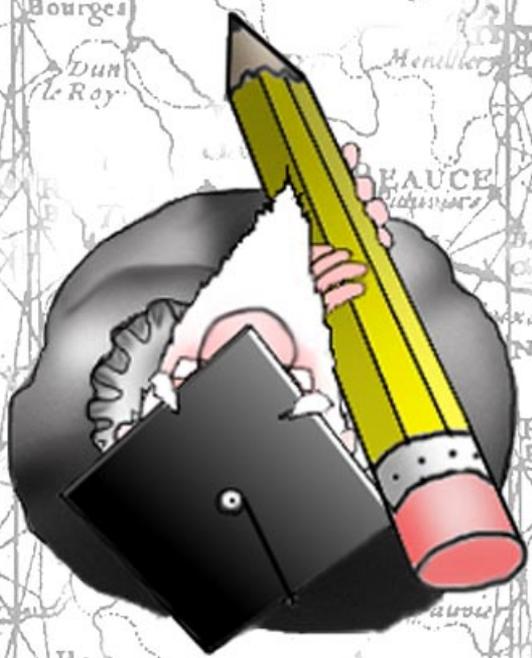


Tutorial



Advanced Vector Editing



with

TNTmips®

TNTedit™

Before Getting Started

The Editor in TNTmips® and TNTedit™ lets you create, alter, and update geospatial data in a robust editing environment that allows combination of multiple editable and reference layers for simple or complex editing tasks. This booklet introduces more advanced vector editing topics than are presented in the *Editing Vector Geodata* tutorial booklet.

Prerequisite Skills This booklet assumes you have completed the exercises in the *Displaying Geospatial Data*, *TNT Product Concepts*, and *Editing Vector Geodata* tutorial booklets. Those exercises introduce essential skills and basic techniques that are not covered again here. Please consult these booklets for any review you need.

Sample Data The exercises in this booklet use sample data distributed with the TNT products. If you do not have access to a TNT products DVD, you can download the data from MicroImages' web site. The exercises in this booklet use the Project Files in the EDITADV directory of DATA. You will also need the CB_COMP and CB_DLG Project Files from the CB_DATA directory. Although making a read-write copy of this sample data on your hard drive is not absolutely necessary because the Editor makes a copy of a file when it is opened, making a copy on your hard drive will generally speed access.

More Documentation This booklet is intended only as an introduction to some of the advanced features for vector editing in TNT's Editor. Consult the Technical Guides and Quick Guides for additional information.

TNTmips Pro, TNTmips Basic, and TNTmips Free TNTmips comes in three versions: TNTmips Pro, TNTmips Basic, and TNTmips Free. If you did not purchase the professional version, which requires a software license key, you are using TNTmips Free or TNTmips Basic. TNTmips Basic and Free limit the size of your project materials. All exercises in this booklet can be completed in TNTmips Free using the sample geodata provided.

Merri P. Skrdla, Ph.D., 16 December 2013

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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 of the newest tutorial booklets on other topics. You can download an installation guide, sample data, and the latest version of TNTmips Free.

<http://www.microimages.com>

Welcome to Advanced Vector Editing

The TNT products Editor lets you create and/or edit raster and geometric objects (vector, shape, CAD, and TIN). All of these data types can be open in the Editor at the same time for either editing or reference. There is an introductory booklet for editing each of these object types. You can also add Web Map Service (WMS) and ArcIMS layers for reference. Be sure you have gone through the introductory booklet for vectors (*Editing Vector Geodata*) before doing the exercises in this booklet as it is assumed you are already familiar with this process.

Vector editing has many additional intricacies, such as auto generated labels and setting contour Z values, not found for other object types. You can even select E00, Coverage, and shapefiles directly for editing and save in the original format if desired or convert the file to an object in RVC format within the Editor. Just be aware of the limitations of external formats if you choose to save to them. For example, if you create a new table for a shapefile, it is lost when saved in shapefile format, since shapefiles support only one associated database table. Shapefiles can also be edited in place if opened directly instead of using Object/Open External.

Unlike the Display process where all element types have selection off by default, the Editor has selection for all element types on by default. A big part of easing editing tasks is to have selection limited to the elements you want to work with at the time. Even the View window has Editor specific icon buttons (Cut, Copy, Paste, Undo, and Redo are on the View toolbar).

The Editor provides multiple step Undo functions for the editing changes you have made in multiple layers. There is also a single step Redo after any Undo for each of the editable layers.



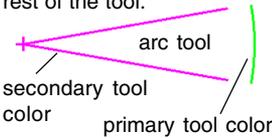
STEPS

- copy the files in the EDITADV data collection and the CB_COMP and CB_DLG Project files from the CB_DATA data collection to your local drive

The exercises on pages 4–5 and 8–9 introduce general topics that affect your operation in the Editor. Pages 6–7 discuss snapping to and auto tracing from elements in different layers. The intricacies of labeling are described on pages 10–17. Filters, panning by query, using 3D views, setting contour Z values, using external files, and cut/copy/paste are discussed on pages 18–23. Editing node positions to move attached lines, island polygons, holes for export, and keyboard shortcuts are described on pages 24–27. Pages 28–31 contain appendices concerned with assigning attributes, Vector Tools window components, differences between geometric object types, internal tables, and other tables that can be generated by TNTmips.

Editor Preferences

Vocabulary: Some tools, such as the arc and arc chord tools, have parts necessary for positioning and resizing that will not be part of the element added. For such tools, the **primary tool color** is used for the part that represents the element and the **secondary tool color** is used for the rest of the tool.



STEPS

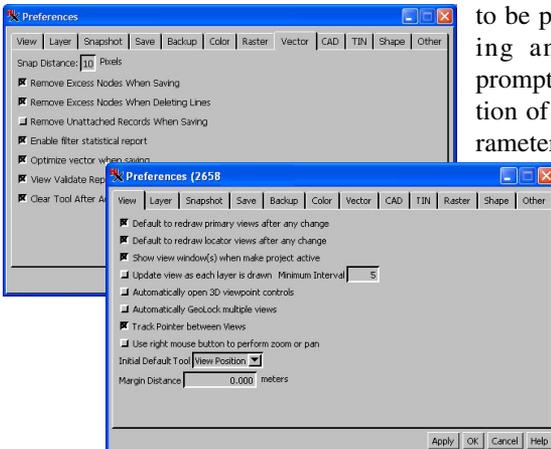
- select Main / Edit
- choose Setup / Preferences in the Editor Layer Manager window
- set the choices on the View and Layer panels to suit your own preferences
- browse the additional panels so you know what options are available

You have direct control over many aspects of the Editor's behavior through the Preferences window. Because editing takes place in a View window, many of the choices are the same as they are in the Display process. The options that are the same as in Display have the same meaning as in the Display process. For example, having the *Default to redraw after any change* option on sets the default state for new View windows to initiate a redraw whenever a layer is added or removed or has its drawing style changed. It does not initiate a redraw for editing changes made to the active layer.

The View and Layer panels each have one option unique to the Editor. The Margin Distance lets you define the distance (in meters) between your layers and the edge of the window when zoomed so that the layers fill the window. The default distance is zero meters, but you can enter a distance if you prefer a margin for ease in editing along the edge of your layers. If the distance you enter is not enough, you can use the Ruler tool in the GeoToolbox to determine an appropriate distance. In addition to the Display options on the Layer panel, you can choose to disable DataTips for the editable layer.

The Save panel lets you decide whether you want

to be prompted to save while editing and the time interval for prompting. You also have the option of saving separate display parameters for use in the Editor with your edited object. The Color panel lets you save the tool and preview colors and line widths. The Vector panel has parameters specific to vector objects and the Other panel has miscellaneous options for the Editor in general.



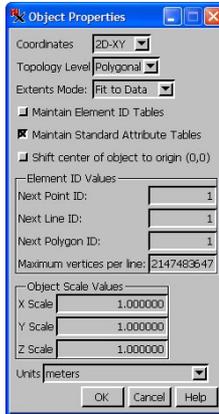
Object Properties

Most of the options in the New Object Values window that opens when you elect to create a new object also appear in the Object Properties window. The only properties that cannot be changed in the Editor once the object is created are the Coordinate Reference System (CRS) used to assign object coordinates and whether an extents box is added automatically.

If you want your new vector to have different extents or be in a different projection than your reference layer(s), choose User Defined from the choices listed for the implied georeference when making a new object. You can also use the User Defined option to set the CRS and extents for a new object in the absence of reference layers.

The X and Y Scale values are determined from an object's georeference, and values you enter will be ignored unless your vector has no georeference. Under such circumstances, you can choose to have your object coordinates in any supported units.

If you use Open External to edit ESRI data (E00, Coverage, or shapefiles), a *Convert to internal format* toggle also appears in the Object Properties window (above the Element ID Values panel). Turning the toggle on lets you save your changes in RVC format. Without the toggle on, objects are exported to their initial format when saved. Keep in mind that the ESRI format you are editing may not support all the editing changes you make. For example, shapefiles are limited to one element type (e.g., polygons or labels, not both), and Coverages are limited to lines with 500 vertices*.



Vocabulary: An object that uses georeference coordinates as object coordinates has **implied georeference**. A vector, CAD, or TIN object created using a raster to supply its georeference has implied georeference.

