

# AGIS for Windows Tutorial

---



Usage notes for AGIS v 1.58

# Contents

<b>INTRODUCTION</b> .....	<b>1</b>
<b>CREATING AND DISPLAYING AN AGIS DATA FILE</b> .....	<b>2</b>
SAVING A NEW TEXT DATA FILE.....	4
OPENING A NEW MAP DISPLAY .....	4
SELECTING A MAP AND DISPLAY FORMAT FOR A MAP LAYER.....	5
ACCEPTING A BASE MAP SELECTION .....	6
ZOOMING TO AN AREA OF INTEREST ON THE MAP.....	7
ADDING A DATA LAYER TO THE MAP DISPLAY .....	8
ADDING A NEW DATA LAYER.....	8
SELECTING A DATA FILE AND DISPLAY FORMAT FOR A DATA LAYER .....	9
CREATING DATA DISPLAY FORMATS.....	10
USING AUTO RANGE.....	11
CHANGING DATA DISPLAY SETTINGS .....	12
DATA DISPLAY SETTINGS.....	13
CHANGING THE SYMBOL DISPLAY STYLE.....	14
CHANGING THE SYMBOL PLOT STYLE.....	14
CHANGING THE SYMBOL BORDER AND FILL STYLES .....	15
SELECTING COLORS .....	15
ACCEPTING A SYMBOL DISPLAY STYLE .....	17
CHANGING THE TEXT LABEL DISPLAY STYLE.....	18
CHANGING TEXT STYLE .....	19
ACCEPTING DATA DISPLAY SETTINGS .....	20
MODIFY A LIST OF DATA DISPLAY FORMATS .....	21
CHANGING THE DATA LEGEND DISPLAY FORMAT.....	22
ACCEPTING A DATA FILE AND DISPLAY FORMAT FOR A DATA LAYER.....	23
ACCEPTING A DATA LAYER .....	24
YOUR NEW MAP DISPLAY .....	25
SAVING THE NEW MAP DISPLAY .....	26
<b>DIGITIZING DATA AND MAPS FROM MAP IMAGES</b> .....	<b>27</b>
INSTALLING AND STARTING WINDIG.....	28
SETTING THE DIGITIZING FORMAT FOR AGIS DATA FILES .....	29
SETTING THE DIGITIZING SCALE FOR THE MAP IMAGE .....	30
SETTING THE COORDINATES OF MAP POINTS.....	31
SAVING THE SCALE ATTRIBUTES .....	31
DIGITIZING THE DATA POINTS .....	32
SAVING THE POINT DATA .....	33
MAKING THE DATA FILE READABLE BY AGIS .....	34
PREPARING TO DIGITIZE MAP LINES AND POLYGONS .....	35
SETTING THE DIGITIZING FORMAT FOR AGIS MAP FILES .....	36
DIGITIZING LINES AND POLYGONS .....	37
EDITING THE ASCII MAP FILE.....	38
ADDING FEATURE HEADERS THE ASCII MAP FILE.....	39
ADDING A FEATURE HEADER FOR A POLYGON .....	40
CONVERTING THE ASCII MAP FILE TO BINARY .....	41
CREATING A DISPLAY WITH THE DIGITIZED DATA .....	42

<b>DISPLAYING DATA FROM A GARMIN HANDHELD GPS .....</b>	<b>43</b>
DOWNLOADING TRACK, WAYPOINT AND ROUTE DATA FROM YOUR GPS .....	44
SELECTING YOUR TRACK FILE .....	45
CONVERTING YOUR FILES TO THE AGIS TEXT FORMAT .....	46
CONVERTING THE MAP FILE FROM TEXT TO BINARY .....	47
CREATING A NEW MAP DISPLAY .....	48
ADDING THE MWDB2 MAP AS A BACKGROUND LAYER .....	49
ADDING THE GPS SAMPLE MAP LAYER .....	50
SELECTING THE GPS MAP DISPLAY FORMAT .....	51
ZOOMING IN TO THE AREA COVERED BY THE GPS DATA .....	52
ADDING GPS POINT DATA .....	53
ADD THE SAMPLE GPS DATA TO THE DISPLAY .....	54
SELECTING A DATA DISPLAY FORMAT .....	54
ACCEPTING DATA LAYERS .....	55
ADDING A GRID AND MAP SCALE TO THE DISPLAY .....	55
CHANGING MAP DISPLAY OPTIONS .....	56
ADDING A SCALE INDICATOR .....	56
SETTING THE ATTRIBUTES OF A SCALE INDICATOR .....	57
SETTING THE ATTRIBUTES OF THE GRID DISPLAY .....	58
SAVING THE GPS MAP DISPLAY .....	59
NAMING A NEW MAP DISPLAY .....	60
FINAL DISPLAY .....	60
EXAMPLE DISPLAY USING DIGITAL CHART OF THE WORLD .....	61
<b>INDEX .....</b>	<b>62</b>

---

# AGIS Tutorial

## Usage notes for AGIS for Windows v 1.58

### Introduction

There are three major sections currently available. All new users of the AGIS software should have a look at the first section on creating and displaying an AGIS data file as this introduces and explains many common procedures for using AGIS.

The second section explains how to get data and map information from bitmap images into the format used by AGIS. This goes into detail about how to use the freely available WinDig utility, and explains more about the text import file formats used by AGIS. Users who want to create their own map files should look at this section.

The third section about displaying Garmin GPS information introduces other procedures not covered, so it would be beneficial to all users to have a look through this as well. You don't actually need to have a GPS to do the third section, as the sample files are provided with this tutorial.

## Creating and displaying an AGIS data file

This tutorial is designed to be followed step by step through the data file creation process. It would be best to make your own data file while following the tutorial - either with some data that you would like to plot, or using the example exactly. A copy of the example data file is supplied with this tutorial to save you some typing. It is called test4.dat and should be copied to your AGIS data directory.

In completing the tutorial, you should also have a better idea how to use many of the dialogs which appear in AGIS. If you need to quickly find information about a certain dialog, use the index below to skip straight to it.

While there might seem to be a lot of steps involved in displaying a data file, the example follows the process from the creation of a text data file, through the creation of a new map display, formatting of display options and finally saving the new display file. With some practice the whole process might take 5-10 minutes - assuming that you are not typing in a huge data file! It should also be remembered that once a display format has been created, it can be easily assigned to new data files which can be displayed in the same way, greatly shortening the time needed for set-up.

## Entering your data values

There are various methods for entering your data including using Word for Windows, NotePad, or Excel. This example uses Excel. Open a new file and type the longitude, latitude, and data values in each column of the spreadsheet. Longitudes and latitudes must be entered as decimal degrees.

The first and second columns are always longitude and latitude. The data values following depend on the type of display that you would like to create. In this example, there are three different kinds of data display types to show you what is possible.

Lines 1-4 show points with attached text. This is suitable for the display of towns, for example, as this allows you to display a symbol with a name attached to it. Which symbol is shown is determined by the data value given in the third column. If you want to display the same symbol for a set of points, then use the same value for each.

It is important to remember that attached text must be enclosed in quotes, so make sure that the quotes are also shown in the same way as the example.

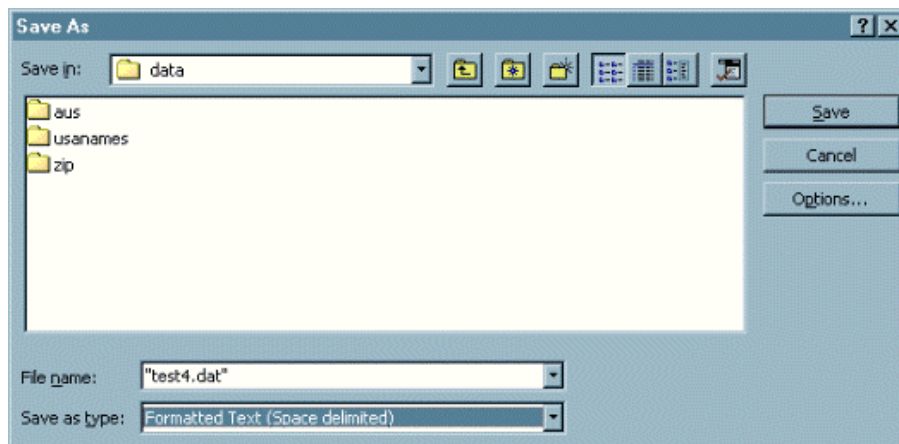
Lines 5-14 (except for line 10) show how data is entered if you do not need to attach text to a point. Line 10 shows how you can also give a rotation value for a displayed symbol. In this case, the displayed symbol will be rotated by 130 degrees in a clockwise direction. Negative rotation values can also be entered.

	A	B	C	D	E	F
1	147.32	-42.88	1	"Hobart"		
2	152.5	-39.5	1000	"first point"		
3	153.5	-39.5	15000	"second point"		
4	150.5	-40.5	10000	"third point"		
5	151.5	-40.5	7000			
6	149.5	-41.5	1500			
7	150.5	-41.5	3000			
8	151.5	-41.5	2000			
9	149.5	-42.5	7000			
10	150.5	-42.5	24000	130	"rotated"	
11	151.5	-42.5	100			
12	148.5	-43.5	400			
13	149.5	-43.5	5000			
14	150.5	-43.5	3000			
15						

## Saving a new text data file


Select "File/Save As" - you need to save the data as a text file, not as a spreadsheet. From the "Save As" dialog, first select your AGIS data directory. This might be on your C drive, AGIS folder, sub-folder data.

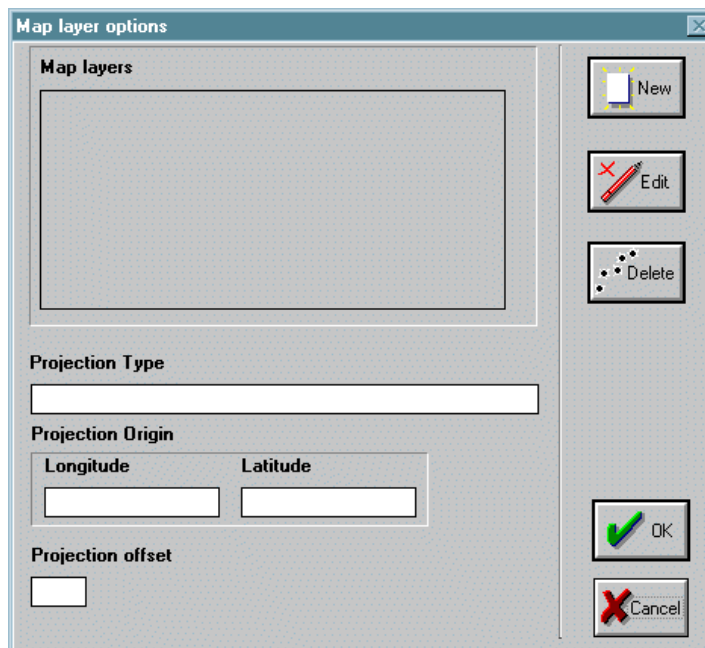
Select the save as type to be formatted text (space delimited) and type the file name as test4.dat as shown in the example, or give it a descriptive name that you will remember. AGIS data files always have to have the .dat extension though.



## Opening a new map display

For this example we will create a new map display and add one map layer and the new data layer. The map layer that we will add is the background map on which your data will be displayed.

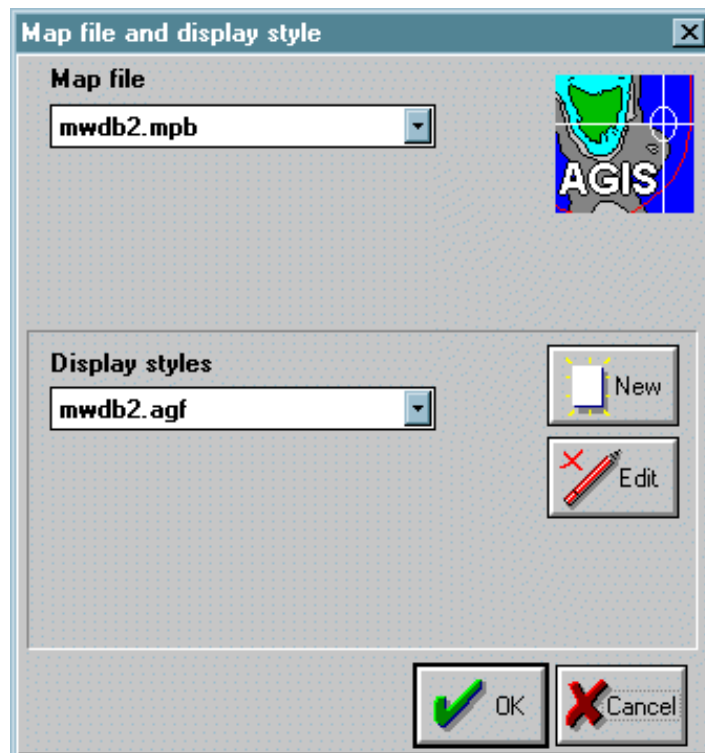
Start AGIS and select "File/New" from the menu, or the  tool. When you start a new file the dialog shown below will appear. This allows you to select a base map. There are no map layers displayed. To add a map layer, press the "New" button.



## Selecting a map and display format for a map layer

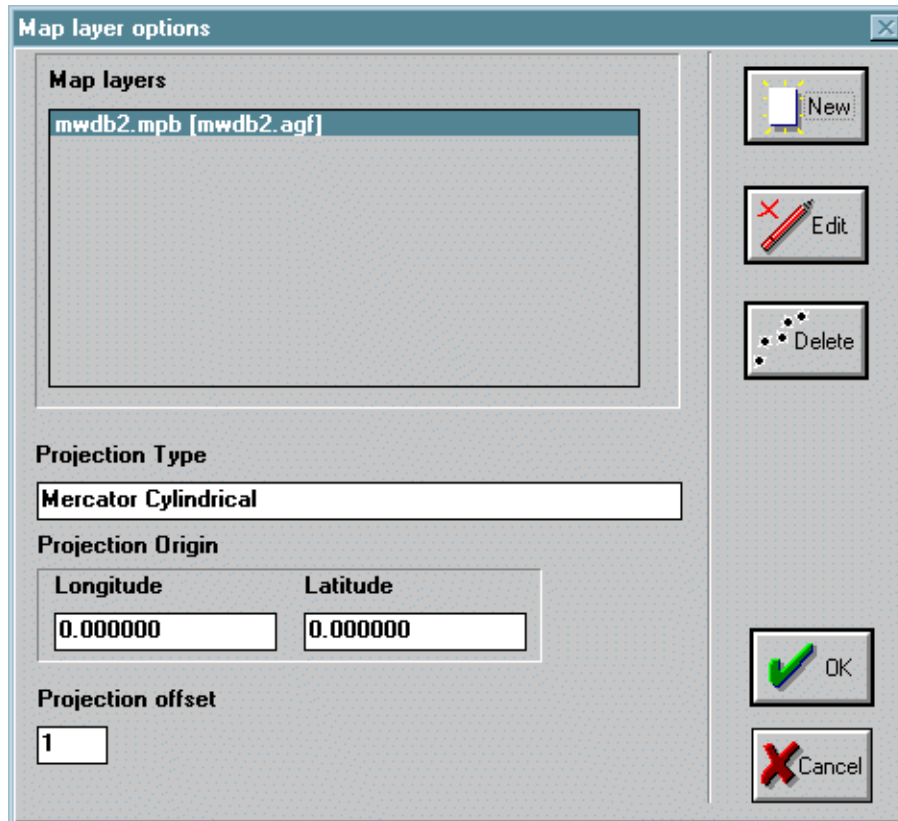
This dialog allows you to choose from all existing map files and display formats. For this example we will choose the world map supplied with AGIS - mwdb2. For the map file choose mwdb2.mpb, and for the display style choose mwdb2.agf. Then press the "OK" button.

A note to remember here is that map display styles are specific to map files which contain the same set of feature identifiers, so the list of available display styles will change depending on the map file selected. A note to also remember is that if you are adding map layers to one that already exists, only map files which were created using the same projection can be overlaid, so only those will appear in the map file list at that stage.




## Accepting a base map selection


You have now selected a map and corresponding display format to be used as your base map. The dialog shows what projection is used for the map, and what the projection origin is. The offset indicates what the extreme map edges are - (1) means longitude -180 to +180. Other offsets allow, for example, continuous display from 0 to +360, which would be better for mapping countries near 180 degrees such as New Zealand. Press "OK".




## Zooming to an area of interest on the map

The base map of the world will now be displayed using the mwdb2.agf format. If you have changed the map display format, the map might not look the same as this (the default map display for versions after 1.58 use a white background instead of black). The example data file contains information for Tasmania, Australia.

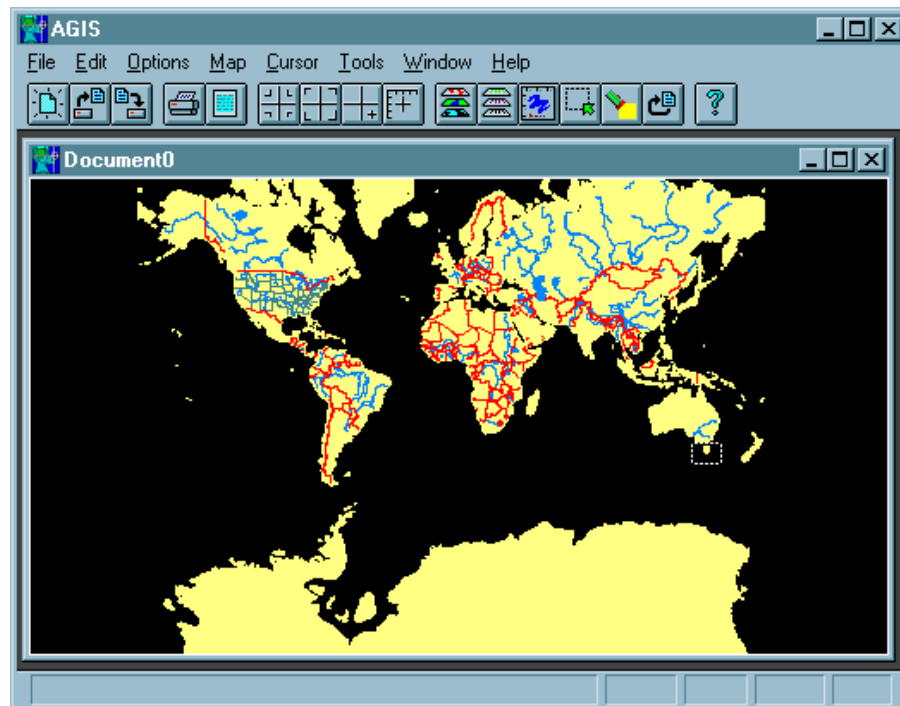
Select "Cursor/Zoom In" from the menu or the  tool. Zoom into the area indicated by the dotted box by clicking on the top left of the area to zoom to, dragging until the box shape is what you want, and releasing the mouse button.

Zooming out is done by selecting "Cursor/Zoom Out" from the menu or the  tool. Zooming out is done by click and drag in the same way as zoom in, but the image that results will have the current image contained in the area you define with the zoom box.

You can pan the image by selecting "Cursor/Pan" or the  tool. To use the pan cursor, just click on the area that you want to make the new map center.

If you are having trouble zooming, select "Map/Set Coordinates" and type Latitude -42, Longitude 149.5, Scale 4700000. It is useful to remember that you can get to exactly where you want using this method.

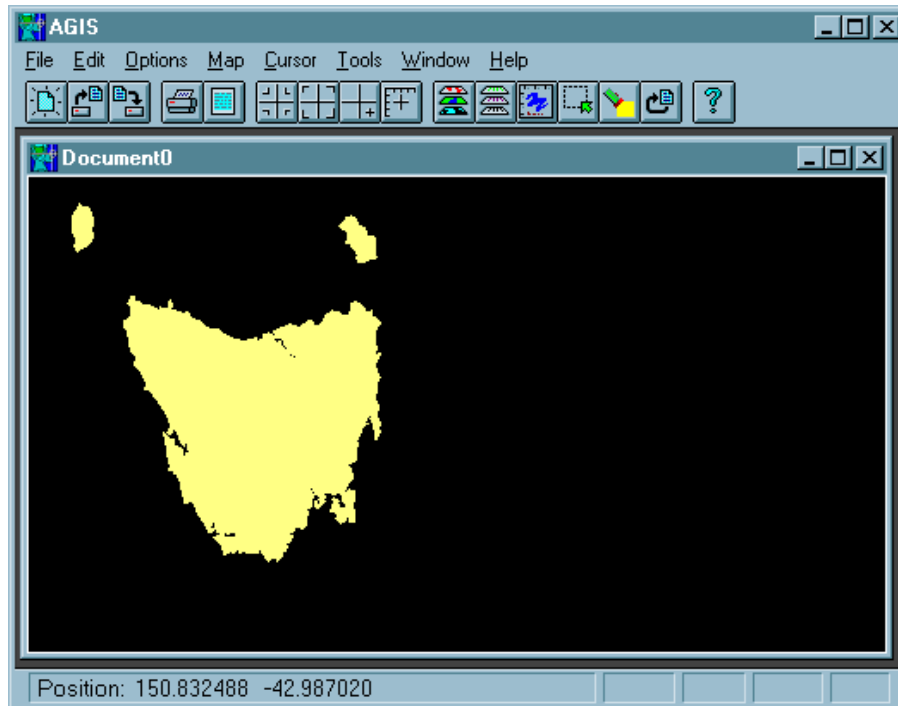
If you get totally lost, select "Map/Full Scale" and this will zoom the map right out to the maximum again.



