

# The Panorama Factory

User's Guide

for Windows 98 / ME / NT / 2000 / XP / 2003 / x64 / Vista / 7 and Mac 05 X 10.3 / 10.4 / 10.5 / 10.6

# The Panorama Factory User's Guide

V5.3 for Windows 98 / ME / NT / 2000 / XP / 2003 / x64 / Vista / 7 and Mac OS X 10.3 / 10.4 / 10.5 / 10.6



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March 2009

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Català / Catalan by Alfons Civit.

繁體中文 / Chinese (Traditional) by Jiunn-Lin Wu and Wei-Dun Teng.

Chinese (Simplified) by Gang Xu.

Česky / Czech by Přemysl Lukavský.

**Deutsch** / **German** by Matthias Fliegner based on previous versions by Johann Tonsing with thanks to the following individuals for their assistance with preparing and proofreading this translation. In alphabetical order: Frank Olzog, Fritz Seyffert, Gerald Nipp, Konrad Buchauer, and Matthias Fliegner.

Español / Spanish by Dioni de la Morena. 98% complete as of March 3, 2009.

**Français** / **French** by Étienne Brès based on previous versions by Thibaut Guilpain and reviewed by Jean-Paul Defossez with additional translation and review by Olivier Detry.

Magyar / Hungarian by Gyula Engloner and Gergő.

Italiano / Italian by Stefano Brini based on previous versions by Fulvio Senore.

日本語 / Japanese by Chris & Mikiko Glick.

Norsk bokmål / Norwegian (Bokmal) by Leif Tore Markman. 63% complete as of March 3, 2009.
 Nederlands (België) / Dutch by Roland Vandenbussche of Belgium with the help of Eduard Frankes and Jan Koopstra of the Netherlands.

Polski / Polish by Damian Wojtanowski.

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Slovensky / Slovak by SlovakSoft, http://www.slovaksoft.com. 81% complete as of March 3, 2009.

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# CHAPTER 1 Introduction

The Panorama Factory is a panoramic stitching program.

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# An overview of The Panorama Factory

The Panorama Factory from Smoky City Design is a panoramic stitching program. You can use it to create high-quality panoramas from a set of overlapping digital images. The Panorama Factory transforms (warps) the images so that they can be joined seamlessly into panoramas whose fields of view can range up to 360 degrees. In fact, you can make panoramas that exceed 360 degrees if you wish!





The Panorama Factory is designed to create images that rival those made by rotational and swinglens panoramic cameras. Unlike some other panoramic stitchers that are intended primarily to facilitate creation of immersive VR worlds, The Panorama Factory is intended for the fine-art panoramic photographer who wishes to work from ordinary 35mm images or images captured with a digital camera.

# Features and capabilities

The Panorama Factory provides a rich set of features:

### Easy to use:

- A Wizard helps you stitch your photos with just a few mouse clicks.
- Automatic detection of focal length.
- Detection of camera rotation and tilt.
- Easy rotation of imported images.
- Includes a library of over 800 digital camera models including digital SLRs.
- Localized versions for Catalan, Chinese-Simplified<sup>†</sup>, Chinese-Traditional<sup>†</sup>, Czech, Dutch, English, French, German, Hungarian, Italian, Japanese<sup>†</sup>, Norwegian-Bokmal (63%\*), Polish, Russian, Slovak (81%\*), Spanish (98%\*), Turkish (24%\*). Online help is "bilingual" (commands, buttons, etc. in the local language with explanations in English).

\* Translation percent complete as of March 3, 2009. Others are 100% complete. † The Chinese and Japanese language versions require the x64, m32 or Mac Edition.

• Lets you save user preferences for all applicable dialog boxes.

### Attention to image-quality issues:

- Includes automatic and manual "de-ghosting" tools.
- Automatically or manually correct barrel distortion and brightness falloff.

### Support for immersive virtual reality:

- Output to QTVR, IVR, PTViewer or HTML image map format.
- Use hotspots to create virtual tours by hyperlinking from one VR image to another.
- Import existing VR images in order to edit and re-export them in other formats.
- Create web pages from pre-defined templates or templates you create yourself.
- Create thumbnail index web pages.

### True full color support:

- Accepts up to 45-bit color images (15 bits each for red, green and blue).
- Supports color managed workflows including conversion to working color space.
- Reads and writes Windows BMP, JPEG, TIFF and PNG images.
- Exports to layered Photoshop image format.
- Optionally maintains full 45-bit data until final image output at 24-bits.
- Can work from positive or negative images.
- Includes a convenient and intuitive color correction tool.
- Trims images from negative strips with a semi-automatic corner finding tool.

### Fast, high-quality image processing engine:

- Focal-length refinement.
- Image overlap from 1-99%.

- Automatic image alignment with manual override.
- Bicubic image sampling is used to maintain image quality.
- Image rescaling with Lanczos2 filtering perfect for creating thumbnail images.
- Multi-threaded execution on multi-processor systems (including multi-core systems).
- 64-bit processor support for the x64 Edition of Windows XP, 2003, Vista or 7.
- Batch processing version available for bulk panorama renderings.

### **Customer support:**

- Printable user guide in PDF format.
- Troubleshooting guide and frequently asked questions.
- Comprehensive online help pages.
- Dedicated support forum.
- Free updates for minor versions (e.g.: V5.2 is a free update for owners of V5.0 and V5.1).

### **Project-file organization:**

- Allows you to change intermediate images without starting over.
- Enables archival storage with reduced disk space.

## System requirements

**Operating system:** Windows 98, ME, NT, 2000, XP, Server 2003, x64, Vista or 7; Mac OS X 10.3.9 or newer.

Utilities: An installed web browser for The Panorama Factory Help Web.

**RAM:** 64 MB—more for better performance.

**Disk space:** About 60 MB of free disk space to download and install the application with online help. Plus 5 MB for the printable User's Guide (downloaded and installed separately).

Lots of free disk space for saved panoramas (you can quickly fill 1GB).

Display size on Windows: 800 x 600 minimum; 1280 x 1024 or larger recommended.

Display size on Mac: 1024 x 768 minimum; 1280 x 1024 or larger recommended.

Display colors: High color (16 bit) minimum, True color (24 or 32 bit) recommended.

- Supported processors for Windows: 486 or newer.
- Supported processors for Mac: PowerPC G4 or newer (on OS X 10.3 or newer) or any Intel Mac (on OS X 10.4 or newer).
- **Processor speed:** The Panorama Factory will run on any reasonably current processor, but it will give you an excuse to upgrade! 400 MHz minimum, 1 GHz or faster recommended.

# The Panorama Factory Editions

The Panorama Factory V5 is available in five editions. All editions include the same features and capabilities (but please read note #9 in the V5.0 release notes). You may install any of these editions with the same Registration Key.

**NOTE:** The Panorama Factory V5 does not yet run on Linux (even under Wine). For Linux-Wine, we recommend the V4.5 Legacy Edition. You may download some older versions of The Panorama Factory, including the V4.5 Legacy Edition at:

www.panoramafactory.com/download.html

### The Panorama Factory x64 Edition

We recommend this version for all x64 Editions of Windows.

This version includes:

- 1. The 64-bit Panorama Factory application.
- 2. Online help.
- 3. Support for multi-processor computers.
- 4. Support for 64-bit processors with x64 architecture.
- 5. Includes the m32 Edition of The Panorama Factory.
- Requires: Windows XP x64 Edition or newer.

This version runs on the x64 Edition of Windows XP, Windows Server 2003, Windows Vista or Windows 7. It requires a 64-bit processor with the x64 architecture such as AMD Athlon 64, AMD Turion 64, AMD Opteron, Intel Xeon with EM64T or Intel Pentium with EM64T. 64-bit processing enables The Panorama Factory to create images that are nearly 1000 times larger than the maximum under Windows XP on a 32-bit processor. This version runs on single- and multi-processor computers, delivering improved stitching speed on multi-processor systems (including multi-core systems) by performing image computations in parallel.

### The Panorama Factory m32 Edition

We recommend this version for Windows XP, Server 2003, Vista or 7.

This version includes:

- 1. The 32-bit Panorama Factory application.
- 2. Online help.
- 3. Support for multi-processor computers.
- Requires: Windows XP or newer.

This version runs on Windows XP, Windows NT 4, Windows 2000, Windows Server 2003, Windows Vista or Windows 7. It runs on single- and multi-processor computers, delivering improved stitching speed on multi-processor systems (including multi-core systems) by performing image computations in parallel.

### The Panorama Factory Mac Leopard Edition

We recommend this version for Mac OS X 10.5 or 10.6 or newer. It will not run on 10.3 or 10.4.

This version includes:

- 1. The 32-bit Panorama Factory application.
- 2. Online help.
- 3. Support for PowerPC and Intel computers.

Requires: OS X 10.5 or newer.

This version runs on Mac OS X 10.5 and 10.6. It runs on single- and multi-processor computers, delivering improved stitching speed on multi-processor systems (including multi-core systems) by performing image computations in parallel.

### The Panorama Factory Mac Legacy Edition

We recommend this version for Mac OS X 10.3 or 10.4.

This version includes:

- 4. The 32-bit Panorama Factory application.
- 5. Online help.
- 6. Support for PowerPC and Intel computers.

Requires: OS X 10.3.9 or newer.

This version runs on Mac OS X 10.3, 10.4, 10.5 or 10.6. It runs on single- and multi-processor computers, but does not take advantage of multiple processors. Support for multi-processor systems (including multi-core systems) requires the Mac Leopard Edition.

### The Panorama Factory Legacy Edition

We recommend this version for Windows 98, ME, NT 4 or 2000.

This version includes:

- 1. The 32-bit Panorama Factory application.
- 2. Online help.

Requires: Windows 98 or newer.

This version runs on all 32-bit Windows platforms starting with Windows 98. It runs on singleand multi-processor computers, but does not take advantage of multiple processors.

# Image size limitations

The Panorama Factory imposes no specific image size limitations. In practice, however, image size is limited by the amount of physical and virtual memory available to The Panorama Factory. The following factors affect the image size limitation:

- System RAM size.
- Free disk space available for virtual memory swapping.
- Operating system policies on memory allocation.

Operating system virtual memory policies may vary among the various versions of Windows and OS X. For example, Windows 98/ME memory allocation policies appear to limit the maximum image size to approximately 50 million pixels (e.g. 5000 high by 10000 wide) in 24-bit mode. Windows NT/2000/XP appear to permit somewhat larger images.

In 45-bit mode, the maximum image size is somewhat smaller due to larger memory requirements for each image pixel.

For extremely large panoramas it may be necessary to upgrade to a 64-bit computer (e.g. AMD Athlon 64 or Intel XEON EM64T) with Windows XP x64. This combination provides 1 terabyte (1000 gigabytes) of virtual memory and makes it possible to create panoramas that are hundreds of times larger than with 32-bit Windows.

## Technical support

Registered users receive free support. We try to help all users, but please consider that registered users are entitled to more extensive support because they have paid for the software. Remember that this is shareware and we do not have a separate support staff.

We do not offer telephone support in order to keep costs down and allow us to concentrate on improving the product while keeping the price low. We try to respond promptly to emailed questions.

If possible, please use English when making a support request.

Before submitting a question, trouble report or request for individual support, please check the online FAO, trouble reports and tips:

Frequently asked questions (FAQ)	www.panoramafactory.com/faq.html
Trouble reports	www.panoramafactory.com/trouble.html
Hints and tips	www.panoramafactory.com/tips.html
Search the web site	www.panoramafactory.com/search.html

If you have a question that is of general interest, please submit it to the FAQ: www.panoramafactory.com/faq.html#create

If you think you have encountered a bug, please submit a trouble report: www.panoramafactory.com/report trouble.html

If all else fails, individual support is available via email. If you are a registered user, please include your registration key in the email. support@panoramafactory.com

# CHAPTER 2 Getting started

To get started with The Panorama Factory: install the software, capture your images and make your first panorama!

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# Installing The Panorama Factory

You may have found the installation package in any of these places:

- The Panorama Factory website.
- A shareware repository website.
- A friend's copy.
- Through a retail purchase.
- Bundled with another software package under
- etc.

You may install The Panorama Factory no matter how you received the installation package. However, you may wish to visit www.panoramafactory.com to be sure that you have the most recent version. The most recent version will always be available directly from The Panorama Factory. Other sources may or may not have the most recent version.

Please refer to the Release Notes section of this User Guide for information about installing The Panorama Factory V5 on a computer that has a previous version of The Panorama Factory.

### **Installing on Windows**

The Panorama Factory is supplied as a single file that contains The Panorama Factory's installation package.

- 1. Locate the installation package with the Windows file Explorer and double-click the file name. For example, the installation package for The Panorama Factory V5 m32 Edition is named *pfactory\_setup\_m32.exe*.
- 2. You will be presented with a **Welcome** panel. As suggested on this panel, be sure you have exited all other programs before installing. Press **Next >** to advance to the next installation panel.
- 3. Read the End User License Agreement and press Yes if you agree to its terms.
- 4. You will now be presented with the **Choose Destination Folder** panel. This allows you to set the file folder into which the software will be installed. You can use the default folder or change it. Press **Next >**.
- Use the Select Language panel to choose the language for The Panorama Factory. If you change your mind later, you can select a different language with The Panorama Factory's Options dialog box (*Tools menu*). Press Next >.
- 6. Finally, you will see the **Start Installation** panel. Press **Next >** to start the installation.
- 7. When setup is complete, you will see a panel telling you that setup has installed the software on your computer. Press **Finish** to exit the installation.
- 8. Select The Panorama Factory icon from the Windows Start menu to run the program. The Windows Start menu is normally located in the lower left hand corner of your computer's desktop.

### **Installing on Mac**

The Panorama Factory is supplied as a disk image file that contains The Panorama Factory application..

- 1. Using the Finder, locate the disk image file and double-click its file name. For example, the disk image file for The Panorama Factory V5 Mac Edition is named *pfactory.dmg*.
- 2. A Finder window will open showing The Panorama Factory icon and the Applications folder.
- 3. Copy (drag-and-drop) the The Panorama Factory icon to the Applications folder.
- 4. Hold down the CONTROL key and click the Applications folder. Select Open from the popup menu to open the Applications folder.
- 5. Locate The Panorama Factory icon in the Applications folder and double-click to run it.
- 6. Return to the Finder window showing The Panorama Factory icon and the Applications folder. Hold down the CONTROL key and click below the icons. Select Eject from the popup menu to close the setup file.

# Installing support for VR creation

If you intend to create panoramic VR images you may need to install software from other vendors to support viewing or authoring the images. The Panorama Factory is able to produce several types of panoramic VR images including QTVR, IVR and PTViewer. For installation instructions, see the individual sections in Chapter 9, "Image file formats."

# Printing the user's guide

We suggest that you print The Panorama Factory User's Guide. It is very helpful to have the guide on the desk next to your keyboard as you are learning to use The Panorama Factory.

The Panorama Factory User's Guide is supplied as an Adobe Acrobat Portable Document Format (PDF) file. You must download the User's Guide separately from the application—it is not automatically installed on your disk. If you wish to download the User's Guide, please visit:

www.panoramafactory.com/download.html

To view or print the User's Guide, you must have the Adobe Acrobat Reader installed in your computer. The Adobe Acrobat Reader is available for download at no charge from:

www.adobe.com/products/acrobat/readstep.html

# Purchasing The Panorama Factory

The Panorama Factory may be obtained under a **shareware evaluation** license. This entitles you to use the program for up to 30 days without registering it. At the end of the evaluation period, you should decide whether you want to keep The Panorama Factory. If you want to keep it, you must purchase a Registration Key. If you decide for any reason that you do not want to purchase a Registration Key, you must stop using the software and remove it from your computer.

During the 30-day evaluation period, The Panorama Factory will place watermarks on your images when saving and printing and will remind you that it is unregistered each time you run it.

Purchasing a Registration Key for The Panorama Factory entitles you to continue using the software. Watermarks will no longer be added to your saved and printed images. In addition, if you saved a Panorama Factory project file during the evaluation period, you can save and print its images without watermarks.

You may copy and redistribute unregistered copies of The Panorama Factory as long as you do not charge a fee for it; do not modify the software, documentation or license statement in any way and do not bundle it with another system.

For complete license terms, refer to the End User License Agreement section at the beginning of this User Guide.

**NOTE:** Continued use of an unregistered copy of The Panorama Factory beyond the 30 day evaluation period is a violation of the End User License Agreement. If you do not agree to the terms of this EULA, do not install or use The Panorama Factory. Instead, you should remove The Panorama Factory from your computer.

To purchase a Registration Key, visit www.panoramafactory.com/purchase.html and follow the instructions. Payment is accepted online by credit card. Upon registering you will receive a registration key by email. Once you enter this registration key in The Panorama Factory's registration panel, all licensing and registration reminders will cease and watermarks will no longer be added to your images.

# Capturing your images

The first step in creating a panoramic image is to capture the images. You can use a digital camera or regular film. If you use film, you must scan the negatives or prints to make image files. This section contains some general imaging guidelines to help you get better results. See also:

"Creating Panoramas" at http://www.panoguide.com/howto/panoramas/

### Alignment

For best results, all images should be made from the same vantage point and with the same camera, lens, focal length, etc.



The camera should rotate around the front nodal point of the lens. The best way to meet this requirement is to use a panoramic bracket to align the lens's front nodal point. It is beyond the scope of this help file to instruct you in the fine points of setting up your camera. You'll find good instructions at the website www.panoguide.com. See also:

"Setting up your camera" at http://www.panoramafactory.com/camera\_setup/setup.html "Using a panoramic head" at http://www.panoguide.com/howto/panoramas/setup\_panohead.jsp

Small variations in image alignment are acceptable, but increase the ghosting problem. Certain types of ghosts can be corrected with the *Fine tune command* (*Edit menu*), but it's best to avoid them as much as possible.

We recommend using a tripod. However, The Panorama Factory produces excellent results even if your images have amounts of camera rotation, so hand held photography is often possible.

### Focus

It's best to make all images with the same focus. The quality of the blend between one image and the next is reduced if there are noticeable differences in focus between the images. This may or may not be a significant effect, particularly if you use a wide angle lens. If you have no way to control focus on your camera, give it a try and see what happens!

### Overlap

The Panorama Factory can work from images that overlap from 1% to 99%. You'll find that if your overlap region is too small, the scalloping effect from image warping will rob you of the very tops and bottoms of your images. Larger overlaps improve The Panorama Factory's ability to fine tune (de-ghost), but increase the number of images required. In turn, this increases the RAM requirements, the disk requirements and makes processing take longer.



There is absolutely no advantage to overlapping more than 50% (although this poses no particular problems to The Panorama Factory). We recommend a 25% to 50% overlap, but you should experiment and find what works best for you.

### Exposure



It's usually best to make all images with the same exposure settings. Some exposure variations can be corrected by using automatic exposure compensation, so if your camera has no manual exposure setting you may be OK.

It is particularly challenging to make a 360 degree panorama when the sun is at an angle. For some images you'll have the sun at your back and for others you'll be shooting into the sun. In this case you may need to use automatic exposure. In fact, the example panorama used in this manual was made with shutter-priority automatic exposure!

The use of a polarizing filter {XE "Polarizing filter"} is not recommended. You may be accustomed to using a polarizing filter to deepen the intensity of blue skies or to reduce glare. Unfortunately, the effect of a polarizing filter is directional and will change as you rotate the camera from image to image. This will accentuate mismatches in exposure from image to image. Use a non-directional filter like a UV or skylight filter instead.

### Scanning

If you have to scan negatives or prints, it does no good to control exposure when making the photographs if you can't control exposure during printing and scanning!

Photographic prints may be suitable only if you control the printing process by making the prints yourself or working with a custom darkroom. You would want all the prints to be made with the same darkroom parameters.

You'll get the best results if you can control the scanner exposure parameters also. Some scanning software performs its own automatic exposure compensation. Disable this if possible.

### File format

The Panorama Factory requires that the image files be TIFF (Tagged Image File Format), JPEG, BMP or PNG images.

# Making your first panorama

Now that you have captured your images, you are ready to make your first panorama.

The easiest way to make your first panorama is to use the Stitching Wizard. Unless you have disabled the Wizard, it runs automatically when you start The Panorama Factory. You can make your first panorama just by stepping through the Wizard panels. You will need to change only a few of the values on the Wizard panels—most of the default settings will work for you without changes.

If you have disabled the Wizard, you can start it manually with the *New Project Wizard command* (*File menu*).

See Chapter 3, "Using the Stitching Wizard to make a panorama" for step by step instructions on using the Stitching Wizard.

NOTE: For photo stitching, the Stitching Wizard expects all your images to be the same size (the sizes may vary for document stitching). If your images need to be trimmed before stitching (e.g. negative strips) you must use the Classic interface to trim the images first. After trimming, you can stitch with the Classic interface or you can run the Wizard on your trimmed images with the **Stitch with the Wizard command (New image menu)**.

# CHAPTER 3 Using the Stitching Wizard to make a panorama

The easiest way to get started making panoramas is to use the Stitching Wizard. It leads you step by step through the process of building a project. When the Wizard finishes, it leaves you with a complete project that you can save, print or modify as you wish.

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# Introduction to the Stitching Wizard

The Stitching Wizard helps you make a Panorama Factory project. It leads you step by step through the process of building a project. When the Wizard finishes, it leaves you with a complete project that you can save, print or modify as you wish.

Everything the Wizard does can also be done using the Classic interface. You don't need to worry that you'll be giving up any capabilities if you decide that you like the Classic interface better. For more information on the Classic interface, see Chapter 4 "Using the Classic interface, step by step."

The Wizard panel can be docked to the left, right, top or bottom edges of the window or it can be moved to float on top of the main window.



To dock the panel, click with the mouse in a blank area of the floating panel and drag it to one of the edges of the main window. To make the panel float on top of the main window, click with the mouse in a blank area of the panel and drag it into the middle of the window.



Each Wizard step displays helpful tips indicated by a lightbulb icon. All of the tips are shown right on the panel when the Wizard is floating. When the Wizard is docked, the tips are displayed in a popup dialog box the first time you enter each Wizard panel for a panorama. You can disable or enable these popup quick tips with the radio buttons:

### Automatically show quick tips

Select this option to display the quick tips automatically the first time you enter each Wizard panel.

### Do not automatically show quick tips

Select this option to disable automatic display of the quick tips. You can also view the tips by clicking the lightbulb button.

We recommend you read all tips the first few times you use the Wizard.

For certain Wizard steps, the tips change depending upon the settings you have chosen. For example, the instructions for **Wizard step 3/9 – Describe your camera** change depending upon the selection of camera type and the instructions for **Wizard step 6/9 – Place stitching points** and **Wizard step 7/9 – Preview at low resolution** change depending upon what stitching method you have chosen.

You may also press the **Help** button to display the help page containing complete instruction for the Wizard step.

NOTE: For photo stitching, the Stitching Wizard expects all your images to be the same size (the sizes may vary for document stitching). If your images need to be trimmed before stitching (e.g. negative strips) you must use the Classic interface to trim the images first. After trimming, you can stitch with the Classic interface or you can run the Wizard on your trimmed images with the **Stitch with the Wizard command (New image menu)**.

The steps that the Wizard follows to create your panorama are:

### 1. Import your images

The first step of the Wizard prompts you to import the images that you will use to construct your panorama.

### 2. Select stitching method

In the second step of the Wizard you select one of three stitching methods based on how you took your photos.

### 3. Describe your camera

The third step of the Wizard helps you describe the camera you used to make the images. The Panorama Factory requires a description of your camera to correctly merge the images.

### 4. Control image quality

In this step, you control the tradeoff between image quality and stitching speed.

### 5. Select panorama type

In this step, you describe the type of panorama you want to create.

### 6. Place stitching points

For semi-automatic and manual stitching you place corresponding stitching points on overlapping pairs of images.

### 7. Preview at low resolution

In this step, you preview the results of semi-automatic or manual stitching to decide whether the stitching points are acceptable.

### 8. Create your panorama

Here you make final choices about the form of the panoramic output file.

### 9. Save & print your panorama

In this step you save, view and print the final panorama.

### 10. Learn more about...

The final step of the Wizard helps you learn more about The Panorama Factory so that you get the result you want.

# Wizard step 1/9 – Import your images

1/9 - Import your images Import Make certain that your images are correct in order from left to right in the main wind	tly oriented and dow.	
Rotate right 90         Rotate left 90         Rotate 180         Reverse order         Insert images         Remove images	To move individual images to their correct positions, click and drag them in the main window.           To delete images, select them in the main window and type the DELETE key.           Use the Help button at the bottom of each Wizard dialog to view the help for the current Wizard step.	
Next time use the Wizard interface     Next time use the Classic interface          		

The first step of the Stitching Wizard prompts you to import the images that you will use to construct your panorama.

Start by pressing the import button:



Imports your images.

The Panorama Factory displays the **Import Images dialog box** so you can select the images to open. When you open images, The Panorama Factory places them at the end of the imported thumbnails.

You can use the Import... button as many times as necessary to import all your images.

Your images must be right side up and in order from left to right in the main window. If your images are not right side up, press one of these buttons to rotate them:

<b>~</b>	Rotate right 90	Rotates clockwise 90 degrees.
4	Rotate left 90	Rotates counter-clockwise 90 degrees.
4	Rotate 180	Rotates 180 degrees.

When you open multiple images at the same time, The Panorama Factory loads them in alphabetical order. Usually this will put your images in the correct order, but if it orders them in reverse (from right to left), use:



Reverses the order of the images.

In some cases, the image order may be scrambled so that the reverse button cannot put them in the correct order. In this case, to move individual images to their correct positions, you should click and drag them in the main window.

If you import more images than you need, you should delete the extras from your project. Or, if you wish, you can remove them from the panorama but leave them in the project. To delete images, select them in the main window by clicking their thumbnails and type the DELETE key. To remove images from the panorama without deleting them from the project, select the images and use:

**Remove images** Removes selected images from the panorama.

To indicate that the images have been removed from the panorama, their thumbnails are displayed with faded colors. If you remove an image from the middle of the panorama, its thumbnail is moved to the end of the list so that the images in the panorama are in an uninterrupted sequence.

If you remove the wrong image, you can add it back into the panorama by selecting it and using:



Adds selected images to the panorama.

Another way to add and remove images from the project is to click and drag their thumbnails. If you drag a thumbnail that has been removed from the project onto one that is part of the project, it will be added back into the project. If you drag a thumbnail onto one that has been removed from the project, it will also be removed.

When you are satisfied with your imported images, press the **Next>** button to advance to the next step of the Wizard. You must import at least 2 images before the Wizard will permit you to go on to the next step.

To choose whether the Wizard will run automatically the next time you start The Panorama Factory, select one of these radio buttons:

### Next time use the Wizard interface

Select this option if you want the Wizard to run automatically each time you start The Panorama Factory.

### Next time use the Classic interface

Select this option if you do not want the Wizard to run automatically each time you start The Panorama Factory. In this case, The Panorama Factory will start with a new, blank project each time you run it. You can return to the Wizard by selecting the *New project wizard command (File menu)*.

# Wizard step 2/9 – Choose stitching method

In the second step of the Stitching Wizard you choose one of four stitching methods. Usually you can select the stitching method based on how you took your pictures. The stitching methods are in two groups. The **Photo stitching** methods are used for true panoramic photos where the camera is in a single position and rotated between one picture and the next. The **Document stitching** method is used for stitching large documents that were scanned in sections on a flatbed scanner.



### Fully automatic (Photo stitching)

Select this stitching method if your camera's frontal tilt (pitch) is zero and the lateral tilt (roll) is identical for all images. A small amount of lateral tilt (up to 5 degrees) can usually be corrected automatically. This option will give usually give excellent results if you have used a tripod and leveled the camera properly. If you are not satisfied with the results from fully automatic stitching, you may need to use semi-automatic or manual stitching instead.

### Semi-automatic (Photo stitching)

Select this stitching method if your camera was tilted up or down and the frontal tilt (pitch) and lateral tilt (roll) are identical for all pictures. You'll need to place stitching points on one or more pairs of images. The Panorama Factory will determine the camera tilt angles and apply the same values to all images. This option will usually give good results if your camera was mounted on a tripod. If you cannot get satisfactory results with semi-automatic stitching, you may need to use manual stitching instead.

### Manual (Photo stitching)

Select this stitching method for hand held images where the tilt angles may be different for different images. You'll place stitching points on all pairs of images so that The Panorama Factory can determine the individual tilt angles. This method is the most general, but also the most time consuming for the user.

### Manual (Document stitching)

Select this stitching method for large documents that were scanned in sections on a flatbed scanner. You'll place stitching points on all pairs of images so that The Panorama Factory can rotate the individual images for the best match.

After selecting the stitching method, press the **Next>** button to advance to the next step of the Wizard.

NOTE: Semi-automatic and manual stitching are available only through the Stitching Wizard. These stitching methods are not available through the Classic interface. Fortunately, you can start the Wizard from the Classic interface. To use semi-automatic or manual stitching from the Classic interface, select a group of thumbnails and use the **Stitch with the Wizard command** (**New image menu**). This starts the Wizard with the selected images. You can use the full power of the Wizard, including semi-automatic or manual stitching, to create your panorama.

### Wizard step 3/9 – Describe your camera

The third step of the Wizard helps you describe the camera you used to make the images. The Panorama Factory requires a description of your camera to correctly merge the images. The Panorama Factory skips this step for document stitching.

**NOTE:** The Panorama Factory's focal length detection is normally very accurate. We strongly recommend that you select **Automatically detect focal length** and **Correct barrel distortion**, especially if using the **Fully automatic** or **Semi-automatic** stitching method.

3/9 - Describe your camera		
Camera type Digital camera Make Model Olympus Model Stylus 770 SW		
Automatically detect focal length (recommended) Focal length 40 mm [38 mm - 114 mm] I guessed the focal length (±50%) I am pretty sure of the focal length (±10%) I am certain of the focal length Wide angle or tele converter (accessory lens): 1 X	We recommend that you initially select "Automatically detect focal length." This allows the software the most flexibility in finding the best solution. You should enter the focal length yourself only if you are unable to get satisfactory results with the automatic setting. For a digital camera, enter the 35mm equivalent focal length. If you do not know the exact value, enter an approximate value as the starting point for refinement.	
✓ Correct barrel distortion         ✓ Correct brightness falloff         ✓ Barrel distortion and brightness falloff are caused by imperfections in your camera's optics. Correcting them may produce an improvement in image quality. These options increase stitching time.   <		

### **Camera type**

Start by selecting the type of camera you used from the drop down list:

**35mm** — Select this option if you used a 35mm camera and scanned negatives, transparencies or prints.

- **APS film scan** Select this option if you used an APS camera and scanned full frame negatives or transparencies.
- **APS hdtv print** Select this option if you used an APS camera and scanned HDTV format prints (APS H).
- **APS classic print** Select this option if you used an APS camera and scanned Classic format prints (APS C).
- **APS panoramic print** Select this option if you used an APS camera and scanned Panoramic format prints (APS P).
- **Digital camera** Select this option if you used a point-and-shoot digital camera.
- **Digital SLR** Select this option if you used a digital camera with interchangeable lenses.
- **Other digital camera -- using 35mm equivalent** Select this option if you used a digital camera that is not in the camera library and you know (or can guess) the 35mm equivalent focal length. If you are unfamiliar with the term "35mm equivalent focal length," please read "What is '35mm equivalent focal length?" at www.panoramafactory.com/equiv35/equiv35.html.
- **Other digital camera -- using focal length multiplier** Select this option if you used a digital SLR that is not in the camera library and you know the focal length multiplier for your camera. The focal length multiplier is a number that relates the focal length of the lens to its 35mm equivalent.
- **Other digital camera -- using sensor dimensions** Select this option if you used a digital SLR that is not in the camera library and you know the dimensions of the imaging sensor (CCD or CMOS array).
- **Swing lens or rotational camera** Select this option if you used a swing lens or rotational panoramic camera.
- **Other film size** Select this option if you used some other type of camera (e.g. medium format).

Other information depends on the type of camera:

### Make and Model

If you selected **Digital camera** or **Digital SLR** choose your camera's **Make** (manufacturer) and **Model** from the drop down lists.

If your digital camera is not available, you should choose one of the following camera types instead:

Other digital camera -- using 35mm equivalent Other digital camera -- using focal length multiplier Other digital camera -- using sensor dimensions

### **Film dimensions**

If you selected **Other film size** enter the width and height of the film image in millimeters.

If you selected **Other digital camera -- using sensor dimensions** enter the dimensions of the imaging sensor (CCD or CMOS array).

For **35mm** and **APS** cameras, the width and height of the film image is displayed for your information.

The film dimensions controls are not needed for other types of cameras.

### Focal length multiplier

If you selected **Other digital camera -- using focal length multiplier**, enter your camera's focal length multiplier value. This is a multiplying factor that relates your camera's true focal length to its 35mm equivalent value. The focal length multiplier should be printed in the owner's manual for your camera.

### Horizontal field of view (degrees)

If you selected **Swing lens or rotational camera**, enter the angular width of your images in degrees. This value is required to compute the field of view of the completed panorama. It is important to enter an accurate value if you intend to export your images to a VR format or if you wish to use the Perspective projection option.

### **Document stitching**

You should select this checkbox if you are using the **Swing lens or rotational camera** option to stitch scanned documents as described in some of The Panorama Factory Forum and FAQ articles. Selecting **Document stitching** together with **Swing lens or rotational camera** disables image warping and enables you to stitch your documents without entering a value for the field of view.

### Automatically detect focal length

Select this checkbox to request The Panorama Factory to determine the focal length automatically.

### Focal length

Enter the focal length of the lens in millimeters.

If you selected an **APS** camera, enter the actual focal length. DO NOT enter the 35mm equivalent focal length.

If you selected **Digital SLR**, **Other digital camera -- using focal length multiplier** or **Other digital camera -- using sensor dimensions**, enter the actual focal length. DO NOT enter the 35mm equivalent focal length.

If you selected **Digital camera** or **Other digital camera -- using 35mm equivalent**, enter the 35mm equivalent focal length focal length.

You don't need to specify the focal length for swing lens or rotational cameras.

If you are unfamiliar with the term "35mm equivalent focal length" please read "What is '35mm equivalent focal length?" at www.panoramafactory.com/equiv35/equiv35.html.