STEPS

- click on the Add Reference Objects  and choose `_16BIT_RGB` from the `CB_COMP` Project File and `HYDROLOGY` and `ROADS` from the `CB_DLG` Project File in the `cb_data` collection
- click on the Create New Object icon  and choose Vector
- note the options available in the New Object Values window (including expandable Object Scale and Element ID Values) and click [OK]
- choose Object / Properties from the Editor Layer Manager window and note the options available and current settings, then click [Cancel]
- keep this editing session open for the next three exercises

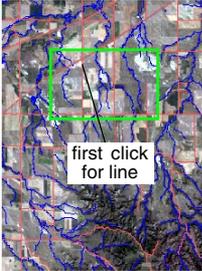
* Lines created in the Editor with more vertices will be broken into lines that fit in a Coverage when saved; labels and database tables added to an opened shapefile are lost if you save in the original format.

Snap to Elements in Different Layers

Vocabulary: The **snap distance** is how close you must be to an element for snapping to be active. The **snap layer** contains the elements used to determine the snapping position.

STEPS

- ☑ use the Zoom Box to enlarge display of the area outlined below



- ☑ click on the Add Line icon



- ☑ check that Snap From is set to Both Vertices in the Snap Options at the bottom of the Vector Tools window

- ☑ choose ROADS from the Snap Layer Option Menu

- ☑ click on the road at the field boundary shown below the road intersection

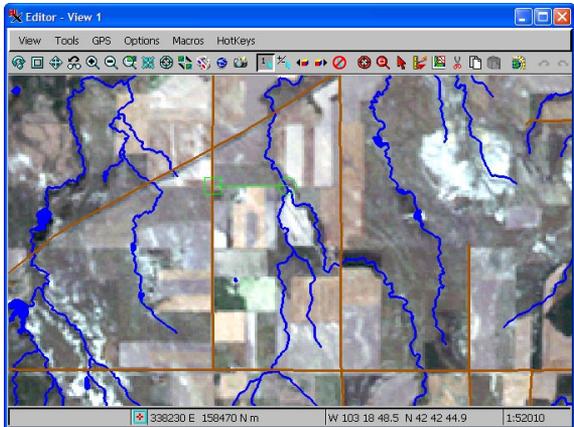
- ☑ next click on the stream to the right of your initial click

- ☑ choose HYDROLOGY from the Snap Layer Option Menu

Line elements created in the Editor will not have gaps unless the automatic snapping feature is turned off. The markers at the ends of the line tool change to the secondary tool color when you are within snapping distance of another element. The *Editing Vector Geodata* booklet describes how to snap lines to one another that should, but don't quite, meet in the layer you are editing. Such errors are often found in imported vector objects.

While snapping to existing lines in the same layer is quite useful, you may often want to snap to lines in a reference layer, such as a stream or road layer when drawing parcel boundaries. You may even want to snap different parts of the line to elements in different vector layers. The Editor lets you snap lines to elements in any vector layer loaded either for editing or reference.

The snap distance is set by vector preferences (page 4). When you change the snap layer, the line end markers change color depending on the proximity of elements in the newly selected layer. Changing the snap layer changes the position of the vertex only at the end of the line being added; previously snapped vertices, such as the start of the line in this exercise, remain at their original positions.



Auto-Tracing Line Segments

The Editor has three drawing modes when creating/editing lines: draw, stretch, and trace. The draw mode adds vertices to the line as you drag or click the mouse. The stretch mode lets you preview the line position as it stretches from the last added vertex, adding a vertex when the mouse button is released. The trace mode is only active when a layer other than the layer you are editing is selected as the snap layer. The Trace icon is in the icon row directly above the snap options.

The trace mode makes a vertex-by-vertex copy of the line in the snap layer between two successive mouse clicks. The tool will not work if the second mouse click is separated from the first by more than one node. The line snapped to in this example branches shortly after it is met. To trace the line with a minimum number of clicks, your next click should be after the first branch but before the second. Note that Close Line will trace a line in the snap layer if you are in trace mode.

If it appears that the Add Line tool is not working in trace mode with a vector of yours, first double-check that you have selected the intended snap layer, then zoom up to locate the source of the problem. You will generally discover a previously unseen “bubble” in the line, which means you were attempting to cross two nodes when tracing. Simply pick the preferred side of the bubble and click there and then click on down the line, or edit out the bubble then resume tracing.



STEPS

- note that the markers at the ends of the lines have changed color
- click on the Trace icon 
- click downstream on the left fork a little below the fork



- click on the stream below the next left fork at the field boundary shown
- click on the Trace icon again to turn it off, check that the Stretch icon is on, then select CROW BUTTE DLG ROADS from the Snap Layer Option Menu 



- click on the road to the left, adjusting the line to follow the field boundary
- click on Trace, then click on the Close icon 
- either right-click to add the line or click on [Add] 

Save / Restart Editing Sessions

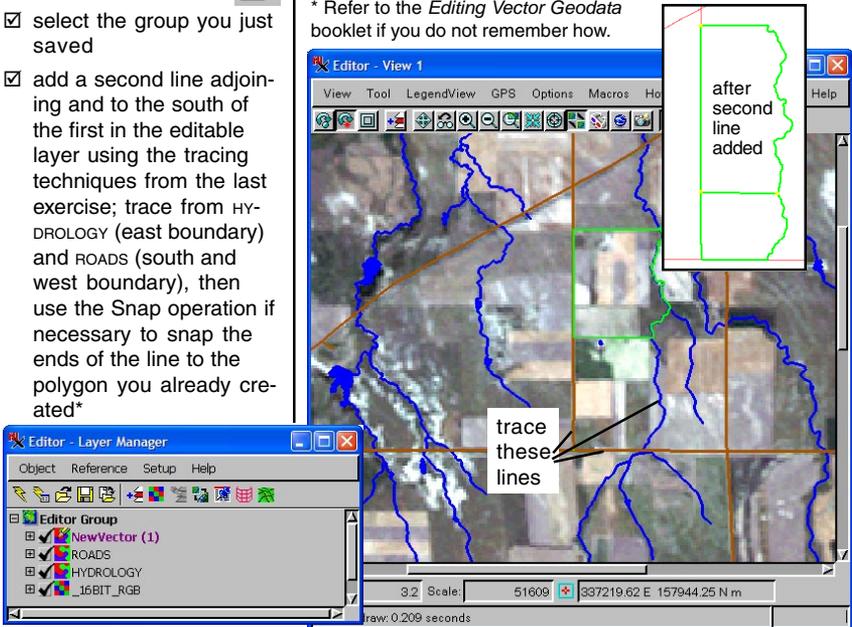
STEPS

- ☑ click on the Layer Controls icon for the NewVector layer and change the line drawing style to green and 2 screen pixels wide 
- ☑ choose Object / Save Group As
- ☑ create a new file and save the group in it
- ☑ you will next be asked to save your vector object; create a new object in the same file as the group
- ☑ choose Object / Exit in the Editor Layer Manager window
- ☑ choose Main / Edit from the TNTmips menu
- ☑ click on the Open icon in the Editor 
- ☑ select the group you just saved
- ☑ add a second line adjoining and to the south of the first in the editable layer using the tracing techniques from the last exercise; trace from HYDROLOGY (east boundary) and ROADS (south and west boundary), then use the Snap operation if necessary to snap the ends of the line to the polygon you already created*

Large editing projects or creation of new vector objects from reference layers may require several editing sessions. When you have a number of reference layers and possibly a number of editable layers, it is a great convenience to be able to save the group and reopen it just as it was. An editing session group not only saves all the layers but whether they were editable or reference layers and which layer was active. Other editing conditions, such as display style, preferences, and DataTips are also retained.

Groups saved in the Editor can also be opened in Display and vice versa. Obviously, information about which layers are editable will not be part of a group saved in display. If during the course of an editing session that started by opening a group you save an editable layer with a new name or add or remove layers, you will be asked if you want to save changes to the group when you exit.

* Refer to the *Editing Vector Geodata* booklet if you do not remember how.



Right Mouse Button Operations

The right mouse button menu (RMBM) lets you increase the speed at which you edit when switching frequently between editing operations for single elements. You can open an existing object and immediately begin editing, labeling, snapping, and deleting elements among other operations. Your right-click selects the element to perform the operation on using the search distance set in your preferences. If the operation you choose from the menu adds a panel to the Vector Tools window, such as for element editing, the panel closes when you right click or press the Save button to finish the operation.

Some of the right mouse button operations, such as assigning attributes and labeling, require specification of parameters for the operation.

When you want to use different parameters, you can either change what is specified for the right mouse button or you can run the operation from the Vector Tools window interface.

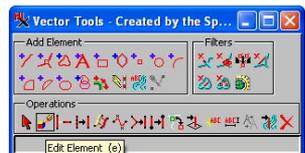
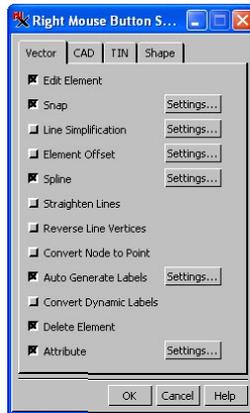
The right mouse button menu is not available unless an editable layer with at least one element is the active layer. It is also not available when you have selected an operation, such as adding or editing elements, that uses the right mouse button for other purposes. To make the RMBM active for choosing operations again, choose the Reposition, Zoom, or Select tool in the View window.

