

Tutorial



PIN
MAPPING

Pin Mapping



with

TNTmips®

TNTedit™

TNTview®

Before Getting Started

Visualization of point locations directly from database materials is a very powerful tool in TNTmips® and TNTview®, particularly when the information is frequently changed. Each location mapped can be represented as a simple point, a symbol, or as a pie chart or bar graph. Databases for pinmaps can be in TNTmips' internal format or in some external format supported by direct linking or Open Database Connectivity (ODBC). Any table that contains X and Y coordinate fields for each record can be used for pin mapping.

Prerequisite Skills This booklet assumes you have completed the exercises in the *Displaying Geospatial Data* and *Navigating* tutorials. 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 objects in the GSPINMAP and UNTDSTAT Project Files in the PINMAP directory of LITEDATA. Objects in Project Files in the CB_DATA directory are also used. Make a read-write copy on your hard drive of the sample data so display parameters can be saved when you use these objects.

More Documentation This booklet is intended only as an introduction to pin mapping. Consult the TNTmips reference manual for more information.

TNTmips and TNTlite™ TNTmips comes in two versions: the professional version and the free TNTlite version. This booklet refers to both versions as "TNTmips." If you did not purchase the professional version (which requires a software license key), TNTmips operates in TNTlite mode, which limits the size of your project materials.

Pin Mapping is available in TNTmips, TNTedit, and TNTview. Pinmaps can be used with TNTAtlas, but they can't be created while running one. All exercises in this booklet can be completed in TNTlite using the sample geodata provided.

Merri P. Skrdla, Ph.D., 1 November 2002

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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 Getting Started booklets on other topics. You can download an installation guide, sample data, and the latest version of TNTlite.

<http://www.microimages.com>

Welcome to Database Pin Mapping

The ability to visualize database information directly is a very powerful tool—it means the information can be updated as often as needed, even during the display process, and the updated locations and information can be viewed immediately. Because TNTmips supports ODBC, as well as direct linking to dBASE IV, FoxPro, and the ARC/INFO database format, you can manipulate databases in their native software and view the updated results in the TNT products without any additional steps. Any table that contains X and Y coordinate fields for each record can be used for pin mapping.

The point locations in the database table can be represented in a variety of ways: as symbols or as open or filled boxes or circles. The symbols can be from the standard set that comes with the TNT products or symbols you design yourself using the Symbol Editor, which is accessible in any process that lets you assign symbols for display. You can also create pie charts or bar graphs that represent the relative values for several attributes at the point location.

Even with elaborate symbols selected to mark point locations, you generally need a reference layer to provide a context for your pin map. The reference layer can be any TNTmips object type, such as satellite imagery, an airphoto, or vector polygons.

There are two parts to a pinmap: the graphic depiction of the point locations and the other associated information in the database table. You can view the database records for the pinmap as single records or in tabular form. When using the tabular view, you can choose to see all records or only the records related to currently selected pins. You can also update the information for existing pins or add records that will place new pins on the map. These changes are immediately reflected in the display.



Vocabulary: A **database pinmap** is a visualization of a number of point locations represented by spatial coordinates in a database table. The pinmap derives its name from the wall-mounted counterpart where pins in a map represent points of interest.



STEPS

- launch TNTmips
- copy the sample data files for this booklet to your hard drive
- select Display / Spatial Data from the main menu and open a new 2D Group
- click on the Preferences icon, choose View Options, and turn on the first option on the View tabbed panel (Redraw after any change)



Pages 4–10 provide instruction for relatively simple pin maps. The remaining exercises take you through more complex pin mapping concepts, such as pie charts and bar graphs, label positioning, and pin selection.

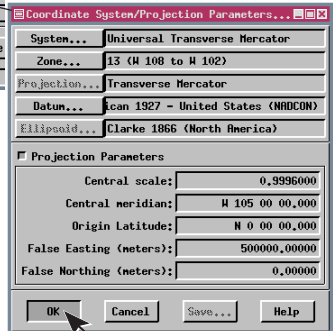
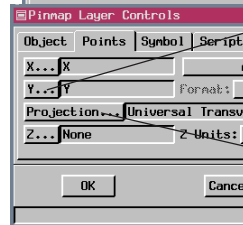
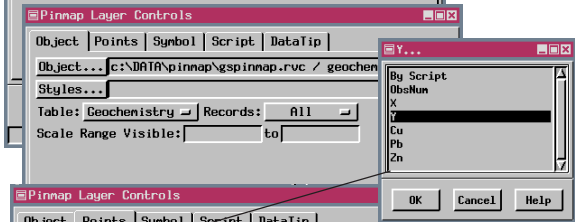
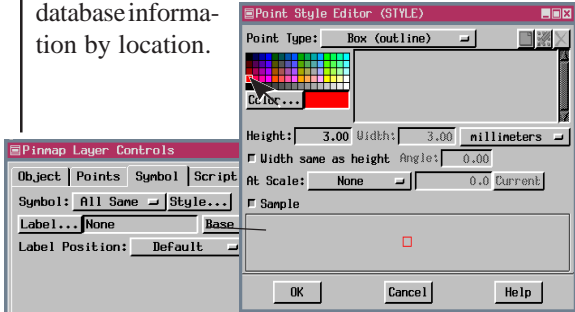
Simplest Possible Pinmap

STEPS

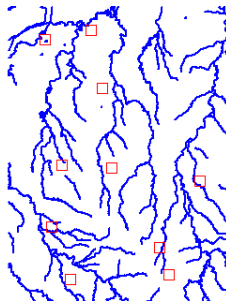
- click on the Add Database Pinmap icon and select GEOCHEM_CB from the GSPINMAP Project File
- click on the Symbol tab, then on [Style] to the right of the Symbol option menu
- click on the red tile in the color palette, then click [OK]
- click on the Points tab, then click on [X], and double-click on X in the list of the new window
- click on [Y], then double-click on Y in the new window's list
- click on [Projection], then on [System] in the new window and double-click on Universal Transverse Mercator
- if some other zone is shown, click on [Zone] and select 13
- click [OK] in the Projection window and [OK] in the Pinmap Layer Controls window



You can create a pinmap without entering any query statements if coordinates are present in a usable format. You can also get by without selecting a style object if you will accept one of the six default drawing styles. Such a pinmap isn't much to look at, see lower left, but it does provide access to the database information by location.



pinmap without reference layer



- click on the Add Vector icon, choose Quick-Add Vector, select HYDROLOGY from the CB_DLG Project File in the CB_DATA data collection

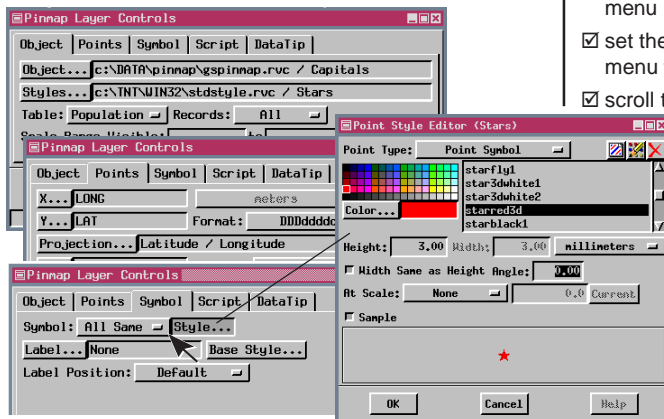


A reference layer is almost necessary with pinmap display to provide a context for what you are viewing.

