EDIT VECTORS

Getting Started

Editing Vector Geodata

in

TNTmips®

and TNTedit™

Before Getting Started

This booklet introduces techniques for creating, altering, and updating vector geospatial objects in the powerful Spatial Data Editor in TNTmips® and TNTedit™. Vector objects that you make or import contain point, line, and polygon elements in strict topological relationships. Each element has associated attributes and can be connected with complex databases. The exercises in this booklet introduce you to the basic tools used with each element type. The Spatial Data Editor also has tools for editing your CAD, raster, database, and TIN geodata.

Prerequisite Skills This booklet assumes that you have completed the exercises in *Getting Started: Displaying Geospatial Data* and *Getting Started: Navigating*. Those exercises introduce essential skills and basic techniques that are not covered again here. Please consult those booklets and the TNTmips reference manual for any review you need.

Sample Data The exercises presented in this booklet use sample data that is distributed with the TNT products. If you do not have access to a TNT products CD, you can download the data from MicroImages' web site. In particular, this booklet uses objects in the NFRESGIS Project File in the EDITVECT data collection, USSTATES from the UNTDSTAT Project File, and STATEPOP.DBF. Make a read-write copy of these files on your hard drive; you may encounter problems if you work directly with the sample data on the CD-ROM.

More Documentation This booklet is intended only as an introduction to vector editing in the Spatial Data Editor. Consult the TNT reference manual, which includes over 200 pages on the Spatial Data Editor, for more information.

TNTmips and TNTlite™ TNTmips comes in two versions: the professional version and the free TNTlite version. This booklet refers to both versions as "TNTmips." If you did not purchase the professional version (which requires a software license key), TNTmips operates in TNTlite mode, which limits object size, and enables data sharing only with other copies of TNTlite. The Spatial Data Editor in TNTmips is also distributed as TNTedit. It is not available in TNTview or TNTatlas. All the exercises can be completed in TNTlite using the sample geodata provided.

Keith Ghormley, 20 September 2000

It may be difficult to identify the important points in some illustrations without a color copy of this booklet. You can print or read this booklet in color from MicroImages' web site. The web site is also your source for the newest Getting Started booklets on other topics. You can download an installation guide, sample data, and the latest version of TNTlite:

http://www.microimages.com

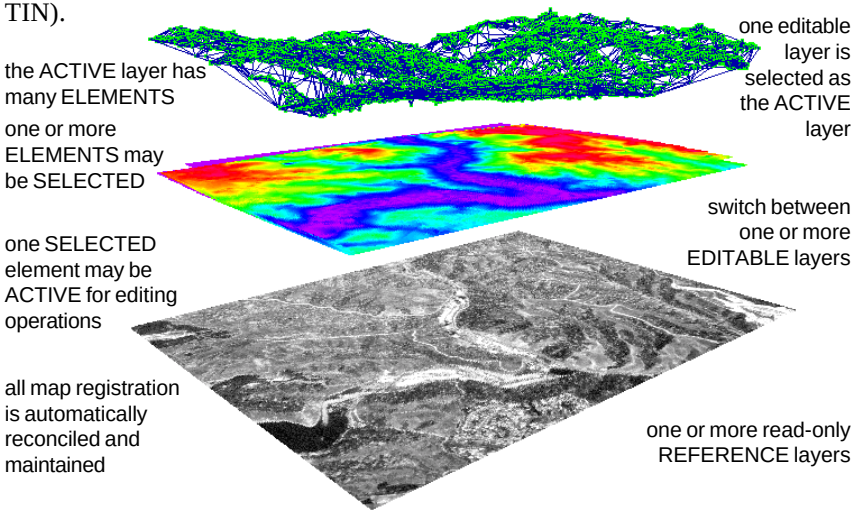
The Spatial Data Editor

The TNTmips Spatial Data Editor (Edit / Spatial Data) offers a flexible, editing environment that can be used for simple one-object tasks or complex multi-layer, multi-object manipulations. You can have a single object in one layer, or a combination of read-only reference layers with editable layers. You can have multiple types of objects open at the same time, stacked in any front-to-back order.

Editing operations apply to the currently "active" layer. As you switch from layer to layer, the editing tools automatically change according to the data type of the active layer (raster, vector, CAD, or TIN).

Newly created objects may have independently defined map registration, or map registration derived from another layer in the editor.

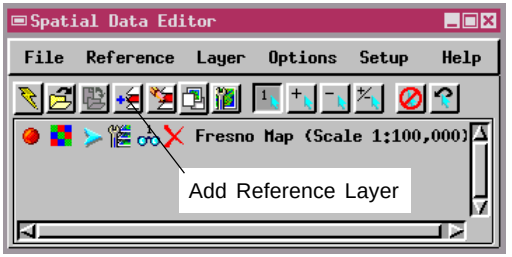
A **layer** contains one geospatial object: raster, vector, CAD, TIN, database, or complex layout. TNT automatically reconciles the map registration and scale of all layers.



You may see editing tools like those in TNTmips in other software products, but the important thing about the TNTmips Spatial Data Editor is the way you can edit *multiple geospatially related* objects easily and intuitively. You can concurrently edit project materials of all types while TNTmips automatically retains and reconciles their map registrations. This means that all the new objects you create can automatically derive their map registration from other layers, so all of your project materials have a correct geospatial relationship.

The exercises on pages 4-14 show how to create a georeferenced vector object that contains drainage line elements traced from a topographic reference map. This activity is often called "heads up digitizing." Pages 15-17 introduce techniques used in creating and editing other vector elements. Pages 18-22 deal with creating and attaching attribute tables.

Add a Reference Layer



Your first task is to create a new vector object that contains georeferenced hydrology line elements. You will use a reference layer that contains a georeferenced map scan that shows hydrology features, and you will trace over the lines with the TNT editing tools.

Vocabulary: a **Reference Layer** is a read-only layer used for visual and spatial reference. An **Editable Layer** is a layer on which you can add and modify elements.

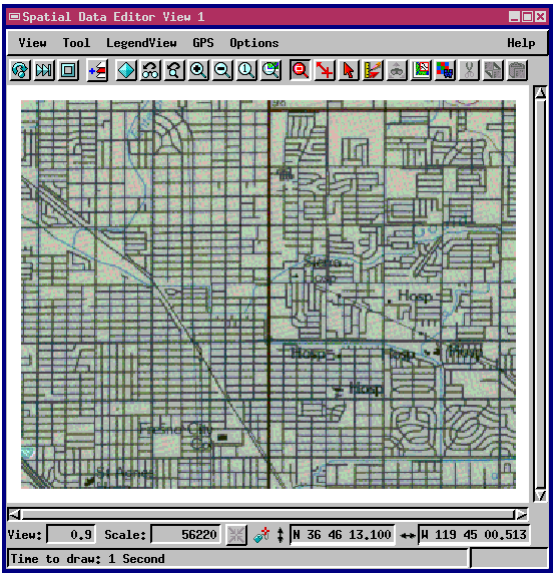
STEPS

- ☑ launch the Spatial Data Editor
- ☑ click the Add Reference Layer icon button 
- ☑ select the MAP_100 raster object from the NFRESGIS Project File in the EDITVECT sample data.