The Editor also has a number of hot keys to let you switch quickly between different tools, filters, and adding different element types. The hot key for each of these functions is shown in the ToolTip for the icon. A Quick Guide that lists all hot keys is available from MicroImages' web site.

STEPS

- create a new table in the polygon database with a One Record per Element attachment type and a single integer field of width 5 (see *Editing Vector Geodata or Managing Relational Databases* if you don't know how)
- choose Setup / Right Mouse Button
- turn on Attribute, click on [Settings], select the table you created as the Polygon table, and click [OK]
- turn on Auto Generate Labels, click on [Settings], set the polygons to label by attribute and choose the field in the table you created, also set the label height to 120 meters on the Metrics panel
- turn off selection of lines


- right click within the upper polygon choosing Attribute from the menu; enter 2045
- right click on the same polygon and choose Auto Generate Labels from the menu
- right click on the lower polygon and repeat steps 6 and 7, but enter 2046 as the value



Auto Labeling Multiple Elements

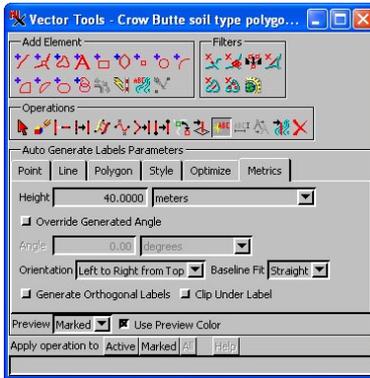
STEPS

- ☑ save the changes to your vector object, then choose Object / Close Group
- ☑ click on the Open icon and choose CBSOILS_LITE* from the CB_SOILS Project File 
- ☑ expand the layer, then right-click on the polygon entry and choose Mark All from the menu
- ☑ click on the Auto Generate Labels icon 
- ☑ on the Polygon tabbed panel, set the Label Type option menu to Attribute and select CLASS in the Table and Field columns
- ☑ also on the Polygon panel note the choices for label position but leave it set to the default of Fit Inside or Outside with Leader
- ☑ on the Metrics panel, enter 40 meters for the Height
- ☑ turn on the Use Preview Color toggle, then set the Preview option menu to Marked (below the tabbed panels)
- ☑ click on the Apply operation to Marked button
- ☑ choose Object / Save As and create a new object
- ☑ click on the Edit Element icon 

* Be sure to use the CBSOILS_LITE copied from the EDITADV directory. It has been specially prepared for this exercise.

The Auto Generate Labels operation creates labels for as many elements as you have selected. When used from the right mouse menu, only one element is selected at a time so only one element is labeled.

The Auto Generate Labels operation lets you generate labels for all element types in a single pass if you want the labels for all to be the same text style. Some of the controls on the auto label tabbed panels apply only to one element type. The choices on the Optimize panel apply only to points and the baseline fit and text direction options on the Metrics panel apply only to lines. Obviously, the options on the Point, Line, and Polygon panel apply only to that element type.



Automatically generated polygon labels are placed in the widest horizontal span of the polygon with preference given to the span that contains the centroid. By default if the widest span

is not large enough for the label, a suitable position is sought in the neighboring polygons and a leader line is added to indicate the polygon to which it refers (if attached to elements, see later exercise for other options).

There is an Attach to Element toggle on each of the element specific panels. For most labeling situations, this option should be left on. When a label is attached to an element, it is deleted when the element is deleted. When a label is not attached, leader lines are not added for labels outside associated polygons, and “slide along the line” editing is not available for line labels.

Editing Polygon Label Positions

Polygon labeling does not yet handle label collisions. Such collisions are most likely to occur when a label is placed outside its associated polygon since the best place for this displaced label may likely also be the best place for the label associated with the polygon where it is placed. The second stage of labeling is to find such labels and move them, which is done one label at a time with the Edit Element tool. When labels are on top of each other, you can tell which label is selected because the leader line is also highlighted for labels with leader lines. You have selected the label that belongs in the polygon if a leader line is not highlighted.

The label editing graphical tool has a number of operating parts with associated context-sensitive cursors. You can drag the label to a new position with the cursor over the middle of the label, which is indicated by the four-point arrow cursor. The right-hand arrow cursor indicates that one of the other sensitive parts of the tool is active. The boxes serve to change the angle of the label and dragging the + resizes the label. If you resize the label using this tool, you are asked whether you want to create a new text style, change the current text style, or ignore the style changes. Your label still remains at the new height when you right click, even if you choose ignore, because the adjusted height also becomes the new element height.

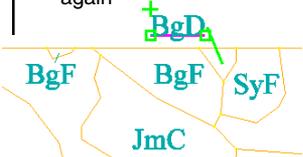
When you drag labels with leader lines, the leader line follows the label, which may result in the line running over the label depending on the label's initial and final positions. This situation is easily remedied by switching the active line from the baseline to the leader line and editing the leader line with the usual line editing tools. You can add a vertex and drag it so the leader line makes a turn between the point of attachment and the label.

STEPS

- turn off selection of all element types except labels in the Editor Layer Manager 
- zoom up on the polygon with label collisions at the middle top (give the View focus and use + key)
- click on the label with the leader line (BgD), then right-click



- click in the center of the label, and drag it up and outside the vector boundary, then right-click again



- reposition the view to near the right edge where there are a number of VaB and VaF labels that collide



- click then right-click on the VaB label for the smallest polygon, and drag it outside the vector boundary



- click on the Next icon in the Leaders row in the Edit Element Parameters panel, grab the endpoint in the middle of the text and drag it down to the baseline, then right-click 



Auto Labeling Lines

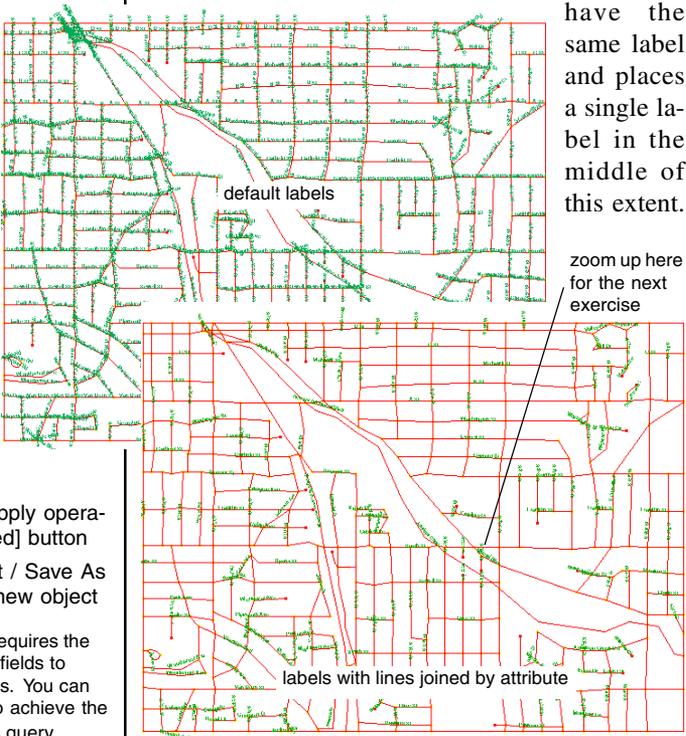
STEPS

- ☑ start a new editing session, choose Open and select the LINCOLNCENTRAL object in the STREETS Project File 
- ☑ expand the layer, then right-click, and choose Mark All for lines
- ☑ click on the Auto Generate Labels icon 
- ☑ on the Line tabbed panel of the Vector Tools set the Label Type option menu to By Script and select STREETS.QRY*
- ☑ on the Metrics panel, enter 30 meters for the Height and set the baseline fit to Exact
- ☑ turn on the Use Preview Color toggle and set the Preview option menu to Marked and note the number of labels
- ☑ toggle Join Lines by Attribute on (Line panel), again note the number of labels
- ☑ click on the Apply operation to: [Marked] button
- ☑ choose Object / Save As and create a new object

In many vector objects, a single feature is represented by multiple lines to maintain polygonal or planar topology. The object will determine whether you want each line labeled. Clearly, in the case of the extracted TIGER data used in this exercise, you do not. In the case of hydrology, you might want to label all tributary branches but not all segments of the major streams or rivers. In such a case, select by attribute and label all tributaries. Then manually select the line segments you want to label for the rivers and streams.

Two solutions are available to prevent “over labeling.” One is the Set Line Labels tool, which is discussed in a later exercise. The other is to join lines by attribute as done in this exercise. This option identifies all contiguous line segments that would

have the same label and places a single label in the middle of this extent.



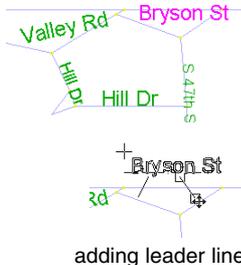
* TIGER/Line data requires the combination of four fields to produce street labels. You can click on Assistant to achieve the same results as this query.

Editing Line Label Positions

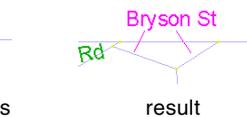
Unlike polygon labels, which can be moved anywhere when editing, line labels slide along the line to which they are attached when they are repositioned. If you want to move a label off a line, you can generate it with the Attach to Element option off or use the Detach Label from Line toggle when editing. Such labels can be repositioned anywhere you want and have leader lines added if desired. Adding leader lines is a feature of the label editing controls. You can even add multiple leader lines to a single label.

