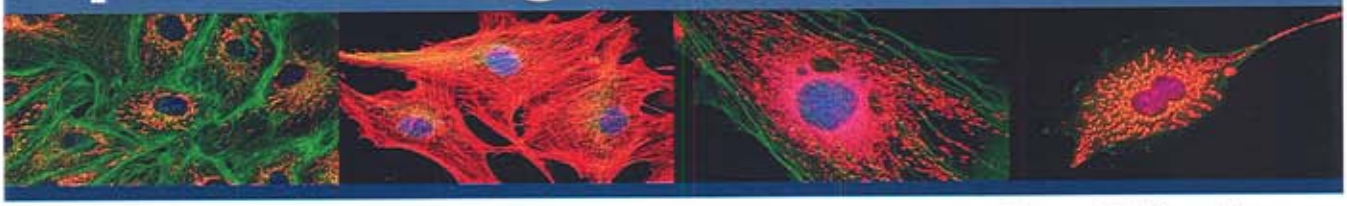
Optronics MagnaFire SP User Guide



For Windows

OPTRONICS
Picture This™

www.optronics.com (800) 796-8909

Table of Contents

Chapter 1: *Camera Operation* **1**
Image Generation 1
Color 1
10 bit 2
Find Exposure 2
Manual Exposure Control 2
Turbo Mode 3
White balance 3
Auto White Balance 3
White Balance Presets 4
Live Window 4
Zoom levels 4

Chapter 2: *Image Capture Examples* **5**
Bright Field Monochrome 6
Bright Field Color 7
Fluorescence Color 8

Chapter 3: *Reference* **11**
Context Menu 11
File menu 11
Open 11
Close 12
Save As 12
Connect to Camera 13
Open Live Window 13
Print 13
Print Preview 13
Print Setup 13
Page Setup 14
Recent File 14
Exit 14
Edit menu 14
Undo 14
Copy 14
Paste 14
Duplicate 14
View menu 15
50% Zoom 15
100% Zoom 15
User Defined Zoom 15
Zoom On Mouse Click 15
Fit Image to Window 15
Snap Window to Image 15

Status Bar 15
Toolbar 15
Image menu 15
Flip Up/Down 15
Reverse Right/Left 15
Rotate 90 15
Rotate 180 15
Rotate 270 16
Rotate Any Angle 16
Deskew 16
Resize 16
Fill 16
Process menu 16
Spatial Filters 16
Brightness 17
Contrast 17
Invert 17
Histogram Equalize 17
Histo-Contrast 18
Stretch Intensity 18
Gamma Correct 18
Intensity Detect 18
Hue 18
Saturation 18
Color Correct 18
Edge Enhance 18
Post Processing Menu 19
Color menu 19
Convert to GrayScale 19
Color Resolution 19
Color Separation 19
Color Merge 19
Camera menu 19
Snap 19
Find Exposure 19
White Balance Adjustment 20
Change Find Exposure Target 20
White Balance 20
Monochrome 21
Turbo 21
Preferences menu 21
8 Bit Acquisition 21
10 Bit Acquisition 21
Load Setup/Save Setup 21
Live Gamma On/Off 22
Clip Detect On/Off 22
Reset Live Window 22
Windows menu 22
Cascade 22
Tile 22
Close All 22
Live To Top 22
List of Open Windows 22
Help menu 22

About MagnaFire 22
Host Adapter Info 22
Diagnostics 22
Online Help 23
Resets Defaults 23
Toolbar 23
Open 23
Save 23
Snap 23
Clip Detect On/Off 23
Mono Button 23
Turbo 23
Auto White Balance 24
White Balance Presets 24
Find Exposure 25
Exposure Control 25

Chapter 4: *Troubleshooting* **27**
Application Issues 27

Appendix **29**
Control Functions 29

Index **31**

CHAPTER 1

Camera Operation

The MagnaFire SP digital camera and software uses state of the art digital imaging technology to capture high resolution images from your microscopic equipment. This chapter will discuss how images are generated and the basic functions of the MagnaFire software.

Image Generation

Utilizing the FireWire technology the MagnaFire SP camera and software provides real time screen display for framing and focusing, and the highest digital picture quality of captured digital images. Both the live real time display and captured images are 1280 pixels wide by 1024 pixels high. Images can be displayed anywhere from 1% of actual size to 1000%. The real time display is 24 bit color. Exposure time can be anywhere from 171.509 µs to 26 min. 8 sec.

The image passes through the camera aperture and impinges on the Bayer Filter CCD. The image information and color information are collected simultaneously and decoded to form a color image. The MagnaFire SP LIVE application displays the color image at 10 images/second in the full 1280p by 1024p (8 bit depth).

Color

Color images are derived using a Bayer Filter CCD. The Bayer Filter consists of a series of red, green, and blue microfilters located over the pixels of the imager in a pattern. This is described in the diagram below:

Since each pixel receives only one channel of the RGB color signal, an interpolation algorithm is applied to the image to produce an integrated color image. Because the image is created through interpolation, some image artifacts are possible. These usually occur as "halos" and other color anomalies along edges. The MagnaFire SP utilizes special image processing steps to minimize common Bayer Filter artifacts. The displayed image in the live window is derived by a two-by-two pixel interpolation. The saved image is a three-by-three derived image to reduce Bayer filter artifacts.

A two-by-two image may be saved by using the Contol D function in which the displayed window will be saved. For a complete listing of Control Functions see the appendix.

10 Bit

By default, color images are captured and saved in 8 bits per color channel. The MagnaFire software allows for the capture of images in 10 bits per color (10 bits monochrome, 30 bits color). This allows more colors to be stored in the image. Because the image data is stored 8 bits at a time, the 10 bit images will be saved as 16 bit TIFFs for monochrome images and 48 bit TIFFs for color images. This can allow for higher precision photometeric measurements, but the difference may be negligible to the naked eye.

There is not an established standard for 10 bit images and many image-editing programs may not be able to open and edit 10 bit images. Check with the documentation of your image editing software or try opening and editing a sample image to make sure that 10 bits images will be compatible with your image editing software.

A monochrome image is derived by summing pixels in quadrants (two green, one red, one blue). This has a similar effect to binning in a monochrome sensor (although it is not equivalent to binning in a monochrome sensor). The apparent light sensitivity of the sensor is increased. Therefore, to produce a normal monochrome image, the exposure time will be reduced. The monochrome image can be viewed live, and captured.

