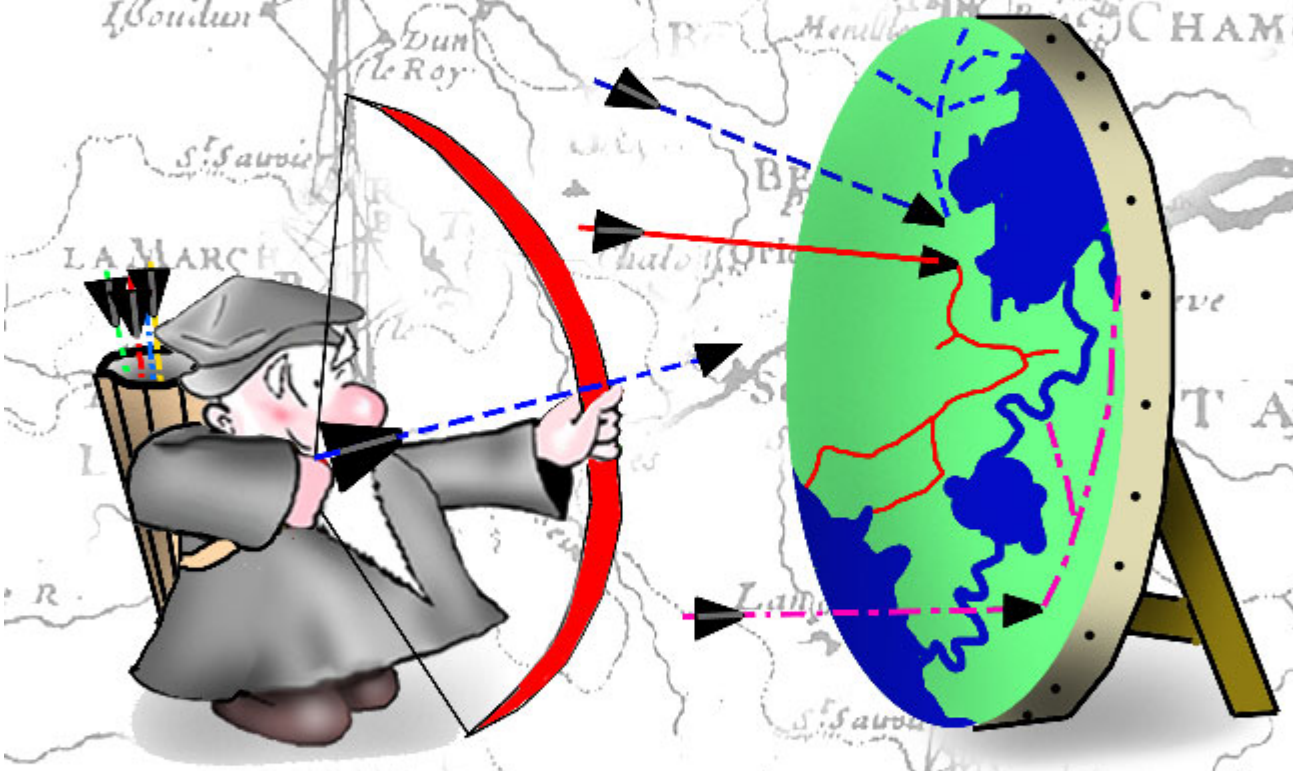
Tutorial

STYLES

Creating and Using Styles



with

TNTmips®

TNTedit™

TNTview®

Before Getting Started

TNTmips®, TNTview®, and TNTedit™ provide many tools for assigning drawing styles for vector, CAD, and TIN objects. Styles have an existence separate from the object to which they are assigned so they can be used for a number of objects. The tools to create your own symbols, line patterns, and fill patterns are provided. A large number of prepared symbols, line patterns, and fill patterns are included with the TNT products.

Prerequisite Skills This booklet assumes you have completed the exercises in the *Displaying Geospatial Data* and *Navigating* 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 presented in this booklet use sample data 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. The exercises in this booklet use the CARTO, DLG, GS_STYLE, TRANSP, and USA Project Files in the STYLES subdirectory of DATA. The *.QRY files in this directory are also used. Objects in the CB_COMP and CB_DLG Project Files in the CB_DATA directory are also used. Make a read-write copy of the sample data on your hard drive so changes can be saved when you use these objects. The exercise on page 6 refers to the STDSTYLE Project File, which is added as part of your TNTmips installation in the directory with your other TNT product files.

More Documentation This booklet is intended only as an introduction to styles and symbology in the TNT products. Consult the TNTmips reference manual for more information. There is also an additional booklet in this series entitled *Using CartoScripts*, which provides significantly more information on these functions, which are only briefly introduced here.

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 the size of your project materials. All exercises in this booklet can be completed in TNTlite using the sample geodata provided.

Merri P. Skrdla, Ph.D., 22 May 2003

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 TNTlite.

http://www.microimages.com

Creating and Using Styles

There are a number of ways to create and assign styles in the TNT products. You can choose to draw all elements of the same type in the same style, you can assign styles according to attribute values of a primary key field, you can assign styles by database query, or you can assign styles using CartoScripts™. This latter method is the topic of a separate tutorial booklet. (You can also assign style by theme, which is the topic of the *Theme Mapping* tutorial and not discussed here.) Styles can be plain (circles or squares for points, solid colors for lines and polygon fills) or symbolic (symbols, line patterns, or bitmap or hatch fill patterns). Symbolic styles can be created anew or modified from the samples provided using TNTmips' interactive drawing tools or using CartoScripts.

Styles are assigned by element type. Point styles are used for vector points, CAD points, database pinmaps, and TIN nodes. Line styles are used for vector lines, CAD lines and arcs, and TIN edges. Polygon styles are used for vector polygons; CAD rectangles, polygons, circles, arc chords, arc wedges, and ellipses; and TIN triangles. [Additional CAD shapes are supported for display, and styles are assigned by whether the element defines an open (line style) or closed shape (polygon style)]. Text styles can also be defined and assigned for vector labels, CAD text, or annotation text for layouts.

Appropriately chosen drawing styles can convey a good deal of information about a vector, CAD, or TIN object at a glance. You can readily tell which elements have similar attributes and which are different. A legend that defines the drawing styles for the elements displayed can be added to a layout by selecting the same style object used to draw the vector, CAD, or TIN layer. For multi-object legends, you simply select the layer and the styles assigned are automatically incorporated.

STEPS

- ☑ copy the files in the STYLES data collection and other files mentioned on page 2 to your hard drive if not already there
- ☑ choose Spatial Data from the Display menu (your Display Spatial Data options should be set to open a 2D group on start up and automatically redraw after any change)

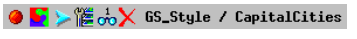
Pages 4 and 5 introduce the All Same drawing style and style objects. Pages 6 and 7 discuss the Style Editor and Style Assignment tables. Setting up and assigning styles is described on pages 8–14 Interactive symbol design is discussed on pages 15–19. Pages 20–22 describe line and fill pattern design, export considerations are discussed on p. 23, and CartoScripts are introduced on pages 24–26. How styles are determined when you add a vector layer is discussed on page 27.

All Same Drawing Style

STEPS

- ☑ click on the Add Vector Icon in the Group Controls window, select Quick-Add Vector from the menu and choose USSTATES and CAPITALCITIES from the USA Project File in the STYLES data collection

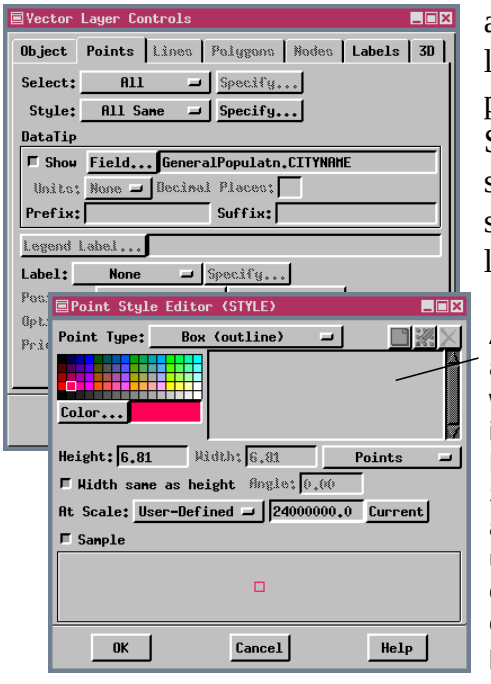
- ☑ click on the Vector icon in the layer icon row for the CAPITALCITIES vector object



- ☑ switch to the Points tabbed panel in the Vector Layer Controls window
- ☑ click on [Specify] for Style, change the Point Type to Point Symbol, and choose starred3d in the list of available point symbols
- ☑ change the value in the Height field to 16 Screen Pixels (at User-Defined Scale of 24000000)
- ☑ click [OK] in the Point Style Editor then in the Vector Layer Controls

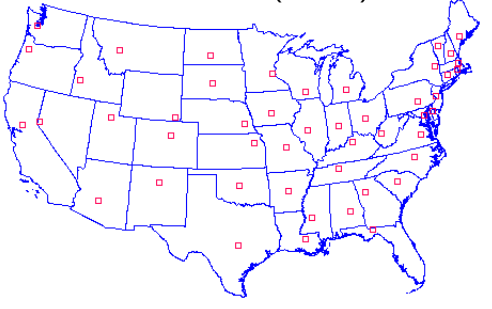
You will often want all elements of the same type to be drawn in the same style. With a soil map, for example, you want to display the soil polygons so that you can distinguish the different soil types, but you likely want all the lines between polygons to be the same color and thickness. Point data often represents observations that are all of the same type, for example telemetric or direct sightings of an individual animal. Distinguishing attributes are necessary for drawing styles other than all same.

Generally, when the elements in an object are all assigned the same drawing style, the style does not make use of symbols or patterns. You can, however, assign symbols, line patterns, or fill patterns for the All Same drawing style if you have a style object selected.



Available symbols are listed here when Point Symbol is the selected Point Type. (Point Symbol is not an active choice unless a style object is selected on the Object panel.)

All Same: Box (outline)



All Same: Point Symbol

Style Objects

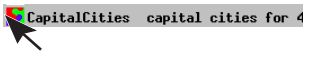
Style objects contain two types of information: drawing style definitions and pattern descriptions (symbol, line pattern, and fill pattern definitions). Style definitions include a style name, selected color(s), drawing type (for example, None, solid, bitmap pattern, or hatch pattern for a polygon fill type), and scale information for points and lines.