In addition to reducing the number of labels using line attributes as done in the previous exercise, you can elect not to label lines that are shorter than a specified length. This option is also on the Line tabbed panel when auto generating labels.

Individual label editing is not required for changes to some label parameters. You can select all labels or a smaller set of labels and change the element height, angle, style, and/or whether “clip under” is applied using the Label Attributes operation.



The initial label position is somewhat misleading, looking like it goes with the boundary rather than the two streets below.



STEPS

- click on the Edit Element icon 
- turn off selection of all elements except labels
- position the cursor where shown on the previous page and press 4
- click on the Normal Blvd label, then right click
- click and hold in the middle of the label while dragging it down and to the right as illustrated, then right click
- pan around and reposition labels as needed
- pan to the northeast corner of the vector, click on the Delete Element icon, select the Bryson St label, and right click 
- click on Auto Generate Labels, turn off the Attach to Element toggle, turn on selection for line elements, select the left line that was below the label, and right-click
- click on the Edit Element icon, select the newly added label, and right-click 
- enter 0 for the Baseline Angle, then move the label as illustrated 
- click on the Add Leader Line icon, then click at the base of the label, click again in the approximate desired position, and drag to the left associated line 
- repeat step 11 but drag to the right associated line, then right-click

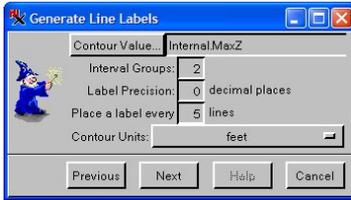
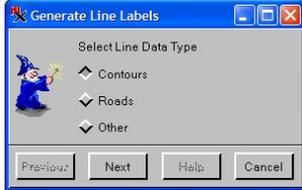
Set Line Labels: Contours

STEPS

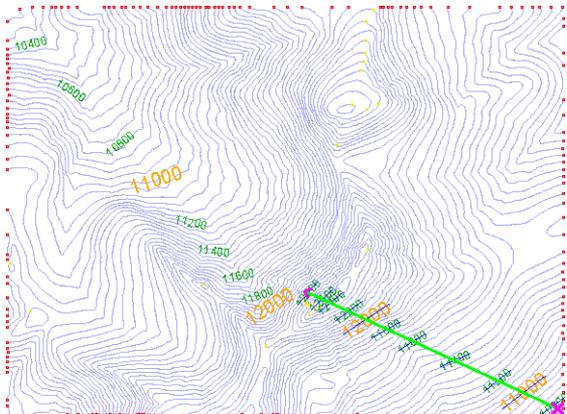
- ☑ save your work from the previous exercise, then remove the layer
- ☑ open the ELEVATION object in the CONTOURS Project File 
- ☑ click on the Set Line Labels tool  (Add Element panel)
- ☑ click on [Assistant], verify that Contours is selected, then click on [Next]
- ☑ set the Interval Groups to 2, Label Precision to 0 with labeling every 5 lines, and Contour Units to feet, then click on [Next]
- ☑ set the Major Contour Step Interval to 1000 feet, the Label Height to 100 meters, click on [Edit Style], and set the foreground color to orange, then click on [Next]
- ☑ set the label height for minor interval values to 60 meters, click on [Edit Style], set the foreground color to green, then click on [Finish]
- ☑ click on the third contour from the upper left and pull out a line down and to the right to just past 12000 feet; right click
- ☑ click on the second contour from the lower right and pull out a line up and to the left over the peak as shown; right click
- ☑ use Save As then remove the contour layer

The Set Line Labels tool lets you pick the label position by drawing a line on which the labels are centered. This tool is specifically designed for contours and TIGER data but will work with any vector object. An Assistant is provided to aid you in writing scripts to generate your labels.

When labeling contours, the Assistant generates a script that designates the line interval between labels, sets up interval groups (major and minor contours) and styles, establishes the units for labeling and does any necessary conversions, and establishes the elevation distance between major contours.



Once the script is generated, position the cursor on the first contour you want labeled, and pull the line out to the last contour you want labeled. In order for major and minor contours to appear, you need to make sure you start on a contour line such that a major contour falls at a multiple of the label interval from the initial line.



Set Line Labels: Roads

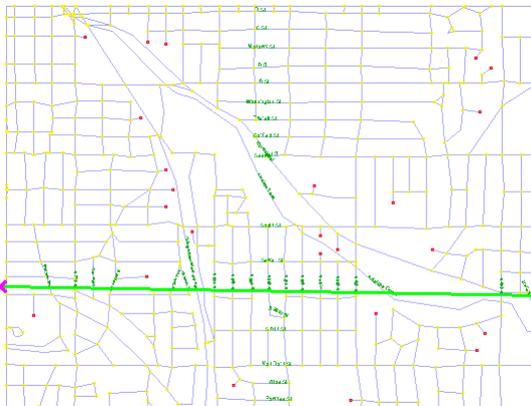
The Assistant for road labels automatically detects pre-shapefile TIGER database structure and fills in the four fields required to generate a complete street name. Other data types may have the entire name in a single field*. If so, choose this field for the road name, which is the only required field.

This tool used to be the method of choice for labeling streets. However, now that you can join lines by attribute and the Assistant has been incorporated in automatic label generation, it is more a matter of preference although the two additional orientation options available with the Set Line Labels tool may give better labeling results for some objects. This tool is still the method of choice for labeling contours, particularly when you want to impose major and minor contour styles.

The default line interval is one (Baseline panel), but in areas that have only numbered or lettered streets, you might elect to label every second or third street only.

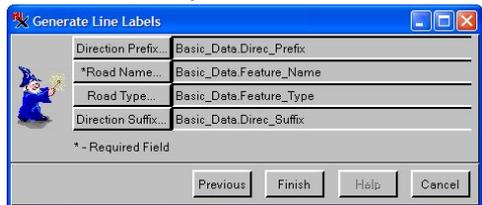
* includes TIGER files in shapefile format

The Left to Right from Tool and Right to Left from Tool orientations are particularly important for labeling lines that run at an angle together with vertical lines if you want all labels to read in the same direction.



STEPS

- choose Open and select the LINCOLN CENTRAL object in the STREETS Project File (the original object, not the one you labeled) 
- click on the Set Line Labels tool 
- click on [Assistant], click on the Roads toggle, then click on [Next]



- note the fields selected then click [Finish]
- set the Height to 30 meters (Metrics panel)
- click at the top of the vector object then hold and drag to the bottom and release
- change the label color if necessary (click on the Edit Style icon on the Style panel) 
- right click over the view, or click on [Assign]
- click at the left edge of the vector and drag across to the right edge
- on the Baseline panel, choose Left to Right from Tool for the Orientation and note that some of the labels flip
- right click over the view or click on [Add]
- save the layer (will be used on page 18)

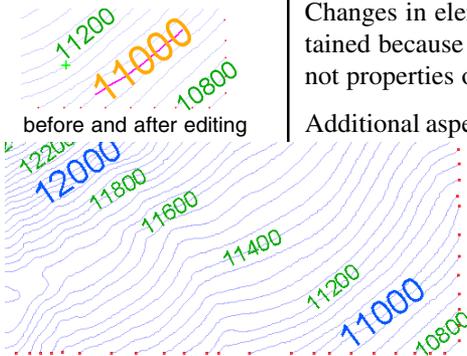
Editing Label Size and Style

STEPS

- ☑ remove the layer from the previous exercise, choose Open and select the labeled contour object you saved on p. 14 
- ☑ expand the layer, and turn off selection of all element types except labels
- ☑ click on the Edit Element icon, select the 11000 foot label at the lower right of the contours, and right-click 
- ☑ drag the + on the label tool down to make the text somewhat smaller, and change the text foreground color to blue (Edit Style, MajorContour)
- ☑ right-click and when the Text Style Changes window opens, choose Change current text style 
- ☑ note that other labels with the MajorContour style are also smaller and blue

Changing the height or other style parameters when editing individual labels introduces issues that must be resolved before continuing. Labels auto generated in a single pass generally all have the same style (unless otherwise defined by script). When you select a single label and change the font or other style parameter, the question is whether you want to change the font for all the labels that have the same style or change the font for the selected label only. In the latter case, you need to create a new text style so the selected label can be displayed differently than the others.

You do not have to remember to create the new text style—the Editor asks what you want to do when you make a change that affects the style. Your options are to create a new text style, change the current text style, or ignore the text style changes. If the first option is chosen, a new style is created with the settings you chose. The only label with that style assigned is the label just edited. You can assign the style to other selected elements later if desired. (When you want to change the style of a number of elements, you should use the Label Attributes operation rather than the Edit Element operation.) If the second option is chosen, all labels using the same style will be changed to match the edited label. The third option is not quite equivalent to cancel. Changes in element height and label angle are retained because these are properties of the text and not properties of the style.



Additional aspects of label style, such as frame and leader type, are controlled from the object's Layer Controls window.

After editing one label, the other labels drawn in the same text style also change if you elect to change the current text style.

