Displaying Grid Files

Grid files are commonly used to store millions of values in a single file. In order to display this amount of data quickly and effectively in map-space, specialized techniques are required. The display of grid data in *Vertical Mapper* is achieved by assigning a range of colour values, defined by a series of colour inflection points, to each grid cell based on the numeric or character value assigned to it. The colour inflection points are carried in the header portion of the grid file but can be easily modified using the *Colour Tool*. When a grid file is opened, the colour information in the header is read and the colour profile is assigned to the grid cells and displayed in the Map window. In this manner, the image displayed on screen is a true representation of the grid file, where each cell of the image represents a grid cell centred around the grid node as illustrated in the Figure 7.1 below.
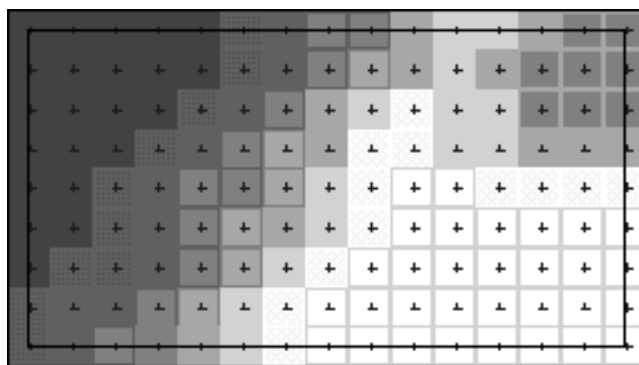

Figure 7.1. Each grid cell is assigned a colour value as defined in the header portion of the file.

Any numeric grid file generated in *Vertical Mapper*, using interpolation or modeling, is automatically assigned a default colour palette that is applied when the file is first opened. It should be noted that the user may change the default colour palette by adding a custom colour profile in the *Preferences* dialogue accessed using the *Vertical Mapper > Preferences* command.

Colour is assigned to a numeric grid file according to ranges of grid values. Assume a grid is comprised of values from 0 to 100. Discrete colour gradients are then assigned by range according to defined inflection points. For example, the range from 0 to 25 would be assigned colours varying from dark blue for the lowest value to medium blue for the highest value; while the range from 26 to 50 would be assigned colours varying from medium blue for the lowest value through green to yellow for the highest value in the range, and so forth. This technique is a standard method of presenting quantitative data in a continuous gridded surface using a gradient colour model; where blue is commonly used to represent low or "cold" values and red is commonly used to represent high or "hot" values. Grid colouring is a powerful tool for data visualization. Users are encouraged to be creative and experiment with their own data using a variety of colour gradients.

In addition to assigning colour gradients to numeric grids, variations in light and shadow can also be applied. Relief shading is an effective visualization process that creates 3D-like images from a continuous grid surface. The procedure calculates light and shadow effects based upon the angle of incidence of an imaginary point source of light to create grey scale or colour images.

Vertical Mapper also supports the generation of true 3D perspective views using the *GridView* module. This module gives users the ability to compose a MapInfo Map window of any vector, raster or textual entity that coincides with the spatial extents of the grid file and then drape the window onto a 3D representation of the grid surface. Perspective 3D rendering is supported in *Vertical Mapper* through implementation of the OpenGL™ graphics language.