## Adding a data layer to the map display

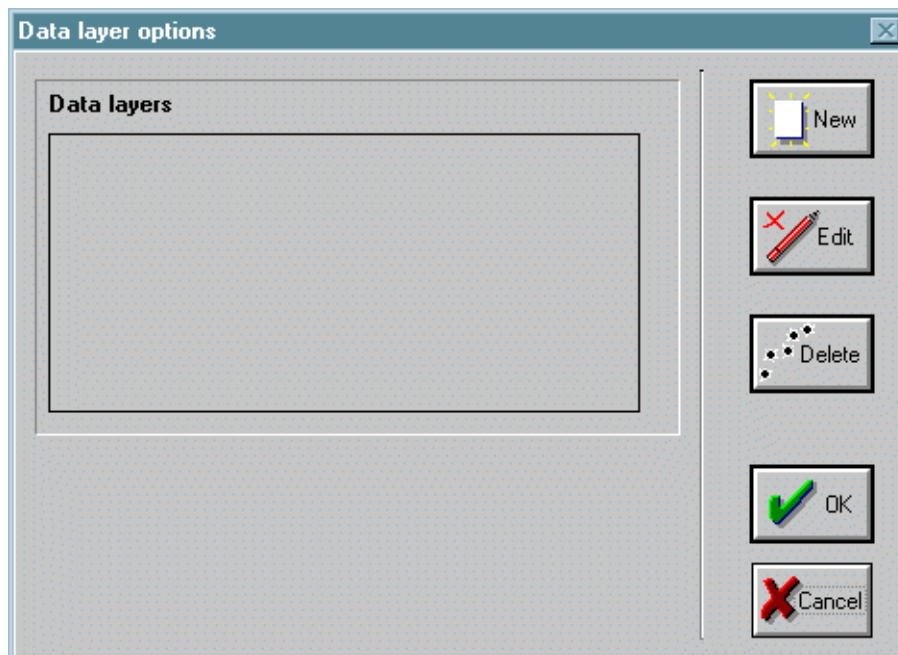
The display should now look something like the example, with Tasmania shown to the left of the display.

To add your data layer, select "Options/Data Layers" from the menu, or the  tool.



## Adding a new data layer

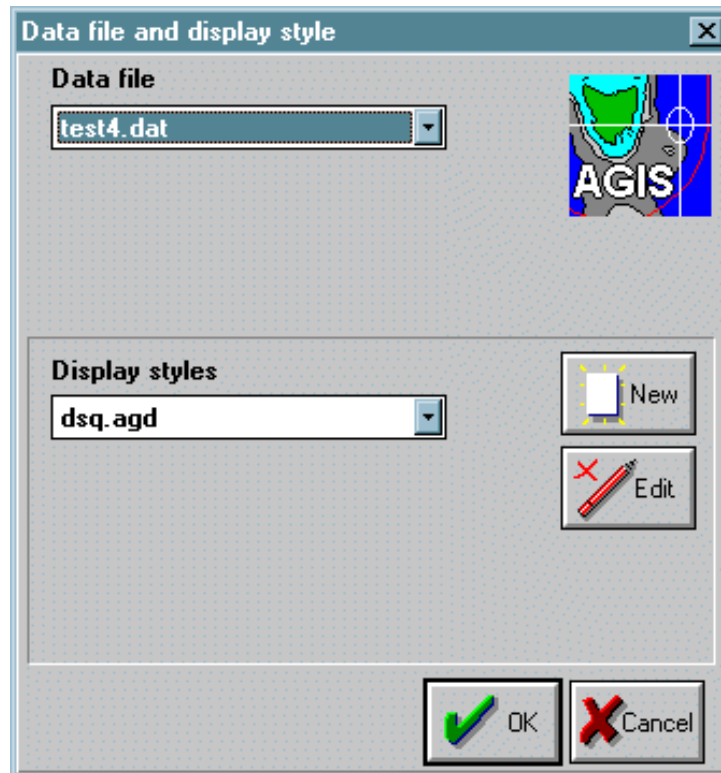
This dialog displays the data layers used for the current map display. There are none present, so select "New".



## Selecting a data file and display format for a data layer

Select your data file from the data file list. If you can't find it, you haven't saved your file as a .dat file in the AGIS data directory.

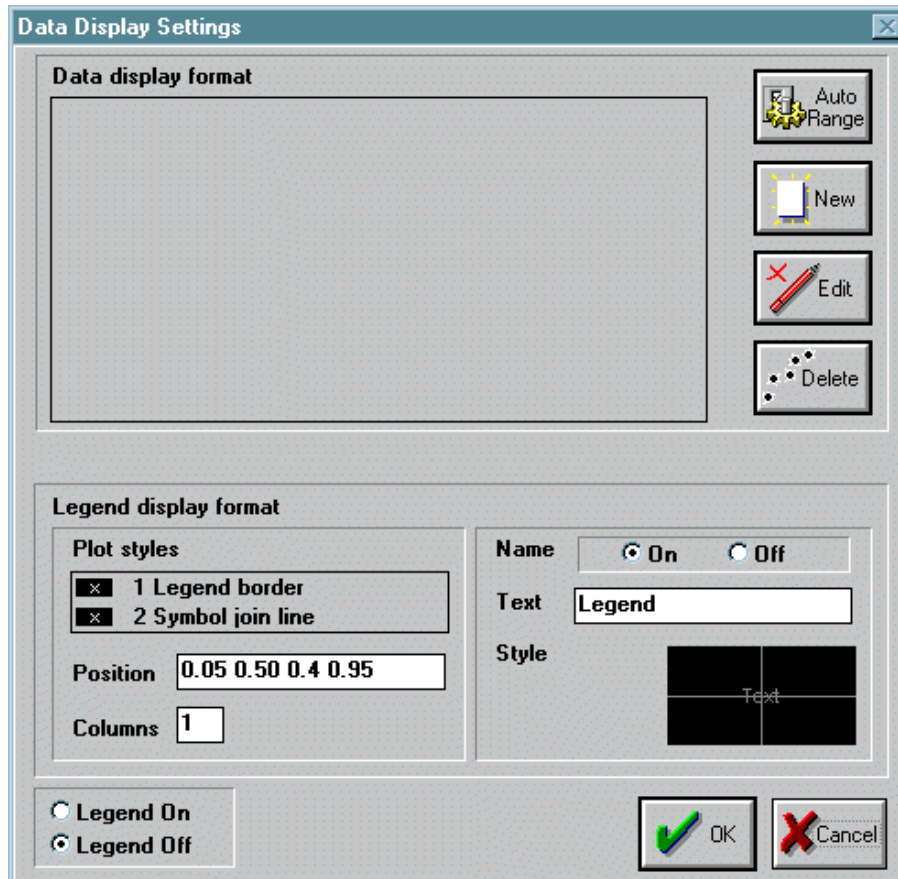
After you have selected your data file, we are going to create a new display style, so select "New".



## Creating data display formats

This dialog allows you to assign symbol types to ranges of data values in your data, font types for text attached to data points, and to set the display style of the data legend.

We are going to allow for five different symbols to be displayed, so press "New" five times.

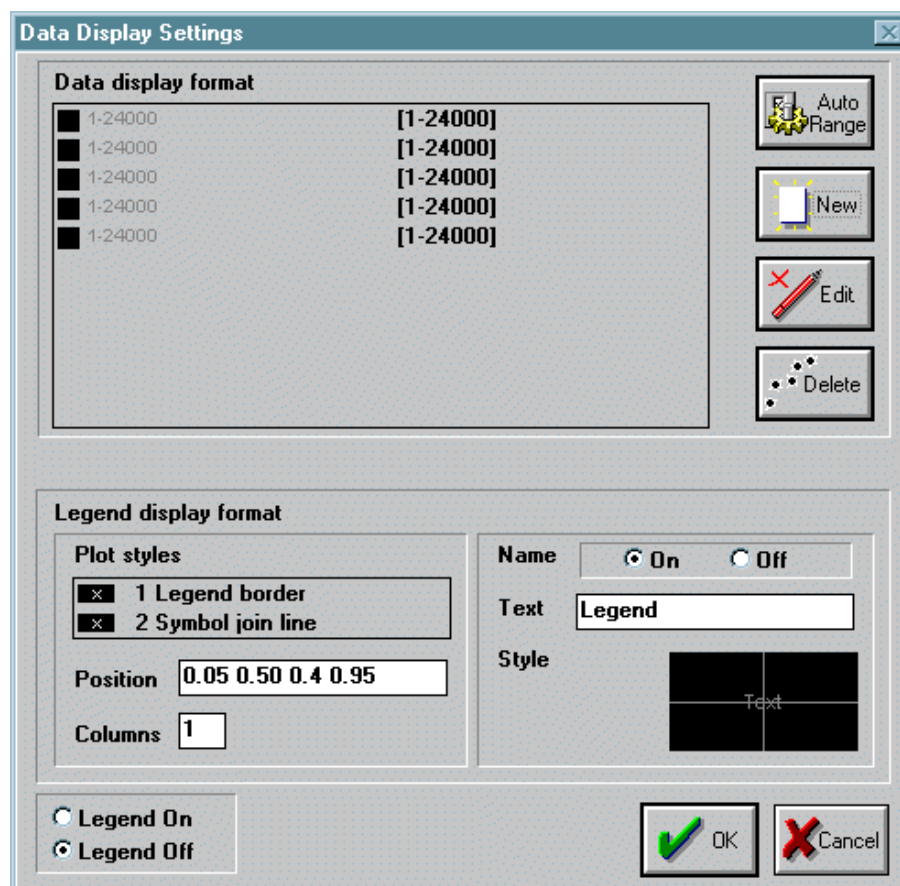


## Using Auto Range

Five default symbols, the text which will appear in the legend, and the range of values from the data file assigned to each symbol are shown. The default symbol is a black filled square, and the default legend text and data ranges are for the full range of values in the data file.

If the data values all had something in common, such as the number of people in towns, then you would want to set the ranges so they are evenly spread for your data file. This is what the Auto Range button is for. It will assign ranges to each symbol which start from the lowest value and end at the highest, but splitting according to how many symbols you have.

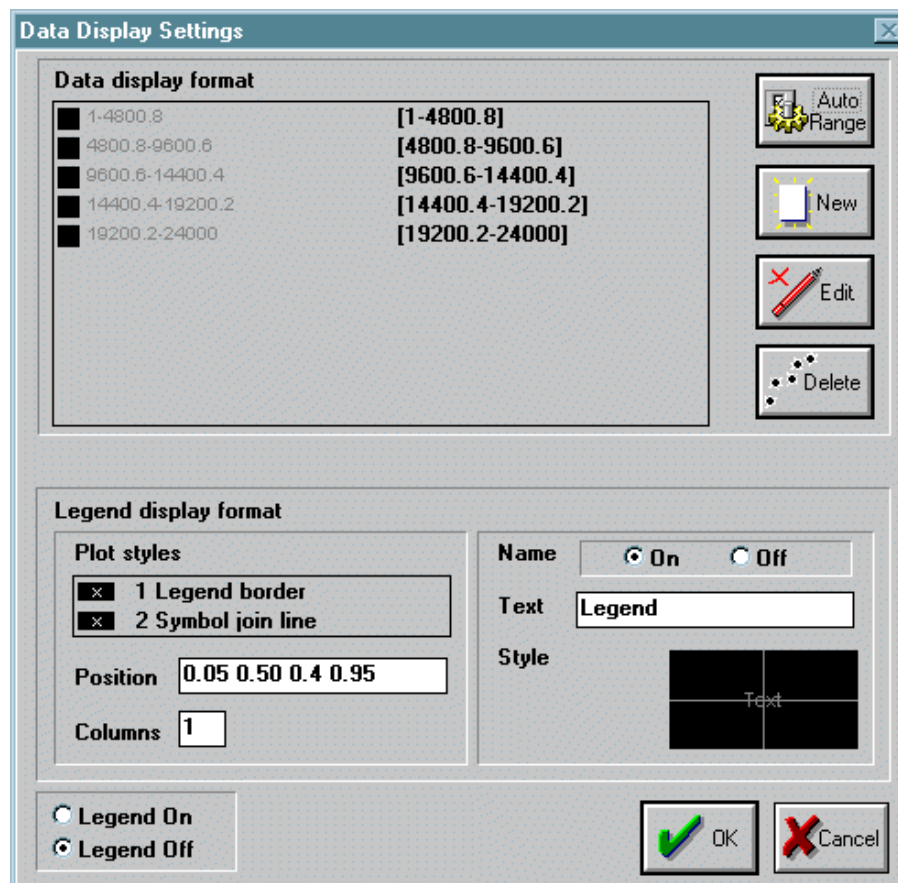
At this stage, the Auto Range button can be used just to check what is in your data file, so press "Auto Range" it to see how it works.



## Changing data display settings

The ranges are now evenly spread for 5 symbols for data values of 1 to 24000. For the example data file, these ranges are not sensible, so we will change them.

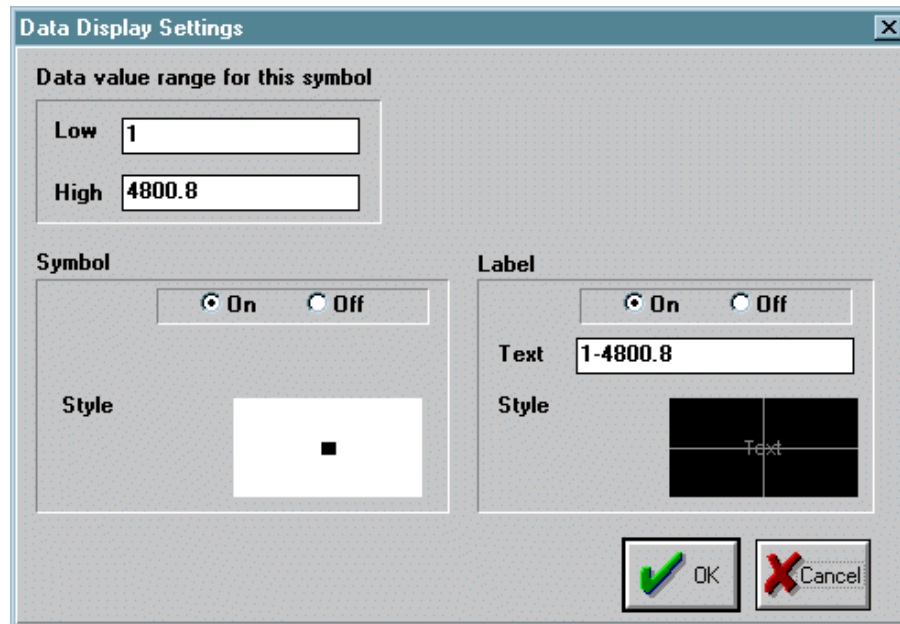
The first data value was for the town of Hobart, and the value was 1. In this example, we will assume that all towns will be displayed using the same symbol and text attributes, so the value range that would be appropriate for towns is from 1 to 1. We would like the data legend to say "Town", and would also like to make the symbol for a town to be a red filled circle. To make these changes we will edit the first symbol. Either double click on the first line in the Data display format list, or select it and press "Edit".



## Data display settings

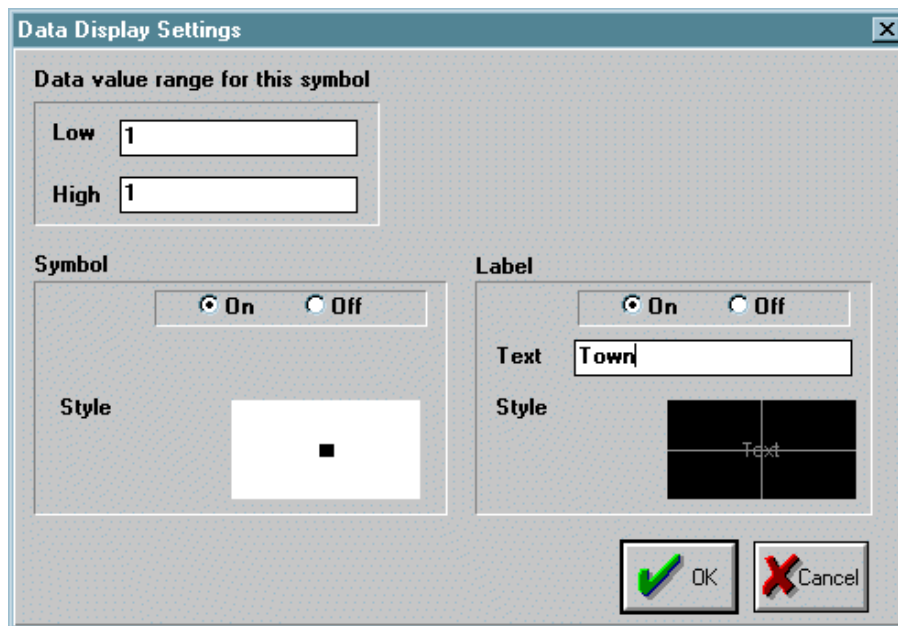
This dialog shows what data value range is being used for this symbol, what the symbol looks like, the font and orientation of attached text. It is also possible to turn the symbol or text displays on or off independently. That means that you can use data points to just specify the position of text without any symbol if you like.

Enter the value 1 for both the low and high values in the data range. Also enter the name "Town" for the label text. This is the name which will appear beside the symbol in the legend.



## Changing the symbol display style

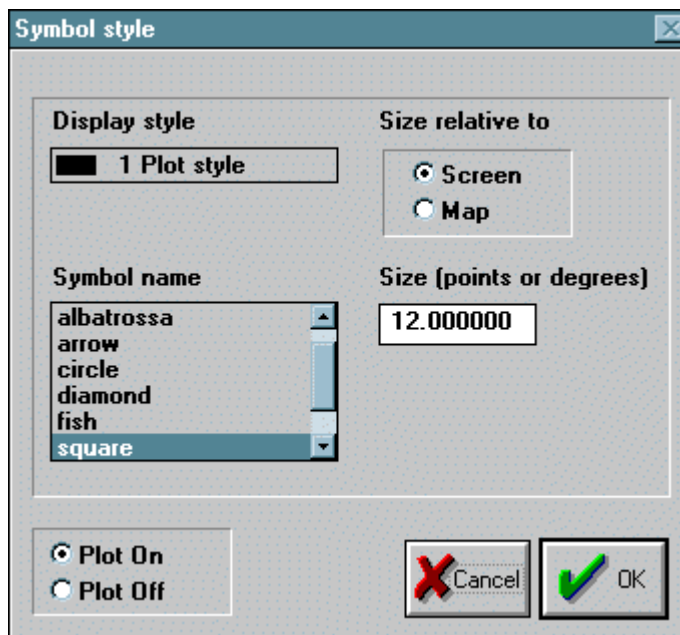
Now we want to change the symbol from a black square to a red circle. To edit the symbol, click once in the symbol style box.



## Changing the symbol plot style

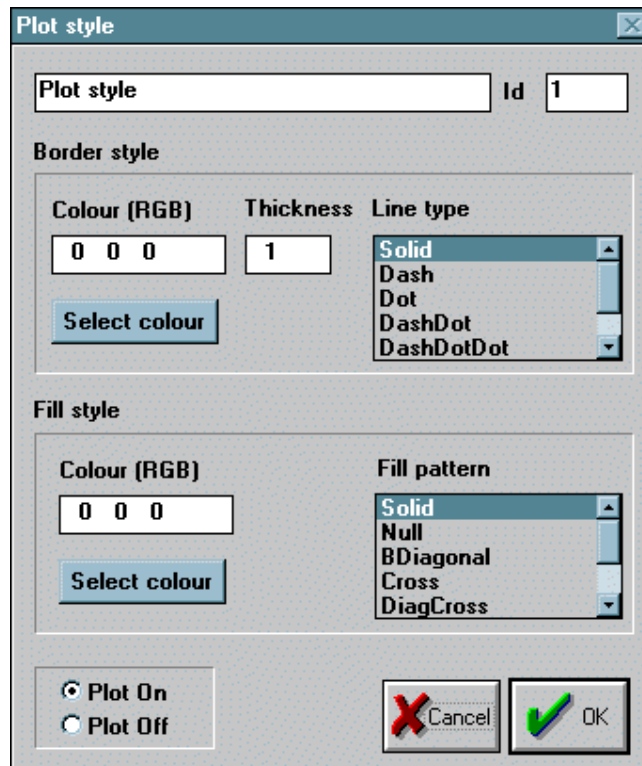
This dialog shows all of the display attributes for a symbol including the plot style (border and fill), the symbol name, whether the symbol is sized relative to the map or the screen, the size value, and whether it is turned on or off.