Convert Dynamic Labels to Fixed Labels

The TNT products offer two label types for vector objects: dynamic labels and permanent, or fixed, labels. Dynamic labels are generated when the object is displayed while permanent labels are elements in the vector object that may have been imported or generated in the Editor. Dynamic point and polygon labels have a number of positioning options. All dynamic labels have the same style and while there are optimization options for point labels, polygon labels may collide.

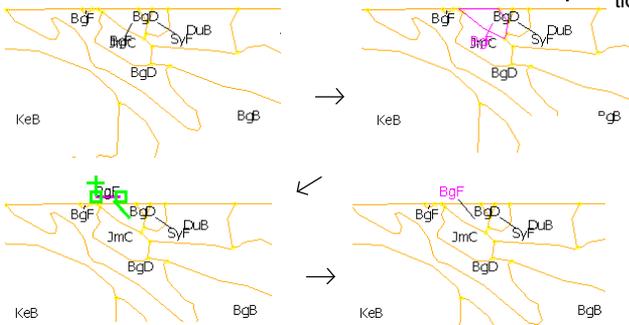
There are three ways to create fixed labels in the Editor: add text labels not associated with (attached to) any element; auto-generate labels for selected points, lines, or polygons using entered text, attributes, or a script; and converting dynamic labels to permanent labels for selected points, lines, or polygons. When you convert dynamic labels to fixed labels, the style and positioning set for the dynamic label are maintained. You can then change the style or move the fixed label as desired using the techniques learned in earlier exercises.

You can convert all dynamic labels to fixed labels or only convert labels associated with selected elements, thus you can have both dynamic and fixed labels for an object. Dynamic labels are not drawn for elements with an associated fixed label.

* The position of dynamic labels will change with zoom level. Make sure to do this step at the zoom level you will use for editing.

STEPS

- remove the layer from the previous exercise, choose Open and select CBSOILS_LITE from the cb_soils Project File
- click on the Layer Controls icon for the opened layer 
- on the Polygons panel set Dynamic Labels Text to By Attribute, click on [Specify], and select CLASS.Class with Position Fit Inside or Outside with Leader, set the Text Style to 5 points at 64000, and click OK
- click on the Select tool to select a polygon labeled outside in a position in conflict with the label in a neighboring polygon* 
- click on Convert Dynamic Labels, then on Active 
- clear selected elements, turn off selection for all element types except labels, then click on the Edit Element icon, select and move the label to a non-conflicting location, then right-click 



To convert individual labels, select the element they are attached to then choose the Convert Dynamic Labels operation.

Filter Tools and Operations

STEPS

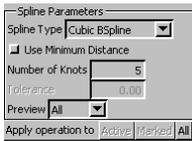
- ☑ remove the layer from the previous exercise, choose Open and select the labeled streets object you saved on p. 15



- ☑ click on the Spline icon



- ☑ choose Cubic BSpline and set the number of knots to 5

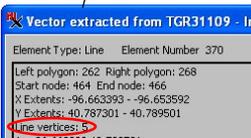
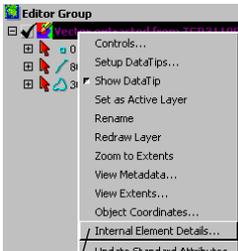


- ☑ set the Preview option to All

- ☑ click on the Select tool in the View window and select the line in the lower right quadrant that shows the greatest difference



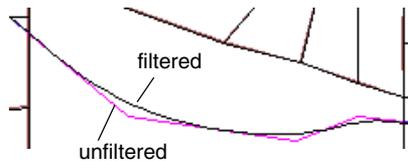
- ☑ right-click on the object line in the Layer Manager, choose Internal Element Details, and note the number of vertices



The Editor provides seven filtering tools and three related operations: Dangling Lines, Remove Bubble Polygons, Remove Excess Nodes, Sliver Polygons, Dissolve Polygons, Remove Island Polygons, and Remove by Script filters, and the Snap, Line Simplification, and Spline operations. Each of the filter tools works on the entire vector object using parameters you set, while the operations will work on selected elements. If you want to apply a filter to a subset of the elements, choose Geometric / Filter to do your filtering. Filters also have a test mode and provide a report, with the exception of the Remove Excess Nodes filter. The operations have a Preview mode and do not provide a report. If you want more information about changes to your vector object made by applying these operations, you can look at internal element details or use the Geometric/Filter process.

Each of the filters and the operations mentioned above, again with the exception of Remove Excess Nodes, add a relevant parameters panel to the Vector Tools window. When you run a test, the lines that will be drawn after filtering are drawn in the color shown on the test color button. You can change this color by clicking on the button. Any lines drawn in the original line color in the test image will not be there after the filter is run. After running a test, you can get quantitative results by clicking on the Report button. The report provides the number of vertices added / removed, the number of nodes, lines, polygons, or islands removed. You can compare internal element details before and after applying one of the operations for similar information.

Little is changed except the depiction of Antelope Creek using the Cubic BSpline filter.

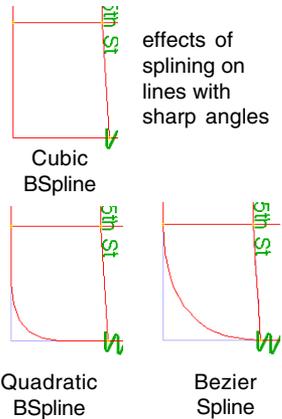
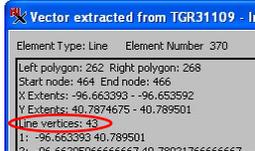


Filter Expectations

The splining operation adds vertices to lines to make the lines better approximate a smooth curve. Since it is adding vertices to the line, it is also known as line densification. There are three different spline types to choose from: Cubic BSpline, Quadratic BSpline, and Bezier Spline. Cubic BSpline is best for cases in which you wish to retain sharp angles in the absence of a node. Splining is also part of the line simplification filter and can be applied before the thinning takes place.

Use of filters for cleaning up common problems in raster to vector conversion is described in the *Digitizing Soil Maps* booklet. The Internal Element Details menu choice used in this pair of exercises provides information about the current active element. If a set of elements is marked, you can step through all of them using the Previous Marked and Next Marked icons on the View window toolbar. The Undo feature used in this exercise may also be important to completion of your editing tasks.

Filters can take care of many problems, but manual editing is still often required. Many filters have similar goals. For example, Remove Bubble Polygons, Remove Sliver Polygons, and Remove Island Polygons all seek to remove small intrusions in your vector objects. Polygons, however, cannot always be deleted even if they meet the filter criteria. Remove Bubble Polygons and Remove Sliver Polygons always delete one of the lines in the identified polygon. For the other filters to remove a polygon, it must be a one-line polygon or an island polygon or it must border the universal polygon (the line being eliminated to delete the polygon must have left or right polygon == 0).



- close the Internal Element Details window
- apply the Spline filter to the active element, then open the Internal Element Details window noting the difference in the number of vertices in the active line
- click on Undo and close the Internal Element Details window 
- change the number of knots to 10, apply the filter to the active element, then open the Internal Element Details window again noting the difference in the number of vertices in the active line
- remove this layer before beginning the next exercise

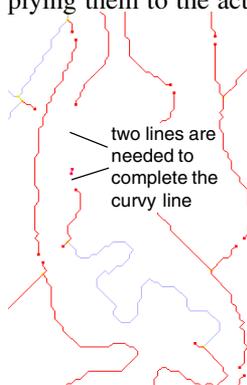
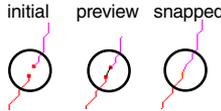
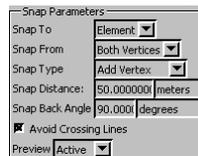
Using Pan By Query for Editing

STEPS

- open the AUTOTRACED SOILS object in the SOILSCONV Project File 
- turn off selection of all element types except lines and zoom in twice
- right-click on  615 lines the line elements entry, choose Mark by Query, click on the Open icon on the Script tab, and select DANGLINE.QRY
- click on [Apply] and note your view has shifted and the gap between the active element and the line to its north
- choose the Snap Operation, set parameters as shown and apply the previewed snap to the [Active] element 
- click on the Next Marked icon in the View window 
- notice another line in the view is now highlighted and has a snap preview, then click [Active]
- click on Next Marked, choose the Delete operation, and click on [Active] 
- click on Next Marked, then on the Add Line tool, and add lines to fill in the blanks in the curvy line
- click on Apply in the Mark By Query window, and continue stepping through and editing elements until you get the basic idea*

Generally, when you are at a zoom level useful for editing elements, the full vector object is not visible in the view. You, thus, need a means of getting from one marked element to the next. Pan by query refers to marking by query then stepping through each of the marked elements for editing considerations, which includes panning the view to center the active element if it is not already in the view window. Because TNTmips uses the concept of active and marked elements, you can mark a large number of elements and evaluate each in turn taking the necessary editing steps for individual elements and applying the change to the active element only.

This exercise utilizes a vector object created from a scanned soil map using Convert / Raster to Geometric Lines for raster to vector conversion. The vector has many extraneous lines and gaps in what should be continuous lines. The majority of these problems can be identified by selecting dangling lines (a line that is not attached to another line at one or both ends). You can step through these elements one by one, taking any editing actions necessary and applying them to the active element only.



