SCANSMITH
CLASS
User Guide

Version 5.0
January, 1998

© Copyright January, 1998, ANA Tech, Littleton, CO, USA

Foreword

This document covers the SCANSMITH CLASS software product. ANA Tech believes the information in this document is accurate as of its publication date. Software features are subject to change.

Document Conventions

The following typographical conventions are used throughout this manual:

Text to be entered via the keyboard appears in a monospaced font as follows:

```
enter this text
```

Emphasized text appears in italics:

this is emphasized text

Text that cautions the user about actions that may result in injury, equipment or software damage or malfunction, or may interfere with the proper operation of the scanner is preceded by the word **Warning**.

Text that presents useful information or valuable tips may be preceded by the word **Note**.

Publisher Information

Published by ANA Tech / an Intergraph Division:
ANA Tech / an Intergraph Division
10499 Bradford Road
Littleton, Colorado 80127
U.S.A.

Copyright January, 1998, ANA Tech an Intergraph Division, Littleton, CO U.S.A. All rights reserved. Printed in the United States of America. ANA Tech is a registered trademark of Intergraph Corporation. Eagle and SCANSMITH are trademarks of ANA Tech / an Intergraph Division. Windows® 95 and Windows® are registered trademarks of Microsoft® Corporation. Windows NT™ is a trademark of Microsoft® Corporation. Other trademarks of products and services listed in this document are trademarks of their respective companies.

Table of Contents

TABLE OF CONTENTS

1. Introduction

This section provides an overview of SCANSMITH CLASS.

Purpose of SCANSMITH CLASS

The SCANSMITH CLASS software is used to create color lookup tables used in scanning with the Eagle series color scanners. When scanning into a color classified format, the scanner interface software requires that the operator select a color lookup table. Although a few color lookup tables are provided with the scanner interface software, it is usually necessary to create a customized color lookup table (*LUT*) for each type of document being scanned to get the best results from the scanner.

What is Color Classification

Color classification can be thought of as a color sorting process in which pixels of many colors are sorted into fewer colors. For instance, a document may contain hundreds of shades of red. But all of these original colors of red are replaced by just one or two red colors such as “red” and “orange” in the color classified output. Or a color document can be classified into shades of gray, or black and white. See Figure 1-1. After color classification, images can be saved in palette based formats which require less disk space than full color images.

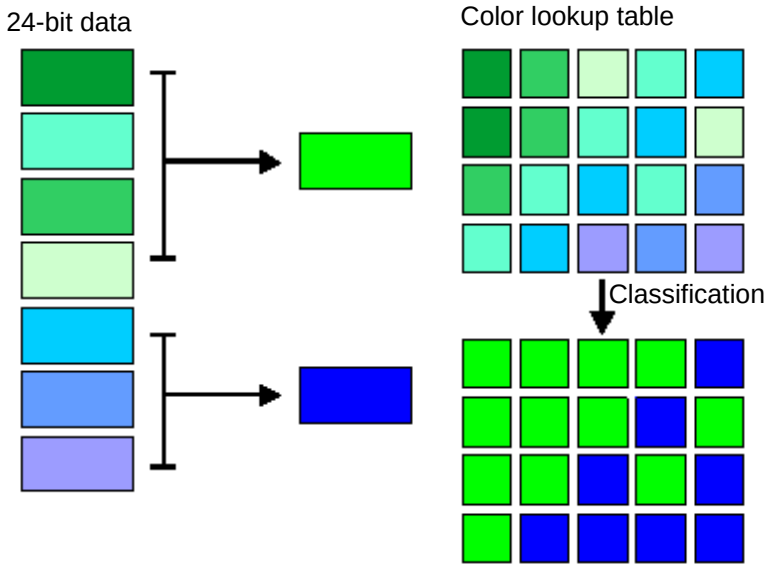


Figure 1-1. Color Classification

Scanning

Color scanning in color classified formats involves much work with color lookup tables. The quality of the results you get from color scanning is significantly influenced by the quality of the color lookup tables you use with the scanner.

When a classified file format is selected for output from an Eagle color scanner, the scanner interface software provides a selection gadget to choose the color lookup table. When the scan is started, this lookup table is downloaded from the host platform to the scanner, where it resides in memory on a color lookup table board. As raw, 24 bit RGB pixel data is generated by the scanning engine, this data is passed through the color lookup table board. This board determines the output color index for each pixel.

The scanner user documentation provides more details about how color lookup tables are used in the scanner.

The color lookup table defines the boundaries between different colors. For instance, some shades of 24-bit blue data may be sorted as color classified “blue” while other shades of 24-bit blue are sorted as color classified “green.” The destination color can be any color which the color lookup table assigns.

This color sorting is helpful when trying to make all pixels in a document that represent similar features share the same color. For instance, the unclassified, raw 24-bit data of a scanned topographic map may show many shades of green, all representing pixels in forest areas. A color lookup table can be set up that makes all shades of green the same, giving the document a much more homogeneous appearance and facilitating computer manipulation of this data. For example, after color classification, a simple histogram applied to the color data would show the number of forest, road, and lake pixels in a map. This information could be used to calculate the land area of forests and roads, for instance.

Using Color Classification

Why use SCANSMITH CLASS to create lookup tables for color classification? First, of course, color lookup tables are required by the Eagle color scanner to scan in color classified formats. But there are many uses for color classification beyond simply operating the scanner. Here are some of the ways color classification can be used.

Data Compression

Files saved in color classified data formats typically require much less storage space than 24-bit data files. This is because in color classified formats, each pixel represents a 4-bit or 8-bit color index rather than 24 bits of RGB data. Also, color classified pixel data is easily compressed, because this data usually has enough consecutive pixels with similar index values to make data compression effective.