We will first change the colour and fill style - which we call the plot style for short. Double click on the line that says plot style in the display style box.



## Changing the symbol border and fill styles

A symbol is always a polygon, so it is possible to have the line around the border displayed differently to the filling. This dialog allows you to set the border and fill display styles. Colours can be typed in directly using an RGB code (amounts of red, green and blue with values from 0 to 255 for each), or the colour can be selected directly using the "Select Colour" button. Press the "Select Colour" button for the border style.



## Selecting colors

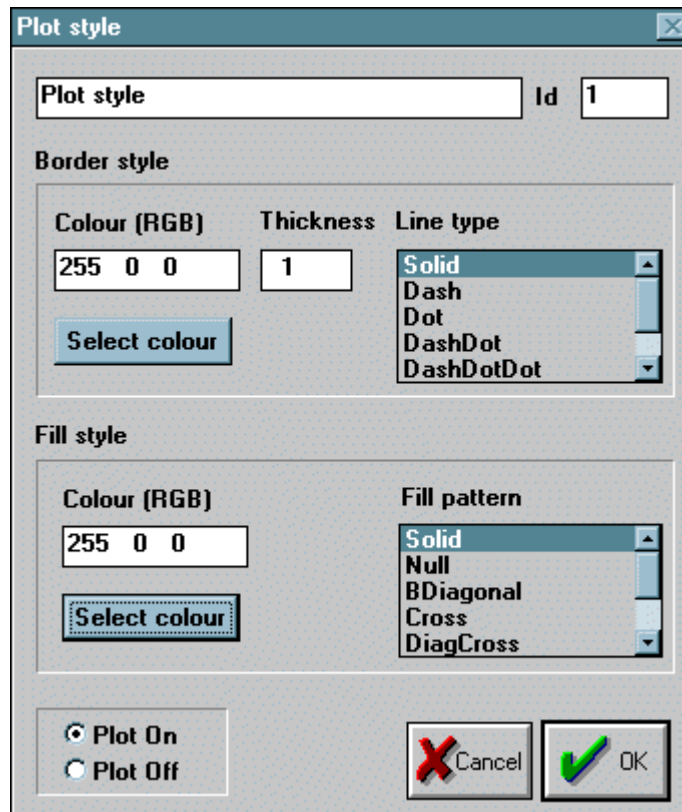
You can choose a colour by pointing to it and pressing "OK". It is also possible to define a wide selection of colors using the "Define custom colors" button. Choose the bright red color and press "OK".



## Accepting symbol border and fill styles

The RGB code for the selected color is entered for you in the colour box. For the border, the line thickness may be changed. A value of 1 is a thin line, and a value of 10 is a very thick line. The line type may also be changed to dashed, dotted etc. Leave the border line thickness as 1, and the type as solid. Make the fill colour red as well, and leave the fill pattern as solid. Fill patterns can be various kinds of hatchings, as well as null which means no fill at all. If you don't want your symbols to cover what is under them, use a hatched or null fill.

When your selections look like this example, press "OK".



The image shows a 'Plot style' dialog box with the following settings:

- Plot style:** (empty text box)
- Id:** 1
- Border style:**
  - Colour (RGB):** 255 0 0
  - Thickness:** 1
  - Line type:** Solid (selected from a list: Solid, Dash, Dot, DashDot, DashDotDot)
- Fill style:**
  - Colour (RGB):** 255 0 0
  - Fill pattern:** Solid (selected from a list: Solid, Null, BDiagonal, Cross, DiagCross)
- Plot On/Off:**  Plot On,  Plot Off
- Buttons:** Cancel (with a red X icon), OK (with a green checkmark icon)

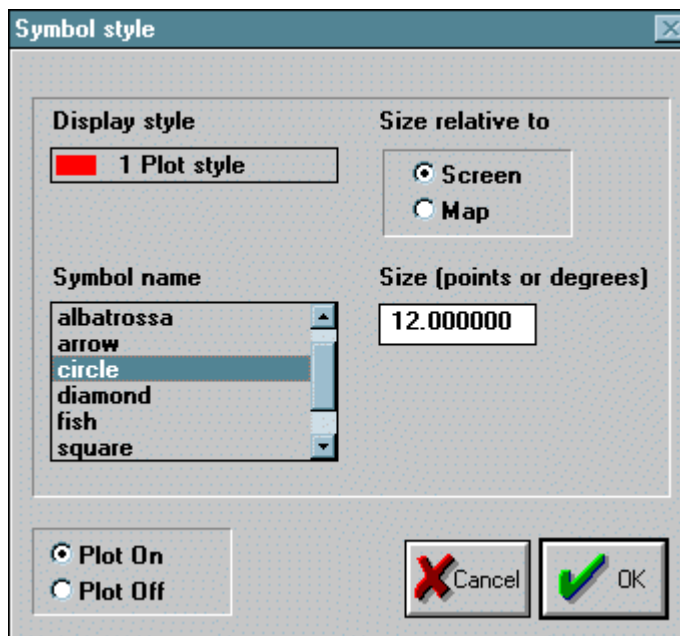
## Accepting a symbol display style

The symbol plot style should now be a solid red box.

For towns on a map, it might be best to have the symbol stay the same size regardless of the scale zoomed to. To have symbols stay the same in this way, they are sized relative to the screen. This is the default value, so no change is needed. If map relative were selected, the symbol would be sized in degrees, and would change in size as you zoom in or out. The actual size value depends on whether screen or map relative is chosen. For screen relative the size is roughly in points, so the default size is roughly the height of 12 point text. For this example, a size of 12 points is suitable, so you don't need to change it. If the size was map relative, then the size is given as height for the symbol in degrees.

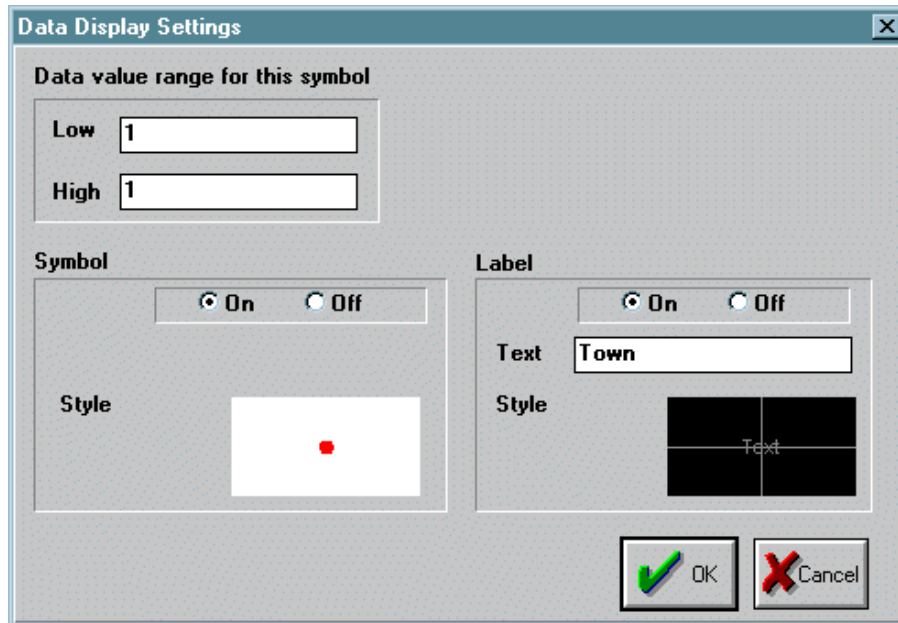
We want to use a circle symbol, so choose circle from the symbol name list.

To accept these selections, press "OK".



## Changing the text label display style

Now we want to change the text label display style. The default is aerial font, grey colour, with the label centred vertically and horizontally over the symbol. To edit, click once in the label style box.



## Changing text style

This is the standard dialog for changing the display attributes of any text in AGIS. There are options for colour, weight (1=thin, 1000=bold), font, italics, justification, screen or map-relative sizing, size, offsets, and orientation. Most of these are self explanatory. If font size is set relative to the screen, the size is specified in points and the text size will not change when zooming in or out to change the map scale. If the size is set relative to the map, the text height is given in decimal degrees, and the text will change in size depending on the map scale.

Offsets are to orientate the text around the data point. The size of an offset is measured in units of text height. A positive X offset will move the text to the right, and a positive Y offset will move the text down. As the Y offset is for the base of the text, a Y offset of 0.5 is the default to vertically centre the text over the data point.

For this example, set the text weight to 1000, the justification to right, and the size to 15 points and press "OK".

**Text style**

**Font style**

Colour (RGB) 128 128 128 Weight 1000 Font name Arial

Select colour

Justification

Italics On  
 Italics Off

Centre  
Left  
Right

**Font size**

Relative to  Screen  Map

Size (points or degrees) 15.000000

Offsets X 0.00 Y 0.50

Orientation (degrees) 0.00

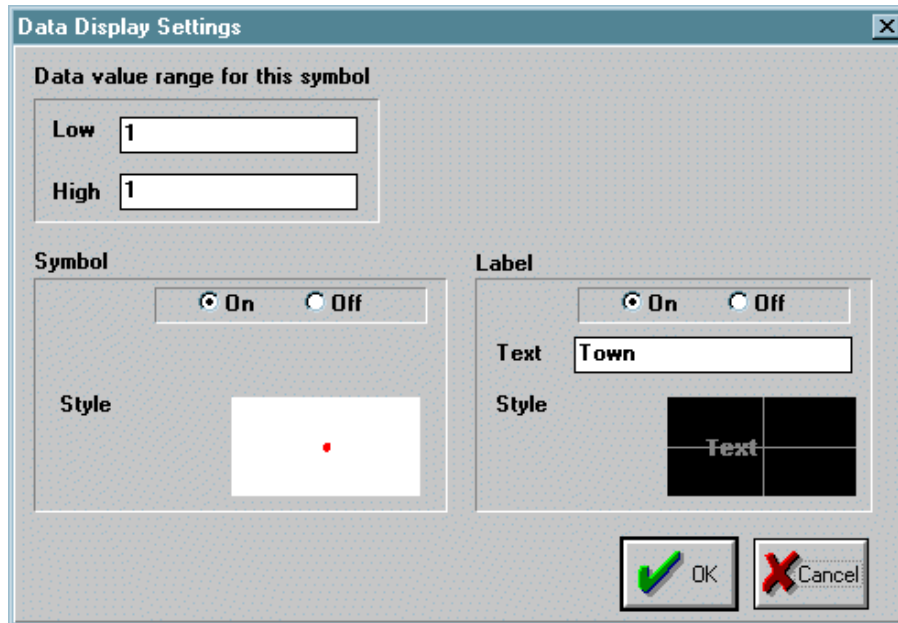
Text On  
 Text Off

Cancel OK

## Accepting data display settings

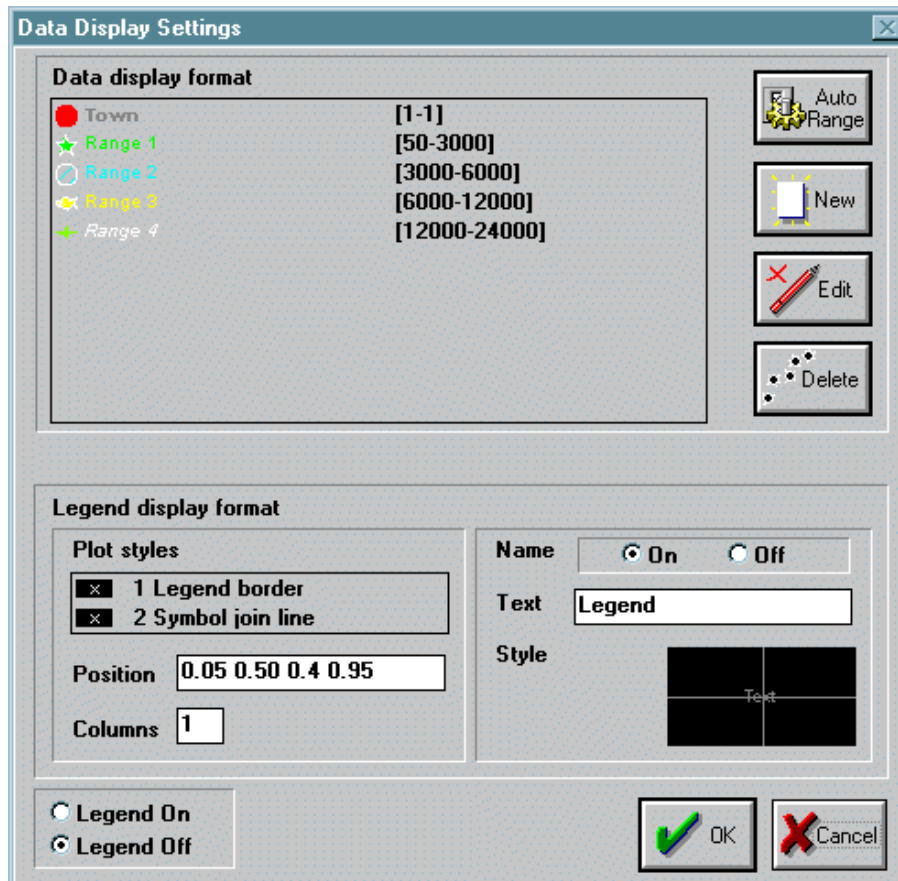
This now shows the symbol and text as it will appear on the map, in actual size for the current map display. The background colours are not necessarily those used in the map, and are set here to contrast with the symbol or text so you can see them clearly.

The settings are now acceptable for the display of town symbols and town names. Press the "OK" button.



## Modify a list of data display formats

Now that you have seen how to modify the display style for the first data range, change the others and try a few more options to see what happens. In particular, try changing the size of the symbols to be relative to the map - a size of about 0.2 degrees is good for this display.



## Changing the data legend display format

Next we will change how the legend is to be displayed. The default plot styles for the legend border and symbol join line are black filled boxes, but both are turned off. The legend border describes the box that the legend will be displayed in, and has attributes for the border and fill styles. The small X indicates that it is turned off. Edit the legend border plot style in the same way as the symbol plot style. Double click on it, and select a dark blue solid line and fill. Don't forget to turn the plotting on.

Next, you can practice changing the symbol join line in the same way, but for this example data file the plotting of the join line should be left off. If turned on, the join line would be displayed joining all of the data points in order. The fill style and pattern are not used, as this is just lines. Only the border style is important.

The legend position is given in fractions of the display height and width. The first two numbers indicate where the top left corner of the legend box should be placed, and the last two indicate the bottom right. Each pair is given as a fraction of the display width across, and then down. Change the defaults to 0.7 across and 0.5 down for the top left corner, and 0.95 across and 0.95 down for the bottom right corner. This will make the legend box appear in the bottom right area of the map display.

Leave the number of columns as 1 for this example. If you have lots of symbols, or you want to spread the legend horizontally, you can easily change the number of columns here. Using this option it is also possible, for example, to set the number of columns to the number of display symbols to produce a horizontal legend.

Turn the legend display on by clicking the "Legend On" button.

Type the heading for the legend in the text box. For this example, we have simply chosen the word "Symbols".

Now change the text style for the legend heading by clicking on the Style box.

When you have finished, the legend options should look something like the following example. Click the "OK" button.

**Data Display Settings**

**Data display format**

Town	[1-1]
Range 1	[50-3000]
Range 2	[3000-6000]
Range 3	[6000-12000]
Range 4	[12000-24000]

Auto Range  
New  
Edit  
Delete

**Legend display format**

**Plot styles**

<input checked="" type="checkbox"/> 1 Legend border
<input checked="" type="checkbox"/> 2 Symbol join line

Position: 0.7 0.5 0.95 0.95

Columns: 1

Name:  On  Off

Text:

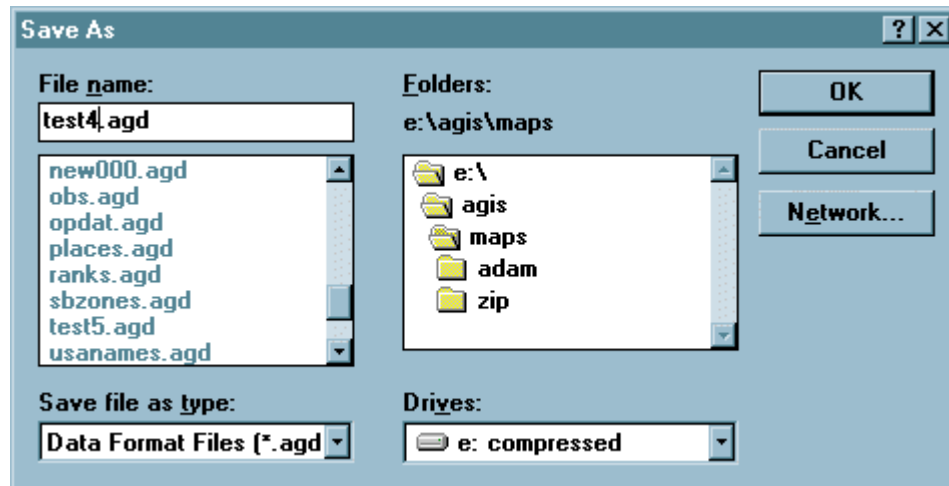
Style:

Legend On  
 Legend Off

OK Cancel

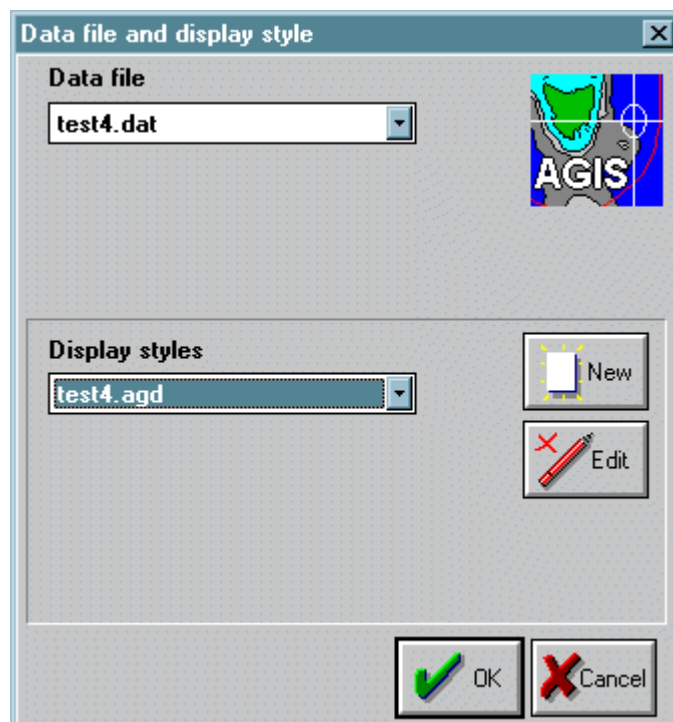
## Saving a new data display format file

This dialog is used to save the data display format information in a file which can be re-used. Name the file "test4.agd". Display format files must have the .agd extension in their names. Press the "OK" button. If the file already exists, you will be asked if you want to overwrite the old one.