If you do not know the focal length, don't worry. Just select **Automatically detect focal length** and The Panorama Factory will try to determine the focal length for you.

I guessed the focal length — The Panorama Factory will try focal lengths from 50% less than the number you entered to 50% more.

- I am pretty sure of the focal length The Panorama Factory will try focal lengths from 10% less than the number you entered to 10% more.
- I am certain of the focal length The Panorama Factory will use the focal length value you entered without trying to refine its value.

Please read "Adjusting focal length and barrel correction" in Chapter 6, "Correcting stitching problems" for more information about manually adjusting the focal length after stitching.



There is a wide variation in how digital camera manufacturers determine their *35mm equivalent focal length*. For conventional cameras, there is a wide variation in the effects produced by scanning and printing methods. Finally, focal length specifications are usually only an approximation to the true focal length value. For these reasons, it is a good idea to use focal length refinement the first time you stitch a panorama with a particular camera, lens and imaging setup even if you are confident that you know the focal length specification.

### Wide angle or tele converter:

Select this checkbox if you added a wide angle converter or telephoto converter to the standard lens used on your camera. Enter the converter's magnification factor into the entry field.

Wide angle converters have a magnification factor that is less than 1. Telephoto converters have a magnification factor that is greater than 1. The Panorama factory will adjust for the magnification factor when it refines the focal length value.

### **Correct barrel distortion**

If your camera and lens combination exhibit barrel (or pincushion) distortion, you can select this checkbox to request that The Panorama Factory try to automatically correct it.

See "Adjusting focal length and barrel correction" in Chapter 6, "Correcting stitching problems" for more information about manually adjusting the barrel correction after stitching.

*NOTE:* Correcting barrel distortion will increase the time required to compute your panorama.

### Correct brightness falloff

If your camera and lens combination exhibit brightness falloff in the corners you can select this checkbox to request that The Panorama Factory try to automatically correct it.

See "Adjusting exposure matching and brightness falloff" in Chapter 6, "Correcting stitching problems" for more information about manually adjusting the barrel correction after stitching.

*NOTE:* Correcting brightness falloff will increase the time required to compute your panorama.

When you are satisfied with your settings, press the **Next>** button to advance to the next step of the Wizard.
## Wizard step 4/9 – Control image quality

In this step, you control the tradeoff between image quality and stitching speed. In document stitching, this is Wizard step 3/7.



Automatically fine tune — Automatically applies the *Fine tune command* (*Image menu*) while stitching the panorama.

When The Panorama Factory aligns adjacent images it finds the offset that minimizes the differences between the images in the overlap region. It is rarely possible to align the images perfectly. When the images are not perfectly aligned, some portions of the overlap region will show double images called ghosts. The *Fine tune command* analyzes overlap region and makes local adjustments in an attempt to remove the ghosts.

- **Enable exposure matching** Selecting this checkbox causes The Panorama Factory to adjust the brightness of successive images to improve the agreement between the images. You should normally select this checkbox if your images were made with different exposure settings (e.g. your camera was set to automatically determine the exposure). You should normally reset this checkbox if your images were all made with the same exposure settings (e.g. you manually controlled the exposure yourself).
- Enable exposure correction Selecting this checkbox causes The Panorama Factory to adjust the overall brightness of the stitched image. For 45-bit images, this sets the White level,
   Black level and Midrange on the Color tool to adjust the brightness. For 24-bit images, this adjusts the pixel values themselves.

Make the corrected image... <--- Darker 0 Lighter --->

8

If you have enabled exposure correction, select one of the radio buttons to control the overall brightness. The center radio button adjusts the overall brightness so that the median brightness value is at 50%. Each radio button step above or below 0 increases or decreases the median brightness.

Don't worry too much about this setting. If your final panorama image is too light or dark, you can change the setting later by using the **Blending properties dialog box**.

Sharpen the final image — Selecting this checkbox causes The Panorama Factory to apply the Sharpen command (New image menu) to the final image.

#### Amount (percent)

Determines the amount of sharpening.

The amount of sharpening you need may depend upon how much sharpening was done by your digital cameras. Some cameras produce sharper pictures and some produce softer pictures. Remember that you can change the amount of sharpening after exiting the Wizard. If you want to change the amount later, select the sharpened image and use the **Show source command** (**Image menu**) to display the **Sharpen image dialog box**.

After making your image quality choices, press the **Next>** button to advance to the next step of the Wizard.

## Wizard step 5/9 – Select panorama type

In this step, you describe the type of panorama you want to create. The Panorama Factory skips this step for document stitching.

5/9 - Select panorama type
QTVR
Choose the type of VR viewer you want to use. Press the Help button at the bottom of this dialog box to learn more about output formats.
🔘 Partial panorama
360 degree panorama
Choose 360 degree panorama to connect the ends of your picture into a ring.
Spherical projection
Cylindrical projection
Perspective projection
Most VR viewers require spherical or cylindrical projection. For perspective project keep images under about 100 degrees. When preparing an image for printing or s this option is an esthetic choice.
To create a cubic QTVR, choose QTVR format and Spherical projection. To create QTVR, choose QTVR format and Cylindrical projection.
< Back Next > Cancel

Begin by selecting the output format.

- **Image file only** Creates an image that you can save in a conventional image format such as JPEG, TIFF, BMP or PNG.
- IVR Creates an IVR object to be viewed with the iSeeMedia Java viewer or browser plug-in. For more information, see "IVR image file format" in Chapter 9, "Image file formats."
- PTViewer Creates an image and a web page to be viewed with Prof. Helmut Dersch's PTViewer. For more information, see "PTViewer image file format" in Chapter 9, "Image file formats."

- **QTVR** Creates a QuickTime VR movie to be viewed with Apple's QuickTime viewer or browser plug-in. For more information, see "QTVR image file format" in Chapter 9, "Image file formats."
- Layered Photoshop image (PSD) Creates a Photoshop file (PSD format) in which each original image of the panorama is stored on its own layer. This gives you the opportunity to use Photoshop to adjust blending and color matching.
- Additional formats Additional output formats may become available as Panorama Factory application extensions are released to support them. See the help file associated with the output format for more information.

Next, select image attributes.

#### Spherical projection Cylindrical projection

**Perspective projection** — The type of projection (warping) used by The Panorama Factory to make the images fit together seamlessly. Some output formats require a particular choice. In this case, the other choice will be unavailable.

Choose **Perspective projection** to flatten the image so that it has conventional perspective. Normally, stitched panoramas show the characteristic "panoramic perspective" where straight lines are curved. **Perspective projection** option restores normal perspective. This option may be used only for images up to about 120 degrees field of view and may not be used for VR viewers.

To learn more about projections, please refer to Chapter 10, "Panoramic projections".

Partial panorama — Choose this option if your images do not cover 360 degrees.

**360 degree panorama** — Choose this option if your images cover 360 degrees. The Panorama Factory will connect the lefthand and righthand ends of the panorama together into a complete circle.

When you are satisfied with your settings, press the **Next>** button to advance to the next step of the Wizard.

## Wizard step 6/9 – Place stitching points

In this step you place stitching points in corresponding positions on overlapping images. This step is used only for manual or semi-automatic stitching. The Panorama Factory skips this step for fully automatic stitching. In document stitching, this is Wizard step 4/7.

6/9 - Place stitching points	
Images     #     Point     L     R       1::2     5     •     2::3     6     •     2     •     •       2::3     6     •     •     2     •     •     •     2       3::4     5     •     •     3     •     •     •     •       5::6     6     •     •     5     •     •     •     •       5::6     6     •     •     •     •     •     •     •       6::7     7     •     •     •     •     •     •     •       6::9     5     •     •     •     •     •     •     •       6::9     5     •     •     •     •     •     •     •	Select from the "Images" list box to show a pair of images on screep. Then select one or more
Match quality: Excellent Good Acceptable Poor Split screen (edit points) Overlay view Rotate all images the same amount Hold CTRL+SHIFT for momentary 500% zoom.	stitching points to view them or click on an image to place the next point in numerical sequence. To complete the manual photo stitch, place enough stitching points to get a checkmark on each pair of images. 5 points are usually sufficient to get a checkmark, but occasionally more are required. Use the Help button for full instructions.
< Back	Next > Cancel Help

For manual stitching, you have to place stitching points on all pairs of images so that The Panorama Factory can determine the tilt angles for each picture. For semi-automatic stitching, you place stitching points on one or more pairs of images. The Panorama Factory assumes that the tilt angles are the same for all pictures and applies the same values to image pairs that do not contain stitching points.

To use this Wizard step, you select a pair or images from the **Images** list. The left and right images of the pair are displayed in a split screen view. To place a stitching point, click on one of the images. Then click in the corresponding location in the other image. The Panorama Factory will try to automatically center the second stitching point on the corresponding image feature if the zoom scale is less than 500%. If you disagree with the automatic centering, you can click and drag the stitching point to the correct position.

It usually best to make the initial stitching point placement with the images zoomed to show the entire overlap region of the two images. We suggest using the *Fit height on screen command* (*Image menu*).



To help you place the points, you can hold the CTRL+SHIFT (Windows) or COMMAND+SHIFT (Mac) keys to momentarily zoom the image to 500%. When you release the keys, the image will return to the previous zoom scale. To precisely position a stitching point using this method, start by placing the point in one of the images. Then move the mouse to the corresponding position in the other image and hold CTRL+SHIFT (Windows) or COMMAND+SHIFT (Mac) while you place the corresponding point using 500% zoom.

You may adjust the positions of the stitching points using the keyboard arrow. To adjust a point with the keyboard, use these steps:

- 1. Click a stitching point to select it.
- 2. While the stitching point is highlighted, use the LEFTARROW, RIGHTARROW, UPARROW and DOWNARROW keys to move it one pixel at a time. Hold the SHIFT key to move it 10 pixels at a time.

After placing several stitching points, we recommend you review their positions. To review and precisely adjust an existing stitching point, select the point by clicking on its number in the **Point** list. Then hold CTRL+SHIFT (Windows) or COMMAND+SHIFT (Mac) while you adjust its position in both images using 500% zoom.

To jump to particular stitching point, click on its number in the **Point** list. The split screen view will scroll to show the selected stitching point in each image. If you select a group of stitching points in the **Point** list, the split screen view will scroll and zoom to show the group of stitching points in each image.



For best results, it is important to spread your points around the overlap region of the two images. If possible, do not place them in a cluster in one area of the picture. For example, try to place

four points as close as possible to each corner of the overlap. The position of the fifth is not so critical, but a central point is a good spot.

The Panorama Factory usually requires 5 stitching points to determine the relationship between the pair of images. If it successful, it displays a checkmark in the **Images** list and adjusts the image warping to agree with the stitching points.



Sometimes you may need to place more than 5 stitching points to get a checkmark. If you cannot get a checkmark by placing additional stitching points, there may be a bad point that you should move or delete instead.

There are several methods you can use to judge the quality of the stitching point placement. You can review the placement at 100% zoom (or larger) in **Split screen (edit points)** view. Or, you can select **Overlay view** to show the images superimposed upon each other.



After an image has a checkmark, The Panorama Factory evaluates the quality of the stitching point match and displays a colored dot in the **Point** list to indicate the results of its evaluation:

- The match quality is excellent.
- The match quality is good.
- The match quality is acceptable.
- The match quality is poor.

The color of the worst stitching point in each image is also shown in the **Images** list. If you have a red dot, we recommend you carefully examine all stitching points on the particular image pair. Often The Panorama Factory correctly identifies the incorrect stitching point with a red dot, but occasionally the position of a different stitching point must be corrected to remove the red dot.

For hand held panoramas or with a tripod when the camera's nodal point is incorrectly positioned, parallax differences between one image and the next can make it difficult for The Panorama Factory to get an acceptable match. When this happens, we recommend placing the stitching points on distant objects in the view, if possible. Differences in distance exaggerate the effect of parallax, so using distant objects can reduce the effect.

Even with hand held photographs, the manual stitching method can deliver excellent results if you are able to place the stitching points properly.

You may advance to the next Wizard step when you have obtained checkmarks on all images for manual stitching or on at least one image for semi-automatic stitching. If you're satisfied with the stitching point placement, press the **Next>** button to advance to the next step of the Wizard.

## Wizard step 7/9 – Preview at low resolution

When you enter this Wizard step, The Panorama Factory displays the stitched panorama at reduced resolution. You can select the stitching resolution with the **Preview resolution** drop down list. The stitching resolution is independent of the displayed zoom. Stitching at low resolution is faster than stitching at full resolution and gives you a chance to decide whether the results of the previous step are satisfactory. This step is used only for manual or semi-automatic stitching. The Panorama Factory skips this step for fully automatic stitching. In document stitching, this is Wizard step 5/7.

7/9 - Preview at low resolut	ion
Images       #       •         1::2       5       •         2::3       6       •         3::4       5       •         4::5       5       •         5::6       6       •         6::7       7       •         7::8       5       •         8::9       5       •	Exercise of the second
Preview resolution 11%   Preview resolution 11%  Apply warp  Reset warp lines  Apply default warp	For manual stitching, you may adjust the image warping by dragging the dots and then applying the warp. Use the Help button for full instructions.
< Back	Next > Cancel Help

In this step, you can click on an image in the scrolling list to highlight the overlap region. If you are not satisfied with the image alignment, return to the previous Wizard step to adjust the stitching points.

In manual stitching mode, particularly with hand held photographs, The Panorama Factory sometimes makes different choices for camera tilt than the ones you would prefer. In this situation, the pictures in your panorama may curve upward or downward.



Or vertical lines in your picture may be slanted instead of straight up and down.



The preview step provides a warping grid to allow you to adjust the panoramic image warping. There are two ways to use the warping grid:

- 1. Adjust the warping grid so that it parallels the horizon.
- 2. Adjust the warping grid so that it parallels two different vertical lines (e.g. building walls).

The procedure for adjusting the warping grid depends upon whether you want to use the horizon method or the vertical line method.

For the horizon method, begin by clicking and dragging one of the handles (red dots) on the warping grid to a starting location on the image, for example a point on the horizon. Then click and drag another handle on the same *horizontal* grid line to a similar position, e.g. another point on the horizon. Finally, click and drag a third point on the same horizontal grid line to a corresponding position. You need three points to determine a line paralleling the horizon.



To adjust the warping grid to parallel two different vertical lines, begin by clicking and dragging one of the handles (red dots) on the warping grid to a starting location on one of the vertical lines. Then click and drag another handle on the same *vertical* grid line to a different location on that vertical line. Repeat this procedure for a second vertical line in the picture using a different starting point on the horizontal grid line.



You may adjust the positions of the handles using the keyboard arrow. To adjust a handle with the keyboard, use these steps:

- 1. Click a handle to select it.
- 2. While the stitching point is selected, use the LEFTARROW, RIGHTARROW, UPARROW and DOWNARROW keys to move it one pixel at a time. Hold the SHIFT key to move it 10 pixels at a time.

When you're satisfied with the warping grid, press the **Apply warp** button to straighten the image. The Panorama Factory restitches the image to straighten the warping grid. You may need to repeat this prodedure if the results of the first warp are not perfect.



If you are not happy with the warping grid, you can reset the image to its initial state with the **Apply default warp** button. Or if you don't like the way you have adjusted the grid lines, you can start over by pressing the **Reset warp lines** button to restore a rectangular grid without applying the warp.

When you are satisfied with the preview image, press the **Next>** button to advance to the next step of the Wizard.

## Wizard step 8/9 – Create your panorama

Here you make final choices about the form of the panoramic output file. In fully automatic stitching or document stitching, this is Wizard step 6/7.



First, indicate the intended disposition of your final image-internet display or printing.

#### Prepare image for internet display

Selecting this option gives you the ability to control the final image size in pixels. It also gives you the option of automatically creating a thumbnail image.

Choose one of these options:

**Maximum size** — The final image will be as large as possible.

- **Image width** Enter the width of the final image in pixels. The Panorama Factory will scale the width and height proportionally to create the final image.
- **Image height** Enter the height of the final image in pixels. The Panorama Factory will scale the width and height proportionally to create the final image.

#### Prepare image for printing

Selecting this option gives you the ability to control the final image size in inches or centimeters.

Choose one of these options:

**Default resolution** — The final image will be printed at the resolution (DPI) specified by the imported images.

- **Printed width** Enter the width of the printed image in inches, cm or pixels. If you choose inches or cm, The Panorama Factory will adjust the resolution (DPI) without changing the size of the image in pixels.
- **Printed height** Enter the height of the printed image in inches, cm or pixels. If you choose inches or cm, The Panorama Factory will adjust the resolution (DPI) without changing the size of the image in pixels.

When you are satisfied with your settings, press the Next> button.

At this point the Wizard will do the work of building your Panorama Factory project. The amount of time this will take depends on the size of your imported images, the options you have chosen and the performance of your computer. It may take a few minutes or tens of minutes.

These are the steps the Wizard will follow to build your project:

1. If you selected Fully automatic (Photo stitching) and any of these options:

Automatically detect focal length I guessed the focal length I am pretty sure of the focal length Correct barrel distortion Correct brightness falloff

the Wizard begins by warping and aligning the central two images. It then uses these two images to calculate the focal length, the correction for barrel distortion and/or the correction for brightness falloff.

- 2. If you did not select **Fully automatic (Photo stitching)**, the Wizard uses the stitching points to determine the focal length and the correction for barrel distortion. It then uses the central two images to calculate the correction for brightness falloff if you selected **Correct brightness falloff**.
- 3. Next, the Wizard warps and aligns all of your images. If you selected **Automatically fine tune**, it also fine tunes the overlap regions to remove ghosts.
- 4. The Wizard crops your image automatically.
- 5. If you specified the size of your final image in pixels, the Wizard resamples the cropped image.
- 6. Finally, the Wizard applies a sharpening filter if you selected **Sharpen the final image**.



The Automatically detect focal length, Automatically fine tune and Sharpen the final options may be somewhat time consuming. If you find that your panoramas take a very long time to create, you may decide to decline one or more of these options. If you decline these options, your image may lose some quality. But don't worry; you can apply all of these options later using the Classic interface. To learn how, see:

- The **Refine ±50%** button on the **Overlap region dialog box** in Chapter 14, "Dialog boxes."
- The Fine tune command (Image menu) in Chapter 6, "Menus."
- The Sharpen command (New image menu) in Chapter 6, "Menus."

## Wizard step 9/9 – Save & print your panorama

<b>£</b> (	Save final image	
) ۲	View in browser	1 miles
	Save project	
Save your	project so that you can open it later if you need to make changes.	<b>I</b>
Before pri preview to	nting, use Page setup to select multiple page, tiled printing. Use Print > be sure it will print the way you expect.	
] 🐯	Page setup	
] 🞑	Print preview	
) 📚 ا	Print	
Select Nex	ιt to learn more about getting results. Select Done to exit.	

In this step you save, view and print the final panorama. In fully automatic stitching or document stitching, this is Wizard step 7/7.

Press these buttons to save or view your image:

£	Save final image	Saves the final image. You'll have an opportunity to create a web page and add a thumbnail to an index page if you wish. See for more information.
۲	View in browser	Starts your web browser to view the final image. This command is available only if you selected Prepare image for internet display in the previous Wizard step.
	Save project	Saves the panorama project file. Saving your project lets you open it later if you need to make changes.

Press these buttons to print your image:

2	Page setup	Runs the <b>Page setup dialog box</b> to let you choose the paper size, the margins, the orientation of the image on the page (portrait or landscape) and the layout of the image.
Q	Print preview	Displays the image as it would appear when printed. When you choose this command, the main window is replaced with a print preview window in which one or two pages will be displayed in their printed format.
5	Print	Sends the final image to the printer.

After saving and printing, press the **Next >** button learn more about getting the results you want or press **Done** to leave the Wizard.

### Learn more about ...

Finally, you can use this page to learn more about getting the results you want. Pressing any of the buttons on this page will start your web browser to display a page giving you useful information.



When you are finished, press **Done** to leave the Wizard.

## CHAPTER 4 Using the Classic interface, step by step

For your first panorama, we suggest you use the Stitching Wizard (see Chapter 3, "Using the Stitching Wizard to make a panorama"). Later you may want to try the Classic interface.

Once you become familiar with The Panorama Factory's Classic interface you will develop your own routines for making panoramas. For your first panorama, however, we suggest you follow this step-by-step guide.

This section is sufficient if you are working from images made with a digital camera. If you are working from scanned photos you should also read Chapter 5, "Extra steps when working from scanned photos."

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## Classic step 1 – Import the images

After capturing the images you should import them into The Panorama Factory. Create a new Panorama Factory project with the New project command (File menu) and then use the Import images... command (File menu) to read the image files into the project. If all of your images are in the same directory, you can import them all at once by using multiple selection in the **Import Images dialog box**. Each imported image appears in the imported thumbnails pane.



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If your images appear rotated when you import them, you can select the thumbnails and use the Rotate right 90 command, Rotate left 90 command or Rotate 180 command (Edit menu) to get them rightside up. If no thumbnails are selected, these buttons rotate the images.

- You'll need to have the images in left-to-right order for stitching. If, after importing the images, they are in reversed order (right-to-left), select the thumbnails and use the **Reverse selected command** (Edit menu) to re-order them. If no thumbnails are selected, this buttons reverses the order of all images. If the order of your images is mixed up, click-drag the thumbnail images one at a time to rearrange them.
  - This is a good time to run the **Camera properties dialog box** to describe the camera you used to capture the images. See the **Camera properties dialog box** in Chapter 14, "Dialog boxes" for more information about entering camera parameters.
  - After you've imported all the images, save your project. Saving the project accomplishes two very good things. First, if for any reason your computer crashes or The Panorama Factory exits abnormally, you will not need to repeat this work. Second, whenever you save, The Panorama Factory removes from main memory any images that it can re-read from a disk file. This helps a lot if your machine doesn't have unlimited RAM. Both of these are good reasons to save your work frequently.

If you are working from scanned photos (negatives, slides or prints), you probably should color correct the imported images and then trim the images before going on to Step 3. See "Color correct the imported images" and "Trim the images" in Chapter 5, "Extra steps when working from scanned photos."

## Classic step 2 – Stitch the images into a panorama



Now use the **Stitch command** or the **Stitch 360 command** (**New image menu**) to form the imported images into a panoramic image.

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If you intend to convert your panorama into an immersive virtual reality file (e.g. IVR or QTVR), you must use the *Stitch 360 command*.

Before stitching, you should probably check the **Camera properties dialog box**, **Alignment properties dialog box**, **Blending properties dialog box** and **Fine tuning properties dialog box** to make sure they are set they way you want them.

By default, The Panorama Factory will attempt to stitch all of the trimmed images. If there are no trimmed images, The Panorama Factory will attempt to stitch all of the imported images. You may, however, select a subset of the computed thumbnails or imported thumbnails to stitch.

The **Stitch command** and the **Stitch 360 command** are available only when you are not viewing a panoramic image.

NOTE: All images to be stitched must have the same width and height.

When stitching is completed, The Panorama Factory adds the stitched image to the end of the computed thumbnails list and selects it as the current image. It displays outlines superimposed on the stitched image to indicate the image overlap regions:



If you use the **Stitch 360 command**, the same image appears at both ends of the panorama to signify that this is a circular panorama. The Panorama Factory hatches the duplicated portions at the left and right ends of the panorama. This provides a bit of flexibility when using the cropping tool to compose the cropped panorama.



(Note the scalloping effect at the tops and bottoms of the image. This is the results of the image warping that is required to match adjacent images.)

#### Opening overlap regions

When you place the cursor over various parts of an overlap outline it changes to show you what editing actions are possible:

This cursor	Means this
↔	Indicates that the cursor is over a handle (red dot) on the left or right border of the outline. Dragging left or right changes the width of the overlap outline. This is used to exclude portions of one image or the other from the blend region. You cannot enlarge the outline beyond the boundaries of the image overlap. If you try, the edges will snap back.
	Double-clicking when the double-headed cursor is active opens the overlap region for manual fine tuning (removal of ghost images).
<b>₩</b> 5	Indicates that the cursor is over the left or right border of an overlap outline. Dragging up or down edits the shape of the outline. You can use this to exclude portions of one image or the other from the blend region. You cannot enlarge the outline beyond the boundaries of the image overlap. If you try, the edges will snap back.
	Double-clicking when this cursor is active opens the overlap region for manual fine tuning (removal of ghost images).
Ð	Indicates that the cursor is over a handle (red dot) on the the top or bottom border of an overlap outline. Clicking opens the overlap region for manual fine tuning (removal of ghost images).

Stitching takes a long time, so when it completes you should probably save again.

## Classic step 3 – Correct problems with the stitched image

Now examine the stitched image carefully. If The Panorama Factory did its job well, all the overlap regions are properly aligned, there are no ghosts and the brightness of your picture is satisfactory. In this case, you can go directly to "Classic step 4 - Crop the stitched image".



You don't need to be concerned about whether you will be able to correct all of the problems at this time. You can make the corrections described in this step at any time. If you discover problems later after cropping, resizing or sharpening, you can return to this step. As you make your corrections, The Panorama Factory will automatically update your cropped, resized and sharpened images accordingly.

This section describes a suggested work-flow for correcting problems in your stitched image, but does not go into detail on the steps. Please refer to the "Troubleshooting guide" in Chapter 6, "Correcting stitching problems" for step-by-step instructions on correcting problems.

Correcting these problems can be tedious or lots of fun, depending on your mindset. In any case, however, it can involve a significant investment of time and mental energy. We suggest saving your project occasionally as you work on the overlap regions.

#### Open the first overlap region

When correcting problems in your stitched image, it is probably best to open each overlap region and correct its problems in turn.

To open the first overlap region, click the handle (red dot) at the top or bottom edge of an overlap outline or double-click anywhere on the outline. Opening the overlap region causes the **Overlap region dialog box** to be displayed. You use this dialog box to navigate from one overlap region to the next and to make adjustments.

#### Work flow in the overlap regions

Once the overlap region is open, the normal sequence of operations is

**Correct the overall alignment** — You should begin by adjusting the image-to-image alignment if it is incorrect because the remaining steps in this work flow assume that the overall alignment is correct. Refer to "Manually aligning images" in Chapter 6, "Correcting stitching problems."

**Check focal length and barrel correction** — Refer to "Adjusting focal length and barrel correction" in Chapter 6, "Correcting stitching problems." Note that same focal length value and barrel correction value apply to all images in your panorama. After adjusting the value, you should check the other overlap regions to be sure the value works well for your entire panorama.

**Fine tune the alignment** — Refer to "Fine tuning the image alignment" in Chapter 6, "Correcting stitching problems."

**Check brightness falloff correction** — Refer to "Adjusting focal length and barrel correction" in Chapter 6, "Correcting stitching problems." Note that same focal length value and barrel correction value apply to all images in your panorama. After adjusting the value, you should check the other overlap regions to be sure the value works well for your entire panorama.

You can use the **<--- Prev** and **Next --->** buttons on the **Overlap region dialog box** to move from one overlap region to another. You can also move from one seam to another by holding the ALT key (Windows) or OPTION key (Mac) and pressing the left or right arrow key.

#### Adjust blending region boundaries

Sometimes an overlap region will have a ghost you just can't eliminate with fine tuning. If an object (e.g. car or person) moved between the times you made the two photographs, its position and/or size will differ in the two images. There's really no way to adjust the images so that features like this will align sharply. You can sometimes eliminate these ghosts by adjusting the boundaries of the blend region.

You make these adjustments when you are looking at the entire stitched image. The overlap regions are displayed as irregular outlines. There are two ways to adjust the boundaries of the blend region. You can use the mouse to move the entire left or right edge to change the width of the region without chaging its shape or you can edit the shape of the edge using a freehand drawing tool.

- ↔ To change the width of the region without changing its shape, move the cursor over the handle (red dot) on the side of the overlap region that has the ghost. The cursor changes to indicate that dragging will change the width of the outline.
- The edit the shape of the region, move the cursor over the left or right border of an overlap outline. Dragging the mouse up or down edits the shape of the outline.

You can include or exclude portions of the lefthand image from the blending region by changing the left edge of the outline. You can include or exclude portions of the righthand image by moving the other edge. You cannot, however, enlarge the outline beyond the boundaries of the image overlap. If you try, the edges will snap back.

## Classic step 4 – Crop the stitched image

#### Now use the Crop command (New image menu) to compose the image.

Use this command to crop the current image. The Panorama Factory displays a cropping rectangle superimposed on the current image and displays the modeless **Crop image dialog box**.

When you approve the cropping, The Panorama Factory retains the portion of the image within the rectangle, discarding the exterior portions. The cropping rectangle shows a horizontal line called the horizon line drawn across its middle. You use this line to judge whether the cropping rectangle is parallel to the actual horizon in the panorama.



For stitched images, the default cropping rectangle is set to include the maximum extent of image (excluding the scalloped top and bottom). The horizon line parallels the average rise or fall in the image from end to end.

The horizon line also indicates the zero tilt angle for Perspective cropping and for VR image export. It's important not to change the location of the horizon line if you plan to use either of these features. Moving the horizon line usually produces unexpected results.

For circular panoramas created with the **Stitch 360 command** (**New image menu**), the ends of the default crop region are set so that the lefthand and righthand edges of the cropped result will match seamlessly. This is important for VR image viewers.

#### Using the cropping rectangle

 $\mathbf{\mathbf{A}}$ 

The cropping rectangle is used to simultaneously crop and rotate the image. You use the horizon line to set the rotation. You drag and rotate the horizon line until it is parallel to the horizon in your image. If you are making a 360 degree panorama it's even easier—you just drag the lefthand and righthand horizon line intersections onto the same feature at the left and right sides of the image. Once you have the horizon line parallel to the image's horizon, you stretch the four sides of the cropping rectangle to enclose the portion of the image that you want to keep.

When you place the cursor over the various parts of the cropping rectangle it changes to show you what editing actions are possible:

	Means this
↔	Indicates that the cursor is over one of the vertical sides of the cropping rectangle or over the midline of a perspective cropping rectangle. Dragging one of the size changes the width of the rectangle without affecting its height or orientation. Dragging the midline affects the shape of the perspective cropping rectangle.
This cursor	For circular panoramas, dragging moves the rectangle without changing its width. To change the width, hold the ALT key (Windows) or OPTION key (Mac) key while this cursor is showing. <b>Means this</b>
¢	Indicates that the cursor is over the top or bottom or the horizon line of the cropping orientation. Dragging the top or bottom changes the height of the rectangle without affecting its width or orientation. Dragging the horizon line repositions it without affecting the rectangle's size or orientation.
25	Indicates that the cursor is over one of the corners of the cropping rectangle. Dragging changes the width and height of the rectangle without affecting its orientation.
	For circular panoramas, dragging changes the rectangle's height and moves it left and right without changing its width. To change the width, hold the ALT key (Windows) or OPTION key (Mac) key while this cursor is showing.
₩	Indicates that the cursor is over the intersection of the horizon line with the left or right side of the cropping rectangle. Dragging repositions the intersection point and also changes the width and orientation of the cropping rectangle.
	For circular panoramas, dragging moves the rectangle without changing its width or orientation. To change the width and orientation, hold the ALT key (Windows) or OPTION key (Mac) key while this cursor is showing.
<b>₹</b> ⊕	Indicates that the cursor is not over any part of the cropping rectangle. Dragging draws a new cropping rectangle. This cursor appears only when there is no cropping rectangle present. If you have a cropping rectangle, you must delete it in order to get this cursor.
	For stitched images, new cropping rectangles are drawn parallel to the average rise or fall in the image. To draw an ordinary crop rectangle, hold the ALT key (Windows) or OPTION key (Mac) key while this cursor is showing.
	For circular panoramas created with the <i>Stitch 360 command</i> ( <i>New image menu</i> ), the ends of the default crop region are set so that the lefthand and righthand edges of the cropped result will match seamlessly. To draw an ordinary crop rectangle, hold the ALT key (Windows) or OPTION key (Mac) key while this cursor is showing.

#### Cropping circular panoramas

When you make a circular panorama with the **Stitch 360 command** (**New image menu**), the first image appears at both ends of the panorama. This gives you only a small amount of flexibility when using the cropping tool to compose your panorama. That is, the left and right ends of the image have to be within the repeated image if you want your final panorama to be a full 360 degrees.

If you want to frame the picture so that the ends are somewhere else or if you want your image to be significantly wider than 360 degrees, you can use the method described here.

Start by cropping the panorama using the default position of the cropping rectangle. That is, don't change the location or angle of the cropping rectangle. Just select the *Crop command* (*New image menu*) and approve it immediately.

Next, apply the *Array command* (*New image menu*) to the cropped image. Set **Direction = Horizontal**, **Spacing = 0** and **Repeat count = 2**. This will create a new image with two copies of your picture end-to-end. That is, this image will be 720 degrees wide—two full revolutions.

Finally, apply the *Crop command* to the array image. This gives you full freedom to frame and crop the image anywhere you wish.

#### **Perspective cropping**

Most panoramic stitching applications, including The Panorama Factory, simulate the effect produced by rotational and swing-lens panoramic cameras. In images produced by these cameras straight lines appear to curve.

Planar panoramic cameras (6x17 etc) do not produce curved lines. However, planar panoramic cameras cannot capture as wide a view as rotational cameras. They are limited to about 120 degrees field of view.

You can use The Panorama Factory's **Perspective cropping** to simulate the effect of a planar panoramic camera. With this cropping option, lines are straightened so that the cropped image has conventional perspective.

If you select this option when you crop a stitched panorama, The Panorama Factory displays a cropping region with a curved top and bottom.



This curvature represents the correction that will be applied to convert from panoramic perspective to conventional perspective.



When you use **Perspective cropping**, the width and height of the cropping rectangle are limited in order to keep the horizontal and field of view under 135 degrees (plus or minus 67.5 degrees). Beyond about 120 degrees the image becomes extremely distorted and the size of the image increases rapidly.

The geometric accuracy of **Perspective cropping** is quite sensitive to the quality of the stitching. Hand held panoramas or panoramas that exhibit parallax errors are more likely to exhibit geometric distortion even after **Perspective cropping** is applied. You may find that manual stitching gives better results than semi-automatic or automatic stitching.

#### Approve

When you have the cropping rectangle where you want it, use the *Approve command* (*Image menu*) to generate the cropped image. The cropped image is added to the end of the computed thumbnails list.

