
Datacolor

ENVISION^{PLUS}

ENVISION^{PRO}

User Guide



Because Color Matters

Datacolor ENVISION^{PLUS}/ENVISION^{PRO} User Guide

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About Datacolor ENVISION

Introduction

The Datacolor ENVISION system is a powerful tool used to design and communicate color electronically. Physical objects are scanned using one of several different devices, and the color data is transmitted to the ENVISION software program. This program converts the color data into digital information and, through the use of device calibration options, provides a precise, accurate and repeatable color representation of the object on a monitor or printer. In addition to object color, the image can include information regarding the appearance qualities of the object, such as texture, gloss, etc. For example, a color used in a textile design or manufacturing application can be displayed on the correct substrate for the application.

Program Options

Three levels of the Datacolor ENVISION product are offered:

- Datacolor ENVISION.
- Datacolor ENVISION^{PLUS}
- Datacolor ENVISION^{PRO}

A Datacolor ENVISION system includes a computer, monitor, and device used as calibration analyzer. The data generated by Datacolor ENVISION can be shared with other users of ENVISION, ENVISION^{PLUS}, ENVISION^{PRO}, and with other Datacolor programs.

Datacolor ENVISION^{PLUS} and ENVISION^{PRO} offer advanced design and communication options not provided with Datacolor ENVISION.

Additional features included with Datacolor ENVISION^{PLUS} include:

- Options to create new colors on the screen, and to modify existing colors.

- Datacolor ENVISION^{PLUS} users can connect a spectrophotometer as an input device for color data.
- Datacolor PrintCal (printer calibration software) is available as an option with ENVISION^{PLUS}.

Datacolor ENVISION^{PRO} includes all of the options included in ENVISION^{PLUS}, and also offers the ability to create image separations. The separations are used to apply color to common objects in a scene, making this a powerful tool for designers of all types of colored products. In addition, Datacolor PrintCal is a standard option with Datacolor ENVISION^{PRO}.

NOTE

This guide describes the program features and operation for Datacolor ENVISION^{PLUS}/ENVISION^{PRO}. Throughout this manual, when a reference is made to Datacolor ENVISION, it is referring to those features available to users of Envision^{PLUS} and Envision^{PRO}. See also *Datacolor ENVISION User's Guide* for a complete explanation of the program features offered with Datacolor ENVISION.

System Requirements

Component	Minimum*	Recommended
Processor	Pentium III 500 MHz	Pentium IV 1.9 GHz
Memory	128 MB	1 GB
Hard Drive Capacity	1 GB Free	40 GB
Color Display Monitor	17" CRT/LCD	21" CRT/LCD
Video Resolution	1024 x 768 True Color	1280 X 1024 True Color
Video Memory	64 MB	128 MB
CD/DVD Drive	CD Reader	CD Writer
Diskette Drive	--	1.44 MB
Available Ports**	2 RS-232 2 USB	2 RS-232 6 USB 1 Parallel
Operating System	Windows XP Pro	--

* The minimum requirements may limit performance and the operation of some features

** The number of ports needed depends on the number of peripheral devices on the system.

When selecting hardware and operating system features to support Datacolor ENVISION, the following requirements may need to be considered:

- Datacolor ENVISION is supplied on a standard 650MB capacity compact disk (CD).
- Datacolor spectrophotometers can be connected to either an RS-232 port or a universal serial bus (USB) port.
- Instrument calibration data may be distributed on 1.44MB diskettes. The presence of this diskette drive will provide maximum operational flexibility.
- Accurate on-screen color display requires a true-color video card.
- For non-networked systems, a CD or DVD writer is recommended for use as a system backup.
- Faster processors, larger hard drives, and greater memory capacity will significantly enhance performance.
- Access to an internet connection is required to share data with other locations

NOTE

To install ENVISION on a terminal server configuration, contact your IT manager for help. A separate server license is required.

Tutorials

Included in this manual are brief tutorials. These should be used to perform the sample exercises to run the software functions. The tutorials include sample data entries to allow the user to complete the option and see the results. The values provided are not standard requirements for the software option.

NOTES

Getting Started

Location of Datacolor ENVISION Workstation

The Datacolor ENVISION system relies on the calibration of the computer monitor to provide accurate color representation simulating a variety of different illuminant and observer conditions. Ambient light from natural and/or artificial sources will interfere with your ability to properly calibrate and view color samples on the monitor. For this reason, the Datacolor ENVISION system must be placed in an environment in which ambient light can be minimized or eliminated. The workstation should be located away from windows, in a room that can be fully darkened during system use.

It is important to locate the Datacolor ENVISION system away from sources of electromagnetic fields. Strong electromagnetic fields (EMF) from sources including power mains, HVAC equipment, electric motors, transformers, etc. can adversely affect the monitor color representation and screen orientation. Typically, if such fields are present, the monitor will display the following symptoms:

- A visible color shift in the background color from one side of the screen to the other
- Screen appears purple or blue in one corner or one side
- Screen cannot be properly centered, i.e., orientation of the visible area can't be made square, sides not parallel, etc.
- If monitor is turned side to side, the screen area visibly changes its position or shape
- Screen colors intermittently fade or shift
- Screen displays inordinate *flicker*

If the system exhibits any of these problems, consult your facility manager to determine the source(s) of the EMF and either relocate the workstation or, if possible, the EMF source.

Software Installation

The following materials are provided with the shipment:

- Datacolor ENVISION^{PLUS}/ENVISION^{PRO} installation CD
- Datacolor ENVISION^{PLUS/PRO} User Guide
- CD containing demonstration environments and images

Program Installation

To install the software, do the following:

1. Insert the Datacolor ENVISION software CD into the CD-ROM drive on your computer. The CD will automatically start the ENVISION^{PLUS} installation, and display the installation window:



2. Click on **Datacolor ENVISION Install** and follow the prompts.

Software License Registration

A licensing screen is displayed when you launch the program:



datacolor Client Hardware/Software Security

You are currently running a demonstration of this product.

datacolor

You have 14 days left in your demonstration period.

Please validate your software by emailing the requested information from the enclosed form to SoftwareLicense@Datacolor.com or by phoning your local sales office or toll free in the U.S. and Canada by phoning 1-800-982-6496.

Serial Number

Computer Validation Number

Unlock Response Number

It may take up to seven days to validate your software. Please do so as soon as possible so that you won't be without the use of this software.

Continue

When you install the software, the dialog above will appear each time the software is opened. It is configured as a 14-day demonstration package, and you must register the software with Datacolor during the demo period.

To register, please contact your local Datacolor sales office, or email Datacolor (SoftwareLicense@datacolor.com). You must provide the following information:

- Your Name
- Your Company Name
- Your Location
- Your Telephone Number
- Your Email address
- The 10 digit serial number as printed on the CD case of your new software
- The computer validation number displayed in the authorization dialog

As part of the licensing process, you will be provided with an *UNLOCK RESPONSE NUMBER* to enter into the software validation screen. When this number is entered, your software is permanently licensed and the licensing screen no longer displays.

Hardware Installation

Monitor

Install the video monitor using the instructions provided by the manufacturer.

NOTE

Install the monitor and turn it on for a minimum of one hour prior to calibration.

Calibration Analyzer

You must assemble the calibration analyzer (when necessary) and activate the analyzer in the software. Six types of devices can be used:

- **Minolta CA-100 Analyzer.** Set up and connect the CA-100 per the manufacturer's instructions.
- **Minolta CA-100 Plus Analyzer.** Set up and connect the CA-100 Plus per the manufacturer's instructions. *See also Appendix, Configuring the Minolta CA-100 Plus Analyzer in this guide for additional information.*
- **Minolta/Datacolor CA 210 Analyzer.** Set up and connect the CA-210 per the manufacturer's instructions. This includes the installation of a software driver. *See also Appendix, Configuring the Minolta CA-100 Plus Analyzer in this guide for additional information.*
- **Datacolor CP-2000 Serial Analyzer.** *See instructions in this section.*
- **Datacolor CP-2000 USB Analyzer.** *See instructions in this section.*
- **Datacolor Spyder2.** *See also Datacolor Spyder2 User's Guide for instructions regarding Spyder2 assembly and monitor calibration.*

Installing the CA 100 Plus Analyzer

1. Install the device driver included with the unit.
2. Configure the analyzer using the recommendations in the Appendix of this guide.

Installing the CA 210 Analyzer

1. Install the device driver included with the unit.
2. Configure the analyzer using the recommendations in the Appendix of this guide.

NOTE

When using this analyzer, you must confirm the rubber hood is attached to the probe.

Installing Datacolor CP-2000 Serial Analyzer

To install the Datacolor CP-2000 *serial* analyzer:

1. Connect the power supply for the Datacolor CP-2000 analyzer to an appropriate power source.
2. Connect the serial port cable to a serial port on the computer. When the power supply is connected, the CP-2000 is *On*.

Installing Datacolor CP-2000 USB Analyzer

To install the Datacolor CP-2000 *USB* analyzer:

1. Connect the USB cable from the CP-2000 analyzer to a USB port on your computer.
2. When the USB cable is connected, the CP-2000 is *On*.

Peripherals Setup

Unpack and set up any peripheral devices, i.e., printer, scanner, camera, etc.

- Attach peripheral devices to CPU per manufacturer's installation instructions.
- Install the peripheral driver(s) per the manufacturer's installation instructions.
- Ensure that peripherals operate properly using manufacturer's suggested test routine(s), i.e., print test page, scan a test image, etc.

Printers

A separate Datacolor module, Datacolor PrintCal is necessary to use a calibrated printer with Datacolor ENVISION is a standard option with ENVISION^{PRO}, and is an option available with Datacolor ENVISION^{PLUS}. If you have purchased this option, you will receive a separate user's guide, Datacolor ENVISION PrintCal User's Guide, providing instructions to calibrate and use the printer. If you have not purchased this option, the calibrated printer option is not available.

Spectrophotometer Setup

Unpack and set up the spectrophotometer per its instruction manual. Ensure any options indicated on the invoice are available.

- The spectrophotometer should be located at least 3 feet (1 meter) away from the monitor, in order to prevent any interference with monitor calibration due to electromagnetic radiation interference.
- Attach the spectrophotometer to the computer using the manufacturer's installation instructions.

Monitor Calibration

The monitor must be calibrated regularly to ensure that the color display is accurate. We recommend that the monitor be calibrated daily.

The procedure used to calibrate the monitor for the first time is different from that used for daily calibrations. In addition, the first monitor calibration takes longer to complete than subsequent calibrations. Below are approximate calibration times for the first calibration:

CA-210:	Approximately 5 minutes
CA-100:	Approximately 5 minutes.
CP-2000:	Approximately 15 minutes.
Spyder2:	Approximately 5 minutes.

Instructions for both procedures are included. See also Monitor Calibration for detailed instructions regarding *first time* calibration procedure and *daily* calibration procedure, using either a CRT or LCD monitor.

NOTES

The monitor must be turned on for a minimum of one hour prior to calibration.

Screensavers and monitor power saving should be turned off.

Default vs. Custom Monitor Settings

For most applications, you will use the default hardware settings on the monitor, and the default values in the software options used to calibrate the monitor. The calibration instructions for both CRT and LCD monitors assume you are using the default settings.

You should use custom monitor settings when you are viewing two monitor's side-by-side, and you need to adjust them to maximize the visual agreement between the two monitors. This calibration procedure is accessed from Datacolor ENVISION, Monitor Menu.

Email Configuration

Datacolor ENVISION supports the ability to send and receive Datacolor ENVISION environments, images, colorways, and color files as email file attachments, directly from the program. The implementation of this facility in Datacolor ENVISION fully complies with the MAPI (Messaging Application Programming Interface) standard and will work with any email service that implements this standard.

To use this capability, all computers that are running Datacolor ENVISION software must be properly configured with at least one MAPI profile, setup as the default email client. Microsoft Outlook (Outlook 97, SP1 or higher) is recommended, but there are several others that may be used.

NOTE

Users have reported problems configuring Lotus Notes (Domino Server version). This is due to problems with their MAPI support, as documented on the Lotus web page www.support.lotus.com.

It is the responsibility of the user to properly install, configure, and maintain the email services on systems running Datacolor ENVISION software. If your system has not already been set up, or if you are not experienced and familiar with email client configuration, Datacolor recommends that you contact your network administration staff to assist in this task.

Before you can use a MAPI compliant email client, you must create an email profile. Information may be found in the Help facilities of your operating system and email client.

System Startup

1. Connect the monitor calibration unit to the power supply and turn on the instrument power switch.
2. If using a spectrophotometer for color measurements, connect it to the supply and turn on the instrument.
3. Connect any printer or other peripheral device.
4. Switch on the monitor.
5. Switch on the PC.
6. On the Windows desktop, click on the ENVISION icon.

NOTE

In order to ensure proper and safe operation, all electronic equipment should be connected through a controlled power supply providing surge suppression and voltage conditioning.

Quick Navigation Guide

Below is a summary of the navigation keys used in the program:

- Right-mouse click in the desktop area to display the Datacolor ENVISION pop-up menu
- Left-mouse click to select objects
- Press the spacebar to open and close the *Information Panel*
- CTRL key + C = copy color
- CTRL key + D = duplicate object
- CTRL key + V = paste color
- CTRL key + U = undo last color change

To close the program:

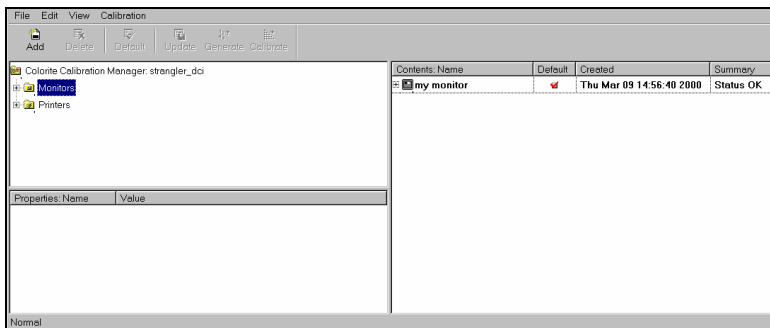
1. Select **File Menu, Quit**. A dialog opens to confirm the operation.
2. Click **Yes** to exit, or **No** to cancel.

Calibration Manager

The *Calibration Manager* is used to install, calibrate and manage hardware devices used with Datacolor ENVISION. All devices must be installed on the computer, using the manufacturer's instructions. Your primary monitor is automatically installed when you run the application for the first time. This section describes how to add an additional monitor to the Calibration Manager, if you change or upgrade your monitor.

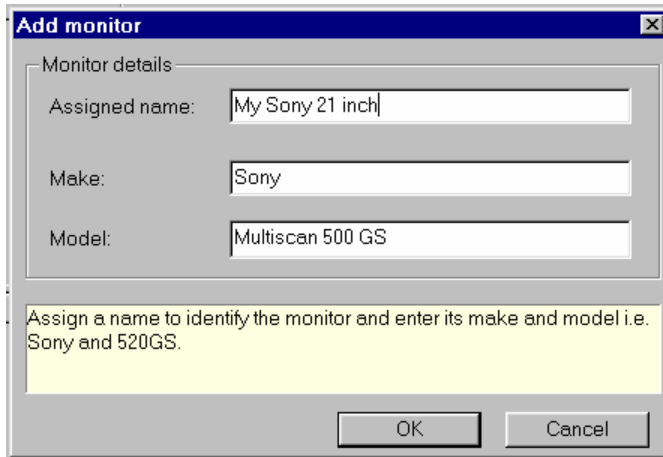
To open the Calibration Manager:

1. From the menu bar, select **File, Calibration Manager**. The window below displays:

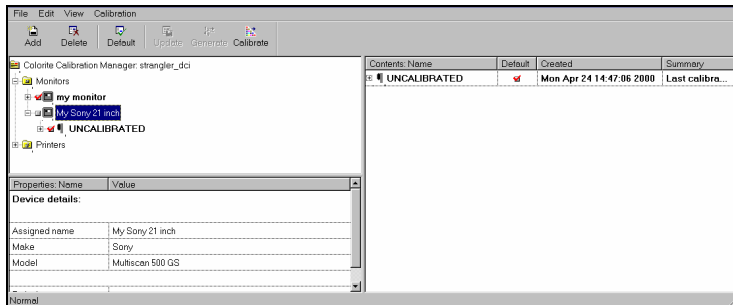


2. Highlight the Monitors folder, and Select **File Menu, Add**. The Add Monitor dialog displays:

3. From the **File** menu, select **Add**. The **Add monitor** dialog opens.



4. Enter the **make** and **model** of your new monitor
5. Enter an **assigned name** that will identify this monitor.
6. Press the **OK** button to install the monitor. You have now installed the monitor, which contains a single, uncalibrated profile:



While you can use the monitor at this point, significantly better results will be obtained after you calibrate the monitor. *See also Monitor Calibration for instructions.*

NOTES

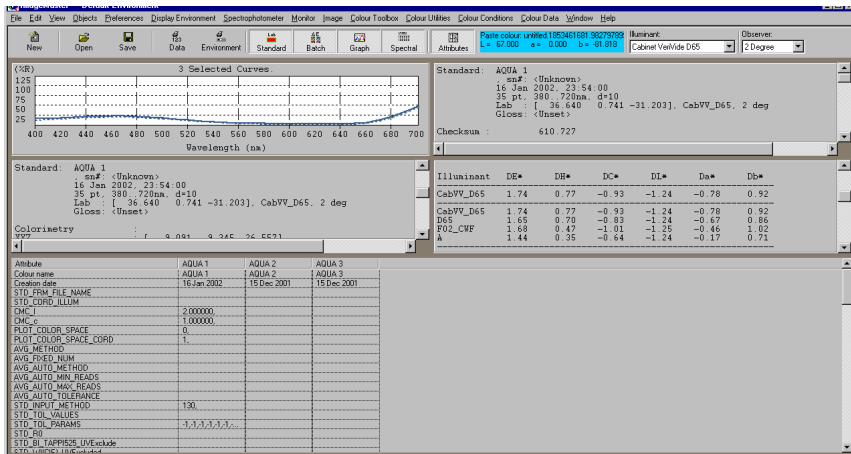
Information Panel/Drawing Area

Overview

The *Drawing Area* is where you will do your design work. To access this window:

- On a three-button mouse, click the middle button.
- Press the space bar on the keyboard.

Below is an example of the layout:



Two main windows are displayed:

- The top window is the Information Panel
- The window below is the Drawing Area (desktop).

Window Navigation

Toggling the Information Panel

The Information Panel can be displayed or hidden. If only one window is visible, press the space bar to display the Information Panel. If you have a 3-button mouse, click the middle button.





To hide the Information Panel, place the cursor in the panel, and press the space bar. If you have a mouse with three buttons, click the middle button.

NOTE

The space bar works in the same way as the middle mouse button. Other tool windows displayed are not affected by the middle button, and remain in position on screen.

Maximizing, Minimizing, Closing a Window

In the top right hand corner of the Information Panel title bar are three buttons:

-  **Minimize.** Left click on the **Minimize** button to reduce the screen to a labeled icon positioned at the bottom of the screen.
-  **Restore.** Left click on the **Restore** button to return the screen to its previous size and position.
-  **Maximize.** The Maximize button re-sizes the window to its largest allowed size screen. Again, clicking on the **Restore** button returns the window to its previous size and position.
-  **Close.** Clicking on the **Close** button closes the window.

Choosing Window Size

The size of most windows can be altered. As the cursor moves over the edge or corner of the window, the cursor changes to a double-ended arrow.

- Hold the left mouse button down and move the mouse.
- Release the button when the window is the desired shape and size.

NOTE

Most of the tools support these functions though some are constrained to specific sizes, or can only be resized in one plane.

Toggleing the Tool Windows

- Press the ESCAPE key to hide all visible tool windows.
- Press the `` key (the key above the tab key) to move all tool windows to the front of the display.

Window and System Input

The Information Panel displays the *main* menu bar. The Drawing Area offers a *pop-up* menu that is displayed by clicking the right mouse button. The *main* menu contains all of the menu options while the *pop-up* menu offers a shortcut to the most frequently used options.

A large number of the operations can also be accessed using keyboard shortcuts. Shortcut keys, which use the CTRL key, or the F5-F8 function keys can be used in any window and not just in the Drawing Area or Information Panel window. The remaining keys can only be used in the Drawing Area or Information Panel window.

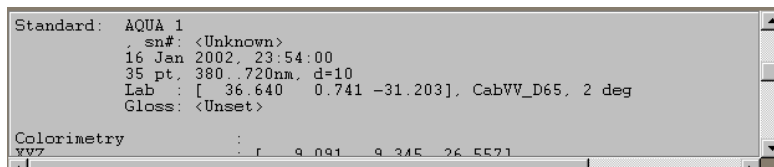
Information Panel

The Information Panel is split into different areas. These areas are updated whenever system changes occur to ensure the information displayed is as up to date as possible. the top the Information Panel window has five buttons:



These buttons open or close specific windows in the Information Panel.

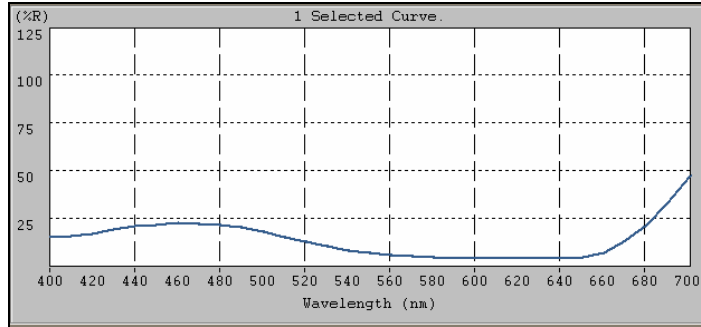
- The **Standard** button toggles the Standard object data window:



- The **Batch** button toggles the standard - batch color difference data:

Illuminant	DE*	DH*	DC*	DL*	Da*	Db*
CabVV_D65	1.74	0.77	-0.93	-1.24	-0.78	0.92
CabVV_D65	1.74	0.77	-0.93	-1.24	-0.78	0.92
D65	1.65	0.70	-0.83	-1.24	-0.67	0.86
F02_CWF	1.68	0.47	-1.01	-1.25	-0.46	1.02
A	1.44	0.35	-0.64	-1.24	-0.17	0.71

- The **Graph** button toggles the display of the object reflectance curve(s):



- The **Spectral** button toggles the selected objects' measurement data:

```

Standard: Blue 1
          . sn#: <Unknown>
          16 Jan 2002, 23:54:00
          35 pt, 380..720nm, d=10
          Lab : [ 36.640 0.741 -31.203], CabWV_D65, 2 deg
          Gloss: <Unset>

Checksum : 610.727

nm      00      10      20      30      40      50      60      70      80
300
400    17.167  18.255  19.585  21.345  22.973  23.928  24.336  24.184  23.
500    19.207  16.550  13.841  11.389  9.292  7.845  6.772  5.809  5.
600     5.018  4.780  4.595  4.554  4.562  5.279  8.374  14.722  23.
700     49.268  49.268  49.268
  
```

- The **Attributes** button toggles a window displaying additional sample information (applicable to Datacolor Tools *.qtx files). Any number of samples can be selected and information displayed in this window.

Attribute	Blue 1	Blue 2	Blue 3
STD_FRM_FILE_NAME			
STD_CORD_ILLUM			
CMC_l	2.000000		
CMC_c	1.000000		
PLOT_COLOR_SPACE	0		
PLOT_COLOR_SPACE_CORD	1		
AVG_METHOD			
AVG_FIXED_NUM			
AVG_AUTO_METHOD			
AVG_AUTO_MIN_READS			
AVG_AUTO_MAX_READS			
AVG_AUTO_TOLERANCE			
STD_INPUT_METHOD	130		
STD_TOL_VALUES			
STD_TOL_PARAMS	-1,-1,-1,-1,-1,-1		
STD_FD			
STD_BI_TAPPI525_UVExclude			
STD_wI(CIE)_UVExclude			
STD_wI_CIE_Tint_UVExclude			
Measurement parameters	Specular comp.		

When these buttons are clicked, the corresponding area of the Information Panel window is displayed. Clicking the same button again will hide the information, and the window will refresh to make the best use of the available screen area.

The Information Panel can be toggled to and from the front of the screen. See also *Information Panel* for instructions to toggle this display. See also *Information Panel Functions* for a more detailed description of the features in the Information Panel.

Basic Functions of Datacolor ENVISION

Tutorial 1: Creating a New Environment

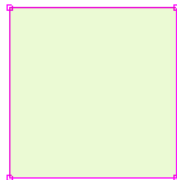
1. Left-click on **F**ile on the main menu.
2. Select **N**ew.
3. If objects already exist on the screen, a dialog box will confirm the command.
 - Click **Y**es to display a new blank environment.
 - Click **N**o to cancel the operation.
4. Click on **Y**es.

Tutorial 2: Creating a New Tile

1. Right-click in the Drawing Area. The pop-up menu displays.
2. Select the **O**bjects option.
3. Select the **A**dd **N**ew **T**ile to **P**osition option.
4. The program prompts you to place the tile in the desired position. Click the mouse button.
5. Place the cursor where the top left corner of the tile should be located, and click the mouse button.

Selected/Created Objects

- Once a single object in the Drawing Area has been created, it is identified as the *current selection* by a border around the object.
- A tile can be selected by clicking on it.
- Once an object or a group of objects (has been selected, operations can be performed on the selected object(s). *See also Selecting Multiple Objects tutorial.*



Objects

Objects are images or parts of images you can create, import, export, layer or separate. Below are tutorials explaining some fundamental object operations.

Tutorial 3: Moving Objects

1. Click and hold the mouse anywhere on the object.
2. Move the mouse to the new location and release the button.

Tutorial 4: Moving Objects with the Keyboard

1. Click on an object to select it.
2. Use the arrow keys to move the object 1 pixel in the desired direction.

Tutorial 5: Resizing Objects

1. Select an object.
2. Position the mouse over one of the *handles* of the selected object (solid squares on the border). The cursor will change to a double arrow.
3. Hold down the left mouse button and stretch the border to the required size.

Tutorial 6: Proportional Resizing of Objects

1. Select an object and position the mouse over one of the handles at the *corner* of the object.
2. Press the **SHIFT** key and the left mouse button, and stretch the border to the required size.

Tutorial 7: Copying Objects to the Clipboard

1. Select an object to be copied, and select the **E**dit option from the main or pop-up menu.
2. Select **Copy Object**. A bitmap copy of the whole object will be placed on the clipboard. Or, to copy only the object, select **Copy Standard Sub-Object**).
3. On the clipboard all images are stored as bitmaps. Because of this, accurate color information **MAY BE LOST**. For transferring or saving color information from Datacolor ENVISION, options from the File menu should always be used.

Tutorial 8: Pasting Objects from the Clipboard

1. Select the **E**dit option from the main or pop-up menu.
2. Select **Paste Image**.
3. The contents of the Windows clipboard will be copied to the center of the Drawing Area. A prompt will ask if you want to convert this RGB based image (i.e., a bitmap) into LCh format.
4. This facility provides a quick way of importing bitmap images into the Datacolor ENVISION system. However, ***it is important not to depend on color information derived from clipboard images.***

Tutorial 9: Duplicating Objects

Duplicate options provide a quick way of accurately replicating objects within the Datacolor ENVISION environment. They behave like copy/paste operations, but the Windows clipboard is not used, and accurate color information is retained.

1. Left click on an object to select it.
2. Right-click to display the pop-up menu.
3. Select the **E**dit option.
4. Select a Duplicate option.
 - To copy all sub-objects, select the **Duplicate Objects** option.
 - To copy only the standard of the selected object select **Duplicate Standard Sub-Object**.
 - To copy only the visible sub-objects select **Duplicate Visible Sub-Objects**.

An identical copy of the object will be generated and positioned slightly below the original.

5. Left click on the new object to select it and drag it to the required position.

A duplicate object, which is positioned by small offset, can also be made using a keyboard shortcut:

- Select the object to be duplicated.
 - Hold down **CTRL + D**.
6. When an object is duplicated a copy is made that has identical physical dimensions, CIE co-ordinates, reflectance values, color name and object name **Duplicate is not the same function** as **Copy Object** and **Paste Image**. The *copy* and *paste* options use the Windows clipboard, and will NOT retain accurate color information or any Datacolor ENVISION image properties.

Locking Object

Objects can be locked into position. If a locked object is selected within a multiple selection, none of the objects will move. Once locked, the object's size and position cannot be changed and the object cannot be deleted. However, the object's color can be changed.

Tutorial 10: Locking/Unlocking Objects

To *lock* an object:

1. Select an unlocked object.
2. Select **Objects** from the pop-up menu.
3. Select **Lock, Lock object(s) movement**.

To *unlock* an object:

1. Select a locked object.
2. Select **Objects** from the pop-up menu.
3. Select **Lock, Unlock object(s) movement**.

When multiple objects reselected, the result of using **CTRL + L** to lock and unlock objects depends on the status of the *Standard* object.

- If the Standard is *locked*, **CTRL + L** will *unlock* all objects in the selection.
- If the Standard is *unlocked* then **CTRL + L** will *lock* all objects in the selection.

Tutorial 11: Deleting Objects

1. Select the object(s) to be deleted.
2. Select **Edit** from the pop-up menu.
3. Select **Delete** or press DELETE on the keyboard.

Tutorial 12: Restoring a Deleted Object

Datacolor ENVISION can only restore the last deleted selection.

- Select **Edit, Undo Delete, Undo Last Delete Operation**.

Selection Order/Selected List

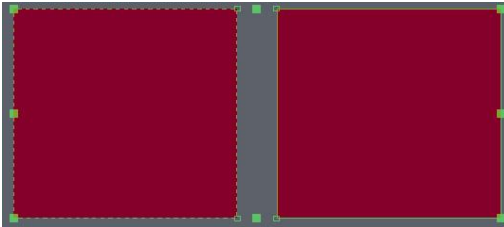
When objects are selected, they are stored in a list inside the program. The position of an object in this list is determined by the order in which the objects are selected:

- If the object selected is a new object, it is added to the end of the list
- If an object is already selected, its position in the list changed.
- **Standard Object.** The very first object in the list is referred to as the *Standard Selected Object* or the *Standard*.
- **Batch Objects.** All the other objects in the list are referred to as *Batch* objects.
- **Final Object.** The last batch-selected as an object is also referred to as the *Final Selected Object*.

Tutorial 13: Identifying Standard, Final and Batch Objects with Multiple Object Selection

There are situations in which you will need to know the order in which objects in the image are chosen. This information is available by displaying a list of the objects. This is accessed from the option *Display Environment, Show Objects Selection Position*.

Identifying Selections in the Drawing Area



This figure shows two selected tiles.

- The *Standard* has a solid border (tile on the right).
- The *Batch* has a dotted border (tile on the left).
- The large squares are the resize handles, which indicate the selected area.

The Border Color

The border color of an object indicates whether it is locked or not.

Typically, *Unlocked* objects have a green border, and *Locked* objects have a red border.

NOTES

The background color affects the perceived color of the border. If the background color has changed and you are unsure of its effects, just lock and unlock TWO selected objects, and check the border color under these conditions.

When multiple objects are selected and some of the objects are locked, the status of individual objects is shown by their border. The resize handles of the selection area will always be set to lock. Move and Resize operations are not permitted until all objects are unlocked.

Resize Handles

The border around all the selected objects includes large, solid squares. Clicking the mouse and dragging these handles allows the selection to be resized. When the selection can only be proportionally resized (i.e., it is one of several selected objects), only the corner handles are shown.

The color of the handles is based on the overall *lock* status. If any of the objects in the selection are locked, then the selection cannot be resized.

Selected Object Border Corners

Small, unfilled squares indicate the corner of each selected object. The object *lock* status determines the color.

Identifying the Standard Selected Object

The standard is always identified with a solid border, which is normally around the entire object.

However, LCh images can have sub-objects inside them that can be individually selected. It is necessary to be able to distinguish the selected sub-object inside the image.

- When the object is an LCh image containing sub-objects, the image is surrounded by a long dotted border to indicate its selection.
- The solid border contains the selected sub-object inside the LCh image. The object corners are still shown on the corners of the whole image.

See Selecting Sub-Objects within LCh Images for an explanation of sub-objects. See also Choosing Standard and Final Selected Objects.

Identifying the Batch Selected Object(s)

Selected batch objects are identified with a short dotted line border.

Selecting Objects

Objects are selected from options in the Edit main menu. You can select objects individually, or use the *rubber band* tool for selection.

Tutorial 14: Selecting Multiple Objects

- **Rubber band method.**
 - Click and hold the left mouse button.
 - Move the mouse until all the desired objects are surrounded.
 - Release the mouse button.
- **Individual object selection.**
 - Press the **SHIFT** or **CTRL** key and click the mouse button on the object to add to the selection.
 - The last object selected while holding the CTRL key is set to be the standard selected object.
- To copy the objects, use either procedure detailed in *Creating Duplicate Objects*.

Creating New Objects

Single New Tile

A tile can be created using the option **Add New Tile to Position**. The position for the new tile is specified by clicking the mouse button when prompted.

New Tiles to Fill a Specified Area

There are several options available to fill an area. They are accessed from the option *Add New Tiles to Fill*. This option includes choices to fill **The Screen Area**, the **Selected Object Area**. When working in an object area, there are additional options to fill **Inside a Chosen Area**, **Across a Chosen Area**, and **Down a Chosen Area**.

- **Fill the screen area.** The program prompts for the following information:
 - The number of new tiles to create
 - The gap between the tiles

- Delete the current environment objects.

Tiles of equal size and shape are then created, so that the as much of the screen area as possible is covered.

- **Fill an object.** Select an object. The program prompts for the following information:
 - The number of new tiles
 - The gap between tiles

New tiles are created inside the selected object.

- **Fill a chosen area.** Define the area using a rubber band, enter the number of tiles and the gap between tiles.
 - The area will be filled with the selected number of new tiles.
 - The tiles will be ordered from the top left corner across the screen down to the bottom right corner.
 - To position the tiles vertically in the area, select the option **Down the Chosen Area**.