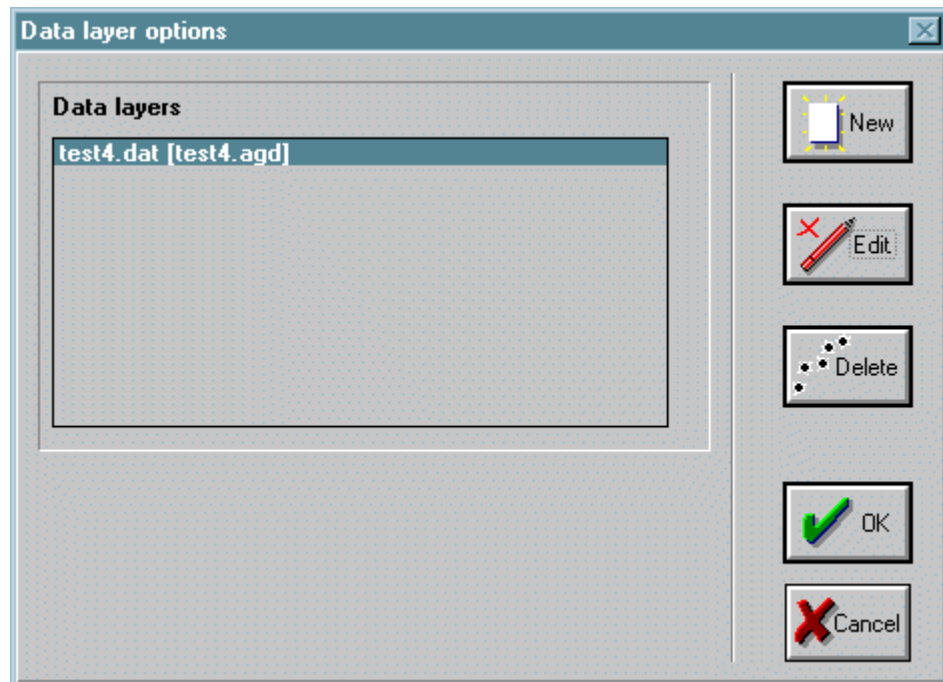
## Accepting a data file and display format for a data layer

You now have an appropriate data display style file for your data. Press the "OK" button to accept the settings for this data layer.



## Accepting a data layer

Now you have constructed a complete data layer, press the "OK" button.



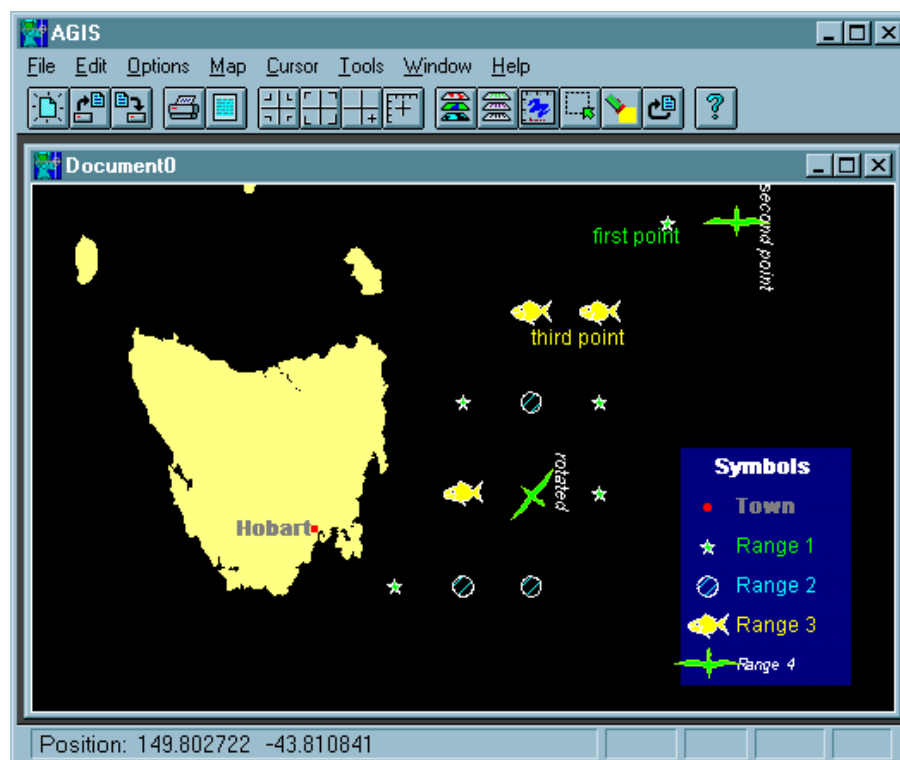
## Your new map display

Here is the end result of your efforts. Your display will not look exactly the same as this because you probably chose some different symbol and text display attributes. We don't present this as being a well constructed final map presentation! There is obviously more work to do to make things look better, but the steps to take have all been covered in this tutorial.

You might want to try adding a title to the map, changing the map box fill colour (the colour of the sea) from black to something else, or add grid lines by selecting "Options/Map Options" from the AGIS menu. You should be able to figure out how those options work by now as well.

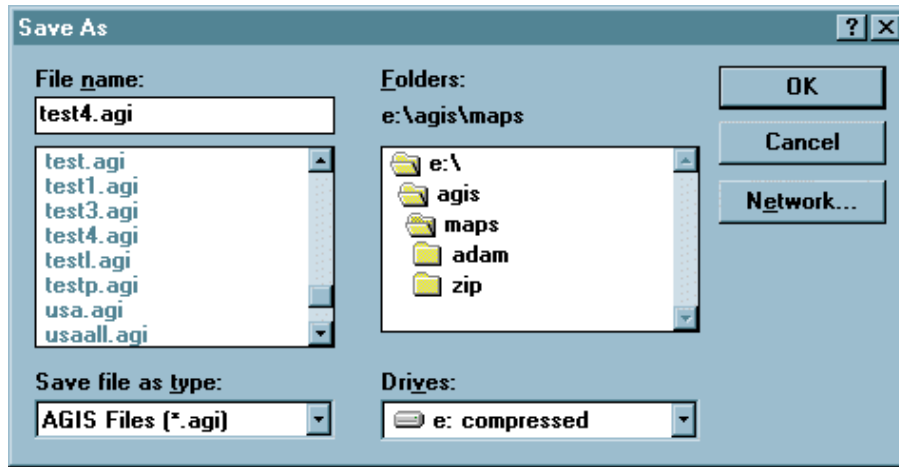
The last thing that needs to be done is to save your new map display.

Select "File/Save As" from the AGIS menu or the  tool.



## Saving the new map display

Call the file test4.agi and press the "OK" button. Congratulations, you've finished!!



## Digitizing data and maps from map images

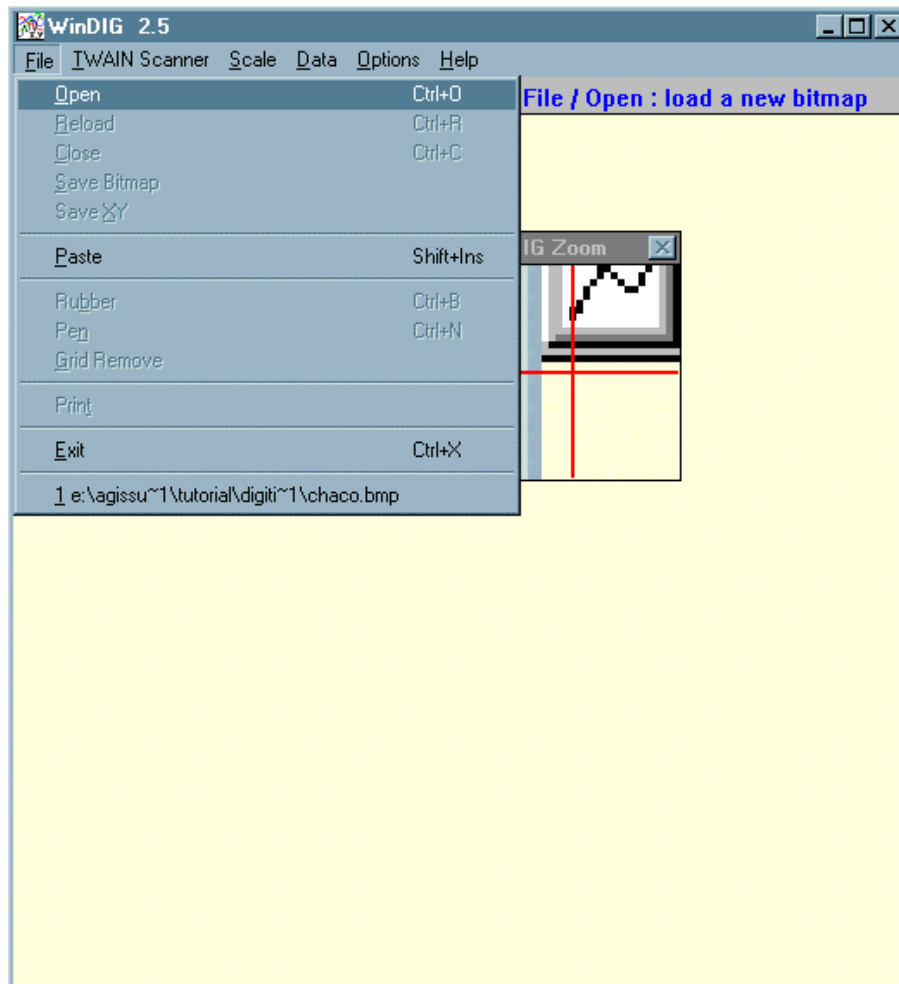
This tutorial is designed to be followed step by step through the digitizing process. It would be best to make your own files while following the tutorial. How to download and install the WinDig program is explained on the next page. The example map image used for this tutorial is called chaco.bmp. This image is a scanned national parks paper map showing the location of ancient Aztec towns and roads in the US State of New Mexico and was downloaded from the PCL Map Collection. The chaco.bmp file supplied is a reduced version of the image to save space, but is usable for demonstration purposes here.

This tutorial illustrates how easy it is to translate scanned map images into a form usable in a vector mapping package such as AGIS.

## Installing and starting WinDig

To install WinDig, you need to run the digi.exe file from <http://www.agismap.com/digi.exe> into a folder on your computer such as c:\windig. This is a self-extracting archive file that both installs WinDig and the chaco.bmp file used for this tutorial. You might want to right click and drag the WinDig icon onto your desktop to create a shortcut to make it more easily accessible.

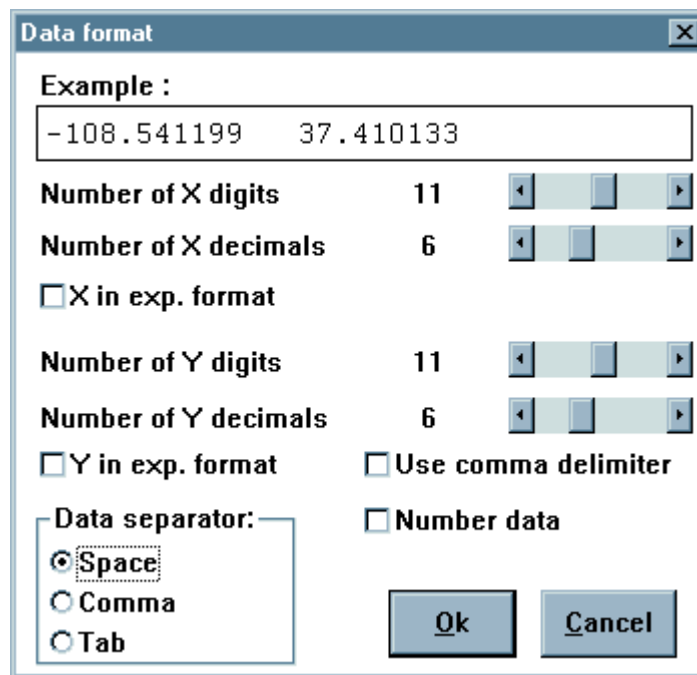
Once you have started WinDig, select File/Open and open the file called chaco.bmp.



## Setting the digitizing format for AGIS data files

First we will digitize some points off the map and save them as an AGIS data file. The points we want to digitize are the locations of the Aztec towns. The details of the format of AGIS data files is explained in the AGIS on-line help file, so we won't go into them further here. However, we do need to know that points in a data file are stored as text with decimal longitudes and latitudes delimited with white space. To minimize the amount of editing required to a file created using WinDig, we will set the capture format as close as possible to that required by AGIS.

In WinDig, select Data/Format and set the format as shown here so that decimal data (not in exponential format) is collected using a space separator.

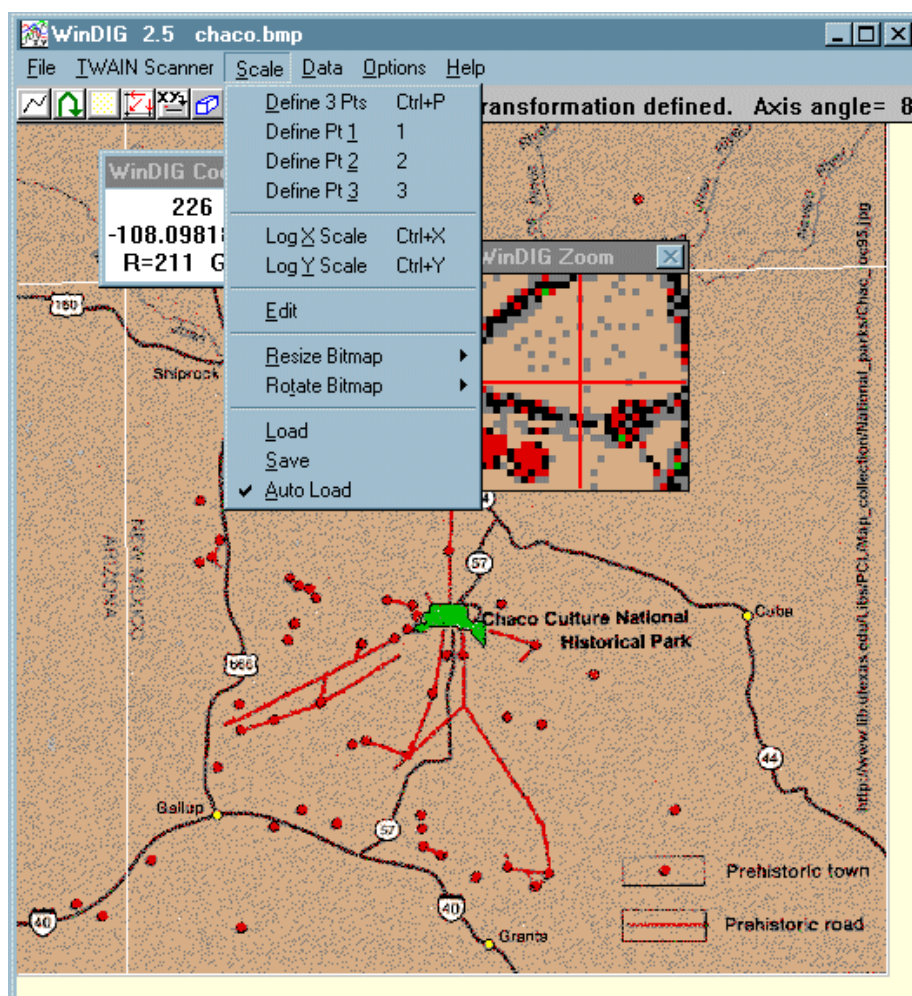


## Setting the digitizing scale for the map image

To be able to digitize correctly placed longitudes and latitudes off the map image, WinDIG needs to know what the coordinate system of the current map is. To set the coordinate system, you need to know the correct X (longitude) and Y (latitude) coordinates of three points on the map - preferably in the shape of a triangle and as widely spaced as possible.

If the map to be digitized contains towns, you could use a web site like the US Census Gazetteer to find the coordinates of named towns. This is what was used to find the location of the towns in this map of Shiprock, Gallup and Grants. For global longitude (X) and latitude (Y) coordinates, you need to remember that degrees west or south need to be negative to be correctly placed.

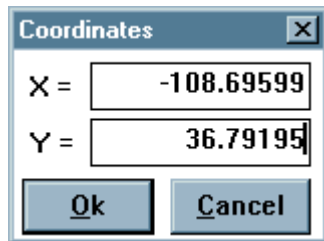
Select Scale/Define Pt 1.



## Setting the coordinates of map points

Point the cursor to Shiprock (using the magnifier to make sure that you are near the center), click, and enter the following X and Y coordinates:

Shiprock X = -108.69599 Y = 36.79195 (don't forget the minus for X)



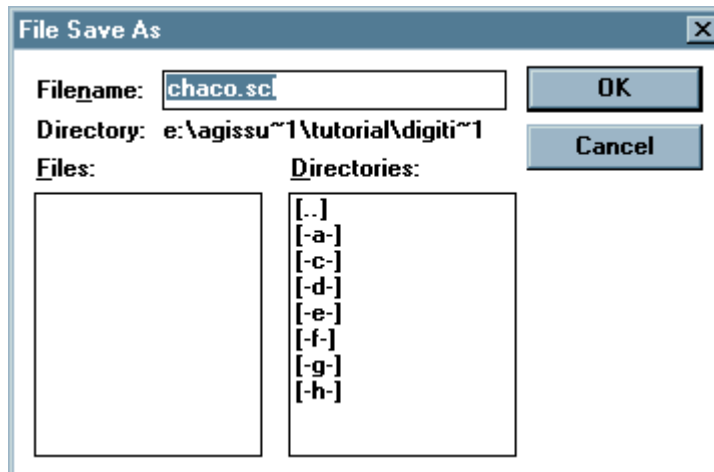
Likewise, enter the following coordinates for the second and third points:

Gallup X = -108.73535 Y = 35.52042

Grants X = -107.83827 Y = 35.15339

## Saving the scale attributes

To save your scale settings for the chaco.bmp file so that when you next open that file you don't need to reset the map location select Scale/Save. Name the scale file chaco.scl and press OK.

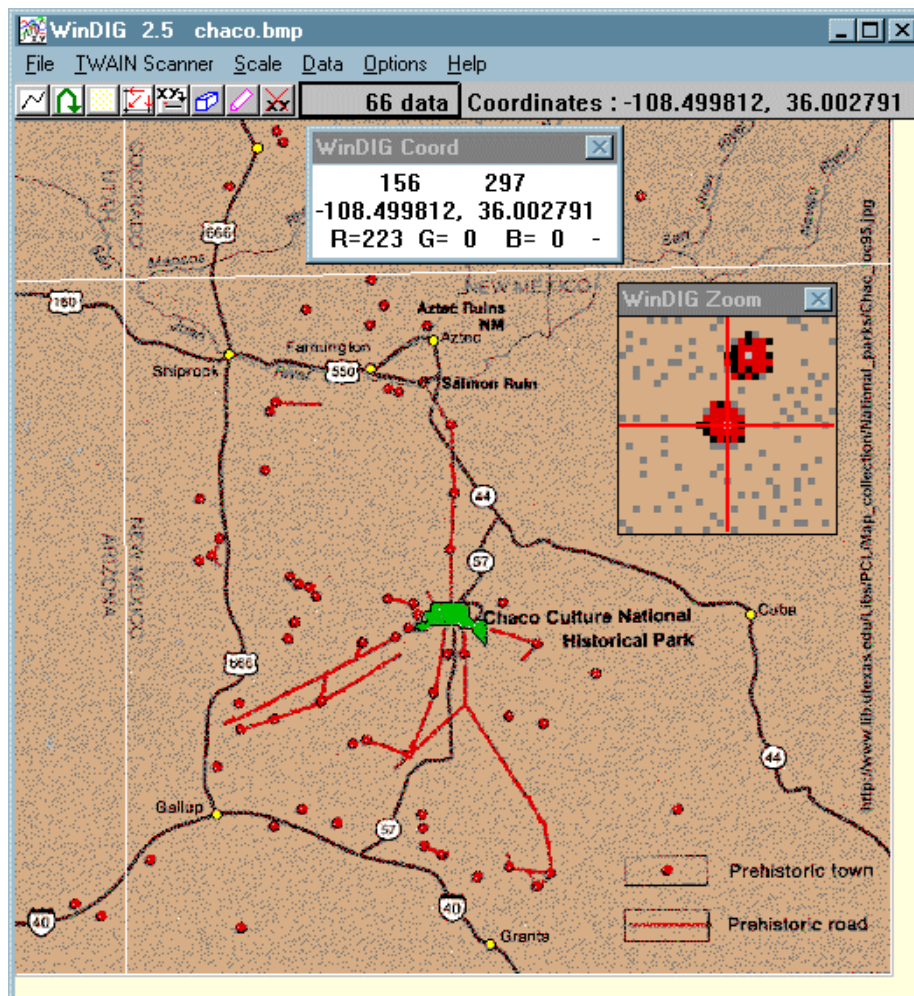


## Digitizing the data points

Now we are ready to start digitizing. To digitize individual points, all that is required is for you to move the cursor to the point and double-click the left mouse button.

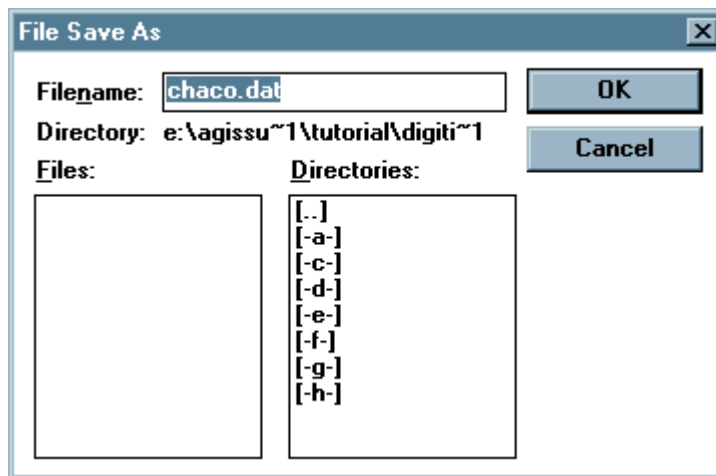
To be as accurate as possible, look at the zoom window to make sure that you are pointing to the center of each point as you click on it. As each point is stored, the number of data points saved will show in the box on the tool bar. If you make a mistake, there are options in the Data menu to delete the last saved point, or to edit the stored data manually.