If you want to change the cropping rectangle later, select the cropped image and use the **Show source command** (**Image menu**) to redisplay the cropping rectangle on the source image of the cropped result.

You'd hate to have to recompose the image if something went wrong. Save after you approve the cropped image.

## Classic step 5 – Resize the cropped image

This is the time to resize the image if you wish. When you choose the **Resize command** (New *image menu*), The Panorama Factory runs the modal **Resize image dialog box**. You enter the new size of the image with this dialog box.

The Panorama Factory scales the image using low-pass filtering so that the resulting image is free of sampling artifacts.

If you want to change the image size later, select the resized image and use the **Show source** command (Image menu) to redisplay the **Resize image dialog box**.

You can also resize a group of images by selecting a group of thumbnails before choosing the **Resize command**. All the images will resize to the same width or height (or both), depending upon which numbers you enter into the dialog box.

On the other hand, if you like the size the way it is, just advance to the next step without resizing the image.

## Classic step 6 – Sharpen the resized image

#### Use the Sharpen command to sharpen the image



Be subtle – it's easy to overdo sharpening! If you're one of those folks that hate sharpening, just skip the sharpening.

In response to the *Sharpen command* (*New image menu*), The Panorama Factory displays a preview rectangle and runs the modeless *Sharpen image dialog box*. You can adjust the sharpening parameters and see the response interactively within the preview rectangle. Refer to the *Sharpen image dialog box* for explanations of the sharpening parameters.

When you place the cursor over the various parts of the preview rectangle it changes to show you what editing actions are possible:

This cursor	Means this
4¢⊉∿	Indicates that the cursor is over one of the sides or corners of the preview rectangle. Dragging changes the size of the rectangle.
<b>N</b> ∎	Indicates that the cursor is not over any part of the preview rectangle. Dragging draws a new preview rectangle.



When you are satisfied with the sharpening parameters, use the *Approve command* (*Image menu*) to generate the sharpened image. The sharpened image is added to the end of the computed thumbnails list.

If you want to change the sharpening parameters later, select the sharpened image and use the **Show source command (Image menu)** to redisplay the **Sharpen image dialog box**.

You can also sharpen a group of images by selecting a group of thumbnails before choosing the *Sharpen command*. All the images will be sharpened by the same amount.

#### Use the Improve quality command to reduce generational degrading



After sharpening, you can use the *Improve quality command* (*Image menu*) to reduce generational degrading of the image. This command recomputes the image more precisely at the expense of speed. You use your own judgment to determine whether this time-quality tradeoff is worth it.

In normal operation, The Panorama Factory computes images by resampling their immediate predecessor images with bicubic sampling. For example, when you crop the stitched image, The Panorama Factory samples pixels from the stitched image. This can lead to a generational degrading of the computed images.

The *Improve quality command* recreates the current image by tracking each pixel back to its corresponding location within the original imported images. This improves the image quality by replacing multiple image generations with a single generation.

The quality improvement may be subtle. A typical panorama only has three significant resampling generations: (1) trimming the imported images, (2) warping the trimmed images (includes barrel correction and fine tuning), and (3) cropping the stitched image. Other image processing steps do not introduce the type of generational degradation that is addressed by the *Improve quality command*.

There is a time-quality tradeoff involved here. The *Improve quality command* takes a significant amount of time to recompute the image. You may or may not find that the improvement is worth the time spent.

Images whose quality has been improved are marked with this symbol above their thumbnail images:

#### Q.

Please note also that quality improvement is temporary. The next time you recompute the image for any reason, the quality improvement is lost and you must repeat the *Improve quality command*. So you probably should use this command only immediately before printing or otherwise publishing a panorama.

To learn more about generational image degradation, see "Improving the quality of multigeneration images" at www.panoramafactory.com/quality/quality.html

*If you are working from scanned photos (negatives, slides or prints), you should color correct the final image before going on to Step 8. See "Color correct the imported images" in Chapter 5, "Extra steps when working from scanned photos."* 

## Classic step 7 – Print your image



You can print your image directly from The Panorama Factory with the *Print current image... command* (*File menu*). The Panorama Factory can layout your printed image in any of these ways:

- Scaled to fit one page.
- Scaled to fit the height of one page, extending to as many pages as necessary to cover the horizontal extent of the image.
- Scaled to fit the width of one page, extending to as many pages as necessary to cover the vertical extent of the image. (This is the default.)
- Scaled to actual size (based on the image size set with the **Image properties dialog box**), extending to as many pages as necessary to cover the horizontal and vertical extents of the image



Use the *Print preview command* (*File menu*) to view the image as it would appear when printed. This shows the way the image is paginated and shows registration marks (if selected on the **Page setup dialog box**).



The *Page setup... command* (*File menu*) runs the **Page setup dialog box**. On this dialog box you can set the paper size, the margins, the orientation of the image on the page (portrait or landscape) and the layout of the image. These options are stored in your project. As a convenience, you can also select the printer you want to use if there is more than one printer connected to your computer. This choice is not saved in the project.

## Modifying your stitching project

As you work on your stitching project you may find that you want to modify one of the images in your panorama. For example, after cropping and sharpening, you might want to recrop the image differently. You don't need to start over and repeat all the work you've done. The Panorama Factory's projects allow you to modify the settings of any particular image processing step, even those that were followed by other steps. Then the derived images can be recalculated automatically, based upon the modified image.

When you approve a modification to an image, The Panorama Factory marks the derived images as out of date. To indicate that an image is out of date, The Panorama Factory displays a gray rectangle in place of the thumbnail. An underlined **?** is shown in the center of the thumbnail. When you're ready to recalculate the derived image, either double-click the image or select the image and use the **Show image command** (**Image menu**).

With the exception of stitched images, to change the image you select its thumbnail and use the **Show source command** (**Image menu**). This command displays the dialog box that was used to create the image. You can modify the settings and approve the changes.

Stitched images are more complex and there are many more ways to modify them. Here are some of the ways to modify your stitched image:

1. Change the settings on any of these dialog boxes:

Camera properties dialog box Alignment properties dialog box Blending properties dialog box Fine tuning properties dialog box

When you approve the change to the dialog box, The Panorama Factory will prompt you to restitch the panorama. If you're planning to make changes to several dialogs, you may choose to delay restitching until you have made all the changes.

2. Modify the overlap regions as described in under "Classic step 3 – Correct problems with the stitched image". You can correct image-to-image misalignments, adjust focal length and barrel correction (if you chose the automatic stitching method), fine tune the image alignment, adjust the brightness falloff correction or adjust the blending of the overlaps between pairs of images.

These editing operations are also discussed in more depth in Chapter 6, "Correcting stitching problems."

3. Run the Wizard on the stitched image. You can use the **Restart the Wizard command** *(Image menu)* to start the Wizard on the stitched image even if you did not use the Wizard to create it in the first place. This lets you use the full power of the Wizard, including semi-automatic or manual stitching, to modify your panorama.

# CHAPTER 5 Extra steps when working from scanned photos

These are additional steps you may need to follow if you are working from scanned photos (negatives, slides or prints).

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## Color correct the imported images

If you are working from scanned photos (negatives, slides or prints), you probably should make only a rough attempt to color correct the images after importing them. It may be that you don't need to, particularly if your scanner or digital camera has done a good job.

*NOTE:* The Color tool is available only when it is enabled on the **Project properties dialog box**. It is enabled automatically when you are working with 45-bit images. See **Use 45-bit pixels** and **Enable color tool** on the **Project properties dialog box** to learn about 45-bit pixels.

If you are working from scanned negatives, there is a standard procedure you can follow to get a good initial color correction:

1. Select "Negative" on the Color tool or use the toolbar button.



- 3. Double click one of the imported images to enlarge it and locate one of its black interframe regions.
- 4. Draw the preview rectangle so that it is entirely within the inter-frame region.
- 5. Press the **Set black** button on the **Histogram panel**.

This procedure should give you recognizable images. You can use other **Color tool** values to improve the images now if you wish, but you can also wait until later.

Note that using the **Set black** button does a good job of filtering out the orange mask.

If you want to take a first stab at color balancing the midrange, try these steps:

- 1. Adjust the Midrange value on the Color tool to get a pleasing overall brightness.
- 2. Use the **Show imported images command** (**View menu**) to return to the imported thumbnails pane.
- 3. Select all of the imported thumbnails.
- 4. Press the Set gray button on the Histogram panel.

Note that using the **Set gray** button performs a passable job of overall color correction. This is because it balances so that on average the images are gray. This works because color perception is relative to overall illumination. Of course you may find a different overall color correction to be more esthetically pleasing, but this should provide a good starting point.

This might be another good time to save the project.



## Trim the images

You can use one of three strategies to trim the imported images.

- 1. If all your images already have the same width and height (in pixels) you may not need to trim them. Go directly to Classic step 2 Stitch the images into a panorama.
- 2. If you've scanned negatives or prints and the corners of the frames are visible, open each imported image in turn using the *Trim marking corners command*.
- 3. If neither of these approaches works, open each imported image in turn using the *Trim rectangle command*.

You'll need to have the images in left-to-right order in the computed thumbnails pane or the imported thumbnails pane. You can either trim them in this order, or trim them in whatever order is convenient and use click-drag to rearrange them.

If you are stitching a 360 degree panorama, this is a good time to plan how you want to frame the finished image. You can rearrange the thumbnails to try different ways of unrolling the cylindrical panorama into a rectangle. You may want to make it more than 360 degrees wide by duplicating one or two images at either end of the panorama with the **Duplicate selected** *command* (*Edit menu*). This gives you the freedom to make framing changes later.

Do not duplicate any images if you plan to use the Stitch 360 command (New image menu)..

It's probably a good idea to save the project each time you change to a new imported image. This lets The Panorama Factory move the previous imported image out of main memory.

#### Trim marking corners

Use this command if you want to trim your imported images by marking the four corners of each image. This is particularly useful for trimming frames from a strip of negatives or from a scanned print. To use this command, you must have overscanned the negatives or prints so that the edges of the frames are visible.

In this mode, selecting an imported image displays it for trimming.

The cursor changes to show which corner should be marked next. You click with the cursor near the corner of the frame and The Panorama Factory attempts to automatically locate the corner. If you agree with The Panorama Factory's location, you just go on to the next corner. If you disagree, you place the cursor over the corner marker and drag it to a better position. When you let go of the mouse button, The Panorama Factory will try again to automatically locate the corner.

You can disable the automatic location by holding the ALT key (Windows) or OPTION key (Mac) key when you release the mouse button.

To delete a corner, click it with the mouse to select it and then click the delete button on the toolbar, press the DELETE key, or select the **Delete selected command** from the **Edit menu**.



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#### This cursor Means this

$\square$	Indicates which corner will be placed next. After each corner is placed,
	The Panorama Factory advances to the next corner in clockwise order. If
	you want to skip a corner, press the space bar to advance to the next
	corner without marking the current one.

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Ы	

Indicates that the cursor is over one of the corners. Dragging moves the corner to a new position.

When you have the four corners where you want them, use the **Approve command** (**Image menu**) to generate the trimmed image. The trimmed image is added to the end of the computed thumbnails list. If you want to change the corners later, select the trimmed image and use the **Show source command** (**Image menu**) to redisplay the corner markers.

After trimming the image, The Panorama Factory leaves the imported image showing rather than changing to the trimmed image. This is intended to make life easier when you are trimming multiple frames out of strips of negative. With the same imported image showing, you can scroll to the next fame for trimming. If you need to change to another imported image, use the **Show** *imported images command* (*View menu*) to return to the imported thumbnails pane or use the **Next image command** (*Image menu*) to advance to the next imported image. You can also move from one imported image to another by holding the ALT key (Windows) or OPTION key (Mac) key and pressing the left or right arrow key.

The Panorama Factory examines the first image you trim to determine the output size of the trimmed images. It transforms the marked areas to rectangles using the average width and average height of the first marked region. This guarantees that all trimmed images will have the same size—a requirement of the stitching method.

#### **Trim rectangle**

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Use this command if you want to trim your imported images with a fixed size rectangle. This is useful when you don't need to square up your imported images or when the corners of the frames are not visible. You use the **Trimming properties dialog box** (*Tools menu*) to set the width and height of the trimmed images.

In this mode, selecting an imported image displays it for trimming.

Clicking within the imported image places the upper-left corner of the fixed size trimming rectangle. You can position the rectangle from its upper-left corner before releasing the mouse button or place it roughly and then use any of its sides or corners to move it to a better position.

To delete the rectangle, click it with the mouse to select it and then click the delete button on the toolbar, press the DELETE key, or select the **Delete selected command** from the **Edit menu**.

This cursor	Means this
1	Indicates that the cursor is over one of the sides or corners of the trimming rectangle. Dragging moves the rectangle to a new position.
<b></b> ∖□	Indicates that clicking will place the upper-left corner of the trimming rectangle. This cursor appears only when there is no trimming rectangle present. If you have a trimming rectangle, you must delete it in order to get this cursor.
When you hav	we the rectangle where you want it, use the <b>Approve command</b> ( <b>Image menu</b> ) t

When you have the rectangle where you want it, use the *Approve command* (*Image menu*) to generate the trimmed image. The trimmed image is added to the end of the computed thumbnails list. If you want to change the trimming rectangle later, select the trimmed image and use the *Show source command* (*Image menu*) to redisplay the rectangle.

After trimming the image, The Panorama Factory leaves the imported image showing rather than changing to the trimmed image. This is intended to make life easier when you are trimming multiple frames out of strips of negative. With the same imported image showing, you can scroll to the next fame for trimming. If you need to change to another imported image, use the **Show** *imported images command* (*View menu*) to return to the imported thumbnails pane or use the **Next image command** (*Image menu*) to advance to the next imported image. You can also move from one imported image to another by holding the ALT key (Windows) or OPTION key (Mac) key and pressing the left or right arrow key.

This trimming technique guarantees that all trimmed images will have the same size—a requirement of the stitching method.

## Color correct the final image



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If you are working from scanned photos (negatives, slides or prints), now is the time to get creative with the **Color tool**. Activate the **Color tool** and the **Histogram panel** (*Tools menu*) and have fun tweaking the image. You can spend hours doing this, though good results take only minutes!

You may find it useful to create a resized image so that you can see the whole image while adjusting the color correction. This works because the same color correction values are applied to all images in the project. Another way to see the entire image while adjusting color correction is to perform it on the final thumbnail image.

This is the time to adjust the saturation control if you wish. Be subtle with this control. It's easy to increase the saturation so much that the image looks cartoonish.

Be sure to save the project when you get the color the way you like it

## Save the final image

If you are working from scanned photos (negatives, slides or prints) and using the color correction tool, be aware that The Panorama Factory stores images in the project as .tiff files (double f) without applying the color correction. You must use the **Save current image as... command** (*File menu*) to store the color corrected image if you want to email it, put it on a web page or send it to a custom darkroom or digital printing service bureau. You use this command to save the final image with a .jpg, .bmp or .tif extension (single f).

To learn more about Panorama Factory projects and file formats, read Chapter 15, "Panorama Factory projects."
# CHAPTER 6 Correcting stitching problems

The Panorama Factory usually does a terrific job of automatically stitching your panorama. However, sometimes problems occur that require manual adjustments. This section begins with a troubleshooting guide and follows up with instructions for correcting common stitching problems.

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# Troubleshooting guide

Examine the stitched image carefully. If The Panorama Factory did its job well, all the overlap regions are properly aligned, there are no ghosts and the brightness of your picture is satisfactory. If you see problems, work through this troubleshooting guide to correct them.



You don't need to be concerned about correcting all of the problems at once. You can make the corrections described in this step at any time. If you discover problems later after cropping, resizing or sharpening, you can return to this step. As you make your corrections, The Panorama Factory will automatically update your cropped, resized and sharpened images accordingly.

#### Some images are misaligned

Read "Correcting alignment problems" and "Manually aligning images."

#### Images are properly aligned, but lines do not meet smoothly

Read "Adjusting focal length and barrel correction."

#### There are ghosts (faint double images)

Read "Fine tuning the image alignment."

#### The brightness changes from image to image

Read "There are abrupt changes in brightness" and "Adjusting exposure matching and brightness falloff."

#### There are dark vertical bands where images overlap

Dark vertical bands are sometimes caused by brightness "fall-off" in the corners of your images. Read "Adjusting exposure matching and brightness falloff" for step-by-step instructions for correcting this.

#### The image brightness is wrong or shows objectionable color shifts

If the brightness or color balance is incorrect, read "Controlling automatic exposure correction."

# Correcting alignment problems

"Some of my images didn't align properly."

There are many factors that can contribute to image misalignment. You can try to correct the root cause of the misalignment or you can just realign the images manually.

- 1. Your focal length setting may be incorrect
- 2. The vertical step from one image to the next may be too large
- 3. Your images may have too much or too little overlap
- 4. There may be too little detail in your images
- 5. If you cannot correct the cause, you must align manually

### Your focal length setting may be incorrect

An incorrect focal length setting may be preventing your images from aligning. You can try to judge whether the focal length setting is correct by examining how lines meet from one image to the next:

Focal length too small:





Read the section "Adjusting focal length and barrel correction" in this chapter for information about correcting focal length problems.

# The vertical step from one image to the next may be too large

If there is a large vertical offset between one image and the next, The Panorama Factory may be unable to align the images. By default, the vertical step is constrained to be less than or equal to 10% of the image height. If the offset is greater than 10%, you may need to change the constraint by running the **Alignment properties dialog box** (*Tools menu*).

# Your images may have too much or too little overlap

By default, The Panorama Factory constrains the overlap to be in the range 10% to 90% of the image width. If your image overlap is outside the range, you may need to change the constraint by running the **Alignment properties dialog box** (*Tools menu*).

#### There may be too little detail in your images

Sometimes there may be too little detail in the images for The Panorama Factory to determine the correct alignment. Or the images may have strong repeated elements that fool The Panorama Factory into matching the wrong objects.

In some cases, you may be able to force The Panorama Factory into finding the correct alignment by tightly constraining the horizontal overlap and/or the vertical offset on the **Alignment properties dialog box** (*Tools menu*).

For example, if all of your images are made with the same amount of overlap, setting the overlap constraints to plus-or-minus 5% from the correct value may help The Panorama Factory to find the correct alignment.

#### If you cannot correct the cause, you must align manually

If none of these suggestions help correct the alignment, you will have to align your images manually. Read "Manually aligning images" in this chapter for step-by-step instructions.

# Manually aligning images

To manually align a pair of images, you must first open the overlap region between the images. Then you select the Image alignment task on the **Overlap region dialog box**. When the image alignment task is selected, you can adjust the image alignment with buttons on the dialog box, with the mouse or the keyboard.

#### Opening an overlap region

To open the overlap region between the two images:

- 1. Locate the stitched image in the upper thumbnail array.
- 2. Double-click this image to make it the current image.
- 3. You'll see red outlines indicating the overlap regions (see "Classic step 2 Stitch the images into a panorama" in Chapter 4, "Using the Classic interface, step by step" for an example).
- 4. Locate the overlap region that is improperly aligned.
- 5. Open the overlap region by clicking the handle at the top or bottom edge or doubleclicking anywhere on the outline.

When an overlap region is open, The Panorama Factory displays the **Overlap region dialog box**. Four different overlap tasks can be performed with the **Overlap region dialog box**. The image alignment task provides the ability to adjust overall alignment between one image and the next.

Manual image alignment is possible only if fine tuning has not been performed, so if you selected **Automatically fine tune** on the **Fine tuning properties dialog box** you'll need to use the **Clear** *fine tuning command (Image menu)* to remove the fine tuning of this overlap region.

### Adjusting alignment with the overlap dialog box

When the image alignment task is selected, you can adjust the image alignment with buttons on the dialog box, with the mouse or the keyboard. Use the arrow buttons on the dialog box to move the right hand image relative to the left hand image. Individual clicks on the buttons move the image by single pixels. Holding a button down causes the image to move continuously. If you hold the button for a long time, the motion accelerates.

### Adjusting alignment with the mouse

- To adjust the alignment with the mouse, move the mouse over the image. This cursor shows a hand to indicate that click-dragging with the mouse will moves the right hand image relative to the left hand image.
- If your images have been fine tuned, the cursor shows a symbol indicating that you are not allowed to adjust the image alignment. You'll need to use the *Clear fine tuning command* to remove the fine tuning of this overlap region before adjusting the alignment.

### Adjusting alignment with the keyboard

You may also adjust the image alignment using the keyboard arrow keys after clicking on the image so that it receives the keyboard focus.

Use the LEFTARROW, RIGHTARROW, UPARROW and DOWNARROW keys to manually align the two images one pixel at a time. Hold the SHIFT key to move the images 10 pixels at a time. When you get close, nudge the images around one pixel at a time until you get the sharpest image in the middle of the overlap region.

**NOTE:** If you click on the **Overlap region dialog box** while trying to adjust the alignment, the arrow keys will be sent to that dialog box instead of being used to adjust the alignment. In this situation, you must click on the large image so that the arrow keys will be sent to the image for the purpose of adjusting alignment.

When you are satisfied with the alignment, restore the fine tuning (if you wish) with the *Fine tune command* (*Image menu*).

Finally, select the **Close** button to exit the overlap region or use the **<--- Prev** or **Next --->** button to move directly to another overlap region.

See also "Fine tuning the image alignment" in this chapter for more information about manually fine tuning your panorama.

# Adjusting focal length and barrel correction

When vertical lines don't match because they are bowing outward or inward, you need to correct for barrel distortion (bowing outward) or pincushion distortion (bowing inward). When horizontal lines do not meet smoothly, you need to adjust the focal length value.



Need to adjust focal length



The Panorama Factory normally does an excellent job of determining the correct focal length value and the appropriate barrel correction value. However, occasionally you may need to manually adjust the settings.

To manually adjust these values, you must first open the overlap region between the images. Then you use the controls on the **Overlap region dialog box** to adjust the settings.

# Opening an overlap region (focal length and barrel correction)

To open the overlap region between the two images:

- 1. Locate the stitched image in the upper thumbnail array.
- 2. Double-click this image to make it the current image.
- 3. You'll see red outlines indicating the overlap regions (see "Classic step 2 Stitch the images into a panorama" in Chapter 4, "Using the Classic interface, step by step" for an example).
- 4. Locate the overlap region that is improperly aligned.
- 5. Open the overlap region by clicking the handle at the top or bottom edge or doubleclicking anywhere on the outline.

Four different overlap tasks can be performed with the **Overlap region dialog box**. The focal length and barrel correction task provides the ability to interactively adjust the focal length and barrel correction settings.

The focal length and barrel correction can be adjusted only if fine tuning has not been performed, so if you selected **Automatically fine tune** on the **Fine tuning properties dialog box** you'll need to use the **Clear fine tuning command** (**Image menu**) to remove the fine tuning of this overlap region.

It may be difficult or impossible to get results if the overall image alignment is incorrect, so adjust overall alignment before performing this task.

#### **Correcting barrel distortion**

It is usually best to use the automatic barrel correction setting on **Wizard step 3/9 – Describe your camera** or the **Camera properties dialog box** (*Tools menu*). Sometimes, however, you need to adjust the barrel correction yourself. This section describes how to use the barrel correction controls on the **Overlap region dialog box**. You can also read this section to see an example of what barrel distortion looks like.

The barrel correction and the focal length setting interact. It is easiest to adjust the barrel correction before setting the focal length value. This section describes a method for determining the correct barrel correction value.



The same focal length value and barrel correction value apply to all images in your panorama. After adjusting the value, you should check the other overlap regions to be sure the value works well for your entire panorama.

Our example uses a pair of images made with a Pentax Super Program 35mm film camera with a 24mm lens. This camera/lens combination actually exhibits some barrel distortion, but not to the degree shown in these images. The barrel distortion was increased artificially to make the example more obvious. Many current digital camera models, particularly when coupled with wide angle converters, suffer from a significant amount of barrel distortion.





The barrel distortion is evident. What should be straight lines are seen as curves, bowing outward from the center of the image. Without correcting for this barrel distortion, the images cannot be properly matched. The following image shows the best that The Panorama Factory can do without applying a correction for the barrel distortion.



It is easiest to adjust the barrel correction if you set the focal length to a large number. This removes most of the effect of the focal length warping. We recommend setting the focal length to **1000 mm** before adjusting the barrel correction.

First try to align the images as well as possible, paying particular attention to vertical lines that should be straight lines. You may find that the **Compare** setting on the **Overlap region dialog box** makes it easier to see when the images are well aligned.



Next, adjust the barrel correction value to bring the straight lines into alignment.



Finally, adjust the focal length to bring the horizontal lines into correct alignment. If you use the **Refine \pm 50\%** button, remember to remove the checkmark from the **Refine with focal length** checkbox under **Correct barrel distortion** box, otherwise the refinement procedure may change your barrel correction value.



# Adjusting the focal length

It is important for the focal length setting to be correct in order to get good matching from one image to the next. The Panorama Factory is usually very good at determining the correct focal length setting itself, but in some cases you may need to adjust the setting.



The same focal length value and barrel correction value apply to all images in your panorama. After adjusting the value, you should check the other overlap regions to be sure the value works well for your entire panorama.

You can analyze the overlap region to decide whether to increase or decrease the focal length. By looking at the way lines in the picture cross you can decide whether to increase or decrease the focal length. If the lines meet smoothly without crossing, the focal length setting is correct.

You may find that the **Compare** setting on the **Overlap region dialog box** makes it easier to see when the images are well aligned.

Focal length is too small you need to increase it:



Focal length is too large, you need to decrease it:





For more information about focal length, please read "What is '35mm equivalent focal length?" at www.panoramafactory.com/equiv35/equiv35.html.

# Fine tuning the image alignment

"I see ghosts (faint double images)."

If the images are aligned properly, the focal length is correct and barrel distortion is corrected but you still see faint double images, you need to perform alignment fine tuning to make local corrections in the image alignment.

To manually control fine tuning of the image alignment, you must first open the overlap region between the images. Then you use the mouse and the controls on the **Overlap region dialog box** to draw, edit and remove fine tuning tiles.

# Why fine tune?

When The Panorama Factory aligns adjacent images, it finds the offset that minimizes the differences between the images in the overlap region. It is rarely possible to align the images perfectly throughout the entire overlap region. When the images are not perfectly aligned, some portions of the overlap region will show double images called ghosts. The *Fine tune command* (*Image menu*) analyzes overlap region and makes local adjustments in an attempt to remove the ghosts.

Some possible sources of ghosts:

- Image distortions introduced by the camera lens.
- Imperfect camera alignment when the pictures were taken.
- Image distortions introduced by the scanner (assuming you didn't use a digital camera).
- Improper setting for the focal length.



See "Capturing your images" in Chapter 2, "Getting started" for suggestions about how to minimize ghosts.

You can use the *Fine tune command* in two ways. If you use it when the stitched image is in the current image pane, The Panorama Factory will fine tune all overlap regions.

To fine tune one overlap region at a time, you must use the *Fine tune command* when that overlap region is open. To open an overlap region, click the handle at the top or bottom edge of an overlap outline or double-click anywhere on the outline when the stitched image is showing. Once the overlap region is open, you can use the *Fine tune command* to automatically fine tune the overlap region or fine tune manually.

# Opening an overlap region (alignment fine tuning)

To open the overlap region between the two images:

- 1. Locate the stitched image in the upper thumbnail array.
- 2. Double-click this image to make it the current image.
- 3. You'll see red outlines indicating the overlap regions (see "Classic step 2 Stitch the images into a panorama" in Chapter 4, "Using the Classic interface, step by step" for an example).
- 4. Locate the overlap region that is improperly aligned.

5. Open the overlap region by clicking the handle at the top or bottom edge or doubleclicking anywhere on the outline.

Four different overlap tasks can be performed with the **Overlap region dialog box**. The fine tuning task provides the ability to make small-scale adjustments to correct for local mismatches in the image alignment.

When you select the fine tuning task, The Panorama Factory displays any fine tuning tiles that have already been added to the image and allows you to draw new tiles and edit existing tiles.

If you didn't use automatic fine tuning or if you cleared it to correct overall alignment, you may want to select the **Auto fine tune** button to run the *Fine tune command* now. The *Fine tune command* tiles the overlap region and adjusts the alignment within each tile independently. It displays a small rectangle representing each fine tuning tile. A line radiating from the center of the tile shows the direction and magnitude of the adjustment. The Panorama Factory may abandon some tiles if it cannot achieve a reasonable alignment.



Low contrast images and images that lack detail are particularly challenging for The Panorama Factory. Images like these often require more manual adjustment than ones that are rich in high-contrast edges. The article "A fine tuning challenge" at

www.panoramafactory.com/finetuning/finetuning.html

examines a particularly challenging set of images as a way to illustrate some potential difficulties with fine tuning and how to avoid them.

### An example

Here's an example of an overlap region with ghosting and the fine tuned result.





# Judging the fine tuning

You can judge how good a job The Panorama Factory did by looking at the consistency or inconsistency of the adjustments. The following example shows how The Panorama Factory can get confused in regions that have too little detail.



### **Removing tiles**

To remove the inconsistently adjusted tiles, you must select the tiles and then click the delete button on the toolbar, press the DELETE key, or select the **Delete selected command** from the **Edit menu**.

You can select individual tiles by clicking them or hold the SHIFT key to click-drag a selection rectangle around a group of tiles.

See Chapter 8, "Working with image decorations" for more information about selecting and deleting tiles.

### **Drawing new tiles**

You can draw new tiles by click-dragging when away from existing tiles. The cursor shows an arrow with a small rectangle to indicate that you can draw a new tile.

In the example, the clouds have offsets that are large enough to cause The Panorama Factory to abandon them (probably because the clouds moved between the time the first and second images were made). By drawing larger tiles, The Panorama Factory gets enough context to compute the correct adjustment.



### Good places to draw tiles

Sometimes you'll have an overlap region that is so poor that you have to draw all the fine tuning tiles yourself. The best places to draw overlap tiles are where there are strong horizontal and vertical elements, e.g. a corner of a building or where sidewalk cracks intersect.

### **Editing tiles**

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When you draw a tile, The Panorama Factory tries to determine the alignment adjustment. You may disagree with its alignment. In this case, there are two strategies you can follow.

You can edit the tile to stretch or shrink it and hope that The Panorama Factory does a better job on the enlarged or reduced tile. To edit the tile, move the cursor over a side or corner of the tile. The cursor changes to indicate that a dragging operation will change the size of the tile.

If you can't convince The Panorama Factory to make the right adjustment you can adjust the tile using the mouse or keyboard. To adjust the tile with the mouse, move the mouse to the center of the tile. The mouse will change to show that you can use it to adjust the tile.

Click-dragging adjusts the relative positions of the images within the fine tuning tile.

To adjust the tile with the keyboard, use these steps:

- 1. Click an edge of the tile to select it.
- 2. While the tile is highlighted, use the LEFTARROW, RIGHTARROW, UPARROW and DOWNARROW keys to control the adjustment one pixel at a time. Hold the SHIFT key to change the adjustment 10 pixels at a time. When you get close, nudge the adjustment around one pixel at a time until you get the sharpest image in the middle of the tile.



If you click on the **Overlap region dialog box** while trying to adjust the tiles, the mouse movements and arrow keys will be sent to that dialog box instead of being used to adjust the tiles. In this situation, you must click on the large image so that the mouse movements and arrow keys will be sent to the image for the purpose of adjusting the tiles.

### The Panorama Factory fills in the gaps

The Panorama Factory will fill in the adjustment between tiles by interpolating and extrapolating from the surrounding adjustments. This means that a small number of tiles may be enough in regions where the adjustment changes slowly, but more tiles are needed where the adjustment changes rapidly.

# There are abrupt changes in brightness

If your panorama shows abrupt changes in brightness, first be sure you have selected **Enable exposure matching**. If you did not enable it when you used the New Project Wizard, you can enable it now by running the **Blending properties dialog box** (*Tools menu*).

If this does not correct the exposure matching from one image to the next, please read "Adjusting exposure matching and brightness falloff" in this chapter for instructions about correcting the exposure manually:

# Adjusting exposure matching and brightness falloff

This section covers two tasks related to image brightness in overlap regions.

1. The Panorama Factory tries to adjust the relative brightness of overlapping pairs of images. Sometimes its automatic adjustment produces undesirable changes in brightness.

If you still see abrupt changes in brightness even after you have enabled automatic exposure matching, you may need to adjust the exposure matching between image pairs yourself.

2. With some cameras and some lenses, image brightness decreases toward the edges and corners of the images. When the images are overlapped, the dark areas reinforce once another, creating dark vertical bands.

Although The Panorama Factory can perform an automatic correction for brightness falloff, in some situations you may need to adjust the brightness falloff correction yourself.

To manually control exposure matching and brightness falloff correction, you must first open the overlap region between the images. Then you use the mouse and the controls on the **Overlap region dialog box** to adjust these corrections.

### Opening an overlap region (adjusting exposure)

To open the overlap region between the two images:

- 1. Locate the stitched image in the upper thumbnail array.
- 2. Double-click this image to make it the current image.
- 3. You'll see red outlines indicating the overlap regions (see "Classic step 2 Stitch the images into a panorama" in Chapter 4, "Using the Classic interface, step by step").

- 4. Locate the overlap region that is improperly aligned.
- 5. Open the overlap region by clicking the handle at the top or bottom edge or doubleclicking anywhere on the outline.

Four different overlap tasks can be performed with the **Overlap region dialog box**. The fine tuning task provides the ability to adjust exposure matching between one image and the next and the brightness falloff correction.

While the exposure and falloff correction controls are active, The Panorama Factory displays a preview rectangle on the current image. The Panorama Factory interactively updates the interior of the preview rectangle as you make changes to the settings.

When you place the cursor over the various parts of the preview rectangle it changes to show you what editing actions are possible:

This cursor	Means this
↔¢₽5	Indicates that the cursor is over one of the sides or corners of the preview rectangle. Dragging changes the size of the rectangle.
× ∎	Indicates that the cursor is not over any part of the preview rectangle. Dragging draws a new preview rectangle.

Fine tuning tiles are not displayed while the exposure matching controls are active. They are redrawn when you deactivate the exposure matching controls.

### Adjusting exposure matching

To adjust the relative brightness of the overlapping images, begin by drawing the preview rectangle so that it includes both edges of the overlap region. As you adjust the exposure matching, you should look at the way the edges of the overlap region match or mismatch with the images themselves.