The MAP_100 raster object is a 333 x 269 composite color section of a scanned 1:100,000 paper map of Fresno, California. It is georeferenced to Latitude / Longitude map coordinates. Each raster cell represents approximately 20 meters on the ground. Since it already has georeference control, any new layers that you create using MAP_100 as a reference layer can automatically have the same georeference attributes.

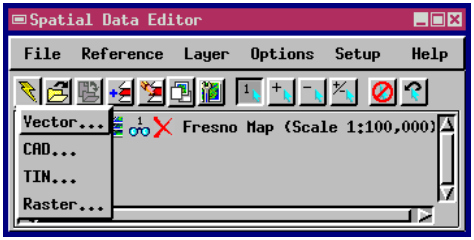
Launch the TNT Spatial Data Editor by selecting Edit / Spatial Data from the main TNTmips menu. TNTmips opens the Spatial Data Editor window. Most menus and icon buttons in this window are the same as those you are already familiar with in the Display / Spatial Data process.

First, add the reference layer. Click on the Add Reference Layer icon button, and use the standard TNT Select Object process to choose the MAP_100 raster object from the NFRESGIS Project File in the EDITVECT sample data.



Create a Geospatial Vector Object

Click the Create New Object icon button and select Vector from the drop down menu. TNTmips adds a new vector object to the layer list in the Spatial Data Editor window and opens a New Object Values window.



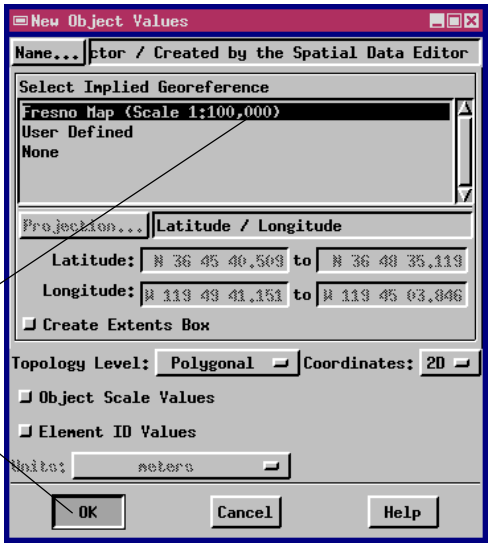
Use the New Object Values window to tell the Editor how your new vector object relates spatially to the MAP_100 reference layer. The first panel lists your choices for georeference, and by default, the selection highlight is on NFRESGIS / MAP_100. Choosing that item means that *your new vector object will have the same spatial extents, orientation, and map registration as the MAP_100 reference layer*. This is one of the important benefits of using a reference layer when you create new spatial objects: your new object can take its map control automatically from existing georeference, and thus it will automatically relate correctly to all of your other georeferenced project materials.

STEPS

- ☑ click the Create New Object icon button and select Vector from the menu

- ☑ click [OK] in the New Object Values window to copy georeference information from the selected MAP_100 reference raster

When you are finished, click the OK button at the bottom of the window. The editor copies the MAP_100 georeference control to your new vector object, and opens the Vector Tools window (described on the following pages).

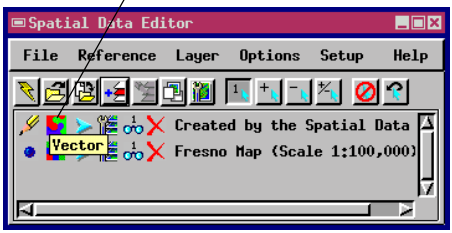


The New Object Values window offers to create georeference control derived from the MAP_100 reference layer. Press the OK button to accept.

Consult the reference manual to see how this window also lets you choose other map projections.

Change the Vector Line Style

Click an object's icon button to open its Display Controls window.



The Spatial Data Editor uses thin white lines as the default drawing style for vectors. For better visibility in this exercise, change the line color to red or some other bright color with a line thickness of 0.5 millimeters.

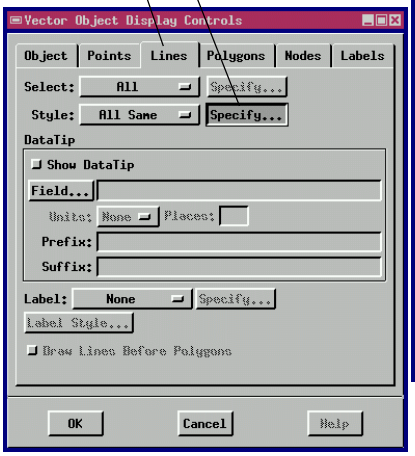
You can change line styles at any time during an editing session. You can save line style definitions and use a single style again and again. Since you are creating hydrology line elements in this exercise, you will eventually want them to display in blue. But since we are tracing over blue pixels in the reference raster, our intermediate work will be easier to see in red.

When you have finished changing the line style, click [OK] to close the Line Style Editor window, and then click [OK] to close the Display Controls window. When the Editor draws the line elements you will create, they will display in red.

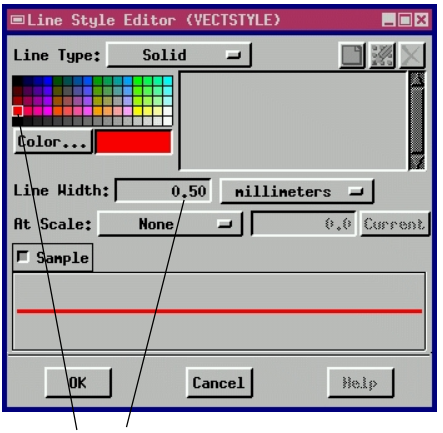
STEPS

- ☑ click the Vector icon button for the NewVector object 
- ☑ select the Lines tab
- ☑ click [Specify] for Style
- ☑ select red from the color palette
- ☑ change the Line Width value to 0.50 millimeters

Select the Lines tab and click [Specify] to open the style editor.

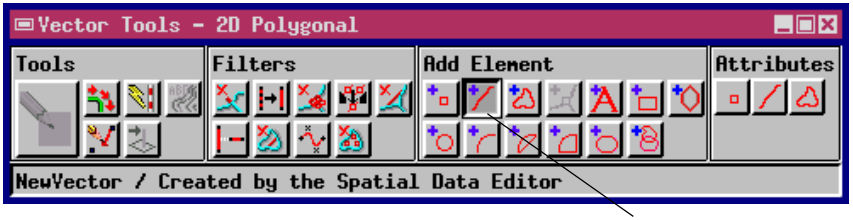


Vocabulary: Line thickness, color, and pattern are defined by the current **Line Style.**



Click on a red tile in the color palette and change the Line Width to 0.50 millimeters.

Select the Add Line Tool



The Add Line tool opens the Line / Polygon Edit Controls window.

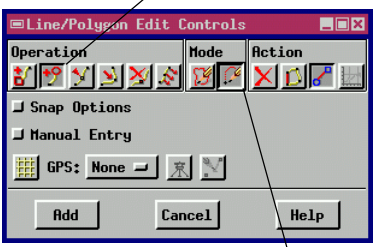
Whenever an editable vector object such as your NewVector is selected in the layer list, the editor opens the Vector Tools window. The Vector Tools window presents a selection of tools for creating and editing elements in a vector object. The large tool button on the left opens the Edit Element tool window (discussed later in this booklet) which is used to modify existing elements. Since you want to add new line elements, click the Add Line icon button in the top row.