Digitize the center points of each Aztec town. As each point is stored you will notice that a small dot is shown, letting you know which ones have already been saved. When you have done them all, the number of data points saved should be 66.



## Saving the point data

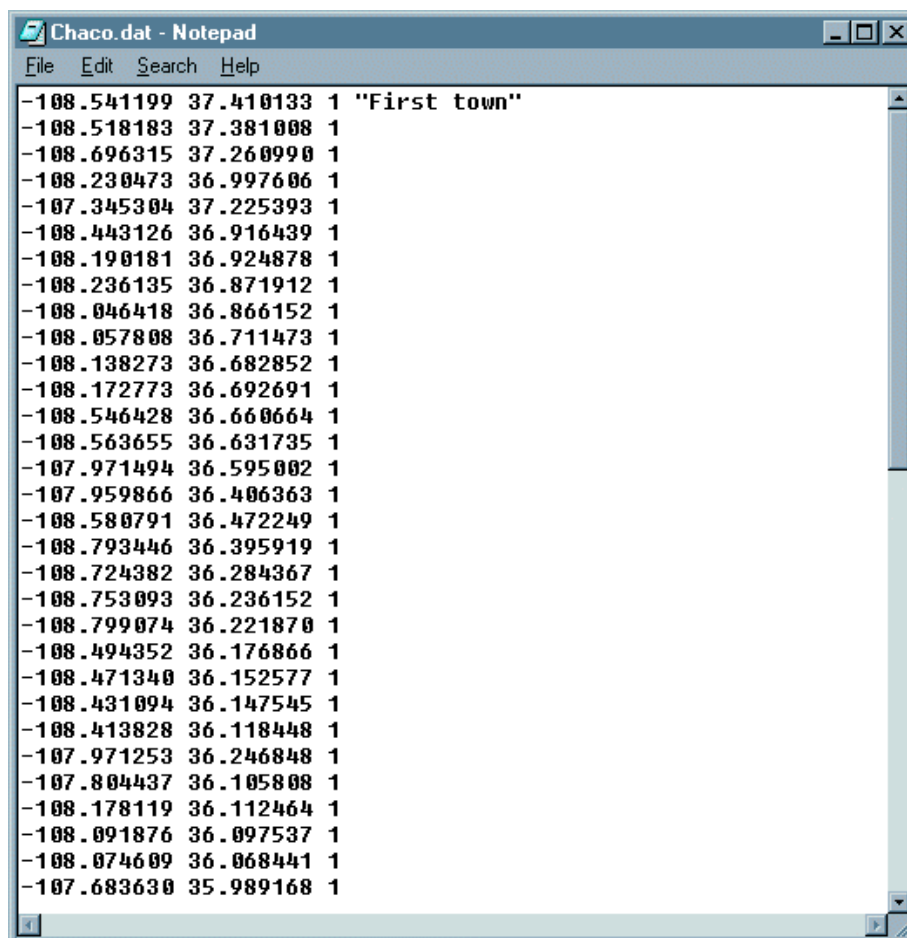
When you have finished digitizing the points, save the data to a text file called chaco.dat by selecting Data/Save.



## Making the data file readable by AGIS

The saved data file is almost usable by AGIS, but we need to edit the file. Open chaco.dat using a text editor such as notepad. When you first open the file you will see two columns of longitudes and latitudes separated by a space. For AGIS to be able to use the file, a data value needs to be added to each line. In the example, all data points are prehistoric towns and they will all be displayed on a map using the same symbol, so the same data value is OK for each point. Add a space and the number 1 to the end of each line as shown below. Names can also be optionally added within quotes as shown for the first line. For more details about format options for AGIS data files please see the first section of this tutorial on Creating and displaying an AGIS data file.

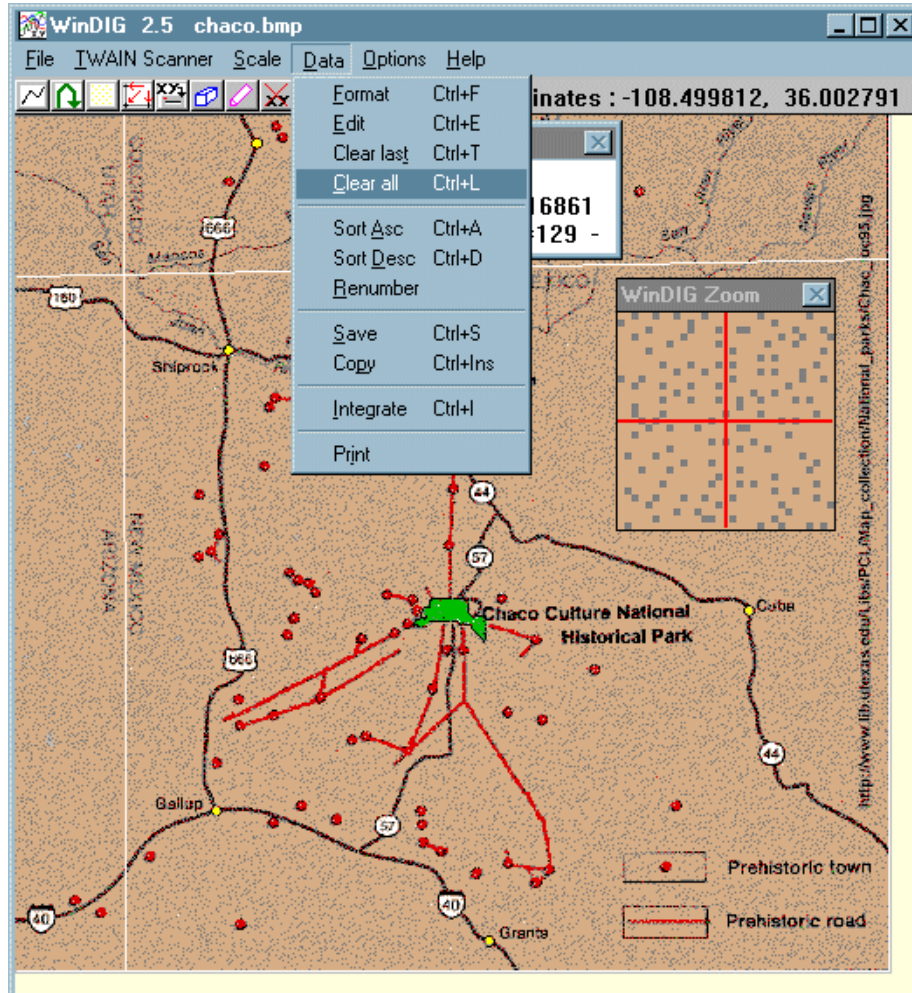
After you have edited the file, save it in your AGIS data folder - normally c:\agis\data by default. That's it! You now have a data file containing the positions of prehistoric towns in New Mexico ready to add to a map display.



```
Chaco.dat - Notepad
File Edit Search Help
-108.541199 37.410133 1 "First town"
-108.518183 37.381008 1
-108.696315 37.260990 1
-108.230473 36.997606 1
-107.345304 37.225393 1
-108.443126 36.916439 1
-108.190181 36.924878 1
-108.236135 36.871912 1
-108.046418 36.866152 1
-108.057808 36.711473 1
-108.138273 36.682852 1
-108.172773 36.692691 1
-108.546428 36.660664 1
-108.563655 36.631735 1
-107.971494 36.595002 1
-107.959866 36.406363 1
-108.580791 36.472249 1
-108.793446 36.395919 1
-108.724382 36.284367 1
-108.753093 36.236152 1
-108.799074 36.221870 1
-108.494352 36.176866 1
-108.471340 36.152577 1
-108.431094 36.147545 1
-108.413828 36.118448 1
-107.971253 36.246848 1
-107.804437 36.105808 1
-108.178119 36.112464 1
-108.091876 36.097537 1
-108.074609 36.068441 1
-107.683630 35.989168 1
```

## Preparing to digitize map lines and polygons

We will now set things up to digitize the lines (prehistoric roads) and a polygon (National historic park boundary). Firstly, we need to clear the stored data ready to make a new file. Select Data/Clear all.



## Setting the digitizing format for AGIS map files

AGIS map files have slightly different requirements to data files. The format of X and Y positions is the same - decimal longitudes and latitudes. However, coordinates in a map file are delimited by commas, so select Data/Format and choose the comma data separator.

**Data format** [X]

**Example :**  
123.456000, -0.098765

**Number of X digits** 11 [◀ ▶]

**Number of X decimals** 6 [◀ ▶]

X in exp. format

**Number of Y digits** 11 [◀ ▶]

**Number of Y decimals** 6 [◀ ▶]

Y in exp. format       Use comma delimiter

Number data

**Data separator:**

Space

Comma

Tab

**Ok**      **Cancel**

## Digitizing lines and polygons

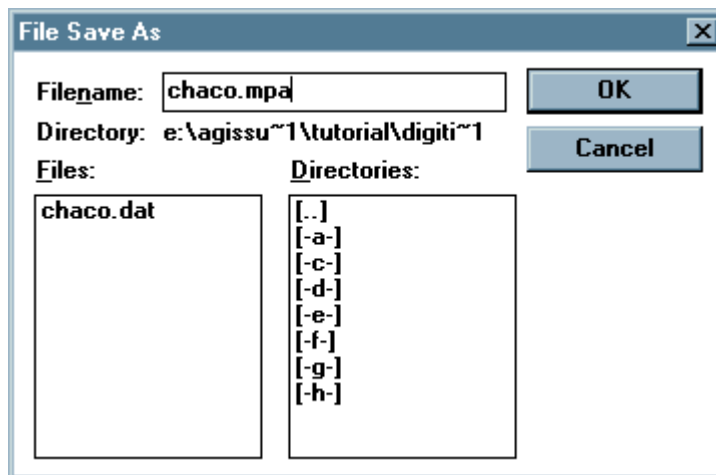
You are now ready to start digitizing lines and polygons or closed areas off the map. If you previously digitized other data off the same display, it is a good time to select File/Reload to start with a clean background bitmap as well.

Lines and polygons are just lists of points digitized in sequence. It is possible to digitize a number of lines and polygons all in the same data file, but you need some way of telling where each one starts and ends in the digitized file. To mark the start of a new sequence of points, the easiest way is to store a point from the map that is outside the data you are digitizing so that you can find it later. For the current map, if you double-click on the far left of the map you will store a point with a longitude value of -109.xxxx which is not found in any of the lines and polygons we will digitize. Therefore, to start digitizing a new line or polygon first double-clicking on the far left of the map.

To digitize a single road segment, double-click on the far left of the map to indicate the start of data for a new line, and then double-click on the points that describe the line from start to end. A single "line" can be made up of many points, and you need to understand that the line will be plotted in AGIS by following the points in the same direction and order that you digitize them. If a road forks, then it is best to save that road as two or more individual lines. Just digitizing the start and end points is all that is required for a straight road.

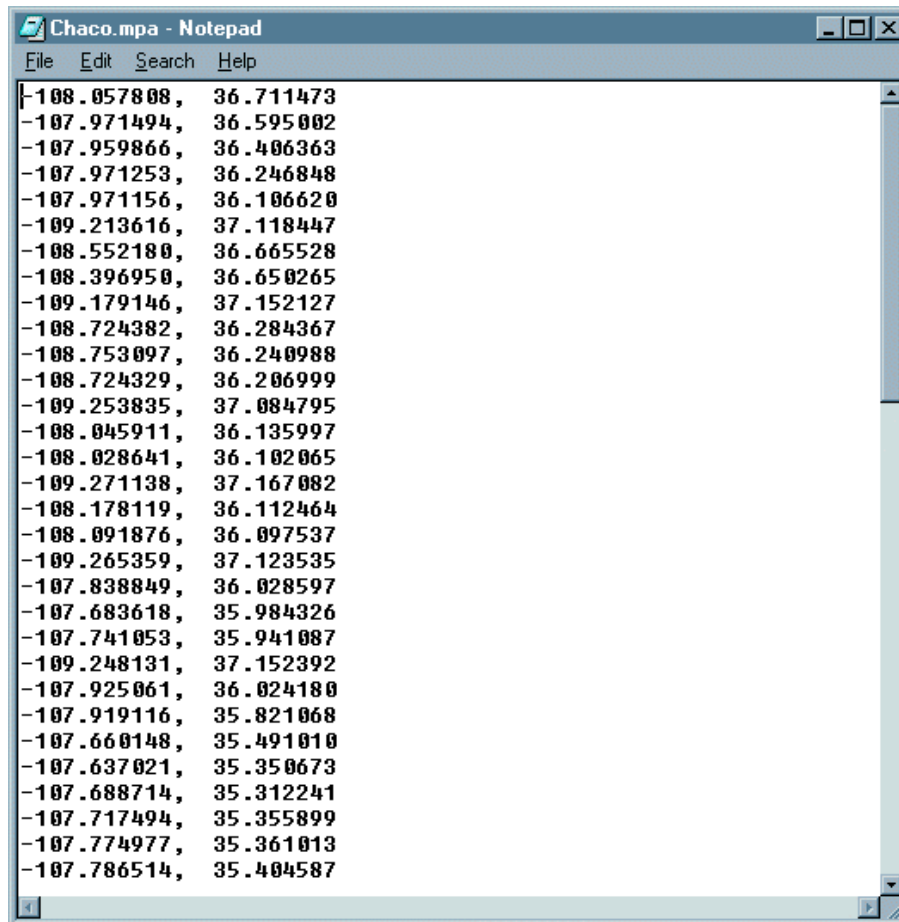
Finally, we will digitize the polygon that describes the park boundary shown in green at the center of the map. Click on the far left of the map to indicate a new set of points, and then digitize points around the park boundary that best show that shape and finish on the same point that you started on.

Now save the digitized data as an AGIS ASCII text map file. Select Data/Save and save the file as chaco.mpa.



## Editing the ASCII map file

The map lines and polygon are now saved to a file that is almost in a form that AGIS can use. Open the chaco.mpa file using a text editor such as notepad. The file should look something like the display below. Notice that the file is comma delimited, and that the longitude values of -109.xxx show where each line and polygon starts and ends.



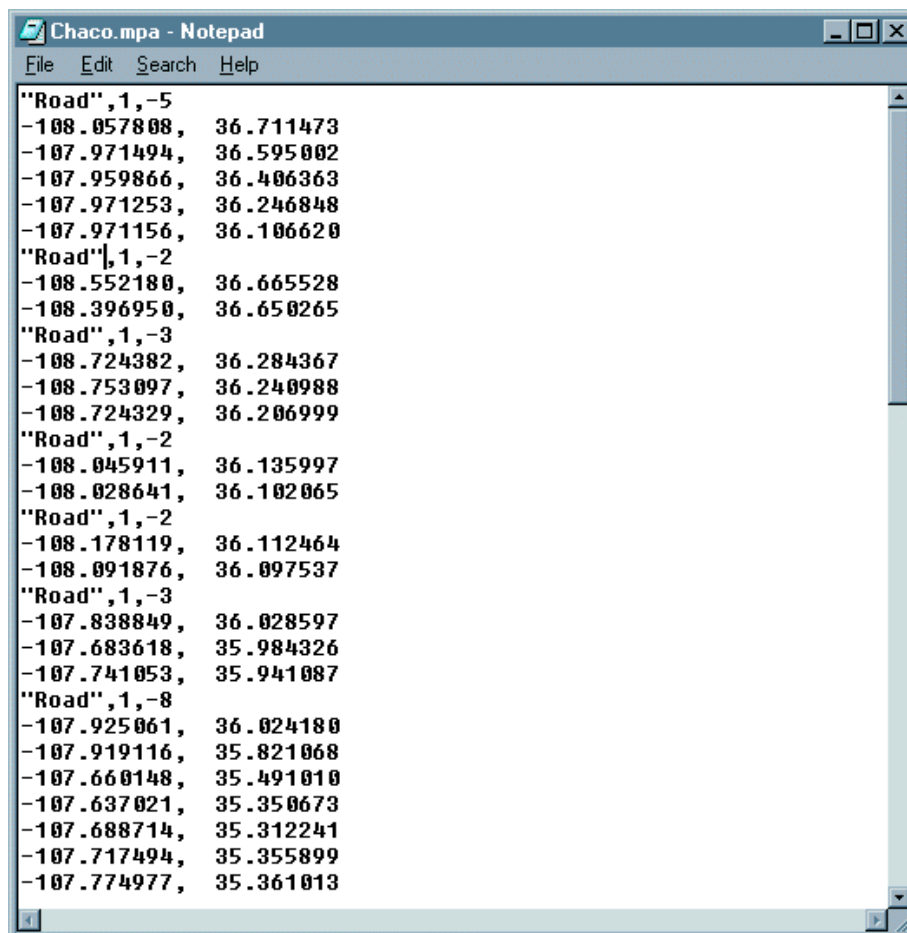
```
Chaco.mpa - Notepad
File Edit Search Help
-108.057808, 36.711473
-107.971494, 36.595002
-107.959866, 36.406363
-107.971253, 36.246848
-107.971156, 36.106620
-109.213616, 37.118447
-108.552180, 36.665528
-108.396950, 36.650265
-109.179146, 37.152127
-108.724382, 36.284367
-108.753097, 36.240988
-108.724329, 36.206999
-109.253835, 37.084795
-108.045911, 36.135997
-108.028641, 36.102065
-109.271138, 37.167082
-108.178119, 36.112464
-108.091876, 36.097537
-109.265359, 37.123535
-107.838849, 36.028597
-107.683618, 35.984326
-107.741053, 35.941087
-109.248131, 37.152392
-107.925061, 36.024180
-107.919116, 35.821068
-107.660148, 35.491010
-107.637021, 35.350673
-107.688714, 35.312241
-107.717494, 35.355899
-107.774977, 35.361013
-107.786514, 35.404587
```

## Adding feature headers the ASCII map file

In an AGIS map file, lines and polygons are called features, and the way that they are plotted is determined by their feature code. A map file can contain from 1 to 99 different feature types. The data that we have digitized is made up of roads and a park boundary, so we will use two feature codes - a code of 1 indicating a road, and 2 indicating the park polygon.

To be able to plot a map line or polygon, each must start with a header that gives a name to that feature, the feature code, and the number of points contained in the feature. If the point count is negative, then the feature is a line, and if it is positive, it is a polygon. To each set of points describing lines for roads, add a header like the ones shown below. The name in quotes at the start of the header can have a maximum of 8 characters. For our example, a quick way to add the road headers is to create the first one, and then replace all following lines that start with -109.xxx with that header. Then all that is required is for you to change the point count for each to the correct value. (Note that the ASCII map format officially requires the point count to be correct, but if you don't provide a correct value it shouldn't matter, so if you are in a hurry, just leave all the point counts as they are)

The formatting required for our park polygon data is described on the next tutorial page.