Use the **<--- Brightness --->** slider to adjust the exposure matching between adjacent images. Moving the slider to the left increases the brightness of the left hand image (or decreases the brightness of the right hand image). Moving the slider to the right increases the brightness of the right hand image (or decreases the brightness of the left hand image).



Manual adjustment of the exposure matching is reset automatically by restitching the panorama.

### **Correcting brightness falloff**

It is usually best to use the automatic falloff correction setting on **Wizard step 3/9 – Describe your camera** or the **Camera properties dialog box** (*Tools menu*). Sometimes, however, you need to adjust the falloff correction yourself. This section describes how to use the falloff correction controls on the **Overlap region dialog box**. You can also read this section to see an example of what brightness falloff looks like.



The same falloff correction setting applies to all images in your panorama. After adjusting the setting, you should check the other overlap regions to be sure it works well for your entire panorama.

Our example uses three images with visible brightness falloff in the corners. These photographs were made with a Pentax Super Program 35mm film camera with a 28-80mm zoom lens set to 28mm and an aperture setting of f3.5. This camera/lens combination actually exhibits this degree of brightness falloff. Many current digital camera models also suffer from a significant amount of brightness falloff.



Brightness falloff becomes a problem when the overlap between one image and the next is less than 50%. When the overlap is small enough that the dark areas overlap, they reinforce one another, creating dark vertical bands on the stitched image.



The automatic correction for brightness falloff can usually do a good job of compensating, but occasionally you will need to adjust the settings yourself. You start by opening an overlap region in the stitched panorama.

The Panorama Factory displays a preview rectangle on the current image. You should draw the preview rectangle so that it covers the corners of the overlap region. The following image shows the overlap region with no falloff correction applied (amount is zero).

As you adjust the falloff correction, you should look at the way the edges of the overlap region match or mismatch with the images themselves.

(	Overlap region
	Seam
	< Prev Close Next>
	Choose an Overlap task
ZR	Image alignment
	Focal length & barrel correction
	Fine tuning
	Exposure & falloff correction
	Help
	Exposure matching
A state of the second s	< Brightness Brightness>
	0
	Correct brightness falloff
the same the state	Amount
and the second se	0 %
	Size
	10 %
	Refine falloff now

The dark arrows indicate where you should look as you adjust the falloff correction.

Begin by adjusting the **Amount** setting under **Correct brightness falloff**. The following image shows the effect of increasing **Amount**. The bright arrows indicate how the corners of the overlap are brightened too much.

 Overlap region
Seam  Choose an Overlap task  Choose an Overlap task  Focal length & barrel correction  Fine tuning  Exposure & falloff correction  Help  Exposure matching
< Brightness Brightness> Correct brightness falloff Amount 15 % Size 10 % Refine falloff now

Reduce **Amount** until the brightness is just about matched at the extreme corners of the overlap.



Next, adjust the Size of the correction. When Size is too small, the corners (brighter arrows) are bright and the sides (darker arrows) are too dark.

X

->

	Overlap region
ZK	Seam Choose an Overlap task Image alignment Focal length & barrel correction Fine tuning Exposure & falloff correction
	Help Exposure matching < Brightness Brightness
	Amount 6 % - Size 5 % - Refine falloff now

X

->



Increasing Size too much makes the sides of the overlap too bright even in the middle of the overlap.

When Amount and Size are just right, the brightness is well matched all along the edges of the overlap region.

	Overlap region
	Seam
	< Prev Close Next>
	Choose an Overlap task
	<ul> <li>Image alignment</li> </ul>
	Focal length & barrel correction
	C Fine tuning
	Exposure & falloff correction
	Help
	Exposure matching
	Brightness Brightness
	Correct brightness falloff
and the second sec	Amount
the state of the s	6 %
	Size
	15 %
	Refine falloff now

**Amount** and **Size** interact, so it is often necessary to go back and forth between the two settings until you get a good result. The following image shows the final, corrected panorama.



# Controlling automatic exposure correction

"My panorama is too bright or dark overall" "My panorama is washed out" "The sky is muddy" "The picture looks posterized"

The automatic exposure correction option of The Panorama Factory normally does a nice job of balancing the brightness and contrast of the final stitched image. Occasionally, however, the final image has objectionable color shifts or desaturation effects.

Happily, a single approach may be used to fix any of these problems. Color problems like these occasionally result from the automatic exposure matching or the automatic exposure correction performed by The Panorama Factory.

The **Enable exposure matching** setting works well for many images, but not for all. For example, it may not be possible to exposure match a 360 degree panorama that includes images into deep shadow and into bright sun (maybe including the sun itself).

The **Enable exposure correction** function tries to balance the resulting image to a pleasing range of brightnesses including black and white (it is a histogram stretching function). Sometimes this results in poor rendering of some areas of the image, particularly for especially dark images (e.g. night scenes) or for images with a wide variation from bright to dark.

When your panorama has one or more of these problems, you should *removing the checkmark* from both **Enable exposure matching** and **Enable exposure correction** to see what happens. You control them on **Wizard step 4/9 – Control image quality** or on the **Blending properties dialog box** (*Tools menu*).

Then you should try selecting **Enable exposure matching** by itself and then **Enable exposure correction** by itself. After stitching (with the Wizard or the Classic interface) but before closing

the project, you can change these settings with the **Blending properties dialog box** (*Tools menu*). The Panorama Factory will recalculate the image without repeating the whole stitching process. If you are using the Wizard, be sure to press the **Done** button before trying to use the **Blending properties dialog box**.

If removing the checkmark from **Enable exposure matching** produces an image with unacceptable brightness variations, you may want to try manually adjusting the exposure matching. Read "Adjusting exposure matching and brightness falloff" in this chapter for step-by-step instructions about adjusting the exposure matching. (Please note that **Enable exposure matching** must be selected before you can manually adjusting it.)

# CHAPTER 7 Making a virtual tour

A virtual tour is a set of web pages that contain panoramas, ordinary images and narration. The web pages are linked together with hotspots (hyperlinks embedded in panoramas and other images). A virtual tour may also include a web page that shows small thumbnail images used as an index to the web pages comprising the tour.

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# Introduction to virtual tours

A virtual tour is a set of web pages that are intended to let a visitor experience a place without actually traveling there. The web pages in the virtual tour may contain panoramas, ordinary photographs, maps, narration and possible other multimedia objects.

The web pages in a virtual tour are linked together with hotspots so that a visitor can move easily from one page to another. Hotspots are hyperlinks embedded in panoramas and other images. Clicking a hotspot might lead the visitor to another location, give them more information about the current location or show them a detailed view of something in the current image.

A virtual tour may also include a web page that shows small thumbnail images. This web page may be used as an index to the web pages comprising the tour.

This chapter documents the parts of The Panorama Factory that are designed to help you create virtual tours.

- You can add hotspots to panoramas created with The Panorama Factory, to panoramas created with other stitching software and also to ordinary images.
- You can create web pages containing your panoramas and ordinary images from templates supplied with The Panorama Factory.
- You can automatically add thumbnail images to index pages built from templates supplied with The Panorama Factory.
- You can create your own templates for web pages and thumbnail indexes.

Each one of these tasks is documented in its own section of this chapter. When you create your own virtual tour, you will stitch, add hotspots, create a web page and create a thumbnail for each panorama in your tour. You should be familiar with all of these concepts before starting to build your tour.

For an example of a virtual tour created with The Panorama Factory, visit "A Virtual Tour of an Arts & Crafts Style House" at http://www.panoramafactory.com/vtour/.

# Planning your virtual tour

You should probably spend a little time planning before creating your virtual tour.

- 1. Begin by deciding on the panoramas, conventional images, descriptions, etc. you want to include in the tour. You can use the New Project Wizard (see Chapter 3, "Using the Stitching Wizard to make a panorama") or the Classic interface (see Chapter 4, "Using the Classic interface, step by step")
- 2. Next, decide whether you want to use a panoramic viewer and choose the viewer format. Refer to "Export image file formats" in Chapter 9, "Image file formats" to learn more about the formats supported by The Panorama Factory.
- 3. Next, choose a template for your web pages. You can use one of the templates supplied with The Panorama Factory or create your own template.

4. Finally, decide whether you want to create a thumbnail index web page. You'll create the template page the first time you save a panorama and then update it each time you save another one. You can use one of the templates supplied with The Panorama Factory or create your own template.

# Adding hotspots to your panoramas

#### What is a hotspot?

A hotspot is an area within an image that does something when you click on it with the mouse. The actions that can be performed depend on what panoramic viewer you are using. Virtually all viewers provide for opening a new web page URL when you click on a hotspot. Some viewers support other actions such as playing a sound file, executing a JavaScript command or executing a command within the viewer itself.

The Panorama Factory creates hotspots that perform the URL action. It does not create hotspots for other actions such as playing a sound file. To make your hotspots perform other actions, you use The Panorama Factory to layout the hotspots as URL hotspots and then modify the web pages to change them into hotspots that perform the action you wanted. Because most viewers embed the properties of hotspots in the web page that contains the panorama, you can edit the HTML code in the web page to change the URL hotspots to perform different actions. You must read the documentation provided by the publisher of your viewer to learn how these actions can be performed.

To learn about the capabilities of the different viewers, see "Export image file formats" and "Import image file formats" in Chapter 9, "Image file formats" for tables comparing the formats supported by The Panorama Factory. You may also refer to the help pages for the individual formats.

#### Adding hotspots to an image

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You use the *Hotspots command* (*Image menu*) to add or edit hotspots on the current image. To begin adding hotspots to an image, open the image by double-clicking its thumbnail. This selects it as the current image and displays it in the lower pane.

Next, choose the *Hotspots command* from the *Image menu*. This causes the Hotspot properties dialog box to appear. Choose a hotspot type under the heading **Create hotspot** on the **Hotspot properties dialog box** and then click or click-drag to add the hotspot to your image. Use the controls on the **Hotspot properties dialog box** to set the properties of the hotspot.

#### Editing hotspots on an existing image

To edit the hotspots on an existing image, just open the image by double-clicking its thumbnail. If the image contains hotspots, The Panorama Factory displays them and opens the **Hotspot properties dialog box** automatically. There are two exceptions to this rule:

1. When you open a stitched image, The Panorama Factory shows the overlap outlines. You must choose the *Hotspots command* from the *Image menu* to reveal the hotspots, if any, on the stitched image.

 When you open an image using the Show source command, The Panorama Factory shows the decorations and/or dialog that generated the computed image. You must choose the Hotspots command from the Image menu to reveal the hotspots, if any, on the source image.

Once you have opened the image, you can choose the selection tool to select existing hotspots or choose a hotspot type if you want to create a new hotspot. The selection tool and the hotspot types are under the **Create hotspot** heading on the **Hotspot properties dialog box**.

Once a hotspot is selected, you can view or change its properties on the **Hotspot properties** dialog box.

### Exporting an image with its hotspots

You use the **Save current image as... command (File menu)** to export the image with its hotspots. You choose the export format from the **Save as type** menu of the **Save Image As dialog box**. The way the hotspots are exported depends upon the particular export format. For example, some formats require that you create a web page in order to export the hotspots.

See "Export image file formats" in Chapter 9, "Image file formats" for a comparison of the different formats that are supported by The Panorama Factory.

### Importing an image with its hotspots

You use the *Import images... command* (*File menu*) to import images into The Panorama Factory. Some import filters are capable of importing the hotspots along with the images. See the section "Editing hotspots on an existing image" for instructions on how to view and edit the hotspots.

See "Import image file formats" in Chapter 9, "Image file formats" for a comparison of the different formats that are supported by The Panorama Factory.

# Adding your panoramas to web pages

You can automatically create a web page containing your panorama at the same time you save your image. These instructions will also work for ordinary images.

To save your image, use the **Save current image as... command (File menu)**. This command runs the **Save Image As dialog box**. You use the controls under the **Web page** heading on this dialog box to create and update web pages containing your image.

#### Creating a new web page

The first time you save your image, you'll probably create a new web page. Select **Create new web page from template**. You can leave the name of the web page blank to create a web page with the same name as your image file. Select a template from the **Template for new web pages** dropdown list. If you'd like to see what the web page will look like, press the **Preview** button to display a sample web page in your computer's web browser.

### Updating an image previously placed in a web page by The Panorama Factory

If you update the image in The Panorama Factory, you'll need to update the image in the web page. Select **Update existing web page** and enter the name of the web page (HTML file) or use the **Browse...** button to use the **Open dialog box** to select the name of the web page. You can update the image only if (1) the image was put into the web page by The Panorama Factory and (2) the name of the image file is the same as the name used when you put the image into the web page.

Updating an image in a web page only affects the image itself. Title and description text is unaffected. If you want to change the title and/or description, you must either create a new web page or edit the web page with a text editor or web page editor.

#### Inserting a new image into an existing web page

If you want to insert the image into an existing web page, you can use the following instructions. This method works for web pages created with The Panorama Factory and also for web pages created outside The Panorama Factory. You'll need to be familiar with editing web pages in order to follow these instructions.

- 1. Open your web page in any text editor or web page editor.
- 2. Add the text =image= where you want your image to appear. This special code must be ordinary text. Placing it inside HTML markup may produce unexpected results.
- 3. Select **Update existing web page** and enter the name of the web page (HTML file) or use the **Browse...** button to use the **Open dialog box** to select the name of the web page.

This method only inserts the image itself. Title and description text are not inserted into the web page. If you want to add a title and/or description, you must do that by editing edit the web page.

# Making your panoramas rotate automatically

When you display your panorama in a web page, you can make it automatically rotate whenever the web page is displayed. To make it auto rotate, open the **QTVR settings dialog box**, the **PTViewer settings dialog box**, or the **IVR settings dialog box** when you save your panorama. Controls on these dialog boxes let you control the speed and direction of automatic rotation.

Automatic rotation stops when the user moves their mouse over the panorama.

**NOTE:** Automatic rotation of QTVR and IVR panoramas is performed by JavaScript statements added to the HTML web page. This means that the person viewing the panorama must have JavaScript enabled in their browser for automatic rotation to work. If JavaScript is disabled, automatic rotation is ignored.

# Controlling the initial viewpoint of your panorama

When you display your panorama in a web page, you can control the initial view direction and zoom of the panorama. In addition, you can set the initial viewpoint to different places using the **#bookmark** notation on the URL of the web page that displays the panorama.

#### Setting the default viewpoint

To set the default initial viewpoint, you make a special hotspot on the panorama. Using the **Hotspot properties dialog box**, draw a hotspot that covers the area that you want to display in the viewer. The smallest rectangle that encloses the hotspot will expand to fill the viewer. A smaller area will zoom in and a larger area will zoom out.

To make a hotspot set the initial viewpoint, select the **This hotspot is the default view** checkbox on the **Hotspot properties dialog box**. This will cause the viewer to zoom, pan and tilt to show the area of the hotspot. If you select the **Set tilt angle to zero** checkbox, the hotspot will still set pan and zoom, but the tilt angle will be set to zero so that the viewer will be looking straight ahead. This usually provides a more natural view than tilting up or down, but the zoom factor may be reduced automatically to achieve this view.

**NOTE:** The initial viewpoint setting is performed by JavaScript statements added to the HTML web page. This means that the person viewing the panorama must have JavaScript enabled in their browser. If JavaScript is disabled, the initial viewpoint setting is ignored.

#### Setting the initial viewpoint

When enter a page from different places, it may be desirable to set the initial viewpoint differently depending upon where you come from. If you can enter a room through different doors, you may want the initial to face away from the door you entered. For example, you might enter the Living Room from either the Kitchen or the Dining Room.

To control the viewpoint this way, create a different hotspot for each initial viewpoint. Then select **This hotspot is also a bookmark** for each hotspot. Give each hotspot a different name. For example, if your panorama is in the Living Room, you might name two hotspots **from\_kitchen** and **from\_dr** for the views you want to show when entering from the Kitchen web page and from the Dining Room web page. Then when you create the hyperlink that leads to the Living Room page from the Kitchen page, set its **Bookmark** to **from\_kitchen** and when you create the hyperlink that leads to the Living Room page from the Dining Room page, set its **Bookmark** to **from dr**.

**NOTE:** The initial viewpoint setting is performed by JavaScript statements added to the HTML web page. This means that the person viewing the panorama must have JavaScript enabled in their browser. If JavaScript is disabled, the initial viewpoint setting is ignored.

# Creating a thumbnail index for your tour

You can automatically add a thumbnail image of your image at the same time you save your image. To save your image, use the **Save current image as... command (File menu)**. This command runs the **Save Image As dialog box**. You use the controls under the **Thumbnail index** heading on this dialog box to create and update thumbnail index web pages.

You'll need to create a new thumbnail index before you can insert the first thumbnail. Press the **Create new thumbnail index...** button to run the **Thumbnail index properties dialog box**. You'll select a thumbnail index template and make choices about the size and style for the thumbnails. If you'd like to see what the thumbnail index will look like, press the **Preview** button to display a sample web page in your computer's web browser.

# Making your own templates

If you are familiar with editing web pages, you can make your own web page and thumbnail index templates. Templates are just web pages that contain special codes that are recognized by The Panorama Factory.

The following sections explain the special codes you'll need to place in your template web pages. For the templates to be recognized by The Panorama Factory, you must place them in the **templates** folder inside the folder on your computer that contains The Panorama Factory application. On Windows, this is normally:

C:\Program Files\Smoky City Design\The Panorama Factory\templates

On Mac, the **templates** folder is in The Panorama Factory's Resources folder. Assuming you installed PFactory.app into /Applications, the easiest way to open this folder is:

- 1. Open a Finder window.
- 2. Choose the "Go to folder" command from Finder's "Go" menu. A dialog box will appear for you to type the folder name.
- 3. Enter "/Applications/PFactory.app/Contents/Resources/templates" into the dialog box and click the "Go" button.

At startup, The Panorama Factory searches this folder for all .HTML files that appear to be valid templates. If you create new templates or modify existing ones, you must exit and restart The Panorama Factory application for it to recognize the changes.

### Creating a web page template

To create a web page template, start by creating an ordinary web page. You can use a text editor or your favorite web page editor. To follow the instructions in this section, you need to be familiar with web page creation. It is beyond the scope of this user's guide to instruct you on web page creation.

For the web page to be recognized by The Panorama Factory as a valid template, it must appear in the **templates** folder inside the The Panorama Factory application folder. The file name must end with a .HTML or .HTM extension.

The web page template must also contain the following special "hidden tag" (HTML comment):

#### <!--webtemplate-->

The hidden tag may appear anywhere within the HTML file, but it is probably best to put it between <head> and </head>.

You place special codes within the web page. The Panorama Factory replaces these special codes when it inserts the image into the template.

```
=image=
```

Place this code where you want the image to appear within the web page.

```
=title=
```

Place this code where you want the image's title text to appear within the web page.

#### =description=

Place this code where you want the image's description text to appear within the web page.

You must give your web page template a "friendly name" that will be appear in the **Template for new web pages** dropdown list on the **Save Image As dialog box**. Put this name between <title> and </title>. The Panorama Factory will replace this with the image's title text when it inserts the image into the template.

### Creating a thumbnail index template

To create a thumbnail index template, start by creating an ordinary web page. You can use a text editor or your favorite web page editor. To follow the instructions in this section, you need to be familiar with web page creation. It is beyond the scope of this user's guide to instruct you on web page creation.

For the web page to be recognized by The Panorama Factory as a valid template, it must appear in the **templates** folder inside the The Panorama Factory application folder. The file name must end with a .HTML or .HTM extension.

The thumbnail index template must also contain the following special "hidden tag" (HTML comment):

```
<!-thumbtemplate
width="..."
height="..."
method="..."
insert="..."
file="..."
```

The hidden tag may appear anywhere within the HTML file, but it is probably best to put it between <head> and </head>. The thumbtemplate tag contains attributes. Just as in ordinary HTML tags, the attributes may be quoted with single or double quotes or may be unquoted if they are simple strings. Note that the parameters should not include any greater-thansigns (>) or two hypens (--) because this have special meaning inside HTML comments.

#### width=

The default maximum thumbnail width. This will be displayed in the **Thumbnail index properties dialog box** when you select the template. Default if omitted: 120.

#### height=

The default maximum thumbnail height. This will be displayed in the **Thumbnail index properties dialog box** when you select the template. Default if omitted: 80.

#### method=

The default method to use for creating thumbnail images. This will be displayed in the **Thumbnail index properties dialog box** when you select the template. Must be one of these strings:

```
"scale to fit"
"scale to fit height and crop"
"scale to fit width and crop"
Default if omitted: "scale to fit height and crop".
```

#### insert=

The default position for inserting new thumbnail images. This will be displayed in the **Thumbnail index properties dialog box** when you select the template. Must be one of these strings:

> "insert newest thumbnail first" "insert newest thumbnail last"

Default if omitted: "insert newest thumbnail first".

#### file=

The name of a supporting file to be copied into the destination directory when the thumbnail index page is created. This may be, for example, a JPG file or another HTML file. You may include as many file= attributes as necessary. Default if omitted: none.

You must include an HTML <DIV > ... </DIV > to indicate where to insert the thumbnails within the web page. The ID= "" attribute of this DIV tag must be the name "thumbnails". If this DIV does not appear within the HTML file, it won't be recognized as a valid thumbnail index template.

The interior of the  $\langle DIV \rangle \dots \langle / DIV \rangle$  must contain a single example of the HTML code you want to use for each thumbnail. It will normally contain an  $\langle img \dots \rangle$  for the thumbnail image, an  $\langle a \rangle \dots \langle /a \rangle$  for the hyperlink to the web page and a placeholder for the image's title text. You place special codes within the thumbnail's HTML code. The Panorama Factory replaces these special codes when it inserts the image into the template.

#### =thumb=

Place this code where you want the name of the thumbnail image file to appear within the web page. You will normally use this in the SRC= "" attribute of an HTML <img ... > tag.

#### =page=

Place this code where you want the name of the web page file to appear within the web page. You will normally use this in the HREF="" attribute of an HTML <a ... > tag.

#### =title=

Place this code where you want the image's title text to appear within the web page. You will normally use this as ordinary text, outside of HTML markup.

#### =description=

Place this code where you want the image's description text to appear within the web page. Because the description text is usually relatively long, you may wish to omit this from your thumbnail index template.

Three other substitutions are performed inside the thumbnail's <img ... > tag.

### width="..."

If the width attribute appears within the thumbnail's < img ... >, the value is updated with the actual width of the thumbnail image file.

#### height="..."

If the height attribute appears within the thumbnail's  $< img \dots >$ , the value is updated with the actual width of the thumbnail image file.

#### alt="..."

If the alt attribute appears within the thumbnail's < img ... >, the value is updated with the image's title text.

You must give your web page template a "friendly name" that will be appear in the **Template for new index** dropdown list on the **Thumbnail index properties dialog box**. Put this name between <title> and </title>. The Panorama Factory will replace this with the title you enter as the **Title for new index** when it creates the thumbnail index file.

# CHAPTER 8 Working with image decorations

Many image processing operations require additional information about positions or areas within an image. The Panorama Factory draws "decorations" on your images to indicate these positions and areas. You can use your computer's mouse to draw and edit image decorations in order to control The Panorama Factory.

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# What is an image decoration?

Many image processing operations require additional information about positions or areas within an image. For example, cropping an image requires you to define a cropping rectangle. The cropping rectangle is indicated by a decoration drawn on the image.

Image decorations are drawn on the image with thin lines. The default color for the lines is red, but you can change this color using the **Options dialog box** (*Tools menu*).

# Types of decorations

#### **Trimming corners**

Trimming corners are used to trim imported pictures that are overscanned to show the edges of a print or negative frame. Once placed on the image, trimming corners can be moved to reposition them:



Please read "Trim the images" in Chapter 5, "Extra steps when working from scanned photos" for more information about trimming corners.

### Rectangles

Rectangles are used for trimming with fixed-size rectangles and when previewing tentative image changes. Ordinary rectangles can usually be resized by moving their edges, but cannot be moved arbitrarily:



Please read about the *Trim rectangle command* (*Trim menu*) for an example of fixed-size rectangles.

Please read about the **Color tool** (*Tools menu*), the *Sharpen command* (*New image menu*), and the section "Adjusting exposure matching and brightness falloff" in Chapter 6, "Correcting stitching problems" for examples of preview rectangles.

#### Fine tuning tiles

Fine tuning tiles are used to fine-tune image alignment by making local adjustments in an overlap region. A line radiating from the center of each tile shows the direction and magnitude of the adjustment. Fine tuning tiles can be resized by moving their edges and the direction and magnitude of the adjustment can be changed:



Please read "Fine tuning the image alignment" in Chapter 6, "Correcting stitching problems" for more information about fine tuning tiles.

#### **Cropping rectangles**

The **Crop command** (**New image menu**) displays a cropping rectangle. Cropping rectangles show a center horizon line which may be rotated to follow the average rise or fall of a panorama. Cropping rectangles can be resized by by moving their edges, but cannot be moved arbitrarily:



#### Spots, Movable circles, Movable rectangles and Polygons

Spots, movable circles, movable rectangles and polygons are used to indicate hotspots for web page hyper linking. Movable circles and rectangles are distinguished from ordinary circles and rectangles by central crosses. Spots, movable circles, movable rectangles and polygons can be moved arbitrarily. Movable circles and movable rectangles can be resized. Polygons can be edited to change their shape:



#### **Irregular outlines**

Irregular outlines show the blending regions between each image and the next in a stitched panorama. Please refer to "Classic step 2 – Stitch the images into a panorama" in Chapter 4, "Using the Classic interface, step by step" for examples of irregular outlines.

### Warping grids

A warping grid is used to adjust the panoramic image warping to correct a curved horizon or slanted vertical lines in the stitched image. Please read "Wizard step 7/9 – Preview at low resolution" in Chapter 3, "Using the Stitching Wizard to make a panorama" for examples of the warping grid.

# Adding decorations

Some decorations are added automatically. For example, the *Stitch command* and the *Stitch 360 command* (*New image menu*) add outlines to indicate the overlap regions. These outlines can be edited to adjust the boundaries of the blend region, but they cannot be removed.

Other decorations are added by user actions. For example, hotspots are added to the image by clicking on the image.

The mouse cursor shape indicates when clicking or click-dragging will add a new decoration. **Hotspot properties dialog box**.
This cursor	Means this
	Indicates that a <b>trimming corner</b> will be placed when you click.
N□	Indicates that a fixed-size <b>trimming rectangle</b> will be placed when you click.
<b>N</b> ■	Indicates that the <b>preview rectangle</b> will be drawn when you click-and- drag on the image.
▶ 🖸	Indicates that a <b>fine tuning tile</b> will be drawn when you click-and-drag on the image.
<b>∖</b> ⊟	Indicates that a <b>cropping rectangle</b> will be drawn when you click-and- drag on the image.
<b>*</b> ●	Indicates that a <b>spot</b> type hotspot will be placed when you click on the image.
≹⊕	Indicates that a <b>movable circle</b> will be drawn when you click-and-drag on the image.
Ҟ⊞	Indicates that a <b>movable rectangle</b> will be drawn when you click-and- drag on the image.
<b>k</b> *	Indicates that a <b>polygon</b> will be drawn when you click-and-drag on the image.
<b>F</b> = <i>i</i> = <b>f</b> =	······································

For information about creating image hotspots, see "Adding hotspots to your panoramas" in Chapter 7, "Making a virtual tour."

# **Editing decorations**

To edit a decoration move the cursor over part of the decoration. The decoration does not need to be selected before editing it—editing a decoration automatically selects it and de-selects all other decorations.

When you move the cursor over a decoration, it changes to show you what editing actions are possible:

This cursor	Means this
↔‡⊉∿	These cursors resize a decoration without changing its position.
	The sides of a <b>rectangle</b> can be moved without affecting other sides.
	There are some special interactions for <b>cropping rectangles</b> on 360 degree panoramas. See the <b>Crop command</b> ( <b>New image menu</b> ) for more information about cropping rectangles.
	The sides of an <b>irregular outline</b> can be moved without affecting the shape by clicking and dragging one of the handles on the side of an outline.
5 10	Indicates that the cursor will move a point on a <b>cropping rectangle</b> , changing its orientation. See the <b>Crop command</b> ( <b>New image menu</b> ) for more information about cropping rectangles.
	This cursor also moves points on the <b>warping grid</b> , changing its orientation or shape. See "Wizard step 7/9 – Preview at low resolution" in Chapter 3, "Using the Stitching Wizard to make a panorama" for more information about the warping grid.
	This cursor can also be used to edit the direction and magnitude of a <b>fine tuning tile</b> . See "Fine tuning the image alignment" in Chapter 6, "Correcting stitching problems" for more information about fine tuning tiles.
<b>₽</b>	Indicates that the cursor will move the entire decoration. To move a <b>movable circle</b> or <b>movable rectangle</b> , place the cursor over one of the central crossing lines. To move a <b>polygon</b> you must choose the Polygon Move tool. See <b>Edit polygon</b> under the <b>Hotspot properties dialog box</b> ( <i>Tools menu</i> ) for more information about editing polygon hotspots.
▶७▶¥ ▶ <del>४</del>	These cursors move, insert and delete points on a polygon. See <b>Edit polygon</b> under the <b>Hotspot properties dialog box</b> ( <i>Tools menu</i> ) for more information about editing polygon hotspots.
	Indicates that the cursor is over the handle at the top or bottom border of an <b>irregular outline</b> . Clicking opens the overlap region for manual fine tuning (removal of ghost images). See "Fine tuning the image alignment" in Chapter 6, "Correcting stitching problems" for more information about fine tuning.
₹\$	Indicates that the cursor is over the left or right border of an <b>irregular outline</b> . Dragging up or down edits the shape of the outline. You can use this to exclude portions of one image or the other from the blend region.

# Selecting decorations

You can select a single decoration by clicking on it. This automatically de-selects all other decorations. Selected decorations are shown in bright red and unselected decorations are shown in pale red:



You can click with any cursor normally used to edit a decoration:

+ + ≠ ∠ ~ 12 12 12 12 14 14 14

To select a group of decorations, you can click-drag a selection rectangle with the arrow cursor:

Decorations that are enclosed by the selection rectangle will be selected and all others will be deselected.

To add a decoration to the set of selected decorations without de-selecting the others, hold the
 SHIFT key when clicking. The cursor changes to show you that you will be adding to the selected set.

You can also click-drag a selection rectangle when this cursor is showing to add a group of decorations to the selected set. All decorations that are enclosed by the selection rectangle will be added to set of selected decorations.

To de-select a single selected decoration, hold the CTRL key (Windows) or COMMAND key (Mac) when clicking. The cursor changes to show you that you will be toggling the selection state of the decoration.

You can also click-drag a selection rectangle when this cursor is showing. All decorations that are enclosed by the selection rectangle will change selection state. That is, decorations that were not previously selected will become selected and decorations that were previously selected will be de-selected.



In some situations you may be unable to click-drag a selection rectangle with the arrow cursor because the default action is to place a new decoration. In these situations you can still hold the SHIFT key, CTRL key (Windows) or COMMAND key (Mac) to drag a selection rectangle to update the set of selected decorations.

# **Deleting decorations**

To delete one or more decorations, select them and then click the delete button on the toolbar, press the DELETE key, or select the **Delete selected command** from the **Edit menu**.

Some decorations are immortal—they cannot be deleted. For example, outlines that indicate image overlap regions after stitching cannot be deleted. If you try to delete an immortal decoration, nothing will happen.

# Moving decorations

To move a single decoration, just move the cursor over the appropriate portion of the decoration to get a move hand:

To move a set of decorations, select them and then move the cursor over the appropriate portion of any one of the selected decorations to get a move hand.

Some decorations are immovable—they cannot be moved. For example, outlines that indicate image overlap regions after stitching may be resized, but not moved. If you try to move an immovable decoration, nothing will happen.

# CHAPTER 9 Image file formats

The Panorama Factory can read and write a variety of image file formats. Some formats are for simple images only, while others can be included in web pages and/or displayed by virtual reality (VR) viewers.

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# Import image file formats

The Panorama Factory can import images in a variety of formats. Each import filter has particular capabilities and limitations. Some limitations are determined by the file format itself (for example, TIFF does not support hotspots) and others are limitations of the import filter.

To import an image, use the *Import images... command* (*File menu*). You choose the import format from the **Files of type** dropdown list of the **Import Images dialog box**.

<b>Format</b> For more information on a particular format, See its section in this chapter of the user's guide	Read web page	Image only	Hotspots	Panoramic attributes
JPEG (*.jpg, *.jpeg) See "JPEG settings dialog box"		~		[8]
<b>TIFF</b> (*.tif, *.tiff) See "TIFF settings dialog box"		~		[8]
Windows BMP (*.bmp, *.dib)		✓		[8]
PNG (*.png) See "PNG settings dialog box"		~		[8]
HTML image map (*.html, *.htm) [6]	~		.html [1]	[8]
QTVR (*.mov) See "QTVR image file format"	~		.mov [7]	
IVR (*.ivr, *.html, *.htm) See "IVR image file format"	~		.ivr [2]	
<b>PTViewer</b> (*.html, *.htm) See "PTViewer image file format"	~		.html [1,3,4]	
Windows Imaging Component (various formats) See "Windows Imaging Component"		~		

# Read web page

The import filter is capable of reading a web page that contains your picture. All images of the specified type will be imported from the web page. Certain formats (e.g. TIFF and BMP) cannot be included in a web page.

### Image only

The import filter reads only the image file. That is, it will not read a web page or other supporting file.

### Hotspots

The import filter will import hotspots in the image. See Editing hotspots on an existing image for instructions on how to view and edit the hotspots.

### **Panoramic attributes**

The import filter reads the panoramic attributes to determine whether the image was prepared with spherical or cylindrical projection and to find the horizontal and vertical field of view of the image. An image with panoramic attributes can be re-exported to a different panoramic format. See also [8].