Coordinate Formats and Symbols





The format in which Latitude / Longitude coordinates are expressed must be designated. TNTmips supports 25 different formats. Select the format used from the option menu on the Points panel (for the CAPITALS database, millionths of a degree). If degrees, minutes, and seconds are expressed in separate fields, you can convert the coordinates to a usable format with a script.

A style object is a collection of drawing specifications for vector, CAD, TIN, and pinmap objects. These specifications include such factors as color, size, and assignment of symbolic representation. Symbols, line patterns, and fill patterns are also stored in style objects. You need to select a style object before symbols become an option for the All Same drawing style.





* For future reference if you did a complete install, STDSTYLE.RVC will also be in the directory on your drive where the TNTmips executables are found.

STEPS

- delete added layers 
- click on the Add Vector icon, choose Quick-Add Vector, and select STATES from the UNTDSTAT Project File 
- click on the Add Database Pinmap icon and select the CAPITALS object from the GSPINMAP Project File 
- click on [Styles] and select STARS from the SYMBOLS folder in the STDSTYLE Project File*
- on the Symbol panel, click on [Style] to the right of the Symbol option menu
- set the Point Type option menu to Point Symbol
- scroll through the list of symbols until you find STARRED3D, click on it, then click [OK]
- check that the projection on the Points panel is Latitude / Longitude
- set the X field to LONG, the Y field to LAT, and the format to DDDddddd
- click [OK] in the Pinmap Layer Controls
- click on the Save Group icon and create a STATECAP group object in your GSPINMAP Project File 

Selection and Style By Script

STEPS

- choose Group / Close then click on the New 2D Group icon 
- click on the Add Database Pinmap icon and select the ARTIFACTS object* from the GSPINMAP Project File 
- click on the Symbol tab, click on [Style] (to the right of the Symbol option menu), and set the Point Type to Circle (filled)
- click on [OK] in the Point Style Editor window, then set the Symbol option menu to By Script
- click on the Points tab, click on [X...], then double-click on EASTING
- click on [Y...], then double-click on NORTHING
- click on [Projection...] and select UTM Zone 16
- click on the Script tab and, in the Query Specification field, type the text exactly as below

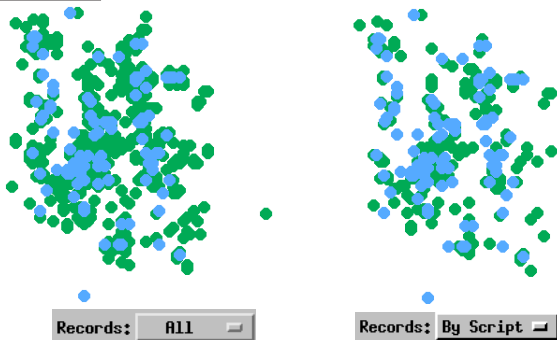
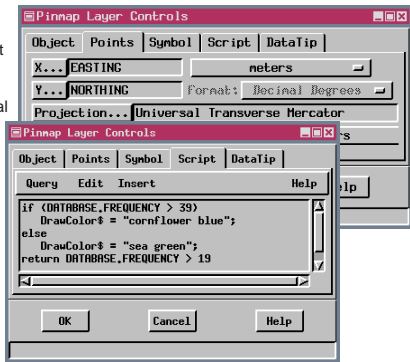
```
if (DATABASE.FREQUENCY > 39)
  DrawColor$ = "cornflower blue";
else
  DrawColor$ = "sea green";
return DATABASE.FREQUENCY > 19
```

- return to the Pinmap Layer Controls window, click on the Object tab, and set the Records option to By Script
- click [OK]

Record selection, symbol assignment, labels, and coordinates can all be specified in a single script. The corresponding option also must be set to By Script for the relevant query statements to be used, as shown by the initial display in this exercise. The “return” statement at the end of the script means that only those records with a FREQUENCY greater than 19 will be displayed when the record selection method is set to By Script.

You can specify drawing color using any color name found in the RGB.TXT reference file or by supplying percent red, green, and blue (separated by spaces). In either case the color specification in the DrawColor\$ = statement must be in quotes. If shape and size are not specified in the query, the last settings for All Same are used.

* The points in the ARTIFACTS object represent a subset of the data collected for the Sayil Archeological Project (Michael P. Smyth and Christopher D. Dore, Principal Investigators).

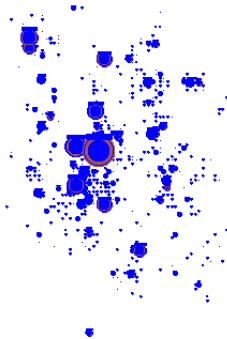


Symbols and Size By Script

You can specify a symbol from a selected style object either by the symbol name or the style name. If the symbol in question uses elements of variable color, the actual color is specified by the style if a style is selected or by the color last chosen for symbol display if only a symbol name is specified.

You need to include scaling information in the query if you specify the symbol by its name. Scale information is included as part of the style definition and, therefore, need not be in the script if a style name is specified. The script in this exercise uses one of the field values to determine the scale so that locations where a greater number of artifacts were found are represented by larger symbols.

The symbol name must be entered exactly as it appears in the style object. In situations where you are not sure of a name or its capitalization, set the Symbol option menu to All Same and click on the Specify button*. Then set the Point Type to Point Symbol (this choice is not active if you don't have a style object selected), and check the list to the right of the color palette. Remember to set the Symbol option back to By Script.



STEPS

- return to the Pinmap Layer Controls window and click on [Styles] on the Object panel
- select the STYLECERAMIC object from the GSPINMAP Project File
- click on the Symbol tab and click on [Style] at the right of the Symbol option menu
- click on the red tile in the color palette then on [OK]



- choose Query / New on the Script panel and type in the text exactly as below

```
Symbol$ = "ceramic";
XScale = (DATABASE.FREQUENCY / 50);
YScale = XScale;
DrawSymbol = 1;
return (DATABASE.FREQUENCY >= 25)
```

- click [OK], and observe the style, distribution, and size of symbols
- return to the Pinmap Layer Controls window
- click on [Style] in the Symbol panel
- click on the blue tile in the color palette then on [OK]





- click [OK] in the Pinmap Layer Controls window

* Assigning a style in a script requires you to be even more familiar with the style object because, at this point, you have direct access only to the list of symbols.