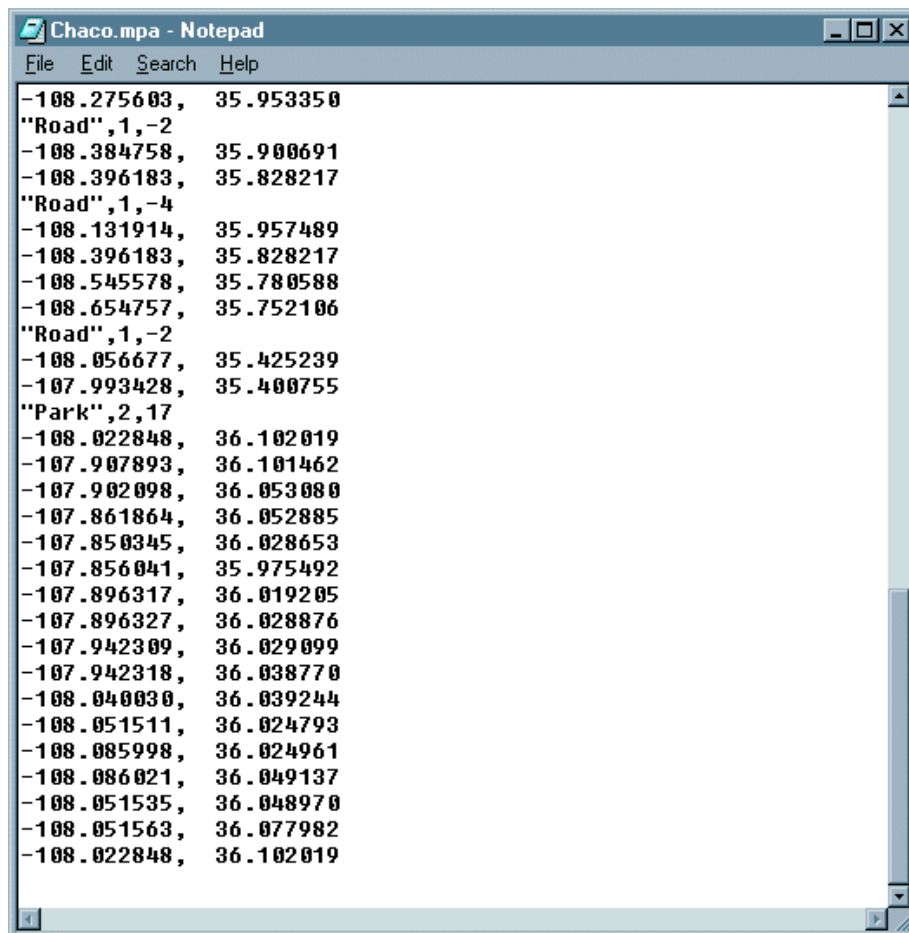


```
Chaco.mpa - Notepad
File Edit Search Help
"Road",1,-5
-108.057808, 36.711473
-107.971494, 36.595002
-107.959866, 36.406363
-107.971253, 36.246848
-107.971156, 36.106620
"Road",1,-2
-108.552180, 36.665528
-108.396950, 36.650265
"Road",1,-3
-108.724382, 36.284367
-108.753097, 36.240988
-108.724329, 36.206999
"Road",1,-2
-108.045911, 36.135997
-108.028641, 36.102065
"Road",1,-2
-108.178119, 36.112464
-108.091876, 36.097537
"Road",1,-3
-107.838849, 36.028597
-107.683618, 35.984326
-107.741053, 35.941087
"Road",1,-8
-107.925061, 36.024180
-107.919116, 35.821068
-107.660148, 35.491010
-107.637021, 35.350673
-107.688714, 35.312241
-107.717494, 35.355899
-107.774977, 35.361013
```

## Adding a feature header for a polygon

The digitized data for the national park area should be near the bottom of the file. As this is a different kind of feature than the roads, we will name it "Park" and give it a feature code of 2. As this is a closed polygon, the point count is positive. Also make sure that the first and last points in the closed polygon are the same or an error will result. If, in your file, the points are not the same, simply copy one set of end point coordinates to the other. It is also a good idea to check that the last line has a carriage return at the end of it, and there are no blank lines at the bottom (or anywhere else) in the file.

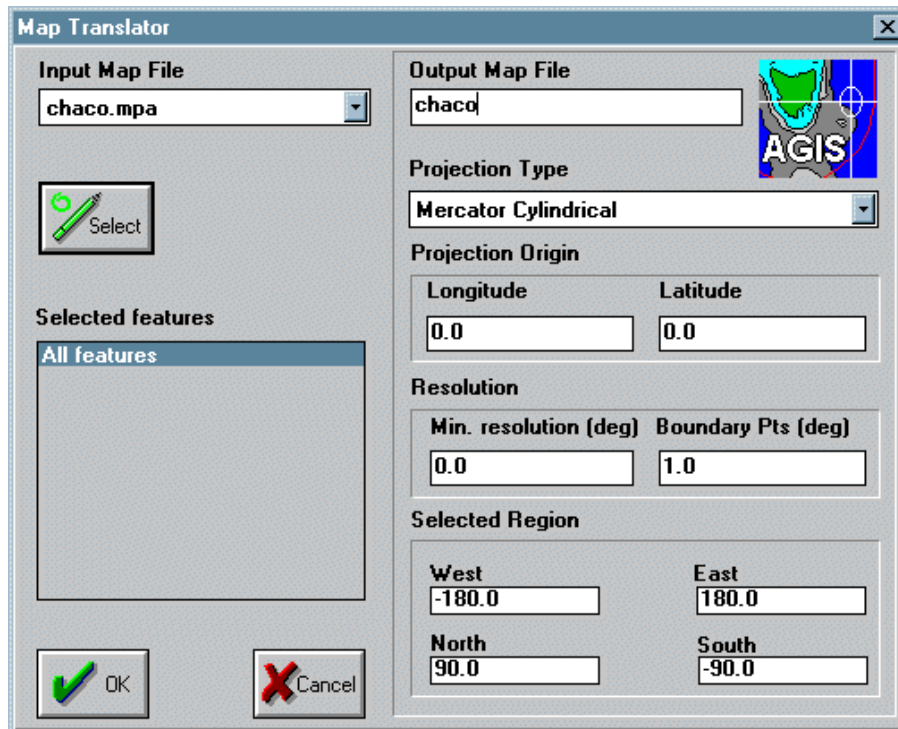
Save the file in your AGIS maps folder as chaco.mpa. Now the digitizing and formatting is finished!



```
Chaco.mpa - Notepad
File Edit Search Help
-108.275603, 35.953350
"Road",1,-2
-108.384758, 35.900691
-108.396183, 35.828217
"Road",1,-4
-108.131914, 35.957489
-108.396183, 35.828217
-108.545578, 35.780588
-108.654757, 35.752106
"Road",1,-2
-108.056677, 35.425239
-107.993428, 35.400755
"Park",2,17
-108.022848, 36.102019
-107.907893, 36.101462
-107.902098, 36.053080
-107.861864, 36.052885
-107.850345, 36.028653
-107.856041, 35.975492
-107.896317, 36.019205
-107.896327, 36.028876
-107.942309, 36.029099
-107.942318, 36.038770
-108.040030, 36.039244
-108.051511, 36.024793
-108.085998, 36.024961
-108.086021, 36.049137
-108.051535, 36.048970
-108.051563, 36.077982
-108.022848, 36.102019
```

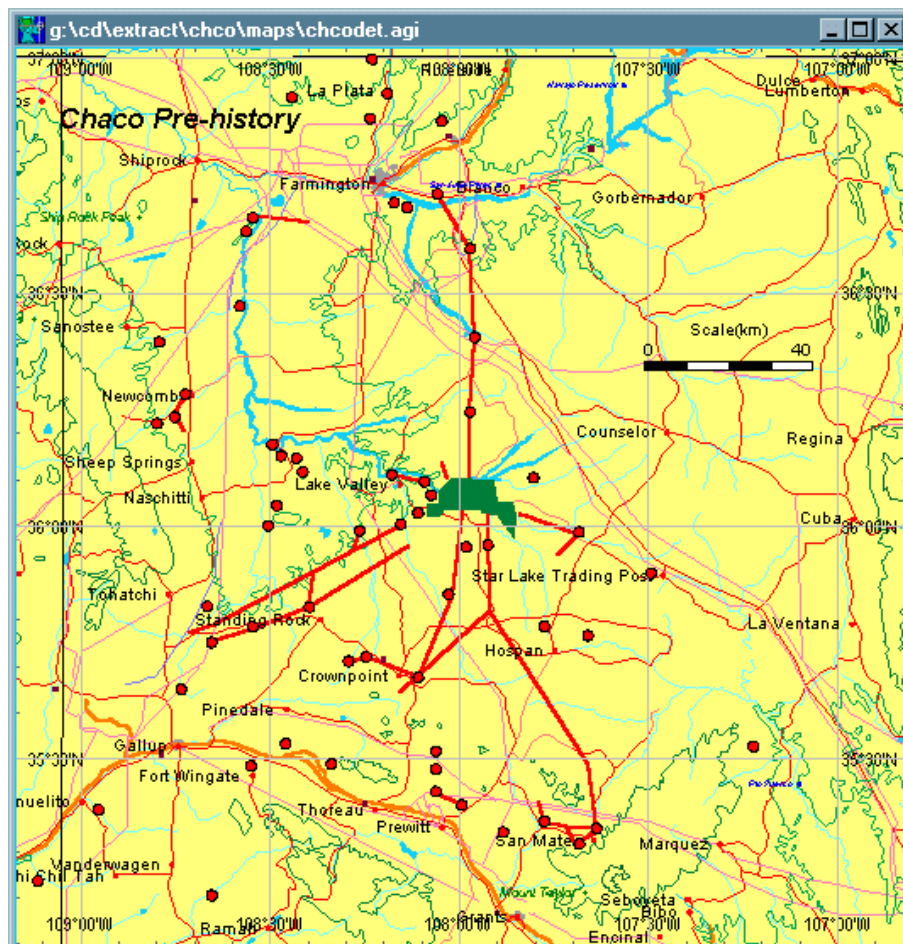
## Converting the ASCII map file to Binary

To convert the chaco.mpa file to a binary map file that can be plotted within AGIS, start AGIS and select Tools/Map Translator. Select chaco.mpa as the input file and type chaco as the output file. Normally the rest of the settings are left as they are. The default settings will write a binary file called chaco.mpb in the Mercator projection. Press OK. If you get any errors during the conversion, you will have to open the chaco.mpa file using a text editor and correct any format problems. Please check the format against the detailed description of the map file format given in the AGIS help file under "AGIS file formats".



## Creating a display with the digitized data

Now you have a file called chaco.dat in your AGIS data file and a file called chaco.mpb in your maps folder. These can now be added as layers to your existing maps, or made into a new map display. Details for how to create new map displays and how to add data and map layers are covered elsewhere, so we will not go into them here. The following display shows the chaco data layered on top of information from the AGIS map of the world to show that the digitizing process has been successfully completed.



## Displaying data from a Garmin handheld GPS

This tutorial is designed to be followed step by step through the process of downloading data from your GPS and creating a new map display using it. It would be best to follow the tutorial the first time using the sample gps files (sample.trk, sample.rte and sample.wpt) provided with this tutorial (these are the example files that come with the Garmin PCX5 software).



While there might seem to be a lot of steps involved in displaying your GPS data, the tutorial goes into each step in detail and also shows how to change some of the options along the way. With some practice, displaying your GPS data in AGIS can be done in a few minutes.

## Downloading track, waypoint and route data from your GPS

Firstly, a word about your GPS settings. To record a position on the earth, a model of the shape of the earth (an ellipsoid) is used to convert your position relative to the satellites to a latitude and longitude on the world. There are many alternative sets of ellipsoid parameters that have been used throughout the years to approximate the shape of the earth, and the one that AGIS uses by default is the GRS80 datum. This is very similar to the WGS84 datum normally used as the factory default in your Garmin GPS, so you should first ensure that your GPS is set to use WGS84 before collecting data to be displayed by AGIS.

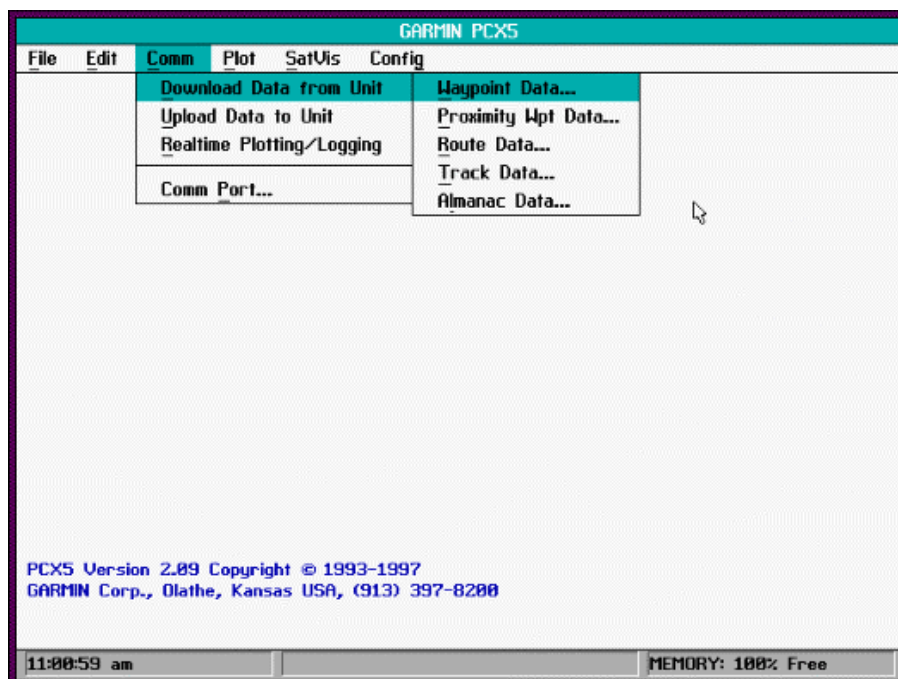


If you want to follow this tutorial using data that you have collected, now is the time to do it. Go somewhere and collect some tracks and waypoints!

Your GPS should have come with a cable that enables the unit to be plugged into a computer via the serial port. Follow the instructions that came with the unit to connect the GPS to your computer, and to start up the Garmin data download program (called PCX5 for this example).

After starting the download program, use the Comm facility to save your GPS files. To keep things simple, it is best to name all associated files with the same name: e.g. myfile.trk, myfile.rte and myfile.wpt. AGIS will read just .trk files, but if there are .wpt or .rte files present with the same name then they will be handled appropriately. Almanac and proximity data are not used by AGIS at this time.

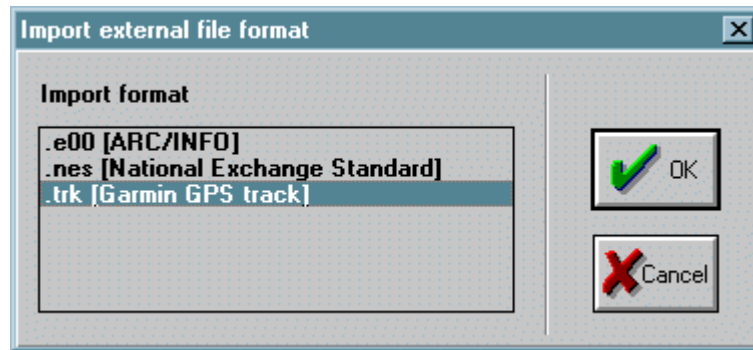
At this stage, you should have at least one .trk file, and maybe an associated .wpt and .rte file all with the same name stored on your computer. Now copy these to the AGIS maps folder (normally c:\agis\maps by default). For the purpose of this tutorial, we will use the sample files that came with the PCX5 program.



## Importing your GPS files into AGIS

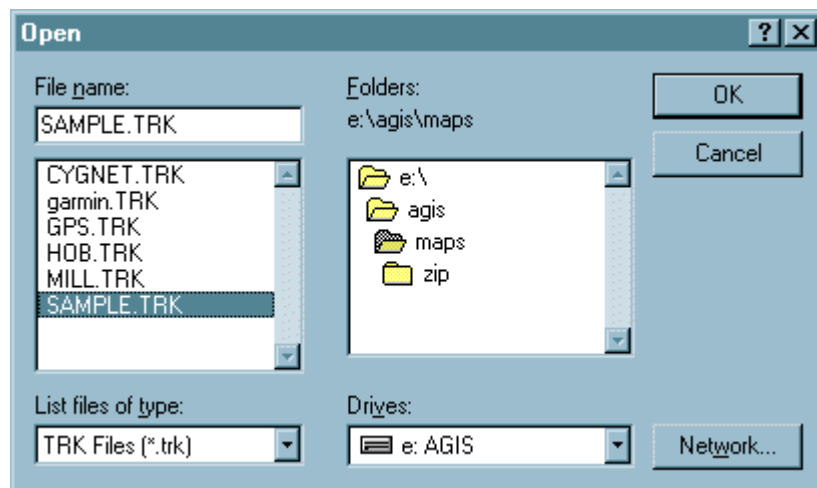
Start AGIS and select "Tools/Import Files". This facility allows you to convert a number of different map and data file formats into ones that AGIS can use.

From the list, select ".trk [Garmin GPS track]" and press OK.



## Selecting your track file

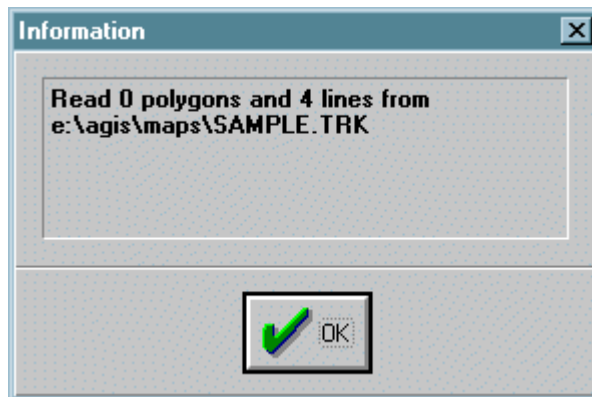
This will bring up a list of .trk files ready for import located in your AGIS maps folder. If you can't find your file, then you must have made a mistake copying it to this folder. For this tutorial we will select the sample.trk file and press OK.



## Converting your files to the AGIS text format

AGIS will then convert your track and also associated waypoint and route files (if they exist) into the standard text format for map and data files used by AGIS. A message indicates how many lines (sets of attached points) were processed. If you see a message at this stage indicating that the data was not in Lat/Long form, or the datum was incorrect, please check your GPS configuration to ensure that it produces files of the same form as the sample ones.

The message box should always indicate that at least 1 line has been read, and should never indicate that there were polygons. Press OK.

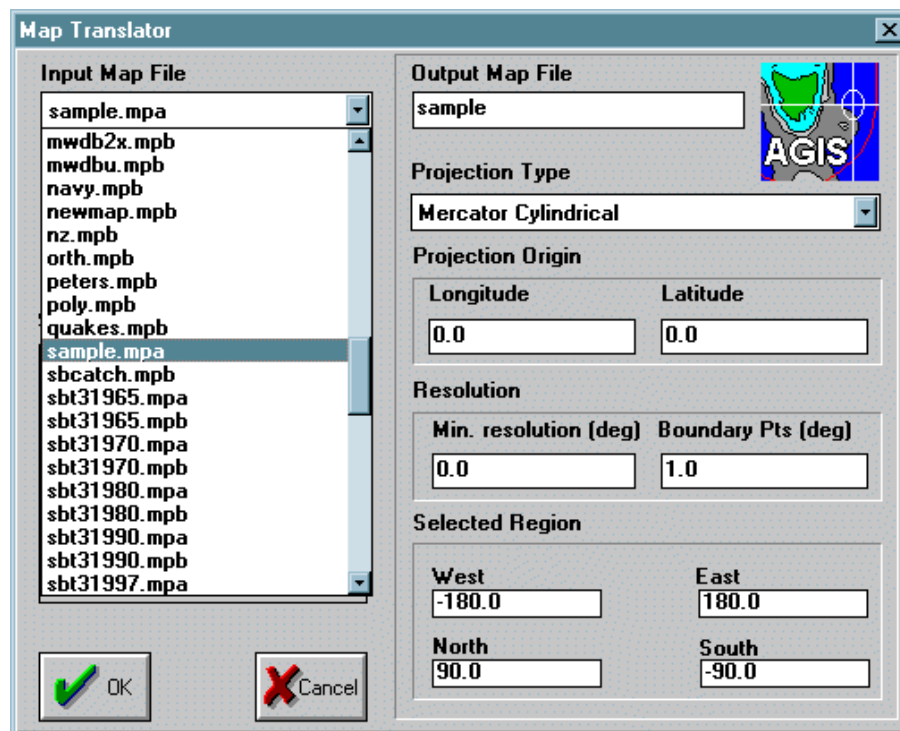


## Converting the map file from text to binary

At this stage, the GPS files have been converted to text files that AGIS can read to make maps and to plot data points. The file `sample.mpa` has been created in the maps folder, and `sample.dat` has been created in the data folder. Data files can be displayed directly, as all data files are just text files. Map files, however, must be translated into binary files using a particular map projection before they can be plotted by AGIS. This means that the `sample.mpa` (map ascii file) must be translated to `sample.mpb` (plottable map binary file) before it can be used in a map display.

Select "Tools/Map Translator" from the AGIS menu, and use the drop-down list box for the Input Map File to select `sample.mpa` (the ascii file). Now type "sample" for the name of the binary file that we will create, which will make a file called `sample.mpb`.


There are a number of options available in this dialog that allow you to select out only certain kinds of features for translation, different map projections, projection origins, minimum resolution (distance between closest points) and to select only a given area by latitude and longitude. Most maps provided with AGIS use the default Mercator projection with an origin of 0,0. If you want to overlay binary map files on top of each other in a single display, they must have the same projection and origin. Therefore, it is often best to use the default projection settings unless you have a specific need for an alternative. As we want to overlay our sample GPS data onto existing maps that use the default projection, we will accept the defaults and press OK.