### Notes:

- 1. Hotspots are read from the web page.
- 2. This format supports Rectangular hotspots only. If you used other shapes when you saved the panorama, they were converted to rectangles.
- 3. This format supports Spot and Rectangular hotspots only. If you used other shapes when you saved the panorama, they were converted to rectangles.
- 4. The PTViewer import filter supports hotspots specified with the 'hotspot' parameter in the APPLET tag. It does not support hotspot masks because these use GIF images. GIF is not supported by The Panorama Factory.
- 6. The HTML image map import filter supports JPG and PNG images that have hotspots defined with HTML image maps.
- 7. When hotspots are imported from this image format, they may have a slightly different shape than when they were exported. For example, circle hotspots will be imported as polygons that approximate the original circle.
- 8. Although some image formats do not preserve panoramic attributes, you can assign panoramic attributes to any image after importing it by using the **Panoramic image properties dialog box** (*Image menu*).

# Export image file formats

The Panorama Factory can export your panorama to a variety of output formats. Each export filter has particular capabilities and limitations, some determined by the file format itself (for example, QTVR does not support spherical projection) and others by the export filter.

To export the current image, use the **Save current image as... command (File menu)**. You choose the export format from the **Save as type** dropdown list of the **Save Image As dialog box**.

<b>Format</b> For more information on a particular format, See its section in this chapter of the user's guide	Create web page	Control viewer size	Hotspots	Spherical projection	Cylindrical projection	Cubic projection	Conventional images	24-bit images	48-bit images	Save uncorrected colors
<b>JPEG</b> (*.jpg, *.jpeg) See "JPEG settings dialog box"	1		.html [1]	~	~	~	✓	✓		
<b>TIFF</b> (*.tif, *.tiff) See "TIFF settings dialog box"				~	~	~	~	~	~	~
Windows BMP (*.bmp, *.dib)				✓	✓	✓	✓	✓		
PNG (*.png) See "PNG settings dialog box"	~		.html [1]	~	~	~	~	~	~	~
Layered Photoship image (*.psd) See "PSD image file format"				~	~	~	~	✓	✓	~
Multiple TIFF (*.tif, *.tiff) See "Multiple TIFF image file format"				~	~	~	~	✓	✓	~
<b>QTVR</b> (*.mov) See "QTVR image file format"	~	~	.mov	[5]	~	~		✓		
<b>IVR</b> (*.ivr, *.html, *.htm) See "IVR image file format"	~	~	.ivr [2]	~	~			~		
<b>PTViewer</b> (*.html, *.htm) See "PTViewer image file format"	~	~	.html [1,3,4]	~				~		

# Read web page

The import filter is capable of reading a web page that contains your picture. All images of the specified type will be imported from the web page. Certain formats (e.g. TIFF and BMP) cannot be included in a web page.

# Create web pag

The export filter is capable of creating a web page that contains your picture.

Certain formats (e.g. TIFF and BMP) cannot be included in a web page. For other formats some features require creating a web page. For example, hotspots are saved for JPEG and PNG images only if you create a web page.

Web page creation is forced for some formats. For example, viewers implemented as Java applets (IVR Java viewer, PTViewer) can be run only within a web page.

### **Control viewer size**

The dimensions of the panoramic view may be controlled independently of the size of the panoramic image.

#### Hotspots

The export format supports hotspots. The text in this column indicates which file the hotspots are stored in.

#### **Spherical projection**

The export format supports spherical projection. To learn more about projections, please refer to Chapter 10, "Panoramic projections".

#### **Cylindrical projection**

The export format supports cylindrical projection. To learn more about projections, please refer to Chapter 10, "Panoramic projections".

# **Conventional images**

Conventional images may be exported in this format. This feature may be used to add hotspots to a JPEG image, for example.

If this column does not contain a checkmark, then only panoramic images may be exported.

#### 24-bit images

All export filters support saving with 24 bits per pixel (8 bits per sample).

#### 48-bit images

Some export filters support saving with 48 bits per pixel (8 bits per sample). 48-bit output is available only if your panorama was created from 48-bit images or if you have selected **Use 45-bit pixels** on the **Project properties dialog box** (*File menu*).

This option is selected with the settings... button on the Save Image As dialog box.

#### Save uncorrected color

Export filters that support saving with 48 bits per pixel also support saving with corrected or uncorrected color. 24-bit images are always saved with corrected color.

This option is selected with the settings... button on the Save Image As dialog box.

### Notes:

- 1. Hotspots are saved only if you create a web page.
- 2. This format supports Rectangular hotspots only. Other shapes are saved as the smallest rectangle that encloses the hotspot shape.
- 3. This format supports Spot and Rectangular hotspots only. Other shapes are saved as the smallest rectangle that encloses the hotspot shape.
- 4. The Panorama Factory's PTViewer export filter supports hotspots specified with the 'hotspot' parameter in the APPLET tag. It does not support hotspot masks because these use GIF images. GIF is not supported by The Panorama Factory.
- 5. Images made with spherical projection are automatically converted to cubic or cylindrical projection when you export to QTVR format.

# PSD image file format

• See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.

# About PSD

PSD image format allows storing multiple image layers in a single image file. For The Panorama Factory, this provides for storing a stitched panorama where each original image is in its own layer. After saving a panorama in PSD format, you can open it with Adobe Photoshop to adjust individual layer brightness, contrast, etc. or edit layer transparency to achieve blending effects that are more complex than ones provided by The Panorama Factory.

The PSD export filter can be applied only to stitched images and crops of stitched images. The Panorama Factory creates a Photoshop layer for each original image. If you have cropped the panorama, some portions of original images may fall outside the cropping bounds. In this case, the boundaries of the Photoshop canvas are set to The Panorama Factory's cropping bounds.

Using options on the **PSD settings dialog box** you may also choose to crop the individual layers images or leave them uncropped. If you leave them uncropped, the parts that fall outside The Panorama Factory's cropping bounds are still written to the Photoshop file. This means you can reveal them by increasing the size of the Photoshop canvas. Cropping individual layer images reduces the size of the Photoshop file, but it limits your ability to edit the overall cropping in Photoshop.

# Capabilities of the PSD export filter

- Stitched and cropped images only The PSD export filter can be applied only to stitched images and crops of stitched images.
- Warping— Each original image is warped before saving in its own layer.
- **Transparency mask** The Photoshop transparency mask is used to produce the blending effect used by The Panorama Factory's stitcher. The blending effect can be disabled.
- Adjustment layers Photoshop adjustment layers are added to perform automatic exposure correction and automatic exposure correction (if enabled). This means that you can adjust these effects in Photoshop after opening the PSD file. The adjustment layers can be disabled.
- 8 bits or 16 bits per color channel The PSD export filter can save with 16 bits per color channel if the stitched image was made with 45-bit pixels. Photoshop CS or newer is required to read PSD files with 16 bits per color channel. If you have an older version of Photoshop, you should use 8 bits per color channel.

# Multiple TIFF image file format

• See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.

# **About Multiple TIFF**

Multiple TIFF image format provides for storing a stitched panorama where each original image is in its own TIFF image file. After saving a panorama in Multiple TIFF format, you use an external blending program such as Enblend or Smartblend to blend the layers into a finished panorama. The Panorama Factory includes powerful built-in blending tools, but some users may feel that external blending software produces better results under some circumstances.

When you enter a file name on the **Save Image As dialog box**, The Panorama Factory appends "\_01.tiff", "\_02.tiff", etc. to create the actual output file names for the individual layer files.

The PSD export filter can be applied only to stitched images and crops of stitched images. The Panorama Factory creates a TIFF image file for each original image. If you have cropped the panorama, some portions of original images may fall outside the cropping bounds. In this case, the boundaries of the image files are set to The Panorama Factory's cropping bounds.

You can use options on Multiple TIFF settings dialog box to control whether The Panorama Factory's own layer blending is applied before saving the TIFF files. Normally, if you are using external blending software you would disable The Panorama Factory's blending.

Using other options on the Multiple TIFF settings dialog box you may also choose to crop the individual layers images or leave them uncropped. If you leave them uncropped, the parts that fall outside The Panorama Factory's cropping bounds are written to the TIFF files. This means you can crop the finished image with an external program. Cropping individual layer images reduces the size of the TIFF files, but it limits your ability to edit the overall cropping in Photoshop.

# Capabilities of the Multiple TIFF export filter

- Stitched and cropped images only The Multiple TIFF export filter can be applied only to stitched images and crops of stitched images.
- Warping— Each original image is warped before saving in its own layer file.
- Alpha channel mask The TIFF alpha channel is used to produce the blending effect used by The Panorama Factory's stitcher. The blending effect can be disabled.
- Associated or unassociated alpha channel The Multiple TIFF export filter provides for marking the alpha channel as either *associated* or *unassociated* with the image data. Some external blending programs require a setting for this option. Refer to the documentation of the program you are using to determine whether one or the other is required.
- 8 bits or 16 bits per color channel The PSD export filter can save with 16 bits per color channel if the stitched image was made with 45-bit pixels. Photoshop CS or newer is required to read PSD files with 16 bits per color channel. If you have an older version of Photoshop, you should use 8 bits per color channel.

# IVR image file format

- See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.
- You may also wish to visit this same web page at The Panorama Factory website to check for updates: www.panoramafactory.com/help/hid\_ivr.html.

# About IVR

**NOTE:** The IVR viewer (Zoom viewer) is produced by iSeeMedia, Inc. and is not a product of Smoky City Design, LLC. When using this viewer, please be sure to comply with licensing requirements (if any) imposed by iSeeMedia, Inc.

IVR format is based on the Image Worlds [1] extension to the VRML 2.0 file format. At this writing (June 2004), the IVR format and its viewers are maintained by iSeeMedia, Inc. [2]. The Zoom viewer from iSeeMedia displays a segment of a panoramic image, re-projecting the image to have conventional perspective. By click-dragging on the image, you can look around as though you were standing in the middle of the scene.

Saving an image in IVR format actually creates two files: a JPEG image and an IVR file. The IVR file contains panoramic attributes and hotspots.

IVR images can contain hotspots. These are areas on the image that do something when you click on them. For more information, see "Adding hotspots to your panoramas" in Chapter 7, "Making a virtual tour."

# Creating an IVR panorama using the Wizard

To make an IVR panorama using the Wizard, simply select **IVR** for the output format on **Wizard** step 5/9/ - Select panorama type.

# Creating an IVR panorama using the Classic interface

Follow these steps to make an IVR panorama:

- 1. Create a panorama using the *Stitch command* or the *Stitch 360 command* (*New image menu*). Be sure to use the *Stitch 360 command* if this is a full 360 degree panorama. You can select either Cylindrical projection or Spherical projection on the Camera properties dialog box before creating your stitched image.
- 2. Crop the stitched image using the *Crop command* (*New image menu*). You may change the height of the cropping rectangle if you wish, but for best results do not change its angle or width.
- 3. Resize, sharpen or otherwise enhance the image.
- 4. Make sure the final image is displayed as the current image. If it is not, you should doubleclick its thumbnail to make it the current image.
- 5. Select the *Save current image as... command* from the *File menu* and then select IVR format from the the *Save as type* dropdown list of the *Save Image As dialog box*.

See also Chapter 4, "Using the Classic interface, step by step."

### Saving an IVR panorama

To save your IVR panorama, select the **Save current image as... command** from the **File menu** and then select **IVR** format from the the **Save as type** dropdown list of the **Save Image As dialog box**.

**NOTE:** Use the **Save current image as... command** to save and name the current image. To save the entire Panorama Factory project, use the **Save project command**, **Save project as... command** or **Save project archive as... command** instead.

Choosing **IVR** enables other choices on the **Save Image As dialog box**. You may create a web page containing an IVR viewer, create a thumbnail image and preview your web page in your computer's web browser.

You can also control attributes of the saved IVR image file by selecting the **IVR settings...** button to display the **IVR settings dialog box**.

# Capabilities of the IVR export filter

The IVR export filter supports only a subset of the IVR format. This section describes this subset and explains the relationship between Panorama Factory panoramas and hotspots and the IVR format.

- Single-vista VR images only A Panorama Factory image can be exported to a singlevista IVR image. There is no provision for combining multiple images into a multi-vista IVR file.
- **Partial panoramas and 360 degree images** The Panorama Factory can export partial panoramas as well as full 360 degree images.
- URL hotspots only The Panorama Factory supports hotspots that link to web URL. It does not support other types of IVR hotspots.
- **Rectangular hotspots** The IVR format supports rectangular hotspots only. Other shapes are saved as the smallest rectangle that encloses the hotspot shape.
- **Hotspot name** The IVR ActiveX and Plug-in viewers preserve hotspot names. The IVR Java viewer does not—hotspots will be renamed hotspot1, hotspot2, etc.
- Show hotspot is not supported IVR does not support the show hotspot attribute.
- Hotspot color is not supported IVR does not support hotspot colors.
- Text message supported by Java viewer only The IVR Java viewer displays a hotspot's text message in the browser status line. The IVR ActiveX and Plug-in viewers do not support the text message.
- Cylindrical and spherical projection only IVR supports three panoramic formats: cylindrical, spherical and cubic. The Panorama Factory only exports cylindrical and spherical images to IVR format.
- **Image quality** The Panorama Factory can control the JPEG image quality. Lowering the image quality can produce smaller file sizes.

# Importing an IVR panorama

To import an IVR panorama, select the *Import images... command* from the *File menu* and then select IVR format from the Files of type dropdown list of the Import Images dialog box.

You can select an **.IVR** file to import a single IVR file or select an **.HTML** or **.HTM** file to import all IVR images that are referenced from a web page.

# Capabilities of the IVR import filter

The IVR import filter supports only a subset of the IVR format. This section describes this subset and explains the relationship between Panorama Factory panoramas and hotspots and the IVR format.

- **Multi-vista VR images** The Panorama Factory can import multi-vista IVR images. Each panoramic vista will be imported to a separate image in The Panorama Factory.
- **Partial panoramas and 360 degree images** The Panorama Factory can import partial panoramas as well as full 360 degree images.
- URL hotspots only The Panorama Factory supports hotspots that link to web URLs. It does not support other types of IVR hotspots.
- **Rectangular hotspots** The IVR format supports rectangular hotspots only. Other hotspot shapes will be converted to rectangles when they are exported.
- **Cylindrical and spherical projection only** IVR supports three panoramic formats: cylindrical, spherical and cubic. The Panorama Factory only imports cylindrical and spherical images from IVR format.

# Installing support for IVR on your computer

**NOTE:** The IVR viewer (Zoom viewer) is produced by iSeeMedia, Inc. and is not a product of Smoky City Design, LLC. When using this viewer, please be sure to comply with licensing requirements (if any) imposed by iSeeMedia, Inc.

In order to view IVR images you may need to install the appropriate viewer (for internet browsers). These components are available directly from iSeeMedia, Inc.

# ActiveX

You do not need to explicitly install the ActiveX viewer. Internet Explorer will prompt you to install it the first time you view a web page that needs it. If you publish a web page containing the ActiveX viewer, visitors to your web site can follow this same procedure.

# Plug-in

You do not need to download the Plug-in before creating your first panorama. The browser will display a box that you may click to visit the download page at iSeeMedia's website. Follow the installation instructions for the download.

If you publish a web page containing the Plug-in viewer, visitors to your web site can follow this same procedure.

# Java

You must obtain the Java viewer directly from iSeeMedia, Inc. The iSeeMedia Java viewer download package includes several viewers packaged as a Zip file. The viewer supported by The Panorama Factory is identified as

java\_viewers\panoapplet.jar.

After downloading the viewer, you should place the **panoapplet.jar** file into the folder on your computer that contains The Panorama Factory application. On Windows this is normally:

C:\Program Files\Smoky City Design\The Panorama Factory

On Mac, you should put **panoapplet.jar** in The Panorama Factory's **Resources** folder. Assuming you installed PFactory.app into /Applications, the easiest way to open this folder is:

- 4. Open a Finder window.
- 5. Choose the "Go to folder" command from Finder's "Go" menu. A dialog box will appear for you to type the folder name.
- 6. Enter "/Applications/PFactory.app/Contents/Resources" into the dialog box and click the "Go" button.

When The Panorama Factory exports an image for the IVR Java viewer, it tries to copy panoapplet.jar from its application folder to the folder into which you are exporting. This enables your web browser to find the JAR file when you view a web page.

If you publish a web page containing the Java viewer, you must be sure to copy panoapplet.jar to your web site.

In the past, support for Java was automatically included with Internet Explorer. However, since the release of Windows XP, Microsoft has not included Java with Internet Explorer. You have to install it separately. You can download and install Java here:

http://java.com/en/download/index.jsp

Here is a web page to detect whether Java is installed in your browser:

http://java.com/en/download/installed.jsp?detect=jre&try=1

# References

This section contains references to web pages at other web sites.

- 1. Image Worlds File Specification, RealSpace, Inc., July 29, 1996
- 2. iSeeMedia, Inc. website, http://www.iseemedia.com/

*NOTE:* There is no guarantee that these web addresses will remain valid over time. If they are no longer valid, please visit this same web page at The Panorama Factory website to check for updates: www.panoramafactory.com/help/hid\_ivr.html.

# PTViewer image file format

- See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.
- You may also wish to visit this same web page at The Panorama Factory website to check for updates: www.panoramafactory.com/help/hid\_ptviewer.html.

# **About PTViewer**

**NOTE:** According to the PTViewer documentation [1], "PTViewer is an open and free Panorama viewer." However, the PTViewer is produced by Helmut Dersch. and is not a product of Smoky City Design, LLC. When using this viewer, please be sure to comply with licensing requirements (if any) imposed by Helmut Dersch.

The PTViewer, from Prof. Helmut Dersch [1], is a Java viewer that is one of the best viewers available. Prof. Dersch has given a great deal of attention to image quality issues in the PTViewer. The viewer also provides a rich set of features.

A recently updated version published by Fulvio Senore [5] provides improved image quality through Lanczos2 interpolation and also corrects the problem described in "Trouble Report 273—Hotspots don't display properly in PTViewer."

PTViewer displays a segment of a panoramic image, re-projecting the image to have conventional perspective. By click-dragging on the image, you can look around as though you were standing in the middle of the scene.

Saving an image in PTViewer format actually creates two files: a JPEG image and a web page (HTML file). It is not possible to create a PTViewer image without the web page.

PTViewer images can contain hotspots. These are areas on the image that do something when you click on them. For more information, see "Adding hotspots to your panoramas" in Chapter 7, "Making a virtual tour."

# Creating a PTViewer panorama using the Wizard

To make a PTViewer panorama using the Wizard, simply select PTViewer for the output format on **Wizard step 5/9/ - Select panorama type**.

# Creating a PTViewer panorama using the Classic interface

Follow these steps to make a PTViewer panorama:

- Create a panorama using the *Stitch command* or the *Stitch 360 command* (*New image menu*). Be sure to use the *Stitch 360 command* if this is a full 360 degree panorama. For best results, select *Spherical projection* on the *Camera properties dialog box* before creating your stitched image.
- 2. Crop the stitched image using the *Crop command* (*New image menu*). You may change the height of the cropping rectangle if you wish, but for best results do not change its angle or width.
- 3. Resize, sharpen or otherwise enhance the image.
- 4. Make sure the final image is displayed as the current image. If it is not, you should doubleclick its thumbnail to make it the current image.
- Select the Save current image as... command from the File menu and then select PTViewer format from the the Save as type dropdown list of the Save Image As dialog box.

See also Chapter 4, "Using the Classic interface, step by step."

# Saving a PTViewer panorama

To save your IVR panorama, select the **Save current image as... command** from the **File menu** and then select **PTViewer** format from the the **Save as type** dropdown list of the **Save Image As dialog box**.

**NOTE:** Use the **Save current image as... command** to save and name the current image. To save the entire Panorama Factory project, use the **Save project command**, **Save project as... command** or **Save project archive as... command** instead.

Choosing **PTViewer** enables other choices on the **Save Image As dialog box**. You may create a web page containing an PTviewer viewer, create a thumbnail image and view your web page in your computer's web browser.

You can also control attributes of the saved IVR image file by selecting the **IVR settings...** button to display the **IVR settings dialog box**.

# Capabilities of the PTViewer export filter

The PTViewer export filter supports only a subset of the PTViewer format. This section describes this subset and explains the relationship between Panorama Factory panoramas and hotspots and the PTViewer format.

- Single-node VR images only A Panorama Factory image can be exported to a web page containing a single VR image. There is no provision for combining multiple images into a multi-node web page.
- **Partial panoramas and 360 degree images** The Panorama Factory can export partial panoramas as well as full 360 degree images.
- URL hotspots only The Panorama Factory supports hotspots that link to web URLs. It does not support other types of PTViewer hotspots.
- **Spot and rectangular hotspots** The PTViewer export filter supports spot-type and rectangular hotspots only. Other shapes are saved as the smallest rectangle that encloses the hotspot shape. Although PTViewer implements arbitrary shapes through the use of hotspot mask images, The Panorama Factory does not support this feature because is uses GIF images. GIF is not supported by The Panorama Factory.
- Hotspot name PTViewer preserves the hotspot name.
- Show hotspot PTViewer supports the show hotspot attribute.
- Hotspot color PTViewer uses the hotspot color when it displays the hotspot.
- Text message PTViewer shows a hotspot's text message when it displays the hotspot.
- Spherical projection only PTViewer directly supports spherical (equirectangular) images. Although PTViewer supports cylindrical and cubic images through QTVR formats, The Panorama Factory only exports spherical images for PTViewer.
- **Image quality** The Panorama Factory can control the JPEG image quality. Lowering the image quality can produce smaller file sizes.

# Importing a PTViewer panorama

To import an PTViewer panorama, select the *Import images... command* from the *File menu* and then select **PTViewer** format from the **Files of type** dropdown list of the **Import Images dialog box**.

You must select an **.HTML** or **.HTM** file that contains a PTViewer image. The Panorama Factory will import all PTViewer images that are referenced from the web page.

# Capabilities of the PTViewer import filter

The PTViewer import filter supports only a subset of the PTViewer format. This section describes this subset and explains the relationship between Panorama Factory panoramas and hotspots and the PTViewer format.

- **Multi-image web pages** The Panorama Factory can import multiple PTViewer images from a single web page. Each panoramic image will be imported to a separate image in The Panorama Factory.
- **Partial panoramas and 360 degree images** The Panorama Factory can import partial panoramas as well as full 360 degree images, however partial panoramas are padded to full 360 degree images when they are imported with the PTViewer import filter.
- URL hotspots only The Panorama Factory supports hotspots that link to web URLs. It does not support other types of PTViewer hotspots.
- **Spot and rectangular hotspots** The PTViewer import filter reads spot-type and rectangular hotspots only. Although PTViewer implements arbitrary shapes through the use of hotspot mask images, The Panorama Factory does not support this feature because is uses GIF images. GIF is not supported by The Panorama Factory.
- **Cylindrical and spherical projection only** PTViewer directly supports spherical (equirectangular) images. Although PTViewer supports cylindrical and cubic images through QTVR formats, The Panorama Factory only imports spherical images for PTViewer.

# Installing support for PTViewer on your computer

**NOTE:** According to the PTViewer documentation [1], "PTViewer is an open and free Panorama viewer." However, the PTViewer is produced by Helmut Dersch. and is not a product of Smoky City Design, LLC. When using this viewer, please be sure to comply with licensing requirements (if any) imposed by Helmut Dersch.

In order to view PTViewer images you must install the PTViewer Java viewer (for internet browsers).

We recommend the recently updated 2.8 version of PTViewer available from Fulvio Senore [5] at http://www.fsoft.it/panorama/ptviewer.htm. PTViewer may also be available directly from Prof. Dersch's website [1] or one of the mirror sites [2,3,4]. As of this writing (June 2004), the most recent revision at the mirror sites appears to be identified as Version 2.5 for Java 1.0.4 or above.

The PTViewer ZIP file contains several different versions of ptviewer.jar. The one supported by The Panorama Factory is identified as

# Applet\ptviewer.jar in the 2.8 ZIP file ptvj2.5\Applet\ptviewer.jar in the 2.5 ZIP file

After downloading the viewer, you should place the **ptviewer.jar** file into the folder on your computer that contains The Panorama Factory application. On Windows this is normally:

C:\Program Files\Smoky City Design\The Panorama Factory

On Mac, you should put **ptviewer.jar** in The Panorama Factory's **Resources** folder. Assuming you installed PFactory.app into /Applications, the easiest way to open this folder is:

- 1. Open a Finder window.
- 2. Choose the "Go to folder" command from Finder's "Go" menu. A dialog box will appear for you to type the folder name.
- 3. Enter "/Applications/PFactory.app/Contents/Resources" into the dialog box and click the "Go" button.

When The Panorama Factory exports an image for PTViewer, it tries to copy **ptviewer.jar** (and possibly also **ptviewer.class**) from its application folder to the folder into which you are exporting. This enables your web browser to find the JAR file when you view a web page.

If you publish a web page containing the Java viewer, you must be sure to copy **ptviewer.jar** and **ptviewer.class**, if present, to your web site.

In the past, support for Java was automatically included with Internet Explorer. However, since the release of Windows XP, Microsoft has not included Java with Internet Explorer. You have to install it separately. You can download and install Java here:

http://java.com/en/download/index.jsp

Here is a web page to detect whether Java is installed in your browser:

http://java.com/en/download/installed.jsp?detect=jre&try=1

### Note for users of V3

The Panorama Factory V3 required you to extract the **ptviewer.class** file from the **ptviewer.jar** file. Starting in V4, The Panorama Factory performs this extraction when needed, so it is no longer necessary for you to do this. Note that **ptviewer.class** is needed for PTViewer version 2.5, but not for PTViewer version 2.7L2 or version 2.8.

# References

This section contains references to web pages at other web sites.

- 1. Prof. Helmut Dersch's website, www.fh-furtwangen.de/~dersch/.
- 2. Mirror site 1, http://www.path.unimelb.edu.au/~dersch/.
- 3. Mirror site 2, http://www.all-in-one.ee/~dersch/.
- 4. Mirror site 3, http://home.no.net/dmaurer/~dersch/Index.htm.
- 5. PTViewer 2.8 from Fulvio Senore, http://www.fsoft.it/panorama/ptviewer.htm.

*NOTE:* There is no guarantee that these web addresses will remain valid over time. If they are no longer valid, please visit this same web page at The Panorama Factory website to check for updates: www.panoramafactory.com/help/hid ptviewer.html.

# QTVR image file format

- See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.
- You may also wish to visit this same web page at The Panorama Factory website to check for updates: www.panoramafactory.com/help/hid\_qtvr.html.

# About QTVR

**NOTE:** The QuickTime viewer is produced by Apple Computer, Inc. and is not a product of Smoky City Design, LLC. When using this viewer, please be sure to comply with licensing requirements (if any) imposed by Apple Computer, Inc.

QTVR is a media type within Apple's [1] QuickTime [2] data format that provides for panoramic images. The QuickTime viewer from Apple displays a segment of a panoramic image, reprojecting the image to have conventional perspective. By click-dragging on the image, you can look around as though you were standing in the middle of the scene.

QTVR images can contain hotspots. These are areas on the image that do something when you click on them. For more information, see "Adding hotspots to your panoramas" in Chapter 7, "Making a virtual tour."

# Creating a QTVR panorama using the Wizard

To make a QTVR panorama using the Wizard, simply select **QTVR** for the output format on **Wizard step 5/9 - Select panorama type**. You may choose either **Spherical projection** or **Cylindrical projection**.

Upon exporting to QTVR format, The Panorama Factory may convert the panorama to cubic or cylindrical projection if it can determine that one projection will produce a significantly smaller file than the other. Otherwise, it will convert spherical panoramas to cubic and leave cylindrical panoramas unchanged. However, cubic projection is always used if you have selected the **Add top and bottom caps to saved image** on the **QTVR settings dialog box** 

# Creating a QTVR panorama using the Classic interface

Follow these steps to make a QTVR panorama:

1. Create a panorama using the *Stitch command* or the *Stitch 360 command* (*New image menu*). Be sure to use the *Stitch 360 command* if this is a full 360 degree panorama.

# You may choose either **Spherical projection** or **Cylindrical projection** on the on the **Camera properties dialog box**.

Upon exporting to QTVR format, The Panorama Factory may convert the panorama to either cubic or cylindrical projection if it can determine that one projection will produce a

significantly smaller file than the other. Otherwise, it will convert spherical panoramas to cubic and leave cylindrical panoramas unchanged. However, cubic projection is always used if you have selected the Add top and bottom caps to saved image on the QTVR settings dialog box

- 2. Crop the stitched image using the **Crop command** (**New image menu**). You may change the height of the cropping rectangle if you wish, but for best results do not change its angle or width.
- 3. Resize, sharpen or otherwise enhance the image.
- 4. Make sure the final image is displayed as the current image. If it is not, you should doubleclick its thumbnail to make it the current image.
- 5. Select the **Save current image as... command** from the **File menu** and then select **QTVR** format from the the **Save as type** dropdown list of the **Save Image As dialog box**.

See also Chapter 4, "Using the Classic interface, step by step."

# Saving a QTVR panorama

To save your QTVR panorama, *Save current image as... command* from the *File menu* and then select **QTVR** format from the the **Save as type** dropdown list of the **Save Image As dialog box**.

**NOTE:** Use the **Save current image as... command** to save and name the current image. To save the entire Panorama Factory project, use the **Save project command**, **Save project as... command** or **Save project archive as... command** instead.

Choosing **QTVR** enables other choices on the **Save Image As dialog box**. You may create a web page containing an PTviewer viewer, create a thumbnail image and view your web page in your computer's web browser.

You can also control attributes of the saved QTVR image file by selecting the **QTVR settings...** button to display the **QTVR settings dialog box**.

# Capabilities of the QTVR export filter

The QTVR export filter supports only a subset of the QuickTime format. This section describes this subset and explains the relationship between Panorama Factory panoramas and hotspots and the QuickTime format.

- Single-node VR images only A Panorama Factory image can be exported to a singlenode QTVR image. There is no provision for combining multiple images into a multinode QTVR file.
- **Partial panoramas and 360 degree images** The Panorama Factory can export partial panoramas as well as full 360 degree images.
- **255 hotspots** The QTVR format imposes a limit of 255 hotspots in a single QTVR image.
- URL hotspots only The Panorama Factory supports hotspots that link to web URLs. It does not support other types of QuickTime hotspots.
- Arbitrary shaped hotspots The Panorama Factory can export hotspots of any shape.
- Hotspot name is not supported QTVR preserves the hotspot name.

- Show hotspot is not supported QTVR does not support the show hotspot attribute.
- Hotspot color is not supported QTVR does not support hotspot colors.
- Text message is not supported QTVR does not support hotspot text messages.
- **Compression formats** The Panorama Factory can export the following QTVR compression formats: JPEG, Sorenson, Cinepak and PNG.
- **Image quality** The Panorama Factory can control the QTVR image quality. Lowering the image quality can produce smaller file sizes.

# Importing a QTVR panorama

To import an PTViewer panorama, select the *Import images... command* from the *File menu* and then select **QTVR** format from the **Files of type** dropdown list of the **Import Images dialog box**.

You can select a **.MOV** file to import a single QTVR file or select an **.HTML** or **.HTM** file to import all QTVR files that are referenced from a web page.

### Capabilities of the QTVR import filter

The QTVR import filter supports only a subset of the QuickTime format. This section describes this subset and explains the relationship between Panorama Factory panoramas and hotspots and the QuickTime format.

- **Multi-node VR images** The Panorama Factory can import multi-node QTVR images. Each panoramic node will be imported to a separate image in The Panorama Factory.
- **Partial panoramas and 360 degree images** The Panorama Factory can import partial panoramas as well as full 360 degree images.
- URL hotspots only The Panorama Factory supports hotspots that link to web URLs. It does not support other types of QuickTime hotspots.
- Arbitrary shaped hotspots The Panorama Factory can import hotspots of any shape. Some shapes may be slightly different than when they were exported. For example, polygon hotspots may not have exactly the same vertexes although they will cover the same area.

# Installing support for QuickTime on your computer

**NOTE:** The QuickTime viewer is produced by Apple Computer, Inc. and is not a product of Smoky City Design, LLC. When using this viewer, please be sure to comply with licensing requirements (if any) imposed by Apple Computer, Inc.

Before you can create QTVR images with The Panorama Factory you must install the QuickTime Authoring components. You should also install the QuickTime plug-in (for internet browsers) to view your images in the Wizard. You may also wish to install the QuickTime viewer application program.

These components are available directly from Apple Computer. Visit the QuickTime download page [2] at Apple Computer, Inc. to download the QuickTime viewer.

### References

This section contains references to web pages at other web sites.

- 1. Apple Computer, Inc. http://www.apple.com.
- 2. QuickTime page at Apple Computer, Inc. http://www.apple.com/quicktime/.

**NOTE:** There is no guarantee that these web addresses will remain valid over time. If they are no longer valid, please visit this same web page at The Panorama Factory website to check for updates: www.panoramafactory.com/help/hid\_qtvr.html.

# Windows Imaging Component

*NOTE:* This help section applies to the Windows m32 and x64 Editions only.

**Windows Imaging Component (WIC)** is an extensible imaging framework introduced by Microsoft in Windows Vista and Windows XP Service Pack 3. It is built into Windows and permits applications like The Panorama Factory to automatically support new image file formats

If your Windows computer supports WIC, The Panorama Factory extends the **Files of type** drop down list on the **Import Images dialog box** with additional image file formats. The Panorama Factory adds the prefix "WIC" to the names of these additional formats. For example:

WIC WMPhoto Decoder (\*.wdp) WIC ICO Decoder (\*.ico; \*.icon) WIC Canon .CRW .CR2 .TIF RAW Decoder (\*.crw; \*.cr2)

We do not supply WIC decoders with The Panorama Factory. However, WIC includes built-in support for a variety of standard image file formats and can be extended by installing plug-ins. Camera RAW image file formats are supported in this manner. To add support for your camera RAW files you must download and install the WIC plug-in for your camera.

Some plug-ins are available free or for a fee from camera manufacturers and from third parties. Here is a partial list of camera RAW plug-ins for WIC:

- Adobe DNG decoder from Ardfry Imaging
- Adobe DNG codec from Adobe
- Canon CR2 decoder from Ardfry Imaging
- Canon CRW and CR2 decoder from Canon
- Nikon NEF decoder from Ardfry Imaging
- Nikon NEF decoder from Nikon
- Olympus ORF decoder from Olympus
- Pentax PEF decoder from Pentax
- Sony ARW, SR2, SRF decoder from Sony

When you save a project file containing images imported by WIC, you are given the opportunity to convert them to a standard format (BMP, TIF or PFI) or leave them in their original format. Leaving the images in their original format is faster and may use less disk space. However, if you transfer the project to a computer that does not have WIC (e.g. a Mac) or to a computer that does

not have the same WIC plug-ins, the images may be unreadable. For this reason, it may be prudent to convert the images when you save an archival copy of the project.