Find Exposure

Clicking the **Find Exposure** button on the Toolbar will automatically find a suitable exposure time based on the average scene intensity. After using the Find Exposure function, the exposure time can be manually set to suit your individual needs with the **Exposure Control**.

The Find Exposure process assumes that the average brightness of the image is not rapidly changing. If the image brightness changes between successive exposures, the camera might not find the target average pixel level.

For darker subjects, such as in dark field or fluorescence microscopy, ***Turbo*** *mode can be turned on (see Turbo Mode below) before clicking the Find Exposure button. This greatly reduces the time it takes to find the suitable exposure.*

Manual Exposure Control

The exposure can be manually adjusted by using the **Exposure Control** sliders. Clicking on the arrows at each end of the control will move the exposure slightly higher or lower. Clicking in the white space on either side of the slider provides coarse adjustment. Clicking and dragging is the third way to manually adjust the exposure. Moving the slider to the left reduces the exposure time, moving the slider to the right increases the exposure time.

The exposure is displayed in microseconds (µs) at the far left (602.426 µs), then in milliseconds as the slider is moved to the middle (1.089 ms), then minutes and seconds near the right side (8 m 14 s).

Turbo Mode

The purpose of the **Turbo** button is to increase the camera sensitivity under low light conditions, thereby facilitating framing and focusing. This is done by increasing the camera gain to the maximum level and reducing the exposure time so that the image brightness is approximately the same as it was with the **Turbo** function off. The speed increase can be as much as 13 times. This means the camera can frame and focus in 0.1 seconds an image that would otherwise take 1.3 seconds. Turbo mode is effective for exposures exceeding 100msec.

Example:

1. Activate **Turbo** function by clicking on the Turbo button.
2. Focus the image and adjust the exposure time (Note: the time shown is the time that the exposure would take with the **Turbo** off). The **Find Exposure** button can be used provided the image brightness is stable.
3. Turn the **Turbo** function off by clicking the Turbo button again.
4. Take a **Snap** shot of the image by clicking the Snap button. To take a monochrome shot of the image, click **Monochrome**, then click the **Snap** button.

Step 3 can be omitted. By leaving the **Turbo** function on, the **Snap** will be quicker. Keep in mind that if the **Turbo** button is left on while taking the **Snap** shots, some "graininess" may be visible in the image due to the increased gain.

White balance

Auto White Balance

The purpose of the **Auto White Balance** button is to automatically determine the correct ratios of red, green and blue exposure times so that a white subject appears white on the computer screen. If the color temperature of the light source has been changed(e.g., turned up or down) the white balance setting must be changed. It is assumed that the camera is looking at something that is white, e.g., a blank, colorless area on a slide.

*The **Auto White Balance** process assumes that the average brightness and color of the image are not rapidly changing. If the image brightness changes between successive exposures, the camera might not find the target average pixel level. If the image color changes before the white balance is complete, the white balance will be incorrect to that degree.*

It is important to perform the **White Balance** operation prior to actually using the camera to ensure accurate color reproduction. Each component of a camera/microscope system can have a significant effect on the color balance. For this reason, it is recommended that the entire optical and illumination system be assembled before white balancing the camera. Be certain that no filters other than neutral density filters or color temperature correction filters are in the optical path of the microscope prior to white balancing.

The **Automatic White Balance** setting is stored by the software. This means that the camera should not need to be re-white balanced when it is turned back on, providing nothing in the system has changed (light source, microscope, etc.). Keep in mind that most illuminator controls are electrical dimmers and changing their settings has a significant effect on the illumination color temperature.

Color accuracy is best when the illuminator color temperature is high. If the illuminator setting is changed, a new white balance operation is recommended.

*If the **Automatic White Balance** function is activated when the light level is very low (1/4 second or more), a considerable amount of time may elapse before the cycle is complete. If necessary, the cycle can be aborted by clicking the **Cancel** button.*

White Balance Presets

2800K: This mode sets the camera white balance for most normal incandescent lighting such as household light bulbs. This setting is appropriate for high intensity light bulbs that are dimmed, such as microscope light bulbs.

3200K: This mode sets the camera white balance for high intensity incandescent lighting such as quartz halogen bulbs, and most microscope illuminators at maximum brightness.

Fluorescence: This mode provides the best color rendition with fluorescent subjects.

Most Recent AWB: This returns to the last **Auto White Balance** setting that was used.

Manual WB: This appears automatically whenever a manual white balance adjustment has been made. Selecting this from the **White Balance Preset** list returns the last manual white balance adjustment. See "White Balance Adjustment" on page 20 for information.

Live Window

The **Live Window** provides Color display for real time feedback to user. This allows feedback while framing and focusing a subject.

Zoom levels

Although data is always full frame 1280 x 1024 pixels, the **Live Window** or captured images can be displayed anywhere from 1% to 1000% of actual size. The **View Menu** provides several scaling presets, as well as an option for defining a particular zoom percentage.

50% Zoom

50% Zoom displays the image at 50% of the image's actual horizontal and vertical size.

100% Zoom

The Full Frame function displays the image at its full 1280 pixels by 1024 pixels size.

User Defined Zoom

The **User Defined Zoom** function allows the user to specify the desired scale of the image, from 1% to 1000%. Enter either the percentage in the Amount box, or use the slider bar to select the desired scaling.

Fit Image to Window

This option enlarges or reduces the image to fit the window in which it is being displayed. This is useful if the window is resized to the desired size and then use this option to force the image to fit inside the window.

Snap Window to Image

Use this option to reduce the size of the active window to fit the image.

CHAPTER 2

Image Capture Examples

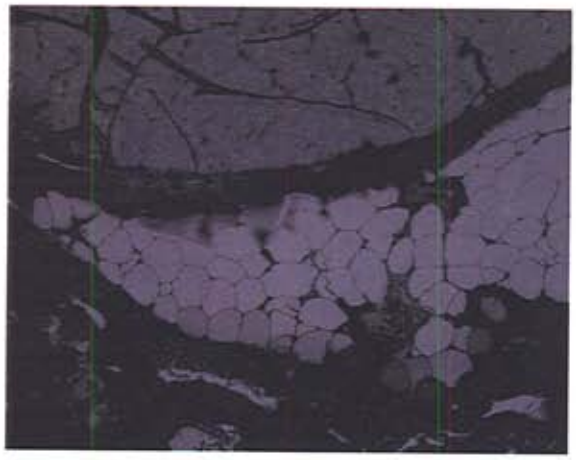
This section describes three typical image capture scenarios with the MagnaFire SP digital camera. These can be adapted to individual scenarios to particular needs or situations. The following will be covered in this section:

- Capturing a bright field monochrome (grayscale) image.
- Capturing a bright field color image.
- Capturing an image using the fluorescence white balance preset.