New Tiles from Object Properties



- **Add New Tiles Beside.** New tiles can be created using aspects of the image itself, such as the base color of the object, or the displayed sub-objects. There are several choices regarding the generation of the base color
- **All Objects from All Synthetic Curve Methods.** Creates a series of small tiles next to each selected object. The tiles represent the results *using each of the synthetic curve methods*, to generate the base color of the tile. These new tiles can be selected, and the reflectance curve generated by (the particular) synthetic curve method is displayed in the Information Panel.

- **All Images From Their Displayed Sub-Objects** New tiles can be created next to selected images. One tile is created for each of the displayed sub-objects in the image.
- **Objects** menu, **Add New Tiles Inside, LCh Image as Displayed Sub-Object Selection Tiles**. Creates a tile for each sub-object, combines them into the image, and makes the tiles slave to the appropriate object. Any operation performed on the tile is also performed on the original sub-object. This is useful when it is difficult to select a sub-object if, for example, sub-objects are small or overlap.

New LCh Images

New LCh images can be created from the selected images, the standard sub-object, or the sub-objects displayed in the image. These options are access from *Objects* menu, *LCh Images*, *Create*.

- **New Image from All Selected Images**. Creates a new LCh image containing all the visible sub-objects from the selection. The new image has the same size as the selection area, and the objects keep their relative positions. If any tiles are included in the selection, they can be automatically converted to LCh images first. The original tile now becomes an LCh image.
- **New Image from Image Standard Sub-Object**. Creates a new LCh image containing one sub-object, the standard sub-object, from the selected image.
- **New Image from Image Displayed Sub-Objects**. Creates a new LCh image containing sub-objects, from all of the displayed sub-objects of the selected image.

Converting Tiles/RGB Images to LCh Images

Tiles and RGB images can be converted to LCh images. This then allows these objects to be manipulated and combined with other LCh images. Both these conversion operations can be found under *Objects*, *Convert to LCh Image*.

Distributing Intermediate Colors between Standard Object and Final Batch Object

This function takes the color from two specified objects, creates a regular color change between these two colors, and applies the range to the selected objects. For example, if six objects are selected, the color of four objects will gradually change between the start and end colors. Both functions that will produce a sequence of colors. The difference in function is how two colors are chosen.

- **Color Utilities, Re-Color Selected Objects, Between Chosen Start and End Object Colors**. This option enables the colors to be chosen explicitly from two objects. These two objects need not be in the selection that is to be re-colored. The **CTRL + R** key command executes the same function.

- **Color Utilities, Re-Color Selected Objects, Between the Standard and Final Object Color.** Uses the colors from the *Standard* object and the *Final* object in the selection that is to be re-colored.

NOTES

To select the standard object, press the **CTRL** key and click inside the object to be designated as the standard.

To view the selection order, *Display Environment, Show Objects Selection Position* should be set to **On**. **CTRL + B** key command will prompt this same function.

- The order in which objects are re-colored is dependent upon the status of the toggle **Color Utilities, Re-Color Selected Objects, Re-Order Using Selection Bias Before Re-Color**. If this toggle is checked then the operation re-colors the objects according to their screen positions rather than the order in which they were selected. This makes the final result look better on screen.

The re-ordering of the selection takes place **after** the *start* and *end* colors are recorded from the standard and final selected object, and **before** the new colors are applied.

The selection re-ordering is dependent upon the selection for **Edit, Choose Selection Bias**.

- **By Rows First.** Colors are applied to the screen position top down objects first.
- **By Columns First.** Colors are applied from left to right. This is the default used for the *Select All* functions. *See also Selection Order*.
- **Re-Order Using Selection Bias Before Re-Color option.** When this is not enabled, the objects are re-colored according to the order in which they were originally selected (*Selection order*).

Ordering Objects by Color Order/Difference

Two options are available for ordering/re-positioning selected objects in the Drawing Area:

- **Color Order.** To order the selected objects by a color order, select *Color Utilities, Re-position Selected Objects, By Color*, and select the desired color order.
- **Object color difference from the Standard object.** To order the selected objects using the color difference from the Standard, select the *Color Utilities, Re-position Selected Objects, By Color Difference*.
 - From the main menu, select **Preferences, Select Color Difference Method** to select the color-difference method.

- Press **<CTRL>** and **click on the object** to select the standard to be used as the basis of the color difference.

NOTE

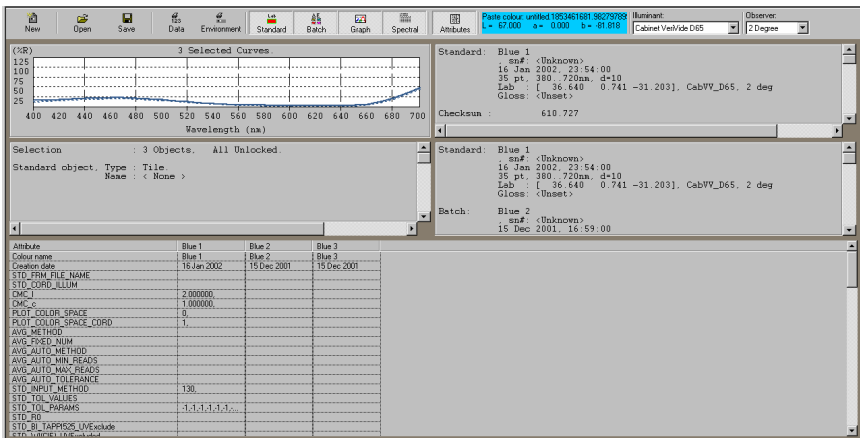
If there are gaps between the objects or the objects overlap each other, the size of the selection area will adjust until it removes all gaps and overlaps between objects.

- The standard object is located at the top left of the selection area. Once the row is filled, the next row is begun.

To display the color difference values on the selected objects, from the main menu click **Display Environment, Show Objects Color Difference**.

To display the color coordinates on the objects, from the main menu select **Display Environment, Show Color Tri-Stimulus Values**.

Information Panel with Multiple Objects Selected



The Information Panel can display the reflectance curve and other data for each object, when multiple objects are selected in the Drawing Area. To ensure the graph is visible:

- Click the **Graph** button at the top left corner of the Information Panel window. The reflectance curve for the standard selected object is displayed as a solid line, and the reflectance curve for batch objects are displayed as dotted lines.
- Click the **Batch View** button to display information about the batches. The area at the bottom left of the window identifies the type, the color coordinates and the color difference calculation for each batch object.

- Click the **Spectral Curve Data** button  to display the spectral curve data for the selected objects.

To display a popup menu, click the right mouse button over the areas containing the color difference information or the spectral curve data. These menu options set the number of objects for which data will be displayed.

Selection Bias

If a number of objects are selected at the same time (e.g. using a rubber band), then the Selection Bias controls the order in which objects are added to the selection list. To choose the Selection Bias to use:

- Click **Edit, Choose Selection Bias**.
- **By Rows First.** Selects objects that are positioned horizontally on the screen first; e.g.,
1 2 3 4 5
6 7 8 9 10
- **By Columns First.** Select objects that are positioned vertically on screen first ;e.g.,
1 3 5 7 9
2 4 6 8 10

This selection also controls the order in which objects are used for operations that re-position or re-color objects.

NOTE

Click **Display Environment, Show Objects Selection Position** to display the position in the selection list for each selected object.

Individual Object Selection/De-selection

Adding an object to the selection list is done using the <SHIFT> key modifier.

- To select an *un-selected* object and add it to the end of the selection list, hold the SHIFT key and click the mouse in the object.
- To *de-select* a selected object, hold the <SHIFT> key and click inside the object.

Changing Selection Order or Choosing Standard/Final Selected Objects

The <CTRL> key modifier is used for these functions.

- To make an individual object the *Standard*, hold down the <CTRL> key and click inside the object. This works on both selected and un-selected objects.
- To make an individual object the *Final* object, hold down the <ALT> key and click inside the object.

Rubber Band Selection

If a selection is made using a “rubber band” method (dragging the mouse cursor around the objects) the objects are added in the direction of cursor motion. For example, if the **Selection Bias** preference is set to **By Rows First** and a rubber band is drawn out starting from the top left corner of the objects then the ordering of the selected objects will be in ascending order from the top left corner, etc. If the preference is set to **By Columns First**, the same principle applies, but is directionally oriented to columns.

If all the objects are selected using **CTRL + A** or **Edit->Select All** from the menu then objects are added to the selection as if a rubber band which starts at the top left of the objects was used and using the selection bias setting. In all cases if the Standard object is removed from the selection the next object on the list is made the standard.

Tutorial 15: Adding/Removing Objects to a Selection

1. Select some objects, and hold down the **SHIFT** key.
2. Click on an un-selected object to add to the selection.
3. If the object is already selected, hold down the **SHIFT** key and click on it to remove the object from the selection.

NOTES

Using the **SHIFT** key to add objects to the selection does not change which object is the Standard.

When objects are added to the selection using the **CTRL** key, the Standard is always the last object selected.

4. If a rubber band is drawn around multiple objects after holding down the **SHIFT** key, multiple objects can be added or removed from a selection. Objects are selected by holding down the **CTRL** key while pressing **A**. You can also click on **Edit, Select All**.

Display Order, Display List or Stacking Order

The objects displayed on the screen have a specific order that determines their position in the image. The order initially is based on the creation date (e.g. a new object goes to the top of the list, and is displayed on top).

Some selection commands make decisions based on the display order. There are also commands and functions, which can change an object's position in the display order.

Tutorial 16: Changing the Display Order of Objects

- **Move objects to the front.** Press **HOME** after selecting an object, or select the object, then select **Objects, Order, To Front**.
- **Moving objects to the back.** Press **END** after selecting an object, or select the object, then select **Objects, Order, To Back**.
- Press the **PAGE UP** key to move the selected object up one layer.
- Press **PAGE DOWN** to move the selected object down one layer.

Tutorial 17: Copying Color Between Objects

1. In the Preferences menu, set the *color change method* to **Set Direct Color Change**.
2. Select the object from which the color is to be copied.
3. Select the object to be changed.
4. Right-click to display the pop-up menu, and select **Edit, Paste Color**. All the selected objects will be re-colored with the previously copied color.

NOTE

If the color change method is not set to Set Direct Color Change, the color change method will be Relative. The Standard object will be set to the selected color, and the batch objects will be re-colored maintaining the relationship between the Standard and the Batch in color space. See also *Color Slider for more information*.

A color can also be copied and pasted by using the following keyboard shortcuts:

1. Select the object with the color to be copied.
2. Hold down the **<CTRL>** key and press **C**.
3. Select the object to which the color is to be copied.
4. Hold down the **<CTRL>** key and press **V**.

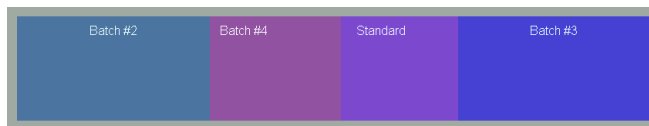
Tutorial 18: Arranging Objects on Screen

1. Select multiple objects.
2. Right-click to display the pop-up menu.
3. Select **Objects, Move, Distribute, Distribute selected object centers**.
4. From the **Objects** menu, select **Move, Align**.
5. Select **Align to standard top**. The objects are now lined up.

There is an option in the *Distribute* menu to reorder the selected objects before they are arranged in the Drawing Area. When set, the selected objects are reordered as if they had been selected using **<CTRL>+A** and the current selection bias preference setting—e.g., **By Rows First** or **By Columns First** (see *Selection Order*).

If **re-order the objects** is checked, then the *distribute* functions use the selection bias to determine which objects to use for the extreme locations.

- If the preference for the selection bias is set to **By Rows First**, the objects in the top and bottom rows are used as the limits. The remaining selected objects are distributed equally across the range.
- If the selection bias is set to **By Columns First**, the objects in the left and right columns are used as the limits. The remaining selected objects are distributed equally across the range.



Align functions line up the selected objects to the standard object. For example, **Align to Standard Bottom** arranges all of the selected objects so that the bottom of all objects is on the same line as that of the Standard object.

Tutorial 19: Displaying/Hiding the Color Difference on Objects in the Drawing Area

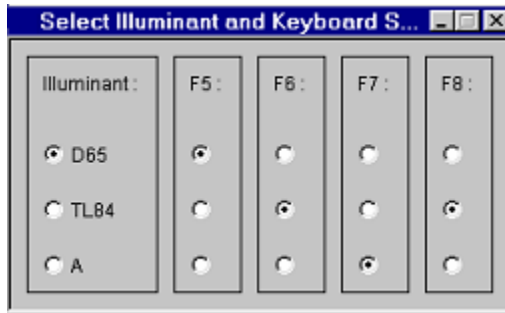
The color difference between the standard and each of the batch objects in a multiple selection object can be shown on the objects. The color name, color values and object name can all be displayed, providing that there is enough space on the object.

1. Select **Display Environment** from the main menu.
2. Click the checkbox labeled **Show Objects Color Difference**.
3. Remove the check from the checkboxes to hide these values.

Viewing Objects under Different Illuminants

- The system has been calibrated for Illuminant D65. Monitor gamut may be limited in other illuminants.
- For colors defined using color coordinates, the color under other illuminants is derived from the *default synthetic curve* option.
- New illuminant data can be installed for other illuminants before the system is executed.
- To speed switching between illuminants, the F5 - 8 function keys are programmable. See *Tutorial 20, Changing the Illuminant*.

Tutorial 20: Changing the Illuminant



To change the illuminant under which colors are viewed:

- From the main menu select **Color Conditions, Select Illuminant**. The tool window displays.
- Select the check box next to the preferred illuminant.

There are also keyboard shortcuts available to change the illuminant. The default settings for the keys are:

D65	F5
TL84	F6
Illuminant A	F7

The illuminant tool can also be used to associate different illuminants with the shortcut keys. The check boxes on the right-hand side of the tool show which key relates to which illuminant. Select a checkbox to associate the key with the illuminant.

Tutorial 21: Viewing Under Different Illuminants

Up to three batch objects can be compared to a standard, under the three illuminants. The order of the objects in the multiple illuminant screen is a function of *selection* and *display order*.

To select the objects, do the following:

1. Select **Color Utilities, Multiple Illuminant View**.
2. Click the **Finish** button to end.

The color displayed is accurate, subject to monitor gamut limits. However, you cannot compare the true color of the object from one illuminant to another, because the perception of the color is affected by *color in context* issues. It is better to use a single illuminant and change the illuminant, to minimize context issues.

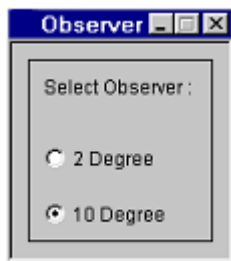
Visible color values and names are recommended to distinguish the batch colors from one other.

Viewing Objects Under CIE 2°/10° Degree Observer

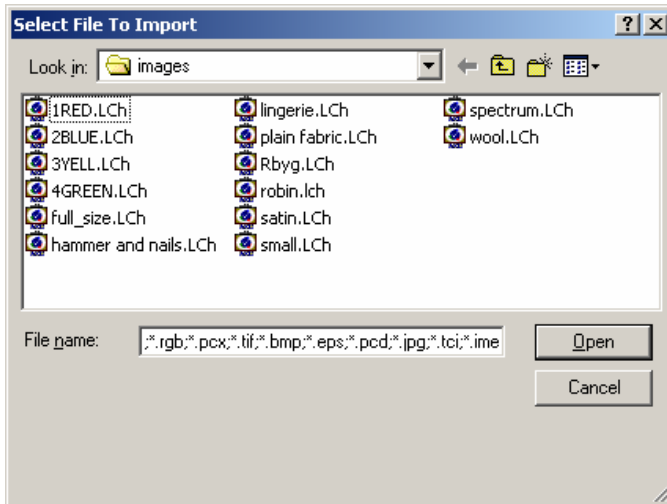
Spectrophotometric data is typically weight by the 10° Standard Observer. However, output from most CRT analyzers is weighted using the 2° Standard Observer. This option is used to change the Standard Observer data used.

Tutorial 22: Changing the Observer

1. From the main menu, select **Color Conditions**.
2. Choose **Select Observer**. The tool window now opens.
3. Select the check box next to the desired observer.



Files



When any file, image file or an environment file, is opened or saved, the File dialog box opens. The window shows the directories and the files available for selection.

- Left click the mouse on a file or directory to select it.

When a file is selected, a short description and the permissions of the file are shown at the bottom of the dialog box.

- **File Name.** This allows the name of the file, which is to be opened or saved, to be typed in.
- **Files of type.** This applies a file filter so that only files of a particular type are shown (e.g., *.ime shows all Datacolor ENVISION environment files). Apple*.ime will only show files beginning with the name apple; *3*. * shows any file containing the number 3 in its name, etc.

Tutorial 23: Saving an Environment

1. Right-click to open the pop-up menu.
2. Select **Save Environment As**. This opens the file dialog box shown in the above figure.
3. Select the file name or enter a new one.

Tutorial 24: Loading an Environment

1. Right-click to open the pop-up menu and select **Open**.
2. The File dialog box opens. Select a file to be opened.

Email Functions

Datacolor ENVISION directly supports email to ease file handling between remote systems. The ENVISION files may be sent and received as email attachments using any MAPI-compliant mail interface such as Microsoft Outlook.

NOTE

If Email is to be launched directly from Datacolor ENVISION, the default email platform **MUST** be MAPI-compliant. Please consult your email software manufacturer's directions for information on compliance.

It is preferable to send and receive email directly through Datacolor ENVISION. Opening attached image files separately through your email software while running the program will result in secondary copies of Datacolor ENVISION running on your system simultaneously. This can significantly affect system performance as well as result in overwriting or misplacement of files.

The email profile used can be selected from those defined for your system. If no profiles exist, you will be prompted to create one.

IMPORTANT NOTE

If your email inbox contains a large number of items, the Datacolor ENVISION *Receive Mail* and *Send Mail* windows will take a long time to open. This is because the system has to retrieve each item from the email server. Archiving or deleting old emails will help maintain the speed of the system at an acceptable level.

Tutorial 25: Sending Datacolor ENVISION Files

1. Verify that the object you wish to send is selected in the Drawing Area.

NOTE

If you are sending the whole environment, nothing needs to be selected.

2. From the menu bar, select **File Menu, Select Send to Mail Recipient**. The Send Selected dialog box will display:



3. Select the object to be sent.
 - You can send the reflectance values for the selected objects including colorways (*.col), data used by Datacolor TOOLS (*.qtx), or data used by Datacolor Datamatch(*.exp).
 - You can send an image separately as an (*.lch).
 - You can send an image in the context of a complete environment (*.ime).

If a valid profile is established on your computer, the Choose Profile dialog will appear. Select the **email profile** you wish to use (to send from) and click **OK**. Click **New** to set-up a new profile.



Your default email window will display a new message, with the selected file attached.

4. You can add text in the normal way and choose the target email address.
5. Press the **Send** button to send the file.

NOTE

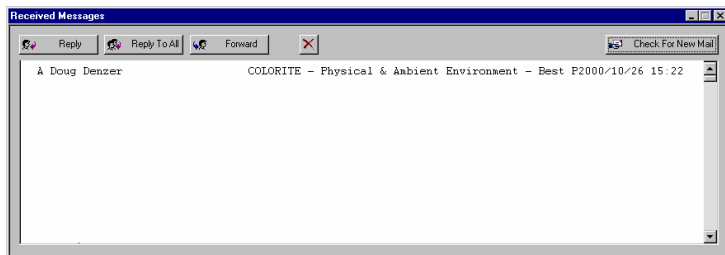
You cannot change the color file name within this window. If it is necessary to rename the file, save the file first using the appropriate Datacolor ENVISION file function. You can then send the file as an attachment through your email service outside the Datacolor ENVISION software.

Tutorial 26: Receiving Datacolor ENVISION Files

NOTE

If you have not previously selected an email profile, a dialog will display asking you to choose a profile

1. From the menu bar, select **File Menu, Receive Mail**. The email box will open:



2. Double click on the appropriate email item to open it

NOTES

If you are opening an environment file (*.IME) you must save the current environment to preserve it.

Color files will be opened in the Color Management tool window, from where they can be copied to tiles or images as required.

NOTES

Information Panel Functions

Overview

The Information Panel consists of five main areas:

- Standard object data
- Batch summary information
- Spectral graphs of the selected objects
- Spectral curve data for the objects
- Object attributes

These areas can be individually displayed or hidden in the *Information Panel* window. The tool bar in the top left corner of the Information Panel window includes buttons which, when depressed, displays the information and, when raised, hides it.



The current layout of the Information Panel window is saved when the Datacolor ENVISION program is closed.

- When you open the program, the position and size of the Information Panel window will restore the previous settings.
- Only those views that were previously visible will be displayed.
- Use the toolbar to display or hide views.

- The *Information Panel* can be resized and repositioned. See also *Window Manipulation*.
- If a large number of objects are selected, the system can slow significantly when displaying complete color information for the object.
- Right-click on the spectral curve graph to display the Batch Information Summary, Color difference display. A pop-up menu will display, allowing you to select the number of objects for which to display data.

Standard Selected Object Information Area

Below is a summary of the object information and its color data.

```

Selection          : 2 Objects,  All Unlocked.

Standard object, Type : Tile
                   Name : < None >

-----
Standard: <Unnamed>
Synthesised by Using Generic Primaries
17 Oct 2000, 09:35:55
31 pt, 400..700nm, d=10
LCh : [ 76.069 69.545 103.506], CabWV_D65, 10 deg
Gloss: <Unset>

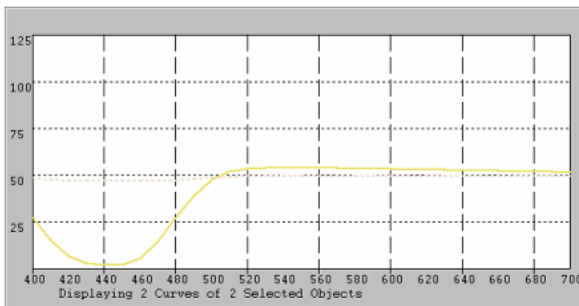
Colorimetry
XYZ          : [ 42.141 50.000 10.756]
xyY          : [ 0.410 0.486 50.000]
Lab          : [ 76.069 -16.242 67.622]
Luv          : [ 76.069 7.071 80.254]
LCh          : [ 76.069 69.545 103.506]
Hunter Lab   : [ 70.711 -14.393 39.395]

Quantised    : For monitor
LCh          : [ 76.179 69.400 103.460]
De CIE Lab   : 0.191
  
```

- The top display color is selected from the *Preferences, Select Main Tri-Stimulus Value To Show* option.
- If only ONE object is selected, the spectral curve data is also displayed in the Information Panel window.

Spectral Curve Display Graph

This displays a maximum of 10 spectral curves, each representing an object. The standard object color is displayed as a solid line, and the batch object(s) as dotted lines.



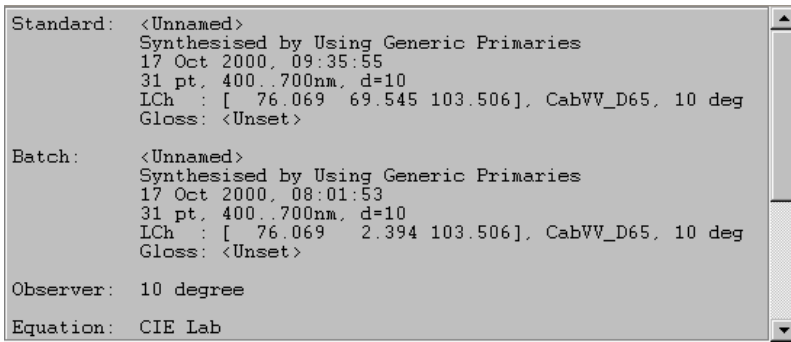
Changing the color of the curve. Normally the color of the curve is the actual base color. However, if the color is cannot be seen clearly, you can change the color of the curve to black.

To change the color of the curve, do the following:

1. Right-click in the graph area. A menu will display.
2. Make the appropriate selection.

Batch Information Summary/Color Difference Display

This option displays a summary of the batch object information:



```
Standard: <Unnamed>
Synthesised by Using Generic Primaries
17 Oct 2000, 09:35:55
31 pt, 400..700nm, d=10
LCh : [ 76.069 69.545 103.506], CabVW_D65, 10 deg
Gloss: <Unset>

Batch: <Unnamed>
Synthesised by Using Generic Primaries
17 Oct 2000, 08:01:53
31 pt, 400..700nm, d=10
LCh : [ 76.069 2.394 103.506], CabVW_D65, 10 deg
Gloss: <Unset>

Observer: 10 degree
Equation: CIE Lab
```

The color coordinates are specific to a color space. To select a different color space:

- Click **Preferences, Select Main Tri-Stimulus Value To Show.**

The color differences are based on the equation selected. To select a different equation:

- Click **Preferences, Select Color Difference Method.** If the selected color difference method supports the data, it will be displayed.

This data can be shown for one or all components. To change the number of components displayed:

- Click **Preferences, Select Color Difference Method, Display Components,** and change the selection as appropriate.

Spectral Curve Data Display

This option displays the spectral curve data for the selected objects. If not all the details are visible in the exposed window, the scroll bar can be used to look through the information.

```

Standard: <Unnamed>
Synthesised by Using Generic Primaries
17 Oct 2000, 09:35:55
31 pt, 400..700nm, d=10
LCh : [ 76.069 69.545 103.506], CabWV_D65, 10 deg
Gloss: <Unset>

Checksum : 1258.240

nm      00      10      20      30      40      50      60      70      80      90
300
400    27.81   15.70   7.05   3.16   2.03   2.29   5.75   14.53   27.16   39.33
500    47.78   52.15   53.85   54.32   54.36   54.28   54.18   54.05   53.92   53.77
600    53.62   53.46   53.30   53.13   52.97   52.80   52.63   52.46   52.30   52.13
700    51.98
    
```

Selected Objects Attributes Display

The *attributes display* window provides additional information for color samples that have been selected on the Datacolor ENVISION desktop. This additional information is available when Datacolor TOOLS files have been imported.

Attribute	Blue 1	Blue 2	Blue 3
STD_FRM_FILE_NAME			
STD_CORD_ILLUM			
CMC_l	2.000000		
CMC_c	1.000000		
PLOT_COLOR_SPACE	0		
PLOT_COLOR_SPACE_CORD	1		
AVG_METHOD			
AVG_FIXED_NUM			
AVG_AUTO_METHOD			
AVG_AUTO_MIN_READS			
AVG_AUTO_MAX_READS			
AVG_AUTO_TOLERANCE			
STD_INPUT_METHOD	130		
STD_TOL_VALUES			
STD_TOL_PARAMS	-1,-1,-1,-1,-1,-1		
STD_R0			
STD_BJ_TAPPI525_UVExclude			
STD_wI(CIE)_UVExcluded			
STD_wI_CIE_Tint_UVExclude			
Measurement parameters	Specular comp...		

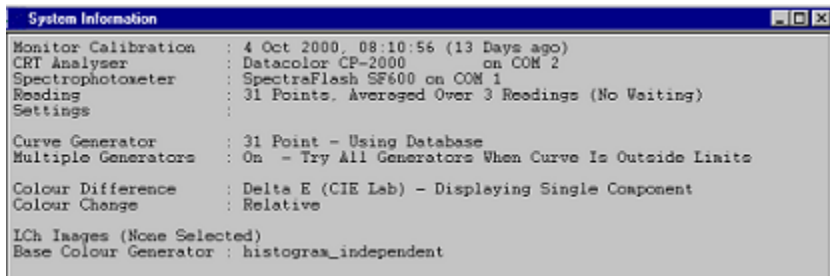
Datacolor TOOLS allows the user to create any number of user-defined fields for storage of sample data such as (e.g., manufacturer name, locations, product ID's, formulas, etc.). All fields included in the TOOLS file are displayed in the Attributes window.

The user can scroll both vertically and horizontally to view all attributes for any selected objects.

With the exception of the color name, the *Attributes* fields displayed in Datacolor ENVISION cannot be edited. This is to ensure integrity of data when files are exchanged between Tools and Datacolor ENVISION.

System Information

The user preferences currently in use are summarized in a separate window. This window can be viewed by selecting **Preferences, Display Preference Information:**



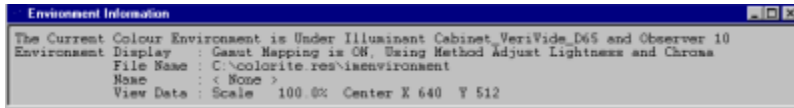
This contains the current system information. Most of it is stored in the user's preference file, and changed in the **Preferences** menu.

The synthetic curve information identifies the current **Curve Generator** and the number of spectral points.

- **Multiple Generators On/Try Alternative Generators.** When selected, when a synthetic curve is outside the normal limits (e.g., contains values below zero, or very large values), the system will use other curve methods to generate a valid curve.
- The color difference parameters are displayed (DE only, DL, Da and Db).
- **LCh images**
 - Displays the *Base Color Generator Method* for the system
 - Displays the LCh image sub-object *slave processing status*.
 - Displays a summary of the *Base color status of the LCh images* current selected.
 - It does not show the specific generators. This is provided as a summary.
 - Selecting individual images will show the base color generator for the selected sub-object in the LCh image.

Current Working Environment Information

The current working environment settings are summarized in a separate window. This window can be viewed by selecting **Display Environment, Display Environment Information**. A summary of the current environment conditions is displayed:



- If gamut mapping is **on** (Display Environment menu), the current gamut mapping method is displayed.

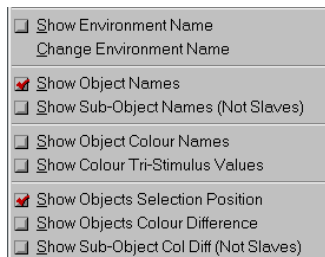
View Data

- If the *View* parameters have been customized (View menu), the view scaling and the center of the screen is shown.
- If the scaling is above 100%, the view area has been decreased (Zoom in)
- If scaling is below 100%, the view area has been increased (Zoom out).

Object Information

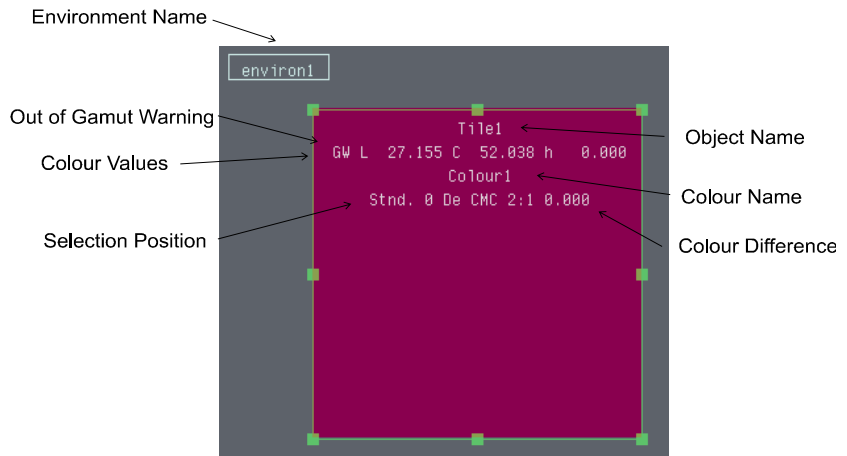
The *Display Environment* menu has options that control the display of information in the Drawing Area and on objects. Some of the data is always shown. Other data is selectively displayed. The options are enabled/disabled through checks next to the option.

- When the option is checked, the information will be displayed on the objects.
- If an object is small all the data will not be visible. Re-size the object to make more of the data visible.



- **Show Environment Name.** The name of the environment is displayed in the top left corner of the Drawing Area.

- **Change Environment Name.** This displays a tool that enables the name of the environment to be changed.
- **Show Object Names.** The name of the object is displayed on all the objects in the Drawing Area.
- **Show Sub-Object Names (Not Slaves).**
- **Show Object Color Names.** The name of the color of the object is displayed on the object.
- **Show Color Tri-Stimulus Values.** The values for the color of the object in the working color space are displayed on the object. The color space can be changed through the **Preferences** menu, **Select Main Tri-Stimulus Value To Show**.
- **Show Objects Selection Position.** This shows the order in which objects have been selected. This is useful when multiple objects are selected, and the operation to be performed depends on the selection order (e.g. re-coloring objects).
- **Show Objects Color Difference.** Displays the color difference between the standard and the batch object.
- **Show Sub-Object Color Diff (Not Slaves).** This displays the color difference between the sub-objects and the Standard sub-object within a single image.



Default/User Background Colors

The background color can be changed from the default cabinet gray to another color known as the *User Color*. The *User Color* can be set from a number of different sources: *White*, *Black*, *Standard Selected Object Color*, or *Spectrophotometer Reading*.

To change the background color of the current environment:

1. Select **Display Environment** from the main menu.
2. Choose **Select Background Color**.
3. Select **Set User Color To** and then select the required source for the user color.

To change the background color of the current environment to the default color:

1. Select **Display Environment** from the main menu.
2. Choose **Select Background Color**.
3. Select **To the Default Color**.

To change the background color back to the current user color:

1. Select **Display Environment** from the main menu.
2. Choose **Select Background Color**.
3. Select **To the Current User Color**.

When new environments are created, they are created with the default background color. When environments are saved, their current background color is saved with the environment. The default color can be changed, which affects all new environments.

To change the default color:

1. Set the user color to the required color.
2. Select **Display Environment** from the main menu.
3. Choose **Select Background Color**.
4. Select **Set Default Color To**.
5. Select **The Current User Color**.

To change the default color back to the original default cabinet gray:

1. Select **Display Environment** from the main menu.
2. Choose **Select Background Color**.
3. Select **Set Default Color To**.
4. Select **Original Default Color**.

To change the default color back to the previously stored default color:

1. Select **Display Environment** from the main menu.
2. Choose **Select Background Color**.
3. Select **Set Default Color To**.
4. Select **Last Stored Default Color**.

NOTES

Menus

Overview

There are two system menus:

- The *Main* menu from the Information Panel
- The *Pop-up* menu from the Drawing Area.
- Some tools also support their own pop-up menus.
- Pop-up menus are displayed by clicking the right mouse button. For example, by clicking the right mouse button in the Drawing Area, the main pop-up menu is displayed.
- Some menu options are active only when they can be used (e.g., after an object has been selected).
- Menu options followed by an arrow indicate the presence of a sub-menu.