For additional information about WIC, please refer to

http://en.wikipedia.org/wiki/Windows\_Imaging\_Component

# BMP settings dialog box

The **BMP settings dialog box** appears when you press the **BMP settings...** button on the **Save Image As dialog box**. It lets you control attributes of the Windows BMP image file.

BMP settings
Color management
BMP format does not support embedded color profiles.
<ul> <li>Do not convert when saving (use working color space)</li> <li>Convert to specified color profile when saving</li> </ul>
Profile sRGB IEC6 1966-2. 1
OK Cancel Help

# **Color management**

Controls color management for the BMP images created by The Panorama Factory. Windows BMP format does not support embedded color profiles. These options contol whether a color space conversion is performed when you save BMP files. We recommend converting to the sRGB profile when saving BMP files.

- **Do not convert when saving** Select this radio button to save the image without color space conversion.
- **Convert to specified color profile when saving** Select this radio button to convert the image to a specific color profile.

**Profile** — Controls the color profile to use.

# JPEG settings dialog box

The **JPEG settings dialog box** appears when you press the **JPEG settings...** button on the **Save Image As dialog box**. It lets you control attributes of the JPEG image file.

> • See also "Import image file formats" and "Export image file formats" in this chapter



for tables comparing the different image formats.

#### Image quality

The text field and its associated slider control the tradeoff between JPEG image file size and image quality. Lower quality settings tend to reduce file sizes.

**NOTE:** Extremely high quality settings may produce large files with minimal improvements in image quality. In general, there may be diminishing returns for values higher than 75%.

# TIFF settings dialog box

The **TIFF settings dialog box** appears when you press the **TIFF settings...** button on the **Save Image As dialog box**. It lets you control attributes of the TIFF image file.

• See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.

#### **Pixel size**

Allows you to choose whether to save the file with

24-bit pixels (8 bits per color channel) or 48-bit pixels (16 bits per color channel).

This option is available only if the image uses 45-bit pixels. See **Use 45-bit pixels** and **Enable color tool** on the **Project properties dialog box** to learn about 45-bit pixels.

#### **Color correction**

Select this checkbox to save images with uncorrected colors. Normally images are saved with the colors shown on the screen as affected by the **Color tool** settings. Selecting this checkbox allows saving the image file without applying color correction.

This option is available only if the image uses 45-bit pixels and the Save 48-bit pixels option is selected. See **Use 45-bit pixels** and **Enable color tool** on the **Project properties dialog box** to learn about 45-bit pixels.

# Multiple TIFF settings dialog box

The **Multiple TIFF** settings dialog box appears when you press the **Multiple TIFF settings...** button on the **Save Image As dialog box**. It lets you control attributes of the set of exported TIFF image files. The Multiple TIFF export format is used when you want to blend your panorama using an external blending program such as Enblend or Smartblend. Each layer of the panorama is saved as a separate TIFF file.

When you enter a file name on the **Save Image As dialog box**, The Panorama Factory appends "\_01.tiff", "\_02.tiff", etc. to create the actual output file names for the individual layer files.

Multiple TIFF settings
Preset
SmartBlend 🗸 🗸
Pixel size
Save 24-bit pixels (8 bits per channel)
Save 48-bit pixels (16 bits per channel)
Layer cropping
Orop layers to image bounds
O not crop layers
Layer blending
Use alpha to blend layers
O not blend layers
Alpha channel
Unassociated alpha channel
Associated alpha channel
Color correction
Save with uncorrected colors
OK Cancel Help

TIFF settings
Pixel size
Save 24-bit pixels (8 bits per channel)
Save 48-bit pixels (16 bits per channel)
Color correction
Save with uncorrected colors
OK Cancel Help

• See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.

### Preset

Initializes theoptions on this dialog box to specific values for certain external blending programs.

### Pixel size

Allows you to choose whether to save the file with 24-bit pixels (8 bits per color channel) or 48-bit pixels (16 bits per color channel).

This option is available only if the image uses 45-bit pixels. See **Use 45-bit pixels** and **Enable color tool** on the **Project properties dialog box** to learn about 45-bit pixels.

### Layer cropping

Controls the cropping of layer images. If you choose the cropped option, the output TIFF files respect the cropping bounds if you are exporting a stitched and cropped image. If you choose the uncropped option, the output TIFF files are enlarged if necessary to include the entire original image.

### Layer blending

Controls the blending of layer images. If you choose the blended option, the alpha channel of each TIFF file is used to blend the images according to the way that you have edited the overlap regions. The unblended option uses the alpha channel only to define the boundaries of the warped images. If you are using an external blending program, you should choose the unblended option.

### Alpha channel

Determines the attributes of the alpha channel in the TIFF files. Some external blending programs require the alpha channel to be marked as either *associated* or *unassociated* with the image data. Refer to the documentation of the program you are using to determine whether one or the other is required.

### **Color correction**

Select this checkbox to save images with uncorrected colors. Normally images are saved with the colors shown on the screen as affected by the **Color tool** settings. Selecting this checkbox allows saving the image file without applying color correction.

This option is available only if the image uses 45-bit pixels and the Save 48-bit pixels option is selected. See **Use 45-bit pixels** and **Enable color tool** on the **Project properties dialog box** to learn about 45-bit pixels.

# PNG settings dialog box

The **PNG settings dialog box** appears when you press the **PNG settings...** button on the **Save Image As dialog box**. It lets you control attributes of the PNG image file.

• See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.

PNG settings
Pixel size
Save 24-bit pixels (8 bits per channel)
Save 48-bit pixels (16 bits per channel)
Color correction
Save with uncorrected colors
OK Cancel Help

#### **Pixel size**

Allows you to choose whether to save the file with 24-bit pixels (8 bits per color channel) or 48-bit pixels (16 bits per color channel).

This option is available only if the image uses 45-bit pixels. See **Use 45-bit pixels** and **Enable color tool** on the **Project properties dialog box** to learn about 45-bit pixels.

#### **Color correction**

Select this checkbox to save images with uncorrected colors. Normally images are saved with the colors shown on the screen as affected by the **Color tool** settings. Selecting this checkbox allows saving the image file without applying color correction.

This option is available only if the image uses 45-bit pixels and the Save 48-bit pixels option is selected. See **Use 45-bit pixels** and **Enable color tool** on the **Project properties dialog box** to learn about 45-bit pixels.

# PSD settings dialog box

The **PSD settings dialog box** appears when you press the **PSD settings...** button on the **Save Image As dialog box**. It lets you control attributes of the PSD image file.

• See also "Export image file formats" in this chapter for tables comparing the different image formats.

#### **Pixel size**

Allows you to choose whether to save the file with 24-bit pixels (8 bits per color channel) or 48-bit pixels (16 bits per color channel).

This option is available only if the image uses 45bit pixels. See **Use 45-bit pixels** and **Enable color tool** on the **Project properties dialog box** to learn about 45-bit pixels.

PSD settings
Pixel size
Save 24-bit pixels (8 bits per channel)
Save 48-bit pixels (16 bits per channel)
Layer cropping
Orop layers to image bounds
Do not crop layers
Layer blending
Output Use layer masks to blend layers
Do not blend layers
Exposure and color correction
Output the second se
Save with uncorrected colors
OK Cancel Help

*NOTE:* 16-bit layered images require Photoshop CS or newer. If you have an older version of Photoshop, you should choose the 24-bit option.

#### Layer cropping

Controls whether the Photoshop layer images are cropped to the image boundaries. For more information, refer to "PSD image file format" in this chapter.

# Layer blending

Controls the blending of layer images. If you choose the blended option, the transparency channel is used to blend the layers according to the way that you have edited the overlap regions. The unblended option uses the transparency channel only to define the boundaries of the warped images. If you intend to use Photoshop's Auto-blend layers command, you should choose the unblended option.

# Exposure and color correction

Controls how the color values are written to the PSD file. Choose **Use adjustment layers for corrections** to save with the colors shown on the screen as affected by the **Color tool** settings and the **Blending properties dialog box settings**. Choose **Save with uncorrected colors** to save without applying any color corrections exposure corrections. If you intend to use Photoshop's Auto-blend layers command, we recommend that you choose the uncorrected option or experiment with both settings to determine which give you the best result.

# IVR settings dialog box

The IVR settings dialog box appears when you press the IVR settings... button on the Save Image As dialog box. It lets you control attributes of the JPEG image file associated with the IVR panorama. For more information see "IVR image file format" in this chapter.

> • See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.

### Image quality

The text field and its associated slider control the tradeoff between JPEG image file size

or co image quai	ty				
	Lowest	Low	Medium	Normal	High
75					
	0		75		100
	Choose lov	ver quality sett	ings to reduce file s	izes.	
	NOTE: Ext improveme	remely high set nts in image qu	tings may produce ality.	large files with mi	nimal
Viewer size (pixel	s)				
w 320		н 240			
Viewer type					
No viewer (IV)	R file only)				
🔘 Java viewer					
ActiveX (IE) a	and Plug-in (Navig	ator) viewer			
Automatic rotatio	0				
None					
© left	Speed 2				
0					
Right					

and image quality. Lower quality settings tend to reduce file sizes.

*NOTE:* Extremely high quality settings may produce large files with minimal improvements in image quality. In general, there may be diminishing returns for values higher than 75%.

#### Viewer size

Sets the dimensions of the panoramic viewer object on the web page. This is independent of the size of the image file itself. If you want to permit some degree of zoom-in without loss of resolution, the image file should be larger than the viewer.

#### Viewer type

The Panorama Factory supports three IVR viewers. You may also create the IVR file without setting up for any particular viewer.

No viewer — Create the IVR file without a web page.

- Java viewer The iSeeMedia Java viewer panoapplet.jar. This viewer should work in any browser that supports Java applets.
- ActiveX and Plug-in viewer This option creates HTML code that automatically selects between the iSeeMedia ActiveX viewer and the iSeeMedia Plug-in viewer so that the image may be viewed in either Netscape Navigator or Internet Explorer.

#### Automatic rotation

Controls automatic rotation of the image. If you select automatic rotation, the rotation begins when the image loads and continues until the user touches the view with the mouse. Please note that automatic rotation is performed by Javascript in the web page. The person viewing the web page must enable Javascript for automatic rotation to function.

- **None** No automatic rotation.
- Left Rotate as though the person viewing the image was looking toward the left side of the image.
- **Right** Rotate as though the person viewing the image was looking toward the right side of the image.
- **Speed** Larger numbers cause the view to rotate faster. The actual speed for a particular number is a function of the IVR viewer and seems to depend upon the speed of the computer.

# PTViewer settings dialog box

The **PTViewer settings dialog box** appears when you press the **PTViewer settings...** button on the **Save Image As dialog box**. It lets you control attributes of the JPEG image file associated with the PTViewer panorama. For more information see "PTViewer image file format" in this chapter.

> • See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.

# Image quality

The text field and its associated slider control the tradeoff between JPEG image file size and image quality.

JPEG image quality					
	Lowest	Low	Medium	Normal	High
75	,				
	0		75	0	10
	Choose low	ver quality set	tings to reduce file s	izes.	
	NOTE: Extr improvement	remely high se nts in image q	ttings may produce uality.	large files with mi	nimal
Viewer size (pixels)					
W 320		H 240			
W 320		H 240			
W 320 PTViewer version PTViewer version 2.6 Automatic rotation None Spe @ Left Right Ra	ed 4 ite 24	H 240	evolutions per minut rames per second	ie	•
W 320 PTViewer version PTViewer version 2.6 Automatic rotation None Spe @ Left Right Ra	ed 4 et 24	H 240	evolutions per minut rames per second	ie	•
W 320 PTViewer version PTViewer version 2.6 Automatic rotation None Spe Left Right Ra Top and bottom caps	a ed 4 ute 24	H 240	evolutions per minut rames per second	æ	•
W 320 PTViewer version PTViewer version 2.8 Automatic rotation None Spe Left Right Ra Top and bottom caps Add top and bottom	ed 4 tte 24	H 240	evolutions per minut rames per second Settings	ie	Ŧ

Lower quality settings tend to reduce file sizes.

*NOTE:* Extremely high quality settings may produce large files with minimal improvements in image quality. In general, there may be diminishing returns for values higher than 75%.

# Viewer size

Sets the dimensions of the panoramic viewer object on the web page. This is independent of the size of the image file itself. If you want to permit some degree of zoom-in without loss of resolution, the image file should be larger than the viewer.

# **PTViewer version**

Shows the version of PTViewer installed in The Panorama Factory's application folder if it is possible to determine the version. Different versions of PTViewer have different capabilities, so it is important to specify the version that you are using. If you want to generate HTML code for a different version, you can select its version from this drop down list. At the time this manual was written, The Panorama Factory was aware of three versions: 2.5, 2.7L2 and 2.8. It is possible that additional versions may be added in the future.

# Automatic rotation

Controls automatic rotation of the image. If you select automatic rotation, the rotation begins when the image loads and continues until the user touches the view with the mouse.

- **None** No automatic rotation.
- Left Rotate as though the person viewing the image was looking toward the left side of the image.

- **Right** Rotate as though the person viewing the image was looking toward the right side of the image.
- **Speed** Controls the speed of rotation. For PTViewer version 2.7L2 and version 2.8, the speed of rotation can be controlled in revolutions per minute. However, for earlier versions the speed is controlled in degrees of rotation per display frame. The frame rate depends upon the speed of the computer, so it is not possible to determine the actual rotation rate.
- **Rate** Controls the display rate in frames per second. This option is available only for PTViewer version 2.7L2 and version 2.8. For earlier versions it is not possible to control the display rate.

### Add top and bottom caps to saved image

Select this checkbox to add top and bottom caps to the saved image. Top and bottom caps allow the user to look up to the zenith (north pole) and down to the nadir (south pole) even if the vertical field of view is less than 180 degrees.

The top and bottom caps may be set to a color or to an image.

**Settings...** — Runs the **Top and bottom caps dialog box** to control the color and image used for the top and bottom caps.

# QTVR settings dialog box

The QTVR settings dialog box appears when you press the QTVR settings... button on the Save Image As dialog box. It lets you control attributes of the QTVR image file. For more information see "QTVR image file format" in this chapter.

> • See also "Import image file formats" and "Export image file formats" in this chapter for tables comparing the different image formats.

TVR settings					X
Image quality					
	Lowest	Low	Medium	Normal	High
75	-				
Compression method	0		75		100
JPEG -	Choose lov	ver quality set	tings to reduce file si	izes.	
	NOTE: Ext improveme	remely high se nts in image q	ttings may produce l uality.	arge files with mi	nimal
Viewer size (pixels)					
W 320		H 240			
Automatic rotation					
<ul> <li>None Spe</li> <li>Left</li> <li>Right</li> </ul>	eed 4	r	evolutions per minut	e	
Top and bottom caps	om caps to sa	aved image	Settings		
Color management					
QTVR format does no	ot support en	bedded color	profiles.		
<ul> <li>Do not convert w</li> <li>Convert to specified</li> </ul>	hen saving (u ìed color prof	use working co île when savin	lor space) Ig		
Profile sRGB IEC619	966-2.1			•	

### Image quality

The text field and its associated slider control the tradeoff between JPEG image file size and image quality. Lower quality settings tend to reduce file sizes.

*NOTE:* Extremely high quality settings may produce large files with minimal improvements in image quality. In general, there may be diminishing returns for values higher than 75%.

### **Compression method**

The QuickTime format provides a variety of image compression formats with different characteristics. The Panorama Factory supports the following subset of the QuickTime image formats:

JPEG Sorenson Cinepak PNG

### Viewer size

Sets the dimensions of the panoramic viewer object on the web page. This is independent of the size of the image file itself. If you want to permit some degree of zoom-in without loss of resolution, the image file should be larger than the viewer.

### Automatic rotation

Controls automatic rotation of the image. If you select automatic rotation, the rotation begins when the image loads and continues until the user touches the view with the mouse. Please note that automatic rotation of QTVR panoramas is performed by Javascript in the web page. The person viewing the web page must enable Javascript for automatic rotation to function.

**None** — No automatic rotation.

- **Left** Rotate as though the person viewing the image was looking toward the left side of the image.
- **Right** Rotate as though the person viewing the image was looking toward the right side of the image.

**Speed** — Controls the speed of rotation in revolutions per minute.

# **Color management**

Controls color management for the QTVR images created by The Panorama Factory. QTVR format does not support embedded color profiles. These options contol whether a color space conversion is performed when you save QTVR files. We recommend converting to the sRGB profile when saving QTVR files.

- **Do not convert when saving** Select this radio button to save the image without color space conversion.
- **Convert to specified color profile when saving** Select this radio button to convert the image to a specific color profile.

**Profile** — Controls the color profile to use.

# GIF is not supported by The Panorama Factory

GIF image file format is not directly supported by The Panorama Factory. The Panorama Factory neither compresses nor decompresses GIF images (except that GIF images can be read through WIC). It doesn't process them.

GIF uses a patented image compression method called The Lempel-Ziv-Welch compression algorithm (see http://www.nist.gov/dads/HTML/lempelZivWelch.html). The patent is owned by Unisys (see http://www.unisys.com/about\_unisys/lzw/). It may be possible to obtain a license for the GIF compression technology from Unisys, but it uncertain whether a small software vendor like Smoky City Design can obtain favorable license terms.

*NOTE:* There is no guarantee that these web addresses will remain valid over time. If they are no longer valid, please visit this same web page at The Panorama Factory website to check for updates: www.panoramafactory.com/help/gif\_not\_supported.html.

This is not a significant sacrifice because the GIF format is usually unsuitable for full color photographic images. The Panorama Factory would find GIF to be useful only in special situations such as defining hotspot image maps.

So we decided that pursuing a license for the GIF technology would not be time well spent.

If you want to create GIF images from The Panorama Factory, you will need to export images in a supported format and convert them to GIF with other software.

# CHAPTER 10 Panoramic projections

A panoramic projection is a method used to convert the panoramic view at a particular point in space into a flat image.

# Contents

About panoramic projections ... 132 Perspective projection ... 132 Spherical projection ... 133 Cylindrical projection ... 134 Cubic projection type 1 – Native ... 135 Cubic projection type 2 – QTVR ... 135 Cubic projection type 3 – Cruciform ... 136 References ... 136

# About panoramic projections

A panoramic projection is a method used to convert the panoramic view at a particular point in space into a planar (flat) image. We can imagine the panoramic view to be painted on the inside surface of a sphere where the camera is at the center of the sphere. A projection flattens the surface of the sphere to make the image. Interestingly, this is the same process used to make flat maps from the curved surface of the earth. The projections used in panoramic photography are relatives of the projections used in cartography (mapmaking).

Conventional cameras make photographs that are in *perspective projection* (also called *rectilinear projection*). Unfortunately, two perspective projections cannot be merged without creating discontinuities in the final image. Therefore, in order to merge your individual photographs into a seamless image, The Panorama Factory must change the projection to one that can be merged seamlessly.

The Panorama Factory works with several different types of projections. The stitcher works internally with images in either *spherical projection* (also called *equirectangular projection*) or *cylindrical projection* depending upon options you choose on **Wizard step 3/9 – Describe your camera** or on the **Camera properties dialog box**.

When exporting to QuickTime QTVR format, The Panorama Factory can automatically convert an image to *cubic projection*. Actually, The Panorama Factory supports three different variations of cubic projections.

Finally, The Panorama Factory can convert an image in spherical, cylindrical or cubic projection back to a conventional perspective projection. This is done through the **Crop command** (**New** *image menu*) because perspective projection cannot represent more than about 120-140 degrees field of view. You choose the particular portion of the panorama to convert by cropping the image.

Swing-lens cameras (e.g. Noblex, Widelux, Horizon) and rotational cameras (e.g. Cirkut, Roundshot, Panoscan) produce cylindrical projections. In these cameras, the film is effectively bent into a cylinder within the camera when the film is exposed.

Spherical (equirectangular) projections can't be produced in a physical camera because the film would need to be bent in two axes at the same time. That is, the film would have to be bent onto a section of a sphere.

Certain VR image viewers may require a particular type of projection or may accept more than one type. Each type of projection produces its own characteristic distortions. When preparing images for printing or for online display as an image file only, the choice of projection is largely an esthetic choice.

The following sections show examples of each type of projection supported by The Panorama Factory and explain the specific characteristics of each one that are important for panoramic photography.

# Perspective projection

Perspective projection is the type of image made by a conventional camera. Straight lines are preserved, so the image looks "normal".


- The Panorama Factory can convert to this format using the "Perspective cropping" option.
- "Normal" perspective -- straight lines are preserved.
- Limited to about 140 degrees vertical and horizontal field of view.
- Objectionable vertical and horizontal stretching beyond about 100 degrees observe the lower right hand corner of the example image.
- Does not export to VR formats.
- Suitable for printing.

# Spherical projection

Spherical projection is very similar to a conventional map projection where the horizontal coordinate is the longitude and the vertical coordinate is the latitude. It can represent a full spherical view. Straight lines are not preserved and the image shows a characteristic "panoramic distortion". Some find this appealing and others find it objectionable.



- Preferred stitching method for The Panorama Factory.
- Required for multi-row stitching in The Panorama Factory.
- Suitable for full circle and partial panoramas.
- Exports to cubic QTVR format.
- Exports to PTViewer format.
- Suitable for printing.

# Cylindrical projection

In cylindrical projection, the image is first mapped onto the surface of a cylinder and then the cylinder is unrolled. It can represent a full 360 degrees horizontally, but cannot represent the full vertical view. It is the type of image produced by a swing-lens or rotational panoramic camera. Straight lines are not preserved and the image shows a characteristic "panoramic distortion". Some find this appealing and others find it objectionable.



• Available stitching method for The Panorama Factory.

- Similar to the result from a swing-lens or rotational panoramic camera.
- Suitable for full circle and partial panoramas.
- Limited to about 140 degrees vertical field of view.
- Objectionable vertical stretching beyond about 100 degrees.
- Exports to cylindrical QTVR format.
- Does not export to PTViewer format.
- Suitable for printing.

# Cubic projection type 1 – Native

In cubic projection, the image is mapped onto the inside of a cube and then the cube is unfolded. Straight lines remain straight except where they cross from one cube face to another. The "native" Panorama Factory cubic format behaves well within the application when resized, sharpened, etc., but at the expense of duplicating portions of the top and bottom cube faces.



- The Panorama Factory can convert to and from this format
- Good for image processing--resize, sharpen, etc.
- Suitable for full circle panoramas but gives surprising results for partial panoramas.
- Exports to cubic QTVR format
- Does not export to PTViewer format
- Generally unsuitable for printing because of strangeness in top and bottom faces

# Cubic projection type 2 – QTVR

In cubic projection, the image is mapped onto the inside of a cube and then the cube is unfolded. Straight lines remain straight except where they cross from one cube face to another. The QTVR cubic format is the one used by QuickTime. The 6 cube faces are arranged along a horizontal line.



- The Panorama Factory can convert to and from this format.
- Suitable for full circle panoramas but gives surprising results for partial panoramas.
- Poor for image processing because of discontinuous faces.
- Exports to cubic QTVR format.
- Does not export to PTViewer format.
- Generally unsuitable for printing because of discontinuous faces.

# Cubic projection type 3 – Cruciform

In cubic projection, the image is mapped onto the inside of a cube. Straight lines remain straight except where they cross from one cube face to another. The curciform cubic format arranges the 6 cube faces in a cross shape as though the cube was simply unfolded.



- The Panorama Factory can convert to and from this format.
- Suitable for full circle panoramas but can give surprising results for partial panoramas between 270 and 360 degrees.
- Poor for image processing because of discontinuous faces.
- Exports to cubic QTVR format.
- Does not export to PTViewer format.
- Makes more intuitive sense than the other cubic format.
- Can be suitable for printing as a special effect.

# References

- 1. Animated projection demonstration http://www.panoramafactory.com/projections/.
- 2. Map projection, http://en.wikipedia.org/wiki/Map\_projection.

- 3. Perspective projection, http://en.wikipedia.org/wiki/Perspective projection.
- 4. Cylindrical projection, http://mathworld.wolfram.com/CylindricalProjection.html.
- 5. Equirectangular projection http://mathworld.wolfram.com/EquirectangularProjection.html.

*NOTE:* There is no guarantee that these web addresses will remain valid over time. If they are no longer valid, please visit this same web page at The Panorama Factory website to check for updates: www.panoramafactory.com/help/projections\_references.html.

# CHAPTER 11 Window layout

When you start The Panorama Factory its window is divided into two main window panes and a variety of title bars, tool bars and status bars.

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The Panorama Factory's window ... 140 Title bar ... 140 Standard toolbar ... 140 Import export toolbar ... 141 Image toolbar ... 142 Tools toolbar ... 143 View toolbar ... 143 Status Bar ... 144 Current image ... 144 Imported thumbnails ... 145

# The Panorama Factory's window

The top portion of The Panorama Factory's window shows a title bar, menu bar, **Standard toolbar Import export toolbar**, **Image toolbar**, **Tools toolbar** and **View toolbar**. The very bottom of the window shows a status bar. The bulk of the window is divided into two panes. In the sample window shown below, the top pane displays computed thumbnail images and the bottom pane shows a completed panorama. The relative sizes of the top and bottom panes can be varied by dragging the dividing line up or down.

To hide or display toolbars, use the **Toolbar** sub-menu from the **View menu**. Toolbars are dockable, meaning that you can pull them off of the main window into their own mini-windows, or dock them to the top or bottom of the main window.



# Title bar

The title bar is located along the top of each window. The main window shows the name of the application and project. Child windows show the name of the project and any notes associated with the project. To learn about editing the notes stored with the project see the **Project notes** command (File menu).

To move the window, drag the title bar. Note: You can also move dialog boxes by dragging their title bars.

# Standard toolbar

The standard toolbar provides quick mouse access to file, printing, edit and help tools used in The Panorama Factory,



# Import export toolbar

The **Import export toolbar** provides quick mouse access tools for importing and exporting image files.

# Click To



Import a new image into the project. Holding down the mouse button or rightclicking this toolbar control opens the **Rotation when importing images commands** dropdown menu. The toolbar graphic displays a small arrow to show you the amount of rotation that will be performed the next time you import an image.



# Image toolbar

The **Image toolbar** provides quick mouse access to tools for creating and modifying images in the project.

Click	То
<b>,                                    </b>	Stitch selected images into a panorama.
<b>R</b>	Stitch selected images into a 360 degree panorama.
*	Stitch selected images with the Wizard
*	Restart the Wizard at Wizard step 2/9 – Choose stitching method. Holding down the mouse button or right-clicking this toolbar control opens a dropdown list to select a specific Wizard step for restart.
	Crop the current image.
\$₩	Resize the current image.
	Sharpen the current image.
<b>Q</b>	Improve the quality of the current image.

Add or edit hotspots on the current image.



Fine tune (remove ghosts).



Approve the current image processing operation.



Delete selected images.

# Tools toolbar

The **Tools toolbar** provides quick mouse access to properties dialog boxes and other global project settings.

Click	То
>	Run the modal Color management dialog box.
Q	Toggle the <b>Enable soft proofing</b> checkbox on the <b>Color management dialog box</b> .
≍	Run the modal Trimming properties dialog box.
6	Run the modal Camera properties dialog box.
D <b>t</b> C	Run the modal Alignment properties dialog box.
Ē	Run the modal <b>Blending properties dialog box</b> .
<b>:</b> ##	Run the modal Fine tuning properties dialog box.
0	Show or hide the modeless Color tool.
9	Toggle the <b>Negative</b> checkbox on the <b>Color tool</b> .
	Show or hide the modeless Histogram panel.

# View toolbar

The **View toolbar** provides quick mouse access to tools that control the way the current image is displayed.

Click	То
R	Return to normal edit mode after zooming or dragging.
Ì	Select the drag tool.
Q	Select the zoom tool.
300% 🔽	Display a dropdown list to set the zoom scale to a particular value.
Q	Zoom larger by one zoom step.
Q	Zoom smaller by one zoom.
1:1	Set the zoom scale to 100%.
-	Zoom to fit the entire image on the screen.
1	Zoom to fit the image height on the screen.
$\leftrightarrow$	Zoom to fit the image width on the screen.

# Status Bar

The status bar is displayed at the bottom of the Panorama Factory window. To display or hide the status bar, use the *Status Bar command* (*View menu*).

The left area of the status bar describes actions of menu items and toolbar buttons as you move the mouse pointer over them.

# Current image

Each Panorama Factory project window is divided into two panes. The upper pane always shows the computed thumbnails. The lower pane either shows the imported thumbnails or shows the current image. Double-clicking any thumbnail selects it as the current image and displays it in the lower pane.

Many image processing commands use the current image as their source. To learn about image processing commands, see the *New image menu* in Chapter 6, "Menus."

Use the **Show imported images command** (**View menu**) to switch back to displaying the imported thumbnails.

# Imported thumbnails

When the lower pane is showing imported thumbnails, you can select a single thumbnail by single-clicking it. If you hold the SHIFT key while clicking, you extend the selection so that a set of adjacent images is selected. If you hold the CTRL key (Windows) or COMMAND key (Mac) while clicking you toggle the selection of a single image, changing it from unselected to selected or vice versa. You can drag a set of selected images to change their order in the imported thumbnails pane.

# Computed thumbnails

When the lower pane is showing computed thumbnails, you can select a single computed thumbnail by single-clicking it. If you hold the SHIFT key while clicking, you extend the selection so that a set of adjacent images is selected. If you hold the CTRL key (Windows) or COMMAND key (Mac) while clicking you toggle the selection of a single image, changing it from unselected to selected or vice versa. You can drag a set of selected images to change their order in the computed thumbnails pane.

# CHAPTER 12 Menus

The menus at the top of the project window contain the commands you will use to create your panorama.

# Contents

File menu ... 148 Edit menu ... 152 Trim menu ... 154 New image menu ... 155 Image menu ... 159 View menu ... 163 Tools menu ... 166 Help menu ... 167

# File menu



# New project command

Use this command to create a new Panorama Factory project.

You can open an existing project with the **Open project... command**.

Shortcut CTRL+N

### New project wizard command

Use this command to create a new Panorama Factory project using the Wizard. To learn more about using the wizard, see Chapter 3, "Using the Stitching Wizard to make a panorama."

To create a blank panorama project, use the New project command (File menu) instead.

You can open an existing project with the **Open project... command**.

### Open project... command



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Use this command to open an existing project in a new window. The Panorama Factory displays the **Open dialog box** so you can select the project to open.

You can create new projects with the **New project command** or the **New project wizard** command.

Shortcut CTRL+O

#### Import images... command

Use this command to import one or more image files into your Panorama Factory project. The Panorama Factory displays the **Import Images dialog box** so you can select the images to open. When you open images, The Panorama Factory places them at the end of the imported thumbnails. When you open multiple images at the same time, The Panorama Factory loads them in alphabetical order.

# Rotation when importing images > No rotation,

Rotate right 90, Rotate left 90, Rotate 180

Use these commands to control the amount of image rotation used when imported images. Rotating the images when you import them can save time when you import large image files.

Selecting one of the commands that specifies a rotation angle changes the default rotation amount and also displays the **Import Images dialog box** so you can select the images to open.

If you forget to rotate the images or if you don't know the correct rotation, don't worry. You can also rotate the images after importing.

The choices you make on this menu are persistent.

# Rotation when importing images > Lock rotation setting, Automatically update rotation setting

Ordinarily, the default rotation setting updates automatically whenever you rotate the images using the *Rotate right 90 command*, *Rotate left 90 command* or *Rotate 180 command* (*Edit menu*). However, you can disable the automatic update by selecting the *Lock rotation setting command*. If you want to restore the automatic updating, select the *Automatically update rotation setting command*.

The choices you make on this menu are persistent.

### **Close project command**

Use this command to close all windows containing the active project. The Panorama Factory suggests that you save changes to your project before you close it. If you close a project without saving, you lose all changes made since the last time you saved it. Before closing an untitled project, The Panorama Factory displays the **Save As dialog box** and suggests that you name and save the project.

You can also close a project by using the Close icon on the project's window.

# Save project command

Use this command to save the active project to its current name and directory. When you save a project for the first time, The Panorama Factory displays the **Save As dialog box** so you can name your project. If you want to change the name or directory of an existing project before you save it, choose the **Save project as... command**.

Panorama Factory projects are actually a collection of files – see Chapter 15, "Panorama Factory projects."

**Shortcut** CTRL+S

### Save project as... command

Use this command to save and name the active project. The Panorama Factory displays the **Save As dialog box** so you can name your project.

To save a project with its current name and directory, use the Save project command.

### Save project archive as... command



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Use this command to save and name the active project. The Panorama Factory displays the **Save As dialog box** so you can name your project. An archival save differs from an ordinary save in that you normally store only the imported image files and thumbnail image files with the archived version. Computed images are not normally stored with the archived version because The Panorama Factory can recompute them when you read the archive.

The **Project properties dialog box** (*File menu*) lets you control which computed images are written when you archive your project. You can also designate a different set of computed images to write when you save your project normally.

# Save current image as... command

Use this command to save and name the current image. The Panorama Factory displays the **Save Image As dialog box** so you can name your file. Naming the image file with a .tif, .bmp or .jpg extension determines the image file format.

To save the entire Panorama Factory project, use the **Save project command**, **Save project as...** command or **Save project archive as...** command.

Shortcut CTRL+V

# Project properties command

Use this command to view and edit properties of your Panorama Factory project. This command displays the **Project properties dialog box**.

### **Project notes command**

Use this command to view and edit notes stored with your Panorama Factory project. This command displays the **Project notes dialog box**.

### Profile organizer command

Use this command to view and edit Panorama Factory profiles. This command displays the **Profile organizer dialog box**.

#### Page setup command

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Use this command to set the paper size, margins, orientation of the image on the page (portrait or landscape) and layout of the image. This command presents the **Page setup dialog box**, where you specify the printing options.