Style objects can be main level objects (created to share styles among many vector, CAD, or TIN objects) or subobjects. A vector, CAD, or TIN object can have only one style subobject. Style assignment tables have a style subobject that is a link to the selected style object.

Each style object in the STDSTYLE Project File provided with the TNT products contains styles for only one element type. A single style object you create may contain styles for all element types.

STEPS

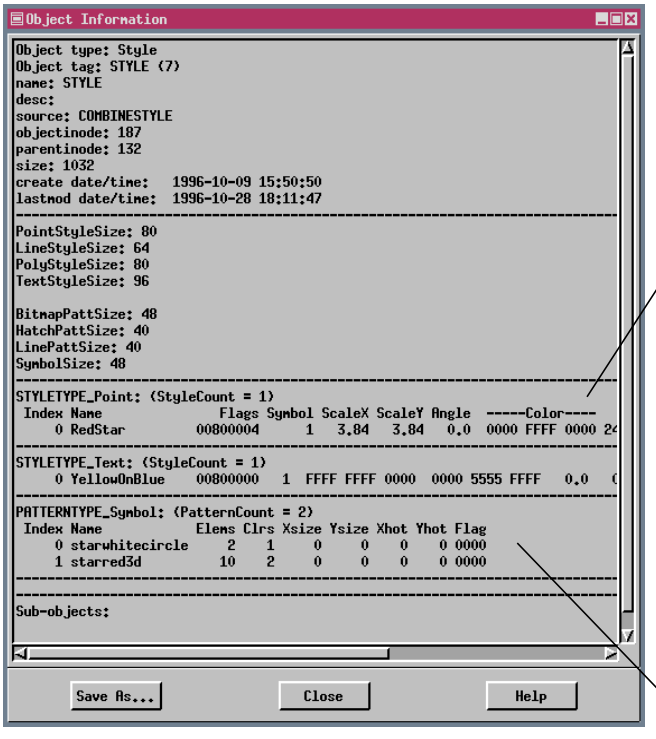
- ☑ choose Support / Maintenance / Project File and navigate to the CAPITALCITIES object used in the previous exercise
- ☑ click once on the vector icon to the left of the object name (or double-click on the object name) to get to the subobject level of the file structure



- ☑ click once on the style subobject name

then click on the Info icon to view information about the style object

- ☑ review the characteristics of the style object



The styles are described here. Point, line, polygon, and text styles are listed separately. This style object has one point style, one text style, and no line or polygon styles defined.

The patterns are described here. Bitmap, hatch, line, and symbol patterns are listed separately. This style object has no bitmap, hatch, or line patterns.

The Style Editor

STEPS

- ☑ choose Edit / Styles from the main TNTmips menu and select (File/ Open) the GEOLOGY_1 style object from the BITMAPPATTERNS folder in the STDSTYLE Project File in your TNT directory
- ☑ click on the Polygon icon near the top of the window 
- ☑ click successively on each entry in the styles list (upper list) and note the different patterns assigned to the different styles (turn on the sample toggle toward the bottom of the window if samples aren't shown)
- ☑ choose File / Exit and click on [No] if prompted to save changes

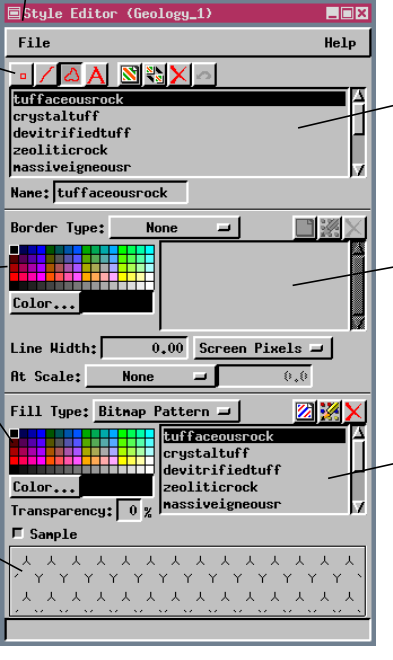
The Style Editor window lets you create drawing styles for assignment to any element type using the Style By Attribute or Style By Script option. The Style Editor lets you access the style information for all element types from a single window. Changing the selected element type changes the parts of the window as necessary. As you move between items in the top list, you are simply viewing the components of each style. When you change what is highlighted or selected anywhere else in the window, you are making changes to the selected style. When working in the stand-alone Style Editor (Edit / Styles), you have the option of saving or discarding changes when you exit. When setting display parameters for a selected vector, CAD, or TIN object, any changes made to a style are automatically saved unless you click on the Cancel button rather than the OK button when you close the window.

The File menu occurs only in the stand-alone version of the Style Editor; you won't find it when you access the Style Editor when choosing display parameters.

These buttons set the element type for which you are viewing style information.

The color palettes set the color for solid color drawing and for any variable color components of patterns.

This area provides a sample of the currently selected style if the Sample toggle is on.



All styles defined for the selected element type are listed here.

All line patterns in the style object are listed here when the Border Type is set to Line Pattern.

All bitmap patterns in the style object are listed here when the Fill Type is set to Bitmap Pattern.

Style Objects and Assignment Tables

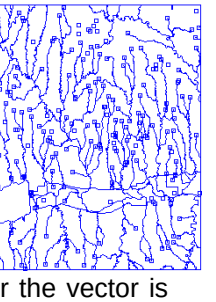
The necessary link between creating styles and assigning them to elements using any attributes is the style assignment table, which can be created and modified any time you specify display parameters for an object that has at least one database table. Although primary key fields are most often used for styling, you can choose any field to use for style assignment.

You must first create styles before you can assign them. We will start with a vector object that has points, lines, and polygons with an empty style object (no styles yet created). The database for each element type has a table named ATTRIBUTES with its Description field assigned as the primary key. You need to select this table and field before proceeding with editing styles. Once you have assigned styles, the last used table and field is remembered when the Assign Styles by Attribute window opens.

The Assign Styles by Attribute window that opens when you click on the Specify button may at first appear rather intimidating. You can think of it simply as a gateway to the Style Editor for the purpose of these next few exercises.

STEPS

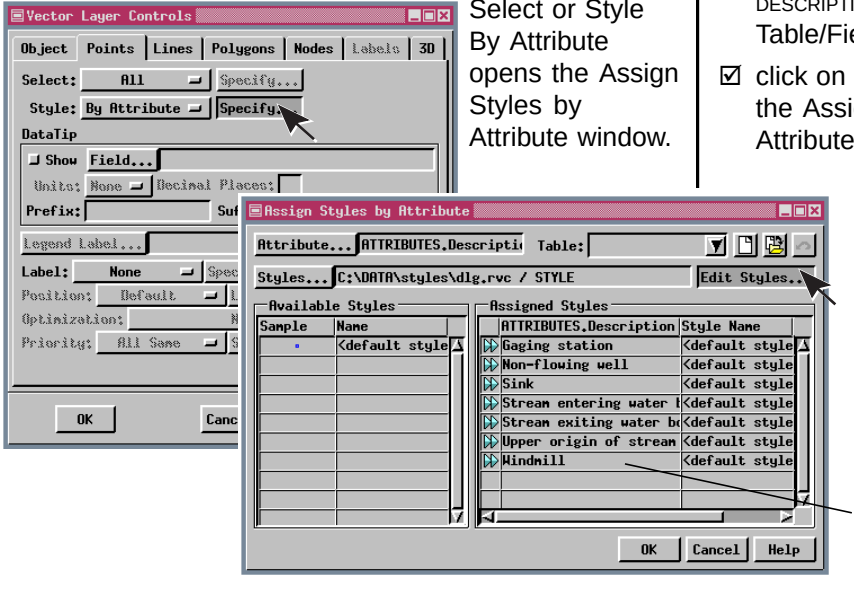
- ☑ choose Display / Spatial Data
- ☑ click on the Add Vector icon, and choose Quick-Add Vector 
- ☑ choose the HYDROLOGYGI3F08 object in the DLG Project File



- ☑ after the vector is drawn, click on the Vector icon in the layer icon row 

- ☑ click on the Points tab in the Vector Layer Controls window that opens, set Style option menu to By Attribute, then click on [Specify], and select ATTRIBUTES then DESCRIPTION in the Select Table/Field window
- ☑ click on [Edit Styles] in the Assign Styles by Attribute window

Clicking on [Specify] for Select or Style By Attribute opens the Assign Styles by Attribute window.



The values for the selected field are listed here.

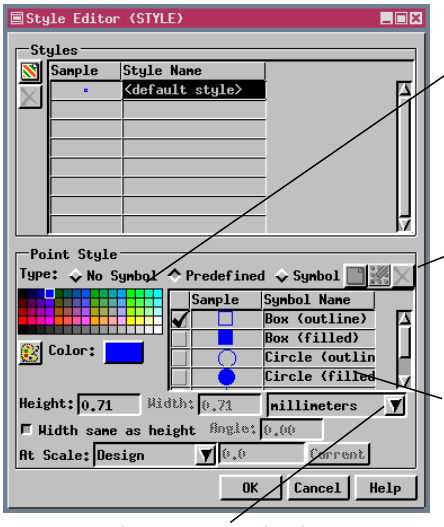
Setting Up Point Styles

STEPS

- ☑ click in the box to the left of Circle (filled) 

- ☑ set the size units to Screen Pixels and change the Height to 1
- ☑ click on the New Style icon 
- ☑ change the text in the Style Name field to Gaging Station
- ☑ select Point Symbol as the Point Style
- ☑ click on the Insert Symbols icon and choose From Style Object 
- ☑ click on Style Set arrow and choose Geographic
- ☑ click on the craneyellow symbol, then click [OK]
- ☑ change the Height to 15
- ☑ use the At Scale arrow to choose User-Defined and enter 400000 in the field to the right
- ☑ click on the New Style icon and name the style Windmill 
- ☑ repeat steps 7–10 except select the windmill symbol, then click in its checkbox
- ☑ select a brown from the color palette 
- ☑ click on the New Style icon and name the style Nonflowing Well
- ☑ repeat step 7–10 except choose the Circle symbol set, select the circle4 solid symbol, click in its checkbox, set Height to 7, and select a medium blue from the color palette

You were directed to Quick-Add the vector object then go to the layer controls in the last exercise so you could see how the vector object looked before you began assigning styles. We'll start by changing the defined default style. This style is used when the Style option button is set to All Same and for any attribute value that does not get another style assigned. Then you'll create three styles that use symbols available from the standard style objects distributed with the TNT products. The selected symbols are copied to the style subobject for the selected vector and appear in the list in the bottom half of the window when symbols are selected as the point type.