NOTE

Depending on program level you have purchased, some of the menu items listed will be not available or enabled.

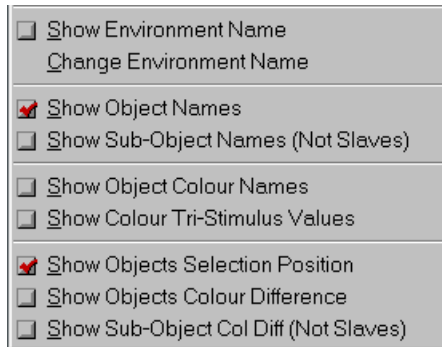
Menu Check Boxes/Toggles

The menus also contain toggles to indicate the selection of certain options. They operate as follows:

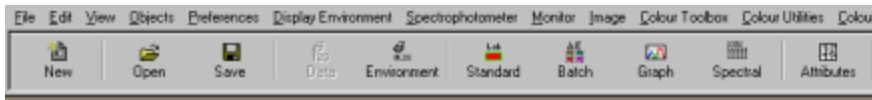
- Control a single set on or off options.

- Allow one of a number of related options to be selected.

Example: Single Set On/Off Toggle



Main Menu



The main menu bar appears at the top of the Information Panel and is accessed as any other Windows menu. The next section explains the options on the menu bar.

File

New. Creates a new environment. It deletes all the current objects and reset the environment. A dialog box requests confirmation of this action.

Open. Loads an existing environment. The environment is selected using the file dialog box that displays. *See also Files.*

Import. This option allows images to be loaded into the Drawing Area. Images are stored as either *CIE-based* (referred to as LCh) or *RGB-based* images. If the image selected is an RGB based image, there is an option to convert it to an LCh image. This allows the image to be manipulated immediately. *See also Reading RGB Based vs. LCh Images for a description of the difference.*

Using the Import option, images stored within any Datacolor ENVISION environment can be brought onto the current desktop environment, without importing the original environment settings.

Datacolor ENVISION supports the following image formats for import:

- *.BMP
- *.TIF (flat and multi-page)
- *.PCX
- *.JPG

Save Environment. This option enables the environment to be saved. You can overwrite an existing environment or create a new environment file. When an existing file is open and is being updated, the existing file is overwritten with the new environment. To prevent file overwriting, a dialog box requests confirmation that the file is to be replaced.

Save Environment As. This option saves the current environment, prompting for a destination directory and file name. This is used mainly for saving a modified copy of an existing environment, without overwriting the original.

Send To

- **Mail Recipient.** This option allows colors, images or whole environments to be exported to a remote system via email. The Datacolor ENVISION email window will be launched.
- **Datacolor TOOLS.** This option will send the base color reflectance values of all selected objects in the Drawing Area to Datacolor TOOLS. If TOOLS is not open, selecting this option launches the program, and the reflectance values will display as standard and batch(es) on the TOOLS desktop.
- **Receive Mail.** Emails and attached image/color files can be opened directly from the Datacolor ENVISION.

Export Image. This allows objects to be exported to files. The selected image is exported to a file chosen from the standard file select window. The available formats for export are:

- Microsoft BMP
- Datacolor ENVISION LCh
- RGB
- TIF (flat and multi-page)
- PCX
- TCI

Convert Images in Directory To. Converts all the image-files in the selected directory to the image file format chosen from:

- Microsoft BMP
- Envision LCh

Import Color Data To. Allows a color from a color file to be imported into objects.

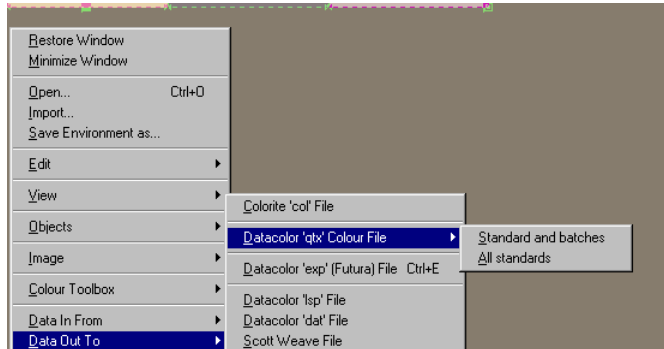
Selected Objects. The selected objects are colored using the colors in the selected file. If the file contains more than one color and more than one object is selected the colors are applied to the objects using the selection order of the objects.

Copies of Selected Object. Creates a new copy of the selected object with each color in the color file.

Create New Tiles. Allows an area to be specified in which new tiles are created and the colors in the selected color file applied.

Data Out To. Datacolor ENVISION allows the colors from the selected object to be exported in a number of color file formats. Choose the most appropriate for your applications. Note that all except the Scott Weave format are based on reflectance curve data.

- **Datacolor ENVISION 'col' Color File.** The color data is stored in a simple text format readable by Datacolor ENVISION systems. The precision is limited to two decimal places.
- **Datacolor 'qtx' Color File.** Datacolor TOOLS QC format. Under this option you can specify *Standard and Batch(es)*, or *All Standards*.



- **Datacolor 'exp' (Futura) Color File.** Datacolor Match format
- **Datacolor 'isp' Color File.** The color data is stored in *isp* file format.

NOTE

This format has 16 point, 6 decimal place precision.

- **Scott Weave Color File.** Scott Weave XYZ data format.

Quit. This option leaves the program.

Edit

Select All. This selects all the objects in the Drawing Area.

Select Only

- **All Tiles.** Selects only the tiles in the Drawing Area.
- **All LCh Images.** Selects only the LCh images in the Drawing Area.
- **All RGB Based Images.** Selects only the RGB based images in the Drawing Area.

Choose Selection Bias

- **By Rows First.** When objects are selected using Select All (or <CTRL> A), the objects are added to the selection moving across the screen. (See *Selection Order*).
- **By Columns First.** When objects are selected using Select All (or <CTRL A>), the objects are added to the selection moving down the screen. (See *Selection Order*).

Undo Last Color Change. This reverses the last color change made to the selected object.

Copy Color. This copies the colors of the selected object, and stores them as the paste color.

Paste Color. This colors the selected object with the current paste color.

Copy Object. This copies the selected object (all sub-objects) to the clipboard.

Copy Standard Sub-Object. This copies the standard sub-object of the selected image to the clipboard.

Paste Image. This pastes the contents of the clipboard to the Drawing Area.

Duplicate Objects. This pastes a copy of the currently selected object(s) into the Drawing Area, positioned at a small offset from the original object(s).

Duplicate Standard Sub-Object. This pastes a copy of the standard sub-object of the current selection to the Drawing Area, positioned at a small offset from the original.

Duplicate Visible Sub_Objects. This pastes a copy of the visible sub-objects of the current selection to the Drawing Area, positioned at a small offset from the original.

Undo Delete

- **Undo Last Delete Operation.** Restores all the objects deleted in the last delete operation.
- **Flush Undo Last Delete Objects.** The list of objects from the last delete operation is emptied.

Delete. Deletes the selected objects.

View

Full Screen Window. This will set the Drawing Area to occupy the full area of the screen.

Set To Normal Scale. This sets the scale to normal, (no zoom function is applied).

Move To Center of the Objects. Centers the Drawing Area in the window so that the objects are central.

Scale and Move To See All the Objects. This redraws the Drawing Area ensuring that all objects are fully visible in the window, changing the scale and moving the center as necessary.

Always Change To See All the Objects. When this item is selected, the Drawing Area will be re-drawn whenever the window is resized. The center is scaled and moved as necessary to ensure all objects are visible, and as large as possible.

Scale

- **Zoom In.** Expands the scale of the objects.
- **Zoom Out.** Reduces the scale of the objects.

Move. Moves all objects in the Drawing Area in the direction specified by the option:

- **Objects Up**
- **Objects Down**
- **Objects Left**
- **Objects Right**

Choose New Center for the Window. Enables the selection of a new center for the window. Click the left mouse button at the desired position.

Objects

Order

- **To Front.** This moves the selected objects to the top layer. This enables all the pixels in that layer to be visible.
- **To Back.** This moves the selected objects to the bottom layer. The only pixels visible from that object are those that have no value in the higher layers.
- **Forward One.** Moves the selected object forward one layer.
- **Back One.** Moves the selected objects back one layer.

Move

- **Align.** Aligns all batch objects in a multiple selection, with the Standard, object, based on the orientation selected:
 - Align objects to standard *top*.
 - Align objects to standard *left edge*.
 - Align objects to standard *bottom*.
 - Align objects to standard *right edge*.
 - Align objects to standard *center*.

Distribute

- **Re-Order Using Selection Bias First.** When checked, changes the selection order using either *By Rows First*, or *By Columns First*. See *Arranging Objects on Screen*.
- **Distribute selected object tops.** Identifies the two most extreme object locations in the selection, and positions the selected objects at an equal distance from adjacent objects, based on the orientation selected:
 - Distribute selected object *bottom*.
 - Distribute selected object *left*.
 - Distribute selected object *right*.
 - Distribute selected object *center*.

Lock

- **Lock object movement.** This prevents an object from being moved. If any objects in a multiple selection are locked, this prevents the movement of the whole selection.

NOTE

A locked object cannot be deleted from the desktop. It must be unlocked to be deleted or moved.

- **Unlock object movement.** This enables the object to be moved.

LCh Images

- **Create.** See *Creating New Objects*.
- **New Image from All Selected Images.** A new LCh image is created containing the displayed sub-objects from all the selected objects. Tiles in the selection are automatically converted first.
- **New Image from Image Standard Sub-Object.** When an LCh image is selected a new LCh image is created from its standard sub-object.
- **New Image from Image Displayed Sub-Objects.** A new LCh image is created from the displayed sub-objects of the selected image.
- **New Tiles beside Image from Displayed Sub-Objects.** This creates a series of tiles alongside the image, with one tile for each of the sub-objects displayed in the image.

Add

- **A Sub-Object in Image from Displayed Sub-Objects.** This creates a new sub-object in the selected image from all the displayed sub-objects in that image.

Delete

- **Standard Sub-Object in the Image.** This deletes the Standard sub-object from the selected image.
- **All Hidden Sub-Objects in the Image.** This deletes all the hidden sub-objects from the selected image.
- **All Visible Sub-Objects in the Image.** This deletes all the visible sub-objects from the selected image.

NOTE

There must always be at least one sub-object in an image. These operations are not possible when the resulting image does not contain any sub-objects.

Combine

- **Into Sub-Objects in the Standard Image.** This adds the selected batch objects to the Standard image. The Standard image must be larger than all the batch images.

Mirror

- **Horizontally.** This rotates the selected images individually 180° about vertical axes, through the center of each of the selected images.
- **Vertically.** This rotates the selected images individually 180° about horizontal axes, through the center of each of the selected images.

Convert To LCh Image. Use this option to convert the selected object (RGB based image or a tile) to an LCh format image. This enables editing and manipulation of the colors in the image. *See also LCh Images within the System.*

Show Object Names. This displays the names of the objects.

Enter Object Name(s). This enables the name of the object to be changed.

Add New Tiles Inside

- **LCh Image as Displayed Sub-Object Selection Tiles.** This creates a number of new sub-objects in the selected image, one for each of the displayed sub-objects. Each original sub-object is then slaved onto the new sub-object. This is useful when selecting sub-objects is difficult (if for example, sub-objects are small or overlap). Any operation performed on the new sub-objects will also be carried out on the original image sub-object. *See also Creating New Objects.*

Add New Tiles Beside. *See Creating New Objects.*

- **All Objects from All Synthetic Curve Methods.** Creates a series of tiles next to each selected object in its base color, using each of the available synthetic curve generators.
- **All Images from Their Displayed Sub-Objects.** Creates a series of tiles next to each selected object, one tile for each of the sub-objects in the image.

Add New Tiles to Fill. *See Creating New Objects.*

- **The Screen Area.** A number of new tiles are created to fill the screen. The program prompts for the number of tiles and the gap between the tiles.
- **The Selected Object Area.** A number of new tiles are created to fill the selected object area. The program prompts for the number of new tiles and the gap between the tiles.

- **Inside a Chosen Area.** A number of new tiles are created to fill the chosen area. The size of the new tiles is calculated using the width and height of the chosen area.
- **Across a Chosen Area.** A number of new tiles are created to fill the chosen area. The new tiles are created as vertical strips across the chosen area.
- **Down a Chosen Area.** A number of new tiles are created to fill the chosen area. The new tiles are created as horizontal strips down the chosen area.

Add New Tile To Position. A new tile is added to the Drawing Area. Left click the mouse button to identify the position to be used.

Preferences

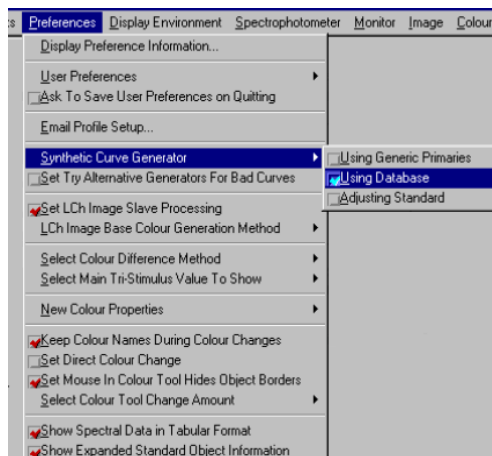
Display Preference Information. Displays a window containing details on the current preference settings.

User Preferences. These options allow the user to *Re-load*, *Save* and *Reset* the preferences.

Ask to Save User Preferences on Quitting. Normally the user preferences are saved automatically each time the user exits the system. When enabled, this option prompts the user to save the preferences.

Synthetic Curve Options. When a color is created or altered using a color tool (slider, enter curve, enter coordinates), a synthetic reflectance curve is generated to represent the color. These options control how the curve is generated.

Because the curves are generated mathematically, some results may generate negative values, or values approaching 100. In these cases, a different curve generation method should be used to generate a more realistic curve.



Synthetic Curve Generator

Select the default generator to use.

- **Using Generic Primaries.** The curve is generated from a database of generic primary colors designed for broad applicability. It will generate curves that can be used in numerous applications but are not specific to an application type, e.g. paints, plastics, textile dyes.
- **Using database.** This selection will use a database created from any color file (*.qtx, *.exp, *.col, etc.). This enables the user to load their own colorants as primary colors for generating curves.

To create this database:

1. Close Datacolor ENVISION.
 2. Using Windows Explorer, copy and paste the desired colorant file into the following file location: Documents and Settings\All Users\Application Data\Datacolor\Envision\Terminal_MACHINE_NAME\ColTools.Res\SynthCrv.res\primaries.res.
 3. When Datacolor ENVISION is restarted, the file is installed as the database. You may install only one database for this purpose.
- **Adjusting standard.** This method makes adjustments to the existing curve for the selected object, rather than creating a new curve based on a colorant database. This approach has advantages when making adjustments to colors applied to different substrates.

Set Try Alternative Generators For Bad Curves

When this is enabled, if a synthesized curve includes values less than zero, the system will scan through each of the curve generators and attempt to generate a curve that contains only positive values.

LCh Image Options

Set LCh Image Slave Processing. When this is enabled, any changes to a *Master* sub-object (i.e., one that has slaves attached to it) in an LCh image, will also affect the slaves of the master.

LCh Image Base Color Generation Method. This sets the default method for generating the single base color for a sub-object in an LCh image. The best method is *histogram independent*.

The base color generator for the selected standard LCh image is displayed in the Information Panel.

The following options apply the changes to the images as described:

- Update Standard Sub-Object In Selected LCh Image(s)
- Update All Sub-Objects In Selected LCh Image(s)
- Update Standard Sub-Object In All LCh Images
- Update All Objects In All LCh Images

Color Options

Select Color Difference Method. Selects the default color difference formula to be used.

NOTE

For systems that allow MS89, the set up for this is under the Color Toolbox menu.

Display Components. Gives the option to display either DE only, or all components (i.e., $L^* a^* b^*$) of the color difference equation. This affects the Information Panel display and the live Drawing Area color difference display. *Not supported for all program levels.*

Select Main Tri-Stimulus Value To Show. Selects the default colorimetric values to display. in the Information Panel and the Drawing Area. When a color tool is used for the first time, the tri-stimulus (color coordinate) type is read from this setting.

Color Tool Options

Set Direct Color Change. The program needs instructions for changing more than one object color at the same time. The options are

Direct. The color is set exactly or directly to all the selected objects when applied (i.e., via the cut/paste color).

Relative. Uses the relative differences between a batch object and the standard object. When color applied to the batch object is changed, the color applied to the standard object is changed by applying the same relative difference. When more than one object is selected and the color is changed, the batch objects maintain their color offsets from the standard object, with the standard object color being set exactly.

The color change method can also be selected locally, within tools that use it. This selection does not affect the default setting.

- **Set Mouse in Color Tool Hides Object Borders:** This controls the display of borders around selected objects, when the mouse is inside a color selection tool. This is important because the border affects how the color is viewed.

- **Select Color Tool Change Amount:** This allows the user to define the default change amount applied to the tri-stimulus values (color coordinates). This value is also selected locally from within tools that use it, and the local selections do not affect the default value.

Data Output Options

Show Spectral Data in Tabular Format. This controls printing and the Information Panel spectral data output. If this toggle is checked then the data is displayed as follows in table format:

```
Standard: c 8 Checksum:          752.147
nm    00    10    20    30    40    50    60    70    80    90
300
400    17.36  16.27  15.17  14.05  12.93  11.78  10.59   9.38   8.22
7.26
500     6.71   6.86   7.95  10.21  13.72  18.36  23.86  29.76  35.51
40.53
600    44.35  46.68  47.40  46.63  44.66  41.87  38.67  35.42  32.41
29.83
700     27.74
```

Otherwise it is displayed and printed in the following format:

```
Spectral Curve Point Values Summary:          Points Sum Check = 752.147
400 to 470  [ 17.36][ 16.27][ 15.17][ 14.05][ 12.93][ 11.78][ 10.59][
9.38]
480 to 550  [ 8.22][ 7.26][ 6.71][ 6.86][ 7.95][ 10.21][ 13.72][
18.36]
560 to 630  [ 23.86][ 29.76][ 35.51][ 40.53][ 44.35][ 46.68][ 47.40][
46.63]
640 to 700  [ 44.66][ 41.87][ 38.67][ 35.42][ 32.41][ 29.83][ 27.74]
```

Show Expanded Standard Object Information. When this option is enabled, additional information for the standard object (e.g., position, dimensions, displayed RGB, etc.) is displayed in the Information Panel.

Other Preference/Control Files

Changes are either saved in the main 'user' preference file or in specific files that are read by all users. The different files are described here.

CRT Analyzer

- The selected device and serial port.
- Saved automatically when any changes are made, in a specific file used by all users.

Communication Settings

- These are stored in text files in the *rs232.res* directory.

Spectrophotometer

- The selected device and serial port.
- Saved automatically when any changes are made, in a specific file used by all users.

MS89

- If MS89 is licensed, the MS89 tolerance and display settings are stored in a file used by all users.
- Stored in the Datacolor ENVISION **Global\ColTools.res\MS89.res** directory.

Display Environment

This set of data controls the color conditions applied to the Drawing Area, and any objects in it. It also controls the position and scaling of the Drawing Area, and defines the information displayed within objects.

Display Environment Files (Extension 'ime')

These files store the current display environment conditions, Drawing Area settings and any images and tiles on the system. The system will warn if an environment about to be saved contains RGB based images.

NOTE

When an environment is opened, it will restore the system to the conditions that were set when the environment was saved. The Drawing Area displays using the saved scale and position values.

If an environment is imported into the current environment, it will only import the objects, and not set any display conditions. The objects are placed where they were in their original environment.

The following color conditions are saved:

- Illuminant
- Observer
- Gamut Mapping On or Off
- Gamut mapping method

The following display environment settings are saved:

- Background Color
- Environment Name

- Perception Tiles On or Off

The following information may be displayed inside objects:

- Object Names
- Sub-Object Names in LCh Images (unless a slave)
- Object Color Names
- Object Tri-Stimulus Values
- Live Selection Feedback on Position in Selection Order
- Live Selection Feedback on Color Difference from Standard Object
- Live Selection Feedback on Color Difference from Standard Sub-Object in LCh Images

On/Off settings for these options are saved.

Environment Menu Options

Display Environment Information. Displays a window containing details on the current environment.

Default Environment. This is the environment for a user that is read automatically when the system is started.

Revert to. Re-load the current default environment.

Save Current As. Save the current environment as the default.

Delete. Deletes the user's default environment. A confirmation message is displayed.

Select Background Color. Options to set and get the background color.

To The Default Color. Sets the color to the default background color.

To The Current User Color. Sets the color to the last color used.

Set User Color To. Changes the background to one of several options, e.g. white, black, spectrophotometer reading, etc.

Set Default Color To

- **The Current User Color.** Sets the default background color to the current user color. This will effect all new environments.
- **The Original Default Color.** Sets the default background color to the default cabinet gray. This will affect all new environments.
- **The Last Stored Default Color.** Sets the default background color back to the last stored default color.

Apply to Selected Object(s). Sets selected objects to the current background color.

Select Background Format. The background can be changed from a plain or light cabinet effect. In plain mode, an LCh image can be texture-mapped into the background.

Virtual Light Booth. The background is displayed as a light cabinet.

Plain Color. The background is the current color.

Textured. This enables/disables any texture that had been set into the background.

Set Texture From. The user sets the background texture from the current LCh image.

Show Perception Tiles. Enables/disables the display of perception tiles. The black and white perception tiles should be on, and visible for proper color perception.

Set Gamut Mapping On. Turns on the gamut mapping and re-calculates all the current system objects, using the method selected.

Gamut Mapping Method. Allows the user to choose different gamut mapping methods. The default method is Adjust Lightness and Chroma. This is a useful tool, but the calculation may be slow to execute.

Show Environment Name. Displays/hides the Drawing Area environment name display. This is found in the top left corner.

Change Environment Name. Opens a text entry tool for entering the environment name.

Show on Objects Options. Various object properties may be displayed. *See also Objects and Preferences for a full description of the object properties that can be displayed.*

Spectrophotometer. *See Spectrophotometer Setup and Use Monitor.*

Calibrate Monitor. Opens the monitor calibration window in *Calibrate* mode. *See also Monitor Calibration.*

Test Calibration. Opens the monitor calibration window in *Display Test Result* mode. *See also Monitor Calibration.*

Image

Resize. This allows the selected image to be re-sized by a specific factor.

Edit LCh Image. This accesses a suite of image processing tools that allow editing of the image in a variety of ways. *See Image Processing.*

Automatically Separate LCh Image. This automatically separates the selected LCh image into sub-objects, with one sub-object for each color in the image.

Color Toolbox

Enter Colors from Co-ordinates. This allows the lightness, chroma and hue co-ordinates to be entered from the keyboard. *See also Enter Co-ordinates Tool.*

Enter Colors from Curve. This allows values on the curves that describe the color to be entered. *See also Enter Curve Data.*

Enter Color Names. This allows a name to be entered for the color. *See also Enter Color Name.*

Color Slider. This allows colors to be changed or created using the sliders to modify the lightness, chroma and hue values. *See also Color Slider.*

Color Slider In View. Creates a Color Slider Tool set in the Drawing Area.

Color Management. A collection of reflectance curves can be saved as a colorway. These colorways can be manipulated using this tool.

Color Graphs. This displays the Color Graphs window. The plots available from this window include Hue Distribution, Color Spread or LCh Color Plots of the selected object(s).

Color Utilities

This menu contains a number of tools for re-coloring and re-positioning objects on the screen. It also includes options to convert spectral curves and re-calculate base colors.

Multiple Illuminant View. This option displays the selection under several illuminants. A maximum of four objects may be selected.

Spectral Curves:

- Convert to Datacolor 16 Point Curve
- Convert to Datacolor 31 Point Curve
- Convert to Datacolor 35 Point Curve
- Convert to Datacolor 40 Point Curve

Create Tiles from All Synthetic Curve Methods. Displays a series of tiles next to each selected object. Each is displayed in its calculated base color, using each of the available synthetic curve generators.

Re-Color Selected Objects. Automatically re-colors the selected objects.

Between Chosen Start and End Object Colors. This re-colors the selected objects using intermediate colors between two chosen objects.

Between The Standard and Final Object Colors. This re-colors the selected objects using intermediate colors between the standard and final selected object. *See also Distributing Intermediate Colors Between Standard Object and Final Batch Object.*

Re-Order using Selection Bias Before Re-Color. When enabled, the re-coloring is applied to objects according to screen position and the Selection Bias option. *See also Selection Order.*

Re-Position Selected Objects. For operations to automatically re-position selected objects according to their color data. (See 'Ordering Objects by Color Order or Color Difference').

By Color. Gives a choice of the color ordering the selected objects will be sorted into.

By Color Difference. Orders the selected objects according to their color difference from the standard object.

Color Conditions

Select Observer. This option allows the observer to be changed. *See also Viewing Objects under CIE 2 Degree or 10 Degree.*

Sort Illuminants In Tool. If additional illuminants have been installed for use Datacolor ENVISION, the illuminants are sorted alphabetically in the *Illuminant Tool*.

Select Illuminant. Selects the illuminant under which the Drawing Area is viewed. *See also Viewing Objects under Different Illuminants.*

Color Data

All Co-ordinate Data (DB compatible). Saves the color coordinate data of the selected objects, as a text file.

Delimited Spectral Data (DB compatible). Saves the spectral curve data of the selected objects, as a text file.

Spectral Data Across. Saves the spectral curve data of the selected objects in tabular format, as a text file.

Spectral Data Down. Saves the spectral curve data of the selected objects in a column format, as a text file.

Co-ordinate Data. Saves the color coordinate data as a text file.

Color Difference Data. When two or more objects are selected, the color difference data is saved as a text file.

Window

Raise Tools. Any tools that are open are brought to the front of the screen.

Lower Tools. Any tools that are open are placed at the back of the screen. Only the Drawing Area and Information Panel are visible.

Information Panel. Makes the Information Panel window visible.

List of Tools that are Open. Lists all open tools. Select a tool name, to move it to the front of the screen.

Keyboard Shortcuts

The following contains a list of frequently used keyboard shortcuts.

Key	Modifier	Action
a	CTRL	Select all objects
d	CTRL	Duplicate selected objects (By Small Offset)
l	CTRL	Toggle for locking / unlocking selected objects
u	CTRL	Undo last color change for selected objects
c	CTRL	Set paste color to the Standard object's color
v	CTRL	Set the selected objects' color to the paste color
o	CTRL	Select an environment to load
s	CTRL	Save current environment
r	CTRL	Re-Color Selected Objects Between Start and End Object
b	CTRL	Re-Color Selected Objects Between Standard and Final Object
e	CTRL	Export selected objects' colors to an 'exp' file.
q	CTRL	Quit program
Space Bar		Toggle Information Panel between the front/back of the display
ESCAPE		Lower all tool windows to the back of the screen
(Often above tab key)		Raise all tool windows to the front of the screen
DELETE		Delete selected objects
HOME		Move selected objects to front
END		Move selected objects to back
PAGE UP		Move selected objects up one layer
PAGE DOWN		Move selected objects down one layer
Up arrow		Move selected objects up by 1 pixel
Down arrow		Move selected objects down by 1 pixel
Left arrow		Move selected objects left by 1 pixel
Right arrow		Move selected objects right by 1 pixel

Function keys F5, F6, F7, and F8 are programmable illuminant change keys.

F5	Change illuminant (Normally D65)
F6	Change illuminant (Normally TL84)
F7	Change illuminant (Normally A)
F8	Change illuminant (Normally undefined)

The following keyboard shortcuts involving the keypad only work with 'Num Lock' ON:

'8'	Move objects up a page
'2'	Move objects down a page
'4'	Move objects left a page
'6'	Move objects right a page
'7'	Zoom in on Drawing Area
'1'	Zoom out on Drawing Area
'5'	Reset the scaling and center the Drawing Area

Spectrophotometer Setup

About the Instrument Menu

This section documents the instrument interfaces that are available with Datacolor ENVISION. An instrument interface refers to the connection between the color-measuring instrument (usually a spectrophotometer), and a desktop computer. For every instrument, the interface includes both hardware and software settings to enable successful communication.

NOTE

Your system **MUST** have an A: drive in order to operate the instrument driver setup.

Accessing the Instrument Menu

The instrument options on the menu bar are used to calibrate your instrument, set instrument defaults in the software, and set parameters for measuring whiteness. The instrument menu can also be used to make a quick measurement and analyze the data, without naming the sample or storing the data.

To access the instrument options, do the following:

1. From the Windows desktop, double-click the **Datacolor ENVISION icon**.
2. When the Information Panel appears, move to the menu bar, and click **Spectrophotometer**. A drop-down list appears with the list of menu options.
3. To select a menu option, simply click on it. The right-facing arrow along side on option indicates there is a secondary list of submenu options (e.g., *Instrument*, *Whiteness Setup*) to choose from.

Instrument Installation

Software Installation

The installation of the Datacolor ENVISION software does not include the selection of an instrument model. Following the program installation, you must select the instrument you have attached to the computer. *See also the Software Installation instructions included with the system for details regarding software and instrument installation.*

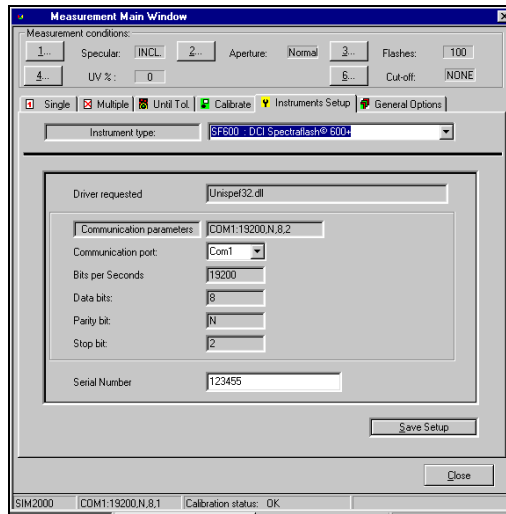
NOTE

Some of the options on the Instrument Menu are used primarily to change or add instruments after the software is installed.

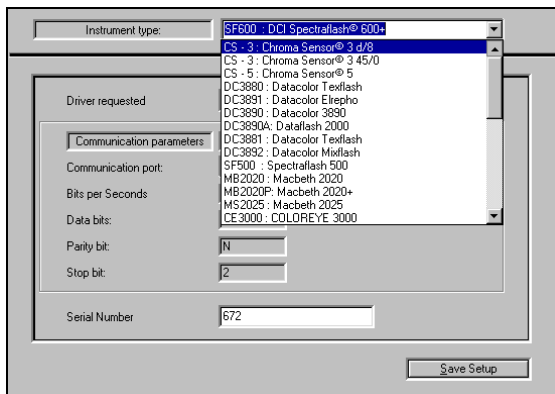
Instrument Installation

This option allows you to change an instrument after software installation.

1. Launch Datacolor ENVISION.
2. In the main window, move to the menu bar, and select **Spectrophotometer, Instrument Setup**. The Measurement Main Window opens, and the Instrument Setup tab is displayed.



3. To display the list of available instruments, click the down arrow next to the *Instrument Type* field.



- To view the complete list of instruments, move the scroll bar on the right up/down.
 - When the correct instrument appears, click to highlight it.
4. Select the desired communication port:
 - Click the down-arrow next to the *Communication Port* field to view the available ports.
 - Click to highlight the port to be used.
5. In the *Serial Number* field, enter the serial number of the white calibration tile.
6. When all selections are made, click the **Save Setup** button.

Instrument Calibration

The calibration procedure standardizes the instrument to compensate for any changes in performance over time. Changes in the environment and the age of the instrument can affect the measurement data. The calibration routine produces factors that are applied to the measurement data to account for these changes. The factors are based on the original reflectance values for the white calibration tile stored at the factory.

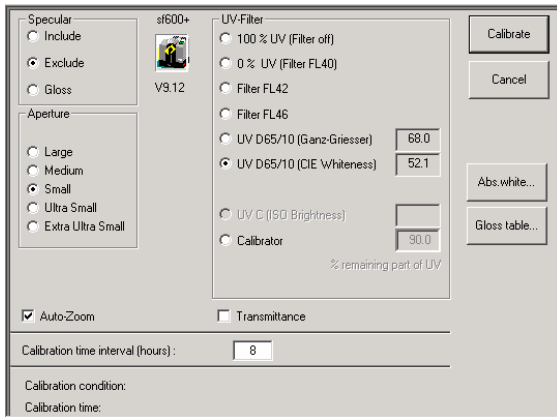
The calibration procedure requires the measurement of the white tile and a black trap.

To access the instrument calibration options:

- From the desktop, move to the **Spectrophotometer** menu, **Calibrate**.

Calibrate Tab

The calibration tab is displayed. It is used to select and edit the instrument conditions to be used for calibration and measurement activities.

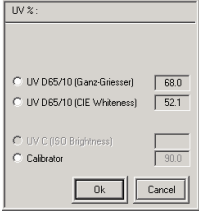
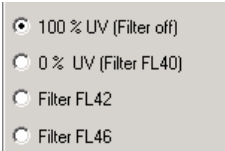


In the Calibration conditions dialog box, make your selections/entries according to the guidelines provided below.

NOTE

Depending on your instrument type, the features available on this screen may change.