#### Print preview command



Use this command to display the current image as it would appear when printed. When you choose this command, the main window will be replaced with a print preview window in which one or two pages will be displayed in their printed format. The Print preview toolbar offers you options to zoom in and out of the view and initiate a print job.

#### Print current image... command



Use this command to print the current image. This command presents a **Print dialog box**, where you may specify the the number of copies to be printed, the destination printer, and other printer setup options.

Shortcut CTRL+P

### File 1, 2, ... command

The Panorama Factory displays a list of recently used project files at the bottom of the *File menu*. Choose the number that corresponds with the project you want to open.

### Exit command

Use this command to end your Panorama Factory session. The Panorama Factory prompts you to save projects with unsaved changes.

# Edit menu



# Undo/Can't Undo command

Use this command to reverse the last editing action, if possible. The name of the command changes, depending on what the last action was. The **Undo command** changes to **Can't Undo** on the menu if you cannot reverse your last action.

### Undo is not yet implemented.

### **Cut command**

Use this command to remove the currently selected data and put it on the clipboard. This command is unavailable if there is no data currently selected.

Cutting data to the clipboard replaces the contents previously stored there.

**Shortcuts** CTRL+X

### Copy command



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Use this command to copy selected data onto the clipboard. This command is unavailable if there is no data currently selected.

Copying data to the clipboard replaces the contents previously stored there.

Shortcuts CTRL+C

### **Paste command**

Use this command to insert a copy of the clipboard contents at the insertion point. This command is unavailable if the clipboard is empty.

Shortcuts CTRL+V

#### **Delete selected command**



Use this command to delete images from either thumbnail pane.

You can delete any image you wish, including an imported image, but only if it is not the source of a computed image.

Shortcut Context menu in computed thumbnails pane Context menu in imported thumbnails pane

#### **Duplicate selected command**

Use this command to make a duplicate copy of images from either thumbnail pane. The new images are added to the end of the thumbnail list.

This command is useful if you want to duplicate one or two images at the ends of a 360 degree panorama to make it more than 360 degrees wide. It's extremely frustrating to complete the entire stitching process only to decide that you want a little more image at the left or right end of the panorama. The extra images give you the freedom to make small framing changes later.

It is unnecessary to duplicate images if you are using the **Stitch 360 command** to stitch your panorama.

#### Rotate right 90 command

Use this command to rotate images clockwise 90 degrees. You can rotate selected thumbnail images or the current image. If no images are selected, this command rotates all imported images.

When applied to imported images, this command rotates them in-place. When applied to computed images, this command performs the **Rotate command** (**New image menu**).

If you duplicate an imported image, the *Rotate right 90 command* is unavailable for the duplicate image until it has been written to a disk file. So if you want to rotate a duplicate imported image, be sure to save your project first.

#### Rotate left 90 command

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Use this command to rotate images counter-clockwise 90 degrees. You can rotate selected thumbnail images or the current image. If no images are selected, this command rotates all imported images.

When applied to imported images, this command rotates them in-place. When applied to computed images, this command performs the *Rotate command* (*New image menu*).

Note that this command applies only to imported images and rotates them in-place. If you duplicate an imported image, the **Rotate left 90 command** is unavailable for the duplicate image until it has been written to a disk file. So if you want to rotate a duplicate imported image, be sure to save your project first.

# Rotate 180 command

Use this command to rotate images 180 degrees. You can rotate selected thumbnail images or the current image. If no images are selected, this command rotates all imported images.

When applied to imported images, this command rotates them in-place. When applied to computed images, this command performs the *Rotate command* (*New image menu*).

Note that this command applies only to imported images and rotates them in-place. If you duplicate an imported image, the **Rotate 180 command** is unavailable for the duplicate image until it has been written to a disk file. So if you want to rotate a duplicate imported image, be sure to save your project first.

### **Reverse selected command**

Use this command to reverse the order of selected thumbnail images. You can reverse selected images in the imported thumbnails pane or the computed thumbnails pane. If no images are selected, this command reverses the order of all imported images

# Trim menu



### Trim marking corners command

Use this command if you want to trim your imported images by marking the four corners of each image. This is particularly useful for trimming frames from a strip of negatives or from a scanned print. To use this command, you must have overscanned the negatives or prints so that the edges of the frames are visible.

To learn more about trimming images, refer to "Trim the images" in Chapter 5, "Extra steps when working from scanned photos."

# Trim rectangle command

Use this command if you want to trim your imported images with a fixed size rectangle. This is useful when you don't need to square up your imported images or when the corners of the frames are not visible. You use the **Trimming properties dialog box** to set the width and height of the trimmed images.

To learn more about trimming images, refer to "Trim the images" in Chapter 5, "Extra steps when working from scanned photos."

# New image menu

P The Panorama Factory - menus.pfp				
File Edit Ti	rim 🚺	lew image Image View Tools Help		
	St	titch 🎽		
	St	titch 360		
	St	titch with the Wizard		
	С	lone the stitched image (for HDR)		
	С	rop		
	R	esize		
	E	nhance		
	S	harpen		
	C	onvert panorama		
	А	rray		
	С	orrect barrel distortion		
	С	orrect brightness falloff		
	R	otate		

### Stitch command

Use this command to stitch a set of images into a panorama. To learn more about stitching, see "Classic step 2 – Stitch the images into a panorama" in Chapter 4, "Using the Classic interface, step by step."

### Stitch 360 command

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Use this command to stitch a set of images into a circular panorama. To learn more about stitching, see "Classic step 2 – Stitch the images into a panorama" in Chapter 4, "Using the Classic interface, step by step."

### Stitch with the Wizard command

This command stitches a set of images using the stitching Wizard. To use this command, select a sequence of thumbnail images in the upper or lower window pane. Then select the command to start the stitching Wizard using the selected images. To learn more about stitching with the Wizard, see Chapter 3, "Using the Stitching Wizard to make a panorama."

# Clone the stitched image (for HDR) command

This command uses the selected images to create a new panorama that is stitched identically to the final image in the upper thumbnail list. Its primary purpose is to support workflow for creating high dynamic range (HDR) panoramic images. You use this command to make identically stitched images from multiple sets of source images with different exposure settings.

To use this command, you should start by stitching a panorama normally. It's probably easiest to start with the 0EV images. You do everything you need to do on this panorama including stitch, fine tune, crop, resize, sharpen, etc. You may use the Wizard or the Classic interface for the first panorama. For the remainder of the process, you only use the Classic interface, not the Wizard

When you are satisfied with the first panorama, you import the next set of images, for example, the +2EV set. You select the thumbnails for the second set of images and choose the **Clone the stitched image (for HDR) command**. The Panorama Factory creates a new stitched image, crops it, resizes it, etc. exactly as the first image, but using the second set of images. Then you repeat this sequence for the third set of images.

The panoramas you create this way are identically stitched and should register perfectly.

We recommend that you disable both **Enable exposure matching** and **Enable exposure correction** on **Wizard step 4/9 – Control image quality** or the **Blending properties dialog box** when stitching for HDR.

Note that The Panorama Factory provides the capability of creating the three identically stitched images, but does not include commands for the HDR transform and tone mapping. You must perform these steps with a separate software application designed for that purpose. Instruction in creating HDR images is beyond the scope of this User's Guide.

# Crop command

Use this command to crop the current image. See "Classic step 4 – Crop the stitched image" in Chapter 4, "Using the Classic interface, step by step" to learn more about cropping images.

# **Resize command**

Use this command to change the size of the current image or a selected group of thumbnail images. See "Classic step 5 – Resize the cropped image" in Chapter 4, "Using the Classic interface, step by step" to learn more about resizing images.

# Sharpen command

Use this command to sharpen the current image. See "Classic step 6 – Sharpen the resized image" in Chapter 4, "Using the Classic interface, step by step" to learn more about sharpening images.

# **Convert panorama**

Use this command to change the panoramic projection of the current image or a selected group of thumbnail images. This command may be applied only to images that already are in a panoramic projection.

When you choose the **Convert panorama command**, The Panorama Factory runs the modal **Convert panorama dialog box**.

# Enhance command

Use this command to "enhance" the current image using a 3x3 or a 5x5 FIR (Finite Impulse Response) filter.

When you choose the *Enhance command* (*New image menu*), The Panorama Factory displays a preview rectangle and runs the modeless Filter control dialog box. You can fiddle with the filter coefficients and see the response interactively within the preview rectangle.

The **Filter control dialog box** provides a 3x3 sharpening filter generator. This sharpening filter is determined by the value at the center of the 3x3. Larger numbers increase the sharpening effect.

When you place the cursor over the various parts of the preview rectangle it changes to show you what editing actions are possible:

This cursor	Means this
↔\$25	Indicates that the cursor is over one of the sides or corners of the preview rectangle. Dragging changes the size of the rectangle.

► Indicates that the cursor is not over any part of the preview rectangle.
Dragging draws a new preview rectangle.

When you are satisfied with the filter parameters, use the *Approve command* (*Image menu*) to generate the enhanced image. The enhanced image is added to the end of the computed thumbnails list.

If you want to change the filter parameters later, select the enhanced image and use the **Show** source command (Image menu) to redisplay the Filter control dialog box.

You can also enhance a group of images by selecting a group of thumbnails before choosing the *Enhance command*. All the images will be enhanced with the same coefficients.

# Array command

Use this command to assemble multiple images into a single image with control over the spacing between the images.

This command helps to solve a common problem when you wish to print your panorama through a service bureau. Many printing services are not set up to handle the unconventional aspect ratio of panoramic images. Their procedures and pricing schedules are designed for images that have conventional photographic aspect ratios: 8x10, 16x20, etc.

Consider, for example, that you want to digitally record your panorama onto a 4x5 negative and then have the negative printed conventionally onto photographic paper. If you send a panoramic image file as-is, you will waste most of the 4x5 negative and most of the photographic print.

A similar situation exists with many printing services that offer direct inkjet or photographic printing from digital image files. They may charge you the save price for a 5x20 panoramic print as they would for a conventional 16x20 image.

You can use the **Array command** to combine several copies of the panoramic image into a single image file that has a conventional aspect ratio. Then each print will contain several copies of the image, thus reducing the printing cost per image.

To create an image array, first select one or more image thumbnails and then select the *Array command*.

When you choose the *Array command*, The Panorama Factory runs the modal **Array of images dialog box**.

# **Correct barrel distortion command**

Use this command to correct barrel distortion of an individual image. This command should be used only to correct single images. You should not use this command to correct images that will be stitched into a panorama. Instead, we recommend that you correct barrel distortion as part of the stitching process.

To correct barrel distortion during the stitching process, you should select "**Correct barrel distortion**" on **Wizard step 3/9 – Describe your camera** or on the **Camera properties dialog box**.

If you are using semi-automatic or manual stitching, barrel distortion is automatically detected from the placement of the stitching points.

When you choose the **Correct barrel distortion command** (**New image menu**), The Panorama Factory displays a preview rectangle and runs the modeless **Correct barrel distortion dialog box**. You can adjust the parameters and see the response interactively within the preview rectangle.

When you are satisfied with the settings, use the *Approve command* (*Image menu*) to generate the corrected image. The corrected image is added to the end of the computed thumbnails list.

If you want to change the settings later, select the corrected image and use the **Show source** *command* (*Image menu*) to redisplay the **Correct barrel distortion dialog box**.

You can also correct a group of images by selecting a group of thumbnails before choosing the *Correct barrel distortion command*. All the images will be corrected with the same settings.

# Correct brightness falloff command

Use this command to correct brightness falloff (vignetting) of an individual image. This command should be used only to correct single images. You should not use this command to correct images that will be stitched into a panorama. Instead, we recommend that you correct brightness falloff as part of the stitching process.

To correct brightness falloff during the stitching process, you should select "**Correct brightness** falloff" on Wizard step 3/9 – Describe your camera or on the Camera properties dialog box.

When you choose the *Correct brightness falloff command* (*New image menu*), The Panorama Factory displays a preview rectangle and runs the modeless Correct brighness falloff dialog **box**. You can adjust the parameters and see the response interactively within the preview rectangle.

When you are satisfied with the settings, use the *Approve command* (*Image menu*) to generate the corrected image. The corrected image is added to the end of the computed thumbnails list.

If you want to change the settings later, select the corrected image and use the **Show source** *command* (*Image menu*) to redisplay the **Correct brighness falloff dialog box**.

You can also correct a group of images by selecting a group of thumbnails before choosing the *Correct brightness falloff command*. All the images will be corrected with the same settings.

### **Rotate command**

Use this command to rotate images by arbitrary angles.

To rotate an image, first make sure that it is displayed as the current image. If it is not, you should double-click its thumbnail to make it the current image. Then select the **Rotate command**.



When you choose the *Rotate command*, The Panorama Factory runs the modal **Rotate image dialog box**.

You can use the **Rotate right 90 command**, **Rotate left 90 command** or **Rotate 180 command** (**Edit menu**) as shortcuts for rotating by multiples of 90 degrees.

You can also rotate a group of images by selecting their thumbnails before choosing the *Rotate command*. All the images will rotate by the same angle.

# Image menu

P The Panorama Factory - menus.pfp				
File       Edit       Trim       New image       Image       View       Tools       Help         Approve       Show source       Restart the Wizard       Properties       Properties       Panoramic properties       Notes         Hotspots       Improve quality       Fine tune       Clear fine tuning       Restitch         Reblend       Automatically blend overlaps       Blend overlaps now       Blend overlaps now	Import your images Choose stitching method Describe your camera Control image quality Select panorama type Place stitching points Preview at low resolution Create your panorama Save & print your panorama Learn more about			
Overlap region	Open			
Next image or seamAlt+RightPrevious image or seamAlt+Left	Reset default shape			

# Approve command

Use this command to approve the current image processing operation.



Shortcut Context menu in current image pane

### Show source command

Use this command to show the source of the current image for the purpose of modifying the computed image. The source image is displayed along with the decorations and/or dialog box that generated the computed image. You can modify the settings and reapprove.

Shortcuts Context menu in current image pane Context menu in computed thumbnails pane

### **Restart the Wizard command**

Use this command to restart the Wizard at any Wizard step on a panorama that you have already stitched. You can modify any of the Wizard settings and then restitch the panorama.

This command can be applied to any stitched image or any image that is derived from a stitched image. It places you in the Wizard at the final Wizard step. You can use the Back button to change any Wizard step, including the one for selecting the stitching method.

To add or remove images or change the order of the images, go back to **Wizard step 1/9** – **Import your images**. In that Wizard step you can click and drag the images to change their order or use the **Add images** and **Remove images** buttons to add and remove images from your panorama. See "Wizard step 1/9 – Import your images" in Chapter 3, "Using the Stitching Wizard to make a panorama" for more information.

When you complete the Wizard, The Panorama Factory restitches the panorama, replacing the existing panorama with the restitched one. Other images that are derived from the stitched image are updated accordingly.

If you cancel the Wizard, the images will remain unchanged.

Shortcuts Context menu in current image pane Context menu in computed thumbnails pane

### **Properties command**

Use this command to view and edit the properties of the image. This command runs the **Image properties dialog box**.

Shortcuts	Context menu in current image pane
	Context menu in computed thumbnails pane
	Context menu in imported thumbnails pane

### Panoramic properties command

Use this command to view and edit the panoramic properties of the image. This command runs the **Panoramic image properties dialog box**.

Shortcuts Context menu in current image pane Context menu in computed thumbnails pane Context menu in imported thumbnails pane

#### **Notes command**

Use this command to view and edit the title and description of the image. This command runs the **Notes for image dialog box**. This dialog box displays an edit window in which you can keep track of any notes that you want to record with the image. For example, you might want to use this note to indicate which is the final image for printing or which should be used for a web thumbnail. The Panorama Factory displays the title above the image thumbnail.

Shortcuts Context menu in current image pane Context menu in computed thumbnails pane Context menu in imported thumbnails pane

#### Hotspots command

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Use this command when you want to add hotspots to your image. This command opens the **Hotspot properties dialog box**. To learn more, read "Adding hotspots to your panoramas" in Chapter 7, "Making a virtual tour."

#### Improve quality command



Use this command to recompute the current image by directly sampling the imported images. To learn more about the *Improve quality command*, see "Classic step 6 – Sharpen the resized image" in Chapter 4, "Using the Classic interface, step by step."

Shortcut Context menu in current image pane

### Fine tune command

Use this command to fine tune the image alignment. To learn more about fine tuning, see "Fine tuning the image alignment" in Chapter 6, "Correcting stitching problems."

Shortcuts Context menu in current image pane

### **Clear fine tuning command**

Use this command to remove the fine tuning of an image.

You can use this command in two ways. If you use it when the stitched image is in the current image pane, The Panorama Factory will remove the fine tuning of all overlap regions.

To remove the fine tuning of one overlap region at a time, you must use the *Clear fine tuning command* when that overlap region is open. To open an overlap region, click the handle at the top or bottom edge of an overlap outline or double-click anywhere on the outline when the stitched image is showing (see the *Stitch command*). Once the overlap region is open, you can use the *Clear fine tuning command* to remove the fine tuning or correct the fine tuning manually.

Shortcuts Context menu in current image pane

### **Restitch command**

Use this command to repeat the stitching of a panoramic image after you change settings on the **Camera properties dialog box**, **Alignment properties dialog box**, **Blending properties dialog box** or **Fine tuning properties dialog box**.

This command is available only when you are viewing a panoramic image.

Shortcuts Context menu in current image pane

### **Reblend command**

Use this command to repeat the blending of a panoramic image without restitching it after you change settings on the **Blending properties dialog box**.

This command is available only when you are viewing a panoramic image.

Shortcuts Context menu in current image pane

### Automatically blend overlaps command

Use this command to enable or disable automatic blending of overlap regions. A checkmark is shown beside the command if automatic blending is enabled. When automatic blending is enabled, the panorama is blended each time you edit the boundary of an overlap region. When automatic blending is disabled, blending is deferred until you select the **Blend overlaps now** *command*. Unblended overlap regions are are drawn with dotted lines.

This command is available only when you are viewing a panoramic image.

**Shortcuts** Context menu in current image pane

### Blend overlaps now command

Use this command to blend all unblended overlap regions.

This command is available only when you are viewing a panoramic image with unblended overlap regions.

Shortcuts Context menu in current image pane

### Overlap region > Open command

You can use this command to open the selected overlap region and display the **Overlap region dialog box**.

This command is available only when a single overlap region is selected.

Shortcuts Context menu in current image pane

### Overlap region > Reset default shape command

This command resets the selected overlap regions to their default shapes after you have edit their boundaries.

This command is available when one or more overlap regions are selected.

Shortcuts Context menu in current image pane

#### Next image or seam command

When viewing an imported or computed image, use this command to close the current image and open the one to its right in the thumbnail list.

When viewing an overlap area of a stitched image use this command to close the current overlap region and open the one to its right.

Shortcuts ALT+RIGHTARROW (Windows) OPTION+RIGHTARROW (MAC) Context menu in current image pane

#### Previous image or seam command

When viewing an imported or computed image, use this command to close the current image and open the one to its left in the thumbnail list.

When viewing an overlap area of a stitched image use this command to close the current overlap region and open the one to its left.

Shortcuts ALT+LEFTARROW RIGHTARROW (Windows) OPTION+ LEFTARROW (MAC) Context menu in current image pane

# View menu



# **Toolbar command**

Use this sub-menu to display and hide the toolbars. The toolbars include buttons for most of the most common commands in The Panorama Factory, such as the **Open project... command** (*File menu*).

See in Chapter 11, "Window layout" for help on using the toolbar.

# Status Bar command

Use this command to display and hide the Status Bar, which describes the action to be executed by the selected menu item or depressed toolbar button, and keyboard latch state. A check mark appears next to the menu item when the Status Bar is displayed.

See "Status Bar" in Chapter 11, "Window layout" for help on using the toolbar.

# Show imported images command



Use this command to display the set of imported thumbnails in the lower pane. Double-clicking any thumbnail selects it as the current image and displays it in the lower pane. If you have chosen the *Trim marking corners command* or the *Trim rectangle command*, the imported image is available for trimming.

# Edit mode command

Use this command return to normal edit mode after zooming or dragging the image.

# Drag mode command



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Use this command to select the drag tool. When the drag tool is selected, the mouse cursor changes to show the drag tool:

Click-dragging on the image with the drag tool moves the image around within its window pane by adjusting the window's scroll controls. This tool has no effect of the image is small enough to be displayed without scrolling.

**Shortcut** Hold the'd' key on the keyboard to temporarily display the drag tool.

# Zoom mode command



Use this command to select the zoom tool. When the zoom tool is selected, the mouse cursor changes to show the zoom tool:

Each time you click on the image, it will zoom larger by one step, keeping the point you click centered in the window. You can also click-drag a rectangle. The zoom will be set to the largest value that keeps the entire rectangle visible in the window.

Shortcuts Hold the 'z' key on the keyboard to temporarily display the zoom-in tool. Hold the 'a' key on the keyboard to temporarily display the zoom-out tool.

### Zoom in command



Use this command to increase the image zoom by one step, making the displayed image larger on the screen.

#### Zoom out command



Use this command to decrease the image zoom by one step, making the displayed image smaller on the screen.

#### Fit on screen command



Use this command to set the zoom scale to the largest value that keeps the entire image visible in the window pane. This may increase the zoom value above 100% or reduce it below 100% depending on the relative sizes of the image and the window pane.

#### Fit height on screen command



1:1

Use this command to set the zoom scale to the largest value that keeps the height of the image visible in the window pane. The image may still exceed the window pane in width. This command may increase the zoom value above 100% or reduce it below 100% depending on the relative sizes of the image and the window pane.

#### Fit width on screen command

Use this command to set the zoom scale to the largest value that keeps the width of the image visible in the window pane. The image may still exceed the window pane in height. This command may increase the zoom value above 100% or reduce it below 100% depending on the relative sizes of the image and the window pane.

### Actual pixels command

Use this command to set the zoom scale 100%. This displays the image so that each image pixel covers a single pixel on the screen.

# Tools menu



# **Color management**



Shows the modal Color management dialog box.

# **Color tool command**



Shows or hides the modeless Color tool.

# Histogram command



Shows or hides the modeless Histogram panel.

# **Trimming properties command**



Runs the modal Trimming properties dialog box.

# Camera properties command



Runs the modal Camera properties dialog box.

### Alignment properties command



Runs the modal Alignment properties dialog box.

# **Blending properties command**



Runs the modal **Blending properties dialog box**.

### Fine tuning properties command

Runs the modal **Fine tuning properties dialog box**.

### **Options command**

部

Runs the modal **Options dialog box**.

### **Reset to English command**

Resets the language used for commands, dialog boxes and messages to U.S. English. This command remains displayed in English regardless of the language setting. Refer to the **Options dialog box** for more information about changing the language setting.

### **Timers command**

Shows or hides the modeless Timing panel.

# Help menu



#### **Help Topics command**

Shows the index of topics on which you can get help.

### What's this? command



When you select this command, the mouse cursor will change to a question mark. Click on some item in The Panorama Factory to get help for that item.

### About The Panorama Factory... command



Use this command to display the copyright notice and version number of your copy of The Panorama Factory.

# License and Registration... command

Use this command to display The Panorama Factory license agreement and your product registration information.

# Check for software updates command

Use this command to run the **Check for software updates dialog box** to find out if a newer version of The Panorama Factory is available.
# CHAPTER 13 Context menus

Context menus appear when you click with the righthand mouse button. These menus provide convenient access to commands that you use frequently.

# Contents

Thumbnail image context menu ... 172

Current image context menu ... 172

Stitched image context menu ... 173

Overlap region context menu ... 173

# Thumbnail image context menu

The **Thumbnail image context menu** appears when you click on a thumbnail image with the righthand mouse button. Refer to the **Image menu** for descriptions of the commands in this menu.

Show image
Show source
Restart the Wizard
Properties
Panoramic properties
Notes

# Show image command

Views the thumbnail image in the current image pane.

Shortcuts Double-click an image in computed thumbnails pane Double-click an image in imported thumbnails pane Context menu in computed thumbnails pane Context menu in imported thumbnails pane

# Current image context menu

The *Current image context menu* appears when you click on the current image with the righthand mouse button. Refer to the *Image menu* for descriptions of the commands in this menu.

Approve Show source Restart the Wizard	•
Properties Panoramic properties Notes	
Hotspots Improve quality Next image Previous image	Alt+Right Alt+Left

# Stitched image context menu

The **Stitched image context menu** appears when you click on a panoramic image with the righthand mouse button. Refer to the **Image menu** for descriptions of the commands in this menu.

Approve
Show source
Restart the Wizard
Properties
Panoramic properties
Notes
Fine tune
Clear fine tuning
Restitch
Reblend
Automatically blend overlaps
Blend overlaps now
Overlap region

# Overlap region context menu

The **Overlap region context menu** appears when you click on the current image with the righthand mouse button when an overlap region is open. Refer to the **Image menu** for descriptions of the commands in this menu.



# CHAPTER 14 Dialog boxes

You control the image processing functions in The Panorama Factory by operating controls on dialog box panels.

# Contents

Alignment properties dialog box ... 176 Array of images dialog box ... 177 Blending properties dialog box ... 178 Camera properties dialog box ... 179 Check for software updates dialog box ... 184 Color management dialog box ... 185 Color tool ... 187 Convert panorama dialog box ... 189You may b Correct barrel distortion dialog box ... 190 Correct brightness falloff dialog box ... 191 Crop image dialog box ... 192 Filter control dialog box ... 194 Fine tuning properties dialog box ... 195 Histogram panel ... 196 Hotspot properties dialog box ... 198 Image properties dialog box ... 201 Import Images dialog box ... 202 Notes dialog box ... 203 Options dialog box ... 204 Overlap region dialog box ... 210 Page setup dialog box ... 215 Panoramic image properties dialog box ... 216 Profile organizer dialog box ... 217 Project properties dialog box ... 219 Resize image dialog box ... 220 Rotate image dialog box ... 221 Save Image As dialog box ... 222 Save settings to a profile dialog box ... 224 Sharpen image dialog box ... 224 Thumbnail index properties dialog box ... 225 Timing panel ... 226 Top and bottom caps dialog box ... 227 Trimming properties dialog box ... 229

# Alignment properties dialog box

You use the Alignment properties dialog box to set the constraints on the alignment portion of the panoramic stitching process. The default values in this dialog box will work for most panoramas. You should rarely (if ever) need to modify these values.

# Min overlap

The minimum overlap: in percent of image width.

You may need to increase this value if the overlaps in your stitched images are consistently too narrow. For example, if your individual frames typically overlap 25%, setting the minimum overlap to 20% will eliminate solutions with very narrow overlaps.

Alignment properties					
Load settings from profile:					
Save settings to a profile					
Horizontal overlap limits (percent)					
Min overlap 10 Max overlap 90					
Vertical offset limit (percent)					
Max offset 10					
Options					
Center weighted alignment					
Constraints					
Low res size 64 Search range 1					
OK Cancel Help					

# Max overlap

The maximum overlap in percent of image width.

# Max offset

The maximum vertical offset in percent of image height.

# Center weighted alignment:

Select this checkbox to make the centers of the images (in the vertical direction) more significant during image alignment. Selecting this checkbox may increase ghosting when the image contains significantly less image detail above or below its middle. For example, images with cloudless blue sky have very little image detail above the horizon.

### Low res size

The minimum dimensions (in pixels) of the reduced-resolution images used during alignment.

# Search range

The maximum image shift (in pixels) while testing alignments at intermediate image resolutions.

# Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

# Array of images dialog box

You use the **Array of images dialog box** to control image repeat count and image spacing when using the **Array command** (**New image menu**). See the **Array command** for more information.

# Direction

Select **Vertical** to array the images vertically. Select **Horizontal** to array the images side-by-side.

### Spacing

Enter the spacing between images in inches, centimeters or pixels, depending on the units.

### pixel

Select this radio button if you want to enter the image spacing in pixels.

### inch

Select this radio button if you want to enter the image spacing in inches.

### cm

Select this radio button if you want to enter the image spacing in centimeters.

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

# Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

Profile organizer Load settings from profile:				
<b></b>				
Save s	settings to a profile			
Direction				
Vertical				
Horizontal				
Constant (standa)				
Spacing (pixels)				
0	pixel			
	() inch			
	() cm			
Repeat count				
1				
-				

# Blending properties dialog box



You use the **Blending properties dialog box** to control the blending of one image to the next in the overlap region.

# Enable exposure matching

Selecting this checkbox causes The Panorama Factory to adjust the brightness of adjacent images to improve the agreement between the images. You should normally select this checkbox if your images were made with different exposure settings (e.g. your camera was set to automatically determine the exposure). You should normally reset this checkbox if your images were all made with the same exposure settings (e.g. you manually controlled the exposure yourself).



# Enable exposure correction

Selecting this checkbox causes The Panorama Factory to adjust the overall brightness of the stitched image. For 45-bit images, this sets the **White level**, **Black level** and **Midrange** to adjust the brightness. For 24-bit images, this adjusts the pixel values themselves.

# <--- Darker 0 Lighter --->

Controls the overall brightness setting when exposure correction is enabled. The center radio button adjusts the overall brightness so that the median brightness value is at 50%. Each radio button step above or below 0 increases or decreases the median brightness.

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

# Camera properties dialog box

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- 6°2	
	5.2
	· ·

You use the **Camera properties dialog box** to describe the camera you used to capture the images.

For a digital SLR, enter the actual focal length. If you do not know the exact value, enter an approximate value as the starting point for refinement.
Make Model
Correct barrel distortion Correct barrel distortion Automatic Amount 0 %
Correct brightness falloff Automatic Amount 0 % Size 0 %
Projection <ul> <li>Spherical projection</li> <li>Cylindrical projection</li> </ul>

#### Camera type:

- **35mm** Select this option if you used a 35mm camera and scanned negatives, transparencies or prints.
- **APS film scan** Select this option if you used an APS camera and scanned full frame negatives or transparencies.
- **APS hdtv print** Select this option if you used an APS camera and scanned HDTV format prints (APS H).
- **APS classic print** Select this option if you used an APS camera and scanned Classic format prints (APS C).
- **APS panoramic print** Select this option if you used an APS camera and scanned Panoramic format prints (APS P).
- Digital camera Select this option if you used a point-and-shoot digital camera.
- **Digital SLR** Select this option if you used a digital camera with interchangeable lenses.

- **Other digital camera -- using 35mm equivalent** Select this option if you used a digital camera that is not in the camera library and you know (or can guess) the 35mm equivalent focal length. If you are unfamiliar with the term "35mm equivalent focal length," please read "What is '35mm equivalent focal length?" at www.panoramafactory.com/equiv35/equiv35.html.
- **Other digital camera -- using focal length multiplier** Select this option if you used a digital SLR that is not in the camera library and you know the focal length multiplier for your camera. The focal length multiplier is a number that relates the focal length of the lens to its 35mm equivalent.
- **Other digital camera -- using sensor dimensions** Select this option if you used a digital SLR that is not in the camera library and you know the dimensions of the imaging sensor (CCD or CMOS array).
- Swing lens or rotational camera Select this option if you used a swing lens or rotational panoramic camera.
- **Other film size** Select this option if you used some other type of camera (e.g. medium format).

### Make and Model

If you selected **Digital camera** or **Digital SLR** choose your camera's **Make** (manufacturer) and **Model** from the drop down lists.

If your digital camera is not available, you should choose one of the following camera types instead:

Other digital camera -- using 35mm equivalent Other digital camera -- using focal length multiplier Other digital camera -- using sensor dimensions

#### Film dimensions

If you selected **Other film size** enter the width and height of the film image in millimeters.

If you selected **Other digital camera -- using sensor dimensions** enter the dimensions of the imaging sensor (CCD or CMOS array).

For **35mm** and **APS** cameras, the width and height of the film image is displayed for your information.

The film dimensions controls are not needed for other types of cameras.

#### Focal length multiplier

If you selected **Other digital camera -- using focal length multiplier**, enter your camera's focal length multiplier value. This is a multiplying factor that relates your camera's true focal length to its 35mm equivalent value. The focal length multiplier should be printed in the owner's manual for your camera.

### Horizontal field of view (degrees)

If you selected **Swing lens or rotational camera**, enter the angular width of your images in degrees. This value is required to compute the field of view of the completed panorama. It is important to enter an accurate value if you intend to export your images to a VR format or if you wish to use the Perspective projection option.

### **Document stitching**

You should select this checkbox if you are using the **Swing lens or rotational camera** option to stitch scanned documents as described in some of The Panorama Factory Forum and FAQ articles. Selecting **Document stitching** together with **Swing lens or rotational camera** disables image warping and enables you to stitch your documents without entering a value for the field of view.

# Focal length

### Automatic

Select this checkbox to request The Panorama Factory to determine the focal length automatically.

# Focal length

Enter the focal length of the lens in millimeters.

If you selected an **APS** camera, enter the actual focal length. DO NOT enter the 35mm equivalent focal length.

If you selected **Digital SLR**, **Other digital camera -- using focal length multiplier** or **Other digital camera -- using sensor dimensions**, enter the actual focal length. DO NOT enter the 35mm equivalent focal length.

If you selected **Digital camera** or **Other digital camera -- using 35mm equivalent**, enter the 35mm equivalent focal length focal length.

You don't need to specify the focal length for swing lens or rotational cameras.

If you are unfamiliar with the term "35mm equivalent focal length" please read "What is '35mm equivalent focal length?" at www.panoramafactory.com/equiv35/equiv35.html.

If you do not know the focal length, don't worry. Just select **Automatically detect focal length** and The Panorama Factory will try to determine the focal length for you.

- I guessed the focal length The Panorama Factory will try focal lengths from 50% less than the number you entered to 50% more.
- I am pretty sure of the focal length The Panorama Factory will try focal lengths from 10% less than the number you entered to 10% more.
- I am certain of the focal length The Panorama Factory will use the focal length value you entered without trying to refine its value.

Please read "Adjusting focal length and barrel correction" in Chapter 6, "Correcting stitching problems" for more information about manually adjusting the focal length after stitching.

# 8

There is a wide variation in how digital camera manufacturers determine their *35mm* equivalent focal length. For conventional cameras, there is a wide variation in the effects produced by scanning and printing methods. Finally, focal length specifications are usually only an approximation to the true focal length value. For these reasons, it is a good idea to use focal length refinement the first time you stitch a panorama with a

particular camera, lens and imaging setup even if you are confident that you know the focal length specification.