In assigning colour to classified grids, *Vertical Mapper* uses a separate function called the *Dictionary Editor*. This tool simply provides an interface to assign unique colours to each category of grid cells.
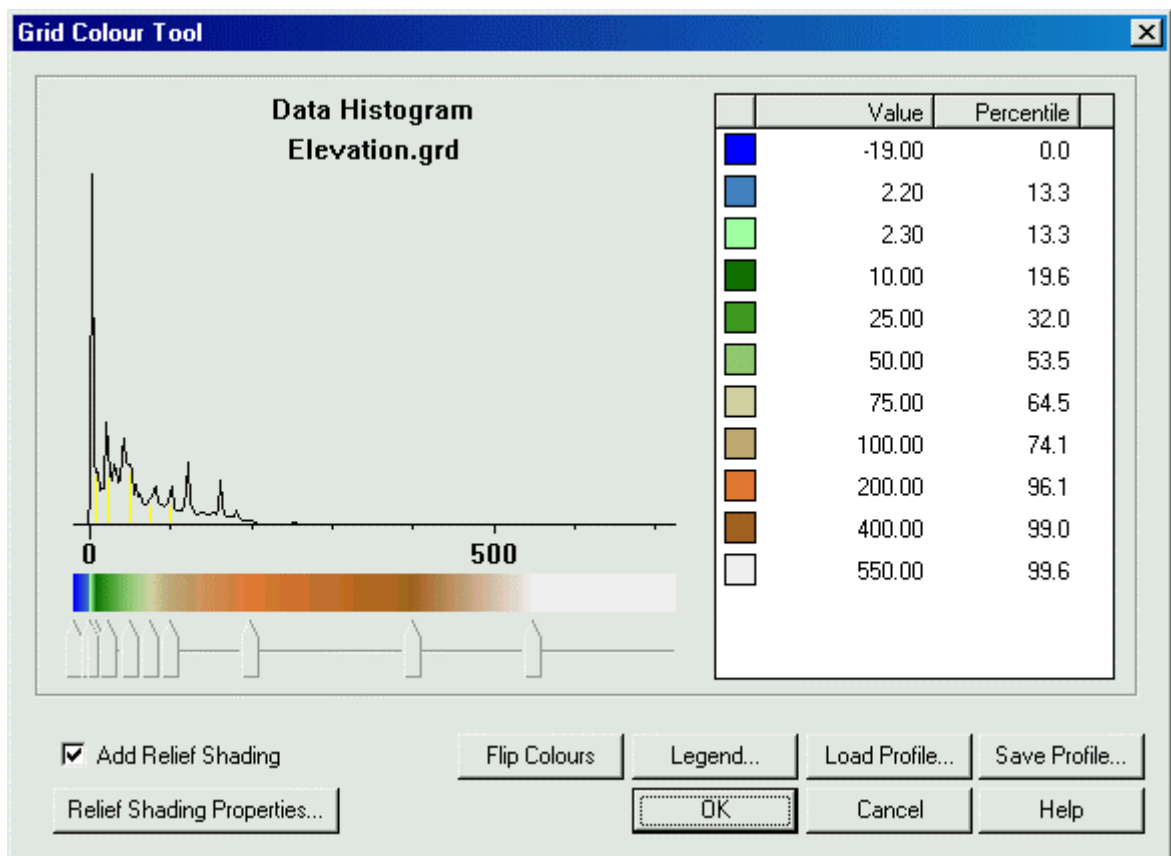
The Colour Tool for Numeric Grids

All of the display and colour options available for numeric grid files are contained in the *Colour Tool* dialogue box which is opened from the *Grid Manager*. For an instructional lesson on changing colours of numeric grids refer to Lesson 1 of the *Installation and Tutorials* manual.

To open the *Grid Manager*, select the button from the *Vertical Mapper* ButtonPad.
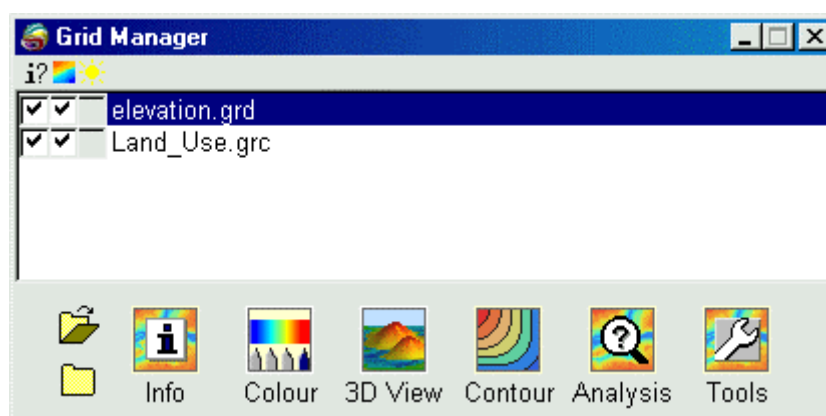
From the *Grid Manager* dialogue, select the button to bring up the **Grid Colour Tool.**

The settings available in the *Grid Colour Tool* allow extremely precise control of gradient colour spread across the range of values found in the grid file. Discrete colour gradients are assigned by range according to defined inflection points. The *Grid Colour Tool* allows placement of 64 inflection points that may be set using either a point and click method on the slider bar or by entering defined values or percentiles in the table editor. A histogram showing the distribution of values in the grid file is displayed in *Grid Colour Tool* to assist in the placement of colour inflection points.