Symbol Angle and Multiple Pins

STEPS

- choose Group / Close then click on the Open icon in the Spatial Data Display toolbar, choose Open Group and select the SCHOOLS group from the GSPINMAP Project File 
- click on the Add Database Pinmap icon, and select the SCHOOLS object from the GSPINMAP Project File 
- click on the Symbol tab and set the Symbol option menu to By Script
- type the text exactly as at the right on the Script panel in the Query Specification field
- click [OK]
- repeat steps 2 and 3, then change the query so DrawColor\$ = "Green" Angle = 0 and XScale = Mayors_Run._1996 / 10
- click [OK]
- repeat steps 2 and 3, then change the query so DrawColor\$ = "Blue" Angle = 310 and XScale = Mayors_Run._1997 / 10
- click [OK]

Each database record can produce only one pin in the pinmap, so to look at information for one location on several dates, you need to have multiple pinmap layers, each with a different drawing style (or you could use a pie chart or bar graph, which are described later in this booklet, if that seems appropriate). To prevent pins in different layers from obscuring one another, assign a different angle to the symbols used in each layer.

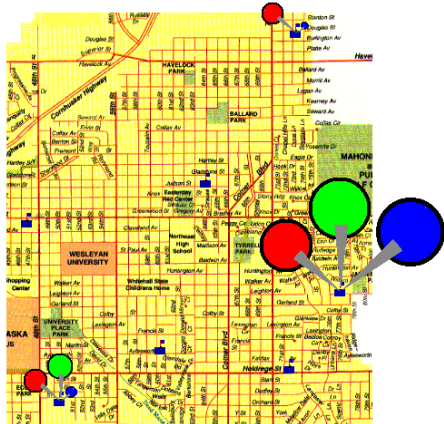
This exercise maps the number of participants from each of seven schools in a 1-mile foot race in three successive years. The years are distinguished both by pin angle and color (all red pins, which are also rotated 50° counter clockwise, represent the 1995 participants). The size of each pin is determined by

```
Symbol$ = "MapPinN2";
DrawColor$ = "Red";
Angle = 50;
DrawSymbol = 1;
XScale = Mayors_Run._1995 / 10;
YScale = XScale;
MapScale = 40000
```

the number of runners from the school located at the point of the pin. When pinmap locations are represented by

symbols, the "hot spot" is placed at the coordinate location. For many symbols, such as those on the preceding pages, the hot spot is in the center of the symbol. For these map pin symbols, the pin point is a more logical choice.

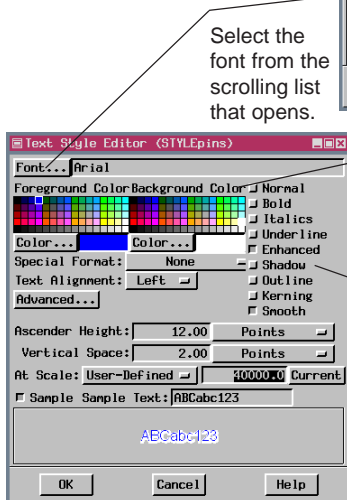
The same database object appears four times in this group, once to identify school locations with a representative symbol, and once for each year in which race participation is being mapped.



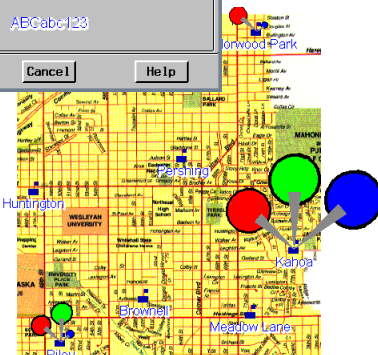
Simple Labels

You can use the value of any field in the database to label the pins. You can also enter a query to generate the labels. The default position for labels is to the right of the pin. You can, however, position labels wherever you want around the pin using the option menu on the Symbol panel.

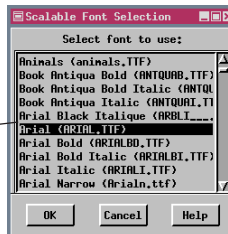
You need to add the labels to only one of the database pinmap layers in this example since the pins represent the same location in each layer. You can, however, have labels in different layers at different sizes if you choose. More advanced labeling features are described in the later exercises (*Multiple Line Labels* and *More About Labeling*).



Use of enhanced text helps to ensure that labels will be visible whether the local background is dark or light.





Select the font from the scrolling list that opens.

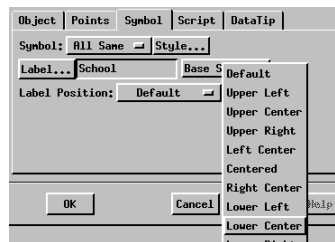


Click on tiles in the color palettes to set the text color.

Set the character style by clicking on one or more of these choices (some are mutually exclusive).






STEPS

- click on the Database Pinmap icon in the layer icon row for the bottom pinmap layer 
- click on the Symbol tab, then on [Label], and double click on School in the Label window 
- click on [Base Style], then on [Font] in the Text Style Editor window, and double click on Arial.ttf (or a similar font)
- set the Ascender Height to 12 Points at a map scale of 40000 with the Scale set to User-Defined
- click on a blue tile for the Foreground Color and a white tile for the Background Color
- click on the Enhanced check button to the right of the color palettes, then click [OK] in the Text Style Editor window
- set the Label Position to Lower Center then click [OK] in the Pinmap Layer Controls window



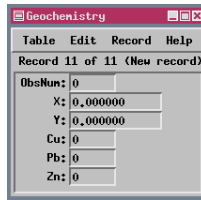
Dynamic Update

STEPS

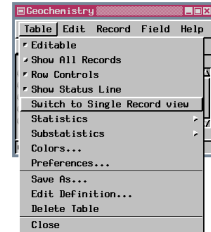
- choose Group / New 2D Group
Close then click on New 2D Group 
- click on the Add Database Pinmap icon and select the GEOCHEM_CB object 
- check that the settings are still the same as for the exercise on page 4
- click on the [Style] button on the Symbol panel and choose Circle (Filled) for the Point Type
- click on [OK] in the Point Style Editor and in the Pinmap Layer Controls
- click on the Show Details icon for the pinmap layer then on the Show Tables icon  
- click on the View Table icon for the Geochemistry table 
- in the new record, enter the information shown above the center pinmap
- choose Record / New and enter the information shown over the pinmap on the right, then choose Table / Close

You can update your pinmap during display by adding new records or changing existing records. When coordinates are changed, the pins are moved. These changes can be made during the display process, or if the database is in an external format, using its native software. During display, changes are apparent as soon as the database is updated by selecting another record or closing the table.

