu defined as EDITCOVERAGE with option code 8. You can point at this cell

then type the name of the coverage at the keyboard. Command control returns to the menu after a carriage control on the keyboard.

Only option code 3 automatically enters a carriage return. Cells with other option codes require you to enter a carriage return when this command input is complete. A carriage return can be included in the menu simply by having a cell listed in the database data file that has option code 3 without any text in the command line.

How to build a custom menu

Following is a step-by-step procedure for developing and using a custom menu.

Step 1. Lay out the commands you wish to include in the menu on a piece of graph paper.

Step 2. Label the column and row number for each cell.

Step 3. Choose an appropriate option code for each cell.

Step 4. Start TABLES and define a file with the following item definitions:

Item Name	Width	Type
Column	2	N
Row	2	N
Option	1	N
Command	80	C

Step 5. In TABLES, add the row number, column number, option code and command for every cell in the grid.

Step 6. Exit TABLES.

Step 7. Refer to the COMMAND command reference for help in using your custom menu.

Note: To automatically access a custom menu from your workspace, place the menu in the \ARCEXE\MENU directory. When you use COMMAND DIGITIZER, ARC/INFO will automatically look for the custom menu file in this directory.

Summary of option codes

Option code	Description
0	No operation
1	Put text in buffer
2	Put text in buffer with a trailing blank
3	Put text in buffer with a trailing carriage return
4	Receive text from keyboard
5	Kill input
6	Backspace
7	Add menu text then transfer control to keyboard input
8	Add menu text with trailing blank then transfer control to keyboard input

Sample edit menu used by production staff at ESRI

EDIT FEATURES

Arc	Node	Label	Tic

TOLERANCES

Edit Distance	Snap Distance	Weed	Grain	

SELECTS and COLLECTS

Select One	Select Many	Select Box	Select All	Select Outline
Unselect Many	Unselect Box	Next	Who	Add

ARC EDITING

Add Vertex	Delete Vertex	Unsplit	Reshape
Move Vertex	Split	Split Vertex	

BASIC COMMANDS

Draw	Command Keyboard	Move	Delete	Undelete	Calc $ID-	Coor-dinate Digitizer	Coor-dinate Cursor	Auto Off	Marker Set *
CR	Map Extent	Map Extent Default	Status	Set Symbol	Draw Select	Set Draw Symbol	Terminal Input	Auto On	List

A default edit menu (ARCED.MEN) is supplied with PC ARCEDIT. It is located in the subdirectory \ARCEXE\MENU. The default menu will be used as the mode of PC ARCEDIT command entry if {filename} is not specified when entering the COMMAND DIGITIZER command line. To use the default menu, follow the steps outlined in the COMMAND command reference. Below is a copy of the default edit menu.

Note: To automatically access a custom menu from your workspace, place the menu in the \ARCEXE\MENU directory. When you use COMMAND DIGITIZER, ARC/INFO will automatically look for the custom menu file in this directory.

Appendix C Using EDGEMATCH

EDGEMATCH allows the adjacent sides of two coverages to be matched interactively. The command uses a 'rubber sheeting' algorithm to move coverage coordinates. All feature coordinates may be shifted; however, the amount they are shifted depends on their distance from the features to which they are being matched. Those coordinates that are closer to the match features are shifted more than those farther from them. Because coverage arc coordinates will change when EDGEMATCH is used, make a copy of the original coverage if you want to preserve its original form.

The EDGEMATCH command is run from the [ARC] prompt. The following is the usage and command reference for EDGEMATCH.

EDGEMATCH **[cover] [match_cover] {tolerance} {edge_box}**

an ARC level command that allows you to match arcs along the adjacent sides of two coverages.

---

arguments

[cover] - the coverage to be edgematched. EDGEMATCH may move the arcs and nodes within this coverage.

[match_cover] - the coverage to be used for reference. Arcs and nodes remain fixed in this coverage.