Bright Field Monochrome

The following explains how to capture a monochrome image. In this scenario, a bright field subject is being used and the exposure time will be relatively low.

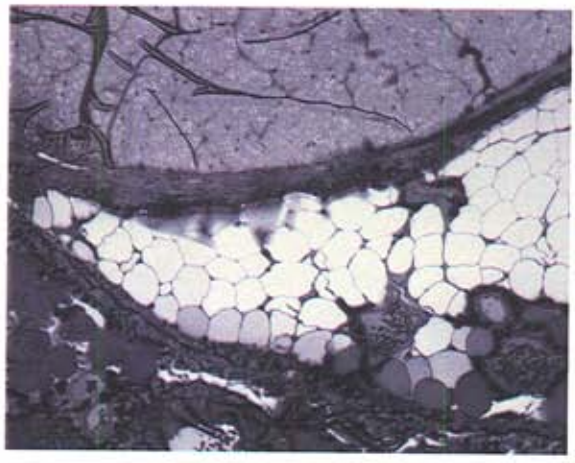
1. To capture a monochrome image, begin by setting the white balance. Either choose from one of the presets, or frame a blank part of a slide (so the viewing area is completely white) and click the **Auto White Balance** button.
2. Click the **Find Exp** button. The camera and software will establish an exposure based on the average pixel brightness.
3. Frame and focus the image.
4. Adjust exposure, if necessary, by using **the Exposure slider bars.**
5. Click **Mono** button to toggle between color and mono modes. The **Mono** button allows the user to view the Live image in either mono mode or color mode.
6. Click the **Snap** button.



In this example, the first snap appears too dark and under exposed

The exposure can be readjusted and snapped again.

7. Examine the resulting image. If necessary, the exposure can be re-adjusted manually and re-snapped.



In this example, the exposure was adjusted and then another snap taken.

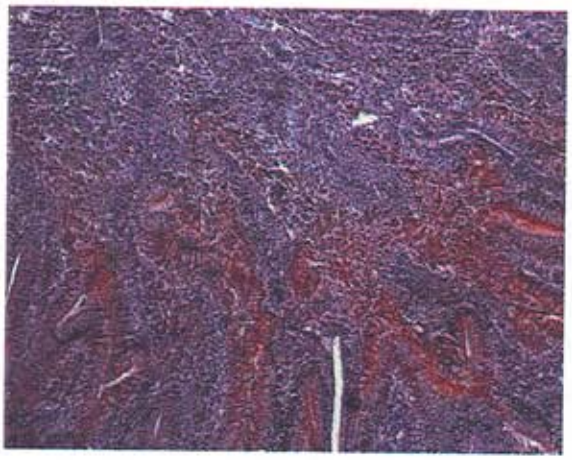
Once the image has been snapped, any of the available processing, image, or color functions can be used to further enhance the image. Once a satisfactory image has been snapped, it is ready to be saved.

Keep in mind that any of the processing options under the Process Menu applied to the Live Window prior to snapping the imaging will be applied to the snapped image.

Bright Field Color

The following explains how to capture a color image from a slide. In this scenario, a bright field subject is being used and the exposure time will be relatively low.

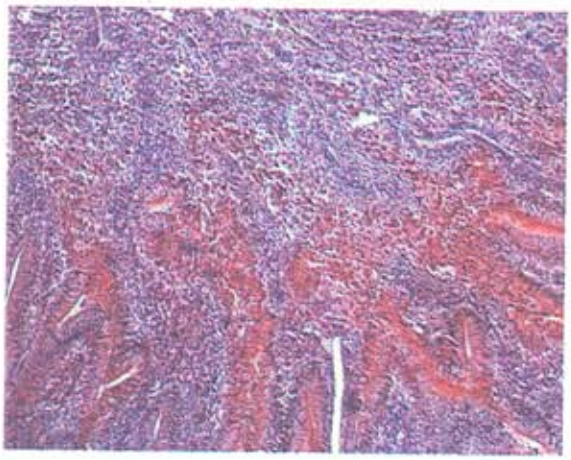
1. To capture a color image, begin by setting the white balance. Either choose from one of the presets, or frame a blank part of a slide (so the viewing area is completely white) and click the **Auto White Balance** button.
2. Click the **Find Exp** button. The camera and software will establish an exposure based on the average pixel brightness.
3. Frame and focus the image.
4. Adjust exposure, if necessary, by using the **Exposure** slider bars.
5. If **Mono** mode is on, click **Mono** button to return to color.
6. Click the **Snap** button.



In this example, the first snap appears too dark and under exposed

The exposure can be readjusted and snapped again.

Examine the resulting image. If necessary, the exposure can be re-adjusted manually and re-snapped.



In this example, the exposure was adjusted and then another snap taken.

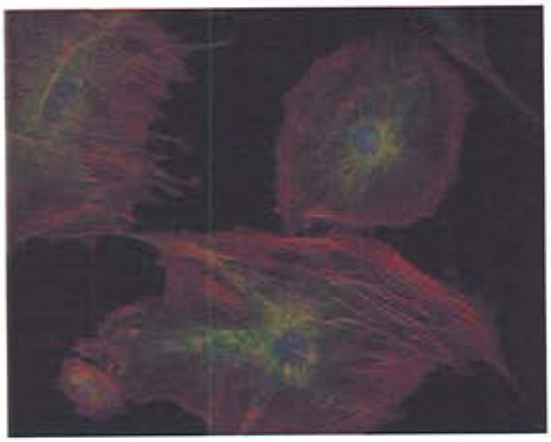
Once the image has been snapped, any of the available processing, image, or color functions can be used to further enhance the image. Once a satisfactory image has been snapped, it is ready to be saved.

Keep in mind that any of the processing options under the Process Menu applied to the Live Window prior to snapping the imaging will be applied to the snapped image.

Fluorescence Color

The following explains how to capture a color image from a slide using the **Fluorescence White Balance** Preset. This is usually under low light conditions with relatively long exposures.