Feature Extraction

The color classifications you create do not need to be similar to the original colors.

The *Edit–Histogram–Edit* menu selection lets you change specific output colors in the color lookup table. You can even make a color lookup table that makes all shades of green appear red, or everything except yellow appear black, and so on. These techniques of substituting colors can be very useful to make certain features stand out and become much more obvious to the naked eye.

Document Cleanup

Editing 24-bit raster data can be tedious, especially if there is no way to separate different color regions for editing changes. Color classification facilitates editing work, by making it easier to use *flood fill* features common in many raster editors. Also, raster editors that can automatically separate colors in color classified files, such as Intergraph's I/RAS B, take advantage of color classified data.

Another aspect of document cleanup is color variation. Minor color differences in a scanned color document can result from subtle variations in document texture or reflectivity. These color variations may detract from the appearance of the document. Color classification makes document colors more uniform, resulting in a cleaner appearance.

Printing

Color printing of maps typically uses spot colors — regions of a single color that can be printed with one ink color. Color classification produces electronic documents that can be printed using spot color printing techniques, because of the clear demarcation of regions of different color.

SCANSMITH CLASS

2. How SCANSMITH CLASS Works

This section provides a description of the operation of SCANSMITH CLASS software.

Overview

The goal of color classification is to create a color lookup table that can be used with the Eagle scanner interface software to scan particular documents effectively. SCANSMITH CLASS provides an interactive environment to create lookup tables and display the output of a color lookup table when applied to a displayed data sample.

SCANSMITH CLASS applies mathematical algorithms to samples of unclassified 24-bit RGB data generated by the scanner to create color lookup tables. The file to be used as a sample is specified by the *File–Open* selection. The file selected should be similar to the type of documents you want to scan. The sample should be unclassified, 24-bit TIFF or Intergraph RGB color data. If you expect to be scanning topographic maps, use a sample of topographic map data with SCANSMITH CLASS to make the lookup table; if you will be scanning engineering drawings with color markups use a similar document when working with SCANSMITH CLASS.

When the file is selected, it is displayed in a window. Zoom commands are available through an icon palette or the *Image* menu.

Once you have selected and displayed an input RGB file, you can further select patches within the file to use in calculating the color lookup table. This is optional. If no patches are selected, the entire RGB image file is used in the calculation. Patches are selected through the Image-Select Rect and Edit–Patches menu selections. When patches are used, overlapping patches are treated cumulatively — that is, some pixels can be counted more than once.

Whether an entire file or one or more patches are used, the RGB data sample is treated as a single database. RGB data consists of pixels with various RGB values, and the color classification software uses the pixel counts for different RGB colors in its automatic calculations that create the color lookup table. SCANSMITH CLASS uses the cumulative totals of pixels and color in the sample file or patches and does not interpret whatever shapes or patterns these pixels represent in the document.

Color Lookup Tables

A color lookup table, referred to here as a *LUT*, is a collection of color index values. The location of each color index value within the LUT determines which RGB color is mapped to the index. *Every color the scanner is capable of generating is mapped to some color index in the LUT.*

In addition to the index values, the LUT contains a palette which is a list of the RGB values to be used for each color index. Palettes can contain up to 256 RGB colors.

To map scanner colors to color index values, the scanner loads the lookup table file into its onboard memory. During the scan, the six high-order bits from the red, green, and blue components of each pixel are used to form an 18-bit number. This 18-bit number indicates a position in the lookup table. This position is referenced and the output color index is thus determined. 18 bits of color data (R x G x B: 2^6 x 2^6 x 2^6, or 64 x 64 x 64) results in 262,144, or 256K possible colors. The LUT therefore has 256K entries and each entry is a color index between 0–255.

When the *File–New LUT* selection is invoked, the *Create New LUT* dialog appears. After making appropriate selections in this dialog, the Create button initiates automatic calculation of the 256K LUT table. SCANSMITH CLASS offers three methods of automatic color lookup table generation. The histogram method is typically used for photos, the convex hull method is typically used for maps, and the color ramp method is used to make a generic lookup table. A special, fourth method generates a lookup table using color map data. (See below.)

Maps

Sometimes it is useful to be able specify exactly which colors should be used in the generation of a lookup table. The histogram, convex hull, and color ramp LUT generation methods do not offer direct control of which colors are generated. The Map feature is used instead of those methods when you know exactly what colors are needed. The map file is created with a text editor, or can be generated interactively by editing a lookup table and then saving the current map values with *File–Save As*. A map file is merely the palette portion of a lookup table. It specifies the output colors, but not the correlation between the 24-bit RGB values and the output colors.

Map files are loaded when you select the *Use Map* option in the *Create New LUT* dialog. The *Use Map* option generates a LUT using the map colors by assigning a color index to each color and then distributing the indexes in the LUT based on distances within RGB space. RGB colors are mapped to the closest color index.

Starting SCANSMITH CLASS

To start SCANSMITH CLASS, run Windows. Double-click on the SCANSMITH CLASS icon. The main SCANSMITH CLASS dialog is displayed. See Figure 2-1.