FIELD	DESCRIPTION
Specular	This field determines whether the measurements made are <i>Specular Included (SCI)</i> or <i>Specular Excluded (SCE)</i> . This option is used to include or exclude the surface effects in the measurement. <i>Specular Included</i> includes the influence of the surface on the reflectance measurement. <i>Specular Excluded</i> excludes the surface effect from the measurement. <i>Gloss</i> makes two measurements of the sample; one specular included, and the other specular excluded.
Aperture	This refers to the measurement port and lens position. Your sample must completely cover the port size you select. Some instruments have one aperture size.
UV filter Adjustable Filter Options. The options included below are used to position the adjustable UV filter	This option identifies the UV filter position to be used for UV calibration and measurements. This option is not available for all instruments. UV D65/10 (Ganz-Greisser). This procedure uses the Ganz-Greisser calibration method. Ganz-Greisser is a separate calibration procedure using a specific equation and instrument-specific factors to determine the correct position of the UV filter. The light source is

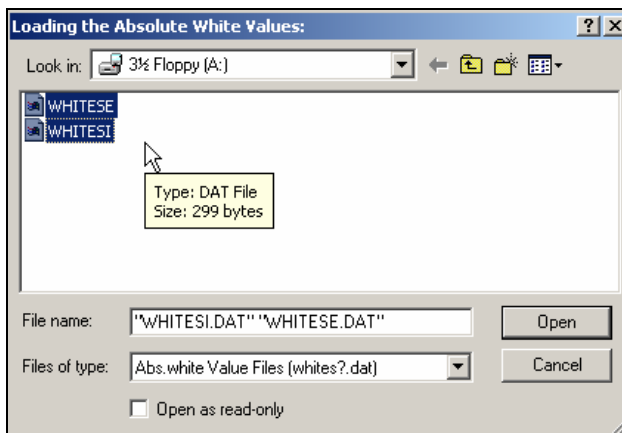
FIELD	DESCRIPTION
	<p>filtered to simulate the D65 Illuminant, and target whiteness value is based on 10° standard observer data. The Ganz-Griesser whiteness value for the fluorescent calibration standard is used as the target.</p> <p>UV D65//10 (CIE Whiteness). When this calibration is performed, the light source is filtered to simulate the spectral power distribution of the D65 Illuminant. This is the procedure to use for performing a CIE Whiteness evaluation (ISO 11475).</p> <p>UV C (ISO Brightness). The light source is filtered to simulate spectral power distribution of the C Illuminant. This is the procedure used for ISO 2470 (Brightness).</p> <p>Calibrator. Identifies the current position of the adjustable UV filter. This is expressed as a percent of the filter extended into the light source path.</p> <p>NOTE For Datacolor instruments with motorized UV filter wheels, the adjustable UV filter setting will default to 68%. You should ensure the correct setting is enabled for this filter prior to initial calibration.</p>
<p>UV-Excl. Cut-off filters option (if available)</p> 	<p>The options included below are used to select the cutoff filter to be used when measuring fluorescent samples. This option is not available for all instruments.</p> <p>100% UV. The UV component in the light source is included. This is the condition of instruments that are not fitted with UV filters.</p> <p>0% UV. This is a fixed filter that excludes the light from wavelengths below the cutoff point. FL40 excludes wavelengths below 400nm. This is the recommended filter position for the "UV-excluded" condition, when evaluating the whiteness of fluorescent samples.</p> <p>FL42. This is a fixed filter that excludes the light from wavelengths below the cutoff point. FL 42 excludes wavelengths below 420nm.</p> <p>FL46. This is a fixed filter that excludes the light from wavelengths below the cutoff point. FL 46 excludes wavelengths below 460nm. This selection can be used to identify molecules that absorb energy in shorter wavelengths of the visible spectrum (i.e., above 460nm) and re-emit it in the longer wavelengths (i.e., above 560nm). These wavelengths are associated with the yellow, orange or red regions of the visible spectrum. It is not used for whiteness evaluations.</p>
<p>Transmission</p>	<p><i>Datacolor ENVISION does not support the display of transmission measurement values.</i></p>

FIELD	DESCRIPTION
Abs. White	Click on this button to install white tile calibration values specific to your instrument. <i>See also Installing Calibration Data.</i>
Calibration time interval	This determines when the instrument needs to be recalibrated.
Auto-Zoom	This can be activated on instruments capable of automatically changing the lens size or lens position.

Installing Calibration Data

If this is a new instrument, you will need to install the calibration data. The calibration data can be found on a diskette or CD included with the calibration tiles. The data is installed as part of the instrument configuration, using software options controlled by the Datacolor program you are running. Below is an example of the installation procedure.

1. When you complete the software instrument configuration and select **Save Setup**, the program prompts you to place the diskette or CD containing the calibration data in the appropriate drive. When you do this, a screen similar to the one below will display:

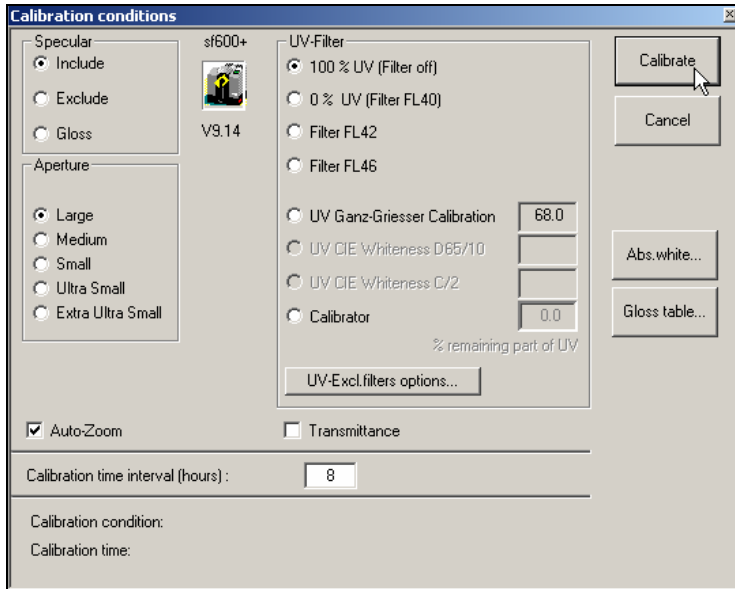


2. The system defaults to Drive A:, and two files containing calibration data are displayed. You must load both files.

NOTE

If the data is on a different driver, browse to the correct drive and retrieve the calibration files.

3. Highlight both file names, and click **Open**. The files are transferred to the system. When the transfer is completed, the program will prompt you to calibrate the instrument. A calibration screen similar to the one below will appear:



4. Click **Calibrate** to start the instrument calibration or **Cancel** to close the window.

NOTES

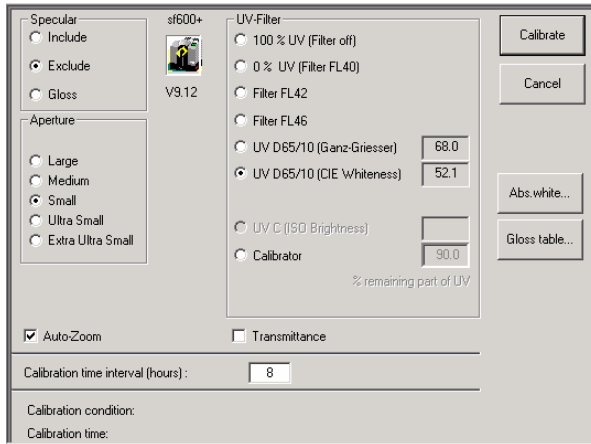
Both the whitesi.dat and whitese.dat files are required to properly operate the instrument. You must select and load *both* files when prompted.

This process must be completed for each instrument that will be used with the Datacolor ENVISION software.

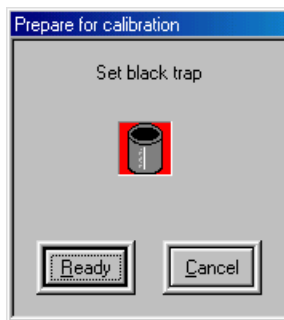
Instrument Calibration Procedure

To start the calibration procedure:

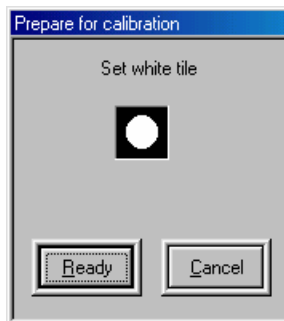
1. From the main ENVISION window, click the **Spectrophotometer** menu, **Calibrate** button. The window below displays:



2. Click the **Calibrate** button. The program will prompt you to measure the black trap.

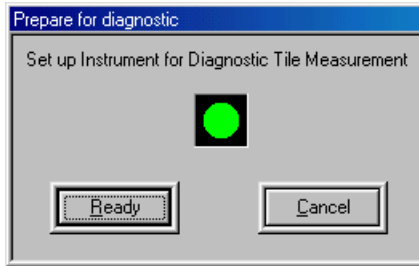


3. Position the black trap at the instrument port and click **Ready**. When the measurement of the black trap is completed, the following window displays:



4. Position the white tile at the instrument port and click **Ready**.

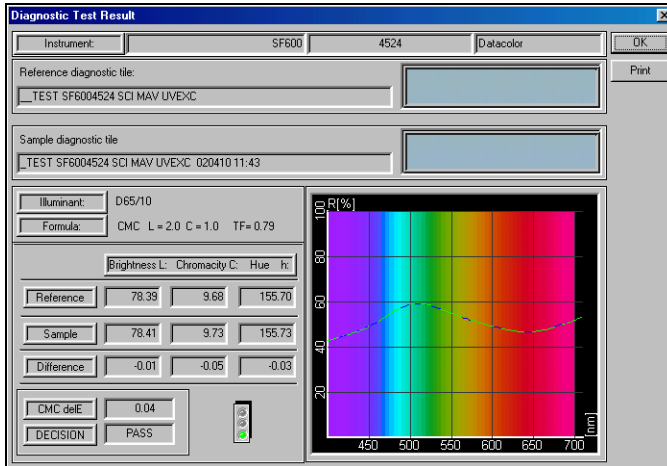
A green tile measurement may be included as part of the calibration procedure. When it is included, you will next be prompted for a green tile measurement:



NOTE

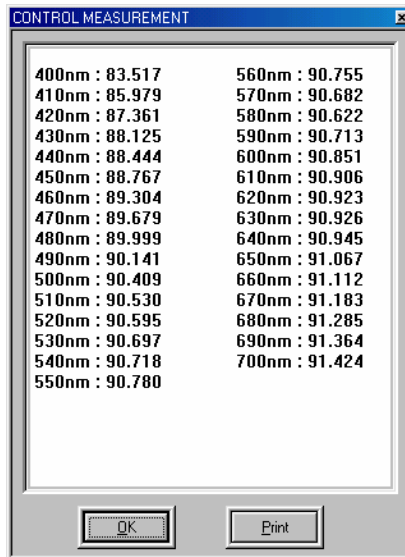
If you are **not** prompted for a diagnostic tile measurement, go to step #8 below.

5. Place the green tile at the instrument and click on **Ready**. When the green tile measurement is completed, a window containing the test results displays:

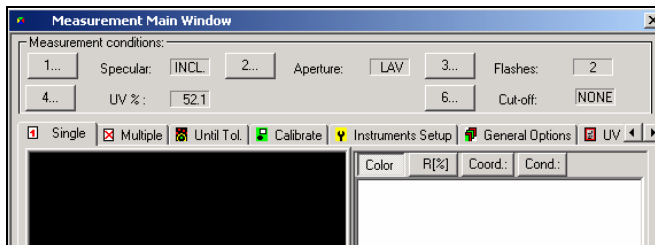


6. If the *Decision* is **Pass**, click **OK** to close the Diagnostic Test Result window.
7. If the result is **Fail**, check the following:
 - **Instrument configuration.** Make sure that the settings are correct.
 - **Cable.** Verify that it is connected to the correct port, and is securely fastened.

- **Calibration tiles.** They should be clean of any debris and should not be scratched.
 - When everything is verified, recalibrate the instrument.
8. When the green tile measurement is not included in the calibration procedure, white tile data displays after the white tile is measured:



9. Click **OK**. The Measurement Main Window displays.



10. Click the **X** at the top right corner of the window to close it.

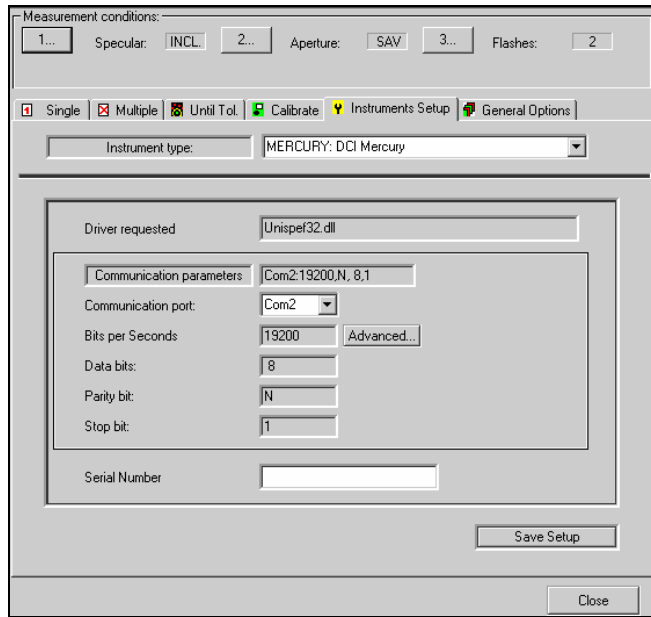
Instrument Setup Tab

The Instrument Setup option controls the operating conditions of the spectrophotometer. Each instrument may have different options available. If an option is not available, the text for the option are grayed out.

WARNING

The communication parameters should not be changed, unless there is a problem with the instrument communicating with the software. This can be done with the assistance of Datacolor personnel.

1. In the main window, move to the menu bar, and select **Instrument, Instrument Setup**. The Measurement Main Window with the Instrument Setup tab displays.

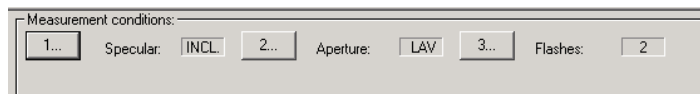


Measurement Conditions

- **Specular.** This option controls the position of the specular port. You can make measurements either *Specular Component Included (SCI)* or *Specular Component Excluded (SCE)*. The selection depends on the particular application, and the sample being measured.
- **Aperture.** Identifies the aperture plate used for the measurement. For many instrument models there are multiple apertures available. This selection depends on the instrument used, and the size of the sample.
- **Flashes.** Number of times the lamp flashes for each measurement. Using multiple flashes enhances the illumination of the sample, and the number is typically increased when measuring dark samples. The default setting is 2.

To change any of the current conditions, do the following:

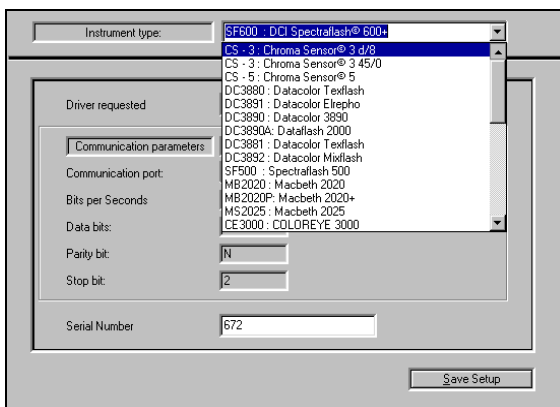
1. Click in the numbered button (1, 2 or 3) for the measurement condition.



A dialog box similar to the one below displays:

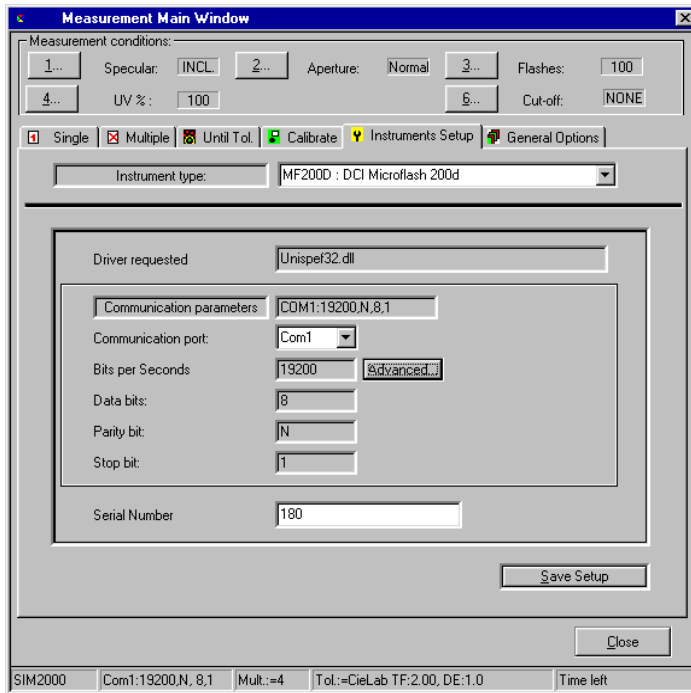


2. Click the down arrow next to the *Instrument Type* field, to display the list of currently defined instruments.



3. Move the scroll bar on the right up/down to view the complete list.

- When the correct instrument is displayed, click to highlight it.



- In the *Communication Port* field, click the down arrow, and select the correct communication port.
- In the *Bits per Seconds* field, the baud rate for the instrument is displayed.

WARNING

The *Bits per Seconds* field should not be changed unless there is a problem with the instrument communicating with the software. This can be done with the assistance of Datacolor personnel.

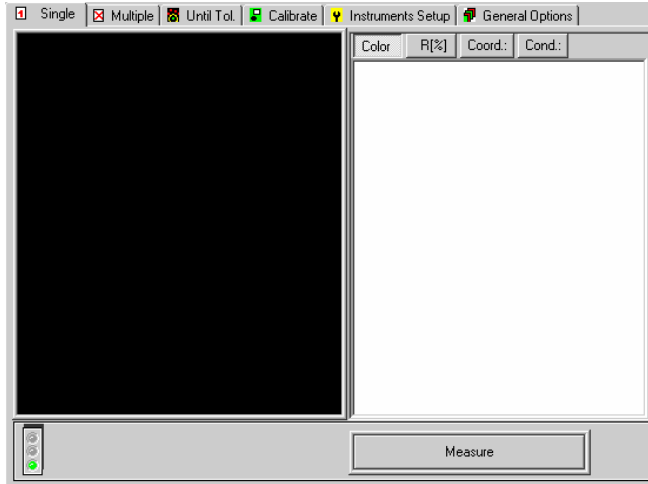
- In the *Serial Number* field, enter the serial number of the instrument. (For Datacolor instruments, this is usually found on a label on the back of the unit.)
- Click the **Save Setup** button.

Single Tab

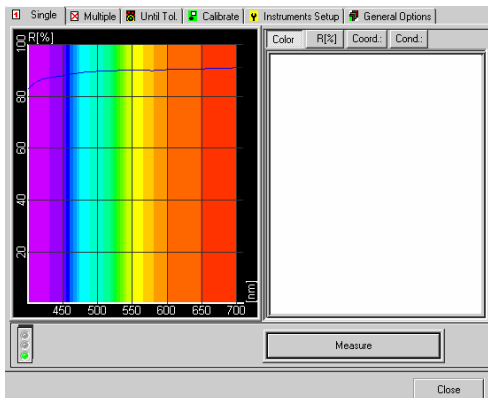
The Single tab allows you to make a single measurement. There is no capability to enter a sample name, or store the data. It can be used to quickly check the measurement of a sample, without leaving the Instrument Menu.

To start the measurement process, do the following:

1. Click on the **Single** tab.



2. Position the sample at the instrument port, and click Measure.
3. Choose the type of data to be displayed (Color, R%, Coordinates, Condition) by clicking the button.



- **Color.** Displays a color patch and reflectance curve plot.
- **%R.** Displays reflectance values and reflectance curve plot.

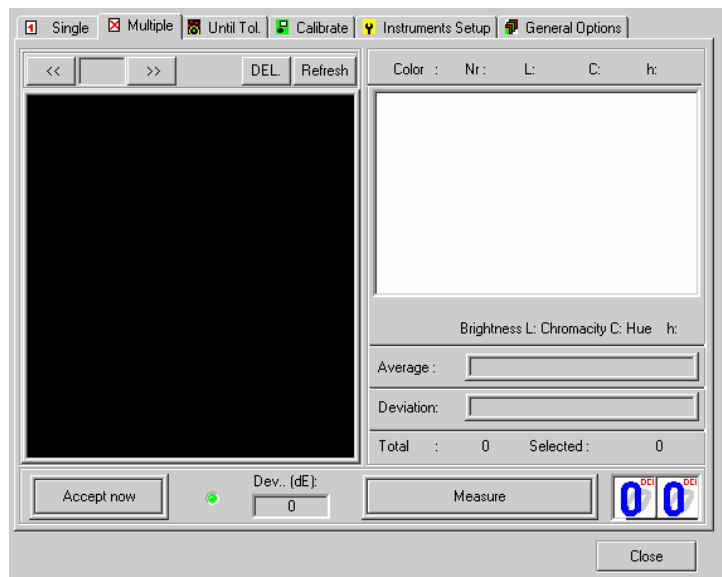
- **Coord.** Displays the measured color coordinates for the sample.
- **Cond.** Displays instrument conditions for the sample measurement.

Multiple Tab

The Multiple tab allows you to average a series of measurements for a single sample. This measurement technique is commonly used to measure samples that do not have a uniform surface, such as textiles, textured paint, etc.

To start the measurement process, do the following

1. Click the **Multiple** tab.



2. Position the sample at the port. You may want to track the orientation of the sample by placing an arrow or some other marking on the back of the sample.
3. Click the **Measure** button.
4. For the next measurement, reposition the sample at the port, and click the Measure button again.

After each measurement, the average of the scans is calculated. The deviation between each individual scan is calculated, based on L, C, h values, and is expressed as Delta E. There is also a counter displaying the number of measurements that have been made.

- To exclude an invalid measurement, highlight the invalid measurement, and click the **DEL** button.

- To recalculate the average after a measurement is deleted, click the Refresh button. The *Average* and *Deviation* information is recalculated.
5. When the specified measurements are completed, the *Measure* button will be labeled **Accept**.
 6. To accept and save the measurements taken click **Accept**. This measurement stored will be the last calculated average.

TIP

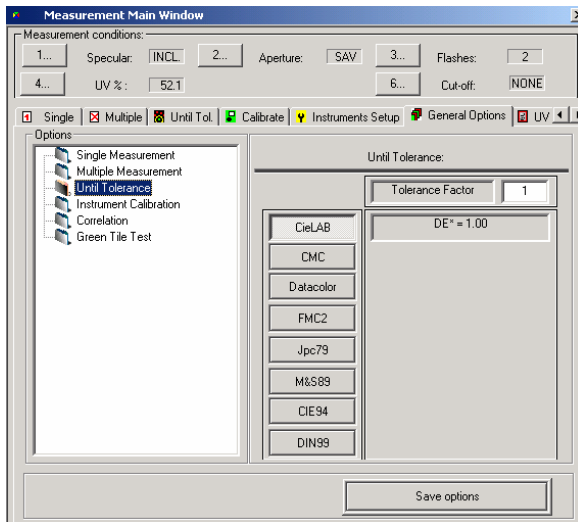
The number of measurements to be averaged is defined in *General Options, Multiple Measurement*.

NOTES

- 1) The measurements made in this option are not named.
- 2) The measurements made in this option are not stored, and cannot be retrieved for use at a later time.
- 3) The measurements made in this option do not appear on the desktop.
- 4) The number of measurements made is defined in General Options, Multiple Measurements.

Until Tolerance Tab

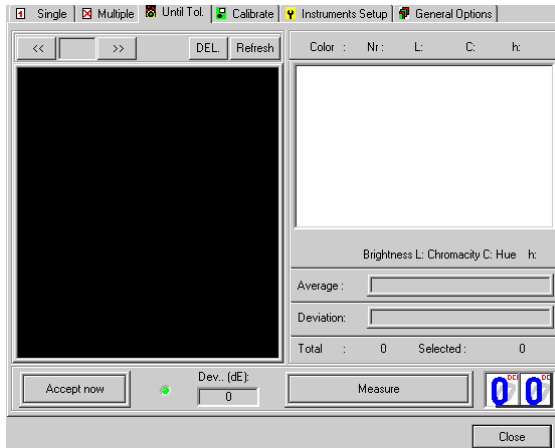
The Until Tol. Tab is used to determine the number of measurements required to accurately describe the sample when multiple measurements need to be averaged for a single sample. It can be used to establish a procedure for measuring samples that do not have a uniform surface.



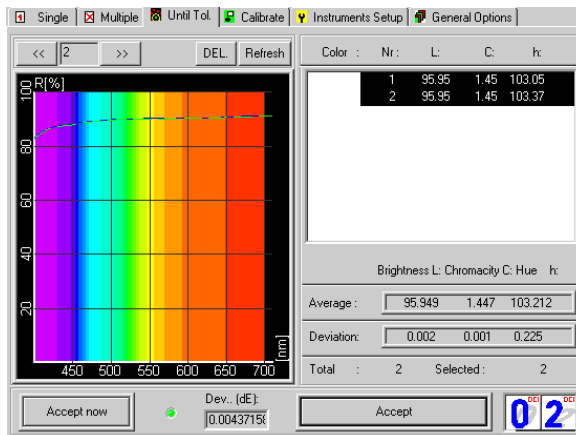
A color difference tolerance is used to specify the amount of deviation that an individual measurement can introduce into the average measurement. When the deviation is less than the specified tolerance, the averaged measurement is an acceptable representation of the sample. The tolerances are defined by clicking the General Options tab. See also *General Options Tab*.

To start the measurement process, do the following:

1. Click the **Until Tol.** tab.



2. Position the sample at the port.
3. Click the **Measure** button. It may be necessary after each measurement to reposition the sample.
4. Repeat the sequence until the *Measure* button on the right is labeled **Accept**. The number of readings require to reach the tolerance is displayed on the lower right corner of the window.



Until Tolerance Window Buttons

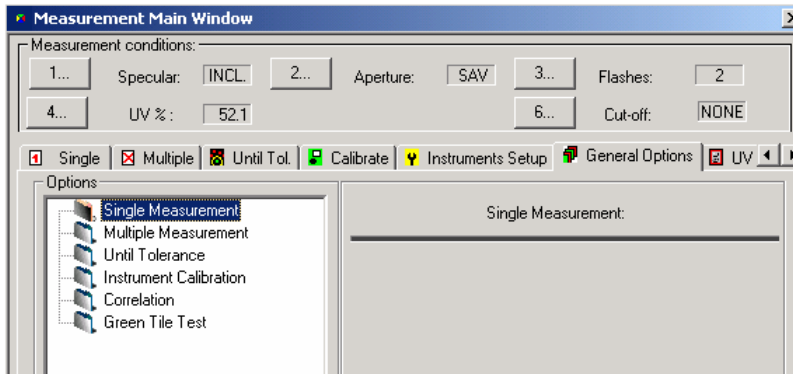
- **VCR Buttons.** Allows you to browse through the scans made for the current sample.
- **DEL.** Allows you to delete an individual scan from the measurement. When you know that there is an error in an individual scan, you can delete it rather than repeating the entire procedure.
- **Refresh.** Resets the display.
- **Accept Now.** This allows you to accept the composite measurement regardless of whether the tolerance has been met.
- **Measure/Accept.** This button is used to start each individual scan. When the tolerance has been satisfied, the button label changes to *Accept*. Click on **Accept** to complete the procedure.

Calibrate Tab

See also *Instrument Calibration*.

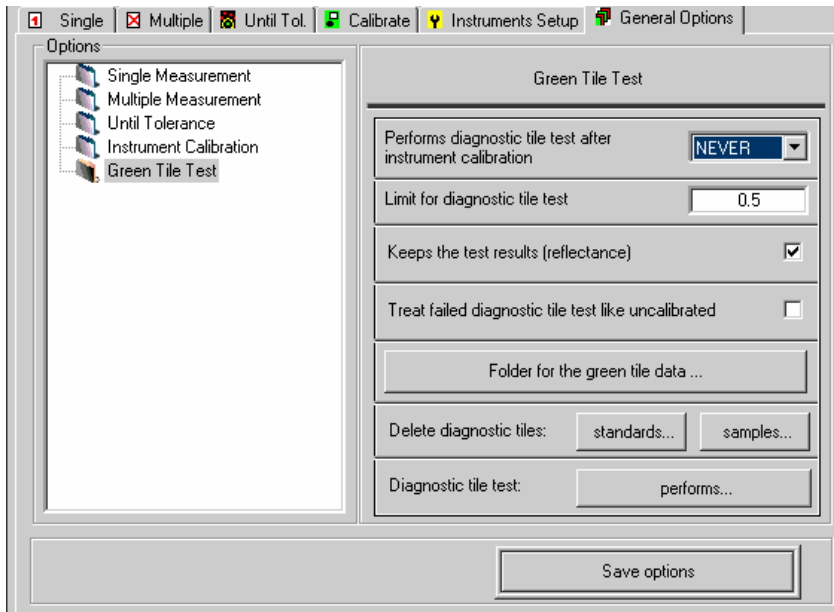
General Options Tab

The General Options tab defines the parameters used for single measurement, multiple measurement, until tolerance, and instrument calibration.



Instrument Correlation. This option enables the application of correlation factors to measurement data. This is only valid for systems that include the Datacolor MAESTRO correlation program.

Green Tile Test. A green diagnostic tile is included with most Datacolor instruments, and is used to perform a routine check on the instrument during calibration. This screen sets up the parameters for the diagnostic test.



- **Performs diagnostic tile test after instrument calibration.** Options include the following:
 - **Never.** Following the normal calibration procedure, the program does not ask for the measurement of the diagnostic tile.
 - **Always.** Following the normal calibration procedure, the program asks for a measurement of a diagnostic tile.
 - **Optional.** Following the normal calibration procedure, choose whether or not to measure the diagnostic tile.
- **Limit for diagnostic tile test.** This defines the acceptable color difference between the current measurement of the diagnostic tile and the stored measurement of the tile. It is expressed in CIEL*a*b* values.
- **Keeps the test results (reflectance).** Saves the measurement results of every green tile test.
- **Treat failed diagnostic tile test like uncalibrated.** If the diagnostic tile test exceeds the CIE Delta E limit, it flags the instrument as *not calibrated*.
- **Folder for the green tile data.** Defines the folder name to store all diagnostic tile measurements during calibration of the instrument.

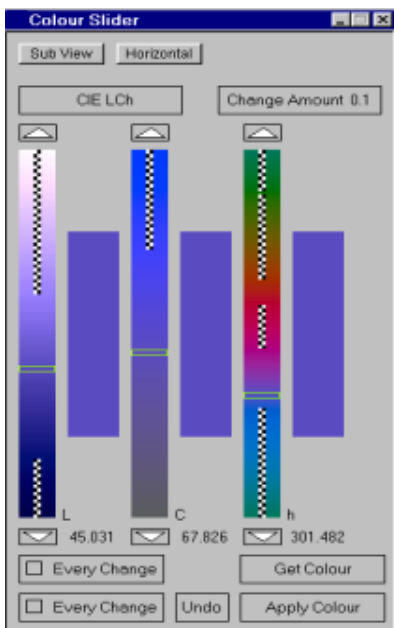
- **Delete diagnostic tiles.** Two options are available:
 - Standards. When selected, the program deletes the first stored measurement of the diagnostic tile from a data folder.
 - Samples. When selected, deletes one or more subsequent measurements of the diagnostic tile from a data folder.
- **Diagnostic tile test.** Button currently disabled.
- **Save options.** Saves the changes to green tile test setup.

The Color Toolbox

The Color Slider

This tool enables colors to be selected, using the sliders. The color can then be applied to the selected objects, (*Apply Color*). Colors can also be retrieved from a selected object, and displayed on the sliders in the Color Slider tool (*Get Color*). If the Illuminant or Observer is changed while the Color Slider tool is open, the color bars in the tool will change based on the new selection. See also *Viewing Objects Under Different Illuminants and Viewing Objects Under CIE 2 Degree or 10 Degree*.

The Color Slider tool can be found under the Color Toolbox menu. It can be accessed either from the main menu or the pop-up menu.



- Right-click on any of the buttons to access the **Options** menu.

Color Space (CIE LCh). The default color space used in Datacolor ENVISION is *Cie LCh*. Right-clicking this button offers XYZ, xyY, LCh, Lab, Luv, Hunter Lab color models as options.

Change Amount. This determines the amount by which the color component is changed when using the arrows on the sliders. When the tool is opened, the amount default in the *Preferences*(**Preferences** menu, **Color Tool Change Amount**). This value can be overridden for the current session from this menu.

Graduated color bars. Provides control of color change for a particular dimension.

- *Left* click on an arrow for a small movement in the dimension.
- Click *within the bar* to identify a target value.
- *Checked* areas indicate colors outside the color gamut.
- The value next to the bottom arrows displays the value currently selected.

Get color. Applies the base color of the object to the slider. When *Every Change* is enabled, the base color of a newly selected object is applied to the slider.

Apply Color. Applies the current color of the sliders to the selected object. When *Every Change* is enabled, as colors are chosen on the graduated color bars, the color changes are automatically applied to the selected object.

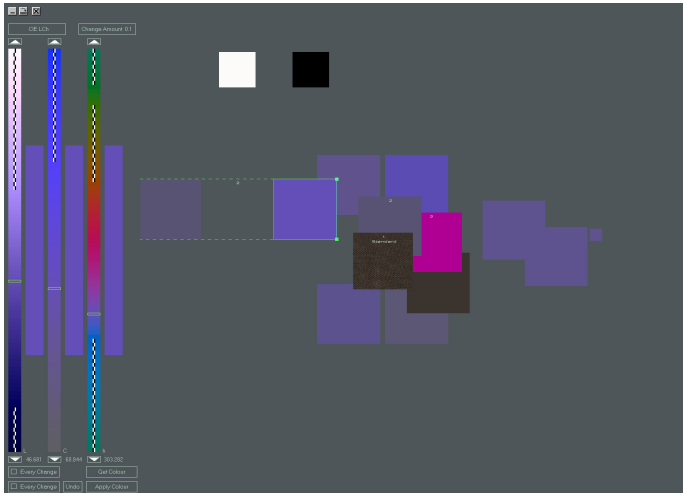
NOTE

Since *Get Color* and *Apply Color* generates synthetic reflectance data based on default environment settings, color names are not transferred from one object to another using the *Get/Apply Color* technique.

Undo. This undoes the last color change.

Horizontal/Vertical. This changes the orientation of the Color Slider Tool from a horizontal configuration to a vertical configuration in the tool window.

Sub View. This button closes the Color Slider tool window and creates a Color Slider tool within the Drawing Area itself.




Color Slider In View. After creating a color slider using the Sub View button in the Color Slider tool or directly from the Color Toolbox menu Color Slider In View option, the Drawing Area will appear as in the diagram below with the color slider along the left side of the screen.