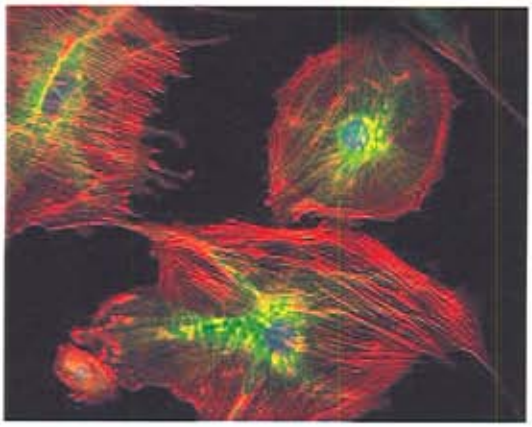
1. Because the microscope illumination can fade fluorescent dyes, it is advisable to reduce the framing and focusing time before illuminating the subject for the exposure.
2. Select the **Fluorescence White Balance** preset from the Toolbar.
3. Click the **Turbo** button on the Toolbar to reduce the exposure for on screen viewing of final framing and focusing.
4. Illuminate the subject.
5. Click the **Exposer Slider** button to establish the exposure manually.
6. Turn off the **Turbo** mode by clicking the **Turbo** button (optional).
7. If **Mono** mode is on, click **Mono** button to return to color.
8. Click the **Snap** button.



In this example, the first snap appears too dark and under exposed

The exposure can be readjusted and snapped again.

9. Examine the resulting image. If necessary, the exposure can be re-adjusted manually and re-snapped.



In this example, the exposure was adjusted and then another snap taken.

Once the image has been snapped, any of the available processing, image, or color functions can be used to further enhance the image. Once a satisfactory image has been snapped, it is ready to be saved.

Keep in mind that any of the processing options under the Process Menu applied to the Live Window prior to snapping the imaging will be applied to the snapped image.

CHAPTER 3

Reference

This chapter explains the MagnaFire SP menus, menu commands, and toolbar buttons. This information can also be found in the online help.

Context Menu

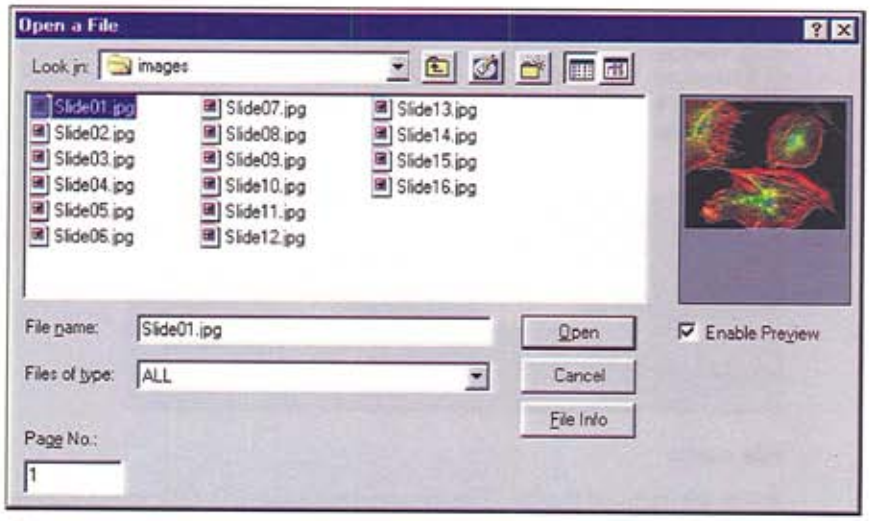
Right clicking on an image displays a context menu of the most common functions. The context menu changes whether you are clicking on the live image or a snapped image. The options are the same as those found under many of the standard menu headings.

File menu

The following functions are available from the File menu.

Open

Use the **Open** command to open previously saved images. Once open, any of the various image and process functions can be used on the image.

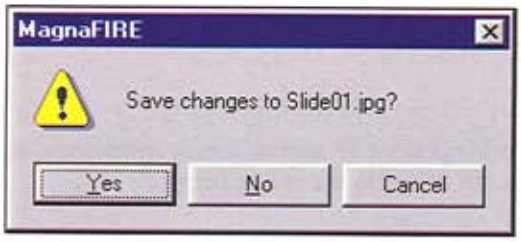


There are a number of available graphic formats that can be opened in MagnaFire. By default, all graphic formats are displayed. You can limit the display of available graphics to a single format by choosing that format from the drop-down list.

If the Enable Preview is checked and the file is highlighted, a preview of the graphic will be displayed when selected in the **Open a File** dialog box. Some files and formats may not have a preview available.

Close

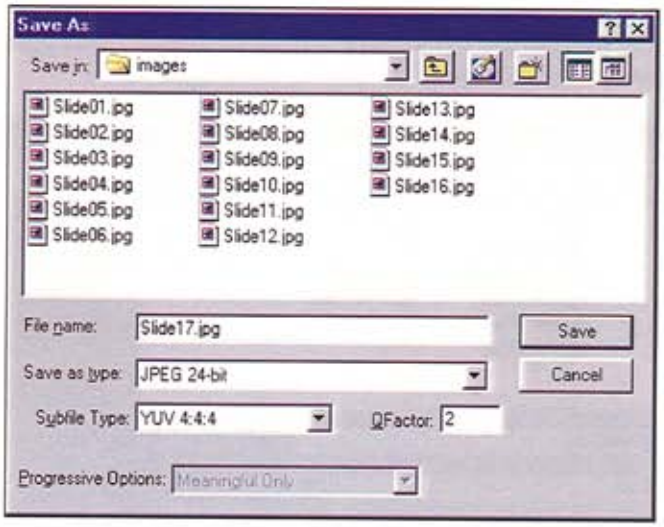
The Close command will close the currently active window. If it is a snap image or a previously saved image that has been changed, you will be asked if you wish to save the image.



Click to save the image, Click to close the image without saving the changes, or click **Cancel** to cancel the **Close** function and leave the window open.

Save As

This function allows the snapped image to be saved, or save a copy of a previously saved image under a different name or in a different location. A **Save As** dialog box appears, which gives the user the options of saving the image as a certain type of file and which file to save to.

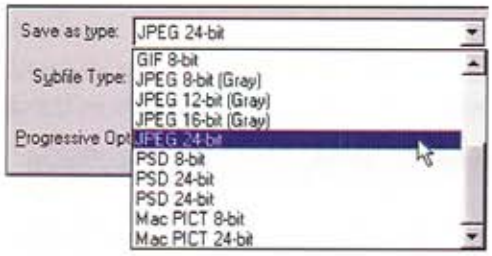


File name

Enter the name of the file. The format extension of the file name can be added, for example, the ".TIF" at the end of the file name, but the program will do this automatically when the graphic format is selected from the **Save as type** list.