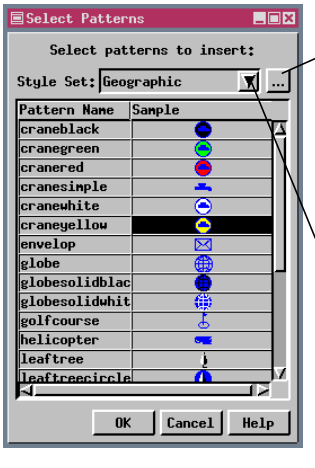


The color palette assigns the color for any variable color parts of a symbol.

These icons are active only when Point Symbol is selected as the Point Type.

All symbols in the style object are shown here. What you see in the list depends on the point style type selected.

Select your units here.



Click here to browse for a symbol set from which to choose.

Click here to specify the standard symbol set from which to choose.

Assigning Styles to Attribute Values

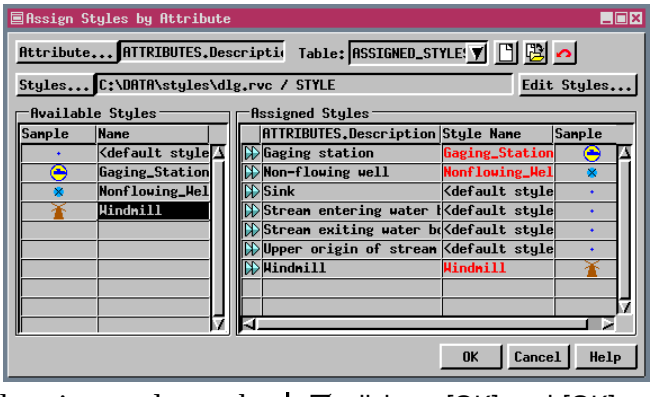
The styles you created are listed at the left of the Assign Styles by Attribute window after you click on the OK button in the Style Editor window. You can now assign the styles to the desired attribute values.

The styles you created are named the same as the corresponding attribute values to make style assignment easy. You will just assign styles to three of the seven attribute values and the remaining values will use the default style. The assignment arrows (double blue arrow heads in center of window) assign the selected style to the attribute at their right. Names of styles that have been assigned in the current use of the Assign Styles by Attribute window are shown in red in the Assigned Styles panel. The style assignments shown in red are subject to change by the Undo button.

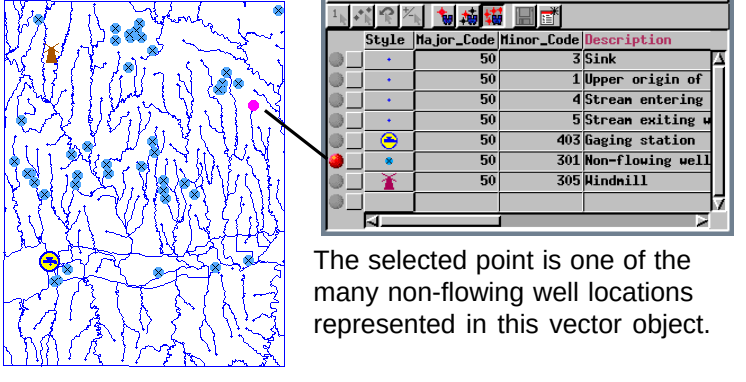
You can view assigned drawing styles directly in tabular view of any database table by revealing a field that is initially hidden. This field also serves as a button shortcut to the Style Editor window allowing you to assign a new drawing style to the elements attached to the record from which you opened the Style Editor.

STEPS

- ☑ click [OK] in the Style Editor window
- ☑ with Gaging station highlighted in the Available Styles list, then click on the assignment arrows to the left of Gaging_Station in the Assigned Styles list
- ☑ repeat step 2 but choose Nonflowing Well from the Available Styles list and assign it to Nonflowing well
- ☑ repeat step 2 but choose Windmill from the Available Styles list and assign it to Windmill



- ☑ click on [OK] and [OK] again to accept the default table name
- ☑ display the object, then return to the Vector Object Display Controls for the next exercise



The selected point is one of the many non-flowing well locations represented in this vector object.

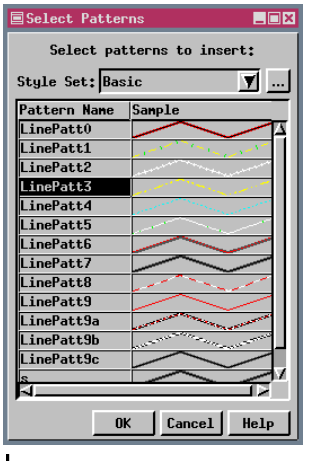
Setting Up Line Styles

STEPS

- ☑ click on the Lines tab in the Vector Layer Controls window
- ☑ set the Style option menu to By Attribute, click on [Specify], and choose ATTRIBUTES.DESCRIPTION
- ☑ click on [Edit Styles] in the Assign Styles by Attribute window
- ☑ with <default style> selected, set the line width to 2 Screen Pixels, and check that the color is pure blue
- ☑ click on the New Style icon and name the style Intermittent 
- ☑ set the Line Type to Pattern, click on the Insert Patterns icon, and select LinePatt3 
- ☑ click on the Create or Edit Pattern icon  then on the Open icon  and select LinePatt3
- ☑ click on each entry in the Element List, and click on the Variable icon  in the Colors panel
- ☑ click on the Save icon then on [Close] 
- ☑ set the line width to 1 and click on [OK] in the Style Editor window
- ☑ assign the Intermittent style to the Intermittent attribute value
- ☑ click [OK] and save the changes to the style assignment table

We are going to assign drawing styles based on whether the line elements represent perennial or intermittent hydrological features. In this vector object, all intermittent features have at least two records attached: one that describes the feature (stream, canal, and so on) and another that identifies it as intermittent. Having multiple records attached creates a problem in assigning drawing styles by attribute—which to use? To get around this quandary, we will write a script to assign the Intermittent style to elements that have the attribute value “Intermittent” in at least one of the attached records. In this exercise, you create the line style to be assigned by script in the next exercise.

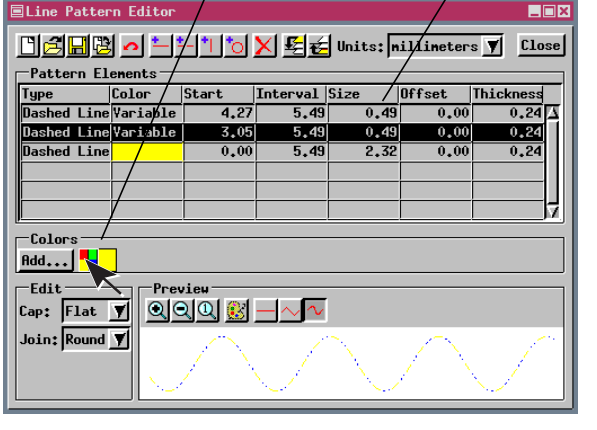
Although you won’t be using the By Attribute option for style assignment, you create a style assignment table in this exercise. You cannot show the style field when viewing a database without a style assignment table.



The Basic line patterns appear by default if your style object has no line patterns.

Setting the color to Variable lets you change the color from the Style Editor window.

All components of the line pattern and their properties are listed.



Assigning Styles By Script

Now that you have a line style in your style object, you can assign the style by name in a style assignment script. You can also assign line patterns by name in a script, but then you also have to specify width and the color of any variable color components (this information is included in a style). The "if statement" in the example query tells the process to look at all records attached to each element for the desired attribute value. These elements are then drawn in the designated style. You can use the Insert / Field menu selection in the Query Editor window to get the correct spelling and capitalization for the Table.Field, but you need to be sure to add the brackets and asterisk ([*]) that direct the process to examine all attached records. If you have any questions about setting the style by script, consult the *Building and Using Queries* booklet.

STEPS

- ☑ set the Style option menu in the Lines panel of the Vector Layer Controls window to By Script
- ☑ click on [Specify] and enter the query exactly as shown below

```
if ("Intermittent" in ATTRIBUTES[*].Description)
    Style$ = "Intermittent";
    UseStyle = 1;
```

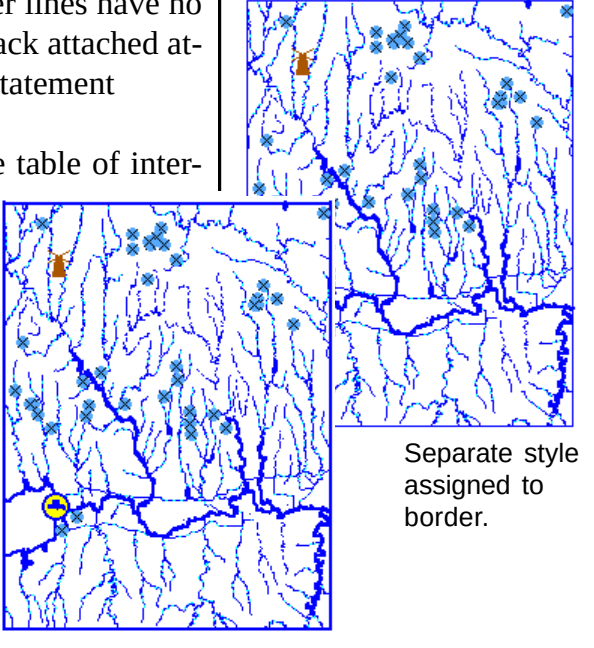
- ☑ click [OK] in the Query Editor window

Vocabulary: A **variable color** component in a pattern has its color assigned in a style that incorporates the pattern. Including variable color components allows you to "reuse" a pattern in a variety of styles and make it a different color for each.

The default style is used for all elements not assigned a style in the script. Here that means both the perennial water features and the border are the same thickness. You could create a style and in the query assign it to the lines that make up the border using the information that the border lines have no attached attributes. Elements that lack attached attributes can be identified with the statement

SetNum(TABLE[*]) < 1

where "TABLE" is the name of the table of interest, in this case ATTRIBUTES.



Separate style assigned to border.

This screen capture shows the styles assigned so far (points and lines). You can continue on and assign polygon styles before closing the Vector Layer Controls window and redrawing the object.