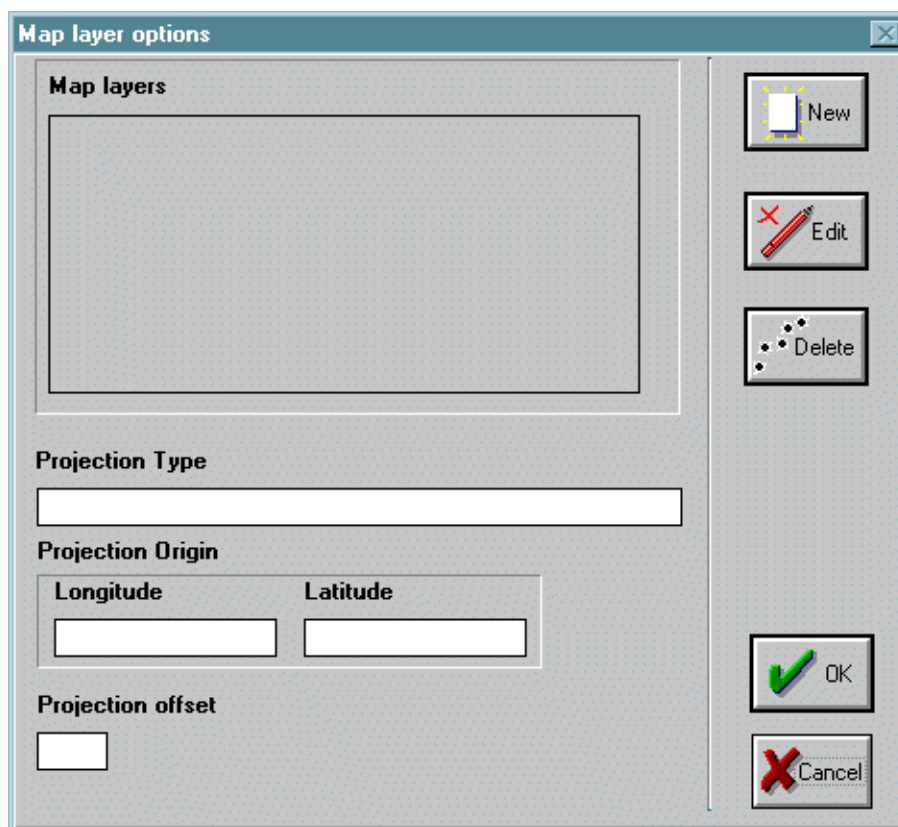
## Creating a new map display

It is a simple task to add your GPS data to an existing map display, but for this tutorial we will go through the process of creating a new one.

Select "File/New" from the AGIS menu or the  tool.

When a new map display is created, there are no active map layers so you are automatically taken to the Map Layer Options dialog. To get to this dialog for any map display, you would have selected "Options/Map Layers" from the menu or selected the  tool.

You want to first select a background map layer to show behind your GPS map layer, so press "New".



## Adding the mwdb2 map as a background layer

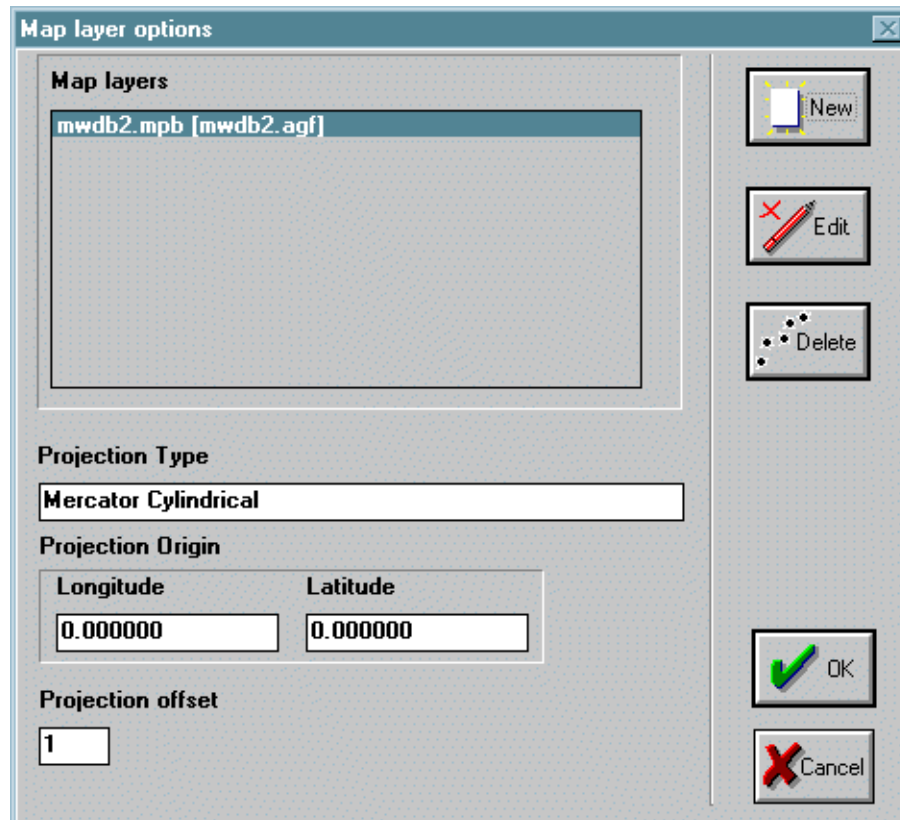
The only map with global coverage supplied with the AGIS installation is call mwdb2 (Micro World DataBase 2 - see the AGIS on-line help file for details). This is not very detailed, but serves our purpose here to show how maps can be overlaid. Select mwdb2.mpb as the map file, and mwdb2.agf as the display format. The agf file determines how the .mpb file is displayed. From this dialog it is also possible to edit the .agf display file to change how features in mwdb2.mpb are displayed, but we will accept them as they are for this tutorial. After selecting both the mwdb2 files, press OK.



## Adding the GPS sample map layer

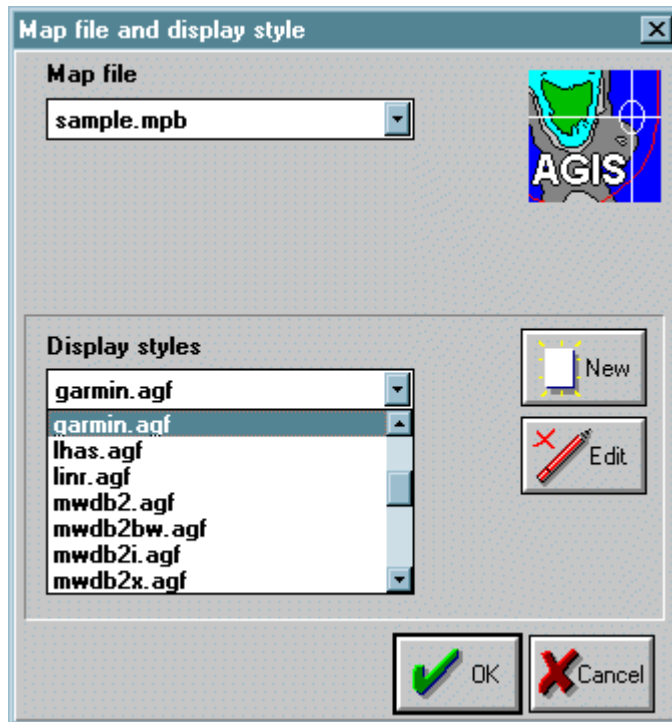
The map layer list now shows the mwdb2 map in place. Note that the projection type, origin and offset are now shown as well. This means that for this map display, only binary map files with these projection settings can be overlaid. From now on, the only map files that you will see in lists that you browse in relation to this display will have these settings. This is why we chose the default projection settings when translating the sample GPS map file.

We want to also add the GPS sample map layer, so press "New" again.



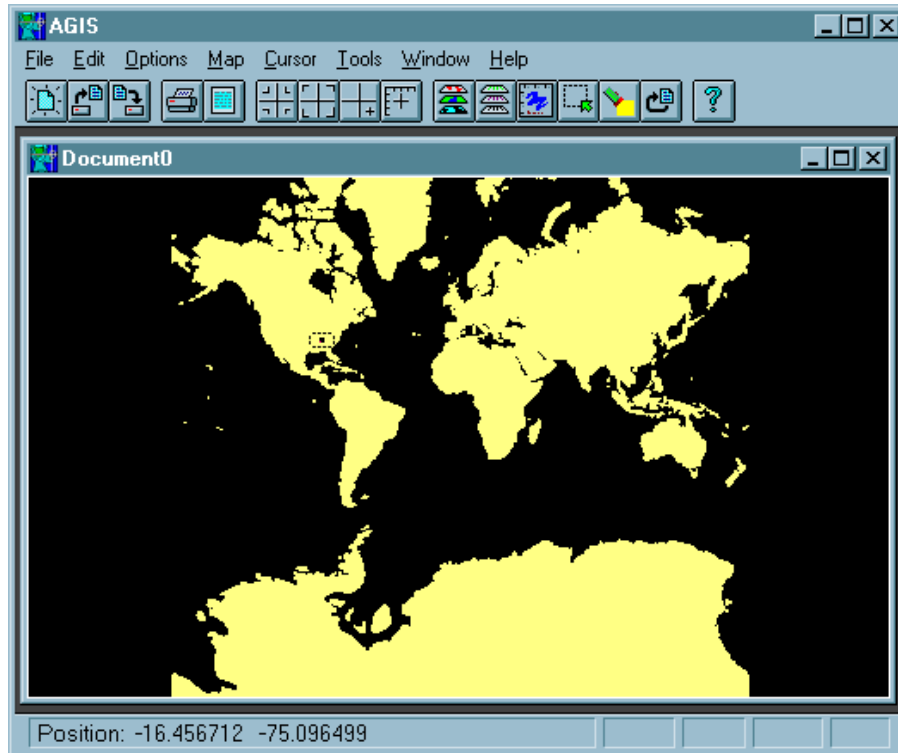
## Selecting the GPS map display format

Select the `sample.mpb` map binary file and the `garmin.agf` display format file. This display format has already been prepared and comes with the AGIS distribution. It controls the color and thickness of tracks (thick black) and routes (thick pink). You can edit these display options from this dialog, but for this tutorial we will accept them as they are. Press OK.



## Zooming in to the area covered by the GPS data

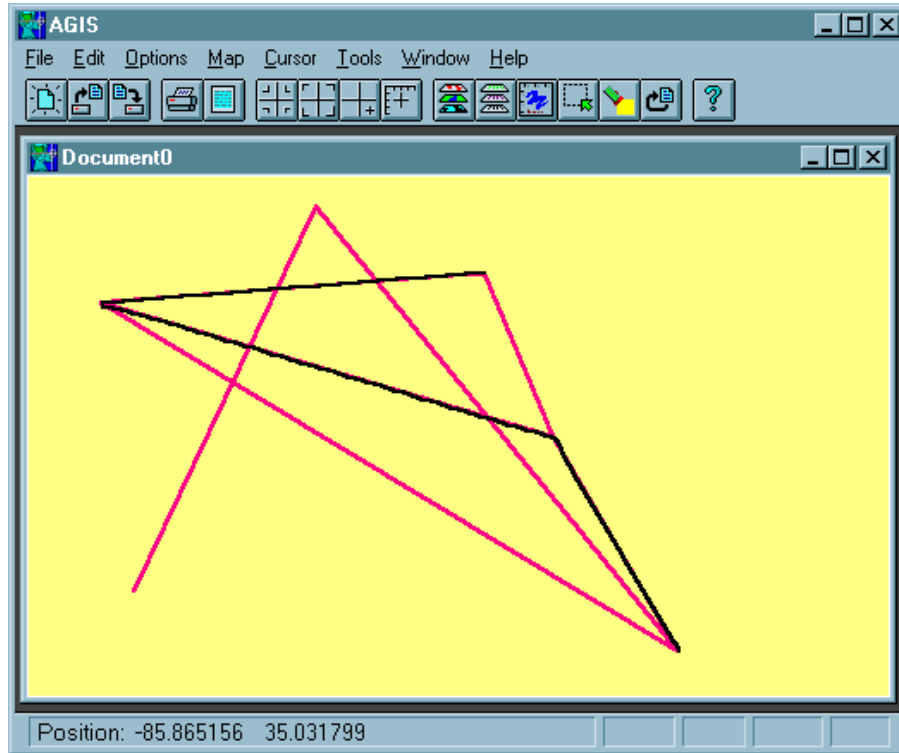
The display now shows the mwdb2 world map with the sample GPS map file overlaid. As the GPS file only covers a small region, it only shows as a dot in the south-east of the US at this scale. Zoom in to that region using the zoom cursors. If you don't know how to do this, more detail is given in the first section of the tutorial on creating and displaying a data file.



## Adding GPS point data

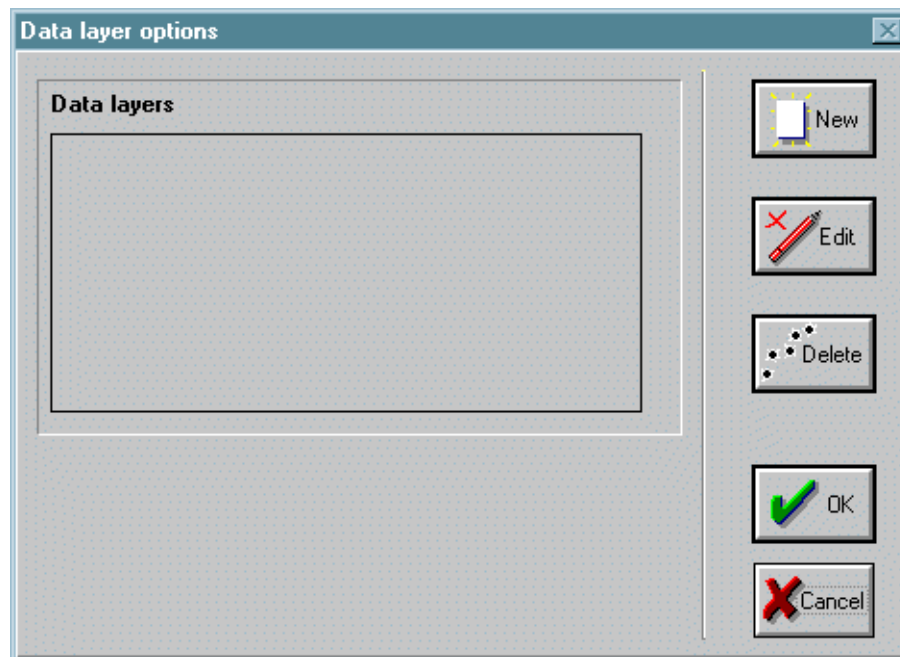
After zooming, your display should look similar to this. Right now, only the GPS map data is displayed, showing track and route lines. Waypoints, other point types and associated text are contained in the sample.dat file that also needs to be displayed.

To add a data layer, select "Options/Data Layers" from the menu, or the  tool.



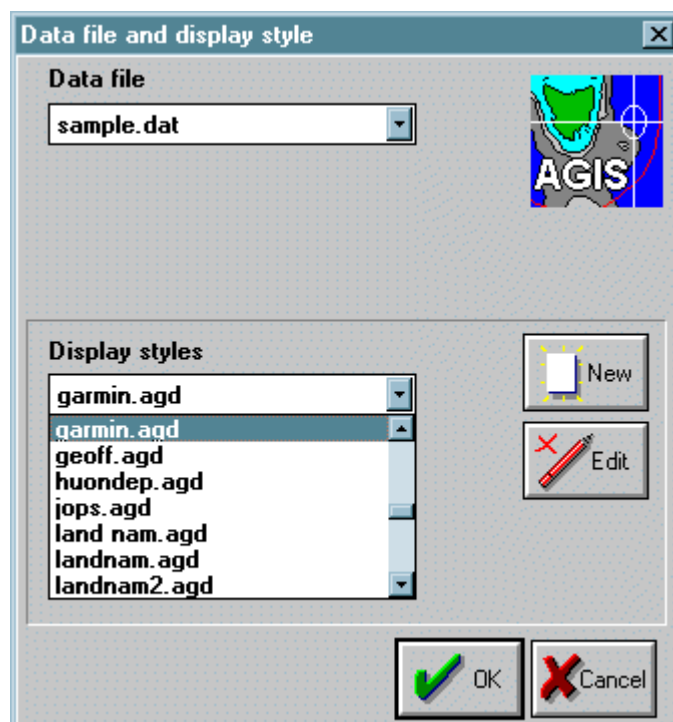
## Add the sample GPS data to the display

This dialog shows a list of the data layers associated with the current display. We want to add a new data layer for the sample GPS data, so select "New".



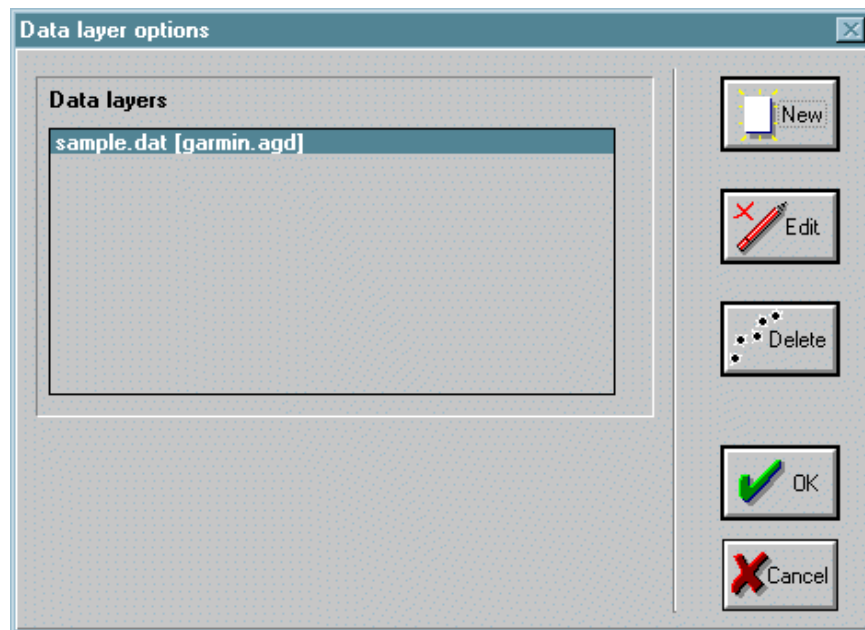
## Selecting a data display format

Select the sample.dat data file, and the garmin.agd data display format file. The garmin.agd file is provided with the AGIS program distribution as a default display format for Garmin GPS point data. From this dialog it is possible to edit the display styles, but we will accept the defaults. Press OK.




## Accepting data layers

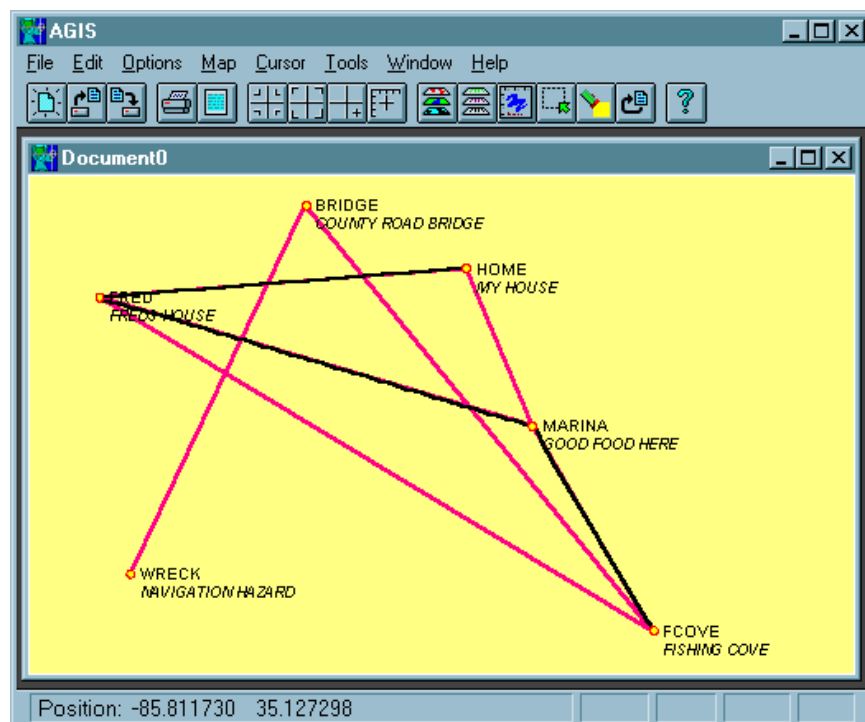
The data layer list now shows the sample.dat file and an appropriate associated display format file. To accept the list, press OK.



## Adding a grid and map scale to the display

Now the display shows both the map and data information from the sample GPS files. It does look plain though, so we will go through how to add a grid and map scale to the display.