When you open a table in single record view with no points selected, the table is automatically positioned at a new record. You then simply enter the information for the new record. You need to take some action that indicates you are done with the record, such as closing the table or selecting another pin, before the new pin is drawn.



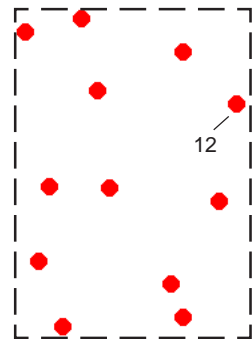
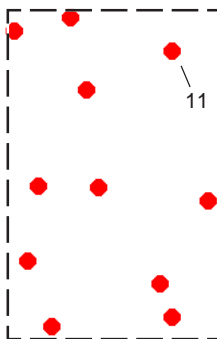
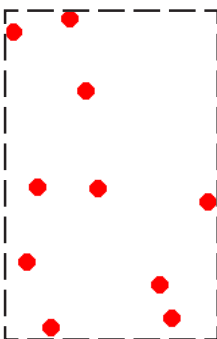
If your table opens showing rows and columns instead of appearing as at the



left, choose Switch to Single Record View from the Table menu

ObsNum: 11
 X: 640759.83
 Y: 4731825.48
 Cu: 87
 Pb: 627
 Zn: 429

ObsNum: 12
 X: 642763.89
 Y: 4729854.62
 Cu: 117
 Pb: 414
 Zn: 658



Pie Charts

Special query statements are available so you can create pie charts and bar graphs to represent each data location. These special symbols can incorporate values from as many different fields as desired. We will display over a raster object for this pie chart sample exercise. An outline around the pie and between the wedges is an optional component of a pie chart so the background is relevant when choosing its color. The color to use for this outline is indicated at the beginning of the pie chart specification (here, it is "white"). If a color name is omitted here, there will be no outline.


You can add as many of the fields as you want to a pie chart and the proportion of each to the whole for that location will be reflected in the relative size of the wedges. The default colors assigned counterclockwise in order from the origin are red, green, blue, cyan, magenta, yellow, and then repeating if you have more than six fields. You can also specify the color for each wedge if desired (consult the reference manual).

You are instructed to type all the queries in this booklet to match the example provided. You can, alternatively, use the Insert menu choices to add most of the components of a query. Using the Insert menu to build queries is described in another booklet in this series (*Getting Started: Building and Using Queries*).




Lead accounted for nearly half of the dissolved chemicals found at the location represented by this pie chart.

STEPS

- click on the Database Pinmap icon in the layers icon row
- 
- choose By Script from the Symbol option menu
 - click on the Script tab and enter the query as below, then click [OK]

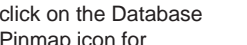
```
Symbol$ = PieChart$("white", Geochemistry.Cu,
                    Geochemistry.Pb, Geochemistry.Zn);
DrawSymbol = 1;
XScale = 5;
YScale = 5;
MapScale = 125000
```

- click on the Add Raster icon, choose Quick-Add Single and select `_8_BIT` from the `CB_COMP` Project File in the `CB_DATA` collection
 - click on the Change Order icon and choose Lower
- 

Bar Graphs

STEPS

- click on the Add Vector icon, choose Quick-Add Vector, and select HYDROLOGY from the CB_DLG Project File
- click on the Remove icon in the layer icon row for the _8_BIT raster object and choose Remove Layer
- click on the Database Pinmap icon for GEOCHEM_CB and replace the pie chart script with the following



```
Symbol$ =
Rectangle$(0,0,1000,1000,0,"white",1) +
Rectangle$(0,0,1000,1000,0,"black",0) +
BarGraph$(
  750,
  "black",
  Geochemistry.Pb, "blue",
  Geochemistry.Zn, "green",
  Geochemistry.Cu, "red"
) +
Line$(-100,0,1100,0,"black");
DrawSymbol = 1;
XScale = 5;
YScale = 7.5;
MapScale = 125000
```

The query to specify a bar graph is more complex than that for a pie chart; a pie chart requires only the symbol type, the fields to be included, and a size at a specified map scale. For a bar graph you also need to specify information for the surrounding rectangle, which is really two rectangles (one white and filled, the other black and unfilled), the baseline (if you want one), and the field value equivalent to the rectangle height.

You can include as many fields as you like in the bar graph; the bars become narrower as more are included. You change the overall width of the bar graph using the XScale parameter in the query. As with pie charts, the color of the bars can be omitted

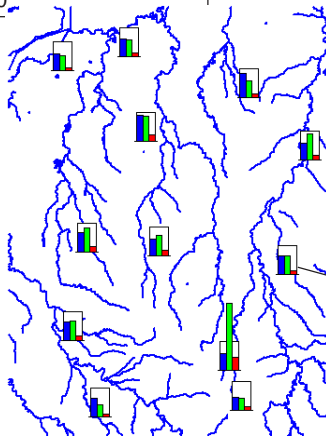
from the query and then are automatically assigned in the order red, green, blue, cyan, magenta, yellow.

The first value in the BarGraph\$ portion of the script sets the rectangle height, here 750. The color name that follows the rectangle height is for the bar outline if desired. The baseline length is determined by the Line\$ part of the script and is relative to the rectangle coordinates such that Line\$(-100,0,1100,0,"black")

specifies a black line that extends 10% of the width beyond a 1000 x 1000 rectangle both to the right and left.

- click on [OK]

These bar graph symbols present values for the same fields but in a different order than in the pie chart exercise.






Approximately equal concentrations of lead and zinc were found at the location represented by this bar graph.

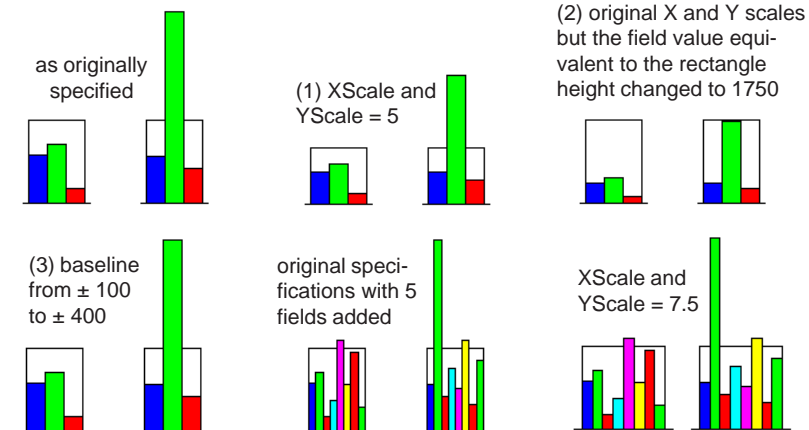
Better Understanding Bar Graphs

Let's change a number of bar graph parameters so you can see how each works. The one part of the bar graph script you should not change is the size specified for the bounding rectangles. The bar graph itself is scaled so the bars for all fields listed in the query fit in a width of 1000 and the maximum field value specified is represented by a height of 1000. The units are arbitrary and used only so that the bounding rectangles can fit the graph. The actual dimensions of the bar graph are controlled by the XScale and YScale assignments and the map scale specified. If you change the width of the rectangle, the width of the bar graph will exceed or fall short of the width of the rectangle. If you change the height of the rectangle, the maximum field value specified will not occur at the top of the rectangle.