Setting Up Polygon Styles

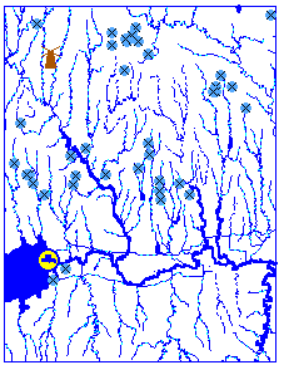
STEPS

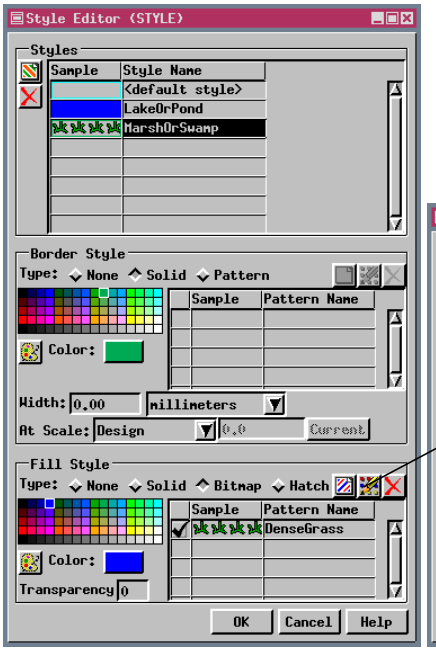
- ☑ click on the Polygons tab in the Vector Layer Controls window, and check that the Select option is set to All
- ☑ set the Style to By Attribute and click on [Specify], select ATTRIBUTES.DESCRIPTION, then click on [Edit Styles] in the Assign Styles by Attribute window
- ☑ click on the New Style icon and name the style LakeOrPond
- ☑ set the color to solid blue in the Border panel
- ☑ set the Fill Type to Solid and the color to the same blue in the Fill panel
- ☑ click on the New Style icon and name the style MarshOrSwamp
- ☑ change the border color to a medium green, and set the Fill Style Type to Bitmap
- ☑ click on the Insert Patterns icon
- ☑ scroll down, select the DenseGrass pattern, click [OK], then click [OK] in the Style Editor window
- ☑ assign the styles to the corresponding attributes (none to surface elevation)
- ☑ click [OK] then [OK] to accept the style assignment table name
- ☑ click [OK] in the Vector Layer Controls window

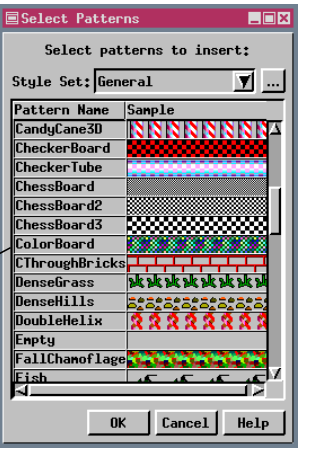
Polygon styles have both border and fill components. All the features available for line styles can be used for polygon borders. The styles created in this exercise use solid lines, but you can elect to use line patterns. One thing you may notice when polygons are drawn is that the border selections you made don't appear to be used because lines are drawn after polygons with the default settings. If you really want your borders drawn as set, you can turn on the Draw Lines Before Polygons toggle in the Vector Layer Controls window.

You create two polygon styles in this exercise and assign them to selected attribute values. One of the styles created is assigned to marshes, wetlands, swamps, and bogs. There is only one polygon of this class in the output object and it is small enough that you likely won't see it at full view, but if you zoom in on the polygon at the top edge in the eastern quarter of the object you can see the fill pattern.

All elements now have assigned styles.

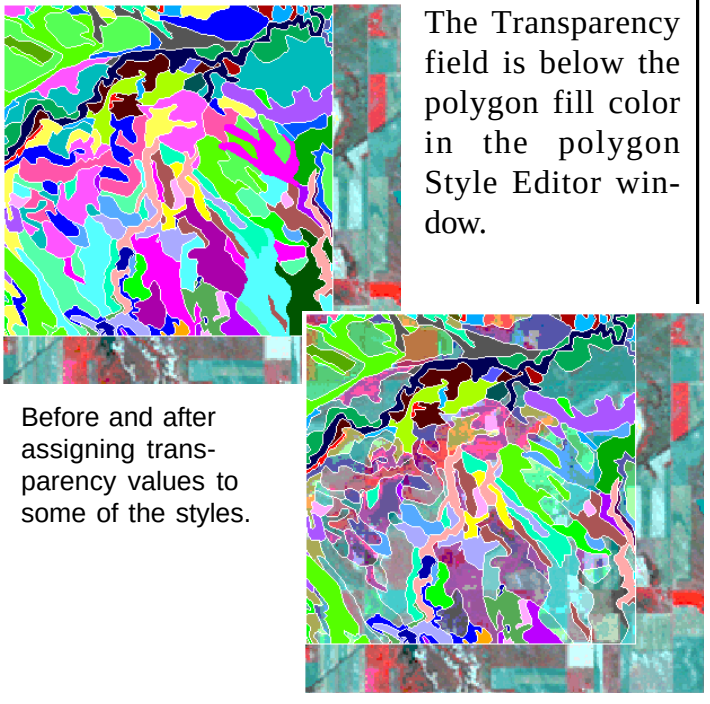






Assigning Transparency to Solid Fills

We have discussed transparent areas in bitmap fill patterns, but you can also see underlying detail through solidly filled polygons by assigning a transparency value to the fill color. Display colors are then determined by mixing the specified percentage of the fill color (40% blue for 60% blue transparency) with the underlying colors to determine the final colors for display and printing.



Before and after assigning transparency values to some of the styles.

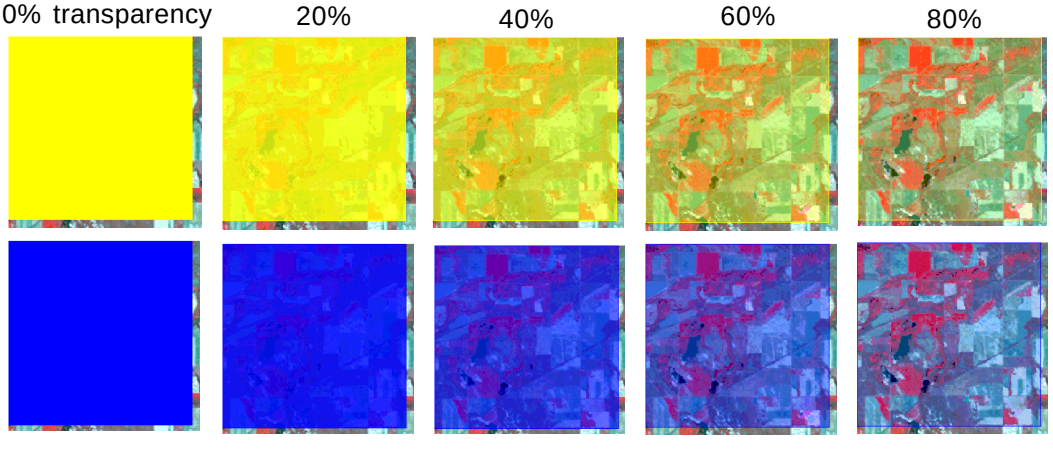
The Transparency field is below the polygon fill color in the polygon Style Editor window.

STEPS

- ☑ click on the Open icon on the Display Spatial Data toolbar, choose Open Group, and select CIRANDSOILS from the TRANSP Project File
- ☑ click on the Vector icon in the CBSOILS_LITE layer icon row
- ☑ click on the Polygons tab, on [Specify] for Style, then on [Edit Styles]
- ☑ in the Fill panel of the Polygon Style Editor, enter 60 in the Transparency field for the JmC, KaB, KaD2, KeB, KeD, Sa, SrC, and VeC styles; enter 70 for BnB, Mt, NrD, and SrD styles (press <enter> after each change)
- ☑ click on [OK] in the Style Editor, Style Assignment, and Layer Controls windows, and note the effects of transparency

The selected fill color affects how well you can see through to the background at a given transparency percentage; darker colors require greater transparency.

Keep this group open for the next exercise.



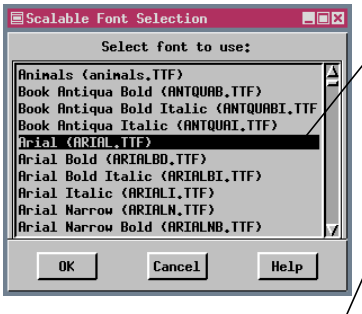
Setting Up Text Styles

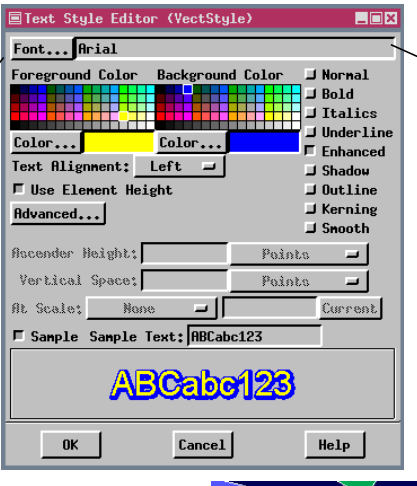
STEPS

- ☑ click on the Vector icon in the CBSOILS_LITE layer icon row
- ☑ click on the Labels tab and set the Select option menu to All
- ☑ click on [Specify] for Style
- ☑ click on [Font] and choose Arial or a similar font on your system
- ☑ set the Foreground Color to yellow and the Background Color to blue
- ☑ turn on the Enhanced toggle button
- ☑ return to the View window, and zoom in until the labels are visible

The best choice in label styles depends on the vector object's other display options and background objects, as well as differential labeling (different styles for different labels) and personal preferences. Differential labeling is established in the Spatial Data Editor when creating the labels. You can elect to set the height independently of the text style with the Use Element Height toggle. Using the element height means you use the size specified for the label when it was added or edited in the Spatial Data Editor. If this element height is not used, all labels will be the size specified in the Ascender Height field.

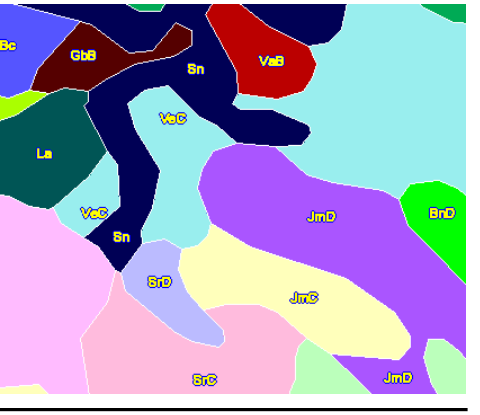
The Foreground Color is used for all text styles. The Background Color is used only for the outline of styles that use two colors. Enhanced type using light and dark colors insures that you can see the label whether the background is light or dark.