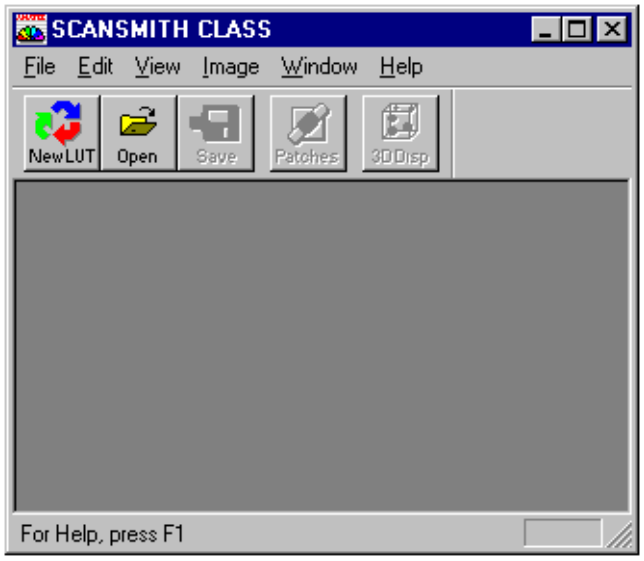


Figure 2-1. SCANSMITH CLASS Dialog

SCANSMITH CLASS actions are selected from one of the menus, the toolbar, or the icon palette.

Menus and Dialogs

The purpose of menus and dialogs is summarized below. More in depth information is contained in the reference section, of this document.

File menu

Pulldown	Used for...
New LUT	Generate a new LUT.
New Map	Open a blank map file.
Open	Open a LUT, map, or image file.
Save	Save the current LUT or map.
Save As	Save the current LUT or map in the specified filename.
Preferences	Access the File Statistics and Measurements options.
Exit	Exit SCANSMITH CLASS

Edit menu

Pulldown	Used for...
Undo	Undo the most recent LUT operation. LUT operations can be undone successively until the maximum number of undo's are executed (see File–Preferences).
Cut, Copy, and Paste	These are available only for text editing of map files.
Histogram	Display a sub-menu of LUT editing tools.
Patches	Brings up the Edit Patches dialog, used to specify patches for statistics generation. (Only available when File–Preferences–General File Statistics Options is set to *Use Patches*.) Same as selecting Patches on toolbar.

View menu

Pulldown	Used for...
RGB histogram	Display distribution of colors in the data sample
3D Display	Display LUT colors in a rotatable cube.
True Color RGB Display	Display the original RGB image (without using a LUT).

Image menu (these are also in the icon palette)

Pulldown	Used for...
Zoom In	Zoom in on image.
Zoom Out	Zoom out on image.
Zoom Rect	Zoom in on selected rectangle.
Fit	Fit image to window size.
1:1	Display image at 1:1, centered around image center.
RGB	In status bar, display RGB value of selected image color.

Select Rect	Select a patch on the image.
Pixel Select	Highlights all image pixels that have the same output color as the selected pixel.
Info	Displays information about the image file.

Window menu

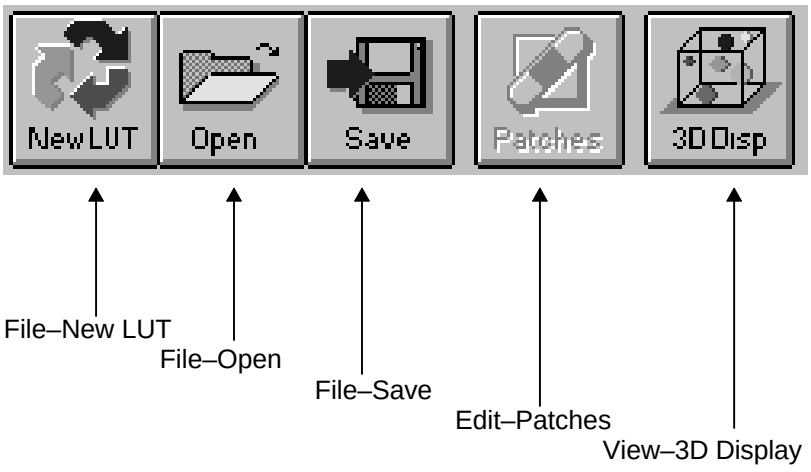
Pulldown	**Used for...**
New Window	Create a new image or LUT window.
Cascade	Cascade windows.
Tile	Tile windows.
Arrange Icons	Order window icons.
Toolbar	Show/hide toolbar.
Status Bar	Show/hide status bar.

Help menu

Pulldown	**Used for...**
Index	Show Help index.
Using Help	Help on help.
About SCANSMITH CLASS	Display version data.

Toolbar

The toolbar can be displayed or hidden with the toolbar selection.



Typical Workflow Summary

Here is how SCANSMITH CLASS is used for typical scanning tasks:

1. Load a sample document in the scanner. Scan a sample file in 24-bit RGB mode with SCANSMITH SCAN-C.
2. Run SCANSMITH CLASS.
3. Select *File–Open*. Select the sample file for input. The image is displayed in a window. (If you want to use patches, you can select patches at this time.)
4. Select *File–New LUT*. Select a method and generate a LUT. The image is then redisplayed with the new LUT.
6. Select *Edit–Histogram*. Use the histogram editing features as needed to modify the LUT.

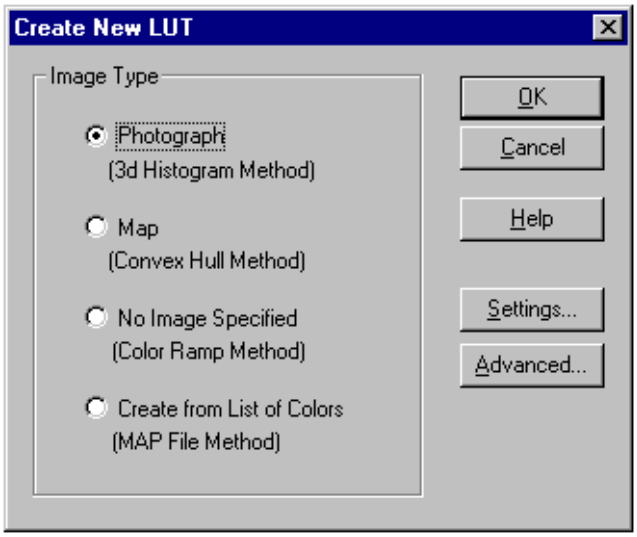
   You can merge colors, add new colors, and delete colors as needed. Also, the *Edit–Histogram–Edit* feature can be used to adjust the RGB output values of individual colors. Use *Edit–Undo* to reverse LUT editing steps, if necessary.
7. Use *File–Save As* to save the LUT. Run SCANSMITH SCAN-C and select the LUT you have created. You are now ready to scan in color classified mode.