The bar graphs that correspond to observation numbers (ObsNum) 3 and 10 are used for the illustrations on this page. All of your bar graph symbols will change in a similar fashion since the script applies to all pins. Your sample data is not set up for the last two examples, which include five additional fields without color specification in the bar graph query. As you can see below, adding more fields with the same XScale specified makes each bar narrower.


STEPS

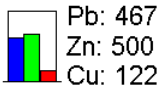
- click on the Database Pinmap icon for GEOCHEM_CB 
- change the YScale in the script from 7.5 to 5
- click [OK], see (1) below
- click on the Database Pinmap icon for GEOCHEM_CB 
- change the YScale back to 7.5, and change the field value equivalent to the rectangle height from 750 to 1750
- click [OK], see (2) below
- click on the Database Pinmap icon for GEOCHEM_CB 
- change the field value / height back to 750, and change the Line\$ statement from -100,0,1100,0 to -400,0,1400,0
- click [OK], see (3) below



Multiple Line Labels

STEPS

- click on the Database Pinmap icon for GEOCHEM_CB 
- change the Line\$ statement back to that specified on page 12
- add the three lines at the right to the end of the script exactly as shown (there is a space between the initial quote and the element identifier so that the label sits to the right of the baseline)
- on the Symbol panel, click on [Label] and double-click on By Script
- click on [Base Style], then click on [Font] in the Text Style Editor window and double click on Arial.ttf (or a similar font)
- set the Ascender Height to 10 Points at a map scale of 100000 with the At Scale option set to User-Defined
- click on the black tile (or white tile if you have a black background) in the Foreground palette
- click [OK] in the Text Style Editor window
- click [OK] in the Pinmap Layer Display Controls window
- exit the Display process



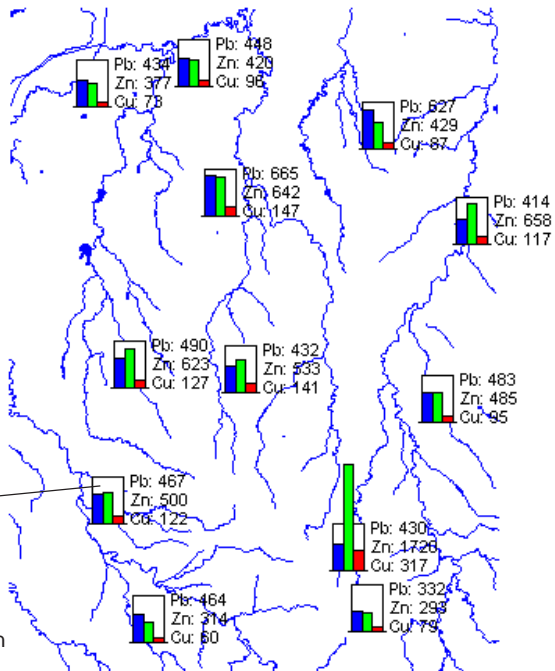
The labels report the concentrations in parts per million of the three chemicals in these bar graphs.

Adding simple one line labels is described in an earlier exercise. Some pin maps, such as pie charts and bar graphs, benefit from multiple line labels. The labels can include values for all of the fields used in these special symbols or values for a subset of these fields. Field values can be reported with or without identifying text. You can also include a line

```
print (" Pb:", Geochemistry.Pb);
print (" Zn:", Geochemistry.Zn);
print (" Cu:", Geochemistry.Cu)
```

of text without an accompanying field value if desired. An alternative method for entering

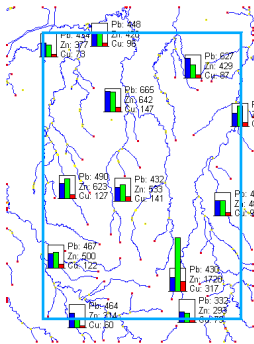
multiline labels uses the Label\$ assignment statement listed for simple labels in combination with text, integer field identifiers, new line specifications, and field names. Consult the reference manual for details on this more complex method of label assignment.



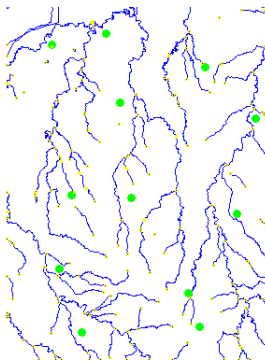
Pasting a Pinmap into a Vector Object

The Copy and Paste features of TNTmips' Spatial Data Editor let you create point elements in a vector object from a database pinmap using the specified coordinate fields to position the database pins you select. These point elements retain direct attachments to the corresponding records in the table, which becomes part of the vector's point database.

You can choose to copy elements from the entire object or from a designated region, which may have been saved previously or can be drawn before copying is initiated. You may copy either all elements or only selected elements from the designated region. The object you are pasting the points into must be an active editing layer while the pinmap can be a reference layer.

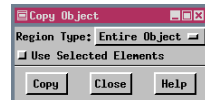


The Paste Placement tool appears as a box with the extents of the copied elements in the same position as the originals. Generally, this is the correct position for pasting because it was determined by georeference. You can, however, move, resize, or rotate the box.



STEPS

- select Edit / Spatial Data from the main menu
- click on the Open icon in the TNTmips Object Editor window and select HYDROLOGY from the CB_DLG Project File
- choose Add / Database Pinmap from the Reference menu and select GEOCHEM_CB from the GSPINMAP Project File, and click [OK]
- click on the Copy icon in the Spatial Data Editor View window, and set the Region Type to Entire Object









- click on [Copy] in the Copy Object window
- click on the Select icon for the HYDROLOGY layer
- click on the Paste icon
- click on [Paste] in the Paste Placement Tool window

- click on the Save As icon and save the edited HYDROLOGY object to a new file, adding POINTS to the object name so you can't confuse it with the original HYDROLOGY object

The original pinmap layer has been hidden and the point display style is set to filled circles that are larger than the default size.