In the top left corner of the screen there are three buttons:



- The **left** button hides the Color Slider tool in the Drawing Area.
- The **middle** button changes the orientation of the Color Slider vertically and horizontally in the Drawing Area.
- The **right** button closes the Color Slider.

Tutorial 27: Re-coloring a Tile using the Color Slider

1. Right-click to get the pop-up menu.
2. Select **Color Toolbox, Color Slider**. The Color Slider window displays.
3. Select a tile.
4. Left-click the **Get Color** button. The color of the selected tile is now applied to the slider.
5. Left click anywhere on each of the graduated color bars, avoiding parts covered by the checked strips.
6. Click on the **Apply Color** button. The selected tile has now been changed to the chosen color.
7. Click on the **Close** button  to close this tool.

NOTE

Double click on a graduated color bar to set the selected objects to the color currently selected.

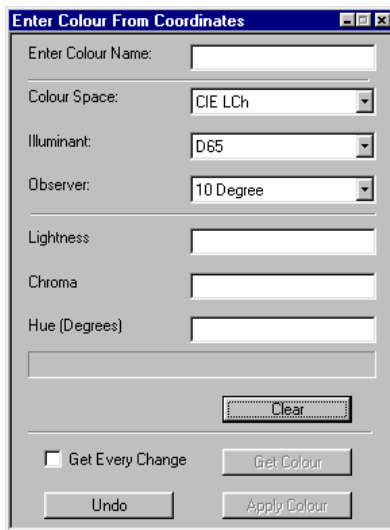
Tutorial 28: Undoing a Color Change

Datacolor ENVISION remembers the last color of each object.

1. Select the object(s) on which to undo the color change.
2. Select **Edit, Undo Last Color Change**, or select the object(s).
3. Press **CTRL + U**.

The Enter Coordinates Tool

This tool uses color coordinates to specify a color. The tool can be found under the *Color Toolbox* menu, accessed either from the main menu, or the pop-up menu.



- **Enter color name.** Enter a specific name or code for a color.
- **Color space:** Identify the type of coordinates provided (e.g., XYZ, xyY, LCh, Lab, Luv, Hunter Lab, (device) RGB).
- **Illuminant:** Identifies the Illuminant data used (e.g. D65, TL84, illuminant A, etc.).
- **Observer.** Identifies the Standard Observer data to be used (e.g. 2° or 10°).
- **Clear.** Clears data fields.


- **Get Color & Apply Color.** Unlike the Color Slider which applies colors based on default environment settings, the color coordinates input are based on the color space, illuminant and observer defined for this tool.

NOTES

The Color Slider applies colors based on default environment selections for the color space, Illuminant and Observer selection.

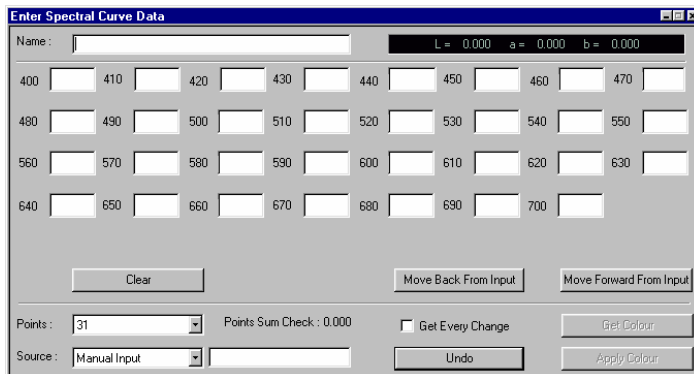
See also *Color Slider* or information on *Get Every Change and Undo*.

Tutorial 29: Re-Coloring the Tile using the Enter Coordinates Tool

1. Right-click to get the pop-up menu.
2. From Coordinates, select **Color Toolbox, Enter Colors**. The Enter Tri-Stimulus Color Data tool displays.
3. Select a tile.
4. Left-click the **Get Color** button. The color of the tile is now entered into the tool.
5. From **Enter Co-ordinates Tool, Color Space menu**, select the CIE LCh color space. The *Lightness, Chroma and Hue* values are shown.
6. Click within the *Lightness* data entry box, and enter new values. Repeat this for the *Chroma and Hue* values.
7. Click the **Apply Color** button. The color applies to the selected tile.
8. Click the **Close** button  to close this tool.

Enter Curve Data

This tool enables the user to enter reflectance curves from the keyboard. The tool is in the Color Toolbox menu, accessed from the main menu or the pop-up menu.



Name. This is an alphanumeric text entry box.

Source. This is an alphanumeric text entry box indicating the source (may have spectrophotometer type if a measured curve).

Manual Input / Measured. For spectral data there are several data options.

- **Points:** Options are 16, 31, 35 and 40 point data or precision curves:

16-point data curves:

Start Wavelength: 400 nm

Wavelength Step: 20 nm.

31-point data curves:

Start Wavelength: 400 nm

Wavelength Step: 10 nm.

35-point data curves:

Start Wavelength: 360 nm

Wavelength Step: 10 nm.

40-point data curves:

Start Wavelength: 360 nm

Wavelength Step: 10 nm.

Clear. Creates a blank form.

Points Sum Check. Adds up the data to provide a checksum.

Move Back From Input. Moves values in the selected data entry box and all preceding data back one box.

Move Forward From Input. Moves values in the selected data entry box, and all following data, forward one box.

Get Every Change, Get color, Apply color, Undo. See *Color Slider*.

Tutorial 30: Input Curve from Keyboard

1. Select an object by left clicking on the object.
2. Right-click to get the pop-up tool.
3. Select **Color Toolbox, Enter Colors from Curve**.

4. Enter the color name in the appropriate data box (e.g. test color).
5. Enter the source i.e., spectrophotometer type, etc. (e.g. tutorial).
6. From the **Points** menu, select '16'. This is the number of points on the curve.
7. Enter the right hand column of data below in the box alongside the corresponding wavelength. Use tab or enter on the keyboard to move to the next data entry box.
8. After the last numeric data is entered, and check the checksum value in the Points Sum Check, click enter.
9. Left click on the **Apply Color** button.

Tutorial 31: Saving a Reflectance Curve

1. Select the object containing the color.
2. Select File, Export Color Data As.
3. Select the required file format. The file dialog box now opens to enter the color file name.

Tutorial 32: Input Curve from a File

1. Select the object to contain the color.
2. Right-click to select the pop-up menu.
3. Select **Data In From, Color File To, Selected Objects**. The file dialog box now opens to select the desired color file from.

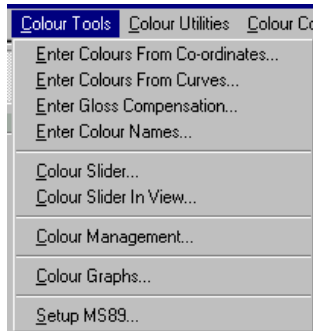
Tutorial 33: Input Curve from Instrument

1. Select the object to contain the color.
2. Right-click to select the popup menu.
3. Click **Data In From**.
4. Click **Spectrophotometer To**.
5. Click **Selected Objects**. A dialog box now opens informing of the default spectrophotometer and precision of the curve. Press yes to continue. Pressing No cancels the operation.

Gloss Compensation

This option adjusts the spectral data for an object to represent the object at a different gloss values.

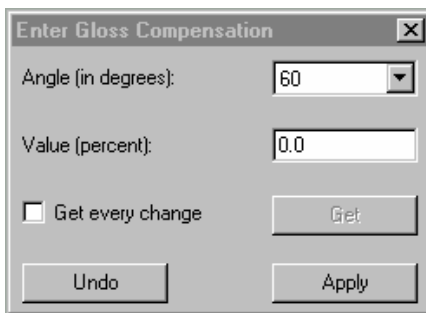
- From the Information Panel, select Color Toolbox, Enter Gloss Compensation.



NOTE

This function applies only to the selected object(s) on screen.

The program prompts for information regarding the gloss of physical samples. The software applies this to the calculations, to improve the visual agreement between the sample and the color on the monitor.



- **Angle.** Enter the type of gloss meter used. You can use either a 20°, 65°, or 80° degree gloss meter.
- **Value.** Enter the target gloss value and click **Apply**. The program will adjust the spectral data of the object to reflect the new gloss value.

Enter Color Name/Enter Object Name

Object names are separate and distinct from color names. Names can be associated with colors using this tool. This option is accessed from the Color Toolbox menu.



6. **Color name.** Enter (or retrieve) a color name.
7. **Clear.** Clears the information in the name field.
8. **Get Object Name.** This button retrieves the object name from the selected object, to be used as the color name..
9. **Get Color Name.** This retrieves the current color name from the selected object and displays it in the data entry box.
10. **Every Change.** When checked, the color names are automatically retrieved as different objects are selected.
11. **Apply.** This applies the text in the data entry box to the object currently selected.
12. Object color names can be seen on objects in the environment. To enable this feature:
 - Select Display Environment, Show Object Color Names.

NOTE

Color names are not transferred from one object to another when the **Get/Apply Color** option is used from the **Color Toolbox**. Copy and paste must be used when you want to retain names or colors on a duplicate object.

Tutorial 34: Naming a Color using the Color Name Tool

Color names can only be applied to a single selected object. However, object names can be applied to more than one selected object. The *Enter Object Name(s) Tool* is found on the *Objects* menu.

1. Select an object with a left mouse click on the object.
2. Right-click to display the pop-up menu, and select **Color Toolbox, Enter Color Names**.
3. Type the color name in the data entry box.
4. Left-click the **Apply** button.

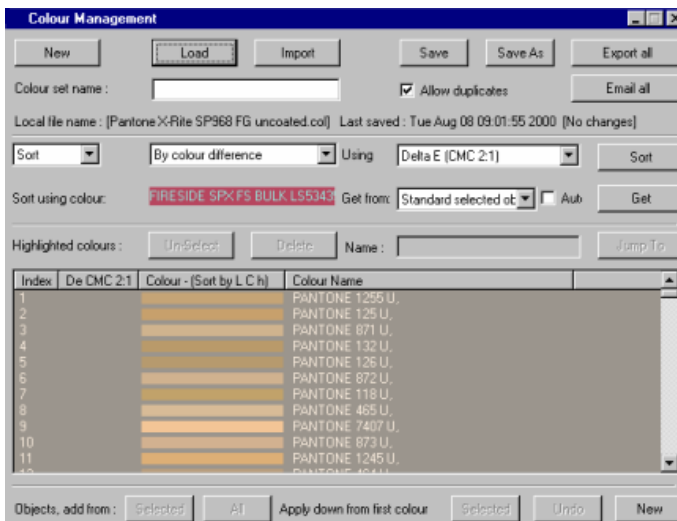
Tutorial 35: Displaying Object Information

1. Left click on the **Display Environment** menu on the main menu.
2. Check (enable) the box, **Show Object Names**, to display the names of the objects.
3. Check the box, **Show Color Tri-Stimulus Values**, to display the color values for the objects.
4. To hide the information, remove the check marks from the appropriate checkboxes.

This data is only fully visible when there is enough space on the object.

Color Management

You may have several colorants that are frequently used in re-coloring or constructing images. These are stored as reflectance curves by the program. You can save *collections* of such reflectance curves as palettes, or *colorways*.



Colorways are accessed through the Color Management tool. This tool is included on the Color Toolbox menu, and is accessed from either the main menu, or the popup menu.

If the illuminant or observer is changed, the colors and background in the Color Management tool will also change. See also *Viewing Objects Under Different Illuminants and Viewing Objects Under CIE 2 Degree or 10 Degree*.

Many operations use colorway entries. Clicking on the row containing the required color highlights a single entry. More than one entry can be highlighted using the CTRL or SHIFT keys.

- The CTRL key highlights only those entries that are selected
- The SHIFT key highlights all the entries between two specified entries.

Fields on the Color Management Screen

OPTION	DESCRIPTION
New	Creates a new, empty colorway. If a modified colorway is currently open, you are prompted to save it.
Load	Used to select a colorway file to display.
Import	Allows multiple colorway files to merge into one colorway file.
Save	Saves the open colorway using the current file name and directory.
Save As	Saves the open colorway under a different name.
Export	When colorway entries are selected (highlighted), you can export only these colors. When no colorway entries are selected, all the colors in the colorway are exported.
Email	Includes two functions: Email all. Saves all the colors in the colorway to a new *.col file, and opens email window. Email highlighted. Saves the selected colors to a new *.col file, and opens email window.
Color Set Name	Assigns a name to the file.
Allow Duplicates	Allows duplicate colorway entries in the file.
Local File Name	Displays the filename under which the open colorway is currently saved.
Last Saved	Displays the date and time when the file was last saved.
Status	Identifies whether the colorway has been modified since it was last saved.
Colors	Displays the number of colors stored in the file.
Find / Sort menu	Select the type of operation to perform on the colorway. For example you can <i>find</i> a particular colorway entry, or <i>sort</i> the colorway.

OPTION	DESCRIPTION
Find Menu	This menu is displayed when the <i>Find</i> option is active.
From Start of Name	Defines the beginning text string to be used when searching for a colorway entry. It is not case-sensitive.
Using Name and Wildcard	This allows wildcards to be used in the colorway search entry. It is not case-sensitive.
Using Exact Match	Returns only those colorway names that match the specified text exactly. It is not case-sensitive
With	Adds a second specification to be used with the selected search option.
Find button	Executes the Find command.
Sort Menu	This menu is displayed when the Sort menu is active.
By Color Difference	Sorts the colors in the file based on color difference. The color difference formula to be used is defined from the adjacent (Using) menu.
By Color Order	Sorts the colors in the file by color order. The criteria is defined in the adjacent (Using) menu.
Using	Identifies the color difference method/color ordering method used for the sort.
Sort button	Executes the Sort command.
Sort Using Color	Defines the color standard to be used for a color difference sort.
Source of color in bar	Identifies the color standard to be used for The Sort Using Color option. It can be a colorway entry, an object in the Drawing Area, or a measurement from a spectrophotometer.
Highlighted In List	The color standard to be used for Sort Using Color is a highlighted colorway entry.
Standard Selected Object	The color standard to be used for Sort Using Color is the Standard selected object in the Drawing Area.
Spectrophotometer Reading	The color standard to be used for Sort Using Color is measurement made from the spectrophotometer.
Auto	Automatically updates the Sort Using Color selection whenever there is a change. For example, if the <i>Source of color in bar</i> is set to <i>Highlighted In List</i> , the <i>Sort Using Color</i> will be updated each time a colorway entry is highlighted. When this option is not enabled, any new color must be retrieved using the Get button.

OPTION	DESCRIPTION
Get	This button retrieves color standard to be used for the Sort Using Color from the highlighted colorway entry, the Standard selected object, or a spectrophotometer reading.
Un-Select	Deselects the highlighted colorway entries.
Delete	Deletes the highlighted colorway entries.
Name	Displays the color name in this data entry box. From this box the color name can be modified. Press the Enter key to commit the change to the colorway entry.
Jump To	Scrolls through the Color Management window to display a highlighted entry. If more than one colorway entry is highlighted, it will scroll to the first highlighted entry in the colorway.
Index	Each colorway entry is given a unique number within the open colorway. This option displays the colorway entries based on their index number.
Color Difference to Sort by	Defines the color difference equation to be used for the sort.
Color	Sorts the colorway using the color ordering selected.
Color Name	Displays the name of the colorway entry.
Selected	Adds the colors from the selected objects to the open colorway.
All	Adds the colors from all objects in the Drawing Area to the open colorway.
Apply Down From First Color	This option is available when there are no colorway entries highlighted.
Selected	This applies the colors in the colorway to the selected objects. The first color in the colorway is applied to the Standard object. The second color is applied to the first batch object, etc., until either there are either no more colorway entries, or all selected objects have been re-colored.
Undo	This undoes the last color change.
New	Creates new tiles from each of the colors in the colorway. The area containing the tiles is specified by a <i>rubber band</i> , and the gap between tiles must be specified.
Apply Highlighted Colors To	This option appears when there are highlighted colorway entries. The colors from the highlighted color downward are applied to the objects.

OPTION	DESCRIPTION
Selected	This applies the highlighted colors to the selected objects in the Drawing Area, based on their selection order.
Undo	Undoes the last color change.
New	Creates new tiles, one for each of the highlighted colors in the colorway. The area containing the tiles is specified by a <i>rubber band</i> , and the gap between tiles must be specified.
Apply Down From Highlighted	This option appears when there is just one colorway entry highlighted. The colors from the highlighted color downward are applied to the objects.

Tutorial 36: Creating a Colorway

1. Right-click to make the pop-up menu appear.
2. Select **Color Toolbox**.
3. Select **Color Management**.
4. Select **New**.
5. Select the objects with the required colors for the colorway.
6. Click on **Selected** button from the **Objects, Add From** area. The new colorway is now displayed.
7. Click **Save As**.
8. Enter the new filename.

NOTE

The colorways are stored with the file extension *.col.

Tutorial 37: Highlighting Colors in the Colorway

This function employs the standard Windows SHIFT and CTRL functions to select items from a list.

SHIFT. Highlights a group of colorway entries.

- Highlight an entry by clicking on the row, then hold down the **SHIFT** key and click on another entry further down the colorway. All the entries between these two colors are highlighted.

CTRL. highlights individual selections.

- Highlight an entry by clicking on the row, then hold down the **CTRL** key and click on other colors. All the colors that are clicked are highlighted.

Tutorial 38: Assigning a Color from the Colorway

1. Select an object in the Drawing Area.
2. Highlight a color in the colorway by clicking in that row.
3. Click on the **Apply Down From Highlighted, Selected** button. The selected object is now in the highlighted color. The color name, if present in the colorway, is displayed on the object.

Tutorial 39: Coloring Multiple Objects in the Colorway

The selection order of the objects is used to determine the colors applied to each object. If the number of objects selected is greater than number of highlighted colors, then the program will cycle through the highlighted colors until all objects are colored.

1. Select several objects.
2. Highlight several colors in the colorway by holding down **CTRL** and clicking in the rows containing the desired colors.
3. Click on the **Apply Highlighted Colors To, Selected** button in the area. The selected objects are colored. The color names, if present, are displayed on the objects.

Tutorial 40: Making New Tiles from a Colorway

1. Clear the color selection in the colorway by clicking the **Un-select** button.
2. Click on **Apply Down From First Color To, New** button in the area. A dialog prompts, *"Choose the Area to Display the Colors in by using the Rubber Band."*
3. Create a rubber band. Hold down the left mouse button and drag out the area in which the new tiles will be created.
4. In the next dialog box, enter the gap between objects, and click **OK**. A tile is created in the area, from each of the colors in the colorway.

Tutorial 41: Making New Tiles - Advanced

1. Highlight a number of colors in the colorway.
2. Click on **Apply Highlighted Colors To, New** button in the area. A dialog box prompts *Choose the Area to Display the Colors in by using the Rubber Band*.
3. Create a rubber band. Hold down the left mouse button and drag out the area in which the new tiles will be created.
4. In the next dialog box enter the gap between objects, and click **OK**. A tile has been created in the area from each of the highlighted colors in the colorway.

Tutorial 42: Source of Color in Bar Menu

1. Verify the **Auto** toggle box is *not* checked.
2. Click on **Source of color in bar menu, Standard Selected Object**.
3. Set the object in the Drawing Area that contains the required color, as the **Standard Object**.
4. In the *Color Management* tool, click the **Get** button.

The *Sort Using Color* has now been set to the color of the *Standard* object. The other options in the *Source of Color in Bar* menu work in a similar way.

Tutorial 43: Sorting Colorways by Color Difference

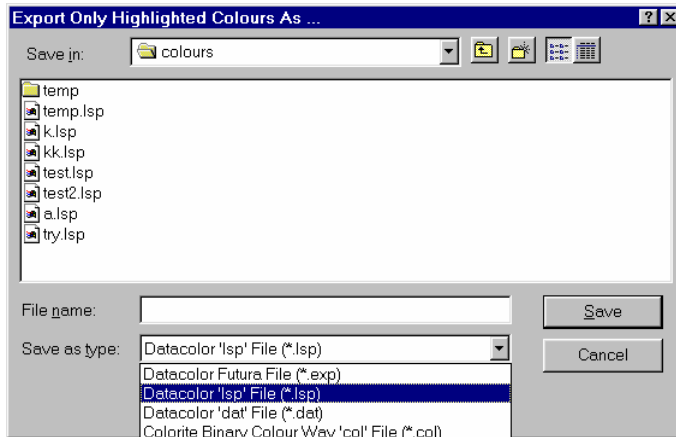
1. Using the method described in tutorial 41, set the *Sort Using Color* to the required color.
2. From the **Sort/Find** menu, select **Sort, By Color Difference**.
3. Choose the desired *Color Difference method*, and click **Sort**. The colors are compared to the color identified in the **Sort Using Color** bar, and sorted using the color difference formula selected.

Tutorial 44: New Color Tiles from a Colorway

1. Create a tile and make 4 copies of it.
2. Arrange these 5 tiles into a line.
3. Verify that color differences are displayed on objects in the Drawing Area. (Check the setting under the *Display Environment* menu).
4. Create another tile.
5. Using the color slider, change its color.
6. Open **Color Management** and load a colorway.
7. Select the newly colored tile.
8. Set the *Sort Using Color to this Standard* to the **selected object**.
9. Sort the colorway, using this color as the basis for comparison.
10. Using a rubber band, select the five tiles in a line.
11. Make sure there are no entries highlighted in the colorway.
12. From the Color Management window, select **Apply Down From First Color To, Selected** button. The five closest colors have now been pasted on to the tiles.
13. Hold down **CTRL**, and click on the tile that was used to sort the colorway. This tile is now the *Standard*. The color difference data for each of the five tiles is displayed.

Tutorial 45: Exporting a Selection of Colors

1. In the Color Management tool, highlight the colors to be exported.
2. Click the **Export Highlighted** button. A dialog box displays:



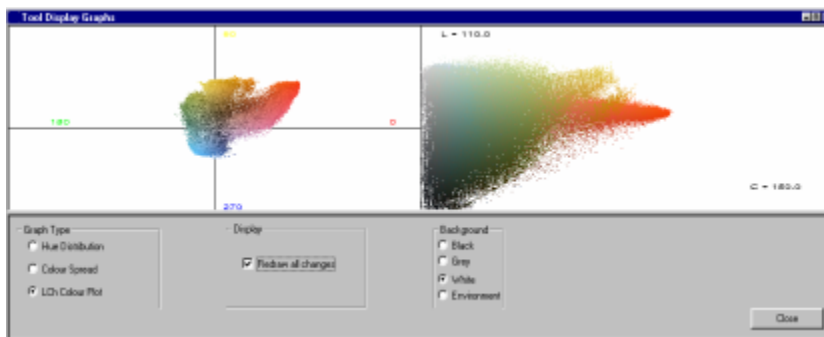
3. From the *Save as Type* menu, select the file type to be exported.
4. Enter the **file name**.
5. Click on the **Save** button.

Tutorial 46: Exporting All Colors in the Colorway

1. Click the **Un-Select** button to verify there are no highlighted entries.
2. Click the **Export All** button. A dialog box is displayed.
3. From the *Save as Type* menu, select the file type to be exported.
4. Enter the *File name*.
5. Click on the **Save** button.

Graph Tools (Color Graph)

From the *Color Toolbox* menu select the *Color Graph* option, to access the Tool Display Graphs window. This displays three different graphs for the object currently selected.



If the image has been separated, you can use the Information Panel to check that the desired sub-object is selected.

Tutorial 47: Displaying a Hue Distribution Graph

The hue distribution graph shows the amount of each hue present in the selected object. It is based on the area it covers (the y-axis is the number of pixels). The selection can consist of more than one object and can be a mixture of tiles and images.

1. In the Drawing Area, ensure the correct object or sub-object(s) is selected
2. From the main menu/popup menu select **Color Toolbox, Color Graph**.
3. Verify that **Redraw all changes** (checkbox) is selected. This ensures the window is updated automatically.
4. Select the **Hue Distribution** radio button.
5. Adjust the background color using the **Background** radio buttons until the graph is most clearly visible.
6. Enable the **Label peak values** box. This displays the hue angle of the most common hue, along with the associated number of pixels.
7. Additional graphs are *Image Color Spread* and *LCh Color Plot*. These are displayed by selecting the appropriate radio button in the *Graph Type* list.
 - *Image Color Spread* plot. Displays a block of color for each different color in the image. The blocks are all of equal size, regardless of the proportion of the color in the image. This gives a

representation of the spread of colors in an image, undistorted by the area they cover. The graph represents a single image. If the selection contains multiple objects, the color spread of the standard is displayed.

- *LCh plot.* Displays the hue circle. The distribution of hues in the selected objects are shown in the left pane of the window. A plot of lightness vs. chroma is displayed in the right panel.
- The selection can consist of more than one object, and can be a mixture of tiles and images.
- For large or complex images, it may take some time for graphs to be generated. In these cases, you can deselect the *Redraw all changes* option, and use the Display Data button to manually update the plot.

NOTES

Image Processing

RGB-Based vs. LCh Images

Computer monitor images are composed of red, green and blue bits at each pixel in the image. A Windows bitmap image, for example, is composed of a matrix of these RGB values. However, the actual color produced by a set of RGB values can vary significantly between different systems. The greatest variation is due to differences in monitor characteristics, such as phosphor output and gamma correction. The result of this is that images based on RGB values may not retain accurate color information between different systems.

The Datacolor ENVISION system reads all popular RGB-based image formats. It also reads and stores images as sets of CIE colors. The color information stored in a CIE-based format is not dependent on the system used to display it. For this reason, CIE-based image formats used by Datacolor ENVISION accurately and consistently store, retrieve and communicate color information.

Datacolor ENVISION can read and write a number of different image formats. RGB-based images (e.g. bmp files) are converted to CIE-based images before they can be manipulated in Datacolor ENVISION.

Supported Formats

Format	Type	Originator	Example	Import	Export
LCh	CIE-Based	Datacolor ENVISION	example.lch	Yes	Yes
XYZ	CIE-Based	Datacolor ENVISION	example.xyz	Yes	No
BMP	RGB-Based	Microsoft	example.bmp	Yes	Yes
RGB	RGB-Based	SGI	example.rgb	Yes	Yes
PCX	RGB-Based	ZSoft	example.pcx	Yes	Yes
TIFF	RGB-Based	Adobe	example.tif	Yes*	Yes*

JPEG	RGB-Based	-	example.jpg	Yes	No
PCD	RGB-Based	Kodak	example.pcd	Yes	No
EPS	RGB-Based	Adobe	example.eps	Yes	No

TIFF images supported must be RGB and not LZW compressed.

- Images are stored in Datacolor ENVISION as either 'RGB-based' or 'CIE-based' images. The CIE based format used by Datacolor ENVISION software is Datacolor ENVISION LCh.

NOTE

Support for the Datacolor ENVISION XYZ format is included for backward compatibility. When the program text refers to LCh images, these are CIE-based images.

- JPEG format (*.jpg images) uses a type of file compression that is particularly likely to degrade color information. If there is a choice of formats, JPEG should be avoided.
- When importing an RGB-based image, there is an option to convert it to an LCh image. If the RGB-based image is only to be previewed and not manipulated, it is faster to import the RGB image without converting it.
- RGB-based images cannot be manipulated in many ways until they have been converted to LCh image format. This conversion can be performed on an RGB image at any time, using the *Convert To LCh Image* option. This conversion option is accessed from the *Objects* menu.
- CIE-based images (i.e., the LCh format) are always read as CIE data. They cannot be imported as RGB based images. I
- Because no conversion is required, images stored as LCh images take a shorter time to read into the system.

Understanding/Using LCh Images

Once an image has been converted to LCh format, it can be manipulated in a variety of ways. The user should have a fundamental understanding of color theory and the various color spaces (CIEL*a*b*, LCh, etc.) in order to more effectively utilize the image processing tools.

LCh images are stored as one or several *sub-objects*, or *layers*. Separated images are re-combined into a viewable image, in such a way that the desired sub-objects or layers are accessible for recoloring. The manner in which the layers are separated and arranged in the finished LCh image is critical.

The first time an RGB-based image is converted to an LCh image, it is stored as the first, (standard) sub-object, and contains all of the information in the original image.

A *sub-object* is created when:

- The image is separated into component areas of specific color range, or tolerance
- An object/sub-object from another image is imported into the image

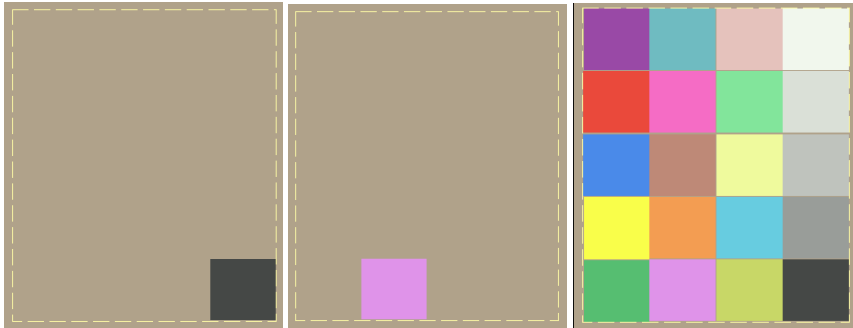
Each sub-object has the following characteristics:

- It can be hidden or displayed
- It can have a base color
- It can have new sub-objects created from it
- It can be moved up or down in the image list of sub-objects, etc.

New sub-objects can be created from an LCh image. For example, two LCh images can be combined into one LCh image. The original LCh images are sub-objects in the final image. This option is accessed from **Objects, LCh Images, Combine, Into Sub-Objects In The Standard Image**.

Within an image, new sub-objects are uniquely numbered as they are created. Each new object is assigned the next available id number.

The example below shows an LCh image that contains a separate sub-object for each of the colors in that object.



The Sub-Object Base Color

Each sub-object in an image has a base color, calculated using one of a number of methods. The generation method is set from the Preferences menu. This menu contains a number of options for re-setting the base color method of images in the system.

NOTE

For new objects this is based upon the current *LCh Image Base Color Generation Method*.

The default generation method is *histogram-independent*. This divides the color distribution into a number of ranges, and then calculates an average for the values within each range. These values are then used to get an overall average, which becomes the base color. This generation method has the advantage of removing some of the noise (e.g. colors at the edges of the desired color tolerance) in the color distribution, rather than simply averaging the whole distribution.

Selecting Sub-Objects within LCh Images

When an image is selected, one of the sub-objects inside the image will be the selected sub-object. *Standards*, *Batches* and *Sub-objects* are identified by borders:

- The longer dotted border around the selected image indicates the boundaries of the image.
- The normal 'standard' or 'batch' border surrounds the boundary of the selected sub-object inside the image.
- The borders of objects inside the image indicate their status. The border of the selected object indicates its status – i.e., relative to other sub-objects in the image.



Note the difference between objects on the desktop (tiles or images), and sub-objects within each LCh image. These differences satisfy the following requirements:

- The system needs a base color for the image. It takes this color from the selected sub-object on the desktop.
- The user must be able to identify which sub-object is selected in an LCh image.

The previous example identifies the following characteristics of the image:

- An image that has been selected and tiles that are unselected.
- The image contains a number of sub-objects, one of which must be selected to be the Standard sub-object of that image (the second light gray tile).
- The longer, dotted border indicates that the image is currently selected.
- The solid border around the sub-object in the image indicates that this sub-object has been selected within the image, and is also the current desktop standard object (as it is a solid line).
- If an object is selected through a menu option (e.g. *Rubber Band*, *Edit*, *Select All* menu options), the standard sub-object will be the last selected sub-object saved in an environment, or the top sub-object in an image.
- Clicking on the required sub-object can change the sub-object currently selected in an image.

If selecting of sub-objects is difficult (e.g., the sub-objects overlap or are too small) you can create selection tiles to make the selection of sub-objects easier. See also *Creating New Tiles from Objects' Properties and Creating Tiles from Displayed Sub-Objects*.

Master/Slave Sub-Objects within LCh Images

An imported LCh image can contain *slaved* sub-objects. A slaved object is an object that is linked to another (master) object. Below are some tips for using this option:

- A master sub-object can have multiple slave sub-objects.
- Operations that change the master sub-object will also change the slaves of the master. For example, a color change to one sub-object can affect any slaves of the sub-object.
 - To enable this feature, sub-objects are slaved to each other, and the **Preferences** menu option, **Set LCh Image Slave Processing**, is enabled.

- When a master sub-object is deleted, its slaves will be deleted.
- When an image is selected, the color difference between ANY master sub-object in the image and the standard sub-object can be displayed on the image. This allows the user to view color differences within an LCh image
 - To enable this option, select **Display Environment, Show Sub-Objects Col Diff (Not Slaves)**.
 - This may be difficult to use when working with complex or small sub-objects. *See also Options To Display Information on Objects.*
- LCh images can be edited via the *Image* option on the Drawing Area menu bar. This option can also be accessed from the pop-up menu that displays in the Drawing Area.
 - The image menu has three items: *Resize, Edit LCh Image* and *Automatically Separate LCh Image*.
- The slaved sub-objects can also be masters themselves, having other slave objects.

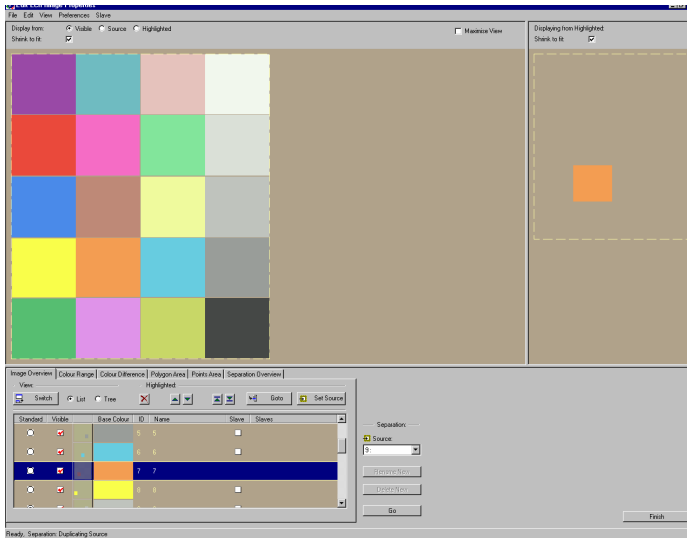
Automatic Image Resizing

The Resize item offers an alternative to the manual method of proportionally resizing images. To use this option:

1. Select the image you want to resize in the Drawing Area. (highlighted border.)
2. Right-click the mouse in the Drawing Area to display the popup menu. Select **Image, Resize** from the menu.
3. Click on one of the percentage options to automatically proportionally resize the selected image by that amount. You can also select **Other** and specify exactly the scale factor (%) you require.