3. File Menu

This section describes File menu selections.

New LUT

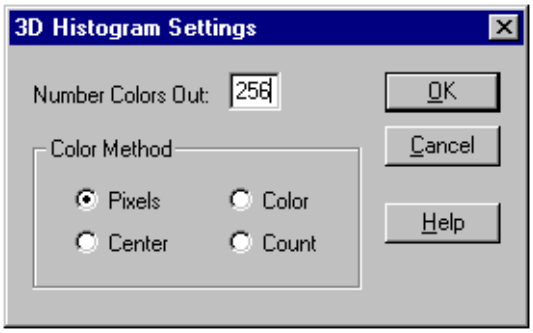
The *File–New LUT* selection brings up the Create New LUT dialog.



You can choose from four LUT generation methods, photograph, map, no image, or create from list. These are described on the following pages.

Photograph (3d Histogram)

This generates a histogram based LUT. The histogram method distributes color indices for the LUT based on analysis of number of pixels in the data sample(s). SCANSMITH CLASS calculates color indices by dividing up RGB space into a set of three-dimensional volumes that enclose a nearly equal number of pixels. There is one volume for every output color. The color associated with each volume is determined by the Pixels, Color, Center, or Count method. Parameters are set in the 3D Histogram Settings dialog.



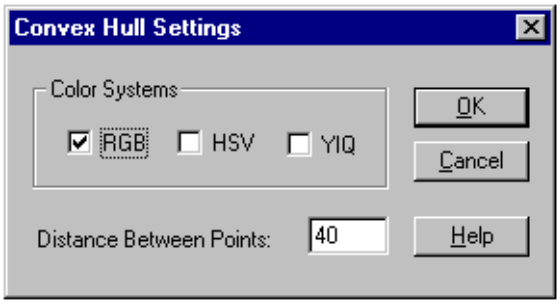
Number Colors Out	Specifies the number of output colors (maximum = 256).
Pixels	This method finds the average color for each volume. This average is weighted by the number of sample pixels for each color in the volume.
Color	This method finds the average color for each volume. This average is not weighted by the number of sample pixel for each color in the volume.
Center	This method finds the color indicated by the geometric center of each volume.
Count	The color of the RGB value with the greatest number of pixels is used as the index color for the volume. Note that this method always generates a color that actually exists among the sample data, whereas the other methods generate average colors.

The Pixels, Color, and Center methods generate an average color for each index. Depending on the size of a volume and the color distribution of RGB data within the volume, the calculated index color for the volume might not exist among the data, sometimes resulting in an unnatural appearance in the displayed image. This can be avoided by adding volumes (selecting more output colors) or by using the Count method, which always assigns an index color that is used by one or more RGB pixels in the data.

The 3D histogram method tends to work well with documents exhibiting subtle shading such as photographs.

Map (Convex Hull) This generates a LUT based on a convex hull algorithm. The convex hull method uses a mathematical projection technique to calculate an imaginary polyhedral shape that encloses all pixels from the data sample(s) in the color space.

The extrema of this shape, that is, points in color space along its outer boundary, are calculated and used as the colors of classification. Since the number of colors depends on the shape, there is no direct control of the number of output colors.



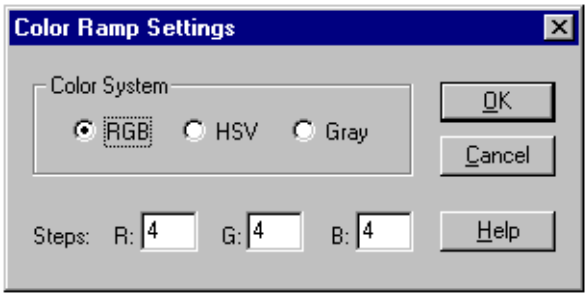
Color System — The convex hull can be calculated in one or more color spaces. Selecting multiple color spaces causes extrema from different color spaces to be added to the LUT.

Min distance — The minimum distance between points indirectly controls the number of output colors. A smaller minimum distance between points allows more complex polyhedral shapes to enclose the color data points and thus generates more extrema — and more colors.

The convex hull method tends to work well with documents that benefit from clearly defined color classifications, such as topographic maps.

No Image Specified (Color Ramp)

This generates a LUT using a color ramp. Color ramps are formed by placing output colors at regular intervals in the color space. For instance, a 6x6x6 ramp in RGB space has six levels of red, six levels of green, and six levels of blue for 6x6x6 = 216 possible colors. The intervals are applied to the dimensions of whatever color system is selected, such as RGB or HSV. It is not necessary to use an equal number of levels for all entries, however the total number of permutations must be less than 256. For example, 9x5x5 (225) is fine, but 9x5x6 (270) is out of bounds.



Color System	The color ramp can be calculated in one color space.
Steps	This setting determines how many steps each axis of the color space can be divided into..

Hint: To better visualize color ramps, create a color ramp and display it with *View–3D color display*.