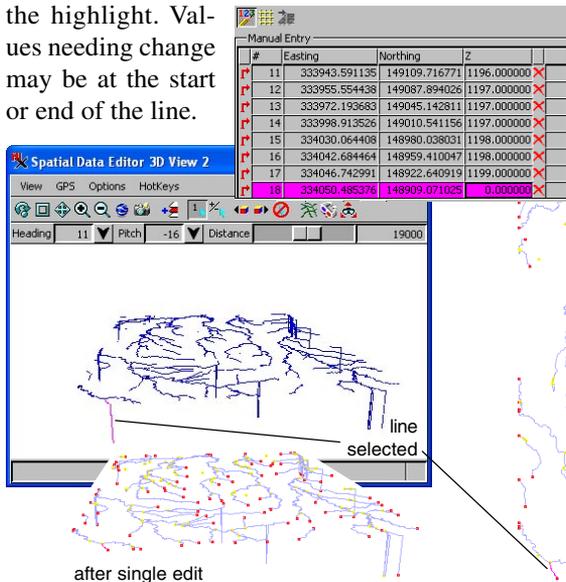
When you click on the Next Marked button, the view does not pan if the new active element is visible. This object contains many very short lines, which may be difficult to identify as marked. If the view has panned, the active element is centered.

* It is not intended that you clean up the entire vector. Pan by query is generally a finishing step in editing.

Using 3D Views to Assist with Editing

When 3D vectors are created using Convert / 2D to 3D Vector and the raster used to provide the elevation values has smaller extents than the vector or contains null or anomalous values, some line vertices may have incorrect elevation values. You can readily identify the presence of such lines in a 3D view because they drop precipitously (unless your data happens to be near sea level). The anomalies could also appear as spikes.

The vector object edited in this exercise has 15 lines with endpoint values of zero. The editing strategy is to find these lines and change the value of the endpoint to that of the nearest vertex. If multiple vertices have incorrect values, you may want to vary the values assigned. You could use pan by query with this vector object, but that only works when the anomalous value is known. You cannot select elements directly in the 3D view, but elements selected in the 2D view are also highlighted in 3D so you can confirm you have the correct element selected. You may have to redraw the 3D view to see the highlight. Values needing change may be at the start or end of the line.



STEPS

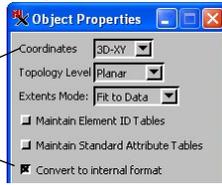
- remove the layer from the previous exercise and open `_3D_VECTOR` from the HYDROL Project File 
- choose Reference / Open 3D View, and adjust the viewpoint to 
- choose Edit Element, select the line at the lower left, and right-click 
- turn on the Manual Entry toggle, scroll to the bottom of the list, and select vertex 18 
- change the Z coordinate from 0 to 1199
- click on [Save]
- locate other lines needing editing by clicking in the 2D view and confirming the correct line is selected in 3D, and edit as above
- remove the layer

Set Contour Z Values, External Files

STEPS

- ☑ choose Object / Open External / ArcView Shapefile format, select MFI.SHP, and accept the defaults in the Import Parameters window
- ☑ choose Object/Properties, change the Coordinates option from 2D-XY to 3D-XY, and turn on the Convert to internal format toggle
- ☑ click on the Set Contour Z Values button from the Operations panel of the Vector Tools window
- ☑ set the Start value to 60500, the Interval to 500, the Assignment Type to Downhill, the Assign Color to Major Interval to 5000, then click on [Interval Colors], and assign orange for the Major Interval and green for the Minor Interval
- ☑ click inside the central circle, drag down past the lowest left contour, release, and right-click*
- ☑ repeat step 5, but drag to the lowest right contour

The TNT Editor lets you choose external file types, (e.g., E00, Coverage, and Shapefiles, for editing. You then have the option of converting them to internal format (RVC) or saving them in their original format. Shapefiles can also be opened directly (Object / Open), but they are edited in place and use the vector tools rather than the shape tools if that path is taken.



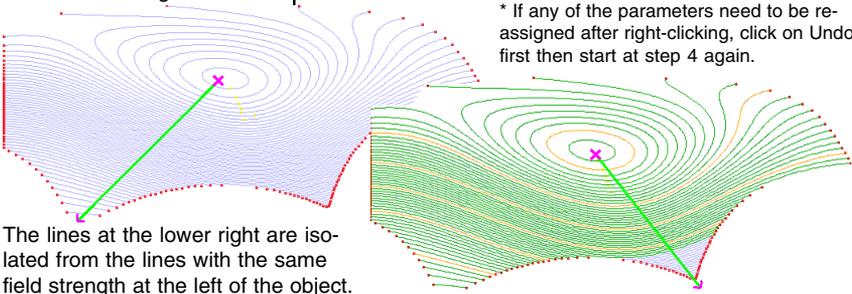
The shapefile used in this exercise does not have 3D coordinates, but the database contains the information to assign values to the isolines for magnetic field strength over North America. The Set Contour Z Value tool will automatically change the object coordinates from 2D-XY to 3D-XY if you do not change it in the Object Properties.



If you are familiar with ArcView, you may notice that this shapefile has been modified from the original—many of the standard fields have been deleted. The

modification was made to assist you in this exercise because many of the isolines were actually 2 or 3 lines that could not be combined by removing excess nodes because unique information not related to magnetic field intensity, such as line number and length, was included.

* If any of the parameters need to be re-assigned after right-clicking, click on Undo first then start at step 4 again.



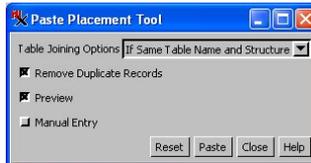
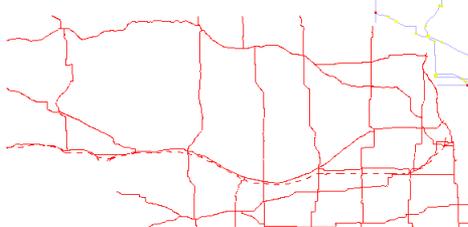
The lines at the lower right are isolated from the lines with the same field strength at the left of the object.

Cut, Copy, and Paste

Cut, copy, and paste are familiar functions in word processing. You have to either cut or copy to have something to paste. Using cut removes the elements from their original location, while copy leaves them in place. In the Editor, you can copy from an editable or reference layer, but an editable layer must be active for the cut and paste functions to be available. The cut, copy, and paste icons on the View window toolbar are for use with raster and vector layers only. When using these tools with rasters, they work between rasters of the same data type only. You can achieve the same ends in a CAD object by saving and inserting blocks.

You can cut or copy selected elements, selected elements within a region, or all elements within a region. When you choose Paste, a placement rectangle appears so you can verify that the position is correct before pasting. This rectangle is positioned by georeference. If georeferencing is not highly accurate, some repositioning or resizing to obtain the best fit may be necessary. Open the Manual Entry panel for precise controls or interactively resize and reposition the rectangle. In the absence of georeference, object coordinates are used to determine where the placement rectangle goes.

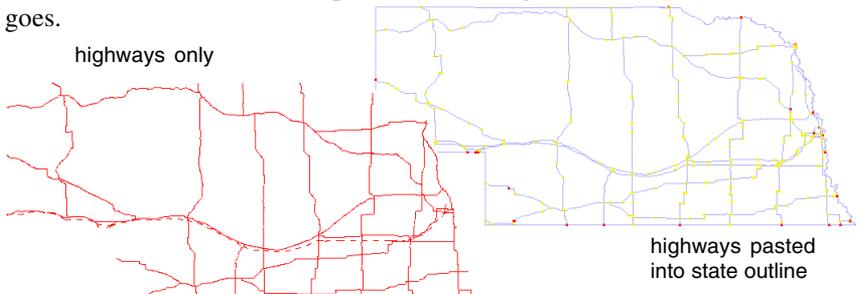
highways only



STEPS

- remove the layer from the last exercise
- click on the Open Object for Editing icon and choose the NEOUTLINE object from the NETRA Project File 
- click on the Add Reference Layer icon and select HIWAYS from the same Project File 
- expand the HIWAYS layer, right-click on the lines row, and choose Mark All
- click on the Copy icon (View window), set the Region Type to Entire Object, turn on the Use Marked Elements toggle, and click [Copy] 
- click on the name of the NEOUTLINE layer in the Layer Manager to make it active, click on the Paste icon, then on [Paste] 
- remove the reference layer, and use Save As to save your edited object 

highways pasted into state outline



Edit Node to Alter Attached Line Positions

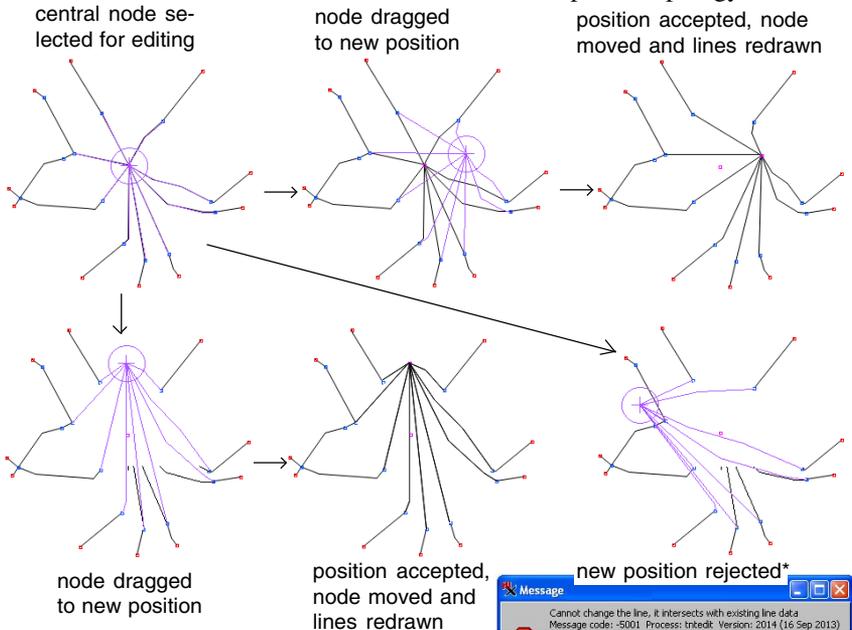
STEPS

- ☑ remove the vector from the previous exercise
- ☑ open roadsL in the FROMGLOBAL Project File
- ☑ turn off selection of all element types except nodes
- ☑ click on the Edit Element icon, left click on the central node, then right-click
- ☑ experiment with dragging the node to new positions, then right-clicking

Note: the vector for this exercise was made by selecting nodes attached to more than 8 lines in a vector with nearly 450,000 lines and 350,000 nodes then using copy and paste of a circular region to a new vector.