Editing an LCh Image

The option accesses a suite of tools for precise modification of an LCh image.



1. Select **Image Menu, Edit LCh Image**.
2. From the *Edit LCh image properties* window, select the item.

NOTES

The image must be in LCh format in order to use these options. Images not in LCh format are not accessible by the Edit LCh image window.

The image to be processed can be selected in the Drawing Area before this item is selected.

It can be opened after the Edit LCh image properties window has been opened (**File menu, Open**).

Image Editing – Separations

The principle of image editing is to define distinctly different color areas that are separated from the source image or any part of the image. Each area of distinct separated color forms a new *sub-object* of the original image. Multiple separations can be performed on the source image, which can be considered to be built up of *layers* made up from each separated sub-object.

Each sub-object or layer is effectively transparent when its defining colors do not exist in the image. You can visualize this process as being much like single-color components of images printed on transparent plastic. By printing each component on a separate sheet, stacking the component layers creates a finished image. This allows you to change an individual color layer without changing the others. This is the same basic concept as digital image separation.

Processing can be performed on the whole image, or on any specified area. The final appearance of the image is determined by selecting which layers display and which are hidden. For example, to remove a certain color from an image, a sub-object containing the color must be defined and then hidden in the final displayed image. A sub-object can be defined simply by a modifying the colors in an existing image or sub-object. The image processing can take two forms, color *separation* or color *editing*.

In the top half of the Edit LCh Image Properties window there are two windows. In the lower half, there is a tab list with six options. The contents of these windows depend on which tab is selected.

Displaying the Visible Image

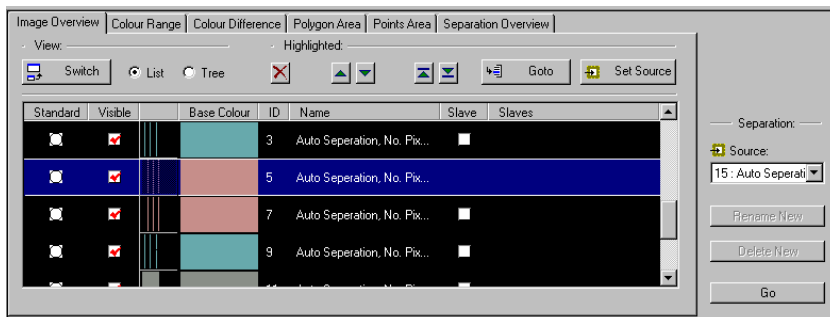
To display the visible image in the left pane of *Image Properties* view, do the following:

1. In the lower half of the window, verify the **Image Overview** tab is selected.
2. From the *Display From* options at the top of the left window, select the **Visible** radio button.
3. If the image is larger than the window, it can be resized using the **Shrink to Fit** check box. The image displays in the left pane, and the selected sub-object displays in the right pane.

When other tabs are selected, the right window will display a magnified view of part of the image in the left window. A 'zoom box' highlights the selected area, shown on the image in the left window and the magnification can be selected from a drop-down list at the top of the right window. Moving the mouse with the right button held down moves the zoom box.

Image Overview Tab

The Image Overview tab displays the sub-objects in the selected image, and their status. This information can be viewed in two formats, *List* view or *Tree* view. Below is the List view:




- The first column indicates the standard sub-object. This is the sub-object that is selected by default, when the image is selected in the Drawing Area (desktop view).
 - Operations performed on only one sub-object will be performed on the standard sub-object, unless different sub-objects are specifically chosen.
 - Multiple sub-objects can be selected by holding down the CTRL key while selecting the desired sub-objects with the left mouse button.
- The second column identifies the sub-objects that are visible. It is usually necessary to alter these settings, to display the effect of a new separation added to the image.
- The third and fourth columns show a *thumbnail* view of the sub-object and its base color respectively.
- The fifth column shows the object ID number, which is assigned automatically.
- The sixth column shows the sub-object name, which may be edited by double clicking the left mouse button in the chosen name field.
- The seventh and eighth columns indicate which sub-objects are slaves, and which are masters. The slave concept is used to define a hierarchy, indicating dependency between sub-objects. This hierarchy is applied the *slaves* of a sub-object is altered. *See also More About Slaved Objects.*
 - A check mark is shown for sub-objects that are slaves to the highlighted sub-object, and
 - Crosses identify the sub-objects' masters.


NOTE

The *slaves* concept is demonstrated more clearly in the tree view, showing slave sub-objects branching off from their masters.

- The image can be displayed in the larger window on the left by clicking the button labeled Switch.

Button Functions

 . **Deletes** the currently highlighted sub-object *and* its slaves. Use this to remove unwanted sub-objects from the image. You can make sub-objects invisible rather than deleting them, if there is a future use for them.

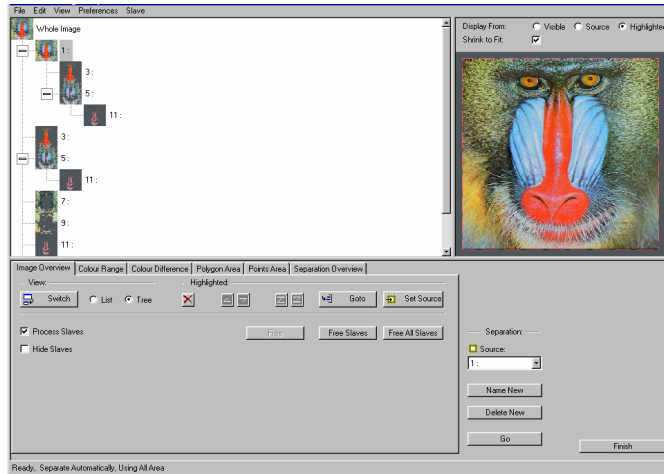
 . **Moves** the highlighted sub-object/layer up or down (front/back) in the composition of the image.

 . **Moves** the selection to the top or bottom of the list respectively.

Goto. Scrolls through the list of sub-objects to view the sub-object currently highlighted.

Set Source. Used to choose the sub-object to be used as the source for the separation operation.

- To view the source currently selected, click on *Display From* field, **Source**.



More About Slaved Sub-Objects

The *Slave* options are used to see the effect of changes to a source image on sub-objects derived from it, without having to repeat a large number of manual separations.

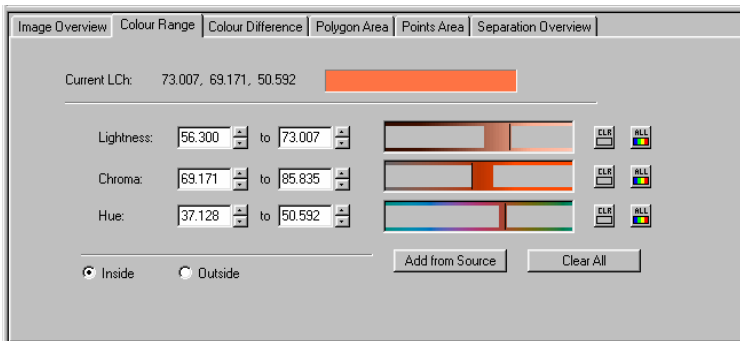
The image in the previous example is a separated image. Slave dependencies defined, and all branches are expanded. Note the following:

- *Sub-object 5* has one slave (sub-object 11). **Sub-object 1** has three direct slaves, *sub-objects 3* and *5*, and *sub-object 11* via *sub-object 5*.
- The *Process Slaves* option is selected. Separations will be carried through to slave sub-objects. In this view, slaves can be defined using the mouse.
 - Drag the icon of one sub-object to another. The sub-object becomes a slave to this object.
- Individual slave objects can be *freed* individually from masters. Select the object, and click the **Free** button.
- Free All Slaves button free all slave objects.
- The *Color Range* and *Color Difference* tabs can be used to specify the colors to be separated from the source (i.e., process).

- The *Polygon Area* and *Points Area* tabs are used to define the area on the image where this process is performed.
- The *Separation Overview* tab displays a summary of the process settings, and provides further options for color editing and spatial restriction.

Color Range Tab

The color range tab defines colors that are separated from the source image. The colors are defined by values expressed in LCh coordinates.



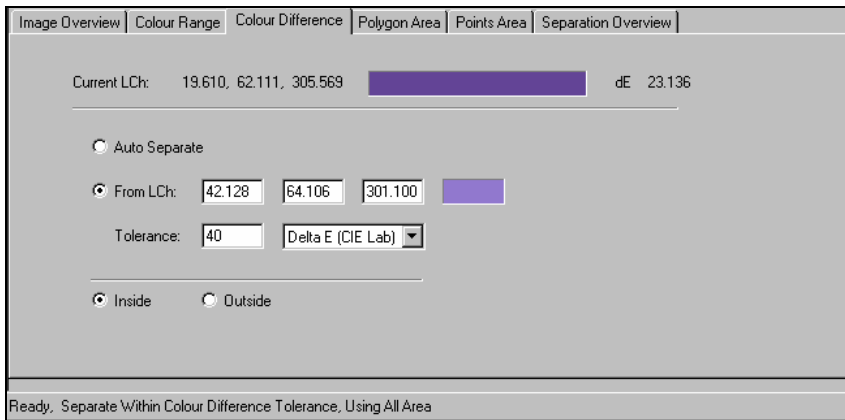
To use this tool:

- Hold down the left mouse button and move the cursor over the required color, either in the *full view* or the *zoom view* window. This will pick up the range of colors as the cursor passes, and allows you to view the coordinates of colors in the image.
- Hold down the <CTRL> key at the same time to add the selected colors to the range.
- The ranges can also be defined manually using the edit boxes and scroll buttons.
- If separation is not required in a dimension (LC or h), the range can be set to ALL.
- Individual colors can be selected, but multiple discrete colors require multiple separations.
- The image from which colors are extracted should be the *Source* image.
- The *Inside/Outside* radio buttons are used to define whether separated colors will be *Inside* or *Outside* the defined range.

Color Difference Tab

This provides another method to define which colors will be separated from the source image. A single color is specified, and an acceptability range is defined in terms of color differences.

- The color difference formula used and the acceptable tolerance is defined by the user.
- Color coordinates can be viewed. Left-click on the image to view the coordinates. A color coordinate can be chosen as the reference by holding down the CTRL key while clicking.
- The *Inside/Outside* radio buttons are used to define whether separated colors will be *Inside* or *Outside* the defined range.



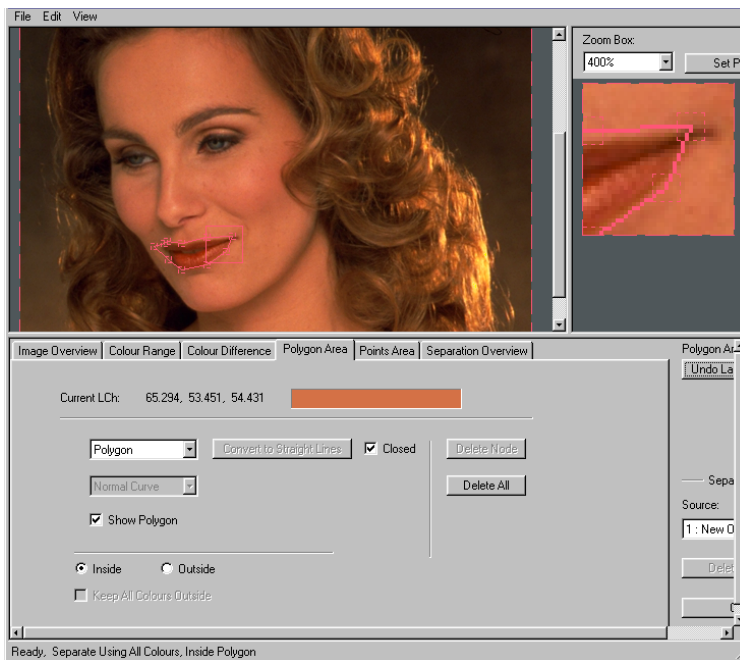
The separation process will extract the group of color pixels within the tolerance range of the reference color, and create a single sub-object containing all those pixels. This is an extremely useful method of separating distinct color areas in complex images. By moving the mouse cursor over areas of similar color, you can establish the relative color differences between the color regions. This gives you a means of determining the tolerance or *bin* of similar colors you want in the new sub-object.

To set the reference color:

1. Depress the <CTRL> key and the left mouse button on the nominal color you wish to separate.
2. Click the **Go** button.
3. Repeat this process for each color group.

Auto Separate

The *Auto Separate* option is the only separation option that can produce more than one sub-object in a single process. It separates the image into sub-objects, containing colors within ranges defined by the delta E or delta h tolerance. Since most digital images contain thousands of different colors, a small tolerance results in the system separating all the pixels within each color “bin” described by that tolerance. You should try to specify the largest reasonable color tolerance when using the Auto-separation option.



- The number of sub-objects produced will depend on the specified tolerance, and the range and number of different colors in the image.
- Each sub-object generated will contain all the colors in the image within a defined color tolerance (DE or Dh) from the standard.

Polygon Area Tab

The polygon area tab can be used if separation is only required on part of the image. A polygon is defined on the source image, and separation will be performed only on the area either inside or outside the polygon.

- The polygon can be drawn freely, using the mouse to define 'nodes' on the image. Nodes are placed with the mouse by pressing the **<CTRL>** key, and clicking the left button.
- A number of standard, re-sizeable, shapes are available (e.g. circle).
- Polygons must be *closed* before a separation can be performed.
- When the *Inside* radio button is selected, the separation will be performed only on the area inside the polygon.
- When the *Outside* radio button is selected the separation will be performed only on the area outside the polygon.

Keep All Colours Outside. Determines the behavior of the area of the image that is excluded from the processing.

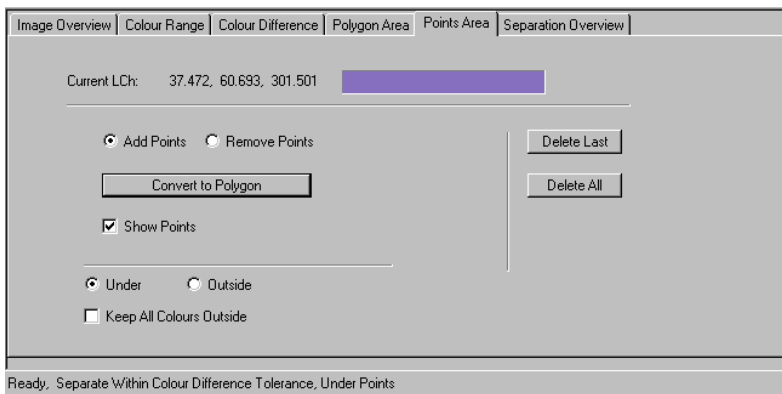
- The area can be totally excluded, in which case it will not appear in the new sub-object.
- The area can be retained, in which case it will appear unchanged in the new sub-object. To retain the excluded region in the new sub-object, place a check in the **Keep All Colors** check box.

NOTE

The excluded region is never processed. It is either cut from the image, or kept unchanged.

Points Area Tab

This provides another way of selecting the location for a separation to be performed. Instead of selecting an area, this option allows individual points to be chosen.



- The current color coordinates can be viewed by moving the mouse over the image, and holding down the **left mouse** button.
 - Points can be added by holding down the **CTRL** key while clicking.
 - To make added points visible, select the **Show Points** check box.
- To perform the separation only at the location of the defined points, select the **Under** radio button.
- To perform the separation anywhere except at the defined points, select the **Outside** radio button.
- **Keep All Colors** is used to determine how the excluded region should be treated. *See also Polygon Tab.*
- The **Convert to Polygon** button converts the selected points to a polygon (i.e., define a region instead of individual points). *See also Polygon Area tab.*
- Use the zoom box when adding or removing points the zoom box.
- Individual points can be added or removed in the zoom view in the right-hand window.
- The **Add to Points** button is used to add points, to completely fill the current area of the zoom box. This will add many points, and may prolong the operation, particularly when a low magnification is used. It is usually better to define a polygon area than add a large number of points using this system.
- The **Convert to Polygon** area button will produce unpredictable results if there are a very large number of points. It is better to use the Polygon Area tab to define the region directly.

Selecting Parts of an Image

1. Select an image in the Drawing area.
2. Select **Image** menu, **Edit LCh Image**.
3. Select the Image Overview tab and from the list of sub-objects, choose the image to use as the source.

NOTE

If the image has not been processed previously, the only sub-object will be the complete image.

4. Highlight the required sub-object and press the **Set Source** button. The default source is the Standard.
5. Open the *Points Area* tab.
 - In the *Display From* field, select the **Source** radio button. The source image should display in the upper left window.
6. Verify the **Add Points** and **Show Points** radio buttons are selected.

7. With the right mouse button clicked, move the zoom box over a detailed part of the image.
8. Use the drop-down list at the top of the right pane to set the magnification of the zoom to **1600%**.
9. Press the **Add to Points** button. Notice the solid square of points drawn on the image.
10. Add some more points on the image. To do this, hold down the **<CTRL>** key and left-click the mouse on the image in either window.
11. In the Tab view, select the **Under** radio button. The region of the image processed should be only where the points are shown on the image.
12. Check the **Keep All Colors Outside box**. The new sub-object will retain the area of the image outside the selected areas unchanged.

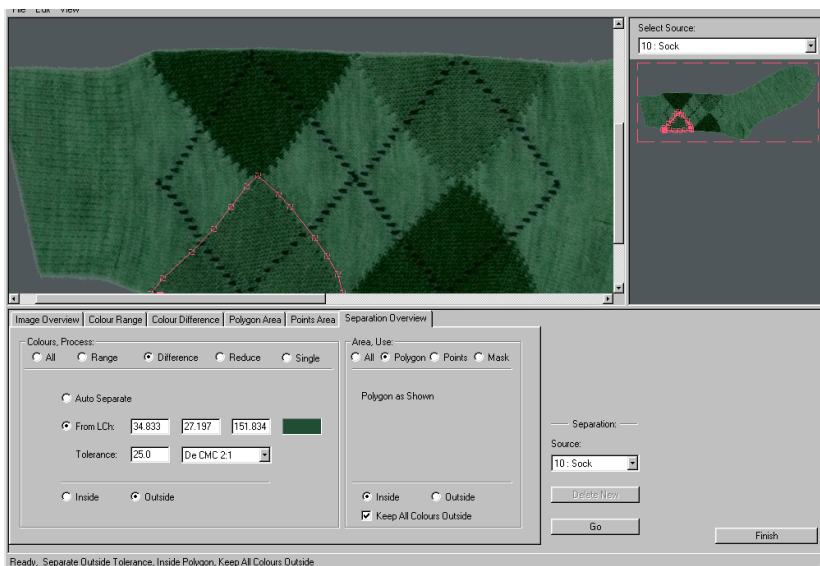
NOTE

This option is not available until a color process has been defined. See also *Color Difference tab*.

13. With a color process defined, check the selections in the *Separation Overview* tab. If all the selections are acceptable, press the **Go** button to start the calculation.

Separation Overview Tab

This tab allows the separation settings to be reviewed and/or modified before the processing is started.



The *Separation Overview* tab is divided into two parts:

- The left pane shows how the color separation itself is defined (i.e., the process).
- The right pane shows how the area of the image subject to the processing will be defined, and how the excluded region will be handled.
- Only one color criteria and one area definition can be used for a single separation.
- For multiple criteria, multiple separations must be performed.
- There is no limit to the number of sub-objects that may be defined.

Procedure

1. Select the *Separation Overview* tab, and make the desired selections.
2. When the desired separation options are selected, click the **Go** button to initialize the processing. For large or complicated images and processes, the calculation may take some time.
3. When the processing is complete, click the **Finish** button in the *Edit LCh Image Properties* window. This updates the image on the desktop.
4. A pop-up window will prompt you to *Make the new sub-object the source*.
 - If you want to perform a series of composite separations on an image and the previous separation is acceptable, select **Yes**.
 - This window can be disabled by checking the **Don't show me this again** box.

Your image must be saved to disk before closing Datacolor ENVISION. To save it:

1. Click **File menu, Export File**.
2. The program will prompt you for a folder. Complete this **folder selection**.
3. Save the image as an **LCh file**.

Options Summary

Process Options

Below is a summary of the *Process* options:

All. All colors will be selected and so the separation will be based only on the area definition.

Range. The colors defined in the Color Range tab will be used.

Difference. The colors defined in the Color Difference tab will be used.

Reduce. This option can be used to reduce the number of different colors in the selection. All the colors within a specified range are reduced to a single color.

- The process is performed in three dimensions for L, C and h, and the range is defined in each of these coordinates (or only one or two of these).
- The delta values define *bins* used to hold the colors within that range. The larger the delta values, the fewer bins there will be. This reduces the number of different colors that will exist in the new sub-object after processing.

Single. This option can be used to set all the colors in the image to a specified value of L, C or h. Only one co-ordinate can be processed in one calculation and the colors will not change with respect to the other two co-ordinates. This is used for example, to set all the colors in an image to an equal Lightness.

NOTE

The *Reduce* and *Single* options are different from the *Range* and *Difference* options. They are not used to separate existing colors from the image. Rather than extracting specific colors from the image, they modify colors in the image to generate the new sub-object

Area Options

Below is a summary of the *Area* options:

All. The separation is performed on the whole image.

Polygon. The area defined in the Polygon Area tab is used. The *Inside/Outside* and *Keep All Colors* options can also be adjusted in this view.

Points. The area(s) defined in the Points Area tab will be used. The *Inside/Outside* and *Keep All Colors* options can be adjusted here.

Mask. This option allows an existing sub-object to be used as a mask. Using this, the new separation can be restricted to the following:

- The section of an image in which an existing sub-object is located (the **Under** radio button).
- The area not included in the sub-object (the **Outside** radio button).
- The **Keep All Colors** check box is used to determine how the excluded region should be treated.
- The source image may be selected from the list of sub-objects at any time in the Image Overview tab.
- If the separation is not as required, click the **Delete New** button to discard the new sub-object.

- Click the **Name New** button to assign a name to the new sub-object. This button will always associate the name entered with the most recently generated sub-object.
 - If more than one sub-object was generated in the last process, all the new sub-objects will have a number prefix assigned to the name.
 - Any sub-object can be named or re-named at anytime by double clicking in its name field in the Image Overview tab.
 - Other properties of the image can also be adjusted as required in the Image **Overview** tab. For example, the new sub-object may be set as the standard, made invisible or its slave properties may be edited.
- Further separations may be performed as required.

Automatic Image Separation

This is an automated method for processing the image, which produces one sub-object for each color in the image. It is only available for images with up to 256 different colors.

NOTE

This option is similar to the *Edit LCh Image Properties, Color Difference Tab Auto Separate* option. When the color difference tolerance in the Color Difference tab is set to 0.0, the two processes are exactly equivalent.

LCh Image Separation

1. Verify an LCh image is selected in the Drawing Area. If the image has been separated previously, verify the correct sub-object is selected.
 - If the correct sub-object is not selected, click the **Edit LCh Image, Image Overview** tab to change the image standard to the required sub-object.
2. Click on **Image** menu, **Automatically Separate LCh Image**. A confirmation window will display. It includes the following information:
 - The number of different colors in the image
 - The number of new sub-objects to be created.
 - When the image is already separated, it identifies the sub-object selected.

3. If the separation is correct, select **Yes**. The calculation starts and a progress bar displays.
4. To cancel the operation, select **No**.

The separation can be reviewed, and the image appearance adjusted, using the *Image Overview* tab (*Edit LCh Image*, *Image Overview*).

Single-Hue Sub-Objects

When working in the *Image Overview* tab, several additional menu options are available under the *Edit* menu option. Most of these are *Copy/Paste/Duplicate/Move* options. However, there is also an option, *Create new single hue sub-objects*, used to process images of single-shade, or *solid color* substrates/objects.

When working with images of heavily textured, solid-color substrates, the image may exhibit areas of light and dark *colors*. However, the substrate itself typically has a very consistent chroma and hue. The greatest contribution to the apparent difference in color in the image is the relative lightness/darkness, or *L* value. This is because the light and dark areas share the same base color, and the greatest variable is in the *L* value. Performing a true separation on substrates to separate the light and dark areas produces sub-objects that do not accurately represent the color of the physical object. In this case, recoloring efforts will not be effective.

When working with these types of solid-color materials, there are minute pixel-to-pixel variations. You can move the image into the *Image Overview* tab, *Edit LCh* image window, and *create new single hue sub-objects*. This will normalize each pixel in the sub-object to an identical hue value, while retaining the lightness/darkness and chroma values of the original image. The finished single-hue sub-object can be re-colored, with the color fidelity and uniformity that would be expected in a dyed or compounded color substrate. The original base image is deleted, and the single hue object will remain as the viewed image.

Creating new single-hue sub-objects is also useful when working with complex, separated images such as printed fabrics or packaging illustrations. In these images, the printed areas are typically uniform colors. The single-hue technique creates new single-hue copies of any separated sub-objects in the image. The original sub-objects can then be deleted or disabled.

Practical Application of Separation Techniques

Images used in Datacolor ENVISION are typically obtained in one of three ways. Each method has advantages in specific applications.

Digital cameras. Digital cameras allow Datacolor ENVISION users to display samples on the system monitor soon after a picture has been taken. This advantage facilitates fast and economical retakes, when a photograph is not acceptable. However, digital cameras in a reasonable price range (\$1,000 - \$2,000) capture object information over a limited dynamic range, and this can prove to be too limiting in some sample situations.

35mm cameras. 35mm cameras consistently offer high-quality images, and good quality 35mm cameras are readily available. The main disadvantages of using a 35mm camera include:

- Image data may not be available for viewing for several days after the pictures are taken.
- The finished image must be digitized either by the developer or by the user
- The images obtained may not be useful.

Digital Scanners. Digital scanners offer several important advantages over using photographic methods. Any flat or nearly flat object can be successfully scanned, except those with a glossy or otherwise directionally reflecting surface (such as a textile satin fabric). Objects that have moderate texture may also be successfully scanned, such as yarns, plastic step chips, and some carpets. However, this approach may not be appropriate for all types of objects.

The primary advantages of using a scanner include:

- Scanner image quality is typically good to excellent for appropriate samples.
- Scanner setup and operation is easy, and does not require special skills or additional equipment.
- Scanner output images are immediately available for review, editing, and for use with Datacolor ENVISION.
- Adequate scanners are currently readily available at prices of less than \$150.

Each of these methods is not driven directly from Datacolor ENVISION. They rely upon a secondary software application to create and manage the initial digital image file. Most digital cameras and scanners are shipped with proprietary software for transferring the image to many common image file formats. Numerous consumer photo management/manipulation software packages are available to handle this function. The resulting image file can then be imported into Datacolor ENVISION.

Generally, selection of the imaging method is determined by the type(s) of object to be imaged.

- If the object is curved or glossy, or if a three-dimensional representation in context is required (such as molded containers, garments on models, consumer packaging, etc.) a digital or 35 mm camera should be used.
- If the object is flat and does not have a glossy surface, the digital scanner is an excellent and fast means of obtaining a high-quality image.

Image separation is used to achieve a number of application solutions. Once areas of specific color have been separated within an image, it is possible to recolor those areas, independent of any other color layer (sub-object) in the image. This re-coloring can be achieved using several different tools:

- Color data from an electronic file (sent via email)
- A palette of existing colors (color management)
- A spectrophotometer measurement of a physical sample
- Using the color slider option in Datacolor ENVISION as a design tool.

The techniques most suitable for image separations are often dependent on the physical substrate to which the end color is to be applied, i.e., textiles, plastics, printed substrates, etc.

- For users whose primary products or applications are solid-color materials, the simplest and best option is to create *single-hue sub-objects* from the base image. This method creates a secondary image whose pixels are uniformly of the same hue. When a new color is applied, the hue that is transferred is constant across the image, and the natural texture of the physical source object is maintained.
- When portions of an image need to be separated, the *Polygon* and *Points* tools are preferable, because they allow clearly defined areas to be separated within a larger image.
- When an entire image is to be separated into component color layers, the *color-based* tools - color range and color difference – should be used. They offer simplicity and speed to the separation process.

You should experiment with each of the image separation tools to find which the method(s) easiest to use, and which offer the best speed and color area separation for your finished image.

Scanners for Image Acquisition

Overview

Object images used by Datacolor ENVISION systems are usually acquired by either photographing or scanning the objects. Using a scanner to acquire Datacolor ENVISION image information has several important advantages over using photographic methods, although this approach is not appropriate for all types of objects.

- Any flat or nearly flat object can probably be successfully scanned. Exceptions are those with a glossy or otherwise directionally reflecting surface (such as a textile satin fabric).
- Objects that have some depth may also be successfully scanned (such as yarns, plastic step chips, and some carpets).
- Scanning is generally NOT a useful imaging technique for materials which are reflective, metal-plated, holographic, or which have a high degree of gloss. The interaction between the object and the light creates a high degree of glare which will “wash-out” the image. This results in areas that are out-of-gamut in Datacolor ENVISION.
- With some preparation, three-dimensional objects can be successfully scanned. These techniques involve ensuring the scanner lid has been removed, and performing the scan in a darkened room. This eliminates any lighting effects behind the sample.
- Scanning can actually be a superior method of capturing certain effects such as metallic and pearlescent finishes.

The advantages of using a scanner to acquire Datacolor ENVISION images include:

- Scanner image quality is typically good to excellent (for appropriate samples).

- Sample illumination angle, type, and intensity is fixed and stable
- Scanner setup and operation is easy, and does not require special skills or additional equipment.
- Scanner output images are immediately available for review, re-imaging, editing, and ready for input from Datacolor ENVISION.
- Adequate scanners are currently readily available at prices of less than \$150.

What Types of Scanners Can Be Used?

In general, a low-cost scanner with at least the following characteristics could be considered a good candidate for Datacolor ENVISION applications:

- Minimum optical scanning resolution of 600 x 1200dpi
- Color resolution of 36 bits (12 bits each R, G, and B).
- The ability to scan documents at least 8.5 inches by 11 inches in size.
- All the software necessary for scanner installation and operation is included.
- The manufacturer has a good reputation for quality and support services.
- The scanner is rated by a reliable independent source to have good scan quality.

For more information on particular scanners, you can check independent PC industry web-sites, such as: www.pcworld.com, www.pccomputing.com, and www.computers.com.

What Types of Samples Can Be Scanned?

Scanner covers (lids) typically serve as the background for the samples being scanned, and are usually white in color. If the sample is translucent, this background may become part of the image color. This happens frequently when translucent, pastel colors are scanned.

If the sample is light in color or highly reflective (glossy), the glare produced by scanning may yield an unacceptable scanned image. It is best to use a neutral-colored sample wherever possible.

The following table presents information on possible scanner usage and sample-backing recommendations for various types of samples.

Type of Sample	Can a Scanner be Used?
Textile - fabric - single color, flat (a woven, a knit, or a print substrate)	Yes. If the sample is not opaque, fold it until it appears to be opaque.
Textile - fabric - multi-color pattern, flat (a print, a woven, or a knit)	Yes. If the sample is not opaque, either back it with 1 or more layers of non-colored substrate, or, if a print, fold it once.
Textile - woven or fleece – not flat, but nearly so (blanket material, woven upholstery)	Yes. Fold fleece until it appears to be opaque. If a woven exhibits light show-through, try backing it.
Textile - fabric with a geometrically directional appearance – single color, flat (a satin, or a velour)	Yes. However, the scanner cannot capture the sample's surface appearance when it is flat, so the material should be loosely "bunched" on the scanner bed, and the lid left open. <i>See also Techniques for Scanning 3-Dimensional Objects.</i>
Textile - yarn or embroidery floss – presented as a skein or card-wound	Possibly. These samples generally scan well. However, high-luster yarns usually do not produce good results.
Textile lace	Yes. Can be presented as either a single layer over a black background, or in multiple layers (opaque).
Carpet	Sometimes. If the carpet is tight-looped and does not appear to have much physical depth, scan results may be acceptable. Shag and other carpets with significant physical depth do not scan well.
Plastic-coated fabric – flat (an upholstery, or artificial leather)	Yes. If necessary, fold the sample until it appears to be opaque.
Plastics – flat, usually molded, with smooth and/or textured surfaces	Yes. The object must be smaller than the size of the scanner bed. However, if the object is glossy and flat, the glare generated by the scanner may yield unacceptable images.
Plastics – step-chips, usually molded, with smooth and/or textured surfaces	Sometimes. Some scanners may not be able to produce an acceptable scan for samples with large (deep) steps, due to differences in focal length.
Three-dimensional objects (round, square, irregular)	Sometimes. <i>See also Techniques for Dimensional Objects.</i>

Recommendations for Using Scanners

Below are recommendations regarding the use of scanners to acquire images for Datacolor ENVISION applications.

NOTE

You should install a professional-quality image editing software package, such as Adobe Photoshop or Corel Paint Shop Pro to be able to easily crop, resize and align the scanned images.

Scanning Resolution

- **Fabrics.** Most fabrics will be best represented by scanning at 75 – 150 dpi. This resolution keeps image sizes small, yet yields image quality that is more than adequate for most fabrics. Exceptions would be fabrics with extremely high thread counts and minimal texture. In such cases, it may be necessary to increase resolution to 300 – 400 dpi in order to obtain best results.
- **Uncoated, molded/formed plastics.** most plastic objects will require resolution of 75 – 150 dpi. Lower resolution will require less memory and will allow smaller file sizes – which can be very important after conversion to LCh image in Datacolor ENVISION.
- **Metallic or pearlescent coatings.** These require high resolution in order to capture the metallic effect. Use a 400 – 600 dpi setting.
- **Wood stains.** The scanner is an excellent means of scanning wood grains and wooden objects. 300 dpi resolution should be used.
- **Paints/Coatings (non-effect).** Scan at 300 dpi
- **Color or Black/White?** In most instances, the *True color* or *Best color photograph* setting should be used for scanning. However, where there are areas of high contrast (large light-dark differences) in the image, or where the target object has significant gloss (such as a satin fabric), it is often useful to use the *Black and White Photograph* setting. This minimizes some of the glare effects, and keeps the file size small. Monochromatic objects can be scanned in Black and White very successfully.
 - When metallic finishes are scanned in this manner, the metal flake effect is well-represented. However, if the target object has multi-colored areas, it will be necessary to scan in *Color* mode
- **Scan Settings.** Scanners include software that provides controls for brightness (lightness), contrast, and to highlight/shadow scanning criteria. Unless the operator is experienced with these setup options it is best to use the default settings. Image editing software packages can be used to modify image parameters in an effort to improve the acceptability of the image, after the image is scanned and saved.