An additional panel that lists style names appears at the top of this window if label style is set to By Element in the Vector Layer Controls.

You can set these parameters if you turn off the Use Element Height toggle. The height by element is set and can be changed in the Spatial Data Editor.

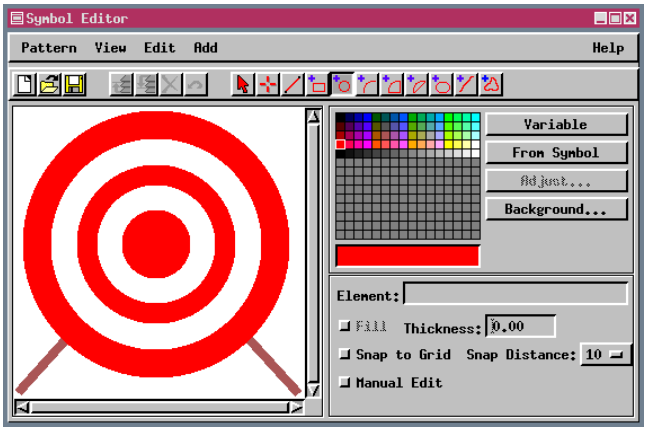


In the polygons where the dark outline blends with the background color, the lighter foreground of the label shows well.

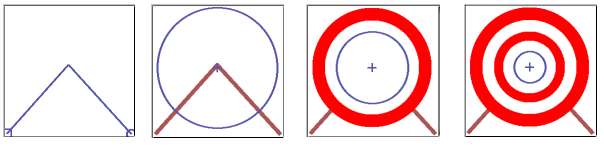
Interactive Symbol Design

There are two basic approaches for designing symbols: start a new one or start with an existing symbol and change it. We'll make a new symbol and save it in a new, main level style object. Creating and editing a symbol is much like working with a CAD object—geometric shapes added remain separately selectable and resizable. The drawing order of elements can also be changed. Element styles, however, are somewhat different than for the corresponding CAD elements. Closed shapes can either be filled or have a solid color boundary of a designated color. There are no patterns, and if you want a filled shape with a different color boundary, you need to add two elements.

You can add segments, rectangles, circles, arcs, arc wedges, arc chords, ellipses, polylines, and polygons to your symbol. (A segment is a straight line created with the same tool used for the ruler or for Slide View. A polyline is a line with any number of vertices created with the line/polygon editing tool.) As you complete each component to be added to the symbol, click the right mouse button over the design area to make it part of the symbol.



selected steps in Target symbol design



STEPS

- ☑ choose Edit / Styles
- ☑ click on the New Style icon and change the Point Type option to Point Symbol
- ☑ click on the Create or Edit Symbol icon
- ☑ click on the Add PolyLine icon, then set the color to brown and the Thickness to 2
- ☑ click in the lower left corner of the symbol design area, then click a little above the center and lastly in the lower right corner, then click the right mouse button
- ☑ click on the Add Circle icon, change the color to red and turn on the Fill toggle
- ☑ draw a large circle centered on the middle of the polyline, then click the right mouse button
- ☑ change the color to white and decrease the diameter of the circle about 20% by dragging inward when the cursor is the right hand shape, then click the right mouse button
- ☑ repeat the preceding step three times, alternating between red and white, to produce the symbol shown
- ☑ choose Pattern / Save and name the pattern Target

Symbol Origins

STEPS

- ☑ return to the Style Editor window (Pattern / Close)
- ☑ click on the Edit Symbol Set icon 
- ☑ click on [Set] and choose Flags, select the second flag (f2), and click on the Copy icon 
- ☑ change the Set back to User and click on the Edit icon 
- ☑ click on the Origin icon*, move the Origin tool up the pole to the middle, then click the right mouse button 
- ☑ choose Pattern/Save As and name it f2Center
- ☑ return to the Style Editor window
- ☑ create four new styles, assigning the f2 symbol to two and f2Center to the other two
- ☑ make the size for all 20 Screen Pixels with the At Scale option set to User-Defined 20000
- ☑ give one f2 and one f2Center style a rotation angle of 60
- ☑ choose File / Save then File / Exit and create a new file named PRACTICE and new object named GETTING_STARTED
- ☑ launch Spatial Data Display, add the TWOPOINTS vector object in GS_STYLE, and experiment with the different styles created above (don't forget to select the style object)

A symbol's origin, or "hot spot," is the position in the graphic design that is placed at the coordinates for the point the symbol represents. It is also the pivot point for symbol rotation. The default origin is at the center of the symbol design area, which is appropriate for all symmetrical patterns, provided they were centered in the design area when created. Some asymmetric patterns have a different logical spot for the origin—flag symbols, for example, might have the origin at the base of the pole.

You can experiment with the symbols created in this exercise by selecting the PRACTICE / GETTINGSTARTED style object either on the Object panel of the Vector Layer Controls window (to assign symbols for the All Same drawing style) or in the Assign Styles by Attribute window for style assignment by attribute (the two points have different attribute values for the primary key).

Symbols with off-center origins coupled with rotation work well for illustration of multiple observations at the same point. See the *Pin Mapping* tutorial booklet for an example that uses the date to determine the symbol angle.

TwoPoints Style: All Same
(Filled circle)

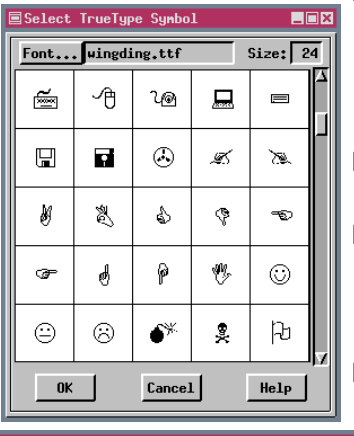
TwoPoints added to above
Style: By Attribute using f2
and f2Center unrotated

third TwoPoints layer added
Style: By Attribute using f2
and f2Center rotated

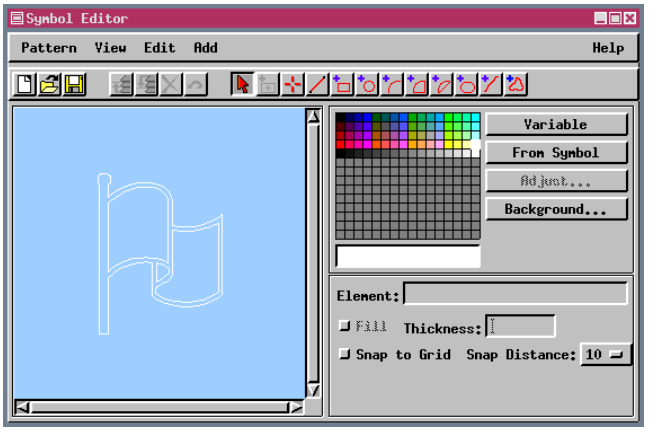
* Note: if you don't see the flag symbol, your background color and variable color are the same; click on [Background], and change the color.

Polygon Symbols from Symbol Fonts

Any glyph in a TrueType font can become a symbol for use with the TNT products. The complexity of the font will determine how much color you can add once the glyph is opened as a symbol. Some fonts provide just a simple outline, which means you can either leave it as an outline in the color of your choice or fill it with a single color. Other fonts are more complex with a number of different polygons used for each glyph. These can become multicolor symbols.

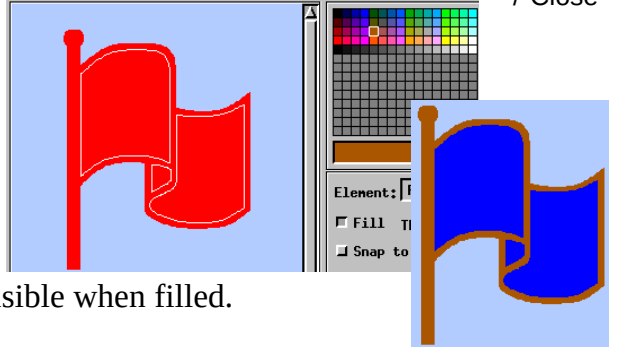


MapInfo provides a number of symbol fonts that include complex glyphs, such as the Interstate Highway symbol and the oil derrick shown below (after adding color in the Symbol Editor). When you start filling polygons to provide color for your symbols, you may discover that the layering order is not optimal, such that smaller interior polygons are obscured by surrounding polygons. You can use the Raise and Lower icon buttons when an element is selected to change the drawing order so that all polygons remain visible when filled.



STEPS

- ☑ return to the Symbol Editor (through the Vector Layer Controls with the TwoPoints object selected)
- ☑ choose Pattern / Open TrueType Symbol, click on [Font] and select wingding.ttf (or similar font)
- ☑ scroll down and choose the flag, then click [OK]
- ☑ click on the flagpole, then click on the brown indicated and on the Fill toggle button
- ☑ click on each of the interior polygons in turn and assign the variable color with Fill toggled on
- ☑ choose Pattern / Save then Pattern / Close



Symbols from Other Sources

STEPS

- ☑ with the Style Editor still open for the TwoPoints vector object, click on the Insert Symbols icon and choose From TrueType

- ☑ select the same font you used in the preceding exercise and choose a phone or other glyph of interest

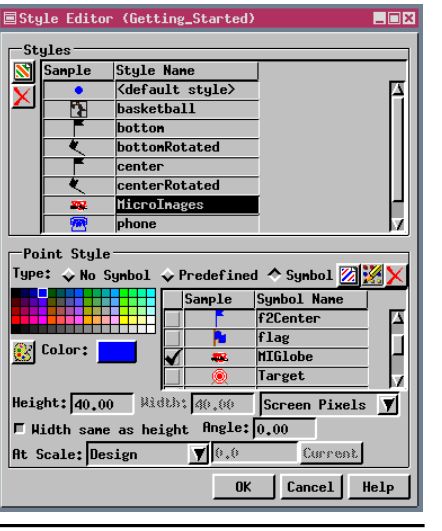
- ☑ create a new style and assign this symbol
- ☑ change the variable color and note how the style sample changes (also note that in the symbol style samples, all symbols with variable color components are now shown in this color)
- ☑ click on the Insert Symbols icon and choose From CAD

- ☑ navigate to the directory where TNTmips is installed, and select MIGlobe from LOGOS.RVC
- ☑ click on the Insert Symbols icon and choose From CGM

- ☑ select Basketball.cgm from the sample data provided

The last exercise discussed making symbols from TrueType fonts in the Symbol Editor, which converts the selected glyph to polygons. You can also access TrueType fonts from the Style Editor. The Insert Symbols icon has a drop down menu that lets you choose your symbol source. TrueType glyphs selected in this manner are referenced as glyphs in the specified font and not converted to polygons. You can change the color of the glyph by changing the color assigned to a style that uses the glyph. You can choose to edit a symbol selected in this mannner, and it is converted to polygons. You can assign any colors, just as you did in the last exercise. All polygon outlines from TrueType symbols acquired in this manner are assigned to variable color rather than white as in the last exercise.