STEPS

- ☑ click the Add Line button 
- ☑ change from Draw mode to Stretch mode 

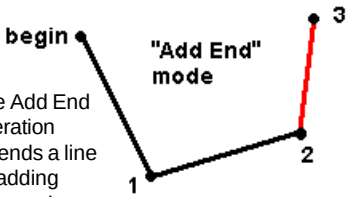
The Editor opens a Line / Polygon Edit Controls window. The Add End operation is the default selection.

The default operation is Add End

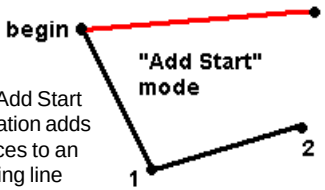


Change to Stretch mode.

Change the drawing mode from Draw to Stretch. The Stretch mode lets you see each new line segment and drag the position of its endpoint before you place it. For the tracing operations in these exercises, this ability to move a segment as you draw to align with the reference image underneath is very helpful.



The Add End operation extends a line by adding new vertices to the end.



The Add Start operation adds vertices to an existing line from the line's beginning.

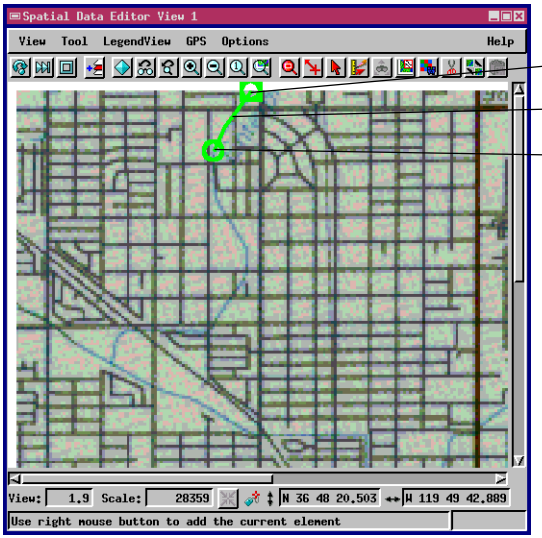
Add Line Segments

STEPS

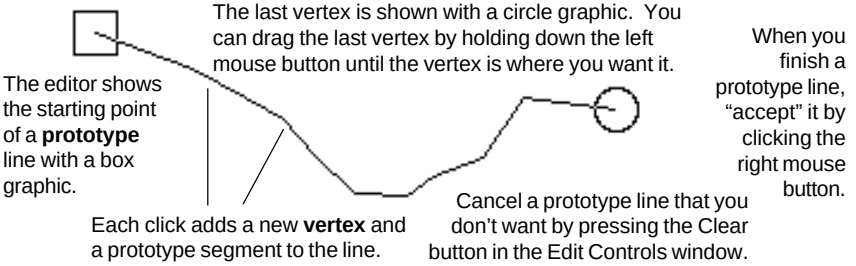
- ☑ zoom in on the hydrology feature
- ☑ click the Add Line button
- ☑ click the right mouse button to add prototype line segments
- ☑ drag each new vertex to adjust the position of the new line segment

You are now ready to begin tracing hydrology features, creating new line elements as you work.

Zoom in to enlarge the northwest corner of the map as illustrated. With the Add Line tool active, each time you click the mouse, the editor adds a vertex to the line element. Your first click defines the starting point of the line, so choose the place where the hydrology runs off the top edge of the reference map. Then move the cursor down a short distance and click on one of the blue hydrology map pixels.

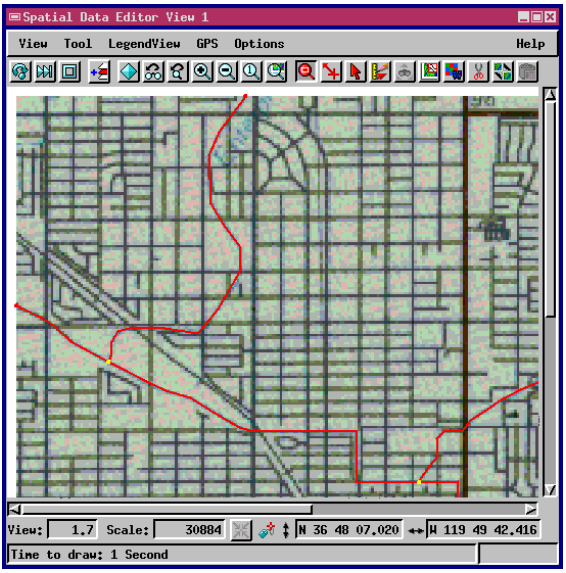


The editor draws a prototype segment that joins your first two click points. Click again, a little farther along the hydrology feature to add another segment. Since you are in stretch mode, you can drag out elastic segments by dragging each new vertex to just the right spot. The prototype line does not show in the red line style we selected as long as the line remains a prototype.



Accept Line Elements

Trace the prototype hydrology feature south to the place it joins the east-west hydrology feature. If you made mistakes and want to start over, cancel the prototype line by pressing the Clear button in the Edit Controls window. Otherwise, click the right mouse button when you finish a line to accept it. The editor redraws the new line element in the selected line style. (A later exercise describes techniques of deleting or reshaping a line after it has been added.)

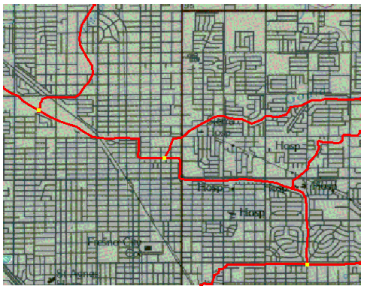


Add a second line element by tracing the east-west hydrology feature.

At any time, you can zoom in to work at a higher magnification, and use the scroll bars to continue working on a line that goes off the edge of the window. All of the standard display tools are available in the View window.

Add line elements for hydrology features across the entire map.

Zoom and pan until you have added line elements across the entire map.

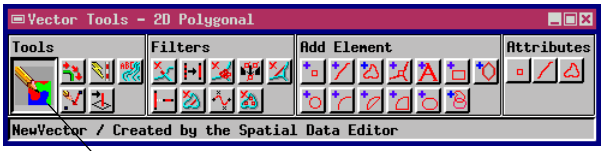


Cancel any prototype line you don't like by pressing the Clear icon button.

Save Early, Save Often

Choose File / Save from the main window. Use the standard select object techniques to select or create a Project File, and name your new object HYDROLOGY. The Spatial Data Editor also offers an autosave feature. To use autosave, select Preferences / Save from the Setup menu and specify how frequently you want a reminder to save your work.