{tolerance} - the distance to be used for rubber sheeting arc coordinates of [cover]. Rubber sheeting affects only the coordinates of arcs within {edge_box}. These are moved according to the specified {tolerance}. Interior arcs remain fixed. The default {tolerance} is set to the larger tolerance value determined from each coverage. The tolerance value for each coverage is calculated as the larger of:

(width of the BND)/10 or (length of the BND)/10

{edge_box} - the area of [cover] and [match_cover] to be displayed on the graphic monitor. An {edge_box} may be specified by entering the minimum x, minimum y, maximum x, and maximum y coordinates of the desired display window. By default, the display window includes all coverage features that are within the {tolerance} distance from the matching edge of each coverage.

notes

- EDGEMATCH is an ARC-level command. It must be used from the [ARC] prompt.

- A graphic monitor (color or monochrome) is needed to EDGEMATCH coverages.

- The default {tolerance} is generally acceptable. You may need to interactively adjust the {edge_box} for larger maps.

- There is a limit of 25,000 arcs which can appear within the matching window used by EDGEMATCH. If you exceed this limit use a smaller {edge_box} for edgematching.
- EDGEMATCH will change arc coordinates in [cover] by rubber sheeting them. Make a copy of [cover] before executing EDGEMATCH if you want to preserve its original form.

- Polygon topology for [cover] is not updated by EDGEMATCH. CLEAN must be used after EDGEMATCH because rubber sheeting will not rebuild topology.

discussion

EDGEMATCH is used to match coordinates between coverages that will later be joined into a single coverage. EDGEMATCH is often used before MAPJOIN or APPEND.

The match coverage is used only as a reference for matching coordinates; its coordinates remain stationary. Nodes of an input coverage can be matched to nodes in the match coverage along the adjacent edge. Only those arcs that are connected to matched nodes can be shifted. All interior arcs will remain stationary. Arc coordinates of the input coverage are moved by rubber sheeting. No arc coordinate in the input coverage will be moved more than the tolerance distance.

EDGEMATCH begins by displaying the adjacent sides of the coverages to be edgematched. On color devices, arcs of the input coverage are displayed with a solid white line. Nodes are displayed with a white +. Tics are displayed as small white boxes. Arcs, nodes and tics of the match coverage are displayed in red with similar symbology. On monochrome devices, the arcs of the input coverage are displayed with a dotted line. Nodes are displayed with the default marker symbol 0. Arcs of the match coverage are displayed as dashed lines and nodes are displayed with the default marker symbol 4. Tics for either coverage are displayed as small boxes.

After the coverages are displayed, the EDGEMATCH menu is displayed in the dialog portion of the monitor screen.

subcommands

The subcommands available in EDGEMATCH are displayed in a menu in the dialog portion of the monitor screen. Type the number of the subcommand you want to use. After a subcommand is executed, the menu is redisplayed on the terminal.

Subcommand	Description and Options
1 – MATCH	Select nodes for matching. 1 – Select node 2 – Select next node within {tolerance} 3 – Stop selecting nodes
2 – UNMATCH	Remove node links. 1 – Select link 2 – Select next link within {tolerance} 3 – Stop selecting links
3 – ADJUST	Match linked nodes.
4 – ZOOM	Change display and redraw coverages. any key – define lower-left and upper-right corner of display window
5 – RESTORE	Restore original display window and redraw coverages.
6 – AUTOMATCH	Define tolerances for matching nodes and identify node links. any key – define beginning and endpoint of tolerance
7 – SPLIT	Define temporary node at arc vertex. 1 – Select arc vertex to become temporary node 2 – Select next arc vertex within {tolerance} 3 – Stop selecting arc vertices
8 – PICK TOLERANCE	Sets the distance for feature selection.
9 – QUIT	Exit from EDGEMATCH.
0 – PAN	Move the coverages within the display window. any key – the new center point of the display window

subcommand discussion

MATCH - identifies node pairs for matching. The cursor appears on the screen. The dialog area displays the following options:

```
1 = Select          2 = Next          3 = Quit
```

First select a node from the input coverage. Position the cursor over the node location and press 1. The selected node is displayed on the screen. If no node is found within the tolerance distance of the cursor location, a tone is emitted. If the identified node is the node you want to select, enter 3 to quit. If not, use 2 to go to the next node within the defined tolerance. Continue entering 2 until the correct node is selected. Then quit, using 3.