Grid Colour Tool

	Value	Percentile
	-19.00	0.0
	2.20	13.3
	2.30	13.3
	10.00	19.6
	25.00	32.0
	50.00	53.5
	75.00	64.5
	100.00	74.1
	200.00	96.1
	400.00	99.0
	550.00	99.6

1   Use The *Colour Slide Bar* to add or edit a colour inflection point.

 1. To add a colour inflection point using the mouse, double click between two pointers along the slide bar. This will add a new pointer.

 2. To change the colour of an inflection point, double click on an existing pointer to launch the *Colour Selection* dialogue box. A new colour can be chosen or defined at this point.

 3. To move an inflection point, position the mouse cursor over an existing slider and move the mouse while keeping the left mouse button depressed. The calculated values in the *Table Editor* box will be automatically updated.

 4. To delete an inflection point, highlight a slider by clicking on it with the mouse, then select the delete key on your keyboard.

2   Selecting the **Flip Colours** button will completely reverse the colour slides placing the inflection points in reverse order and updating the gradient colour pattern.

•   Use the Table Editor on the right side of the *Colour Tool* to change values and percentiles. Click on an existing entry in the table editor to make the value editable. Enter a new value intermediate between the values above and below it.

3   Use *Colour Profiles* to save and load settings. Custom colour settings may be saved either by value or by percentile in choosing the **Save Profile** button. Similarly, saved profiles may be loaded using the **Load Profile** button. Profiles are saved as text files with a .VCP extension.

> ***Tip:*** In deciding whether to save colour profile inflection points by value or by percentile, use the following as a guideline. If it is more important to assign specific colours to specific values in a series of related grid files, then save by value. If it is more important to assign a particular colour range to a series of related grid files and where the value range may vary considerably, then save by percentile.

4   Check the ***Add Relief Shading*** box to redefine the grid colours based upon how they would be illuminated by a single light source. The ***Relief Shading Properties*** button opens the ***Relief Shading Properties*** dialogue box which controls a few basic elements of grey level adjustment using a Hue/Saturation/Luminescence (HSL) colour model. Grids can also be viewed in grey scale only relief shading.
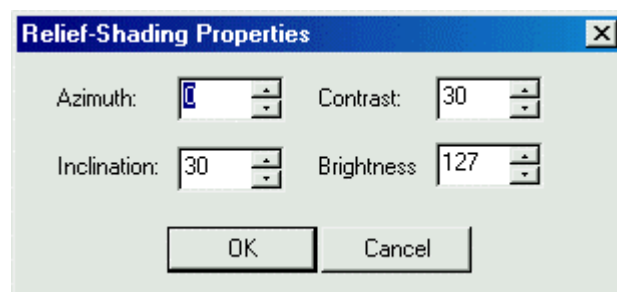

1   ***Azimuth*** is the direction (in degrees) from which the imaginary light source emanates. ***Inclination*** is the angle of incidence (in degrees) of the imaginary light source measured from a horizontal plane. The effect of using different values is dependent upon the general "topography" of the grid surface.

2   ***Brightness*** is a measure of both the colour intensity and overall greyness of an image. Increasing brightness will increase colour intensity as well as reduce the greyness of an image. ***Contrast*** determines the difference between the lightest and darkest tones in an image. Increasing the contrast setting will make the brighter areas brighter and the darker areas darker. Both are measured on a scale of 1 to 255 and the default values presented in the dialogue box are considered appropriate for most renderings.