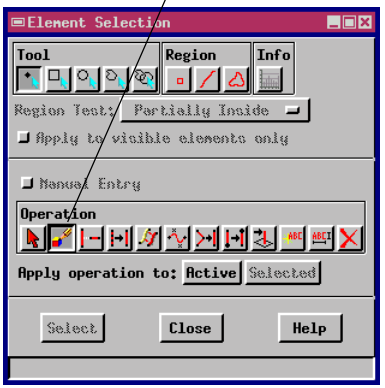
Select Existing Line Elements

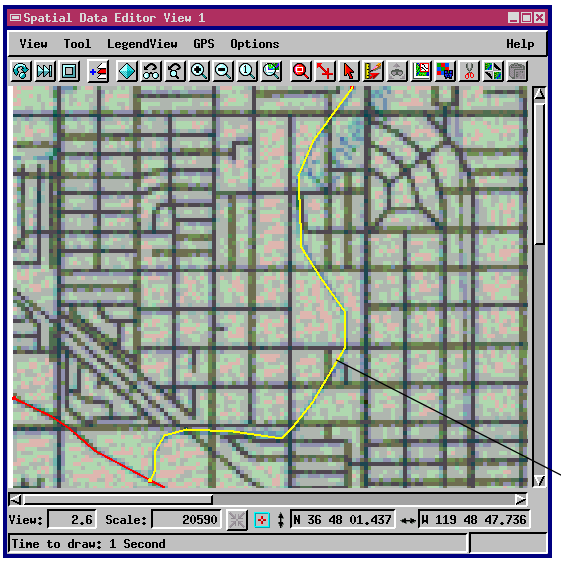


After you accept a line, the Editor draws it in the currently selected line style. You can extend it or change its shape with the edit tools.

STEPS
- ☑ choose Edit Elements ...
- ☑ click on the Edit Element operation

Select the Edit Elements tool in the Vector Tools window. The editor opens an Element Selection window. This window provides many editing controls, only a few of which are introduced in this booklet. As the window name implies, editing operations involve two steps: first, element selection, and second, element editing. Element selection can be complex, involving operations that are applied to multiple elements that are selected in a number of ways. (The Reference Manual provides more information on multiple element selection and editing.) In our simple example, you will select just one line element.





Click the icon the Edit Element operation in the Element Selection window. Then in the View window, select our first hydrology line element by clicking on it with the left mouse button. The editor displays **selected** lines in a special highlight color.

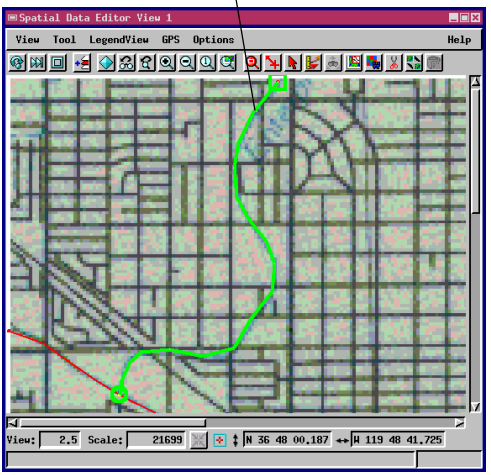
☑ click on a line element with the left mouse button to select it

Line Editing Operations

When a single line is selected, you can **activate** it for editing operations by clicking the right mouse button. The editor removes the line highlight, makes the line element **active**, and opens the Line / Polygon Edit Controls window (which was previously introduced).

You can reshape a line by inserting, deleting, or dragging vertices. To follow the example on this page, find a place where the line element you traced does not accurately follow the reference feature. Where the line element "cuts corners" on a curve, you will use the insert vertex tool to correct it. (Editing operations are described more fully on the next page.)

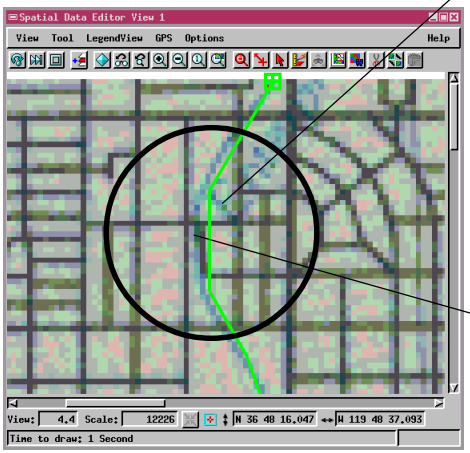
When a line element is **active** for editing, its highlight color is removed.

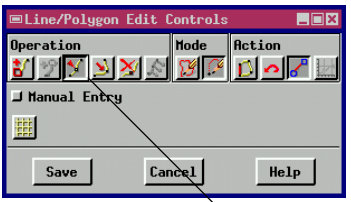


STEPS

- ☑ click the right mouse button to **activate** the line you selected in the previous exercise
- ☑ zoom in on a section that does not accurately follow its reference feature

Vocabulary: A **selected** line element becomes **active** when you click the right mouse button. Only an **active** line can be edited with the editing tools.





- ☑ select the Insert Vertex tool
- ☑ click the mouse pointer where you want new vertices. The editor automatically reshapes the line to include each new vertex.

Insert, Delete, and Drag Vertices

Practice on a line segment. If you want to keep your changes, click the right mouse button or [Save]. To discard your changes, click the [Cancel] button or just select a different editing function.

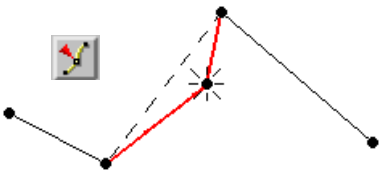
Practice using the three primary editing operations: Insert, Delete, and Drag. Zoom in on a line segment, perhaps choosing a segment that strays from its reference hydrology feature. Use the selection technique described on the previous pages to activate the segment, and open the Line / Polygon Edit Controls window.

Select the Insert, Drag, and Delete tools in turn and practice changing the shape of the line.

Delete vertices where too many errant mouse clicks wandered off the feature.

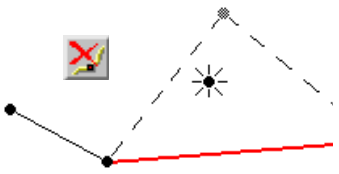
Insert vertices where too few mouse clicks did not conform to the complex shape of the feature.

Drag vertices where the mouse clicks missed the feature.



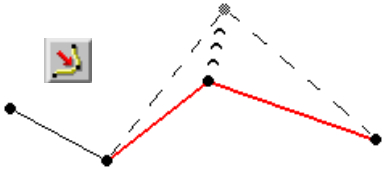
INSERT VERTEX

- single mouse click
- adds a new vertex at click point
- one segment becomes two



DELETE VERTEX

- single mouse click
- removes vertex nearest to click point
- two segments become one

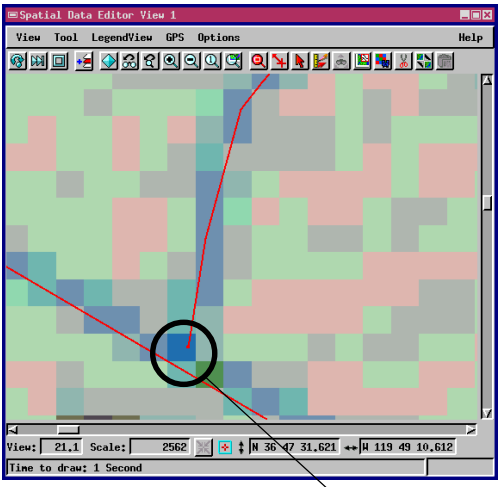


DRAG VERTEX

- drag with mouse
- moves a vertex
- number of segments does not change

Find and Close Gaps

Line elements that you create in the Spatial Data Editor should have no gaps as long as you do not disable the automatic snapping feature. The Spatial Data Editor joins the end of a new line to an existing line automatically whenever the new line is drawn within an adjustable snap tolerance distance.