You can also bring in symbols from CAD and CGM (Computer Graphics Metafile) formats. Such symbols are often quite useful for pin mapping (for example, logos to mark business locations). Line and fill colors are retained for symbols obtained from CAD or CGM. Any CAD format supported for direct display in TNTmips, such as shapefiles, can also be selected for a symbol. CAD objects may consist of one or more blocks. If the object has multiple blocks, they are brought in as separate symbols. You can select multiple CGM files at one time to become symbols.



You should make sure that symbols are not too complex to display well at a reasonable size.

Editing Symbols

You have already done a little symbol editing in the exercise on page 17, namely changing assigned colors. Colors and whether or not to fill can be changed when an element is selected (click on it when the Select tool is active). Further element editing requires you to select Edit from the Edit menu in the Symbol Editor window. An element is edited using the same tool you used to create it.

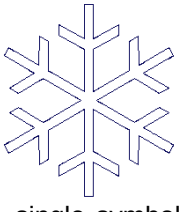
You can edit any TrueType symbol brought in; these glyphs are simply one or more polygons now that can be edited just like any other polygon. Only polygon outlines are drawn when editing—the polygon will be filled again (if the Fill toggle is on) when you click the right mouse button to indicate you are done editing the selected element.

You can also delete or copy a selected element or create an array of specified dimensions from it. The Copy choice makes a duplicate of the element that is active for editing so you can move it or change its Fill status. There is an Undo button on the toolbar that undoes your last editing step. An Undo All is available from the Edit menu.

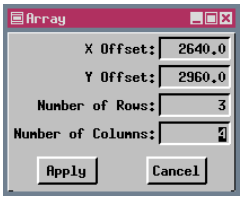
STEPS

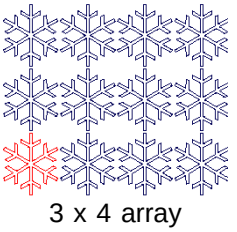
- ☑ add the oilspot1 symbol from the Geographic symbol set to your style object (refer to page 8 if you need help) and click on the Create or Edit Symbol icon in the Style Editor 
- ☑ click on the Open icon and select the oilspot, then click on the symbol with the Select tool active and choose Edit from the Edit menu 
- ☑ click on the Drag Vertex icon in the Line / Polygon Edit Controls window 
- ☑ grab and drag the vertices to alter the appearance of the oilspot
- ☑ click the right mouse button over the design area when done editing
- ☑ select Pattern / Save As and name it oilspot2

You can generate an array from any selected symbol element with a designated number of rows and columns and a defined spacing.

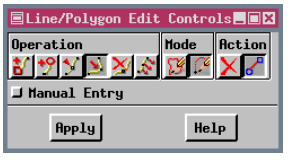


single symbol





3 x 4 array



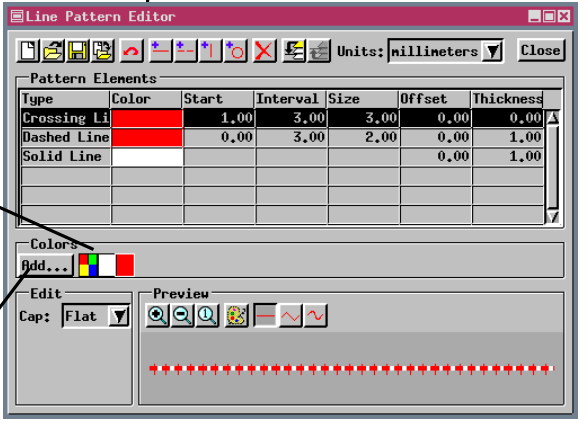
The Interstate Highway symbol on page 17 is shown against a darker background because the outer polygon is white. Copying this polygon, turning off fill, and assigning black as the color (at left) provides the definition needed for use against any background. The numbers were added by choosing Pattern / Paste TrueType Symbol and selecting the numbers from a more conventional font.

The grouping of deer shown is a single symbol made by pasting more than one glyph from a TrueType font.

Interactive Line Pattern Design

STEPS

- ☑ open a new 2D group, and the vector object in the DLG Project File, set the style to By Attribute on the Lines panel of the Vector Layer Controls, and click on [Specify], then on [Edit Styles]
- ☑ click on the New Style icon and set the Line Style Type to Line Pattern
- ☑ click on the Create or Edit Pattern icon
- ☑ click on the Add Solid Line icon
- ☑ set the color to white*, and Thickness to 1.0
- ☑ click on the Add Dashed Line icon, set the color to red, the Interval to 3.0, the Size to 2.0, and the Thickness to 1.0
- ☑ click on the Add Crossing Line icon, set the color to red, set the start to 1.0, the Interval to 3.0, and the Size to 3.0
- ☑ click on the Save icon and name the pattern



* Colors are selected from the small palette at the right. To add colors to the small palette, click on the Add button.

You were introduced to the Line Style Editor in the exercise on setting up line styles. We will explore more of the available features and learn how to make a new line pattern in this exercise.

There are four elements that can be used either singly or in combination to create line patterns: solid lines, dashed lines, crossing lines, and circles. You can set the width and color for all element types, and variable color is an option just as it is for symbols. All element types can also be offset from the center of the line, which is most typically used to add a pair of thin flanking lines at the outer edges of a wider line. For dashes, circles, and crossing elements you can set the interval between elements as well as the size of the components. The size of a crossing element is measured perpendicular to the overall line.

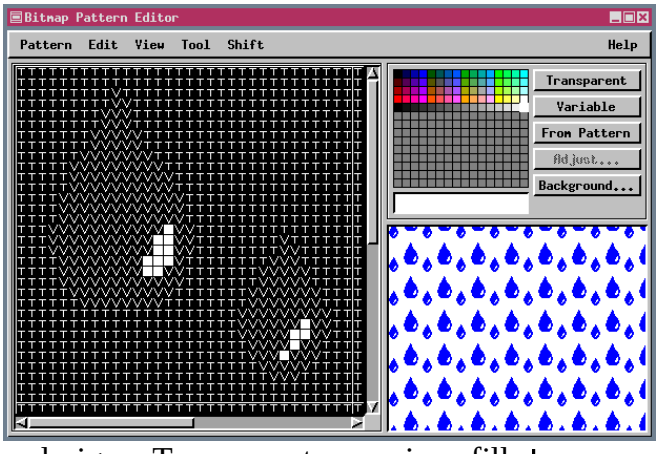
When you combine other than solid elements in a line pattern, you need to consider the start, interval, and size of each element in order to achieve the desired effect. You can set the parameters for dashed lines so that the final pattern is a multicolored solid line, as in this example, or so there are gaps between segments, as in the Intermittent pattern used in an earlier exercise.

A line component with a thickness of zero is one pixel wide regardless of the current map scale of your display or hardcopy. Setting the thickness at zero is not recommended for line patterns in general but may be desirable for selected components, such as the crossing lines in this example or a thin center line over a wider line.

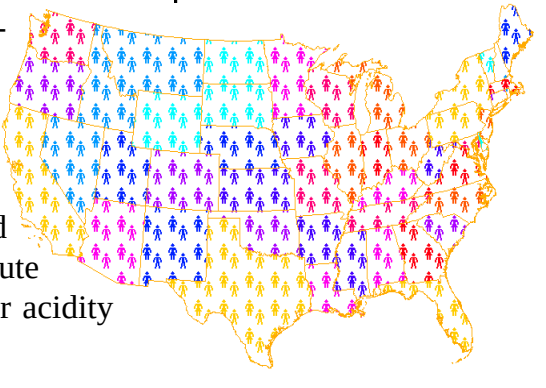
Interactive Bitmap Pattern Design

A bitmap pattern is composed of repeating units of a 32 x 32 design by default. The design area is a 2 x 2 duplication of the bitmap pattern so you can see how it fits together horizontally and vertically when used for polygon filling. There are lines in the design area to indicate the location of the boundaries of the 32 x 32 area.

The Bitmap Pattern Editor window initially opens with what at casual glance appears to be a grid, but is in fact an array of Ts used to represent transparent pixels in the pattern design. Transparent areas in a fill pattern allow you to see through to an image beneath the layer with filled polygons. Variable color pixels can also be assigned as part of a bitmap pattern and are represented by Vs, rather than the current variable color. The current variable color is used to show variable pixels in the sample area of the Pattern Editor window.

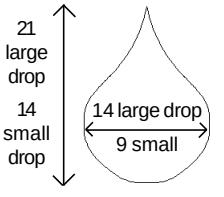


A bitmap pattern with areas of variable color can form the basis for many styles. All 73 soil types in the soil map for Crow Butte use the same variable color bitmap pattern with different colors assigned as part of the style. Bitmap patterns with variable color can also be used in theme maps, as shown for the population map at the left. The raindrop pattern you created could be color coded (either by attribute or theme) to reveal rainfall amounts or acidity within an area.