The Colour Tool for Classified Grids

Just as the *Colour Tool* is used to assign the spread of gradient colours according to the range of values found in numeric grid files, the *Dictionary Editor* is used to assign colour values to each unique, category of cells found in a *Vertical Mapper* text-based classified grid file. For an instructional lesson on changing colours of classified grids refer to Lesson 1 of the *Installation and Tutorials* manual.

Assuming that a .GRC file is selected in the *Grid Manager*, all of the display and colour options available for classified grid files are contained in the *Dictionary Editor* dialogue box.
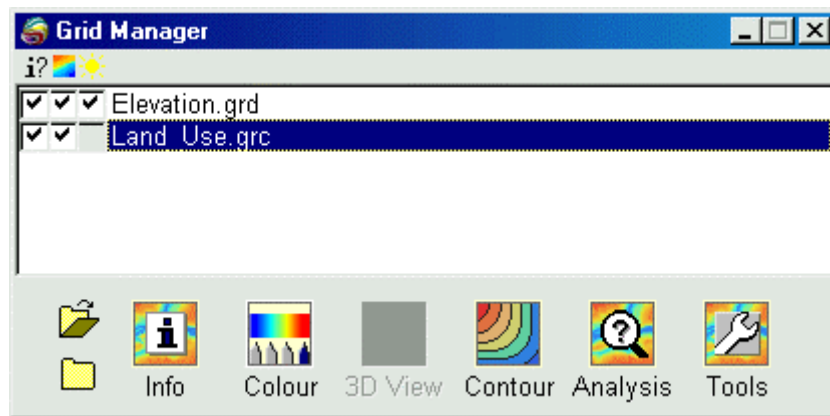
From the *Grid Manager* dialogue, select the button to bring up the **Dictionary Editor** dialogue box.
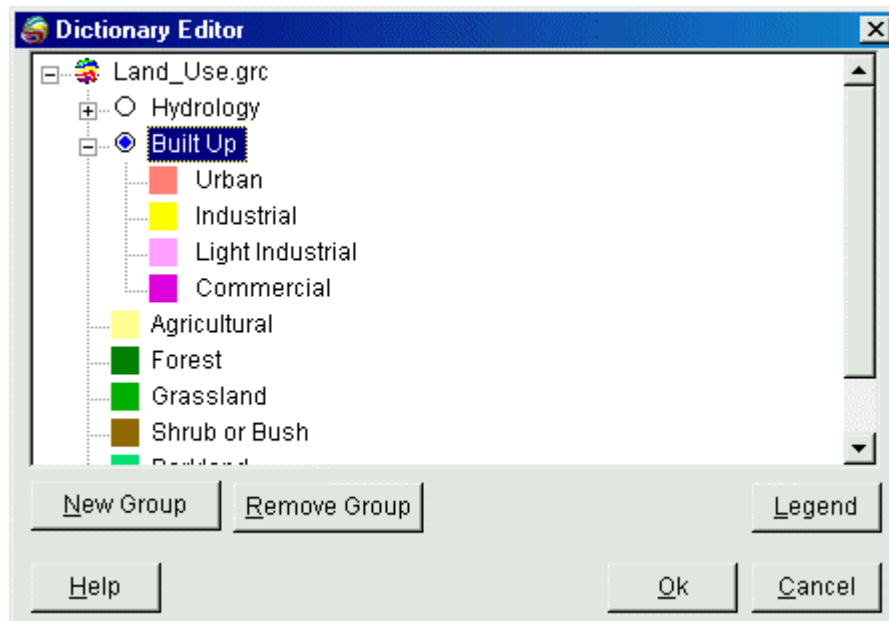
- The dialogue brings up a complete hierarchical list of all of the groups and subgroups of classified cells that comprise the grid file as well as the corresponding colour assigned to each unique category.

  1 *Groups* are identifed by the "+" symbol in a box which can be selected in order to expand the *Group* into its category members. The "–" symbol in a box identifies a *Group* that has been expanded and can be selected to compress all individual categories. The same commands can be initiated by clicking the right mouse button and selecting the **Expand All** or **Collapse All** menu items.

   a) A **New Group** can be added to the *Dictionary* using the approprate button.