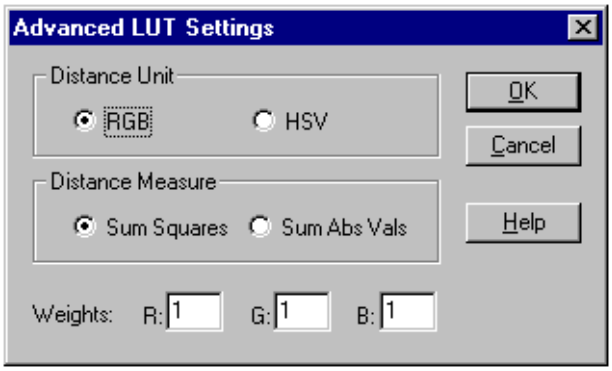
Note When the Gray color system is selected, you only need to enter one number for the number of steps, because grey color space has only one dimension.

Create from list (MAP file)

This generates a LUT using the output colors specified in a Map file, which is a text file that lists only LUT output colors (not the mappings of RGB values to output colors). There are no settings required for this method of LUT generation.

Advanced LUT Settings

The distance settings offer choices that control how distances in color space are calculated. When a pixel is converted from a 24-bit pixel to a color classified pixel, the location of the pixel within the color space and the proximity to color classifications in the color space determine what color classification to use for the pixel. In general, pixels are classified to the nearest color classification. The method of measuring distance and weighting factors that may be modified affect which color classifications are "nearest."



Distance unit — Select RGB or HSV.

Distance measure — Select Sum Squares or Sum AbsVals. Sum Squares provides a standard distance measurement in color space, $D^2 = X^2 + Y^2 + Z^2$, while Sum AbsVals uses the approximation $D = |X| + |Y| + |Z|$. Sum AbsVals may be faster in certain cases without significantly affecting the accuracy of the generated LUT.

Weights — Select three values to use with the three axis of the color system. In RGB space, the weights are applied to the red, green, and blue axis. If the weight for any axis is 0, then that axis has no effect on the mapping of 24-bit data pixels to color classifications. 1 is normal weight. Higher weights have greater effect. For example, in RGB space weights of **2 1 1** will result in color classified pixels that are more responsive to the red component of the pixel. Weights must be integers.

New Map

The *File–New Map* selection brings up a text editor window for editing map files. The form of the Map file is shown below.

```
MAP
0     0     0     0
1     0     0     85
2     0     0     170
3     0     0     255
4     0     85    0
5     0     85    85
6     0     85    170
```

The first line must contain the word MAP. On subsequent lines, the first value is the color index, and subsequent values are the red, green, and blue components for the output color that corresponds to the index. There can be up to 256 output colors (index 0-255).

The Edit Cut, Copy, and Paste commands are available for text editing of map files. Also note that you can make a LUT and save the LUT as a text map file using File–Save As. When you save a LUT as a map file, the output colors of the LUT are saved in the map file, though the LUT mappings are lost (See *Maps* in Section 2.)

Open

The *File–Open* selection brings up a file selection dialog that lets you open LUT, image, or map files.

If an image file is opened before a LUT is generated, the color ramp LUT provided with SCANSMITH CLASS is used to display the image. This default LUT is installed in the SCANSMITH CLASS installation directory. The default LUT can be changed with File–Preferences.

Image files can be in 24-bit TIF or Intergraph RGB formats. Once loaded, the image file is displayed in a window.

Opening a LUT file removes the current LUT from memory and loads a new one from disk.

Save

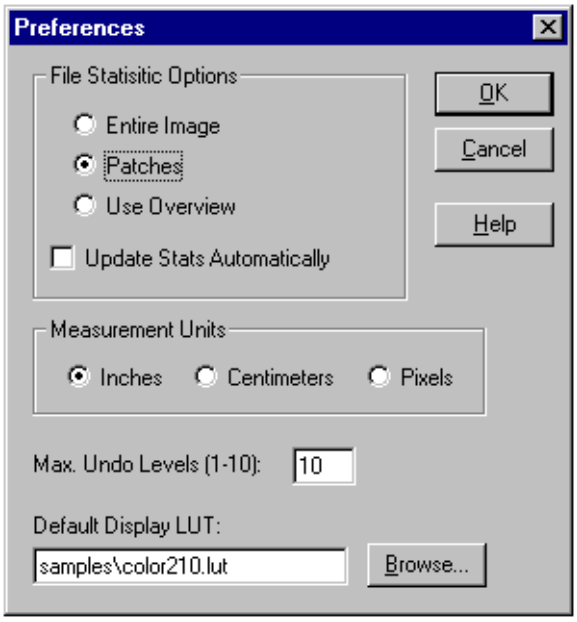
The *File–Save* selection saves the current LUT, or Map file, or image file, depending on which window is active when you select Save. If the LUT Window is active, the LUT is saved. If the Map window is active, the map is saved. If the image window is active, the color classified image is saved using the current LUT. If the LUT is new and has not yet been assigned a filename, the Save As dialog appears.

Save As

The *File–Save As* selection brings up a save dialog. Specify a name and file extension for the LUT or Map file.

Preferences

The Preferences selection is used to set certain SCANSMITH CLASS settings that are typically set infrequently.



The File Statistic options in the Preferences menu are used to select the implementation of patches. Statistics for LUT generation can be based on data from the entire image, on image patches, or on an overview tile.