- **Scanner Interface Options.** Scanners are designed to connect to computers using SCSI, Parallel Port, or USB methods. SCSI models transfer data at the highest rate, while the Parallel Port models transfer at the slowest.
- **Pre-scans.** Most scanners first *pre-scan* the sample, allowing the user to select the actual area to be scanned. This minimizes the size of the image data file. The scans made should be slightly oversized, with the images later cropped to exact size using an appropriate photo/paint program.
- **Moire' Patterns.** If a scanned image exhibits a series of concentric curves that should not be there, the problem usually involves moiré patterns. In these cases, the sample should be pressed absolutely flat against the scanner's glass surface, weighting it if necessary, to make the scan. Some scanners offer a de-screen option, which you can use if the sample presentation cannot be corrected. When using this option, set the de-screen dpi value to the number of threads per inch for the sample (if a fabric). Note that de-screening may produce an image that is unacceptable, because it has lost too much surface definition.

Techniques for Scanning 3-Dimensional Objects

Scanning dimensional objects requires a different approach. Dimensional objects can be successfully scanned as long as the following guidelines are applied:

- The areas of the object to be scanned should not be extremely complex, and should be secured to the scanner bed.
- The object to be scanned must be physically smaller than the scanner bed.
- The area(s) of the object to be scanned must be within the focal length of the scanner (approximately 1-2 cm from the scanner bed).
- The object must be positioned in an orientation that does not cause size/shape distortions when imaged.
- The areas of the object to be scanned should not have shapes/textures which vary in depth/height by more than a few centimeters. Large differences in texture or "depth" will create unacceptable shadows and highlights in the image.
- The scanner cover should be removed, or remain open.
- The room in which the scanner is set up should be fully darkened to avoid unwanted background lighting and other image effects. A dark background will make separation of the image in Datacolor ENVISION much simpler, and will enhance the contrast shown on the object in the image.

To successfully use the scanner for capturing images of three-dimensional objects:

1. Open or remove the scanner cover.
2. Select the view of the object that you wish to image. You will need to find a means of physically stabilizing the object so that there is no movement during scanning. Use adhesive tape or other material to stabilize the object in the orientation you wish to scan.

It is important that the object to be scanned does not have a lot of deep texture or highly irregular shapes. These are not be properly captured by the scanner.

3. Once the object has been stabilized, darken the room in which the scanner will be used. If this is not possible, use a piece of dark, opaque fabric to block out any overhead lighting.
4. Open the scanner software and begin your scan. Most software will offer a previewing mode in which you can see the result of the scan. This will give you a chance to evaluate the scanning position, and adjust it to compensate for glare or shadows.
5. Once a suitable scan has been obtained, save the scan or send it to photo editing software. You can then resize the image to match the original size, and to crop out any unwanted image areas.

Photography for Image Acquisition

Overview

Images of objects used with Datacolor ENVISION systems are primarily acquired by either photographing or scanning the objects. When properly executed, the photographic method is not only appropriate for most types of samples, but it can also yield consistently high-quality images. The photographic method, however, is not always successful, because the results obtained are dependent upon the following variables:

- Sample illumination conditions
- Sample stability
- Camera type/settings
- Professional technique

In addition, certain objects require photography rather than scanning because of three-dimensional effects, or are of a size that simply cannot be captured with the scanning process.

Digital Cameras. Digital cameras are able to provide images to the system immediately after a picture is taken. This advantage facilitates fast and economical retakes, should a photograph not be acceptable. However, digital cameras in a reasonable price range (\$1,000 - \$2,000) capture object information over a limited dynamic range, and this may be a limitation in some sample situations.

35mm Cameras. 35mm cameras consistently offer high-quality images. In addition, high-quality 35mm cameras are readily available. The main disadvantages of using a 35mm camera include:

- Film development time may require several days
- No “preview” is available to determine if the images are useful. If not, the photographic session must be repeated, which can become very costly.

Sample Considerations

Before an object is photographed, consider the following:

- Material and method to properly back the sample.
- The appearance of the area that surrounds the sample.

For more information, see also “Sample Preparation and Backing”.

General Recommendations

The following recommendations are applicable for both the film and digital photography methods:

- **Camera positioning.** Aim the camera at the sample at an angle that is perpendicular to the sample surface being photographed. This technique provides the following advantages:
 - Minimizes depth-of-field problems
 - Assures that camera auto-focus systems will work properly
 - Minimizes manual focusing problems
 - Facilitates close-up photography
 - Simplifies composing the sample in the camera’s field of view.
- **Sample illumination.** The best results are obtained when you can simulate illumination conditions typically employed in a professional photographic studio. These include:
 - Placing samples on a copy-board, with the camera positioned so that it is perpendicular to the sample surface.
 - Illumination is typically provided by two lamps that are aimed at the sample from opposing angles, each approximately 45⁰ to the plane of the sample.
- **Camera tripod.** Always use a tripod to prevent blurred images.

- **Flash.** Never use a camera-mounted flash. If the sample is illuminated by such a flash system the illumination will nearly be at the specular angle, and “hot spots” in the image will likely be present.
- **Depth-of-Field.** A medium camera aperture (f-stop) setting should be selected. Higher f-stop settings maximize the camera’s depth-of-focus range, and improve the chances that the entire image will be in focus.
- **Macro Capability.** Use a camera that has a good macro capability (the ability to take close-up pictures of the object).
- **Picture Composition.** Position the camera and adjust the zoom control so that the sample nearly fills the field-of-view. If the sample occupies too small an area of the photograph, it may be difficult to achieve an adequate scanning (digitizing) resolution, particularly when a digital camera is used.
- **High-Gloss Flexible Samples.** If glossy textiles, such as satins, are photographed when they are flat, the images will not be acceptable. This is because the directional surface reflections will not be adequately captured. These samples should be prepared so that the sample surface can be seen at a full range of illumination angles. This can be accomplished by pleating the sample or pulling it through a napkin or similar ring.
- **High Gloss Rigid Flat Samples.** The full appearance profile of a flat glossy (plastic or paint) sample cannot be adequately captured in a single photograph. In these cases, the sample should be photographed using camera positioning and sample illumination discussed earlier.

Film Photography Recommendations

The following recommendations are applicable for film photography only, and should be considered in conjunction with the general recommendations.

- **35mm format.** Although larger camera formats such as 2.25” x 2.25” can be used to acquire images, the 35mm format offers the advantage that there are many more options available for digitizing the photographs.
- **Film digitizing methods.** Third-party film digitizing services offer high quality 35-mm film scans at very reasonable prices.
- **Film scan resolution.** The size of the displayed image depends upon the *Display Setting* selected in Datacolor ENVISION, and the sample size within the photographic image. Either 1024 x 1536 pixels or (512 x 768 pixels) resolutions are recommended, depending upon image size requirements, and the area of original image is to be displayed. Lowest resolutions used for thumbnail images, and highest resolutions are not suitable for Datacolor ENVISION applications.

- **Transparency or negative film.** Image photographs should be taken using transparency (slide) 35-mm film, with an ASA rating of 100 or lower. An important advantage of using slides is that they can be directly viewed at the full color gamut reproduced by the film.
- **Film color balance.** The color balance of the film to be used depends upon the sample illumination being used. Indoor film should be used when using tungsten illumination.

Digital Photography Recommendations

The following recommendations are applicable for digital photography only, and should be considered in conjunction with the general recommendations.

- **Camera image resolution.** A minimum resolution of 1600x1200 pixels should prove adequate for Datacolor ENVISION applications, providing that the sample image fills a sufficiently large part of the total picture area.
- **Camera color resolution.** Cameras may offer a maximum color resolution of 24-bits (8 each R, G, and B). At this resolution, the digital camera offers far less dynamic range than that available from 35mm photography. This may result in unacceptable or marginal images, when samples contain both important highlight and shadow information. In this situation, the image may sometimes be improved by editing with image/photo editing software.
- **Picture file size and camera memory.** Images should be photographed at the maximum camera resolutions (1600x1200 pixels and 24-bit true color). At these resolution settings, each picture requires an on-board camera memory of about 5.7MB (1600x1200x3). At minimum, camera memory should provide storage of 10 images at this resolution. File compression formats such as JPEG can reduce the size of files; however, data is lost in the process and this compression format should not be used.
- **Manual white color balance.** A digital camera should have the ability to select the appropriate white balance setting, to match the color distribution of the illumination source. If the camera has the ability to adjust color balance automatically for any light source by calibrating on a white paper or card, that method should be used.
- **Image quality and unwanted camera noise.** A good test of the image quality of a digital camera is to photograph a consistent gray sample, and evaluate it on screen using a magnification tool to display individual pixels. Under these display conditions, almost all the pixels should appear to be gray (not red, green, and blue mixtures). They should not appear white or black (which would indicate that pixel data has been lost).

For more information on particular digital cameras, check independent PC industry web-sites such as www.pcworld.com, www.pccomputing.com, and www.computers.com.

Photographing Samples in a VeriVide Light Cabinet

Photographing samples using the VeriVide Light Cabinet for sample illumination eliminates the need for an additional sample lighting environment. Acceptable photographic results have been obtained when samples are placed on the floor of the booth or on an optional 45° sample-shelf. Please note the following:

- With a sample on the floor of the cabinet the camera should be positioned so that it is aimed at approximately a 45° angle to the plane of the sample.
- With a sample on the shelf the camera should be positioned so that it is aimed at approximately a 90° angle to the plane of the sample.

When a sample is photographed on the cabinet floor, the resulting image will appear to be somewhat narrower across the top and wider across the bottom (the *Keystone* effect), and it may prove difficult to get the entire sample in-focus. When a sample is photographed on the viewing shelf, the resulting image will likely appear to be somewhat lighter at the top and darker at the bottom. Either of these effects may be objectionable. They can be reduced by reducing the top-to-bottom dimension of the area photographed before taking the picture, or by cropping the resulting image.

Images obtained using the shelf methods usually have sample surface textures that are more realistic than those obtained with the sample on the floor. For some samples, this may prove to be an important advantage. The shelf method allows the camera to be positioned closer to the sample, image framing is simplified, and camera auto-focus systems can be used reliably.

When photographing in the VeriVide cabinet, the D65 light source should be selected and lamp intensity set at the maximum. If a digital camera is being used, the white balance should be calibrated using a white card. If a film camera is being used, the film should be color-balanced for outdoor applications.

NOTES

Sample Preparation & Backing

Overview

Sample images that are displayed in Datacolor ENVISION applications are often compared with actual samples as they are viewed, usually under controlled lighting conditions in a lighting cabinet. Also, the samples may be measured by one or more spectrophotometers during the product color development process, and/or color specifications may be sent regarding the samples. The sample data must be accurate. You must carefully consider the sample preparation and sample backing techniques used to achieve the most accurate data. In particular, sample backing and/or surround conditions should be optimized to avoid introducing error into the color display, viewing, and/or measurement activities.

Sample Surround Colors

Colors that surround an object can have a significant effect on its perceived color. If the evaluated color is in an area that contains other similar colors and shapes, the adjacent images and colors will affect the viewer's perception of the target color. For example, when working with a print, you should evaluate the color visually using the same printed surround area included in the field of view. If the colored object or image is essentially a single color, then the surround conditions need to be considered prior to any color or appearance evaluation.

In general, when viewing object images in Datacolor ENVISION it is best to completely eliminate surrounding colors or images. You should use the Datacolor ENVISION-generated gray surround appropriate for the lighting cabinet and Illuminant/Observer combination to be used.

In some cases, the surround can be eliminated from the object image by simply cropping it out. However, if the object cannot be presented as a perfectly cropped

rectangle, then the object's surround will need to be eliminated from the image during the first step in the Datacolor ENVISION separation process. This is normally the case when a 3-D object is involved, or when a Datacolor ENVISION user includes non-uniform edges of a sample in the image, to enhance the realism of the displayed object. In general, object surround colors should be neutral (black, gray, or white) whenever the object will be photographed or scanned, regardless of whether the surround will be included in the final Datacolor ENVISION image. This technique reduces the chance of stray light adversely affecting sample colors during the image acquisition process.

If the Datacolor ENVISION separation process is used to eliminate the surround area from the image, you should select a solid, un-textured surround color. It should be clearly different from any of the main colors in the image, so that it can be removed from the image in one separation step.

Sample Backing - General

If a sample is fully opaque, it doesn't matter what is directly behind the sample when it is viewed, measured by a spectrophotometer, photographed or scanned. However, if the sample is translucent, you must consider the background. Failure to choose the correct material can adversely affect the results. You must consider the sample background in the following situations:

- How the sample will be viewed.
- How the background affects the scanned or photographed image.
- How the sample will be viewed during a visual evaluation.

While the most convenient solution is to use the same sample-backing method for all these operations, that may not be the best approach to take.

Mounting Samples on Cards

Since samples are often handled many times during the course of using them, it may be a good idea to mount the samples on a card and handle them by handling the card. This technique insures that the samples can easily be maintained in an appropriate backing/surround condition. In these cases the card should be solid black, white, or gray. If a white card is to be used, every effort should be made to avoid one that includes an optical brightener.

Samples Evaluated in Viewing Cabinets

When a translucent sample is evaluated in a light cabinet, it may be held by hand, placed on the cabinet floor or placed on a 45° shelf. If the sample is not backed, the gray interior of the cabinet becomes the background and influence the appearance of the sample. One solution is to mount the sample on a gray card, similar in appearance to the cabinet interior.

Translucent Sample Backing

Photographic Image Acquisition

When a translucent sample is not backed, the background color may influence the appearance of the sample. One solution is to mount the sample on a gray card.

Samples Evaluated by Spectrophotometers

By default, the instrument sample holder is covered with a white backing. When a Datacolor ENVISION system is used to determine CIE colors and the associated spectral data, the sample backing and measurement must be consistent throughout the sample preparation and submission process. This minimizes errors introduced by using different measurement techniques.

NOTES

Monitor Calibration

Overview

The monitor must be calibrated regularly to ensure that the color display is accurate. We recommend that the monitor be calibrated daily. Depending on the type of monitor you are using, the initial calibration procedure used to setup the monitor may be different from the daily calibration procedure. Both procedures are documented in this guide.

NOTES

The monitor must be turned on for a **minimum of one hour** prior to calibration.

Screensavers and monitor power saving should be turned off.

The initial monitor calibration takes longer than subsequent calibrations. Below are approximate calibration times for the first calibration:

- CA-210:** Approximately 5 minutes
- CA-100:** Approximately 5 minutes.
- CP-2000:** Approximately 15 minutes.
- Spyder2:** Approximately 5 minutes.

The procedure used to calibrate the monitor for the first time is different from that used for daily calibrations. Instructions for both procedures are included.

Default vs. Custom Monitor Settings

For most applications, you will use the default hardware settings on the monitor, and the default values in the software options to calibrate the monitor. The calibration routines described below for both CRT and LCD monitors start from the default settings.

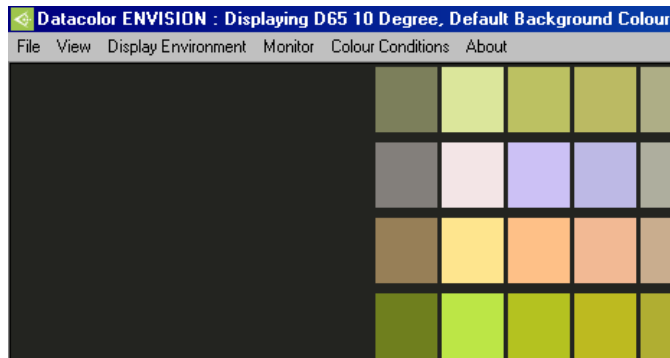
You should use custom monitor settings when you are viewing two monitor's side-by-side, and you need to adjust them to maximize the visual agreement between the two monitors. This calibration procedure is accessed from Datacolor ENVISION, Monitor Menu.

First Time Monitor Calibration

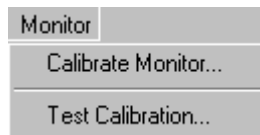
The calibration procedure includes slightly different screen prompts depending on whether you are using a CRT or LCD monitor.

CRT Monitor Calibration

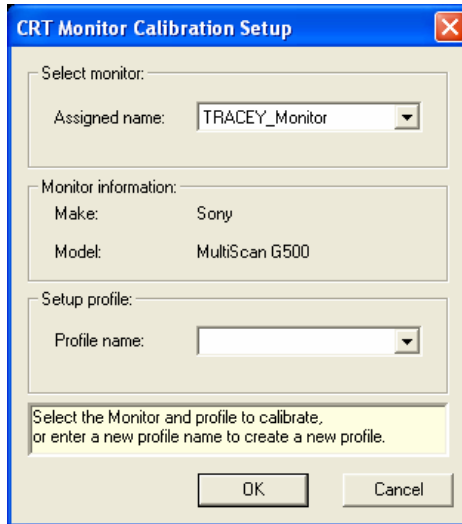
1. Launch the program. The ENVISION Drawing Area is displayed:



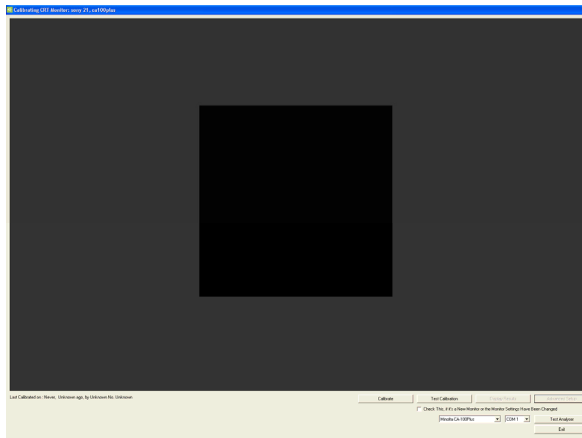
2. Click on **Monitor Menu, Calibrate Monitor.**



The Monitor Calibration Setup dialog appears.



3. Enter a name for the profile (for example the type of analyzer you are using), and click **OK**. The calibration window is displayed:



The fields at the bottom of the window provide information regarding the device and com port being used. Verify that the correct calibration device and com port are selected.



4. The analyzer you are using should appear in the *Analyser* field. If the correct analyzer is not displayed, click on the down arrow and highlight the analyzer you are using.

5. Confirm that the analyzer is connected to the port displayed. If the correct com port is not displayed, click on the down arrow and highlight the correct com port.
6. Click **Test Analyzer** to verify the connection. You should receive a message that the connection was successful.
7. After the connection is verified, click the **Calibrate** button.
8. In the bottom left corner of the window, instructions to complete the calibration will be displayed. Follow these instructions.

NOTE

The instructions below are an example generated used the *CA100 Plus* analyzer. The procedure is similar for each of the CRT analyzers that can be used.

- The instructions will prompt you to put the probe face down. When it is positioned correctly click **Accept**, while keeping the probe face down.

Please Place the Calibration Probe Face Down Against a Flat Opaque Surface...

Press <Accept> to continue...

- The program will next prompt you to mount the analyzer on the screen. Mount the analyzer in the center of the calibration square on-screen. The analyzer should be sealed to the monitor.

Please Place the Probe Against the Monitor in the Center of the Black Rectangle

Press <Accept> to continue...

NOTE

Depending on the analyzer used, the seal is achieved through the use of a rubber skirt or suction cups. Do not click **Accept** until it is sealed.

When using the Minolta CA-100 Plus analyzer, the probe is mounted in the clamp and stand.

Monitor Contrast. The program will next prompt you to set the monitor contrast to maximum. When this is done, click **Accept**.

Please set Monitor Contrast to Maximum... (normally a circle or half moon symbol)

Press <Accept> to continue...

Monitor Brightness. The program will prompt you to set the monitor brightness to maximum. When this is done, click **Accept**.

Please set Monitor Brightness to Maximum... (normally a sun or star like symbol)

Press <Accept> to continue...

If the monitor is too bright, you will be asked to reduce the monitor brightness:

Initial Check: Brightness Control: Please continue to hold probe against screen...

+{2270} Too Bright: Please Reduce Monitor Brightness (Sun Symbol)... /

Reduce the monitor brightness slowly, until you see the message that you are **Close Enough**.

Initial Check: Brightness Control: Please continue to hold probe against screen...

-{010} Close Enough: Checking Stability... -

If the monitor contrast is too high, you will be asked to reduce the monitor contrast:

Checking Contrast Control: Please continue to hold probe against screen...

+{031} Too High: Please Reduce Monitor Contrast (normally a circle or half moon symbol)... |

Reduce the monitor contrast slowly until you see the message that you are **Close Enough**.

Checking Contrast Control: Please continue to hold probe against screen...

+{002} Close Enough: Checking Stability... -

The program will indicate when all monitor and contrast settings are satisfactory. You will be instructed to leave the probe connected to the screen to complete the calibration.

Thank You, No Further Manual Adjustment is Required: Please continue to hold probe against screen...

The remainder of the calibration procedure consists of displaying a series of colors on the screen. This may take from 5 to 30 minutes depending on your monitor settings and the probe being used.

You will receive a message when the calibration is completed.

Last Calibrated on : 14 Sep 2005, 10:57:58, 48 Seconds ago, by Minolta CA-100Plus No. 08001420

Calibration complete.

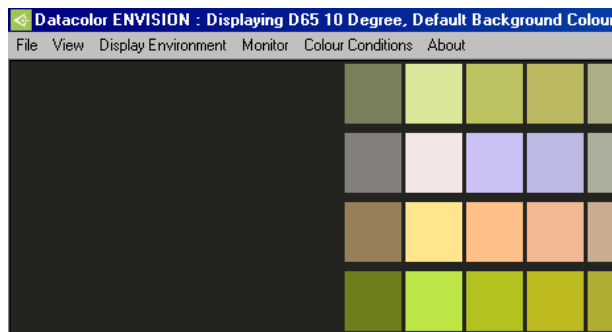
Your monitor is now calibrated and ready for use. You can now view and evaluate images provided by other ENVISION users. You should review the test results. See *Display Results below for an explanation of the test results.*

LCD Monitor Calibration

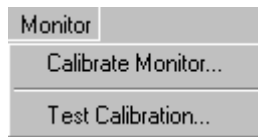
The LCD monitor calibration is to be performed with the rubber hood installed on the front of the probe. Please ensure this hood is installed before you begin the calibration procedure.

To calibrate an LCD monitor:

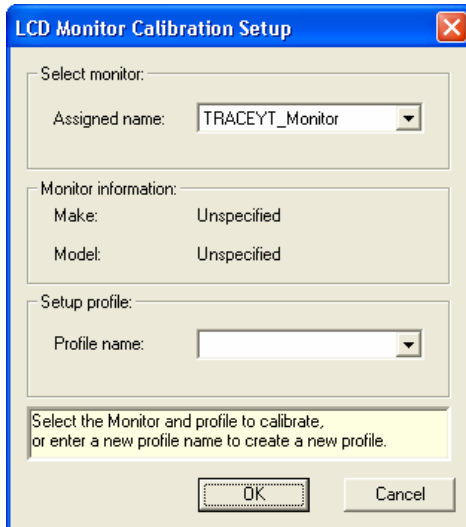
1. Launch the program. The ENVISION Drawing Area is displayed:



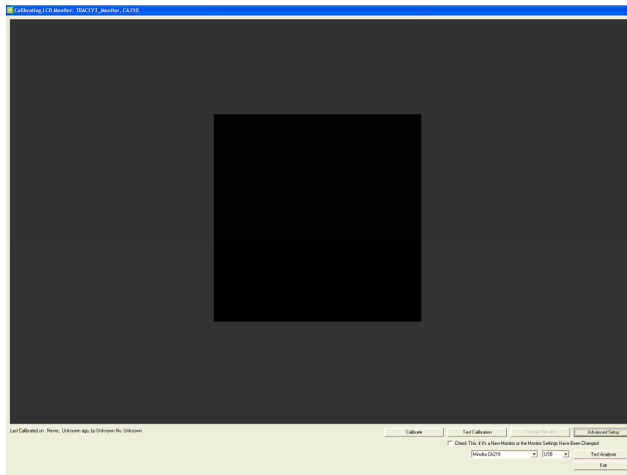
2. Click on **Monitor Menu, Calibrate Monitor.**



The Monitor Calibration Setup dialog appears.



3. Enter a name for the profile (e.g., the type of analyzer you are using), and click **OK**. The calibration window is displayed:



The fields at the bottom of the window provide information regarding the device and com port being used. Verify that the correct calibration device and COM port are selected.



- The analyzer you are using should appear in the *Analyzer* field. If the correct analyzer is not displayed, click on the down arrow and highlight the analyzer you are using.

- Confirm that the analyzer is connected to the port displayed. If the correct com port is not displayed, click on the down arrow and highlight the correct com port.
- Click **Test Analyzer** to verify the connection. You should receive a message that the connection was successful.

You are now ready to calibrate the unit.

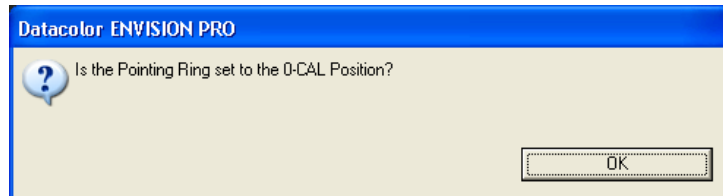
1. Click the **Calibrate** button. The program will remind you that you should be using the factory default settings (contrast, brightness, etc.) for your monitor.



2. Click **OK**. Instructions to complete this procedure will be displayed in the bottom left corner of the screen. Follow these instructions. The program will prompt you to dial the Pointing Ring to the 0-CAL setting.

Please Set the Pointing Ring to the 0-CAL Position then Place the Calibration Probe Face Down Against a Flat Opaque Surface...

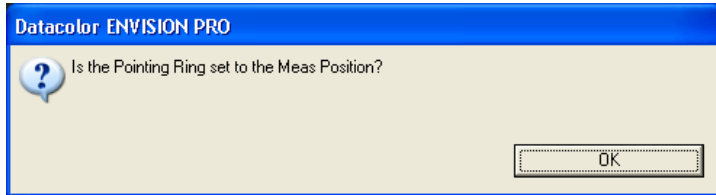
3. When the Pointing Ring is correctly set, put the probe face down on an opaque surface. Click **Accept** while keeping the probe face down. The program confirms the setting on the Pointing Ring before you start the measurement:



4. Click **OK** to start the measurement. When it is finished, you will be prompted to change the Pointing Ring setting.

For the next scan, move the *Pointing Ring* to **MEAS** position.

1. Mount the analyzer in the center of the calibration square on the screen. The analyzer should be sealed to the monitor. The program confirms the setting on the *Pointing Ring* before you start the next measurement:



2. Click **OK** to start the measurement. This is the last measurement in the calibration procedure.

Thank You, No Further Manual Adjustment is Required: Please continue to hold probe against screen...

The program will notify you when it is complete:

Calibration complete.

3. Click the **Display Results** button to review the calibration results. See also *Display Results for a detailed explanation of the results*.

Daily Monitor Calibrations

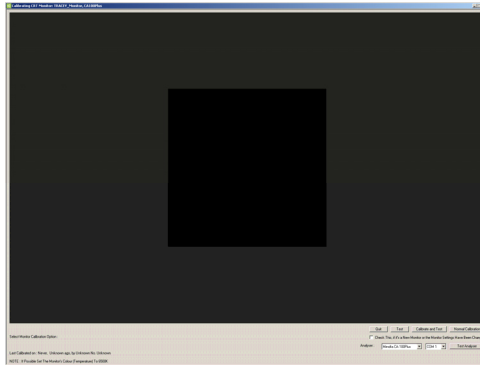
The daily monitor calibration routine does not include adjustments to the monitor brightness and contrast. Brightness and contrast are typically only set once, and only need to be reset under the following circumstances:

- Monitor is not properly warmed up before calibration.
- Monitor has been replaced.
- Monitor color temperature has been changed.

CRT Monitor Calibration

To perform the daily monitor calibration on a CRT monitor, do the following:

1. Click on **Monitor Menu, Calibrate Monitor**. The calibration window displays.



2. Verify that the correct calibration device and COM port are selected. This information is displayed at the bottom of the calibration screen.



3. Click the **Calibrate** button. The instructions will then prompt you to place the probe face down.

Please Place the Calibration Probe Face Down Against a Flat Opaque Surface...

Press <Accept> to continue...

4. Position the probe as instructed and click **Accept**, while keeping the probe face down. The program will next prompt you to mount the analyzer on the monitor face.

Please Place the Probe Against the Monitor in the Center of the Black Rectangle

Press <Accept> to continue...

The analyzer should be placed in the center of the on-screen calibration square, sealed to the monitor.

NOTES

Depending on the analyzer used, the seal is achieved through the use of a rubber skirt or suction cups. Do not click the **Accept** button until it is sealed.

When using the Minolta CA-100 Plus analyzer, the probe is mounted in the clamp and stand.

The program will check to determine if the state of the monitor has changed since the previous calibration.

Detecting changes in monitor since last calibration...

5. If the monitor is still in an acceptable state, the program will continue through the normal calibration procedure, and will indicate that the calibration procedure is complete.

Last Calibrated on : 14 Sep 2005, 10:57:58, 48 Seconds ago, by Minolta CA-100Plus No. 08001420

Calibration complete.

6. If the program detects a change, it will prompt you to adjust monitor settings. *Go to First Time Monitor Calibration, Step #8 in this guide for instructions to complete the calibration under these circumstances.*

LCD Monitor Calibration

The procedure for daily monitor calibration for an LCD monitor is the same as that used for the first-time calibration. *See also First Time Monitor Calibration, LCD Monitors for detailed instructions.*

Display Results

To review the calibration results, click the **Display Results** button. This report displays the differences between the stored values for the colors displayed, and the values currently used to display the color.

```

=====
Group 3. Medium Colours
=====
Target Values:      Measured Values:      Differences:      (CIE Lab)(CMC 2:1)
x   y   Y           x   y   Y           x   y   Y           h   C   L           E           E
-----
0.358 0.294 21.75   0.359 0.294 21.90   0.001 0.000 0.15   0.007 0.293 0.163  0.338  0.168
0.408 0.324 21.75   0.408 0.324 21.80   0.000 0.000 0.05   0.063 0.084 0.057  0.119  0.070
0.442 0.361 21.75   0.443 0.361 21.70   0.001 0.000 0.05   -0.106 0.368 0.050  0.386  0.214
0.430 0.443 21.75   0.432 0.446 21.90   0.002 0.003 0.15   0.204 1.403 0.163  1.427  0.608
0.366 0.461 21.75   0.367 0.465 22.00   0.001 0.004 0.25   0.094 1.229 0.269  1.262  0.548
0.269 0.386 21.75   0.269 0.387 21.90   0.000 0.001 0.15   -0.102 0.212 0.163  0.286  0.144
0.236 0.327 21.75   0.236 0.327 22.00   0.000 0.000 0.25   -0.093 0.205 0.249  0.351  0.171
0.221 0.270 21.75   0.220 0.269 21.70   0.001 0.001 0.05   0.308 0.255 0.050  0.403  0.262
0.245 0.245 21.75   0.244 0.244 21.80   0.001 0.001 0.05   -0.027 0.414 0.057  0.413  0.211
0.293 0.249 21.75   0.292 0.247 21.60   0.001 0.002 0.15   -0.055 0.834 0.358  0.931  0.401

Group Maximum Differences:      0.002 0.004 0.25   0.308 1.403 0.269  1.427  0.608
Group Average Differences:      0.001 0.001 0.13   0.037 0.527 0.140  0.582  0.280

=====
Group 4. Dark Colours
=====
Target Values:      Measured Values:      Differences:      (CIE Lab)(CMC 2:1)
x   y   Y           x   y   Y           x   y   Y           h   C   L           E           E
-----
0.356 0.260 3.44   0.353 0.258 3.45   0.003 0.002 0.01   -0.470 0.185 0.026  0.506  0.385
0.418 0.303 3.44   0.419 0.302 3.41   0.001 0.001 0.03   -0.119 0.294 0.121  0.338  0.220
0.467 0.374 3.44   0.470 0.376 3.38   0.003 0.002 0.06   0.287 0.263 0.232  0.453  0.459
0.436 0.442 3.49   0.435 0.440 3.52   0.001 0.002 0.03   -0.141 0.271 0.121  0.329  0.226
0.358 0.465 3.44   0.360 0.466 3.46   0.001 0.001 0.02   -0.206 0.201 0.052  0.294  0.206
0.264 0.394 3.44   0.265 0.397 3.49   0.001 0.003 0.05   -0.328 0.375 0.171  0.527  0.401
0.223 0.315 3.44   0.224 0.315 3.52   0.001 0.000 0.08   0.117 0.156 0.279  0.341  0.261
0.205 0.252 3.45   0.208 0.256 3.53   0.002 0.004 0.08   -0.607 0.385 0.300  0.779  0.651
0.226 0.219 3.44   0.224 0.218 3.48   0.002 0.001 0.04   -0.429 0.220 0.135  0.500  0.475
0.291 0.226 3.44   0.288 0.223 3.42   0.003 0.003 0.02   -0.409 0.574 0.084  0.710  0.470

Group Maximum Differences:      0.003 0.004 0.08   0.287 0.574 0.300  0.779  0.651
Group Average Differences:      0.002 0.002 0.04   -0.240 0.295 0.157  0.494  0.392

=====dx=====dy=====dY=====dh=====dC=====dL=====dE=====dE=====
(CIE Lab)(CMC 2:1)
Overall Maximum Differences:      0.003 0.004 0.49   0.399 1.403 0.300  1.427  0.949
Overall Average Differences:      0.001 0.001 0.12   -0.036 0.372 0.129  0.474  0.357

```

The smaller the color difference (dE), the better the monitor performance.