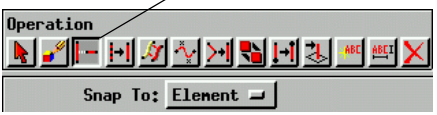


When you zoom in on an intersection, it may become apparent that the lines do not meet.

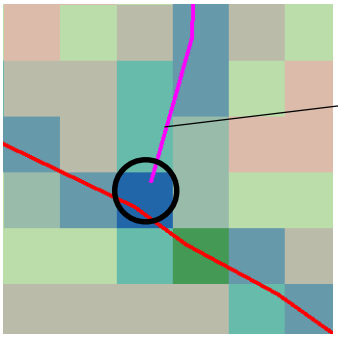
However, if you import vector line elements from external data sources, you may have unwanted gaps between line elements that should intersect. Gaps are often not apparent except at high zoom levels. You should check all intersections for possible gaps.

To close a gap, select the dangling line element. Click the Snap icon button in the Operations panel of the Element Selection window, and click the right mouse button to apply the Snap operation.

Snap icon button

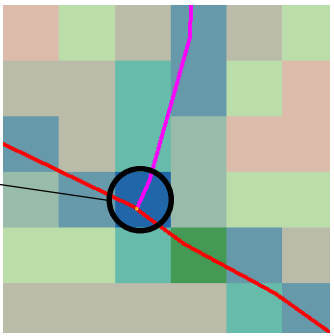


Advanced users can adjust the automatic snap threshold, and use a selection query to find dangling line elements automatically. (For details, refer to the Reference Manual.)



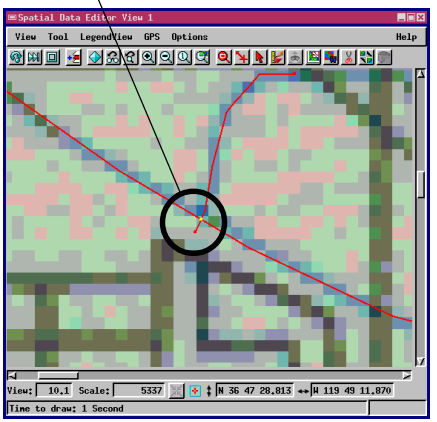
STEPS

- ☑ select the dangling line element
- ☑ apply the Snap operation to close the gap



Remove Overshoots

Zoom in on an intersection, to look for an **overshoot** where one line incorrectly extends past another.

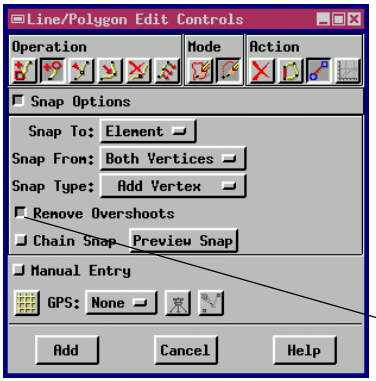


Line elements that you create in the Spatial Data Editor should have no overshoots as long as you do not disable the automatic Remove Overshoot feature. The Spatial Data Editor removes an overshoot automatically whenever the new line is drawn within the currently defined overshoot distance.

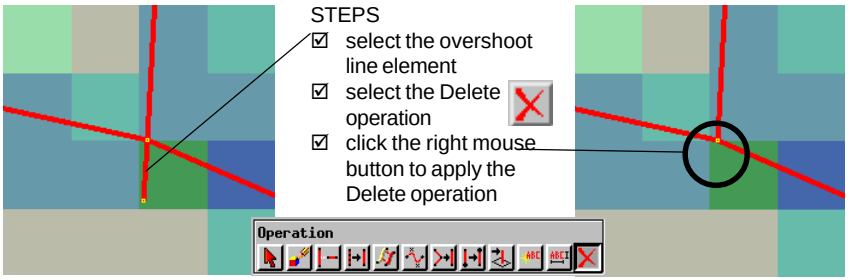
However, if you import vectors from external data sources, you may have unwanted overshoots that extend beyond line intersections. Overshoots are often visible only at high zoom levels.

To remove an overshoot, zoom in and select the short, unwanted overshoot line element. Click the Delete icon button in the Operations panel of the Element Selection window, and apply the Delete operation by clicking the right mouse button.

Advanced users can adjust the automatic overshoot threshold, and use a selection query to find overshoot line elements automatically. (Refer to the Reference Manual.)



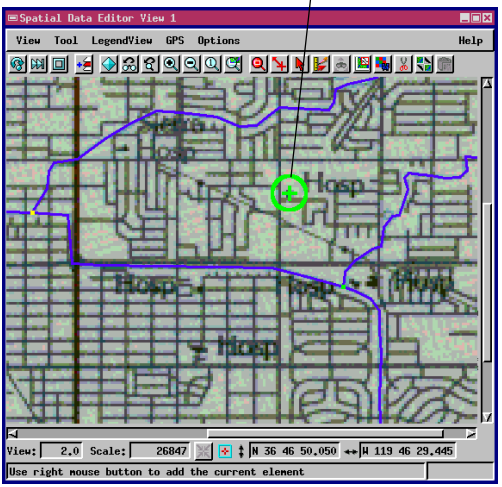
The Remove Overshoots toggle in the Snap Options panel makes the Spatial Data Editor remove overshoots in new lines automatically as you draw them.



Add Points

Five hospital locations are visible on the MAP_100 reference map. In this exercise, you will create a point element for each hospital.

Add a point for each hospital location.



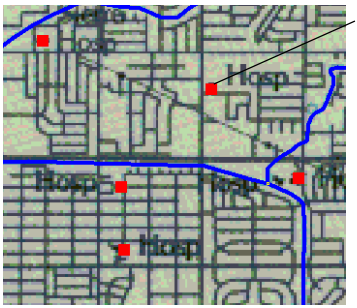
You could create a separate vector object for the hospitals (refer back to page 5), but for this exercise we will use your existing HYDROLOGY vector object. Click the Add Point icon button in the Vector Tools window. The Spatial Data Editor opens the Point Edit Controls window. The Latitude and Longitude fields in that window show the current position of the Add Point crosshair tool in the View window. You could type in map coordinates from the keyboard, but for this exercise, just click the left mouse button to position the crosshairs on a hospital. Click the right mouse button to add a point at the crosshairs. Add points for each of the five hospitals on the map.

You can edit the position of point elements using the same editing techniques as those described on page 10. You can change the drawing style using the same editing techniques as on page 6.

STEPS

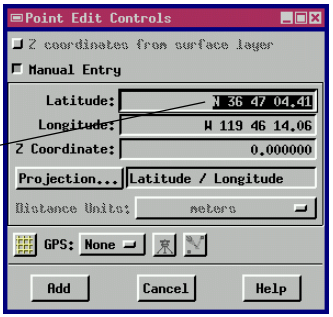
- ☑ select the Add Point tool 
- ☑ click the left mouse button on a hospital location
- ☑ place the point element by clicking the right mouse button

Drag the Add Point crosshair tool with the left mouse button, then click the right mouse button to place the point.