Entire Image	The entire image is used to generate the statistical database.
Patches	The area selection tool is used (in icon palette or Image–Select Rect) in conjunction with Edit–Patches to specify patches. Patches are added together to form the statistical database.
Use Overview	An overview tile (used internally only by SCANSMITH CLASS) is generated by automatic decimation of the image to 500x500 pixels.
Update Stats Automatically	Whenever a new patch is selected, the database is updated. When disabled, the database is updated automatically only before the LUT is generated.
Measurement Units	Select Inches, Centimeters, or Pixels.
Max. Undo Levels	This sets the maximum number of undo operations that are allowed. Each undo operation temporarily uses about 256 Kbytes of disk space. The limit is 10.
Default Display LUT	This configures the default LUT which is used to display an image when you open an image file before creating a LUT.

Exit

The File–Exit command exits SCANSMITH CLASS. A warning message appears requesting confirmation that you want to exit.

SCANSMITH CLASS

4. Edit Menu

This section describes Edit menu selections.

Undo

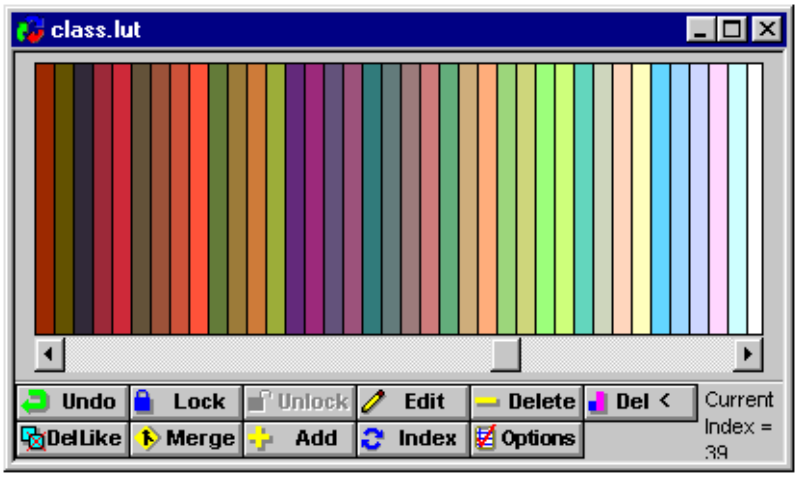
Whenever changes are made to the LUT, SCANSMITH CLASS automatically saves the current LUT in a temporary file. If the Undo option is selected, then SCANSMITH CLASS reverts to the previous LUT. You can use the Undo feature multiple times until you restore the desired LUT. When SCANSMITH CLASS ends execution, the temporary disk files are deleted. Each temporary Undo file requires 256 Kbytes of storage space. The maximum number of Undo operations that can be performed is specified in File–Preferences. The upper limit of this setting is 10 Undo's.

Cut, Copy, and Paste

These options are available only when editing a Map text file. These are standard Windows text edit operations.

Histogram

The Histogram selection displays the LUT histogram.



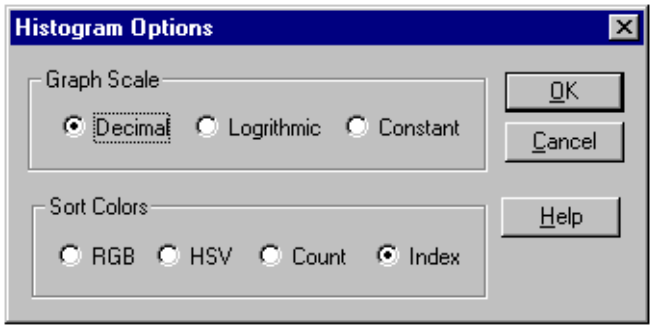
This histogram displays the distribution of colors in the LUT. Within the Histogram dialog, you can edit the LUT colors and cause image RGB pixel values to be remapped.

Here is a summary of Histogram dialog options:

Undo	Revert to previous LUT. Multiple undo steps are possible, until the maximum number of undo's have been executed (see File–Preferences).
Lock	Lock an output LUT color so that it cannot be deleted or merged into another output color. This is useful if you know which output colors you want. Lock these colors and edit the LUT to merge all other colors into one of the locked colors.
Unlock	Unlock a color. See above.
Edit	Change the RGB value of an output color. With this feature, particular output colors can be specified. This may be useful in feature extraction. Note that LUT mappings are unaffected by this command.
Delete	Delete an output LUT color. All RGB values in the statistical database previously mapped to this output color are remapped to the nearest remaining output colors.
Del Less	"Delete Less Than" is used to delete output colors that have less than the specified number of database RGB values mapped to them. All RGB values in the statistical database previously mapped to these output colors are remapped to the nearest remaining output colors.
Del Like	"Delete Like" is used to delete output colors that are close to other output colors in RGB color space. All RGB values in the statistical database previously mapped to these output colors are remapped to the nearest remaining output colors.

Merge	Merge two or more output colors together. The first color selected for this operation specifies the color to merge *to*. The remaining colors specify the colors that will be deleted. All RGB values in the statistical database previously mapped to these deleted output colors are remapped to the specified Merge color. You can select colors one at a time or draw a rectangle to select a group of colors. When selecting a group of colors, the first corner of the rectangle is the color to merge to. Press OK when ready to execute the Merge.
Add	Add colors between two existing colors. Select two colors. At the prompt, specify the number of colors to add. Using color interpolation, new output colors are added between the selected colors. All RGB values previously mapped to the two colors are remapped to a range of new colors bounded on either side by the two original colors.
Color Enhancement	Brings up a Color Enhancement dialog with gamma and color saturation controls that are applied to the output colors.
Re-Index	
Re Index Now	
Options	Brings up the Histogram Options dialog, below.

The histogram appearance is controlled with the Options selection.