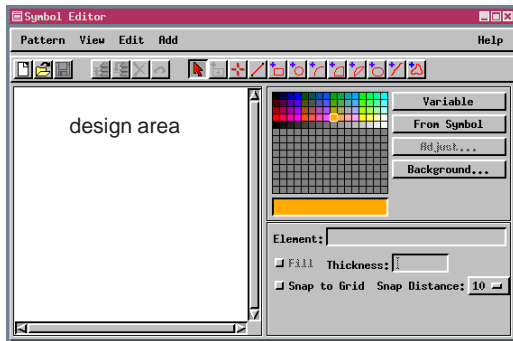
Designing Your Own Pinmap Symbols

STEPS

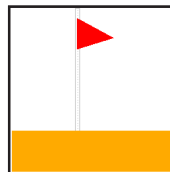
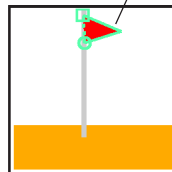
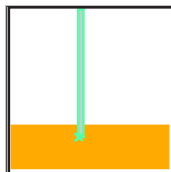
- ☑ launch Display / Spatial Data with a new 2D group
- ☑ click on the Add Database Pinmap icon and choose the ARTIFACTS object 
- ☑ click on the Symbol tab, set the Symbol option menu to All Same, and click on [Style]
- ☑ set the Point Type to Point Symbol
- ☑ click on the New Symbol icon then on the Rectangle icon in the Symbol Editor window  
- ☑ click on an orange tile in the color palette, then turn on the Fill toggle
- ☑ pull out a rectangle that fills the bottom quarter or third of the design area and right-click to add it
- ☑ click on a gray tile and change the shape of the rectangle tool to be thin, extend to the top of the design area, and overlap the first rectangle, then right click
- ☑ click on the Polygon tool 
- ☑ click on [Variable] and draw a triangle as shown, then right-click
- ☑ click the Select icon then on the gray, thin rectangle and next on the Lower icon  
- ☑ save your work, close the Pattern Editor window, choose your new symbol from the list, click [OK] and display

You can create your own symbols in any TNTmips display process if a style object has been specified for the pinmap. Since you can choose to create a new style object in the selection process, you can design your own symbols to be added to an existing or new style object at any time by opening the control window, designating a style object on the Object panel, clicking on [Style...] on the Symbol panel, and clicking on the New Symbol icon. TNTmips also has a separate Style Editor process (Edit / Styles) that lets you design point symbols, line patterns, and fill patterns for use with any object type without having a specific object selected for display.

The tools used in this exercise for symbol design are interactive. A scripting language for precise, symmetric symbol design is also available.



The All Same drawing color, which is used as the variable color, is set to red in this example.



Creating Symbols from TrueType Glyphs

You do not have to rely on your own drawing abilities to create pinmap symbols; you can paste and colorize any glyph from a TrueType font. Some fonts contain only one element in a glyph, which means you cannot create a multicolored symbol without adding to the design.

Symbol elements can have one color assigned and be either filled or unfilled. Thus, to have an outline for a filled symbol, you need to add a copy of the outermost element and assign a contrasting color to it (without filling).

Symbol elements have an assigned drawing order that may need to be changed when the elements are filled. If you fill an element and can no longer see another element that should be on top of it, you need to lower the former element in the drawing order.






Selected glyphs

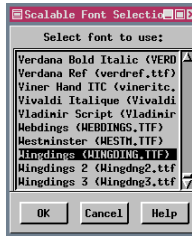
appear in outline. If you don't see the selected glyph in the design area, change the area's background color.



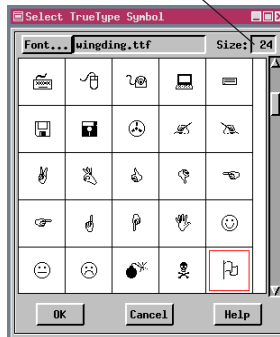
The pole and the background of the flag are a single polygon in this glyph, so they can only be assigned a single color. Several steps in the sequence of coloring and outlining the flag symbol are shown above.

STEPS

- click on the Database Pinmap icon in the layer icon row 
- click on the Symbol tab, then on [Style]
- click on the New Symbol icon 
- choose Open TrueType Symbol from the Pattern Menu in the Symbol Editor window
- select windings or some other TrueType font
- scroll until you find a glyph you'd like to use, click on it, then click [OK]
- select each element in turn, click on the color you want in the palette (or choose Variable), and click on Fill
- change the drawing order of any element layered so it hides another element
- select the outermost element again, choose Copy from the Edit menu, then choose Paste, and click on [Apply] in the Box Edit Controls window (without moving the box)
- click the Select icon, select the new outermost element, click on the black color tile, and turn off the Fill toggle if on 
- save your work (Pattern / Save)



The font size set does not affect the symbol, only the size at which it is viewed for selection.



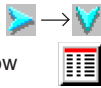
single element

multiple elements

Table Viewing

STEPS

- click on the Open icon on the toolbar, choose Open Group, and select the STATECAP group you saved on page 5
- choose Options / Colors in the View window, change the Selected color to green, then click [OK]
- click on the Show Details icon for the pinmap object, then on the Show Tables icon
- right-click on the POPULATION table name or description, and turn off the Tabular View toggle
- click on the View Table icon for the POPULATION table
- click on the Toolbox icon, then on the Rectangle icon, and draw a rectangle that includes the capitals of the northeastern states
- right-click and choose Select Elements
- choose Table / Switch to Tabular view in the database table window
- click on each of the View icons (in the toolbar below the Record menu), and note the differences in information shown



Database tables can be displayed in either single record or tabular view. Each view type has its own associated features. There are two methods to switch between viewing modes: right-click on the table name to turn on / off the Tabular View toggle or select the other viewing mode from the Table menu in the database table viewing window.

Single record view is often easiest for data entry because a smaller window is needed to view all fields. Also, for vector, CAD, and TIN objects, a new record is created automatically when you click on an element without a related record in a table.

Single record view, however, only presents information about the active element and does not have any of the element selection features available in tabular view.

You have the option in tabular view of viewing all records, records related to all selected elements, or only those records related to the active element.

You can also select one or more records and click on an icon to select all the elements related to those records.