The rigorous vector topology enforced by the TNT products constrains how a vector object can be edited. You cannot simply move lines in a TNT vector object because of the topology that specifies what nodes are the endpoints of the line and what other lines are attached. (For more on vector topology see the *Vector Analysis Operations* booklet.) You can move the node at the end of a line selected for editing only if that node is not attached to any other line. The line can also be reshaped by inserting and/or dragging vertices.

You can select a node to which multiple lines are attached for editing and reposition that node, which drags along all of the attached lines. The attached lines are connected by a straight line from the new node position to the nearest vertex on each line. None of the newly positioned lines may cross existing lines unless the vector has network topology. The vector used as sample data for this exercise and its illustrations has planar topology.



* This node position would be accepted for a vector with network topology.

Islands in Vector Objects

One aspect of vector polygonal topology is whether a polygon contains islands or is an island of another polygon. Island polygons are fully contained inside another polygon. Such polygons may represent meaningful inclusions in the data (an island in a lake or ocean) or they may represent holes (areas that are not like the surrounding polygon in a way that is not relevant to the current topic of interest).

Differential styling of holes or islands is easily achieved for vector objects in the TNT products. If the islands and other polygons have assigned attributes, styles can be designated using these attributes. If none of the polygons have attributes, you can still readily distinguish between islands and other polygons using Internal.Inside as the field for styling. The simplest styling assigns the same drawing style to all islands/holes and a different, uniform drawing style to all other polygons. More complex styling can use a computed field to introduce the Internal.Inside field values into another table used for styling if desired.

In this exercise, a simple script is used to assign one drawing style to the non-island polygons and another to the islands. You could also just specify one drawing style and the All Same style will be used for all other elements. You can also use the 0 and 1 values of Internal.Inside to assign styles by attribute.

Note: all database and style manipulations can be performed in the Display process as well as in TNT's Editor.

STEPS

- choose Main/Display
 - click on Add Objects and select  ISLANDS in the FROMGLOBAL Project File
 - note the All Same drawing style, then click on the Layer Controls icon for ISLANDS 
 - click on the Polygons tab, set the Style to Assigned_Styles, and click on [Apply]
- Style ASSIGNED_STYLES 
- after noting the appearance, choose By Script for the Style, and click on [Apply], then click on Edit to review the script

Individual islands have assigned attributes used for styling in this example.



vector styled by attribute



vector styled by script
(island/not island)

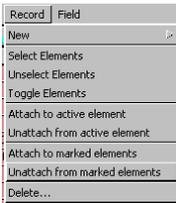
Individually assigned attributes in user-defined tables are ignored in this example; the island status (0 or 1) is used for styling.

Creating Holes for Export

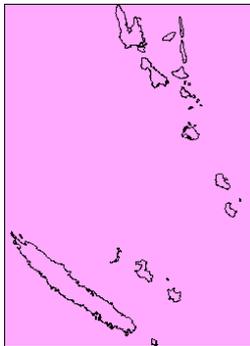
- ☑ choose Main/Edit and open the ISLANDS object from the previous exercise 
- ☑ expand the layer and its polygons in the Layer Manager, then open the PolBndA table
- ☑ in tabular view, select all records except the Coral Sea record (click in the checkbox for the next record, then scroll down and shift-click in the checkbox for the last record)
- ☑ click on the Exclusive icon 
- ☑ repeat step 3, then choose Record/Unattach from marked elements
- ☑ click on Save As and save this edited vector in a new Project File 
- ☑ choose Main/Export, set the format to ARCSHAPEFILE, select the object saved in the preceding step, click on Next, then on Export
- ☑ click on Details for the warnings received and note that field lengths were truncated because shapefiles do not support the field widths allowed and specified in TNT
- ☑ choose this shapefile for direct display in a new 2D group
- ☑ click on the Layer Controls icon, then on Specify for Element Style, set the Fill Style to Solid, click OK, then Apply 

Vector objects with polygonal topology in TNTmips cannot have “holes” because any hole is also a polygon and is kept track of as such. Other vector topology types cannot have holes because they have no polygons.

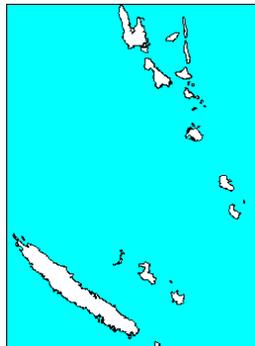
A polygonal vector object can contain polygons that will become holes when exported to shapefiles. Any island polygon without attributes in the table selected for export will be a hole in the resulting shapefile. Polygons that represent islands of interest rather than holes should have an attached attribute so their polygon is maintained on export. It is not necessary to remove unattached records; they are deleted automatically when you export to shapefile. Non-island polygons that lack attached records will end up with a blank attached record after export.



The steps in this exercise that will result in holes in the exported object could also be done in the Display process. There is not an option to save to a new object in Display, so any changes you make to the database will be saved with the original object. When you make these changes in the Editor, you can retain the original object and save the changes to a new vector object.



vector object prepared for export, polygon style All Same with solid fill



shapefile with holes, polygon style All Same with solid fill

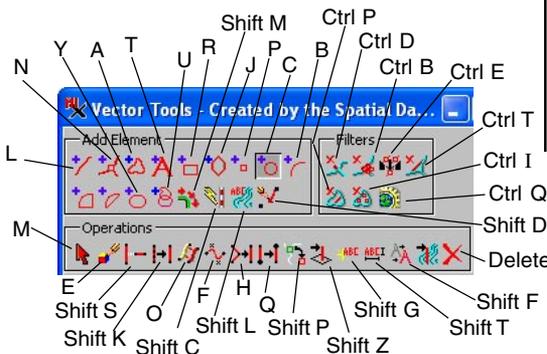


Keyboard Shortcuts (HotKeys)

HotKeys, or keyboard shortcuts, let you substitute one or a combination of key strokes for mouse clicks. There are a number of shortcut keys supported in all TNT processes with View windows that let you zoom in, out, scroll 90%, and recenter. These shortcuts are position sensitive, which means the action occurs centered around the cursor position rather than simply around the center of the view, and are listed on the HotKeys menu in the View window.

TNT's Editor provides many additional shortcuts that let you switch from one tool to another or between tool modes and actions using the keyboard. Shortcut keys can speed your editing work when you routinely switch between different tools, operations, and modes. The shortcuts for tools and operations are provided as part of the ToolTip. The shortcuts that switch between tools, filters, and operations are a letter or a letter in combination with the <shift> or <ctrl> key. The shortcuts that switch between tool modes use keys such as <tab> and <esc> to switch modes or take some other action.

Shortcuts that switch you between tool modes and actions can be shown in the Tools window when the active Add Element tool has shortcuts to switch modes or for additional actions. Those shortcuts that correspond to icons shown with the tool parameters will be shown in the icon ToolTip.



Note: the View window must have focus for these shortcuts to function.

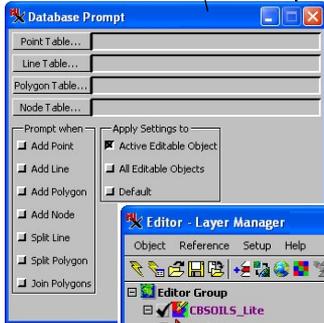
STEPS

- remove the layer from the previous exercise
- click on the Add Reference Layer  icon and select the CIR_4 object from the DAWSON Project File
- click on the Create New Object icon,  choose Vector, change the Topology Level to Planar, and click [OK] for the New Object Values
- click on the View window to give it focus, then press the L key,  and note that the Add Line tool is selected
- press the <tab> key and note that the line drawing mode switches  between Draw and Stretch
- press the C key and note that the Add Circle tool is selected
- draw a circle around the bare center pivot field and right-click
- note that you have added one line and no polygons (remember you assigned planar topology to the new vector)

Appendix: Assigning Attributes

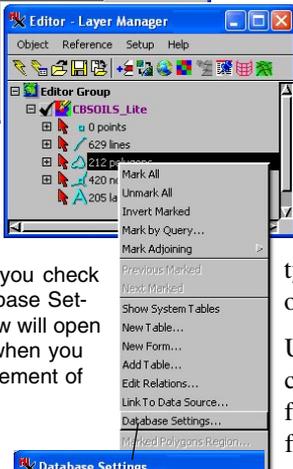


The Editor has a number of features designed for easy assignment of attributes as you add and edit elements. You can elect to be prompted to enter an attribute each time you add an element. You designate a separate table for each element type, which can be set up by the usual methods or created when you specify the database prompting parameters. You can also be prompted to assign attributes when you split a line or split or join polygons while editing.