After selecting a node from the input coverage, select a node from the match coverage using the same procedure. A green line (solid line on monochrome terminals) will be drawn between the two nodes just selected. Nodes that are linked will be matched once the ADJUST subcommand is executed.

UNMATCH - removes the link (green or solid line) between matched nodes. The cursor is displayed on the screen, and the dialog area displays the following options:

```
1 = Select          2 = Next          3 = Quit
```

Position the cursor over any portion of the link between nodes to UNMATCH. Press 1 to select the link. If no link is found within the tolerance distance of the cursor location, a tone is emitted. If the identified link is the link you want to select, press 3 to quit. If not, enter 2 to select the next link within the tolerance. Continue entering 2 until the proper link is found. Then press 3 to quit.

ADJUST - begins the EDGEMATCH process. After selecting ADJUST, a message is displayed on the screen asking you to verify that you want to ADJUST the coverage. If you do, enter 3 again. Each node in the input coverage will then be matched to its linked node in the match coverage. Arc coordinates of the input coverage will be modified by rubber sheeting. The graphic display is updated as the EDGEMATCHing is done.

ZOOM - magnifies the view within a specified display window. This subcommand is useful for zooming in on a portion of the adjacent edges of the coverages.

After the cursor appears on the screen, enter the lower-left and the upper-right corners of the desired window. Position the cursor over each corner and press any key to enter it. The screen clears, and the portions of the coverages in the display window are redrawn.

RESTORE - returns to the original display window. This subcommand is useful for redrawing the coverages after an ADJUST.

AUTOMATCH - allows the user to define a match tolerance. This tolerance is used by EDGEMATCH to find node pairs.

After the cursor appears on the screen, digitize a match tolerance by positioning the cursor at the beginning and ending points of the match tolerance distance. Press any key to enter the points. After the tolerance is entered, all node pairs that are within the digitized tolerance distance of each other will be linked for matching (by a green or solid line).

The AUTOMATCH tolerance is different than the {tolerance} specified for EDGEMATCH.

PICK TOLERANCE - allows the user to define two points which defines the distance for feature selection. This distance is defined in display units so that it does not matter if you are zoomed in or not.

SPLIT - temporarily defines nodes at arc vertices. This subcommand is useful to match coverages at places where no nodes are defined (e.g., corners). Note that you cannot split arcs where there are existing nodes or between vertices.

When the cursor first appears on the screen, the following options are displayed:

```
1 - Split arc within [cover]
2 - Split arc within [match_cover]
```

Position the cursor over the arc vertex to be temporarily defined as a node. Press 1 if it is within [cover], or 2 if it is within [match_cover]. (A tone will be emitted if an arc vertex cannot be located within the tolerance distance of the cursor position.) After this first cursor position is entered, the following options are displayed in the dialog area of the screen:

```
1 = Select          2 = Next          3 = Done
```

If the correct arc vertex is selected, enter 3. If not, position the cursor at another location within the specified coverage, and enter 1 to select a new arc vertex, or 2 to choose another vertex within the search distance of the current cursor location. If an arc vertex cannot be found within the tolerance distance of the cursor's location, a tone is emitted. When the correct arc vertex is selected, enter 3 to end the splitting process. The arc vertex can then be used as a node for matching.

EDGEMATCH does not allow placing a node between vertices on an arc. If a vertex or a node needs to be added to an arc, refer to the PC ARCEDIT commands VERTEX ADD and SPLIT.