Save as type

From the **Save as type Format** list, choose the format to use for the image.



The higher the number, the more colors that can be displayed in the image. For high quality color images, choose 24 or 32 bits. Monochrome images are usually in 8 bits. Black and White bitmaps are in 1 bit.

This option is only visible for certain graphic formats. It offers additional format options depending on the format chosen. These usually include compression options.

Some compression formats, such as JPEG can loose image data.

Connect to Camera

Generally, there is no reason to use this feature, as the software and camera connect automatically. This feature would be used in case of a problem with the software connecting automatically.

Open Live Window

This function opens a new live image from the camera and is only available if no live image window is open, i.e., if the Live Window was closed.

Print

The print command brings up the *Print Dialog* box. From this dialog box the following can be selected:

- The printer to print to
- The number of copies to be printed
- Set various printer properties

The options in this dialog box may change depending on the printer driver being used. Consult the printer documentation for other options.

Print Preview

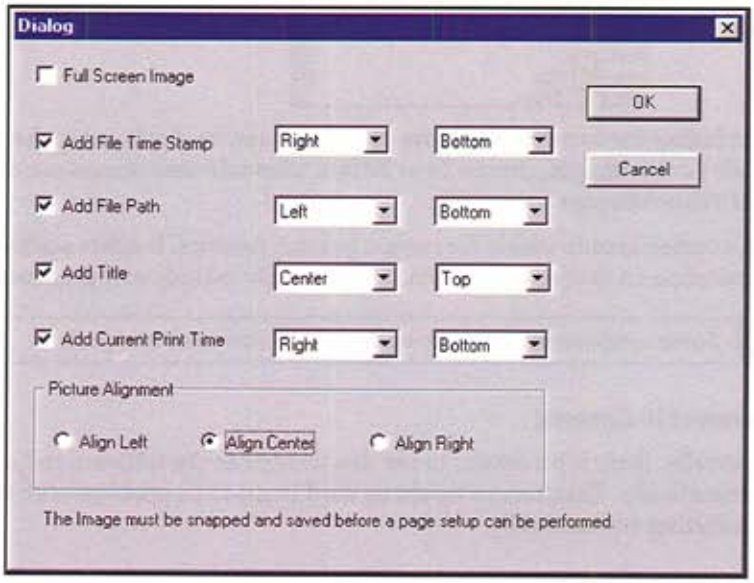
Print Preview displays a preview of the way the currently active image will print.

Print Setup

Print Setup allows you to choose the printer to print to, set the paper source, and page orientation. Clicking the Properties button gives you access to other printer features. These features vary from printer to printer, so check the printer's documentation for specific information concerning the printer's properties and other options.

Page Setup

Page Setup allows you to select how the saved image will be aligned on the printed page. The various settings that can be added or omitted are listed on the chart below.



Recent File

This allows you to open the most recently opened file.

Exit

Closes and exits the program. The user will be prompted to save any unsaved images.

Edit menu

The standard Edit menu commands are available.

Undo

This will undo the last operation that was done to an image.

Copy

The currently active window can be copied to the Windows Clipboard.

Paste

Once an active window has been copied, the Paste command will create a new image window and paste that image into it.

Duplicate

This duplicates the image in the current window in a new window. This applies to the Live image or a Snapped image. In addition, if live window is the current active window, the live window will be brought back to the foreground after the duplicate operation. This way, the user can take a rapid sequence of images from the live window by repeating the Ctrl + D operation.

View menu

50% Zoom

Displays the image one half of it's original picture size. This is actually 50% of the original.

100% Zoom

The Full Frame function displays the image at 1280 pixels by 1024 pixels size.

User Defined Zoom

The User Defined Zoom function allows the user to specify the desired scale of the image, from 1%to 1000%. Enter either the desired percentage in the Amount box, or use the slider bar to select the desired scaling.

Zoom On Mouse Click

When this is checked, clicking the left mouse button will zoom in on the image in steps of 20%. Clicking the right mouse button will zoom out on the image in steps of 20%. Click on Zoom On Mouse Click to turn function off. Esc key also turns this function off.

Fit Image to Window

This option enlarges or reduces the image to fit the window in which it is being displayed. This is handy if the window has been resized to the desired size and then use this option to force the image to fit inside the window.

Snap Window to Image

Use this option to reduce the size of the active window to fit the image.

Status Bar

Toggles on and off the Status Bar at the bottom of the application window. However, the Status Bar can be toggled off when more screen space is needed to display an image.

Toolbar

Toggles the Toolbar on and off. In most circumstances, the user will want the Toolbar visible to have access to its functions. However, the Toolbar can be toggled off when more screen space is needed to a display an image by turning off the Toolbar.

Image menu

Flip Up/Down

Flips the image upside down. This is different from a 180 degree rotation, as it is an upside down mirror image.

Reverse Right/Left

Flips the image horizontally creating a mirror image from the original.

Rotate 90°

Rotates the image on its side 90 degrees clockwise.

Rotate 180°

Rotates the image top side down 180 degrees clockwise.

Rotate 270°

Rotates the image on its side 270 degrees clockwise.

Rotate Any Angle

This function presents a dialog box where the user enters the exact angle wanted. Checking the Resize box will resize the image to fit within the existing window when it is rotated. If this option in not checked, the corners of the image maybe cropped off depending on the angle of rotation.

Deskew

Rotates the bitmap to straighten it. This method typically is used to automatically straighten scanned images.

The calculated rotation is limited to 10 degrees in either direction. This method is intended for images, such as scanned documents, that are mainly horizontal lines of text. The results are unpredictable with other types of images.

Resize

Allows the image to be resized based on the width and height of the image in pixels. The *Keep Aspect* check box will keep the current aspect ratio, so making a change to either width or height will make a proportional change in the other measurement. If the Interpolate box is checked, the program will try to preserve as much image quality as possible.

Fill

This function brings up the standard Windows Color palette. Select a color and click OK. The currently active image is filled with the selected color.

Process menu

Imposes a spatial filter on the bitmap. Spatial filters are used for operations such as sharpening an image or detecting edges within the image.

These functions work best with 24-bit, 16-bit, or monochrome bitmaps. If a bitmap uses a color palette, this method matches the new brightness value of each pixel to the nearest color in the existing palette.

Processing done to the **Live Window** applies to both monochrome and color snaps made after processing is applied.

Spatial Filters

Sharpen

Increases or decreases the sharpness of the image in the bitmap.