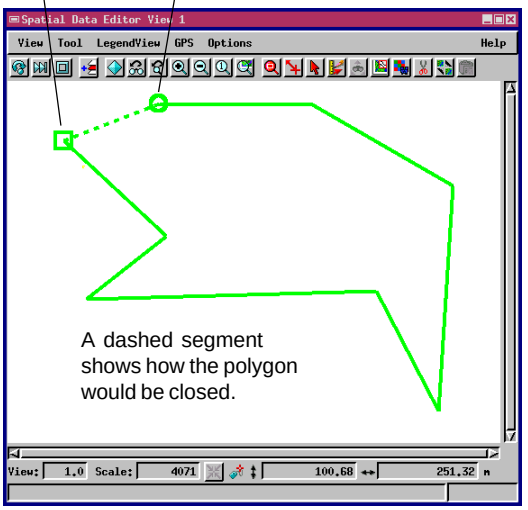
Five hospital locations are visible on the MAP_100 map.

You may edit map coordinates in the Manual Entry panel of the Point Edit Controls window.



Add Polygons

The Add Polygon tool is slightly more complex than the Add Line tool, which you already know how to use (see pages 7-9). As with the line tool, a polygon's initial vertex is indicated with a box, and the last vertex is indicated with a circle. The new thing you see in the polygon tool is a dashed line segment (between the initial vertex and the last vertex) which indicates how the polygon would be closed were you to complete it by clicking the right mouse button. All other aspects of the polygon tool are the same as the line tool.



For this exercise, remove the MAP_100 reference map and any other layers from the layer list. Then create a new vector object and select the Add Polygon tool. Place a series of vertices by clicking the left mouse button, and finish the polygon by clicking the right mouse button.

You can select and edit an existing polygon element the same way you select and edit a line element. Use the insert, delete, and drag operations to reshape a polygon.

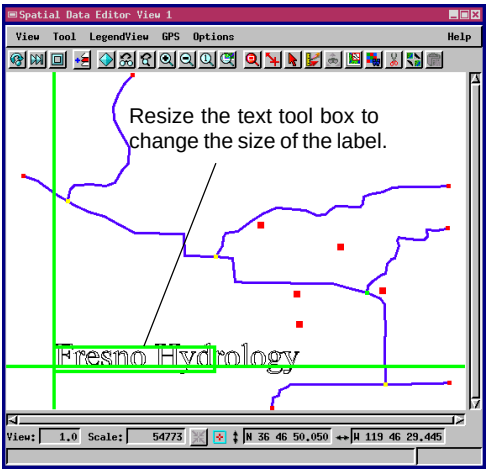
STEPS

- ☑ remove MAP_100 and any other layers 
- ☑ create a new vector object 
- ☑ select the Add Polygon tool 
- ☑ click the left mouse button to place a sequence of vertices
- ☑ click the right mouse button to complete the polygon

The Spatial Data Editor automatically maintains **topology** for all vector objects as you edit. The internal topology tables record information about things like line intersections and island polygons. Processes that work with vector objects rely on precise and dependable topology. You can update topology explicitly by selecting Validate from an object's Tools menu in the layer list. 

Add Labels

A **label** in a vector object is an element that has position and style information, just as a point element has. Just as you can change the drawing style and position of a point element, so you can change the font, text, size, and color of a label.



In this exercise, you will add a label element to the hydrology layer you created in an earlier exercise. First, remove the temporary polygon layer you created in the last exercise. Then open your Fresno HYDROLOGY object.

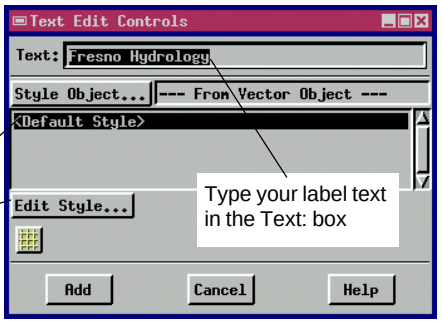
When the text tool is active, your left mouse button moves the text tool crosshair. Enter your label text in the Text Edit Controls window. Press the <Enter> key to finish typing, and your label text appears in outline on the screen at the text tool crosshair. To make the label larger or smaller, just resize the text tool box.

You can change the font style and color by clicking [Edit Style...] in the Text Edit Controls window. (The prototype label continues to display in outline until you finish it.)

When you click the right mouse button to finish the label, the editor displays it in the selected style. You can select and edit a label with the same selection technique you use for other elements.

STEPS

- ☑ open your HYDROLOGY object 
- ☑ select the Add Label tool 
- ☑ click the left mouse button to move the text crosshair
- ☑ type label text in the Text Edit Controls window
- ☑ change text size and style
- ☑ click the right mouse button to save the label

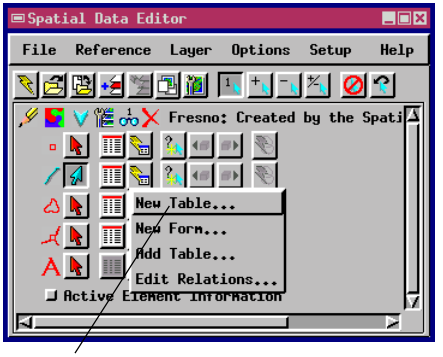


Create an Attribute Table

STEPS

☑ click Show Details in the layer list

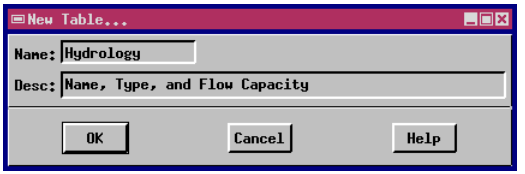
One of the most useful features that a geospatial system can offer is the association of tabular attribute values with each element. In this exercise, you will create a simple name, type, and flow capacity table for your Fresno HYDROLOGY.



☑ open the Make Table / Form icon menu for line elements and select New Table

Your HYDROLOGY object should still be open for editing from the last exercise. Click the Show Details icon button in the layer list. To create a table, select New Table from the Make Table/Form icon menu for line elements. Type in a name and description in the New Table window. When you click [OK], TNT opens a table definition window.

Follow the sequence illustrated below to create three fields: Name (type: *String*, width: *10*), Type (type: *String*, width: *10*), and CapacityCFS (type: *Integer*, width: *5*). Click the OK button to complete the table definition and close the definition window.

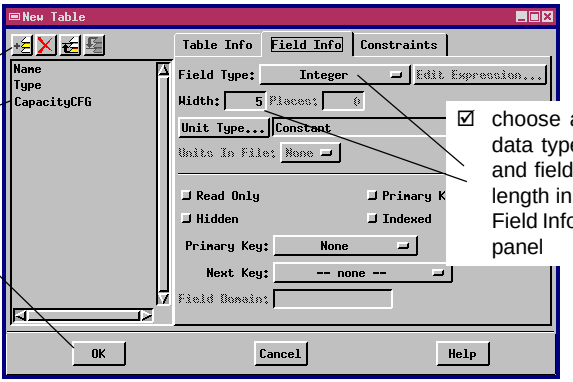


☑ give the new table a name and description

☑ to create a field, click [Add Field]

☑ select and edit the field name

☑ click [OK] after you have created all the fields you want.