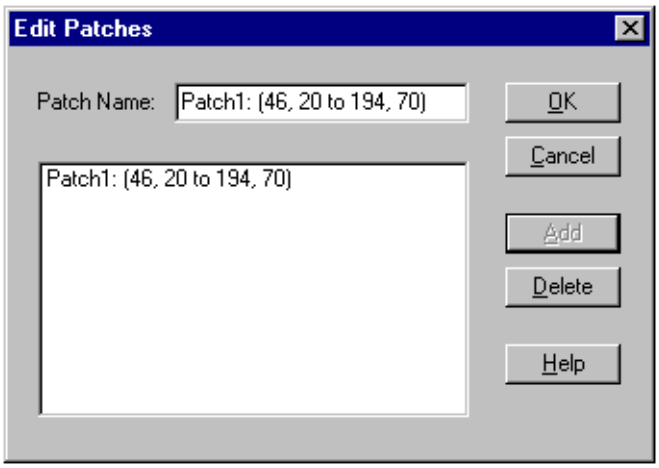
Graph Scale	*Determines how the vertical heights of colors are displayed*
Decimal	Heights are displayed in a proportional decimal scale.
Logarithmic	Heights are displayed logarithmically, so that a color bar twice as high as another means there are ten times as many pixels with that output color.
Constant	All color bars have the same height.
Sort Colors	*Determines the order of colors.*
RGB	Sort in ascending RGB order.
HSV	Sort in ascending HSV order.
Count	Sort in descending order of the number of output pixels.
Index	Sort in ascending order of color indices.

Patches

The *Edit–Patches* selection provides options for selecting image patches. Patches are used to supply statistics used in the calculation of the LUT. Using patches instead of the entire image as a statistical source reduces LUT calculation time and can be used to "steer" the LUT, by selecting patches around certain colors that are important. Colors that predominate in the patches will have more closely matched LUT output values.

You can make multiple patches. Note that when patches overlap, the pixel in the overlap area are counted once for each patch. Be careful about overlapping patches, or you may inadvertently weight the data sample used for lookup table generation with pixels of certain colors found in the patch overlaps.

Before patches can be created, Patches mode must be selected in the Preferences dialog called by File–Preferences. When no patches are active, the entire input RGB file or an overview tile is used to make statistics for lookup table generation, according to the Preferences selection.



To add a patch to the statistical database, use the area selection tool (Image-Select Rect) to draw a rectangle in the image. Then select Edit–Patches or press Patches on the toolbar. Enter the desired name and select Add.

To delete a patch, bring up the Edit patches dialog. Select the patch name and press Delete.

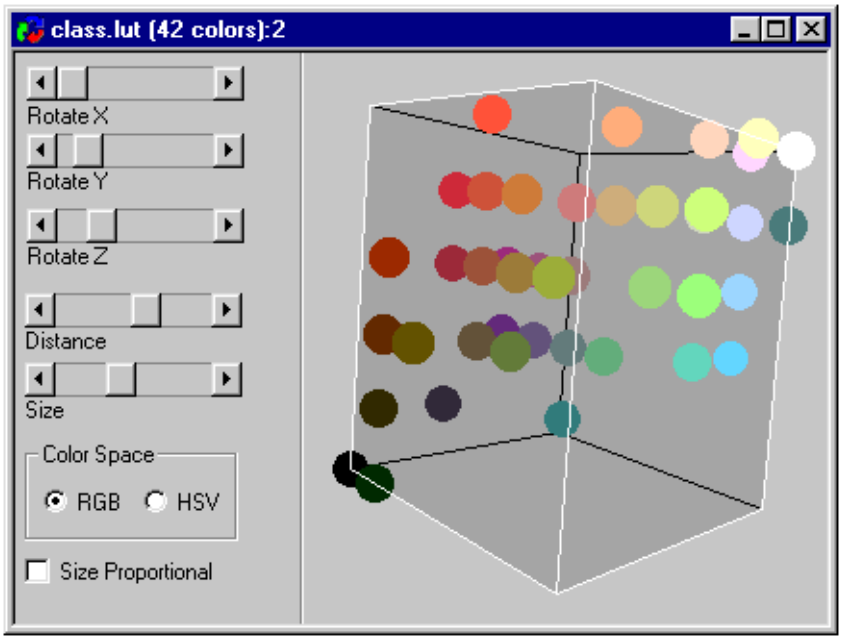
If Update Stats Automatically is enabled in the Preferences dialog, then the statistical database is updated when you press OK to close the Edit Patches dialog. Otherwise, the database is not updated until a new LUT is generated.

5. View Menu

This section describes View menu selections.

3D Color Display

The *View–3D color display* command brings up the *3D color display* dialog. This dialog is a three dimensional representation of the LUT.

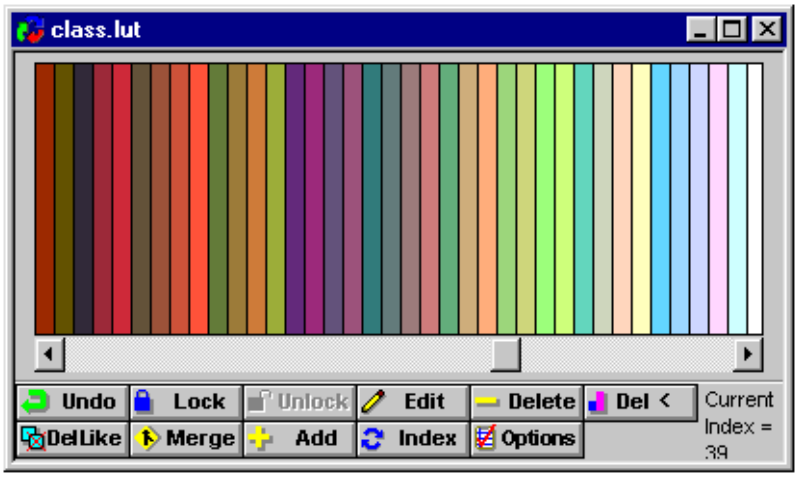


You can use the controls available to reorient the display as needed to better visualize the colors. The Distance control changes the apparent perspective of the color space. This makes it easier to visualize where in three dimensional color space a particular color is. The Size control causes color regions to appear larger when a larger number of pixel instances of the color appear in the data sample and smaller when a smaller number of pixel instances appear in the data sample.