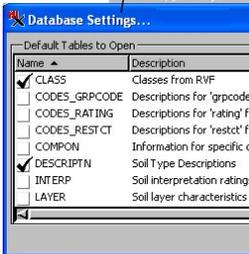
You can streamline attribute assignment by adding elements of the same type one after another. For this specialized circumstance, you can designate a default record. The default record will be assigned to all new elements, such as all added roads, until you change the default. You can change the default record for each open table for each element type by selecting a different record in any of the open tables.

The tables you check in the Database Settings window will open by default when you select an element of that type.



Using Setup/Database Prompt will let you change the default for all element types from the same window. Use a tabular view for default record assignment to facilitate changing the current default when the desired record(s) already exist. To specify a default record from an existing table for use and change, open a tabular view of the desired database table. The record you check in the tabular view of the table will be assigned to all newly added elements until you check another record in the table.

For more information on the mechanics of assigning attributes and using default records see the Technical Guide entitled *Spatial Editor: Database Prompt and Default Record* and the *Managing Geoattributes* booklet.

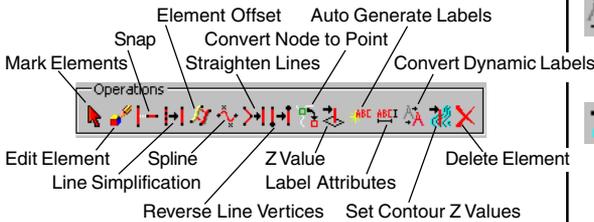
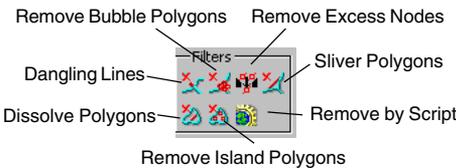
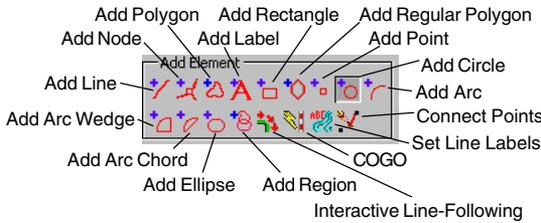


When a table is open in tabular view and a record is selected, you are in the default record mode when an element is added or split. You are in database prompting mode, if it has been set up, and no record is checked in an open table(s).

Appendices

Add Element, Filters, and Operations Icons

Not all of the icons in the Vector Tools window are active at all times. An icon must be active for its ToolTip to appear. The circumstances necessary to activate icons that may be inactive when a new vector object is created are listed at the right.



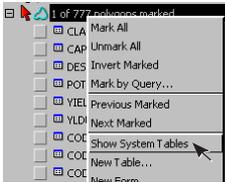
All filters and operations require some element to be added before they are active.

-  Add Node is not active until some other element type is added.
-  These filters require that the object contain a polygon.
-  Interactive Line-Following is not active until a reference raster is added.
-  Set Line Labels requires that the vector has a line.
-  Connect Points requires that the vector has a point.
-  Label Attributes requires that the vector has a label.
-  Convert Dynamic Labels requires that the vector has dynamic labels set up.
-  Set Contour Z Values requires that the vector has more than one line.

Vector, CAD, Shape Object Differences

Vector objects are the only object type that has different topology levels: polygonal, planar, or network. Shape objects have no representation in Project File format. CAD objects do not have internal tables and cannot have implied one-to-one tables. Shape and CAD objects can have multi-points, multi-lines, and multi-polygons. CAD objects use geometric descriptions for geometric shapes (e.g., center point and radius for a circle). CAD objects have individual element styles. CAD elements can be moved from front to back (and vice versa). A CAD object can be inserted as a block into another CAD object. Shape and CAD objects can have holes. Vector and shape objects have “internal tables.”

Appendix: Internal Tables



The fields present in internal tables differ between 2D and 3D objects. In addition to X and Y values, internal tables for 3D objects will provide Z information.

Internal tables are a type of system table that keep track of element information. For raster objects the internal table provides cell values. For shape objects the internal table provides the element number. For TIN objects the internal tables keep track of the node coordinates, which triangles are on either side of a line, and which edges make up a triangle. For vector objects the internal tables keep track of all the topology information. CAD objects do not have internal tables because they are not referenced by element number.

ElemNum	NumLines	x	y	IsNode
1	3	1116.000000	3142.000000	<input checked="" type="checkbox"/>
2	3	1120.000000	3110.000000	<input checked="" type="checkbox"/>
3	3	603.000000	3139.000000	<input checked="" type="checkbox"/>
4	3	638.000000	3117.000000	<input checked="" type="checkbox"/>
5	3	644.000000	3095.000000	<input checked="" type="checkbox"/>
6	3	442.000000	3137.000000	<input checked="" type="checkbox"/>

420 of 420 records shown - 1 related to selected elements

There is a single internal table for points and nodes. They are distinguished by a check in the IsNode field. Nodes are necessary for vector topology. In all topology types lines start and end with a node. A node can also be a point if it has attributes.

Name	Value
ElemNum	135
MinX	614.000000
MinY	2735.000000
MaxX	762.000000
MaxY	2835.000000
LeftPoly	58
RightPoly	66
StartNode	115
EndNode	116
NumPoints	30

1 line attached | 135/629 records in tab

Line attributes include information about what polygon is on the left and right of the line if the vector has polygonal topology. The NumPoints attribute tells you the number of vertices in the line.

Name	Value
ElemNum	352
MinX	806.000000
MinY	363.579319
MaxX	2220.888299
MaxY	1367.000000
Inside	0
NumIslands	14
NumLines	84

1 polygon attached | 352/777 records in tab

Polygon attributes include whether the polygon is (Inside = 1) or is not (Inside = 0) an island of another polygon and the number of lines that make up the boundary as well as the number of islands the polygon contains. The Inside attribute can be useful for simple styling by script or by attribute depending on whether the polygon is or is not an island. The polygon selected for the record illustration at the left is relatively large and surrounded by many other polygons, which leads to the large number of lines that make up the polygon.

Right-click on an element type line in a Manager window and choose Show System Tables to show internal tables along with other system tables, such as style tables.

Appendix: Other TNT-Generated Attributes

The Geometric / Attributes menu provides a number of choices for computing additional attribute tables. The standard attributes tables for vector lines and polygons can also be generated and maintained in TNT's Editor. The standard attributes tables contain such information as length and midpoint for lines and area, boundary length, and centroid location for polygons.

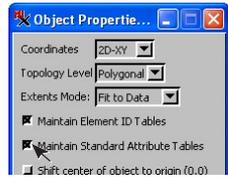
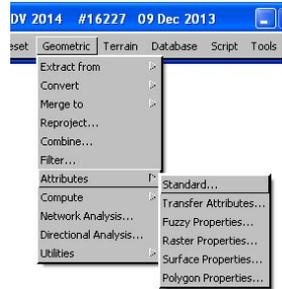
The Transfer Attributes process lets you transfer the attributes from a vector, raster, or CAD object to vector elements that fall in the same or an overlapping location. If transferring attributes from another vector, you can transfer attributes from points, lines, or polygons to points lines or polygons in the destination object.

The Compute Fuzzy Properties process computes up to 12 properties for polygons including such information as Form Ratio, Grain Shape Index, Compactness, and Thinness Ratio.

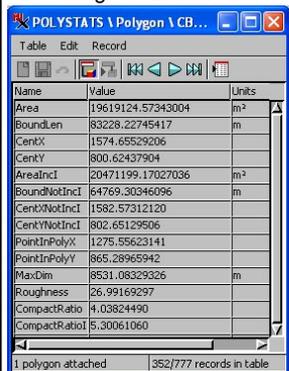
The Raster Properties process transfers raster information to polygons that overlay the raster. You can choose how to treat boundary cells, optionally compute the histogram for each polygon and decide whether or not to include islands in property assignment.

The Surface Properties process transfers information about the surface underlying vector elements to those elements (lines and/or polygons), such as minimum and maximum Z values and minimum and maximum slope of the boundary line.

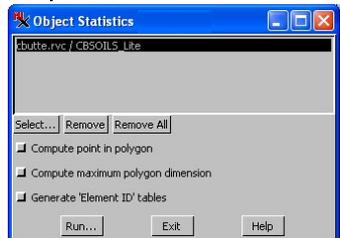
The Polygon Properties process creates statistics for a selected field in tables with a one record per element attachment type. These area statistics are calculated for points or polygons and records are attached to polygons in another object that covers the same area. If multiple records are attached, the sum of the attached percentage fields will be 100.



Choose to keep standard attributes updated while you are using the Editor.



Standard attributes table for polygons without optional components.



Dialog for stand-alone Standard Attributes process.

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