NOTES

Color difference is notated as dE. In the above screen, the color difference values are found in the two columns on the far right, and the notation "E" is used as an abbreviation.

Color differences can be expressed in several different units. ENVISION provides color differences measured in two different units. One is CIEL*a*b*, and the other is CMC. See also *Appendix, Interpreting Color Differences for a detailed explanation of these values.*

To scroll through the pages in the report, click the **Display Results** button. At the bottom of the display are values for *Overall Maximum Difference* and *Overall Average Difference*.

```

=====dx=====dy=====dY=====dh=====dC=====dL=====dE=====dE=====
(CIE Lab)(CMC 2:1)
Overall Maximum Differences:      0.003 0.004 0.49   0.399 1.403 0.300  1.427  0.949
Overall Average Differences:      0.001 0.001 0.12   -0.036 0.372 0.129  0.474  0.357

```

You should have an *Overall Average Difference* less than 1.5 DE (CMC) for an initial calibration performed in a standard manufacturing environment.

NOTE

The DE can fall below approx. 0.8 DE when the ambient light is minimal.

After reviewing the results, click the **Exit** button to close the monitor calibration window.

Calibrate Test Calibration Display Results **Advanced Setup**

Check This, if it's a New Monitor or the Monitor Settings Have Been Changed

Minolta CA210 USB Test Analyser

Exit

Appendix

Troubleshooting Tips for Monitor Calibration

If the monitor calibration is not successful, check the following:

- Probe-to-analyzer communication cable is not properly seated.
- Probe-to-analyzer cable is defective.
- Analyzer-to-CPU communication cable is not properly seated.
- Analyzer-to CPU cable is defective.
- CRT analyzer is not properly zero-calibrated.
- CRT analyzer is not fully sealed against the monitor glass, and stray light is present.
- Line voltage is not at rated requirement (i.e., 100 volts vs. 110 volts required).
- Monitor is in close proximity to electromagnetic fields (power leads, HVAC equipment, etc.).
- Monitor-to-CPU cable is not shielded.
- Com port conflicts. Other 3rd party programs may be calling to the resident com port assigned to the analyzer. This can interrupt or prevent the calibration.
- Com ports inaccurately named. Verify the number of the COM port, for example Com 2, is correctly identified.

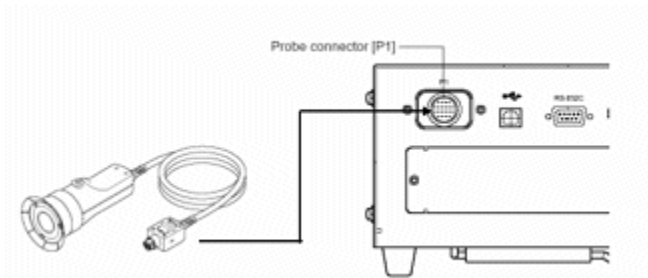
Configuring the CA-100 Plus Analyzer

This document describes the procedure required to set-up a Minolta CA-100Plus colorimeter to be used for screen calibration with a Datacolor ENVISION system.

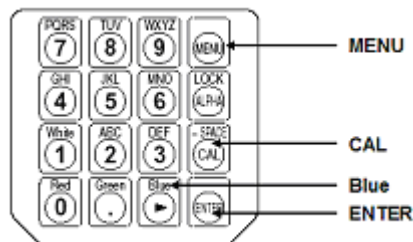
Before You Begin

Before you start the calibration procedure, you should confirm the following conditions:

- The CA-100Plus analyzer is turned off.
- A computer monitor connected to a system running Microsoft Windows is within reach of the CA-100Plus probe. The system must be running Windows XP Professional or higher.
- The measurement probe is plugged into the rear of the main instrument body. The plug is keyed to ensure that the probe is plugged in at the correct orientation.



- The settings are accessed and changed using several keys on the numeric keypad.



Zero-Calibration (0-CAL) Procedure

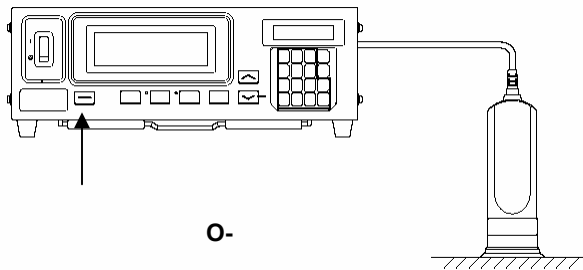
Each time you restart the analyzer, the unit requires you to perform a zero calibration (0-CAL) before you can access any of the settings. You cannot skip this calibration step.

NOTE

You can view and change the *Analyzer Compatibility Mode* and *Type* setting without performing the zero calibration. See also *Analyzer Compatibility Mode and Type below for instructions*.

To complete this calibration:

1. Place the probe face down against a flat opaque surface and press the 0-CAL button.

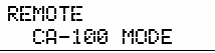
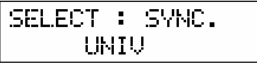


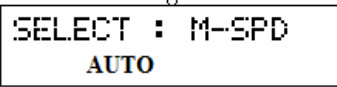
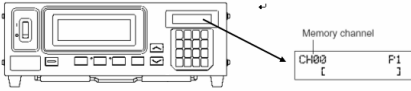
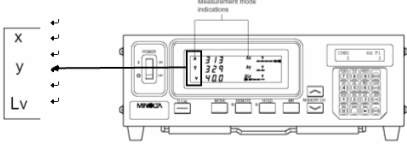



2. When the calibration is complete, the device will automatically display the analyzer settings:

```
CH00 UNIV Ad P1  
[ ]
```

Changing the Analyzer Settings

The following selections must be set correctly to enable communications between the monitor analyzer and the system:

Setting	Correct Selection	Screen
Analyzer Compatibility Mode and Type	Mode = Remote Type = CA-100	
Synchronization Type	Universal (UNIV)	
Baud Rate	9600	
Number of Figures	4 Figures	
Measurement Speed	Auto	
Memory Channel	CH-00	
Display Mode	x,y, Lv	
Luminance Unit	cd/m2	

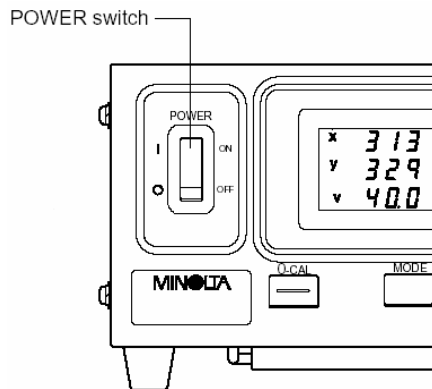
Analyzer Compatibility Mode/Type

Below is an example of the display identifying the correct setting for *Analyzer Compatibility Mode* and *Type*:

```
REMOTE
CA-100 MODE
```

To view or change the *Analyzer Compatibility Mode* and *Type*:

- Set the power switch to the **On** position:



The LCD display should contain the following information:

```
REMOTE
CA-100 MODE
```

This information is displayed every time you activate the unit. If the display contains the following message, it must be reset:

```
REMOTE
CA-200 MODE
```

To reset the analyzer:

1. Turn off the CA-100Plus.
2. Press the **REMOTE** key.

- With the REMOTE key is depressed, switch on the CA-100Plus. The REMOTE key must be held for more than two seconds after the power is applied. The screen should refresh and the analyzer model should be set to CA-100 mode.

Synchronization Type

When the zero-calibration (0-CAL) is complete, the device will automatically display the analyzer settings:

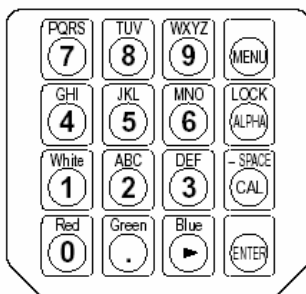
```
CH00 UNIV Ad P1
[ ]
```

NOTE

If you have restarted the analyzer, you must perform the zero calibration (0-CAL) before you can access the *Synchronization Type* setting. See also *Zero Calibration Procedure* for instructions.

If the LCD displays the message **NO SYNC.SIGNAL**, or the *Sync Type* is not **UNIV**, you must change the setting. To access this setting:

- Press the **MENU** key on the keypad:



The LCD will display the menu screen:

```
MENU :: SELECT
PUSH SPACE KEY
```

- Press the **CAL** key repeatedly to access the SYNC selection screen:

```
SELECT : SYNC.
EXT
```

3. Press the **Blue** key repeatedly to display UNIV:



```
SELECT : SYNC.  
UNIV
```

4. Press the **ENTER** key to confirm the selection.

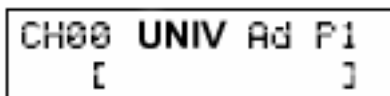
Baud Rate

The data exchange rate should be set to 9600 bps.

NOTE

If you have restarted the Analyzer, you must perform the Zero Calibration (0-CAL) before you can access the *Baud Rate* setting. See also *Zero Calibration Procedures for instructions*.

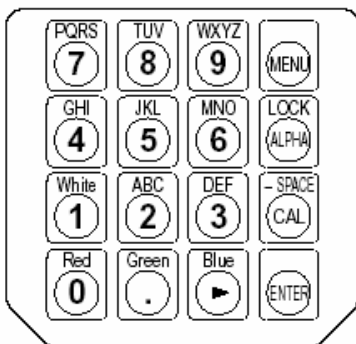
When the zero calibration (0-CAL) is complete, the device will automatically display the analyzer settings:



```
CH00 UNIV Ad P1  
[ ]
```

To access the Baud Rate setting:

1. Press the **MENU** button:



The LCD will display the menu screen:

```
MENU : SELECT
PUSH SPACE KEY
```

2. Press the **CAL** key repeatedly to access the *baud rate selection* screen.

```
SELECT : BAUD
38400
```

3. Press the **Blue** key repeatedly to display **9600 BPS**.

```
SELECT : BAUD
9600
```

4. Press the **ENTER** key to confirm the selection.

Number of Digits

You must set the number of digits displayed to four decimal places.

NOTE

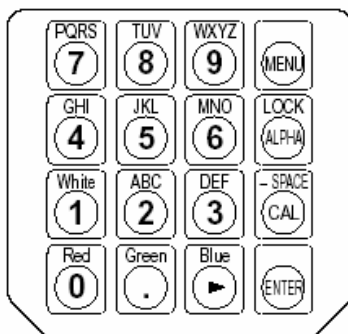
If you have restarted the analyzer, you must perform the Zero Calibration (0-CAL) before you can access the *Number of Digits* setting. See also *Zero Calibration Procedures for instructions*.

When the zero calibration (0-CAL) is complete, the device will automatically display the analyzer setting:

```
CH00 UNIV Ad P1
[           ]
```

To access the *Number of Digits* setting:

1. Press the **MENU** button:



The LCD will display the menu screen:

```
MENU : SELECT
PUSH SPACE KEY
```

2. Press the **CAL** key repeatedly to access the display the *Number of Digits* screen.

```
SELECT : DISP.
3 FIGURES
```

3. Press the **Blue** key repeatedly to display **4 FIGURES**.

```
SELECT : DISP.
4 FIGURES
```

4. Press the **ENTER** key to confirm the selection.

Measurement Speed

The Measurement Speed should be set to AUTO.

NOTE

If you have restarted the Analyzer, you must perform the Zero Calibration (0-CAL) before you can access the *Measurement Speed* setting. See also *Zero Calibration Procedures for instructions*.

When the zero calibration (0-CAL) is complete, the device will automatically display the analyzer settings:

CH00 UNIV Ad P1
[]

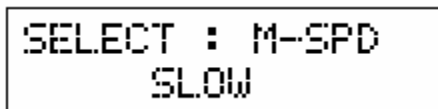
To access the *Measurement Speed* setting:

1. Press the **MENU** button. The LCD will display a menu screen:



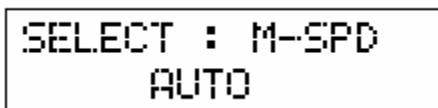
MENU : SELECT
PUSH SPACE KEY

2. Press the **CAL** key repeatedly to access the measurement speed selection screen:



SELECT : M-SPD
SLOW

3. Press the **Blue** key repeatedly to display **AUTO**:



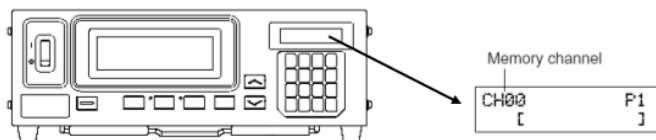
SELECT : M-SPD
AUTO

4. Press the **ENTER** key to confirm the selection.

Memory Channel

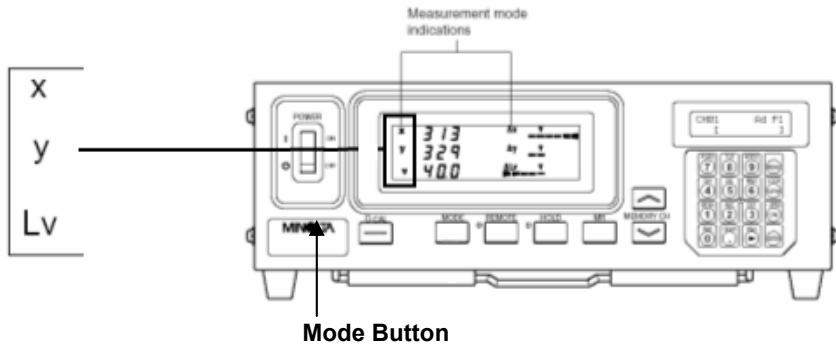
The Memory Channel should be set to CH00. This information is displayed in the window on the far right side of the analyzer. The buttons used to access this information are arrow keys located on the unit.

1. Press the up down arrow buttons associated with the **MEMORY CH** until the LCD displays **CH00**.



Display Mode

The main measurement display should display x, y, and Lv values.



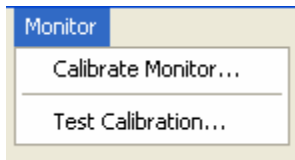
If this data is not displayed:

- Press the **MODE** button until it shows x, y, and Lv.

Testing the Analyzer Connection

Once you have entered the correct settings and calibrated the analyzer, you must test the communications with the ENVISION program. To do this:

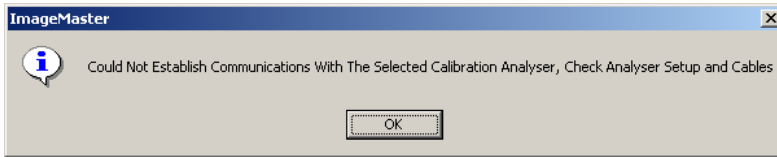
1. Launch ENVISION.
2. From the Datacolor ENVISION menu bar, select **Monitor, Calibrate Monitor**:



3. From the Analyzer selection box, select **Minolta CA-100Plus**.
4. Select the **COM port** connected to the analyzer.
5. Press the **Test Analyzer** button on the unit. This will complete the CA-100Plus set up.

Troubleshooting the CA-100 Plus Analyzer

If the communication with the analyzer fails, the message below will be displayed:



- Confirm the following hardware configuration:
 - The cable connections are correctly connected and secure.
 - There is power to the unit.
 - The CA-100Plus main switch is in the **On** position.
- Confirm the **analyzer settings** are correct.
- Confirm that the **correct port** is selected in Datacolor ENVISION.
- Repeat the zero calibration (0-CAL).
- Press the **Test Analyzer** button on the screen.

If the communication fails again, check the *Luminance Unit* setting. See *Luminance Unit below for instructions to view or change the Luminance Unit setting.*

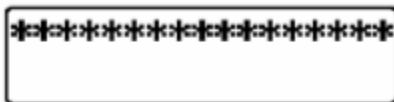
Luminance Unit Setting

If the analyzer fails the test, the Luminance Unit setting may be incorrect. To view or change this selection:

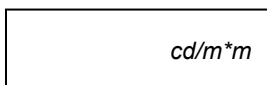
1. Turn off the CA-100Plus unit.
2. Press the **MODE** key.
3. With MODE key depressed, use the power switch to turn on the unit. A single asterisk (*) will appear in the display:



4. Press the * (8) key on the keypad and hold until the * repeats 16 times on the display:



5. To store this setup, press the **ENTER** key for more than 5 seconds. When the settings are saved, the instrument will beep, and then whistle. The *Luminance Setting* screen should display cd/m² as the unit:



If the unit is not , it must be edited. Repeat this procedure to select the correct luminance unit.

Configuring the CA-210 Analyzer

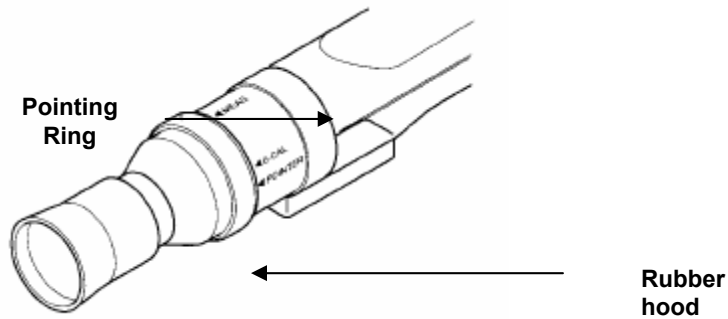
This document describes the procedure required to set-up a Minolta CA-210 colorimeter to be used for screen calibration with Datacolor ENVISION.

Before You Begin

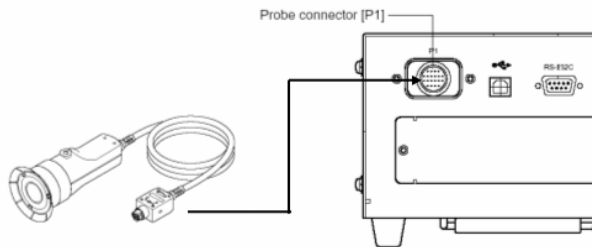
You must install the device driver provided with the unit. This program enables the analyzer to communicate with the system.

Before you start the calibration procedure, you should confirm the following conditions:

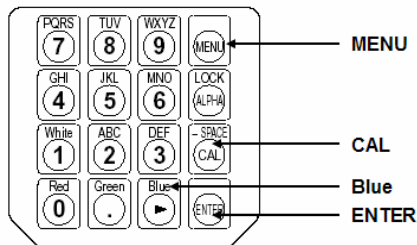
- The CA-210 analyzer is turned off
- A computer monitor connected to a system running Microsoft Windows is within reach of the CA-210 probe. The system must be running Windows XP Professional or higher.
- The rubber hood is attached to the probe.



- The measurement probe is plugged into the rear of the main instrument body. The plug is keyed to ensure that the probe is plugged in at the correct orientation.



The settings are accessed and changed using several keys on the numeric keypad:

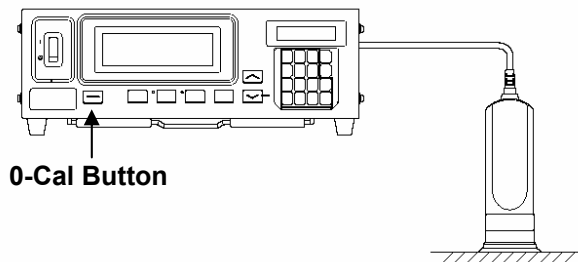


Zero Calibration (0-CAL) Procedure

Each time you restart the analyzer, the unit requires you to perform a zero calibration (0-CAL) before you can access any of the settings. You cannot skip this calibration step.

To complete this calibration:

1. The pointing ring should be in the 0-CAL position.
2. Place the probe face down against a flat opaque surface and press the 0-CAL button.




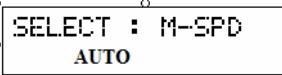
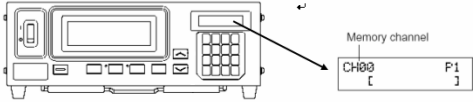
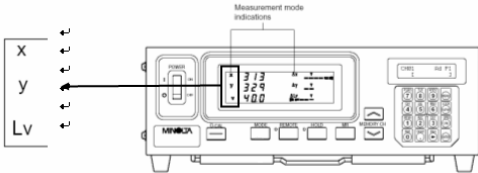

When the calibration is complete, the device will automatically display the analyzer settings:

```
CH00 UNIV Ad P1  
[ ]
```

Changing the Analyzer Settings

The following selections must be set correctly to enable communications between the monitor analyzer and the system:

Setting	Correct Selection	Screen
Synchroni- zation Type	Universal (UNIV)	SELECT : SYNC. UNIV
Baud Rate	9600	SELECT : BAUD 9600

Number of Figures	4 Figures	
Measurement Speed	Auto	
Memory Channel	C-00	
Display Mode	x,y,Lv	
Luminance Unit	cd/m2	

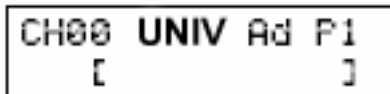
Synchronization Type

The Synchronization Type must be set to **UNIV**:

NOTE

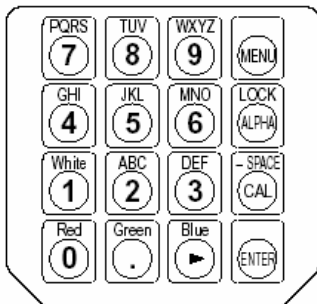
If you have restarted the Analyzer, you must perform the Zero Calibration (0-CAL) before you can access the *Synchronization Type* setting. See also *Zero Calibration Procedure for instructions*.

When the zero calibration (0-CAL) is complete, the device will automatically display the analyzer settings:



If after the zero calibration, the LCD displays NO SYNC.SIGNAL, or the Sync Type is not UNIV, you must change the setting. To access this setting:

1. Press the **MENU** key on the keypad:



The LCD will display the menu screen:

```
MENU : SELECT
PUSH SPACE KEY
```

2. Press the **CAL** key repeatedly to access the **SYNC** selection screen:

```
SELECT : SYNC.
EXT
```

3. Press the **Blue** key repeatedly to display **UNIV**:

```
SELECT : SYNC.
UNIV
```

4. Press the **ENTER** key to confirm the selection.

Baud Rate

The data exchange rate should be set to 9600 bps.



NOTE

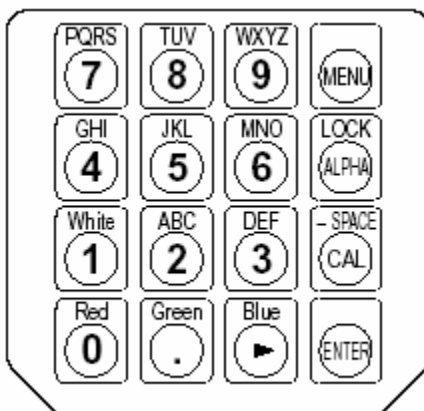
If you have restarted the analyzer, you must perform the Zero Calibration (0-CAL) before you can access the *Baud Rate* setting. See also *Zero Calibration Procedures for instructions*.

When the zero calibration (0-Cal) is complete, the device will automatically display the analyzer settings:

```
CH00 UNIV Ad P1  
[ ]
```

To access the *baud rate* setting:

1. Press the **MENU** button:



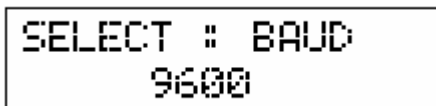
The LCD will display the menu screen:

```
MENU : SELECT  
PUSH SPACE KEY
```

2. Press the **CAL** key repeatedly to access the baud rate selection screen:

```
SELECT : BAUD  
38400
```

3. Press the **Blue** key repeatedly to display 9600 BPS:



```
SELECT :: BAUD
          9600
```

4. Press the **ENTER** key to confirm the selection.

Number of Digits

You must set the number of digits displayed to **four decimal places**.

NOTE

If you have restarted the analyzer, you must perform the Zero Calibration (0-CAL) before you can access the *Number of Digits* setting. See also *Zero Calibration Procedures for instructions*.

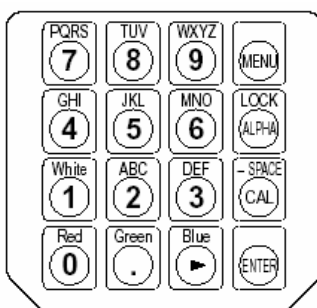
When the zero calibration (0-CAL) is complete, the device will automatically display the analyzer settings:



```
CH00 UNIV Ad P1
 [           ]
```

To access the *Number of Digits* setting:

1. Press the **MENU** button:



The LCD will display the menu screen:



```
MENU :: SELECT
PUSH SPACE KEY
```

2. Press the **CAL** key repeatedly to access the display the numerical resolution screen:

```
SELECT : DISP.  
3 FIGURES
```

3. Press the **Blue** key repeatedly to display **4 FIGURES**:

```
SELECT : DISP.  
4 FIGURES
```

4. Press the **ENTER** key to confirm the selection.

Measurement Speed

The Measurement Speed should be set to AUTO.

NOTE

If you have restarted the Analyzer, you must perform the Zero Calibration (0-CAL) before you can access the *Measurement Speed* setting. See also *Zero Calibration Procedures for instructions*.

When the zero calibration (0-CAL) is complete, the device will automatically display the analyzer settings:

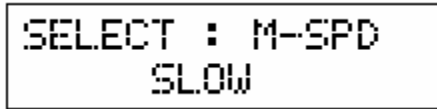
```
CH00 UNIV Ad P1  
[ ]
```

To access the **Measurement Speed** setting:

1. Press the **MENU** button. The LCD will display a menu screen:

```
MENU : SELECT  
PUSH SPACE KEY
```

2. Press the **CAL** key repeatedly to access the measurement speed selection screen:



3. Press the **Blue** key repeatedly to display **AUTO**:

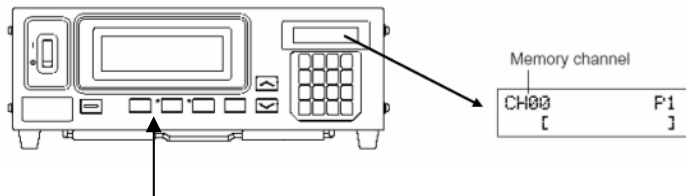


4. Press the **ENTER** key to confirm the selection.

Memory Channel

The Memory Channel should be set to 00. This information is displayed in the window on the far right side of the analyzer. The buttons used to access this information are arrows keys located on the unit.

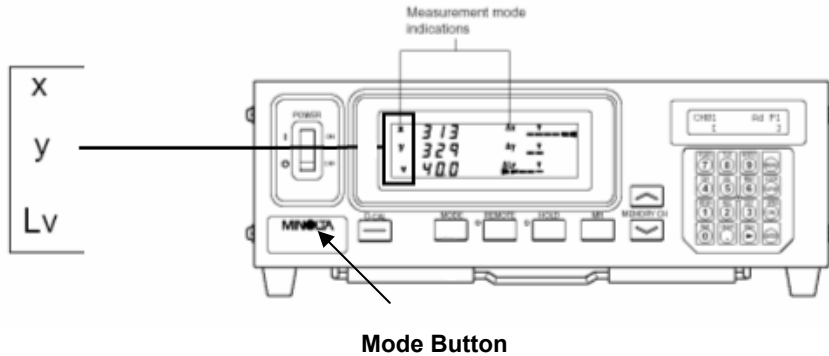
- Press the up/down arrow buttons associated with the MEMORY CH until the LCD displays **CH00**.



Memory Channel Buttons

Display Mode

The main measurement display should display x, y, and Lv values.



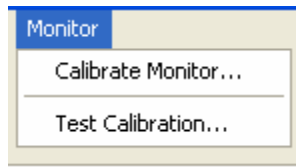
If this data is not displayed:

- Press the **MODE** button until x, y, and Lv is displayed.

Testing the Analyzer Connection

Once you have entered the correct settings and calibrated the analyzer, you must test the communications with the ENVISION program. To do this:

1. Launch Datacolor **ENVISION**.
2. From the Datacolor ENVISION menu bar, select **Monitor, Calibrate Monitor**:



3. Select **Minolta CA-210** from the Analyzer selection box.
4. Select the **COM** port you are using for the analyzer.
5. Press the **Test Analyzer** button on the screen. This will complete the CA-210 set up.

Troubleshooting the CA-210 Analyzer

If the communication with the analyzer fails, the message below will be displayed:



1. Confirm the following hardware configuration:
 - The cable connections are correctly connected and secure
 - There is power to the unit.
 - The CA-210 main switch is in the *On* position
2. Confirm the **analyzer settings** are correct.
3. Confirm that the **correct port** is selected in ENVISION
4. Perform the zero calibration (0-cal).
5. Press the **Test Analyzer** button on the unit.
6. If the communication fails again, check the *Luminance Unit* setting. See *Luminance Unit below for instructions to view or change the Luminance Unit setting.*

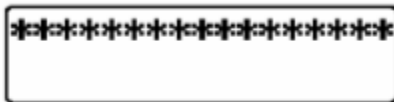
Luminance Unit Setting

If the analyzer fails the test, the *Luminance Unit* setting may be incorrect. To view or change this selection:

1. Turn off the CA-210 unit.
2. Press the **MODE** key.
3. With Mode key depressed, use the **Power** switch to turn on the unit. A single asterisk (*) will appear in the display:



4. Press the *(8) key on the keypad and hold until the * repeats 16 times on the display:



5. To store this setup, press the **ENTER** key for more than 5 seconds. When the settings are saved, the instrument will beep, and then whistle. The Luminance Setting screen should display cd/m^2m as the unit:



6. If the unit is not cd/m^2m , it must be edited. Repeat this procedure to select the correct luminance unit.

Interpreting Color Differences

Datacolor ENVISION includes a report regarding monitor performance that expresses values in terms of color differences. In the case of ENVISION, the differences reported are between settings for a reference color stored in the system, and the settings currently used to produce the same color on the monitor.

All color difference equations include a calculation of the differences between two colors, for each of three dimensions, or axes. Many equations report differences between the standard and current color along a 'red-green axis', a 'yellow-blue' axis and a 'lightness-darkness' axis.

Some equations report color differences using an alternate system that expresses the 3 dimensions of color space as hue (differences in color shade), chroma (differences in color intensity) and lightness. Every color difference equation calculates a DE value, which represents the overall color difference between the two colors.

Understanding the Numbers

Regardless of the color difference equation you use, color difference components are expressed as negative or positive distances between the current color and the reference color. However DE, the total color difference, is always a positive number.

Below is a table containing the color difference equations included in the Datacolor ENVISION program. It includes the name of the equation, and details of the color difference calculation it displays.

CIELab

Color Space Model	Based on CIELAB color space model
Red-Green Difference	Da (+Da*) current color is redder than the reference color. (-Da*) current color is greener than the reference color.
Yellow-Blue Difference	Db (+Db*) current color is yellower than the reference color. (-Db*) current color is bluer than the reference color.
Lightness-Darkness Difference	DL (+DL*) current color is lighter than the reference color. (-DL*) current color is darker than the reference color.
Other Differences Displayed	DC = Chroma (+DC*) current color is more saturated than the reference color. (-DC*) current color is less intense than standard. DH. This represents the hue component of the color difference. Its sign (□) indicates the direction of the hue shift, which is dependent upon the color of the standard. Generally, the magnitude of the hue difference (rather than the direction) is typically a key indicator of the quality of the color match. Small DH values generally correspond to acceptable visual matches.
Overall Color Difference	DE*

CIEL*C*H*

Color Space Model	CIELAB color space model
Red-Green Difference	N/A
Yellow-Blue Difference	N/A
Lightness-Darkness Difference	DL (+DL*) current color is lighter than the reference color. (-DL*) current color is darker than the reference color.
Other Differences Displayed	C(chroma) and H(hue) differences described under CIELab.
Overall Color Difference	DE

CMC

Color Space Model	CIE LAB color space model
Red-Green Difference	N/A
Lightness-Darkness Difference	DL (+DL) current color is lighter than the reference color. (-DL) current color is darker than the reference color.
Other Differences Displayed	C(chroma) and H(hue) differences described under CIELab.
Overall Color Difference	DE

Glossary of Terms

The following terms and definitions are used throughout this document. They are all introduced here to avoid their unnecessary redefinition throughout the remainder of the document. This will help make each section easier to read.

Tile. A solid rectangle of color.

Image. A device independent LCh format image.

Object. Either a tile or an Image.

Illuminant. A standard illuminant as defined by the CIE, ASTM or other standards organization. Alternatively, spectral response data specific to a physical light source such as a fluorescent tube or Tungsten lamp.

Observer. A standard observer as defined by the CIE, ASTM or other standards organization.

Device. A color reproduction device. For our purposes, this is either a monitor or a printer.

Gamut. The specific range of colors that may be reproduced by a device. For monitors, this is the range of colors that can be reproduced on a screen. For a printer, this is the range of colors that can be reproduced using particular ink-set on a particular paper.

Gamut mapping. The method of replacing a color that is outside the gamut of a device with the most appropriate alternative color that is within the gamut of that device for reproduction purposes.

Environment. A collection of objects displayed in their correct context. Contains all required information to fully reproduce a scene, including illuminant, observer and gamut mapping information, etc.

Profile. Contains the complete calibration information required to reproduce colors on a device that is configured for a specific set of conditions. A device may have several profiles containing calibration information for different device conditions. For example, a monitor may have a profile for each colorimeter used with the system, or a printer may have a profile for each kind of paper that is used.

Qualified Profile. Contains the specific calibration information required to reproduce colors for viewing under a specific illuminant by a specific observer on a device that is configured for a specific set of conditions. Qualified profiles are generated from profiles such that each profile may have several qualified profiles. A qualified profile is typically defined by the combination of its illuminant and observer.

Calibration. The process of generating a profile for a device.

Assigned name. Each device and profile has an assigned name. This is the name that the user chooses to uniquely identify that device or profile. It should be carefully chosen to help the user remember the specific device being referred to and, where appropriate, to help remind the user as to the specific device settings that the profile pertains to. E.g. “Epson photo paper 360dpi”

Default Device. Each device class has a default device. That is, there will be one default-monitor and one default-printer per system. The default device is the one that is used in absentia of any contrary instruction by the user.

Default Profile. Each device has a default profile. The default profile is the one that is used for a device in absentia of any contrary instruction by the user.

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