QUIT - terminates EDGEMATCH. Verify your intent to exit from EDGEMATCH by entering 9 again. If you enter any other subcommand key, the subcommand menu will reappear.

A typical EDGEMATCHing session proceeds as follows:

1) Scan the adjacent sides of the coverages to determine the appropriate size for the AUTOMATCH tolerance. Use the ZOOM and RESTORE subcommands.

2) Enter an AUTOMATCH tolerance based on the scan. All node pairs within this tolerance distance of each other will be linked with green (or solid) lines.

3) Scan the matching edge again to determine whether node pairs were properly matched. Use UNMATCH for node pairs that were not matched properly. Use MATCH to match nodes that were not linked by AUTOMATCH.

4) Use the SPLIT subcommand to split arcs and assign temporary nodes, where necessary (e.g., at coverage corners). Repeat Step 3 to link the temporary nodes.

5) Use the ADJUST subcommand to adjust input coverage arcs to nodes of the match coverage.

6) Scan the adjacent sides of the coverages once more and make additional changes, where necessary.

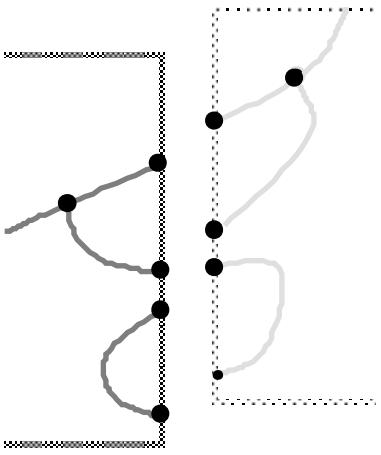
Arc coordinates of the input coverage are modified by ADJUST. The original arc coordinates cannot be restored.

PAN - allows the coverages being matched to be moved within the display window. This subcommand is useful after ZOOMing in on a particular portion of the coverages.

Enter 0, and after the cursor appears on the screen, enter a point that will become the center of the display. The screen will clear and the coverages will be redrawn with the point entered at the center of the display window.

Steps of a typical EDGEMATCH procedure

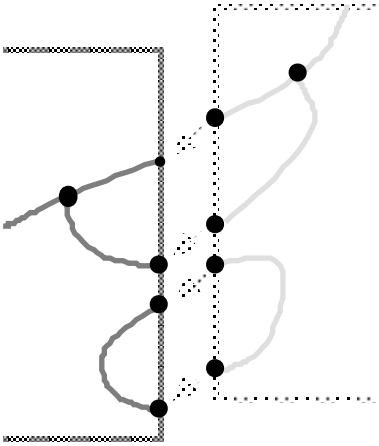
1. Begin



[match_cover] [cover]

Node

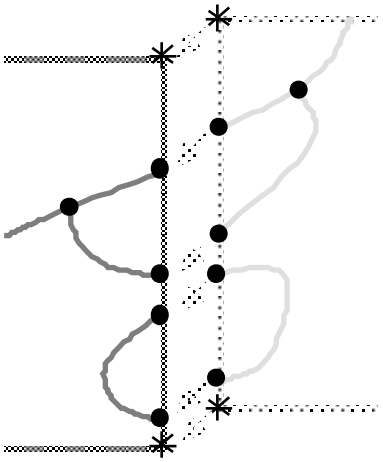
2. Use AUTOMATCH



AUTOMATCH tolerance

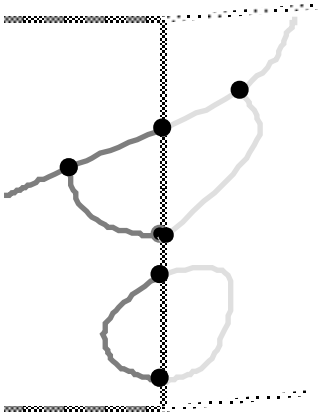
Link between nodes matched by AUTOMATCH

3. Match Corners



Arcs split at coordinates and linked

4. ADJUST



Edges after ADJUST