Table	Edit	Record	Help
Record 1 of 48 (1/1 attached)			
CITYNAME: ALBANY, NY			
STNAME: NEW YORK			
LAT: 42704168			
LONG: -73862473			
POP: 101082			
HALEPOP: 47444			
FENPOP: 53638			

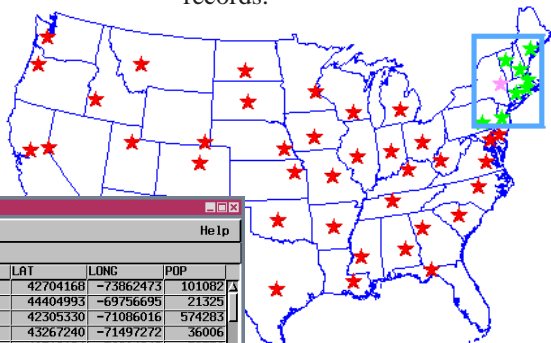
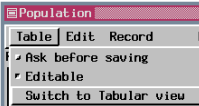


Table	Edit	Record	Field	Help
9 of 48 records shown - 9 related to selected elements				
●			CITYNAME	STNAME
●			ALBANY, NY	NEW YORK
●			AUGUSTA, ME	MAINE
●			BOSTON, MA	MASSACHUSETTS
●			CONCORD, NH	NEW HAMPSHIRE
●			HARRISBURG, PA	PENNSYLVANIA
			LAT	LONG
			42704168	-73862473
			44404993	-69756695
			42305330	-71086016
			43267240	-71492722
			40312124	-76604849
			POP	
			101082	21325
			574283	36006
			52376	



Selecting Pins

You changed the highlight color for selected elements in the last exercise because the symbol used for the pinmap is red, which means selected elements are indistinguishable from other elements unless the highlight color is changed from red.

You can click on pins and view the related database information, as you did in the last exercise, or select records and view the associated pins. When you are selecting pins to view related records you want to be in either the View Active or View Selected Element Records mode so all the records of interest will be in view in the table. You generally want to be in the View All Records mode to choose records for use in selecting pins.

You can choose to sort on any field for database viewing purposes. This table was initially sorted alphabetically by capital city. After sorting by population and selecting as described, all capital cities with population > 250000 should be highlighted.

STEPS

- ☑ click on the View All Records icon 
- ☑ widen the Population table so you can see the fifth field, or column (Pop), right-click on the field name, and choose Sort On This Field from the menu that pops up
- ☑ scroll down until you see a population >250,000 and click in the Select Record box (should be St. Paul, MN)
- ☑ scroll to the bottom of the table (after sorting, should be Phoenix, AZ), hold the <shift> key and click on the last Select Record box
- ☑ click on the Exclusive icon 

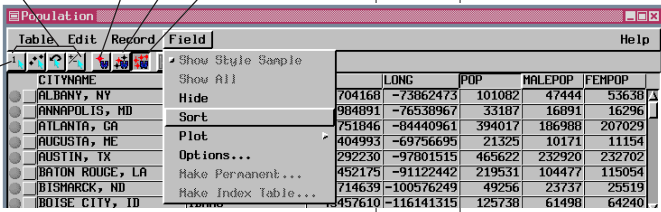
View Active Element Records

View Selected Element Records

View All Records

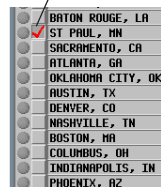
icons for element selection from selected records

Exclusive



CITYNAME	LONG	POP	MALEPOP	FEMPOP	
ALBANY, NY	704168	-7362473	101082	47444	53630
BANAFOLIS, MD	904091	-7653967	33187	16891	16296
ATLANTA, GA	761846	-84440961	394017	186986	207629
AUGUSTA, ME	404993	-69756695	21325	10171	11154
AUSTIN, TX	292230	-97801515	465622	232920	232702
BATON ROUGE, LA	452175	-91122442	219531	104477	115054
BISHARCK, ND	714639	-100576249	49256	23737	25519
BOISE CITY, ID	457610	-116141315	125738	61498	64240

1) click here



2) hold down the <shift> key, then click in the last Select Record box

3) click on the Exclusive icon




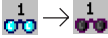
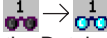
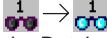

4) the checks are replaced by related indicators...



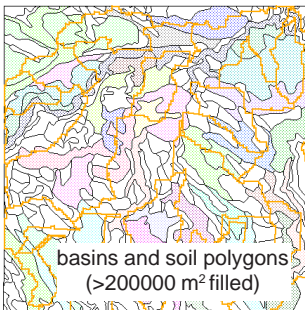
...and the pins are redrawn with selected elements in highlight

Pinmap from Vector Database Tables

STEPS

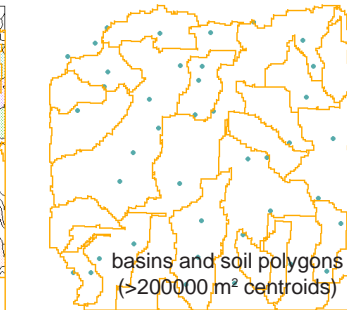
- click on the Open icon on the Display Spatial Data toolbar, choose Open Group, and select **BASINSANDSOILS** from the **CENTROID** Project File 
- note how difficult it is to determine which basins (wide, orange outline) contain soil polygons with area $>200000 \text{ m}^2$ (filled) 
- click on the Hide/Show icon for the **CBSOILS_LITE** **vector** layer to **hide** the layer 
- click Hide/Show icon for the **POLYDATA** **pinmap** layer to **show** the layer 
- click on the Database Pinmap icon for the pinmap layer and note the settings in the Pinmap Layer Controls 

soil polygons less than 200000 m^2 are not filled



You can create a pinmap from any database table that can be viewed in TNTmips and contains X and Y coordinates in each record. The table need not be part of a main level database object; it can be part of the point, line, or polygon database of a vector object, for example. You might want to represent soil polygons by their centroids when displayed over other polygonal data, such as watershed basins, because multiple sets of polygon boundaries are visually confusing. You can, however, readily visualize the number of different soil type polygons within a watershed basin when soil polygon centroids are displayed with the watershed polygons. Usable centroid coordinates are available for any polygon-containing vector object that has a standard attributes table (polystats).

Pinmaps can also have a Z component provided by any field in the same table. You can use this value to float the points over the surface. You can connect these floating points to the surface by adding the pinmap as a second time and using narrow rectangular symbols with a Y Scale tied to the same field. (Symbols are billboards and have no Z scale.) Although this effect can be created from a database pinmap, it is

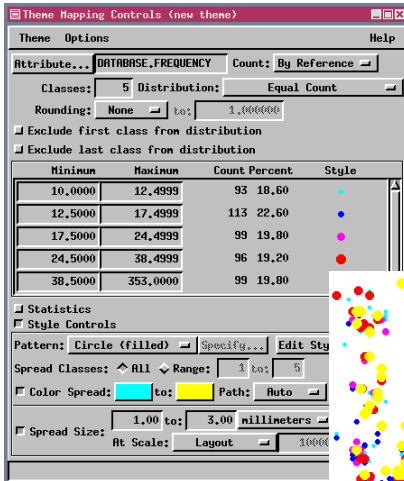


done more easily and versatily using vector points (connecting line can use a variety of line styles instead of a single symbol).