Negative values decrease the sharpness of the image. Specify -1000 for minimum sharpness. Positive values increase the sharpness. Specify +1000 for maximum sharpness.

Average

Changes the color of each pixel in the bitmap to the average color of pixels in its neighborhood. This results in a blur effect.

The amount of blur can be controlled by specifying the size of the neighborhood that is used for averaging. Select a value from 3 to 11.

Median

Changes the color of each pixel in the bitmap to the median color of pixels in its neighborhood. This is similar to the Average method, but it is used for noise reduction, rather than a blur effect.

The median effect can be controlled by specifying the size of the neighborhood that is used for calculating the median value. Select a value from 3 to 11.

Gradient

Detects edges using a Gradient directional filter. All pixels not on the detected edges are changed to black. Choose the appropriate value for the direction of the effect.

Laplacian

Applies Laplacian line detection. There are three omnidirectional filters and three bi-directional filters. All pixels not on the detected lines are changed to black.

Sobel

Applies Sobel edge detection. All pixels not on the detected edges are changed to black. (The usage is the same as Prewitt, but the algorithm is different.) Choose the appropriate value for horizontal or vertical detection.

Prewitt

Applies Prewitt edge detection. All pixels not on the detected edges are changed to black. (The usage is the same as Sobel, but the algorithm is different.) Choose the appropriate value for horizontal or vertical detection.

Shift and Difference

Applies shift-and-difference edge detection. All pixels not on the detected edges are changed to black. Choose the appropriate value for diagonal, horizontal, or vertical detection.

Brightness

Changes the intensity (brightness) of the bitmap. Specify a value from –100 (very dark) to +100 (very bright).

Contrast

Increases or decreases the contrast of the bitmap. Specify a value from –100 (low contrast) to +100 (high contrast).

Invert

Inverts the colors in the bitmap, making it like a photographic negative.

This method can also be used to invert the color of a 1-bit bitmap, making the black white and the white black.

Histogram Equalize

Linearizes the number of pixels per gray level in the bitmap. This can be used to bring out the detail in dark areas of an image.

Histo-Contrast

Increases or decreases the contrast of the image in a bitmap, using a histogram to determine the median brightness.

This method finds the median brightness of the image; then brightens the pixels with values above the median and darkens the pixels with values below the median. This is more sophisticated (but slower) than the Contrast method, which uses the middle possible value (128) rather than finding the actual median.

Stretch Intensity

Increases the contrast in a bitmap by centering, maximizing, and proportioning the range of intensity values between 0 and 100.

Unlike the Contrast method, this method always retains the original number of different intensity values. (Ordinary contrast adjustments can lose values at the high and low ends of the scale.)

Gamma Correct

Adjusts the intensity of colors in the bitmap by changing the gamma constant that is used to map the intensity values.

Intensity values ideally follow a logarithmic progression, because the eye perceives changes in intensity as being equal when the ratio of change is equal. For example, humans would see a change from 0.1 to 0.2 as being equal to a change from 0.2 to 0.4.

Gamma is a standard constant that is used to calculate the progression. For most CRTs the gamma constant is in the range of 2.2 to 2.5.

Intensity Detect

Filters the bitmap to detect colors in a specified intensity range.

Intensity levels range from 0 to 255 for each color plane (red, green, and blue). This method processes each plane separately. If a value falls within the range, it is raised to 255, and if it falls outside the range, it is lowered to 0.

Hue

Changes the hue of colors in the color bitmap by rotating the color wheel.

This method can rotate the color wheel in either direction. A 180-degree rotation in either direction changes each color to its complement. Positive rotation takes red toward green, green toward blue, and blue toward red. Negative rotation has the opposite effect.

Saturation

Increases or decreases the saturation of colors in the color bitmap.

Negative values decrease the saturation of colors. Specify -100 to change the colors to monochrome. Positive values increase the saturation. Specify +100 to make the colors as intense as they can be.

Color Correct

Corrects the still image to more closely reesemble the color of the image seen through the microscope.

Edge Enhance

Increases the contrast of edges in the image, there by sharpening the image.

Post Processing Menu

The Post Processing options modify a image about to be snapped to improve the over all image and help it more closely resemble the image seen through the microscope.

Color Correction

Corrects the digital image to more closely resemble the color of the image seen through the microscope.

Edge Enhancement

Enhances the edges of the image to sharpen the snapped image.

Gamma On

Applies gamma adjustment of 1.4 to more closely resemble the image as seen through the microscope.

Color menu

Convert to GrayScale

Converts a color image to an 8-bit monochrome bitmap.

Color Resolution

Converts the bitmap from any bits-per-pixel to any bits-per-pixel, letting the user specify the palette to use.

When reducing the pixel depth of an image, the user can select from a list of dithering methods.

When converting to 16-bits per pixel or higher, the user can specify RGB or BGR color order.

Color Separation

Choose the color separation model to be used in the image: models are RGB, CMYK, CMY, HSV, and HLS.

Color Merge

Choose the color merge model to be used in the image: models are RGB, CMYK, HSV, HSL and CMY.

Camera menu

Snap

This menu command is the same as clicking the **Snap** button on the Toolbar. The **Snap** function takes a snapshot of the current **Live** window. See example of **Snap** on page 7.

Find Exposure

The purpose of the **Find Exposure** button is to automatically find a suitable exposure time. This is done by calculating the average pixel intensity for the entire image, comparing this with the target average pixel level and adjusting the exposure time so that the next image's average will be closer to the target value. When the average image intensity is the same as the target value, the **Find Exposure** process is complete. At this point, the exposure time can manually be "tweaked" to suit the users needs with the **Exposure Control.**

Note: the Find Exposure process assumes that the average brightness of the image is not rapidly changing. If the image brightness changes between successive exposures, the camera might not find the target average pixel level.

The target value is fixed at 50%.

White Balance Adjustment

This function allows manual adjustment of the White Balance settings. When **White Balance Adjustment** is selected, the software displays the current white balance settings, including the presets or the most recent white balance. Adjustments can be made to either the red, green, or blue settings. The example below is the settings for the 3200K white balance settings. Moving sliders to the left reduces that particular color in the white balance, moving to the right increases that color in the white balance. Adjustments can be made from .25 to 3.91.

*There is a significant difference between how the **White Balance Adjustment** and the **Color Exposure Adjustment** works. The **White Balance Adjustment** is adjusting the ratios of red and blue exposure times to the green exposure time. The **Color Exposure Adjustment** does not effect the white balance values. In fact, it doesn't use the white balance values at all. It explicitly sets the exposure time for each of the red, green, and blue exposures.*

Change Find Exposure Target

This option changes the center point of the Find Exposure function. The setting range is from 20 to 140 with the default being 80. Setting the number higher will increase the exposure, making it lighter, lowering the number will decrease the exposure, making it darker. Use this function when the default setting is not producing the desired exposure results.