Classification entries can be moved through the heirarchy by selecting the entry with a click of the left mouse button and dragging it to a new position. The *New Group* command may also be accessed by clicking the right mouse button and selecting the appropriate menu item.

b)

c) A *Group* can be removed by selecting the entry and clicking on the **Remove Group** button. The same command can be accessed using the right mouse button and selecting the *Remove Group* menu item.

d) Classification text entries can be edited by first selecting an entry then clicking on it with the left mouse button to bring up a text curser.

1   Colours assigned to each category member can be edited by double clicking on the entry to bring up the standard Windows Colour box that can be used to assign a unique colour to that category. Colour changes are not applied until the user exits the dialogue by selecting **OK**.

2   Selecting the **Legend** button opens a new dialogue called the **Legend Generator** that provides a number of options for constructing a legend for the *Dictionary Editor* entries. This is discussed in the next portion of this chapter.

Creating Legends

When using either the *Colour Tool* for numeric grids or the *Dictionary Editor* for classified grids, the **Legend** button opens a new dialogue called the **Legend Generator.** This dialogue provides a number of options for constructing a legend showing either the continuous range of colours and values that comprise a numeric grid or the colours and class names contained in a classified grid. For an instructional lesson on creating grid legends refer to Lesson 1 of the *Installation and Tutorials* manual.

3   The **Range** tabbed window displays, and allows editing of, the values to be plotted on a legend bar. The values and percentiles that appear are those that have been defined in the *Colour Tool* as the colour inflection points (discussed earlier).
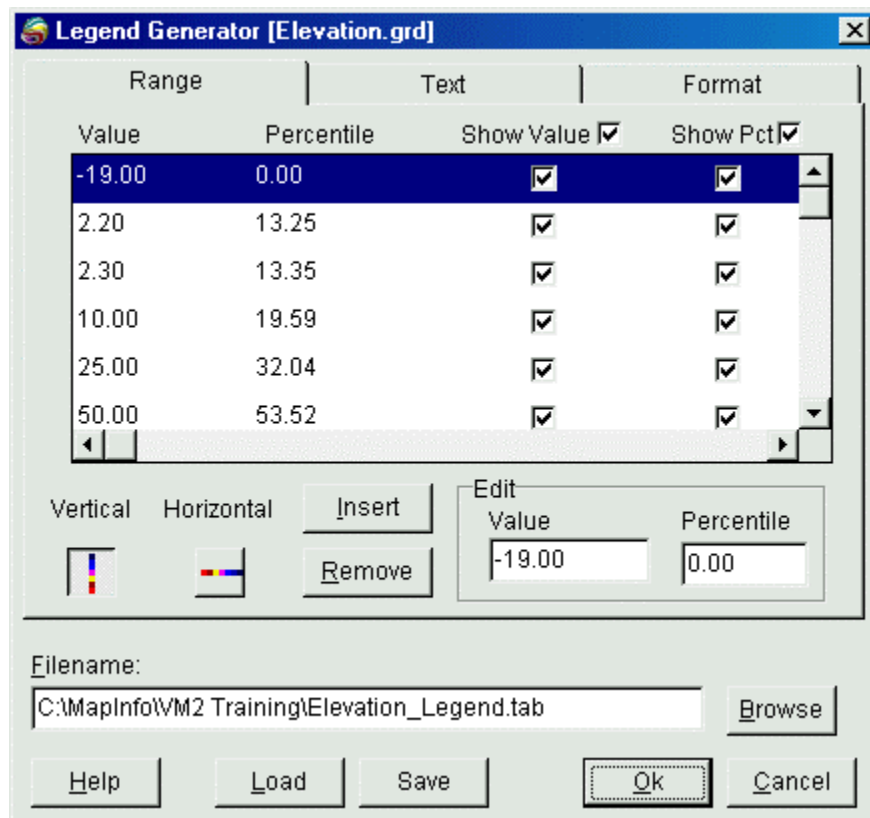
a) For numeric grids the values and percentiles that appear in the top portion of the dialogue represent the colour inflection points currently used. It is these values that will be used by default. For classified grids this area only displays the different class names.

b) For numeric grids new values may be entered into the legend using the *Insert* button or may be removed using the *Remove* button. Not available for classified grids.

c) By checking the appropriate box, the user may choose to *Show Value* only, *Show Percentile* only or show both plotted beside the legend colour bar. Not available for classified grids.

d) The orientation of the colour legend can be chosen to be *Horizontal* or *Vertical* by selecting the appropriate button. Classified grids will only appear in a vertical form.