STEPS

- ☑ click on the Close button then click on the Polygon icon in the Style Editor window 
- ☑ click on the New Style icon, change the Fill Type to Bitmap, and click on the Create or Edit Pattern icon  
- ☑ click on the Variable button and draw the outline of the two raindrops as shown



- ☑ choose Tool / Fill and click inside each of the raindrop outlines
- ☑ choose Tool / Point, click on the white tile in the palette, then add the white highlight to each raindrop as shown
- ☑ choose Pattern / Save and name the pattern

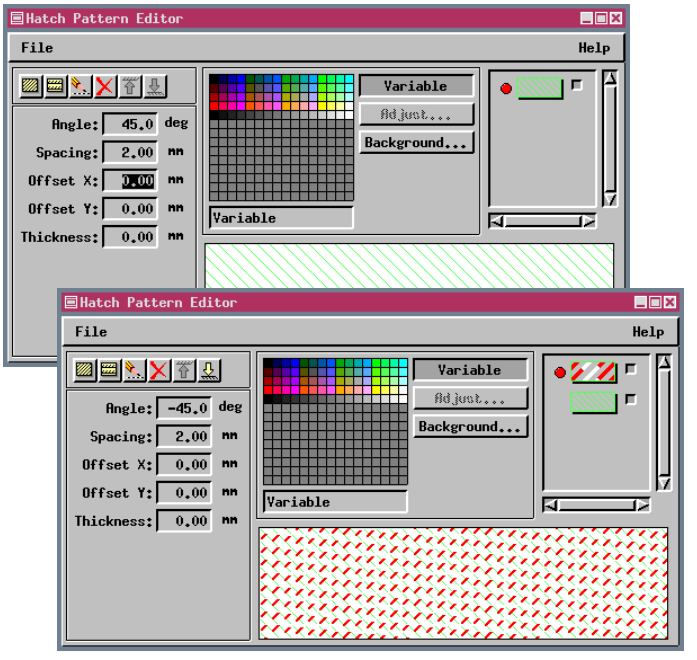
Interactive Hatch Pattern Design

STEPS

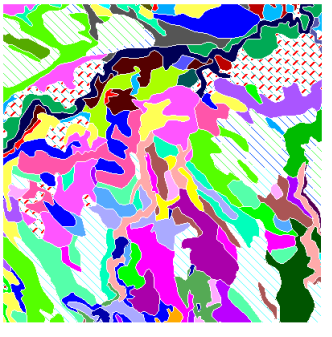
- ☑ open a new 2D group, click on the Add Vector icon, choose Add Vector Layer, and select CBSOILS_LITE from the TRANSP Project File
- ☑ click on the Polygons tab, check that Style is set to By Attribute, then click on [Specify]
- ☑ click on [Edit Styles], select the KeB style, set the Fill Style Type to Hatch, and click on the Create or Edit Pattern icon
- ☑ click on the New Simple Hatch Element icon
- ☑ click on [Variable], set the Angle to 45 degrees and the spacing to 2.0
- ☑ choose File / Save and name the pattern VAR45
- ☑ click on Add Line Pattern Element, and choose LinePatt8 from the Basic set
- ☑ set the Angle to -45 and the thickness to 0.0
- ☑ choose File / Save As and name the pattern, then choose File / Close
- ☑ click on var45 to assign it to KeB, then select KaB, change the Fill Type to Hatch Pattern and select var45; repeat for KeD
- ☑ select VeC, change the Fill Type to Hatch Pattern, and assign the second hatch pattern you made
- ☑ click [OK] three times and view the results

Hatch patterns are scalable fill patterns made up of one or more line elements. Unlike bitmap pattern lines that become “stair steps” when you zoom in, these line elements remain lines regardless of the scale at which they are drawn.

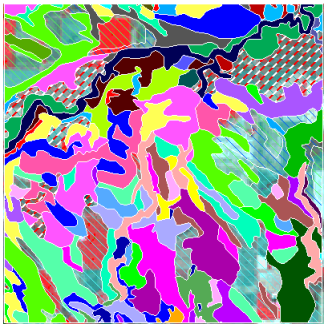
The line elements included may be simple, solid color lines, previously saved line patterns, or newly created line patterns. You set the angle, spacing, and thickness of the line elements in the pattern, as well as offsets if desired. The spacing and thickness of the lines, as well as the number of line elements, determines the amount of the pattern that is transparent.



vector alone



over raster background



Are You Exporting?

If your ultimate goal is to export the object you are styling for use in another software package, you should create your styles with the capabilities of the intended external software package in mind. TNTmips supports the export of styles to ArcView shapefiles and, through the print process from a layout, to EPS, Scalable Vector Graphics (SVG), Adobe Illustrator, and Adobe Acrobat (PDF). The print process creates a single file; the export process creates a separate style file (.avl). Styles come across fairly well in the print formats with the exception of hatch patterns. Hatch patterns appear approximately the same in TNTmips and the other products at full view but get wider as you zoom up in Acrobat, Illustrator, and the SVG Viewer. Hatch patterns are not exported to ArcView.

Export to shapefile provides a log of style features not supported by ArcView when you export. You may want to change the assigned style to something that is supported or go without assigned styles for the effected elements. A list of known, unsupported style elements is provided in the right-hand column. It is recommended for all element types that styles be assigned at design scale.

Point Symbols

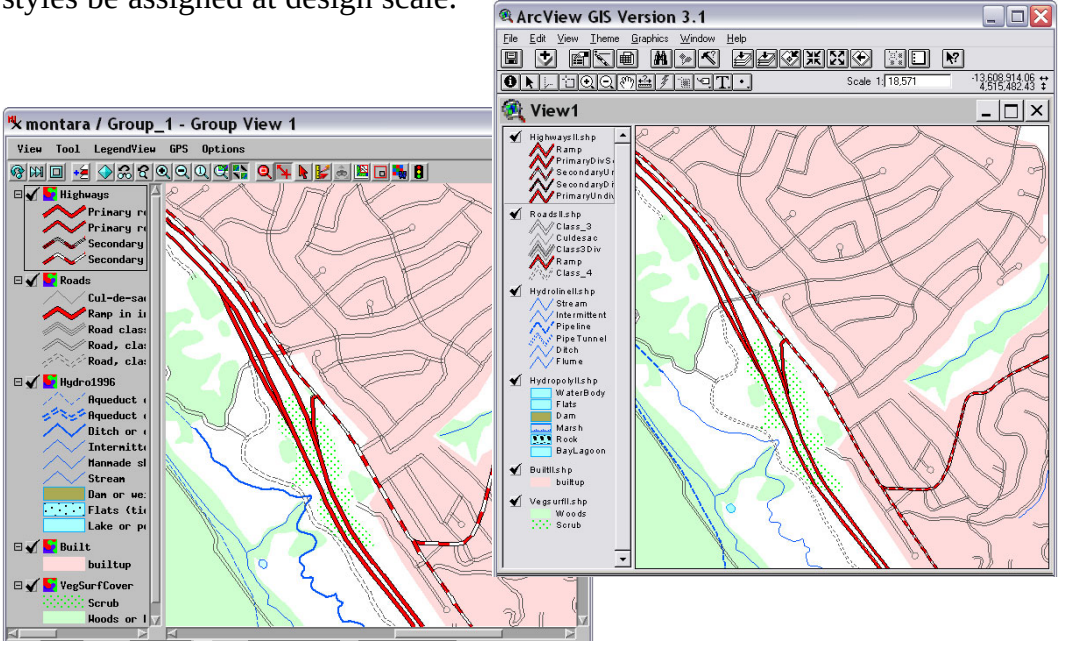
Symbols must be a single glyph from a font created in the manner described on page 18. TNTmips' pre-defined point symbols, except the enhanced crosshair.

Line Patterns

Offset elements must occur in matched pairs, for example ± 0.5. Check your line pattern definitions. Dashed lines don't zoom well in ArcView.

Polygon Fill Patterns

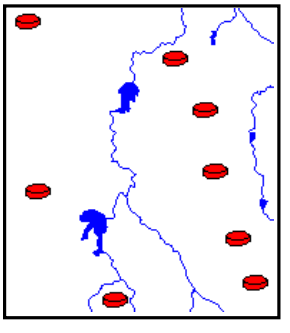
Only 8x8 fill patterns are supported. The default in TNTmips is 32x32. You cannot change the size of an existing fill pattern, but if you choose Pattern/New in the Bitmap Pattern Editor, you can specify the size. Hatch patterns are not supported.



CartoScripts

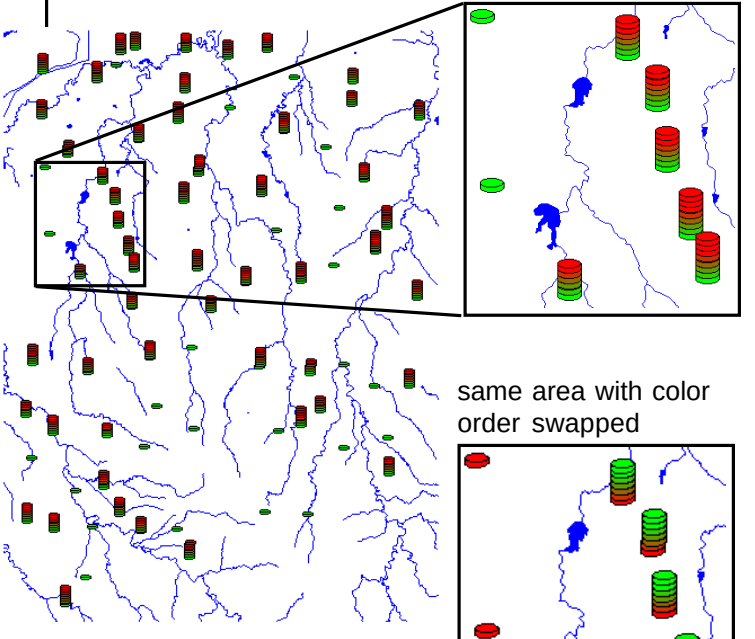
STEPS

- ☑ open a new 2D group
- ☑ click on the Add Vector icon and choose Quick-Add Vector
- ☑ select HYDROLOGY from the CB_DLG Project File (in CB_DATA) and CARTOSCRIPTPNTS in the CARTO Project file
- ☑ draw the vector, zoom in, and pan around
- ☑ click on the vector icon in the CARTO SCRIPTPNTS layer icon row
- ☑ click on [Specify] for Style By Script
- ☑ change the 16th and 17th lines of the script to read
  green = i*colorate
  red = 255 - green
- ☑ click [OK] in both the Query Editor and Vector Object Display Controls windows
- ☑ again, pan around
- ☑ return to the Query Editor window (steps 5 and 6)
- ☑ change YIELD.OATS in the 15th line to YIELD.HAYWET
- ☑ redisplay the object



The description of styles up to this point has been about the interactive tools available in the TNT products. A cartographic scripting language is also offered. The CartoScripts™ written with this language give you precise control over symbols and line patterns and let you use the attributes of the object you are drawing to determine characteristics of the symbol or line pattern if desired.

CartoScripts for point symbols can be used with vector, CAD, or database pinmap points. You simply set the point style to By Script and enter or open the desired script. You can also use CartoScripts to refine interactively designed point symbols or to make their rendering relate to specific attributes of the points. The purpose of this exercise is to show point symbols generated by CartoScripts that couldn't be made interactively and to provide some experience in altering CartoScript parameters. Many more examples are provided in the *Using CartoScripts* tutorial booklet.