White Balance

This function allows the user to try and correct a snap that has already been taken. Click on an area that should be white, but appears to have shifted in color. The program will analyze a 32 pixel by 32 pixel region of a picture that the user clicks on. The balancing of red, green, and blue are then adjusted across the image, assuming that the region inside of this 32x32 area is white.

Monochrome

This option toggles the Live window from color to monochrome.

Turbo

The purpose of the **Turbo** button is to increase the sensitivity of the camera in low light conditions, thereby facilitating framing and focusing. This is done by increasing the camera gain to the maximum level and reducing the exposure time so that the brightness is approximately the same as it was with the **Turbo** function off. The speed increase can be as much as 13 times. The camera can frame and focus an image at 0.1s that would otherwise take 1.3s.

An example is as follows:

1. Turn the **Turbo** function on by clicking on the button (depressed).
2. Focus the image and adjust the exposure time (Note: the time shown is the time that the exposure would take with the **Turbo** off). The **Find Exposure** button can be used (provided the image brightness is stable-see *Find Exposure*).
3. Turn the **Turbo** function off by clicking the button again.
4. Take a **Snap** shot of the image by clicking the **Snap** button.

Step 3 can be omitted which will take the snap shot a lot quicker. If the Turbo button is on while taking the **Snap** shots, some noise may be visible in the image do to the increased gain.

Preferences menu

8 Bit Acquisition

In this mode, images will be stored as 8 bits per color (8 bits monochrome, 24 bits color). This is the standard for most applications that edit or import graphic images. In most cases, this is the setting to be used for images.

10 Bit Acquisition

In this mode, images will be stored as 10 bits per color (10 bits monochrome, 30 bits color). This allows for more colors to be stored in the image.

Note: in this mode the images will be larger and take up more disk space. Also, there is not an established standard for 10 bit images and many imaging editing programs may not be able to open and edit 10 bit images. Because the image data is stored 8 bits at a time, the 10 bit images will be saved as 16 bit TIFFs for monochrome images and 48 bit TIFFs for color images.

Load Setup/Save Setup

This allows you to save current settings and load them again later. The following information is stored in the preferences file:

- **Lux Index** It defines the exposure time of the camera
- **Turbo** Whether it's on or off.
- **Bit Depth** What the current bit depth is set at
- **White Balance selection** The current White Balance setting, 2800k, 3200k, Fluorescence, or Manual.
- **White Balance Setting** The actual White Balance information for each White Balance settings.

- **Exposure Values** The Exposure values for red, blue, and green.

Live Gamma On/Off

This setting turns on a gamma correction of 1.4 which is applied to the live image. Gamma correction attempts to make images on your monitor more closely resemble what you see in the microscope.

Clip Detect On/Off

When this setting is turned on, over exposed areas of the **Live Window** will appear red. If clipping occurs, click the Find Exposure button or move slider to adjust exposure and reduce clipping. If clipping continues, manual adjust the exposure until image is no longer being clipped.

Reset Live Window

Resets the coordinates of the live window back to the left hand upper left corner and clears any imaging processing.

Windows menu

Cascade

Arranges all the open windows to overlap each other with their Title bars visible.

Tile

Arranges all windows side by side and reduces the windows in size so they are not overlapping.

Close All

Closes all the currently open windows, except for the Live Window.

⚠ *This function will close all open windows with the exception of the Live Window, without asking if any open images are to be saved.*

Live to Top Selecting this option brings the Live Widow to the top. Use this if the Live window becomes obstructed from view.

List of Open Windows

At the bottom of the Windows menu is a list of all currently open windows. Selecting an item in the list brings that window to the front.

Help menu

About MagnaFire

Displays General information about the MagnaFire application, including version number.

Host Adapter Info

Displays information about the Fire Host Adapter being used by MagnaFire.

Diagnostics

Manufacturer's use only.

Online Help

Launches the MagnaFire Online Help.

Resets Defaults

This option resets all program defaults to original settings.

Toolbar

Open

Use the **Open** button to open previously saved images. Once open, any of the various images and process functions to the image can be viewed.

Save

This function allows a snapped image to be saved, or saves a copy of a previously saved image under a different name or different location. A Save As dialog box will open where a folder in which to save the image can be selected. The default image format is TIFF (.TIFF).

Snap

The **Snap** function takes a snapshot of the current Live window. It does this by taking a series of snaps using the Red, Green, and Blue filters. The program then merges these three images into a single color image. Because of this, it is imperative that the camera and subject by absolutely still during the snapping process. Otherwise blurring and mis-registration of color will occur. This image can be saved or it is possible to apply any of the Image, Process, or Color functions on the image. See examples of **Snap** beginning on page 6.

Clip Detect On/Off

When this setting is turned on, over exposed areas of the **Live Window** will appear red. If clipping occurs, click the Find Exposure button or move slider to adjust exposure and reduce clipping. If clipping continues, manual adjust the exposure until image is no longer being clipped.

Mono Button

The **Mono** button toggles the Live view between color or monochrome. When the mono function is on, the snapped image will be monochrome. When the mono function is off, the Live image will revert back to color.

Turbo

The purpose of the **Turbo** button is to increase the sensitivity of the camera in low light conditions, thereby facilitating framing and focusing. This is done by increasing the camera gain to the maximum level and reducing the exposure time so that the brightness is approximately the same as it was with the **Turbo** function off. The speed increase can be as much as 13 times. The camera can frame and focus an image at 0.1s that would otherwise take 1.3s.

An example is as follows:

1. Turn the **Turbo** function on by clicking on the button (depressed).
2. Focus the image and adjust the exposure time (Note: the time shown is the time that the exposure would take with the **Turbo** off). The **Find Exposure** button can be used (provided the image brightness is stable-see *Find Exposure*).

3 Turn the **Turbo** function off by clicking the button again.

4 Take a **Snap** shot of the image by clicking the **Snap** button.

Step 3 can be omitted which will take the snap shot a lot quicker. If the Turbo button is on while taking the **Snap** shots, some noise may be visible in the image do to the increased gain.

Auto White Balance

The purpose of the **Auto White Balance** button is to automatically determine the correct ratios of red, green and blue exposure times so that a white image appears white on the computer screen. If the color temperature of the light source has been changed (e.g., turned up or down) the white balance setting must be changed. It is assumed that the camera is looking at something that is white (e.g., a blank area on a slide).