1 The *Text* tabbed window is used to control the placement and formatting of textual elements that appear in the legend including the title, label position, font style, and size.
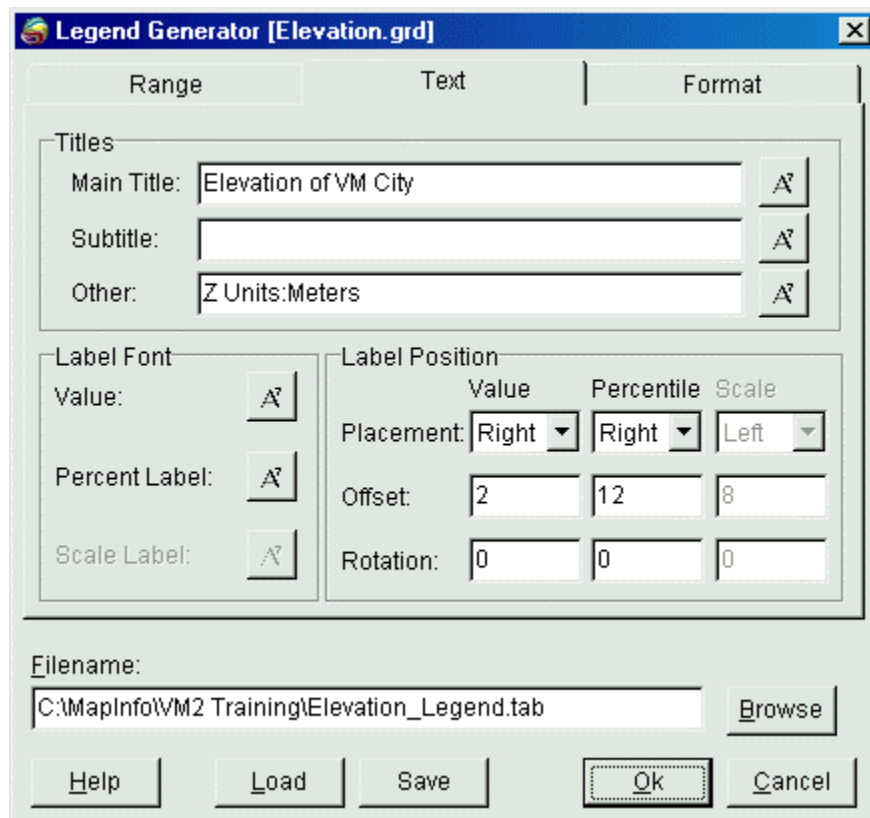
a) In the *Titles* section, enter a *Main Title* and, if desired, a *Sub Title* that will be positioned immediately below the Main. An *Other* title may added which is positioned at the bottom of vertical legends and at the lower left base of a horizontal legend bar. The desired font for each of the three titles may be chosen by selecting the [A] button.

b) The *Label Font* section of the dialogue is used to modify the type and size of either the *Value* label, the *Percentile* label, or the label by selecting the font button.

c) The *Position* section contains settings to control the placement characteristics of each set of labels. The *Placement* drop-down allows the user to plot the labels either to the *Left* or the *Right* of a vertical bar legend or on the *Top* or the *Bottom* of a horizontal legend bar. The *Offset* value controls the spacing between the legend bar and the starting point of the tick mark label measured in centimetres or inches. The *Rotation* settings control the rotation around the insertion point (lower left) of each text string that comprises a label, where rotation defaults to 0 degrees (horizontal) in vertically oriented legend bars and to 90 degrees (vertical) in horizontally oriented legend bars.