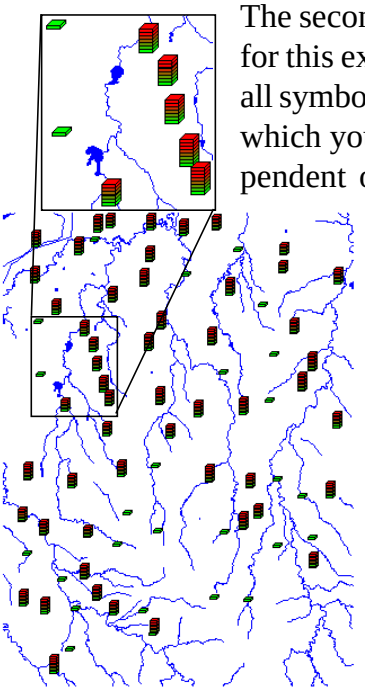


same area with wet hay yield used to determine the height of the stacks

same area with color order swapped

Symbols with CartoScripts

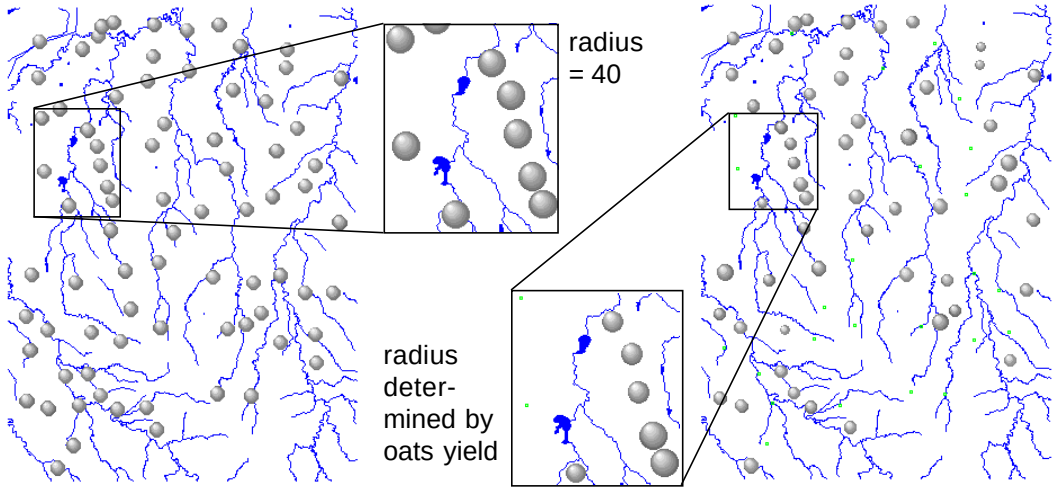
This exercise illustrates use of two additional cartographic functions and how easily a CartoScript can be adapted to make use of the attributes associated with the elements displayed. The function illustrated on the previous page (LineStyleDrawCylinder) uses the same parameters as the first function in this exercise (LineStyleDrawCube), so you can change from cylindrical to cubic stacks with color and dimensions that remain the same by simply changing the function name.



The second CartoScript you load for this exercise is written so that all symbols have the same radius, which you then modify to be dependent on one of the fields in the database associated with the points. Additional CartoScripts are provided as *.qry files with the sample data for this booklet. A comprehensive list of scripting functions is found in the Query Editor window (Insert / Function / Line Style.

STEPS

- ☑ with the same objects displayed as in the previous exercise, return to the Query Editor window for the point style and choose File / Open / *.QRY File and select STACKCYL.QRY
- ☑ two lines above the final curly bracket change the word *Cylinder* (in LineStyleDrawCylinder) to *Cube*
- ☑ click [OK] in the Query Editor and Layer Controls windows and redraw
- ☑ return to the Query Editor window and open SPHERE.QRY then repeat the previous step
- ☑ return to the Query Editor and change the radius (first line after initial comments and declarations) from 40 to YIELD.OATS
- ☑ click [OK] in the Query Editor and Layer Controls windows and redraw

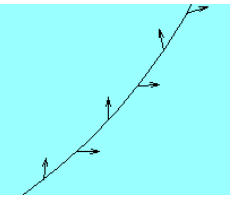


Line Patterns with CartoScripts

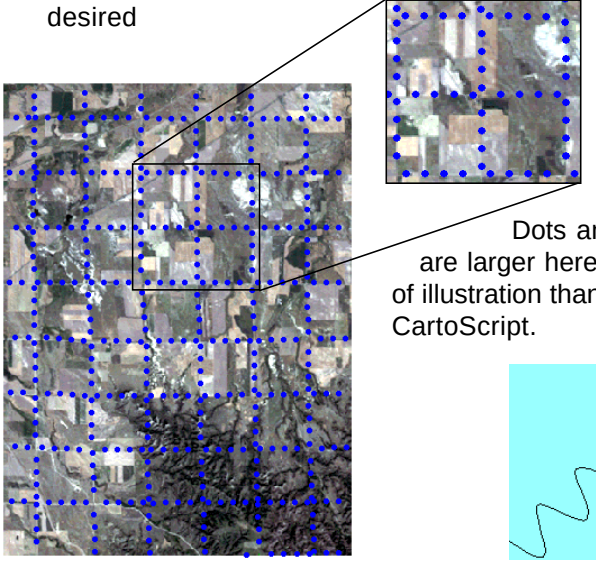
STEPS

- ☑ remove the layers from the previous exercise
- ☑ click on the Add Layers icon and select _16BIT_RGB from the CB_COMP Project File and PLANDS from the CB_DLG Project File (both in the CB_DATA directory)
- ☑ click on the Vector icon for the PLANDS layer
- ☑ in the Lines panel, change the style to By Script then click on [Specify]
- ☑ choose File / Open / *.QRY and select the DOTTED.QRY file
- ☑ return to the View window and redraw the group
- ☑ open a new 2D group or remove the existing layers, then click on the Add Vector icon, choose Quick-Add, and select the SHAPES object in the CARTO Project File
- ☑ review the script if desired

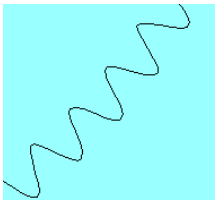
You can generate a variety of line patterns with CartoScripts, some of which can be created with the interactive line pattern editor and some of which cannot. Insertion of elements dependent on the curvature of the line and sine waves are examples of patterns that cannot be created by interactive means. The interactive line editor limits pattern components that cross the line to symmetrically placed lines. With CartoScripts, you can have other components of the pattern, such as arrows or triangles alternating sides of the line.



We have discussed scripts that depend on the attributes of elements in the displayed object, but in a sense, all CartoScripts are data dependent because object coordinates are the default units for distances specified. Thus, a script created for elements in one object may not be suitable for use with another without significant modification. Including the statement LineStyleSetCoordType(1) in your query sets the units to millimeters for display and printing. When the units are set to millimeters, symbols and line patterns do not scale with the objects as you zoom in and out.



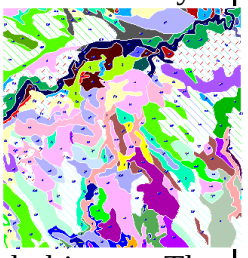
Dots and interval are larger here for purposes of illustration than in the actual CartoScript.



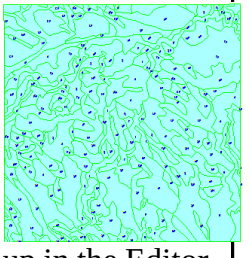
The script for generating a sine wave line pattern is the query assigned to the SHAPES object in the CARTO Project File.

DispParmView and DispParmEdit

The parameters you set for display (for example, Select: All, Style: By Attribute, the selected style assignment table) are automatically recorded and used the next time you display the same object. Because these are kept on an object by object basis, rather than simply the last used parameters for any object, they are stored as subobjects. The subobject for the Spatial Data Display process is named DispParmView. You can also maintain separate display parameters for use in the Spatial Data Editor (DispParmEdit) depending on how your preferences are set.



You generally want to maintain these separately. Display styles by attribute or theme, for example, can be distracting when you are trying to edit elements. In the circumstance where you have been editing an object and you have set the vector styles as you want to see them subsequently in Display, you need to turn off the option to save display parameters in a separate editor object. If it is on, you will get the default display parameters in Spatial Data Display, not those you set up in the Editor. If there is no DispParmEdit when an object is opened in the Editor, the parameters in DispParmView are used except that polygon filling is turned off. If you find yourself frequently changing from these styles, you should turn on the option to save the editor parameters separately, but remember to turn it off if you are setting up styles you want to use in Display.



Polygons are not filled when an object is opened for editing regardless of how they were last displayed and whether or not a DispParm Edit exists.

STEPS

- ☑ open a new 2D group and add the vector from TRANSP.RVC (see p.22)
- ☑ choose Edit / Spatial Data and select the same object (change your background color if you can't see the lines)
- ☑ choose Setup / Preferences from the Spatial Data Editor window and on the Save panel turn off the *Save display parameters in separate editor object* toggle button
- ☑ click on the Vector icon for the editable layer 
- ☑ on the Lines tabbed panel, change the line color to bright green; on the Polygons panel, set the Style to All Same and specify a solid fill in light cyan, and enable polygon filling
- ☑ choose File / Save As and save the vector to a new file
- ☑ open the new object in Display and note that the styles are as saved
- ☑ set the polygon style back to By Attribute, redraw, and remove the layer
- ☑ open the object for editing, turn on the *Save display parameters in separate editor object* toggle, set the styles as in step 5 and Save
- ☑ open the saved object in Spatial Data Display

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 in a wide variety of formats.

TNTview TNTview has the same powerful display features as TNTmips and is perfect for those who 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 can be used on any popular computing platform.

TNTserver TNTserver lets you publish TNTatlases on the Internet or on your intranet. Navigate through geodata atlases with your web browser and the TNTclient Java applet.

TNTlite TNTlite is a free version of TNTmips for students and professionals with small projects. You can download TNTlite from MicroImages' web site, or you can order TNTlite on CD-ROM.

Index

MicroImages, Inc.

11th Floor – Sharp Tower
206 South 13th Street
Lincoln, Nebraska 68508-2010 USA

Voice: (402)477-9554
FAX: (402)477-9559

email: info@microimages.com
Internet: www.microimages.com