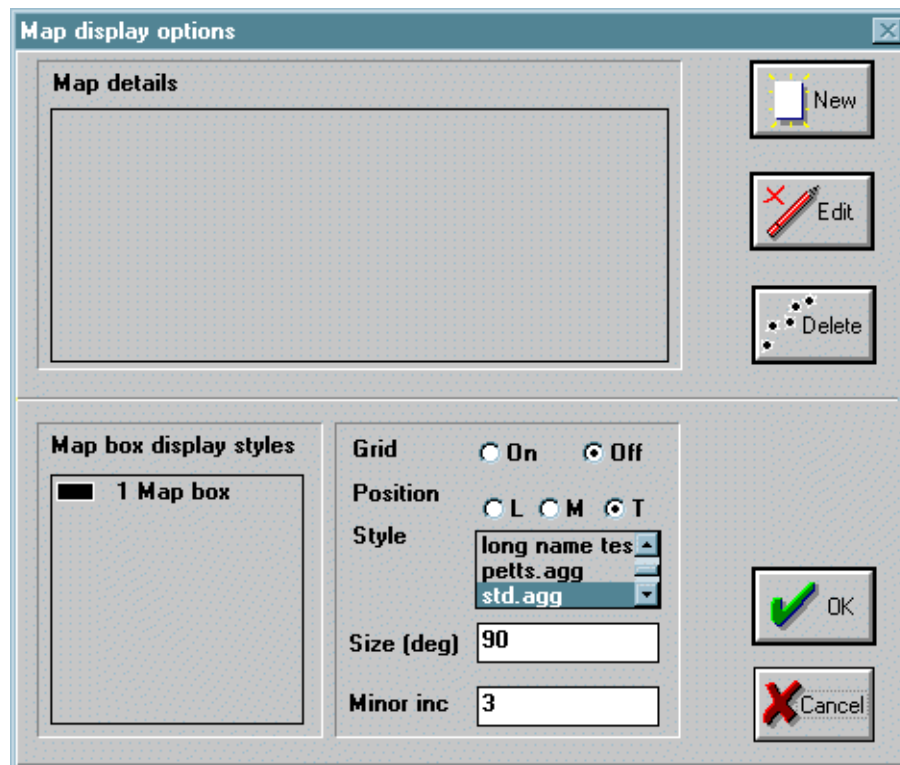
Select "Options/Display Options" from the AGIS menu, or the  tool.



## Changing map display options

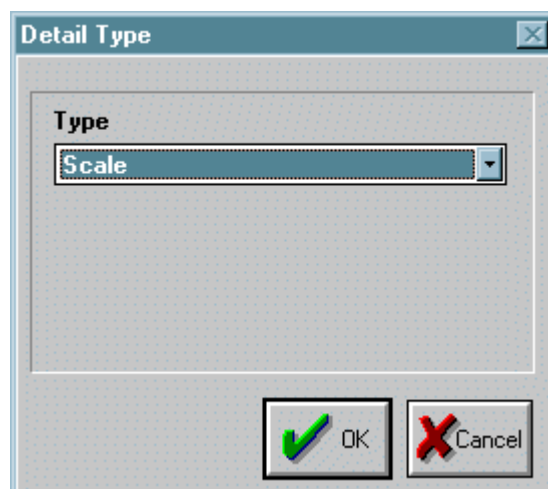
This is the map display options dialog that allows you to change many things related to the current map display. Here you can add map details (text, colored boxes and scale indicators) to your displays, change the attributes of the map box (the box surrounding the display) which is currently a white line border filled with black (the color currently used for the sea), and change the appearance of the grid or graticule.

First we will add a scale indicator. Press "New".



## Adding a scale indicator

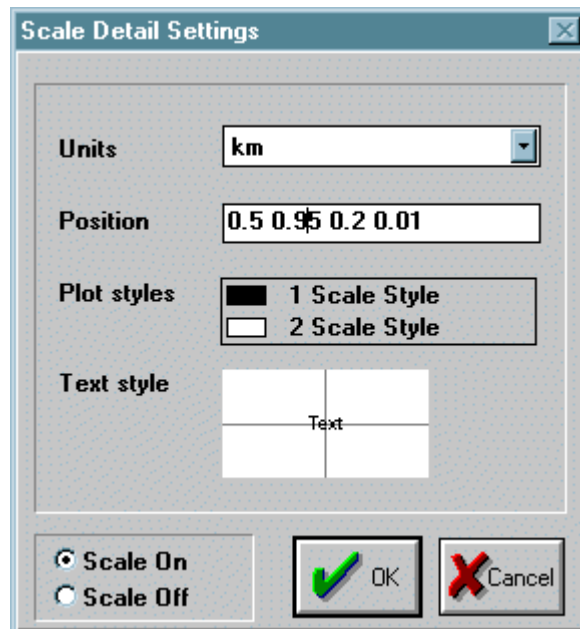
The detail types that can be added are text, boxes or a scale. Select Scale from the list and press OK.



## Setting the attributes of a scale indicator

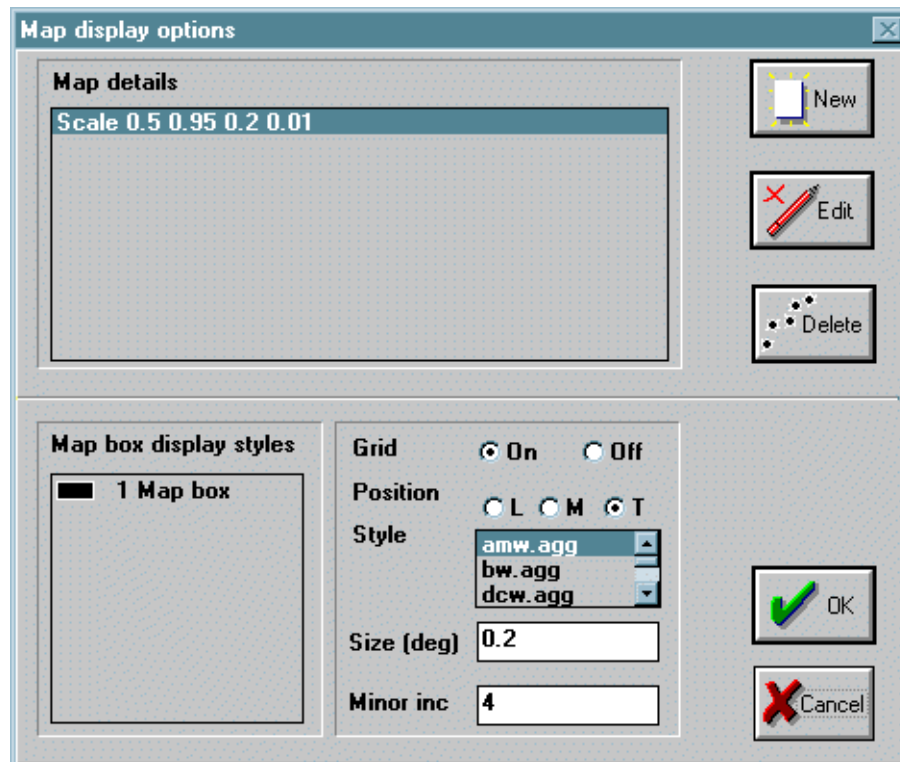
This is the Scale Detail Settings dialog that controls all aspects of the display of a map scale. Select km from the units list. Other possible units are nm (nautical miles), mi (US miles) or m (meters). The color pattern is white and black boxes surrounded by black lines which is OK. These can be changed by double-clicking on them, but we will accept the default. The text is small, black, arial font, justified centrally vertically and horizontally. This is also OK for our needs, but can be modified by clicking in the text style box.

The numbers in the position box determine where the scale indicator will be placed on the map, and how big it will be. The first 2 numbers are the X and Y coordinates for the center of the scale indicator on the display, assuming that the display measures 1 unit from left to right and 1 unit from top to bottom. The values of 0.5 and 0.95 will place the scale half way across the display and near the bottom. The third number determines how wide the scale indicator should be, and a value of 0.2 says that the scale indicator should be one fifth as wide as the map display. The fourth value of 0.01 determines how thick the scale bar should be, and this value means one hundredth of the map display height. Type these values in, make sure that "Scale on" is selected and press OK.




## Setting the attributes of the grid display

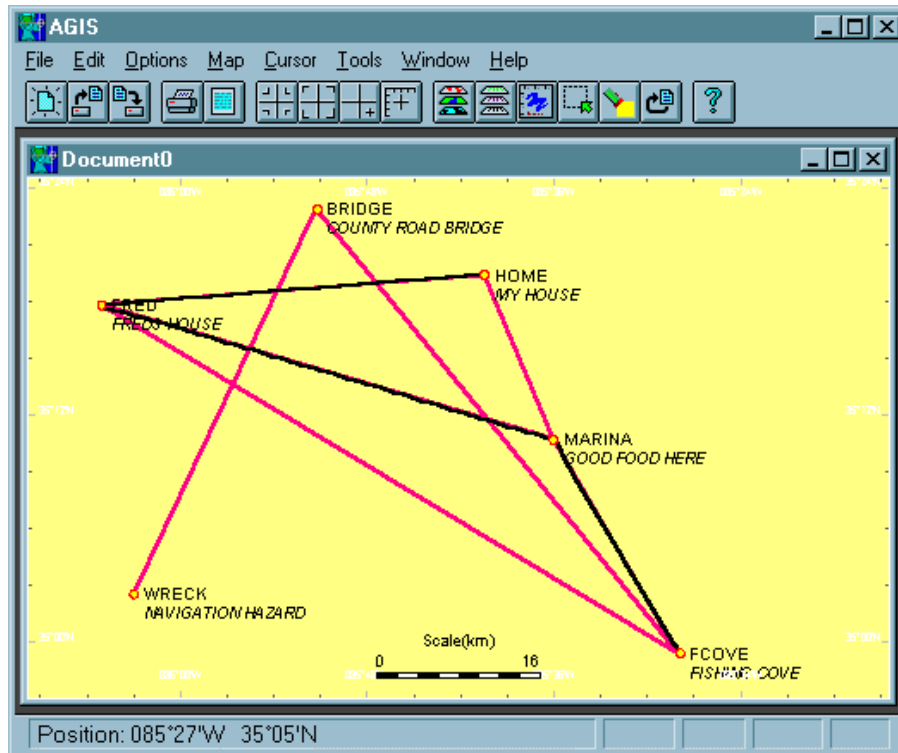
The map details list now shows the added map scale. To turn the grid display on, select "On" in the grid box. Select amw.agg as the display format for the grid. This can be edited by double-clicking on it, but we will accept the grid display settings in that file. Set the major grid size in degrees to 0.2, and the number of minor increments to 4. AGIS can display both a major and minor grid, so this setting sets the major grid to increments of 0.2 degrees, and the minor increment to 0.05 degrees. The grid position can either be under the map layers (L), between the map and data layers (M), or completely on top of the map display (T). Leave the grid display on top of the map. Press OK.



## Saving the GPS map display

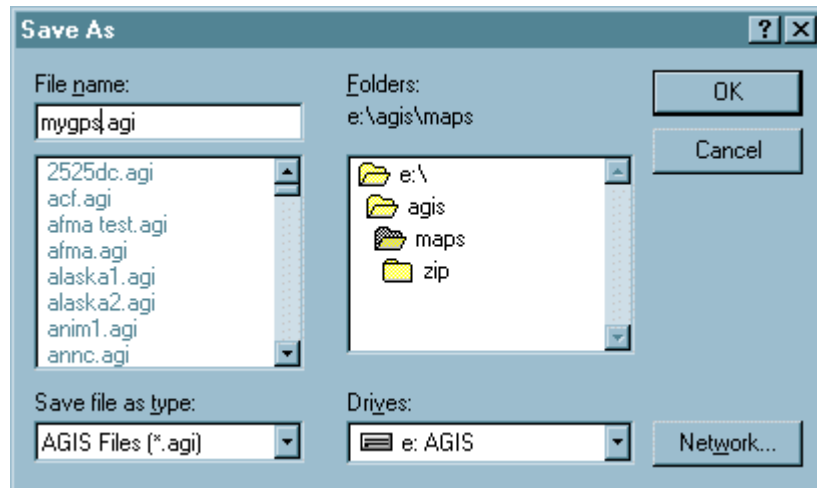
The map has a scale and a grid. Grid lines are not turned on, so the grid only shows as ticks around the edge, and the white text color is not very readable. You should know enough now to work out how to change these to more suitable values. (Hint: Start at "Options/Display Options" and double-click on the amw.agg grid display format)

All that is left to do now is to save the new map display. Select "File/Save As" from the AGIS menu or the  tool.



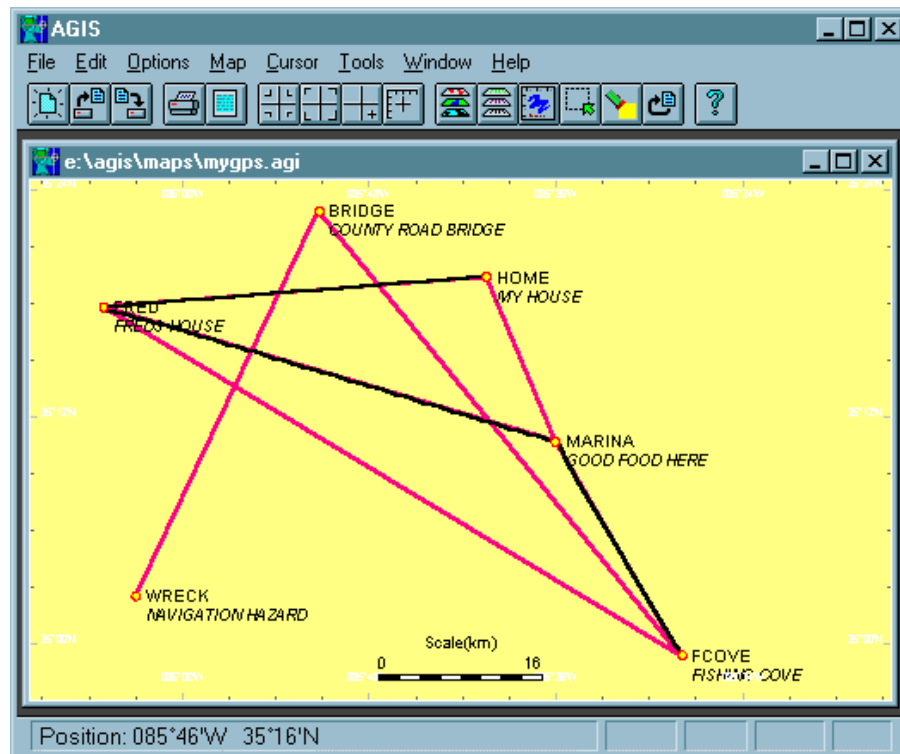
## Naming a new map display

Type a name for your new map display, making sure that you keep the .agi extension in the name. It is also best to keep the file in the AGIS maps folder, so don't change this unless you have a good reason. Only displays in the AGIS maps folder show by default when you want to open your files. After typing the new name, press OK.



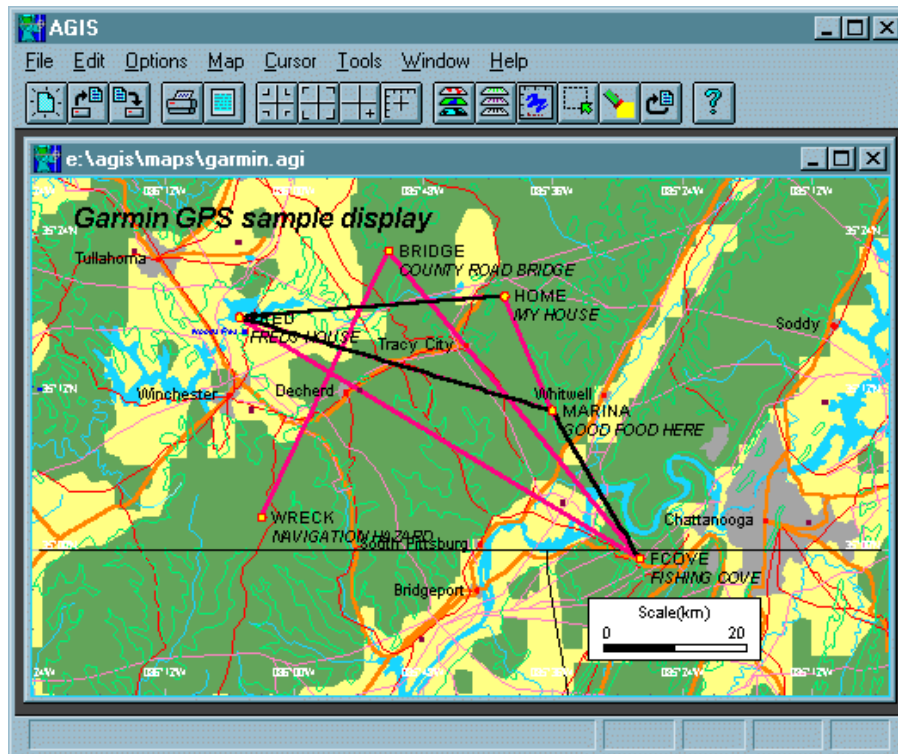
## Final display

Congratulations - you've finished this section of the tutorial! The next page just shows the same GPS information displayed on top of an extract from the Digital Chart of the World.



## Example display using Digital Chart of the World

This display shows the same GPS data displayed on top of an extract from the Digital Chart of the World as contained in the example display provided with agis called garmin.agi. It clearly shows the advantage of being able to overlay map information from a number of sources.



# Index

- A**
- auto range ..... See data symbols
- C**
- center of map
  - setting manually ..... 7
- colors
  - selecting..... 15
- cursor
  - pan ..... 7
  - zoom in ..... 7
  - zoom out ..... 7
- D**
- data display format
  - saving ..... 23
  - selecting..... 54
- data display style
  - creating new ..... 9
  - editing..... 12
- data file format
  - entry ..... 3
- data files
  - saving ..... 4
- data layer
  - adding..... 8
  - adding..... 8
  - adding to a map display ..... 53
  - saving display style ..... 23
- data legend
  - changing display characteristics..... 22
  - default..... 11
- data points
  - digitizing ..... See digitizing
- data symbols
  - assigning symbol types ..... 10
  - auto range ..... 11
  - changing ..... 12
  - changing the border and fill style..... 15
  - changing the display style ..... 14
  - changing the plot/drawing style..... 14
  - data value range..... 11
  - display formats..... 21
  - sizing ..... 17
- data values
  - entry ..... 3
  - range ..... 11
- decimal degrees ..... 3
- digital chart of the world ..... 61
- digitizing ..... 27
  - data points..... 32
  - formatting a data file..... 34
  - formatting an ASCII map file..... 38
  - map polygons and lines..... 35
  - saving point data..... 33
- E**
- Excel ..... 3
- G**
- GPS
  - displaying track and waypoint files ..... 43
  - downloading track and waypoint files .... 44
  - importing trk and wpt files ..... 45
- grid lines
  - adding a grid to a map display ..... 55
  - settings ..... 58
- L**
- legend..... See data legend
- lines
  - digitizing..... See digitizing
- M**
- map background
  - changing display options ..... 56
- map display
  - create new..... 4
  - creating new ..... 48
  - naming and saving..... 60
  - saving ..... 26
- map display format
  - selecting..... 51
- map layer
  - create new..... 4
  - display format ..... 5
- map layers
  - adding a new layer ..... 50
- map offset ..... 6
- mpa file
  - formatting digitized points ..... 38
- mpa file format
  - adding feature headers ..... 40
  - converting to binary mpb ..... 41
  - creating from GPS trk files ..... 45
- mpb file format
  - creating from ASCII mpa files ..... 41
  - creating from mpa files ..... 47
- mwdb2
  - display format ..... 5
- mwdb2 map layer
  - using as a background..... 49
- N**
- NotePad..... 3
- P**
- panning ..... See cursor, pan

PCX5 .....	See GPS
point label	
attached text .....	3
point symbol	
rotation value.....	3
polygons	
digitizing .....	See digitizing

**R**

rotation value.....	See point symbol
---------------------	------------------

**S**

scale bar	
adding to a map display .....	55
settings .....	57
scale of map	
setting manually .....	7

**T**

text display style	
changing .....	18
fonts .....	19
justification.....	19

rotation .....	19
size .....	19
weight.....	19
text font .....	See text display style
text justification.....	See text display style
text rotation.....	See text display style
text size.....	See text display style
text weight .....	See text display style

**W**

WinDig	
data format .....	29
geo-registering.....	30
installation .....	28
saving scale attributes .....	31
setting point coordinates .....	31
setting the format for lines and polygons	36

**Z**

zoom in .....	See cursor, zoom in
zoom out .....	See cursor, zoom out