1   The *Format* window controls the placement and formatting of tick marks, scale intervals, and frames.
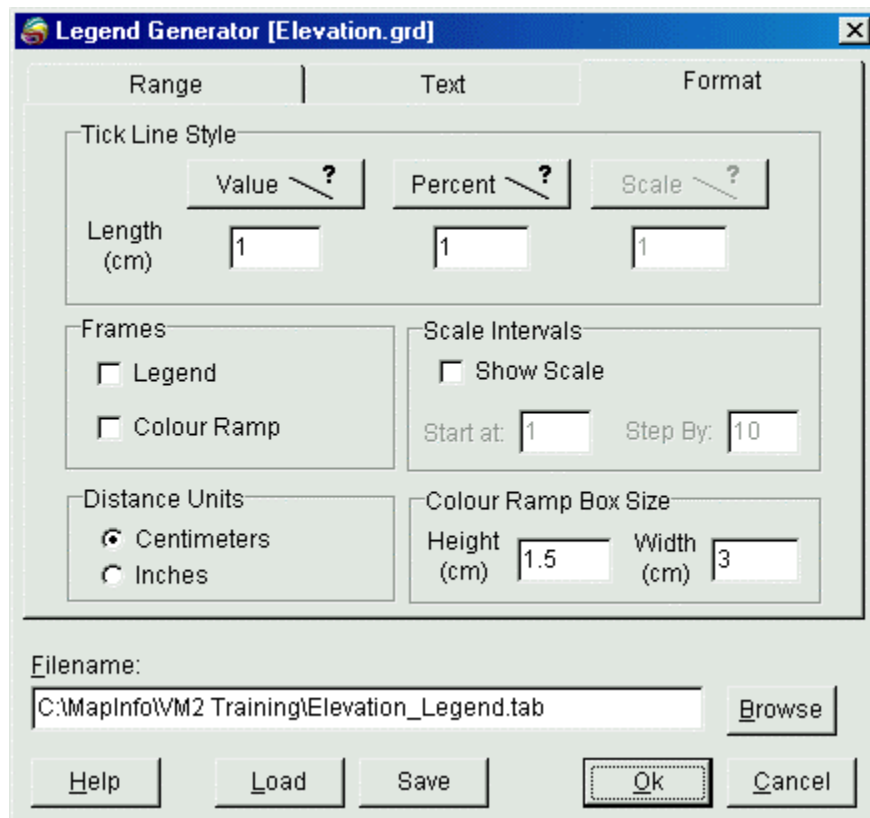
a) Use the buttons in the *Tick Line Style* section of the dialogue to modify the line style and colour of the *Value* tick line, *Percentile* tick line, or *Scale* tick line. The *Length* of each set of tick lines may also be set independently. Not available for classified grids.

b) In the *Frames* section, select the *Legend* check box to draw a box around the entire legend. The *Colour Ramp* check box draws a frame around the entire colour ramp for numeric grids and around each individual colour box for classified grids.

c) The *Distance Units* settings refer to the units of distance measurement applied to the non-earth coordinate system of the legend Map window. The user may select either *Centimetres* or *Inches* as the unit of measure. The dialogue box will update appropriately for settings where distance measurements are required such as tick length or colour box size.

d) The *Scale Intervals* section controls the placement of a set of tick marks inserted along the entire length of the scale bar at regular intervals. If the *Show Scale* box is checked, the *Start At* setting determines where the scale markings will begin measured from the start of the colour bar (bottom or left) while the *Step By* setting controls the interval spacing of the scale markings. The unit of measure is defined by the data value unit. Not available for classified grids.

e) The *Colour Ramp Box Size* determines the size of each colour box that makes up the colour legend bar. By default, the numeric grid colour ramp is made up of 64 individual coloured box elements that are set to resemble the current colour settings of the grid. By changing the *Height* or *Width* of the individual boxes, the size and proportion of the colour bar can be modified.

1 The user may also choose to save a legend configuration using the *Save* button or load a saved legend using the *Load* button. Legend profiles are saved as .VML files.

1. Once all the settings have been made to the colour legend, a file name must be chosen before selecting *OK* to continue.

- The on-screen grid file display is immediately updated once all the changes have been made and the *OK* button selected. If a legend option was chosen, the legend file will be displayed in a different Map window.