*The **Auto White Balance** process assumes that the average brightness and color of the image is not rapidly changing. If the image brightness changes between successive exposures, the camera might not find the target average pixel level. If the image color changes before the white balance is complete, the white balance will be incorrect to that degree.*

For accurate color reproduction, it is important to perform the white balance operation prior to actually using the camera. Each component of a camera/microscope system can have a significant effect on the color balance. For this reason, it is recommended that the entire optical and illumination system be assembled before white balancing the camera. Be certain that no filters other than neutral density filters or color temperature correction filters are in the optical path of the microscope prior to white balancing.

The automatic white balance setting is stored by the software. The camera should not require additional white balance adjustments when it is turned back on, providing nothing in the system has changed (light source, microscope, etc.). Keep in mind that most illuminator controls are electrical dimmers and changing their settings has a significant effect on the illumination color temperature.

Color accuracy is best when the illuminator color temperature is high. Therefore, it is recommended that the illuminator be set to maximum at all times. If the illuminator setting is changed, a new white balance operation is recommended.

*If the automatic white balance function is activated when the light level is very low (1/4 second or more), a considerable amount of time may elapse before the cycle is complete. If necessary, the cycle can be aborted by clicking the **Cancel** button.*

White Balance Presets

2800K: This mode sets the camera white balance for most normal incandescent lighting such as household light bulbs. This setting is appropriate for high intensity light bulbs that are dimmed, such as microscope light bulbs.

3200K: This mode sets the camera white balance for high intensity incandescent lighting such as quartz halogen bulbs, and most microscope illuminators at maximum brightness.

Fluorescence: This mode provides the best color rendition with fluorescent subjects.

Most Recent AWB: This returns to the last **Auto White Balance** setting that was used.

Manual WB: This appears automatically whenever a manual white balance adjustment has been made. Selecting this from the White Balance Preset list returns to the last manual white balance adjustment. See "White Balance Adjustment" on page 20 for information about the *Manual White Balance Adjustment* function.

Find Exposure

The purpose of the **Find Exposure** button is to automatically find a suitable exposure time. This is done by calculating the average pixel intensity for the entire image, comparing this with the target average pixel level and adjusting the exposure time so that the next image's average will be closer to the target value. When the average image intensity is the same as the target value, the **Find Exposure** process is complete. At this point, the exposure time can manually be "tweaked" to suit the users needs with the **Exposure Control.**

Note: the Find Exposure process assumes that the average brightness of the image is not rapidly changing. If the image brightness changes between successive exposures, the camera might not find the target average pixel level.

Exposure Control

The exposure can be manually adjusted using the **Exposure Control** sliders. Clicking on the arrows at each end of the control will move the exposure slightly higher or lower. Clicking and dragging the slider bar to adjust the exposure. Moving the slider to the left reduces the exposure time, to the right increases the exposure time.

The exposure is displayed in microseconds at the far left (62.036 µs), then in milliseconds as you move to the middle (1.089 ms), then minutes and seconds near the right side (8 min., 14 sec.).

CHAPTER 4

Troubleshooting

Following is a guide to troubleshooting common problems should they arise.

Application Issues

- **The software starts up, but there is no Live Window.**

1 Verify that the power to the camera is on and the connection between the camera and the power supply is secure.

2 Verify that both ends of the FireWire cable are seated correctly.

- **The Live Window opens but it is all black or white.**

1 Verify that the microscope's beam splitter is positioned to send an image to the camera.

2 Verify that the **Mono** button is off.

- **Cannot save an image to a diskette.**

MagnaFire images are much larger than the capacity of high density diskette, a ZIP diskette should be used.

- **Cannot open a high bit depth(10 bit) image.**

Many image editing applications do not support high bit depth image formats. Consult your image editor's documentation for compatibility.

For continued problems contact:

Phones

(805) 968-3658
(800) 796-8909 Optronic General Assistance
(888) 393-8909 Technical Support

Fax

(805) 968-0933

Email

support@optronics.com

Home Page

www.optronics.com

US Mail/Shipping Address

Optronics
175 Cremona Drive
Goleta, CA 93117

Appendix

Control Functions

Ctrl + C	Copies screen contents to clipboard
Ctrl + D	Duplicates the currently active window
Ctrl + H	Performs camera white balance
Ctrl + L	Moves LIVE window to front
Ctrl + O	Opens a file
Ctrl + P	Prints a file
Ctrl + S	Saves a file
Ctrl + V	Pastes contents of the clipboard to the MagnaFire Application

Index

Numerics
10 Bit Acquisition 21
100% Zoom 4, 15
50% Zoom 4, 15
8 Bit Acquisition 21

A
Auto Color Snap 19, 23
Auto White Balance 28
Average 16

B
Brightness 17

C
camera operation 1
Close 12
Close All 22
Color Exposure Adjustment 20
Color Merge 19
Color Resolution 19
Color Separation 19
Connect to Camera 13
Contrast 17
Convert to GrayScale 19
Copy 14

E
Edge Enhance 18
Exit 14
exposure 3, 19, 25

F
Find Exposure 3, 19, 25
Fit Image to Window 4, 15
Flip Up/Down 15

G
Gamma Correct 18
Gradient 17

H
Histo-Contrast 18
Histogram Equalize 17
Hue 18

I
image capture examples 6
    Bright Field Color 7
    Bright Field Monochrome 6
    Fluorescence Color 8
image generation 1
image processing tools 16
Intensity Detect 18
Invert 17

L
Laplacian 17
Live Window 4

M
Manual Exposure 2
Median 17
Monochrome 6, 20, 23

O
Open 11, 23

P
Page Setup 14
Paste 14
Prewitt 17
Print 13
Print Preview 13
Print Setup 14

R
Resize 16
Reverse Right/Left 15
Rotate 180° 15
Rotate 270° 16
Rotate 90° 16

Rotate Any Angle 16

S
Saturation 18
Save 23
Save As 12
Sharpen 16
Shift and Difference 17
Snap 4, 19, 23
Snap Window to Image 15
Sobel 17
Spatial Filters 16
Status Bar 15
Stretch Intensity 18

T
Toolbar 23
Turbo mode 3, 21, 23

U
Undo 14
User Defined Zoom 4, 15

W
White Balance 3, 20, 24
  presets 4, 24
White Balance Adjustment 24

Z
Zoom levels 4, 15