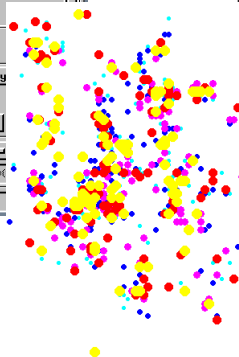
Pins to Vector Points for Theme Mapping

Pasting pins into an existing vector object as points has been discussed. This exercise describes importing a database to create a new vector object for theme mapping. Importing points from a database table eliminates the fluid properties of a pinmap that allow pin movement by simply changing coordinate values in the table. A theme map equivalent to that created interactively for vector points can be generated for a pinmap by script, but writing such a script is rather tedious. Creating a 500 point vector object by import takes only about two seconds for the import and less than a minute to set up. Interactive theme map setup is also very quick.

You then need to consider the source and use of the data to decide whether query writing or import is the best choice for you. If the data is dynamic with pin positions frequently changing, you should probably write the appropriate query. If the data is static with pin positions based on past observations, import is likely the way to go.



Accept the defaults in the upper portion of the Theme Mapping Controls window.





Compare this depiction of the artifact data points with the versions presented on pages 6 and 7.

STEPS

- choose Process / Import/ Export, set the option menus to Vector and Import, and double-click on Database in the list of formats
- set the Database Format to RVC Database Object, click on [Database] and select ARTIFACTS from the GSPINMAP Project File
- click on [Table] and click [OK] in the Select Subobject window
- click on [Projection] and choose UTM Zone 16
- click on [X Column] and choose EASTING (Y Column should be set to NORTHING), then click [Import] and name the new object in the GSPINMAP Project File ARTIFACTPOINTS
- open a new 2D group in Spatial Data Display
- click on the Add Vector icon, choose Add Vector Layer, and select ARTIFACTPOINTS
- click on the Points tab, set the Style to By Theme, and click on [Specify]
- choose the DATABASE table and FREQUENCY field, then click [OK]
- open the Style Controls panel, turn on the Spread Size toggle, and set the spread from 1 to 3 mm at Layout Scale
- choose Theme / Save, accept the defaults, then choose Theme / Close and display the object


More About Labeling

STEPS

- ☑ click on the New 2D Group icon 
- ☑ click on the Add Database Pinmap icon and select the SCHOOLS object from the GSPINMAP Project File 
- ☑ click on [Styles] and select STYLEPINS from the same Project File
- ☑ check that the Symbol option menu is set to All Same and that the Point Type is specified as Point Symbol with school_p as the selected symbol
- ☑ click on the Script tab and enter the query below in the Query Specification panel


```
LabelPosn=2
LabelOffset=5
LabelAngle=20
```

- ☑ click [OK] and observe the result
- ☑ return to the Pinmap Layer Display Controls window and modify the query to match the second example below
- ☑ click [OK] and observe the result
- ☑ try each of the four examples and any other permutations you'd like

Riley  LabelPosn=2
LabelOffset=5
LabelAngle=20

Riley  LabelPosn=1
LabelOffset=7
LabelAngle=90

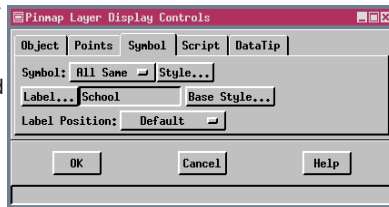
Riley  LabelPosn=7
LabelOffset=5
#LabelAngle=90

Riley  LabelPosn=5
LabelAngle=-45

Designating label position from the option menu on the Symbol panel was described on page 9. You can also specify label position in the script, which lets you vary the position according to other pin attributes. The label position is specified by including "LabelPosn" in the script and assigning a value from 1-9. The values are in a 3 X 3 grid as shown, such that a value of 5 positions the label centered over the pin, 1 positions the label above and to the left of the pin, and so on.

1	2	3
4	5	6
7	8	9

Two additional terms can be added to a script to modify the position of pinmap labels: LabelOffset and Label Angle. The direction for label offset is determined by the label position. Labels above



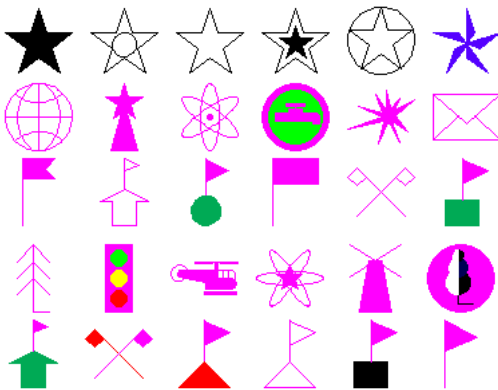
the pin are moved up, labels to the right of the pin are moved further right, labels positioned diagonally from the pin are moved the specified offset distance in the two appropriate directions, and so on. The offset you specify is from the pin location to the beginning of the label in the same units as the symbol size, which means the offset must be at least half the symbol width or the label will cover part of the symbol. Unrotated labels without specified offsets do not collide with their associated symbols. Add a LabelAngle assignment to the query to set label rotation. Rotation is specified in degrees anti-clockwise around the label position.

When you want to remove a statement from a query, you can either delete the text (bottom right) or you can comment it out by placing a # at the beginning of the line (bottom left). (Other SML conventions also apply. See the tutorial booklet entitled *Writing Scripts with SML.*)

Further Notes on Pin Mapping

The last used display parameters for a database pinmap are saved with the database object for use as defaults the next time the database is selected for pinmap display. These display parameters include the settings of all buttons and fields in the Pinmap Layer Controls window and any entered query statements. When multiple pinmap layers of the same database are used in a single layout, as in the Symbol Angle and Multiple Pins exercise on page 8, these multiple display parameters for a single database object can be saved as a group or layout. The display parameters for the last added pinmap layer will be the ones retained for the next time the database is selected as an individual pinmap layer, while all the different parameters will be used to recreate the initial display when the layout is opened.

You can save any entered pinmap script for later use with the same or other database objects by choosing Query / Save from the menu bar in the Script panel of the Pinmap Layer Controls. Obviously, any field names in the script would have to be the same across objects for an unmodified script to work with another object. You can always use one script as a model for the next, changing field names and map scales as necessary. You will get a syntax error in the query if you forget to modify all field names to match the currently selected database.



All of these symbols are found in the `STYLEPINS` style object in the `GSPINMAP` Project File. Many more are available in the `STYLE` Project File distributed with TNT products (a sample of these symbols is shown at the bottom left of the page with magenta as the variable color). Any of these symbols or symbols of your own design can be used with pin maps or point elements in vector and CAD objects and in the legends you may include when creating a layout.



Don't forget, if you find a symbol you want that is a character in a TrueType font, you can easily use it with your pin maps or vector objects.

STEPS

- click on the Preferences icon, choose View Options, and turn off the first option on the View tabbed panel (Redraw after any change)



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