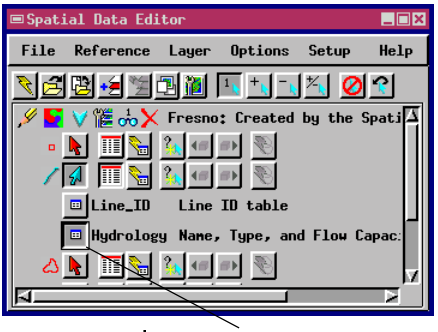


☑ choose a data type and field length in the Field Info panel

Refer to *Getting Started: Managing Geoattributes* for more on elements and associated tables.

Enter Attributes

In this exercise, you will enter name, type, and flow capacity data into the attribute table that you created in the previous exercise. For each line segment of the Fresno HYDROLOGY, you will enter the name of the feature, its type (canal, ditch, or creek), and its flow capacity expressed in cubic feet per second.



Click the View Table icon button for the HYDROLOGY table in the layer list to open the attribute table you created in the last exercise. TNT opens a Database View window. If your view shows multiple records, switch to single record view by selecting Single Record View from the Table menu. Select one of the HYDROLOGY line elements from the Spatial View window. Move the mouse cursor to the Database Record window (to give this window **keyboard focus**), and type in some practice attribute values.

Select each line element in turn, and enter attribute values in the Database Record window. Click the Attached toggle button to attach each new record to the currently selected element before going on to the next line element.

STEPS

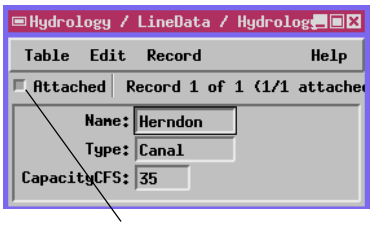
- ☑ open your new table from the database list

- ☑ select Single Record View from the Table menu

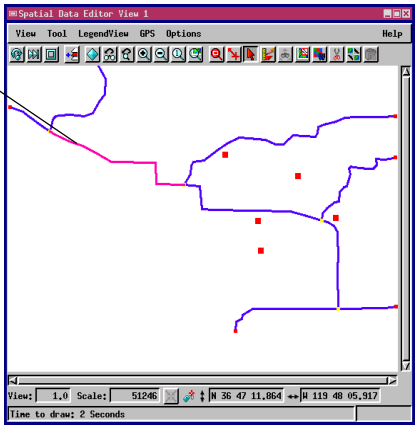
Vocabulary: before you can enter data from the keyboard, you must give the target window **keyboard focus** by moving the mouse cursor into that window.

You can create attribute tables for point, line, and polygon elements.

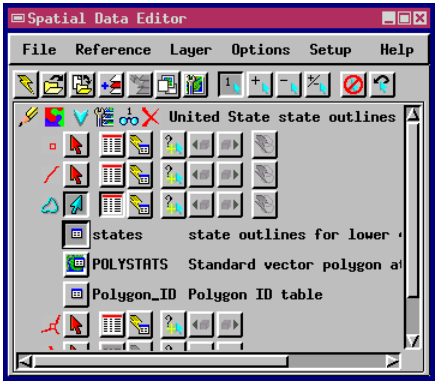
- ☑ click on a line element in the view window
- ☑ give the Database Record window **focus** by moving the mouse cursor to it
- ☑ type in some database values



- ☑ click the Attached toggle to attach the new record to the currently selected line element



Define a Key Field



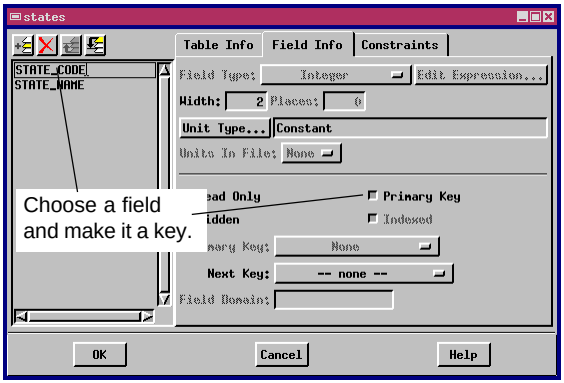
Although you can type in vector attributes from the keyboard, keyboard entry is tedious and error-prone if you are working with large existing databases. The next three exercises detail the steps you can follow to attach existing databases to vector elements. In this exercise, you will define a key field in an attribute table. In the next two exercises, you will import and associate a second database table through that key field.

STEPS

- ☑ open LITEDATA / USA / UNTDSTAT / STATES 
- ☑ open the STATES table from the table list for polygons 
- ☑ select Edit Definition from the Table menu
- ☑ select the STATE_CODE field and depress the Primary Key toggle button in the Field Info panel

Open the STATES vector object from the UNTDSTAT Project File in the sample litedata. The polygon elements have a STATES table that contains just two fields: STATE_CODE and STATE_NAME. The STATE_CODE field makes a good key for other tables to link through, since it contains the ID number used in all the U.S. Census surveys. By publishing STATE_CODE as a **Primary Key**, you make it possible to access any other table that has STATE_CODE data values.

Select Edit Definition from the Table menu in the database view window. Then in the database definition window, select STATE_CODE and depress the Primary Key toggle button. Click [OK] to complete the operation. Now other tables can link to the STATES polygons through STATE_CODE values.

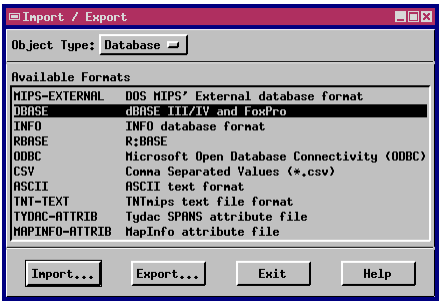


See *Getting Started: Managing Relational Databases.*

Vocabulary: a **Primary Key** is a field that other tables use to link through. For example, if a table attached to vector elements publishes its ID field as a Primary Key, then any other table that has a field containing ID data can link to the vector elements through that Primary Key.

Import an Attribute Table

Now that you have published the STATE_CODE field in the STATES table as a Primary Key, you are ready to import a population table to the STATES vector object. After you import the population table, its population values can be associated with their corresponding polygon elements.



First, close the STATES vector object so that the import process will be able to import the new database table. (As long as the Spatial Data Editor has an object open, the parent Project File is **locked** and cannot be used by other processes.)

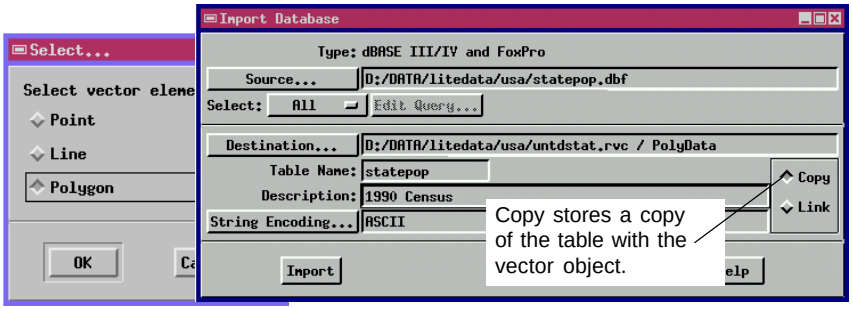
Select Import / Export from the TNTmips Process menu (or press the Import / Export menu bar icon in TNTedit). In the Import / Export window, select Database in the Object Type option button and DBASE from the format list. When you press [Import...], TNTmips opens the Import Database window. Click the Source button and select the STATEPOP.DBF file from the sample data. Click [Destination...] and select the UNTDSTAT Project File and the STATES vector object. TNT opens a Select window where you should depress the Polygon toggle, which tells the import process to associate the STATEPOP table with the polygon elements in STATES.