Rotate X, Y, Z	Rotate the display in three dimensions 0º–360º.
Distance	Increase or decrease the effect of simulated three-dimensional perspective on the color space cube. A setting of 0 indicates no perspective.
Size	Increase or decrease the size of the circles that represent the LUT index colors.

LUT Histogram

Brings up the standard histogram view of the LUT.



True Color RGB Display

This command brings up a window and displays the current image file in true color mode. The original colors in the image file are displayed, not the output LUT colors. If the Windows display system is not capable of displaying 24-bit color, then Windows approximates the display.

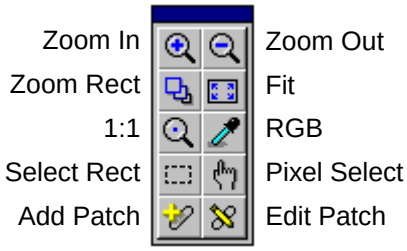
Displaying the true color image may be useful as a visual reference, so you can compare the original image to the image when it is displayed with a LUT.

6. Image Menu

This section describes Image menu selections.

Command	Description
Zoom In	Zoom in
Zoom Out	Zoom out
Zoom Rect	Zoom on selected area. After choosing this command, use the mouse to draw the zoom rectangle.
Fit	Fits the image data to the image window.
1:1	Displays the image with one screen pixel for each image pixel.
RGB	Select any pixel to display its RGB value. The value of the 24-bit RGB data is displayed.
Select Rect	Use this to select a rectangle for other commands that require an image rectangle to be selected.
Pixel Select	Use this to select a pixel for other commands that require a pixel to be selected (e.g., merge, delete colors, etc.).
Add Patch	Add the currently selected rectangle to the list of patches.
Info	Displays details about the image file.

Most of the Image menu selections can also be launched from the icon palette, which is visible whenever an image window is active.



SCANSMITH CLASS

7. Window Menu

This section describes Window menu selections.

Command	Description
New Window	Create a new image or histogram window. If the image window is active, an image window is created. If the histogram window is active, a histogram (LUT) window is created.
Cascade	Cascade windows.
Tile Horizontally / Vertically	Tile windows horizontally or vertically.
Arrange Icons	Arrange minimized window icons.
Toolbar	Show/hide toolbar.
Status Bar	Show/hide status bar.

SCANSMITH CLASS

8. Help Menu

This section describes Help menu selections.

Command	Description
Index	Access the Help system.
Using Help	Display Windows help on how to use help.
Manual - User Guide	Launches Adobe Acrobat Reader and displays the SCANSMITH CLASS User Guide.
Manual - Training Guide	Launches Adobe Acrobat Reader and displays the SCANSMITH CLASS Training Guide.
About SCANSMITH CLASS	Display version information.

SCANSMITH CLASS

Glossary

This section provides definitions of SCANSMITH CLASS terms and concepts related to color classification.

Color Space Color space is a coordinate system used to display or analyze color. SCANSMITH CLASS uses a three dimensional cube system to display and analyze color distribution in RGB and HSV color spaces.

Color Ramp A set of colors in color space generated by dividing up RGB color space at regular intervals along the red, green, and blue axis.

Convex Hull A polyhedral shape that encloses data points in a color space.

Extrema The outermost points around a convex hull.

Histogram A histogram is a graphical representation of statistical data. SCANSMITH CLASS histograms include the Edit–Histogram and the View–3D Display histograms.

Index An index is a number between 0–255. Color classification replaces 24-bit RGB pixel data with an 8-bit (0–255) index number.

LUT Color lookup table. A color lookup table is a file that consists of RGB palette data and a set of color index values between 0–255. The palette identifies up to 256 colors. The location of the index values implies the 18-bit RGB values that are mapped to each index. Lookup tables exist in memory during the design stage in SCANSMITH CLASS, then are saved to disk with *File–Save/Save As*. During scanning, the LUT file is selected with the scanner interface software. A LUT must be selected whenever scanning in color classified formats. The scanner interface automatically downloads the LUT data from host to scanner in order to scan.

MAP MAP file. A MAP file is a text file that contains a list of RGB colors. MAP files can contain up to 256 output colors. RGB colors are specified by three numbers between 0–255. The MAP file does not contain the mappings of RGB values to output colors, but you can use the *Create From List* option in the File–Create New LUT option to create a LUT from a MAP file.

Palette A palette associates a set of indexes to specific RGB colors to be used for display or representation of data. Palettes exist within LUTs and instruct SCANSMITH CLASS what colors to use when displaying pixels of various index values. Color classified data is sometimes referred to as “palette data.” The term is also associated with computer monitors and the number of colors they are capable of displaying.

Patch A patch is a rectangle selected from the displayed RGB image. The rectangle specifies image pixels to be used by SCANSMITH CLASS in the calculation of LUTs and the display of SCANSMITH CLASS histograms. More than one patch can be selected (overlaps count). If no patches are selected, the entire image is used for SCANSMITH CLASS LUT calculations and histogram display.

RGB file A color data file containing 24-bit color data. This file supplies sample data for SCANSMITH CLASS algorithms.

I. Index

1

3

A

C

D

E

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W

Z

SCANSMITH CLASS