Click [OK] and [Import], and then exit the Import / Export process and return to the Spatial Data Editor.

Vocabulary: **File Locking** is the technique whereby one TNTmips process prevents any other TNTmips process from changing a file while the first process is using it. File locking allows many TNTmips users on a network to share Project Files safely.

STEPS

- ☑ close the Spatial Data Editor and select PROCESS / IMPORT/EXPORT from the main menu
- ☑ select Database from the Object Type option button
- ☑ select the DBASE format
- ☑ supply the import parameters illustrated



Link a Second Table by Key

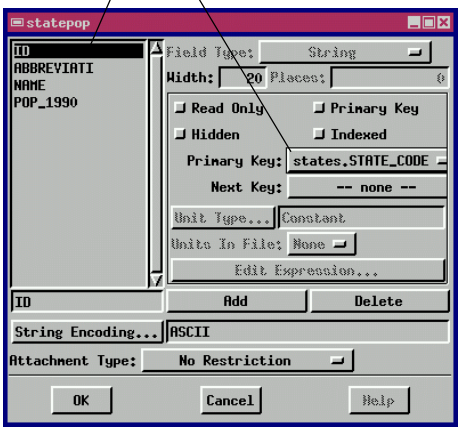
STEPS

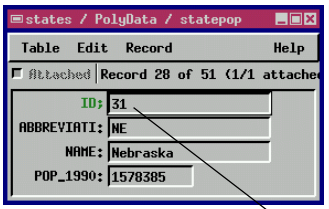
- ☑ open the STATES vector object and click Show Details in the layer list
- ☑ open the STATEPOP table from the table list for polygons
- ☑ select Edit Definition from the Table menu
- ☑ select the ID field and choose for the Primary Key STATES.STATE_CODE

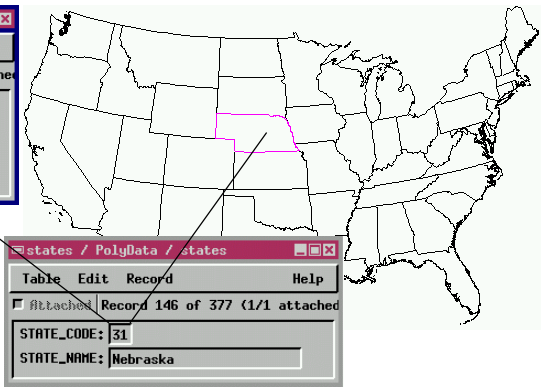
In the previous exercise, you imported the STATEPOP.DBF table as a polygon table in the STATES vector object. Now it's time to link the records of the STATEPOP table to particular polygon elements by choosing a key field.

Open STATES in the Spatial Data Editor and depress the polygons icon button for Attributes. Select the STATEPOP table from the database table list, and select Edit Definition from the Table menu in the Database View window.

The ID field in STATEPOP contains ID values that correspond to the values in the STATES table's STATE_CODE key field. Select ID from the STATEPOP field list. Open the Primary Key option button. Since you published the STATE_CODE field as a primary key for polygon elements in the exercise on page 20, the button shows STATES.STATE_CODE as a selection. Choose STATES.STATE_CODE and click [OK] to close the database definition window. Now you can select a polygon element in the Spatial View window, and the corresponding record in STATEPOP will be displayed.







The ID field in the STATEPOP table now links to the STATE_CODE key in the STATES table so the STATEPOP records relate correctly to STATES polygons.

Where Next?

This *Getting Started* booklet has introduced some of the basic techniques you need for creating and editing vector objects in the TNT Spatial Data Editor. Many powerful features were not mentioned. Be sure to look at the reference manual to investigate many other useful features.

As you approach editing tasks, consider what type of geospatial object is best suited to your application. The CAD object type is similar to the vector object type (and TNTmips has processes for CAD-Vector conversion), but the two types are not automatically interchangeable. Always use the **Vector object type** for applications that analyze the topological characteristics of vector elements. For example, if your application computes the area of polygons excluding the area of interior island polygons, then you must use the topologically rigorous vector object type. On the other hand, choose a **CAD object type** if your application does not depend on topological relationships. For example, to draw direct interpretations over an airphoto, the CAD type should suffice. (You can always convert from CAD to vector later.) CAD objects also support selectable and resizable geometric shapes. Thus you can draw a CAD circle element, and later reselect and resize it. By contrast, a "circle" in a vector object is drawn as a polygon with discrete vertices joined by short line segments. Once it has been drawn, you cannot select a "circle" in a vector object and resize it dynamically.

This *Getting Started* booklet is one in a series of booklets about the TNT Spatial Data Editor. Other titles in the series describe editing techniques for raster, CAD, TIN, and database objects. As your projects grow in size and complexity, be sure you tap into all the power of multi-layer, multi-object geospatial editing in TNTmips and TNTedit.

You can use the values from any attached database table to generate **Automatic Labels** in display and print processes.

Investigate the **Grid** tool for creating elements that automatically snap to an alignment grid.

A powerful **Query** tool lets you create complex queries so you can pan to and select elements according to their attributes. See *Getting Started: Building and Using Queries.*

Point and line elements can be assigned a z coordinate value, so you can edit the **3D attributes** of vector elements.

Interactive Line-Following lets you pick colors from line images in a raster object and trace vector line elements automatically.

Advanced Software for Geospatial Analysis

MicroImages, Inc. publishes a complete line of professional software for advanced geospatial data visualization, analysis, and publishing. Contact us or visit our web site for detailed product information.

TNTmips TNTmips is a professional system for fully integrated GIS, image analysis, CAD, TIN, desktop cartography, and geospatial database management.

TNTedit TNTedit provides interactive tools to create, georeference, and edit vector, image, CAD, TIN, and relational database project materials. TNTedit can access geospatial data in a wide variety of commercial and public formats.

TNTview TNTview has all the same powerful display features for complex visualization and interpretation of geospatial materials as TNTmips. TNTview is perfect for those who need flexible access to the TNT project materials but do not need the technical processing and preparation features of TNTmips.

TNTatlas TNTatlas lets you publish and distribute your spatial project materials on CD-ROM at low cost. TNTatlas CDs contain multiple versions of the TNTatlas software so that a single CD can be used on any popular computing platform.

TNTserver TNTserver lets you publish TNTatlases on the Internet or on your intranet. Navigate through massive geodata atlases with your web browser by using the free, open-source TNTclient Java applet (or any custom applet you create) to communicate with TNTserver.

TNTlite TNTlite is a free version of TNTmips, TNTedit, and TNTview for students and professionals with small projects. You can download TNTlite for your computer (about 100MB) from MicroImages' web site, or you can order TNTlite on CD-ROM with the current set of *Getting Started* tutorial booklets (shipping and reproduction charges apply).

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