### Accessory lens

Select the **Wide angle or tele converter:** checkbox if you added a wide angle converter or telephoto converter to the standard lens used on your camera. Enter the converter's magnification factor into the entry field.

Wide angle converters have a magnification factor that is less than 1. Telephoto converters have a magnification factor that is greater than 1. The Panorama factory will adjust for the magnification factor when it refines the focal length value.

# **Correct barrel distortion**

If your camera and lens combination exhibit barrel (or pincushion) distortion, you can use these controls to correct it.

- Automatic Select this checkbox if you want The Panorama Factory to automatically determine the barrel distortion correction.
- **Amount** Enter the amount of correction (if you did not select the **Automatic** checkbox). Barrel and pincushion distortion are characterized by the percentage change in magnification from the center to the nearest edge of the image. With barrel distortion, the magnification is smaller at the edges than at the center of the image, so you use small negative numbers (-10% is a large correction) to correct barrel distortion. With pincushion distortion, the magnification is larger at the edges than at the center of the image, so you use small positive numbers (10% is a large correction) to correct pincushion distortion. To disable the correction, enter zero.





barrel distortion requiring -10% correction

pincushion distortion requiring 10% correction

It is usually best to choose **Automatic** correction and, if necessary, adjust the value later. See "Adjusting focal length and barrel correction" in Chapter 6, "Correcting stitching problems" for more information about manually adjusting the barrel correction after stitching.

*NOTE:* Correcting barrel distortion will increase the time required to compute your panorama.

# Correct brightness falloff

If your camera and lens combination exhibit brightness falloff in the corners you can use these controls to correct it.

Automatic — Select this checkbox if you want The Panorama Factory to automatically determine the brightness falloff correction.

- **Amount** Enter the percentage of brightness reduction in the corners as compared with the center of the image. For example, value of 30 means that the corners are 30% less bright than the center (approximately one half stop). To disable the correction, enter zero.
- Size Enter the spread of the falloff outward from the corners of the image, expressed as a percentage. The value roughly represents the amount of the image affected by the falloff. For example, a value of 10 means that approximately 10% of the image is affected by the falloff. Because brightness falloff is gradual, this is only a rough expression of the coverage, not a precise measurement.

It is usually best to choose **Automatic** correction and, if necessary, adjust the values later. See "Adjusting exposure matching and brightness falloff" in Chapter 6, "Correcting stitching problems" for more information about manually adjusting the barrel correction after stitching.

*NOTE:* Correcting brightness falloff will increase the time required to compute your panorama.

### Projection

This sets the type of projection (warping) used by The Panorama Factory to make the images fit together seamlessly. To learn more about projections, please refer to Chapter 10, "Panoramic projections".

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

To learn more, see the **Profile organizer dialog box** and the **Save settings to a profile dialog box** in Chapter 14, "Dialog boxes."

# Note for users of V3.0

Starting with V3.1, the values for barrel correction and falloff correction are expressed as percentages. Prior to V3.1 they were expressed as decimal fractions. Only the scale of the displayed numbers was changed, not their meaning. To convert V3.0 values to V3.1, simply multiply by 100. The values stored in project files created with V3.0 are automatically converted when loaded into The Panorama Factory V3.1 (and thereafter).

To read more about the definition of the correction values, see the sections "**Correct barrel distortion**" and "**Correct brightness falloff**" on this page.

# Check for software updates dialog box

This dialog box runs when you use the **Check** for software updates command (Help menu). It also runs when The Panorama Factory automatically checks for software updates.

The update check is performed through your computer's internet connection. You may use this dialog box to enable or disable the software update checking. You may also use it to get more information about updates or download them when they become available.

Software updates fall into three categories:

A *patch* is a small file that modifies a subset of the application. Patches are used to correct software trouble reports or to release new data files such as the camera library. The Panorama Factory can check for software updates if your computer is connected to the internet. Patch level 0.0.0000 is available Download the patch now Read more about the patch Update V0.0 is available Download the update now Read more about the update Upgrade V0.0 is available Purchase the upgrade now Read more about the upgrade Check for updates now Schedulina Automatically check for updates once a week Check for updates once a week, but ask each time O Do not automatically check for updates Check again tomorrow rather than next week OK Cancel Help

Check for software updates

X

An *update* is a minor version number change

that reloads the entire application. Updates are free within major versions, i.e. 5.0, 5.1, 5.2, etc. Updates are normally used to release changes that include new functionality or to correct software trouble reports when they cannot be corrected with a patch.

An *upgrade* is a major version number change that reloads the entire application. Upgrades normally require an upgrade fee.

The **Check for software updates dialog box** asks The Panorama Factory web site whether a newer version of the software is available. The dialog box display a message indicating whether your software is up to date or a newer version is available. It shows buttons that you can use to learn more about the newer version and to download it..

# Download the patch now Download the update now

Initiates downloading of the latest patch or update that applies to your copy of The Panorama Factory.

# Purchase the upgrade now

Opens the "Buy Now" web page at The Panorama Factory web site.

### Read more about the patch Read more about the update Read more about the upgrade

Displays a web page telling describing the latest patch, update or upgrade that applies to your copy of The Panorama Factory.

# Check for updates now

If this checkbox is selected, the software will check The Panorama Factory web site when you click the **OK** button.

# Scheduling

These controls enable or disable automatic checking for updates.

- Automatically check for updates once a week If one week has elapsed since the last check, The Panorama Factory automatically checks The Panorama Factory web site when you start the application. The Check for software updates dialog box appears at startup only if an update is available.
- **Check for updates once a week, but ask each time** When you start the application, if one week has elapsed since the last check, the **Check for software updates dialog box** appears to ask whether it should check The Panorama Factory web site. This lets you control exactly when the check happens.
- **Do not automatically check for updates** Disables automatic checking. You can still perform the check manually by using the *Check for software updates command* (*Help menu*).

### Check again tomorrow rather than next week

If you have selected one of the automatic checking options, this checkbox causes the next check to happen tomorrow instead of one week in the future. This option is intended to be used if the automatic checking reports that it could not communicate with the web site.

# Color management dialog box

This dialog box controls color management using ICM on Windows and ColorSync on Mac. An understanding of digital image color management is assumed. Instruction on color management is beyond the scope of this User's Guide.

This is a modal dialog box. Changes made on this dialog box are reflected instantly on The Panorama Factory's window, but the changes are not made permanent until you click the **OK** button. If you select the **Cancel** button, the changes are abandoned.

# Working color space

Controls the working color space of the document. All image processing operations in The Panorama Factory will be performed in this color space. If necessary, color space conversions will be performed when images are imported or exported. By default, exported images will receive the

Color management				
Profile organizer				
Load settings from profile:				
Save settings to a profile				
Working color space				
Enable color management				
Profile First imported image (Wide Gamut RGB)				
Color space conversions				
Intent (Picture (Perceptual)				
Missing profiles				
Assign profile and then convert to working color space				
Profile sRGB IEC61966-2.1				
Soft proofing ☑ Enable soft proofing				
Profile Current printer (sRGB IEC61966-2.1)				
Intent Picture (Perceptual)				
OK Cancel Help				

working color space. However, certain output formats (e.g. BMP and QTVR) do not support embedded color profiles. For these formats, the images are transformed to the color space chosen on the associated settings dialog box (**BMP settings dialog box**, **QTVR settings dialog box**, etc.).

Enable color management — Enables ICM (Windows) or ColorSync (Mac) color management. If you do not select this checkbox, images written from The Panorama Factory will not contain color profiles. **Profile** — Sets the working color space. You may select **First imported image** to use the color profile embedded in the first imported image. If the first imported image does not contain a color profile, color management will be disabled.

### **Color space conversions**

Controls the colimetric intent used for color space conversions. Colorimetric intent choicess are well-defined under standard color management. Explanation of colorimetric intent is beyond the scope of this user's guide.

Picture (Perceptual) Proof (Relative Colorimetric) Graphic (Relative Saturation) Match (Absolute Colorimetric)

# **Missing profiles**

Controls the color profile used for images that do not contain embedded color profiles. The selected profile is assigned and then the image is converted to the working color space. You may select **Working color space** to assign the working color space without performing any color space conversions.



# Soft proofing

Controls on-screen proofing. This is intended to show you how the colors will appear on a particular printer. Soft proofing is shown in The Panorama Factory's main window, but *does not apply to print preview*.

Enable soft proofing — Enables on-screen proofing.

### profile

Controls the printer profile to use for soft proofing. You may select **Current printer** to use the profile for the printer most recently chosen with the **Page setup dialog box** or the **Printer dialog box**.

# Intent

Controls the colimetric intent used for soft proofing. Colorimetric intent choicess are well-defined under standard color management. Explanation of colorimetric intent is beyond the scope of this user's guide.

Picture (Perceptual) Proof (Relative Colorimetric) Graphic (Relative Saturation) Match (Absolute Colorimetric)

# Color tool

The **Color tool** is a modeless dialog box that controls color correction. Color correction is an attribute of the Panorama Factory project. That is, you do not color correct individual images. Rather, the same color correction settings apply to all images in the project. This approach is taken to ensure that all images within a panorama are color corrected in a consistent fashion.

While the **Color tool** is active, The Panorama Factory displays a preview rectangle on the current image. The Panorama Factory interactively updates the color within the preview rectangle as you make changes on the color panel. if you pause for a few seconds, The Panorama Factory updates the color of all images on the screen.

**NOTE:** The Color tool is available only when it is enabled on the Project properties dialog. It is enabled automatically when



you are working with 44-bit images. See **Use 45-bit pixels** and **Enable color tool** on the **Project properties dialog box** to learn about 45-bit pixels.

When you place the cursor over the various parts of the preview rectangle it changes to show you what editing actions are possible:

This cursor	Means this
↔‡2%	Indicates that the cursor is over one of the sides or corners of the preview rectangle. Dragging changes the size of the rectangle.
▶ 🗖	Indicates that the cursor is not over any part of the preview rectangle. Dragging draws a new preview rectangle.

You can also perform color correction operations using one or more thumbnail images. If you select thumbnail images, The Panorama Factory interactively updates their color.

# White level, Color, Balance

Controls the brightness and color balance of the highlights of the image.

- White level Increasing this value brightens the highlights. Decreasing this value dims the highlights.
- **Color** Controls the direction of the color shift of the white point. If your whites are too blue, for example, you make them whiter by moving this value toward yellow, blue's complementary color.

**Balance** — Controls the degree of color shift in the white point. Once you have selected the color shift direction, changing this value increases or decreases the amount of the white point shift.

You can use the color wheel to the right of the White level, color and balance controls to simultaneously change color and balance.

### Midrange, Color, Balance

Controls the brightness and color balance of the midrange of the image.

- Midrange Increasing this value brightens the midrange. Decreasing this value dims the midrange.
- **Color** Controls the direction of the color shift of the midrange. If your image has a general bluish cast, for example, you compensate by moving this value toward yellow, blue's complementary color.
- **Balance** Controls the degree of color shift in the midrange. Once you have selected the color shift direction, changing this value increases or decreases the amount of the midrange shift.

You can use the color wheel to the right of the Midrange level, color and balance controls to simultaneously change color and balance.

#### Black level, Color, Balance

Controls the brightness and color balance of the shadows of the image.

- **Black level** Increasing this value brightens the shadows. Decreasing this value dims the shadows.
- **Color** Controls the direction of the color shift of the black point. If your shadows have a general bluish cast, for example, you compensate by moving this value toward yellow, blue's complementary color.
- **Balance** Controls the degree of color shift of the black point. Once you have selected the color shift direction, changing this value increases or decreases the amount of the black point shift.

You can use the color wheel to the right of the Black level, color and balance controls to simultaneously change color and balance.

### Saturation

Controls the color saturation within the image. Increasing this value makes the colors more saturated and decreasing it makes them less saturated.

NOTE: Color correction is slower when the Saturation control is non-zero. You may wish to leave this at zero until you make final color corrections when you are satisfied with all other aspects of your Panorama Factory project.

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Selecting this checkbox causes The Panorama Factory to invert the colors within the image. You use this checkbox when your original images are photographic negatives.

### Monochrome

Negative

Selecting this checkbox removes all color from the image, making it a "black and white" image.

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

#### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

To learn more, see the **Profile organizer dialog box** and the **Save settings to a profile dialog box** in Chapter 14, "Dialog boxes."

# Convert panorama dialog box

This dialog box controls the panoramic projection of the new image when you use the **Convert panorama command** (**New image menu**).

### Source image projection

Shows the panoramic projection of the source image.

### **New projection**

Spherical projection
Cylindrical projection
Cubic projection (native)
Cubic projection (QTVR)
Cubic projection (cruciform) — Select the type of projection for the result image. To learn more about projections, please refer to Chapter 10, "Panoramic projections".

onvert panorama	×
Profile organizer	
Load settings from profile:	
	•
Save settings to a	a profile
Source image projection	
Spherical projection	
New projection	
Spherical projection	
Optimical projection	
Cubic projection (native	)
Oubic projection (QTVR)	)
Cubic projection (crucifo)	orm)
OK Cancel	Help

#### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

#### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

# Correct barrel distortion dialog box

This dialog box controls the parameters used by the **Correct barrel distortion command (New image menu)**. As you change the parameters, The Panorama Factory shows you the effect interactively within the preview rectangle.

Correct barrel distortion				
Profile organizer				
Load settings from profile:				
<b></b>				
Save settings to a profile				
Correct barrel distortion				
1.5 %				
OK Cancel Help				

Amount — Enter the amount of correction. Barrel and pincushion distortion are characterized by the percentage change in magnification from the center to the nearest edge of the image. With barrel distortion, the magnification is smaller at the edges than at the center of the image, so you use small negative numbers (-10% is a large correction) to correct barrel distortion. With pincushion distortion, the magnification is larger at the edges than at the center of the image, so you use small positive numbers (10% is a large correction) to correct pincushion distortion.

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barrel distortion requiring -10% correction



pincushion distortion requiring 10% correction

# Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

# Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

# Correct brightness falloff dialog box

This dialog box controls the parameters used by the **Correct brightness falloff command** (**New image menu**). As you change the parameters, The Panorama Factory shows you the effect interactively within the preview rectangle.

If your camera and lens combination exhibit brightness falloff (vignetting) in the corners you can use these controls to correct it.

orrect brightne Profile organizer Load settings fr	om profile:
	Save settings to a profile
Correct brightne Amount 5	ss falloff
Size 15	%
	OK Cancel Help

- **Amount** Enter the percentage of brightness reduction in the corners as compared with the center of the image. For example, value of 30 means that the corners are 30% less bright than the center (approximately one half stop). To disable the correction, enter zero.
- Size Enter the spread of the falloff outward from the corners of the image, expressed as a percentage. The value roughly represents the amount of the image affected by the falloff. For example, a value of 10 means that approximately 10% of the image is affected by the falloff. Because brightness falloff is gradual, this is only a rough expression of the coverage, not a precise measurement.

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

# Crop image dialog box



This dialog box controls is displayed when you are using the *Crop command* (*New image menu*).

### **Cropping tool**

Selects the type of cropping area.

# **Rectangular cropping**

A simple crop rectangle You can control the edges and the angle of the crop.

### **Perspective cropping**

A cropping region that converts from panoramic to conventional perspective. Refer to "Perspective cropping" in in Chapter 4, "Using the Classic interface, step by step" for an example of perspective cropping.

Crop image
Cropping tool
Rectangular cropping     Recrementive cropping
Vertically symmetric
Fixed horizon line
Fixed width
Cropped image size (pixels)
w 580 н 403
Horizontal field of view (degrees)
10tal 26.7
Left 13.4 Right 13.4
Vertical field of view (degrees)
Total 18.6
Above 9.3 Below 9.3
OK Cancel Help

#### Horizontally symmetric

Constrains the cropping region to be symmetric. If you move the left or right edge of the region, the opposite edge moves to preserve the symmetry.

# Vertically symmetric

Constrains the cropping region to be symmetric. If you move the top or bottom edge of the region, the opposite edge moves to preserve the symmetry.

#### **Fixed horizon line**

Prevents you from editing the position or angle of the horizon line. When cropping panoramic images, it's usually important to keep the horizon line constant because it represents the zero tilt position for perspective cropping and for VR image export. Moving the horizon line usually produces unexpected results.

By default, this option is selected only for panoramic images. You can temporarily override this option by holding the ALT key (Windows) or OPTION key (Mac) key when you move over the horizon line.

# **Fixed width**

Prevents you from changing the width of the cropping rectangle. When cropping a 360 degree stitched image it is usually important to keep the width constant if you're planning to export to a VR viewer, otherwise the image will no longer be 360 degrees. If you move one side of the crop rectangle when this option is not selected, the other side moves to preserve the width

By default, this option is selected only for stitched images made with the **360 degree panorama** option. You can temporarily override this option by holding the ALT key (Windows) or OPTION key (Mac) key when you move over the sides of the cropping rectangle.

### Cropped image size (pixels)

Shows the width and height of the cropped image in pixels. These values update automatically as you adjust the cropping region with the mouse. If you select **Rectangular cropping** you can also enter numbers into these text fields to control the size of the cropping region.

# Horizontal field of view (degrees)

Shows the total field of view and the field of view to the left and right of the midline when **Perspective cropping** is selected. These values update automatically as you adjust the cropping region with the mouse or you may enter values to control the size of the cropping region.

### Vertical field of view (degrees)

Shows the total field of view and the field of view above and below the horizon when **Perspective cropping** is selected. These values update automatically as you adjust the cropping region with the mouse or you may enter values to control the size of the cropping region.

# Filter control dialog box

This dialog box controls Filter control X the 3x3 or 5x5 FIR Profile organizer (Finite Impulse Load settings from profile: Response) filter Ŧ coefficients used by the Save settings to a profile. Enhance command Filter kernel (New image menu). As you change the filter 0 0 0 0 0 coefficients, The -0.1036 0 0 -0.1464 -0.1036 Panorama Factory shows 0 -0.1464 2 -0.1464 0 you the effect 0 -0.1036 -0.1464 -0.1036 0 interactively within the 0 0 0 0 0 preview rectangle. Filter type Filter kernel 🔘 3 x 3 The 3x3 or 5x5 S x 5 Sharpen convolution kernel coefficients. Filter shape Horizontally symmetric Filter type Vertically symmetric 3x3 3x3 Circularly symmetric Separable FIR Vormalize filter. 5x5 5x5 ОК Cancel Help FIR filter.

**Sharpen** 3x3 sharpening filter. This filter is generated automatically from its center coefficient. You can also use the slider to control the center value.

### Filter shape

Horizontally symmetric Vertically symmetric Circularly symmetric

Constrains the filter to have the specified symmetry.

### Separable

Constrains the filter be separable. A separable filter can be applied in separate horizontal and vertical passes. This has the potential of improving filtering speed (although The Panorama Factory currently does not take advantage of this).

### Normalize

Normalizes the filter coefficients so that the filter neither brightens nor darkens the image (on average). Selecting this option causes The Panorama Factory to divide each filter coefficient by the sum of all coefficients when the filter is applied.

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

# Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

To learn more, see the **Profile organizer dialog box** and the **Save settings to a profile dialog box** in Chapter 14, "Dialog boxes."

# Fine tuning properties dialog box

You use the **Fine tuning properties dialog box** to control the image fine tuning (removal of ghost images) with the *Fine tune command* (*Image menu*).

See "Fine tuning the image alignment" in Chapter 6, "Correcting stitching problems" for more information about fine tuning the image alignment.

### Tiles

1

Controls the number and size of tiles used during the fine tuning process. The best setting for this value is sensitive to (1) the amount of detail in the image, (2) the image resolution and (3) the width of the overlap regions.

Smaller tiles may or may not give better results. As the tiles get smaller, the interpolation between tiles is more precise, so this may improve the results.

Fine tuning properties	η
Profile organizer	
Load settings from profile:	
•	
Save settings to a profile	
Tiles	
Tile count	
20	
Tiling method	
Arrayed (V1.6 compatibility)	
<ul> <li>Successive subdivision</li> </ul>	
Ontions	
Options	
Automatically fine tune	
OK Cancel Help	
	1

But smaller tiles cannot correct large alignment errors because the tile size limits the maximum displacement considered by the automatic fine tuning.

As the tiles get smaller, you also need more tiles. This increases the time required for fine tuning, so the program gets slower.

Two methods are available for determining the tile size.

**Tile count** —Tile width and height are calculated by dividing the width or height of the image, whichever is smaller, by the tile count value you enter. The advantage of this method is that it adjusts automatically for varying image sizes.

Tile size — Tile width and height are set to the value you enter.

The default value should be good for most panoramas. When the results of the automatic fine tuning are not acceptable, rather than adjusting the tile size you probably need to manually fine tune. Refer to "Fine tuning the image alignment" in Chapter 6, "Correcting stitching problems" for more information about manual fine tuning.

#### **Tiling method**

Controls the way the overlap region is divided into fine tuning tiles.

**Arrayed** — Fills the overlap region with tiles starting from the upper left corner. Each tile is fine tuned independently.

This is the only method that was available through V1.6.

**Successive subdivision** — Divides the overlap region in half, then divides the halves in half again, and so on. At each subdivision, the fine tuning procedure is applied, using the alignment of the surrounding area as a starting point. Constraints on the alignment offset are tightened at each successive subdivision step.

In some cases this method requires less manual adjustment because it improves the overall consistency of the fine tuning.

# Automatically fine tune

Selecting this checkbox causes The Panorama Factory to automatically fine tune all the overlap regions during image alignment and stitching. Remember that you can correct the fine tuning manually after The Panorama Factory has done its best.

# Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

# Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

To learn more, see the **Profile organizer dialog box** and the **Save settings to a profile dialog box** in Chapter 14, "Dialog boxes."

# Histogram panel

The **Histogram panel** helps you visualize the color balance of an image and visualize color corrections specified with the **Color tool**. In addition, it provides powerful tools for loading certain types of color correction values into the **Color tool**.

While the **Histogram panel** is active, The Panorama Factory displays a preview rectangle on the current image.

When you place the cursor over the various parts of the preview rectangle it changes to show you what editing actions are possible:



# This cursor Means this

- $\leftrightarrow$   $\uparrow$   $\checkmark$  Indicates that the cursor is over one of the sides or corners of the preview rectangle. Dragging changes the size of the rectangle.
- ▶ Indicates that the cursor is not over any part of the preview rectangle. Dragging draws a new preview rectangle.

The Panorama Factory displays three types of information on the **Histogram panel** and updates them as you change the color correction values:

The histogram of color values within the preview rectangle are shown with a line graph. Separate lines are displayed for the red, blue and green components of the image.

The transfer function specified by the color correction tool. Separate lines are displayed for the red, blue and green components of the transfer function.

The average red, green and blue values within the preview rectangle are shown as triangles at the top of the graph. This shows you the average color cast within the preview rectangle. For example, if the average is a shade of gray, the three triangles are superimposed.

You can also select one or more thumbnail images to show the histogram of the thumbnails. Note that this computes the histogram of the sub-sampled thumbnail images. This histogram may differ slightly from the histogram of the full resolution images they represent.

The Histogram panel offers the following controls:

#### Uncorrected

Select this radio button to show the histogram of the image prior to color correction.

#### Corrected

Select this radio button to show the histogram of the image after applying color correction.

#### Set black

Simultaneously sets the level, color and balance of the black point according to the average value within the preview rectangle. This provides a convenient way of setting the black point for negative images. Draw the preview rectangle within an inter-frame region of the negative and then press this button.

#### Set gray

Sets the midrange color and balance, but not level, to make the average value within the preview rectangle be a shade of gray. This provides a convenient way of correcting the color balance of the image if it contains a gray reference. Draw the preview rectangle within the gray reference and then press this button. An 18% gray card provides a good gray reference, but you can also use any whitish object in the image as long as its brightness is not too near the white or black point. It is best to use the tool only after setting the white and black points.

#### Set white

Simultaneously sets the level, color and balance of the white point according to the average value within the preview rectangle. This provides a convenient way of setting the white point for positive images printed on white paper with a border. Draw the preview rectangle within the border region and then press this button.

#### Left mouse button

Clicking or dragging the left mouse button within the histogram graph moves the black level to the mouse position.

#### Right mouse button

Clicking or dragging the right mouse button within the histogram graph moves the white level to the mouse position.

# Hotspot properties dialog box

- You use the **Hotspot properties dialog box** to choose the type for new image hotspots and to control properties of existing hotspot. To learn more, see "Adding hotspots to your panoramas" in Chapter 7, "Making a virtual tour."
  - To create a new hotspot Choose a hotspot type under the Create hotspot heading and then click or click-drag on the image.
  - To view and/or modify the properties of an existing hotspot choose the Selection tool under the Create hotspot heading and then select the hotspot by clicking it.
  - **To move hotspots** Select one or more hotspots, place the cursor over a selected hotspots and click-drag to move them.

Hotspot properties	X	
Create hotspot Edit polygon		
	◎ 雨 🔨 🔨	
Selected hotspot name		
Polygon1		
Hyperlink		
URL		
Bookmark		
Frame		
Bookmarks	Show hotspot Hotspot color	
This hotspot is also a bookmark	Normal	
Set tilt angle to zero	<ul> <li>Always</li> </ul>	
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• To delete hotspots — Select one or more hotspots and then choose the **Delete selected command** from the **Edit menu** or press the DELETE key.

# Create hotspot

Chooses the type for new image hotspots. After selecting a hotspot type, the next mouseclick or click-drag on the image creates a new hotspot of the chosen type. After creating a hotspot, the Create hotspot choice returns to the selection arrow.

The size and appearance of the active region for each type of hotspot are determined by the particular export format used. See "Export image file formats" in Chapter 9, "Image file formats" for more information.

# This button Means this

Chooses the Selection tool. Clicking or click-dragging on the image selects one or more hotspots. See Chapter 8, "Working with image decorations" for more information.
 Chooses the Spot tool. Clicking on the image adds a Spot type hotspot at the mouse position. Spot type hotspots identify a particular point on the image.
 Chooses the Circle tool. Click-dragging on the image draws a Circle type hotspot.
 Chooses the Rectangle tool. Click-dragging on the image draws a Rectangle type hotspot.



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Chooses the **Bookmark tool**. Clicking on the image adds a Bookmark at the mouse position. A bookmark identifies a particular point on the image.

# Selected hotspot name

Controls the name of the hotspot or bookmark. The Panorama Factory automatically assigns a name to each hotspot or bookmark, but the name can be changed by editing the text in this text field.

The significance of this name is determined by the particular export format used. See "Export image file formats" in Chapter 9, "Image file formats" for more information.

### Hyperlink

Chooses the action to be performed when the user clicks a hotspot in the exported image.

URL — Specifies the URL (web address) that the hotspot will reference. The URL can include a web page bookmark using the #bookmark notation. The URL value corresponds to the "url" portion of the HREF= attribute in the HTML construction:

<A HREF=url> or <A HREF=url#bookmark>.

**Bookmark** — Specifies a web page bookmark within the page entered in the URL field. To specify the top of the web page, leave the Bookmark value blank. The Bookmark value corresponds to the "bookmark" portion of the HREF= attribute in the HTML construction:

<A HREF=url#bookmark>.

**Frame** — The Frame is normally used if you are making web pages that use multiple frames. This value specifies the target frame in which to open the URL. You may leave the Frame blank to open the URL in the entire browser window. The Frame value corresponds to the TARGET= attribute in the HTML construction:

<A HREF=url TARGET=frame>.

#### Edit polygon

These controls are enabled when a **Polygon** type hotspot is selected. You can use these buttons to choose the polygon editing tool.

This button	This cursor	Means this		
<b>2</b>		Chooses the Polygon Move tool. To move the entire polygon, place the cursor over any line of the polygon. The cursor changes to a move hand indicating that a click-drag will move the entire polygon.		
Ъ	<b>►</b> ∰	Chooses the Point Move tool. To move a point on the polygon, place the cursor over the point. The cursor		

changes to a move pointer indicating that a click-drag will move the point.

Chooses the Point Insert tool. To insert a new point into the polygon, place the cursor over any line of the polygon. The cursor changes to an insert pointer indicating that a click-drag will insert a new point within the line.

Chooses the Point Delete tool. To delete a point from the polygon, place the cursor over the point. The cursor changes to a delete pointer indicating that a click will delete the point.

#### **Bookmarks**

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Controls the bookmark attributes of a hotspot. Please note that the bookmark functions of hotspots are implemented with Javascript. The person viewing the web page must enable Javascript for bookmarks to function.

- **This hotspot is also a bookmark** Selecting this checkbox makes the hotspot function as a bookmark. If you embed the panorama in a web page, another hotspot can jump to this one using the **#bookmark** notation in its **URL** value.
- **This hotspot is the default view** Selecting this checkbox sets the hotspot as the default view. When the web page containing this panorama is displayed, the viewer will jump to this hotspot if the page's URL did not include a **#bookmark** notation.
- Set tilt angle to zero Ordinarily the bookmark sets pan, tilt and zoom so that the hotspot shape will fill the viewer. If you select this checkbox, the bookmark will still set pan and zoom from the hotspot shape but it will set the tilt angle to zero so that the viewer will be looking straight ahead. This usually provides a more natural view than tilting the view up or down. In some cases it may not be possible to set the tilt angle to zero, for example when the entire panorama was made with the camera tilted down below the horizon. In this situation the tilt angle is set as close to zero as possible.

#### Show hotspot

Determines whether the hotspot will be visible on the image. The following descriptions are suggestive of how the hotspot show attributes are intended to work, but the precise effects are interpreted by the particular export format used. See "Export image file formats" in Chapter 9, "Image file formats" for more information.

- **Normal** Normal hotspots are invisible. Some image viewers may provide a command to make them visible.
- **Popup** Popup hotspots are normally invisible. Some viewers may show Popup hotspots when you move the cursor over their locations.
- Always These hotspots are always visible in viewers that recognize this attribute.

#### Hotspot color

Clicking the color well displays a **Color chooser dialog box**. This color determines the color used to display the hotspot within The Panorama Factory. Some viewers may

recognize this attribute and display the hotspot in the selected color. See "Export image file formats" in Chapter 9, "Image file formats" for more information.

#### Text message

Some image viewers recognize this text message and display it under certain circumstances. See "Export image file formats" in Chapter 9, "Image file formats" for more information.

# Image properties dialog box

#### Image size

Shows the width and height of the image in pixels.

#### Image size

Controls the width and height of the image in inches or centimeters, depending on the resolution units.

#### Image resolution

Controls the horizontal and vertical image resolution in pixels per inch or pixels per centimeter, depending on the resolution units.

# unknown — Select this radio button if you don't want to specify the image resolution.

Image size (pixels)				
W 24	400	н	3625	
Image size (inches)				
W 3	3.3333	н	50.3472	
Image resolution				
Horizontal 7	2	Vertical	72	
© unknown ◉ pixels / inch ⊙ pixels / cm		V Isometric		
Color profiles				
Embedded				
Assigned sRGE	IEC61966-2.1			
Converted to Wide	Gamut RGB			
Save in project		Save in archive		
Image recipe only		Image recipe only		
Image (.tiff or .bmp) and recipe		Image (.tiff or .bmp) and recipe		
Use project defa	ault	Ose project	default	

**pixels** / inch — Select this radio button to specify the image resolution in pixels per inch.

**pixels / cm** — Select this radio button to specify the image resolution in pixels per centimeter.

#### Isometric

Select this checkbox if you want the horizontal and vertical resolution to be the same.

NOTE: Controlling the image size and/or image resolution does not change the image. No image processing is involved. Rather, the **Image properties dialog box** stores information with the image that may be used later to inform printing services (including The Panorama Factory's **Print current image... command**) of the desired print dimensions.

#### Save in project

Controls how the image is saved when the project is saved normally. *NOTE: Image recipes are always saved regardless of this option setting.* 

- **Image recipe only** Select this radio button to save only the recipe for recreating the image from its source image(s). When you select this radio button the image is not saved to a .tiff or .bmp file in the project. This can conserve disk space at the expense of execution time when you open the project later.
- **Image and recipe** Select this radio button to save both the recipe for recreating the image from its source image(s) and a .tiff or .bmp file. This can speed up response time at the expense of disk space.
- **Use project default** Select this radio button to let the **Project properties dialog box** control whether the image file is saved with the project.

#### Save in archive

Controls how the image is saved when the project is saved with the **Save archive as...** command (File menu). NOTE: Image recipes are always saved regardless of this option setting.

- **Image recipe only** Select this radio button to save only the recipe for recreating the image from its source image(s). When you select this radio button the image is not saved to a .tiff or .bmp file. This can conserve disk space at the expense of execution time when you open the archive later.
- Image and recipe Select this radio button to save both the recipe for recreating the image from its source image(s) and a .tiff or .bmp file. This can speed up response time at the expense of disk space.
- **Use project default** Select this radio button to let the **Project properties dialog box** control whether the image file is saved with the archive.

#### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

#### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

To learn more, see the **Profile organizer dialog box** and the **Save settings to a profile dialog box** in Chapter 14, "Dialog boxes."

# Note for users of V3

Starting with V4.0, projection and field of view are shown in the new **Panoramic image properties dialog box** (*Image menu*) rather than on the Image properties dialog box.

# Import Images dialog box

When you use the *Import images... command* (*File menu*) to read new source images, the **Import Images dialog box** appears so that you can choose the images to import. The images are automatically rotated by the multiple of 90 degrees that you selected with the *Rotation when importing images commands* (*File menu*).

> If you forget to set the image rotation or if you don't know the correct rotation, don't worry. You can also rotate the images after importing.

🦗 Import Im	nages (No rotation)			x	
Look in: 🌗	Kitchen 7.26.2007		- 🧿 🎓 🖽 -		
Name	Date modified	Туре	Size		
CRW_50	031_RT16.TIF			=	
🛃 CRW_50	CRW_5032_RT16.TIF				
RW_5033_RT16.TIF					
CRW_5034_RT16.TIF					
CRW_50	035_RT16.TIF				
- CRW 50	36 RT16.TIF			-	
File name:			Оре	n	
Files of type:	Basic image formats	TIFF, JPEG, E	BMP, PNC - Canc	el	

# Note for users of V4

Starting with V5.0, the **Rotate imported images** radio buttons that were on the **Import Images dialog box** have been replaced with the **Rotation when importing images commands** (*File menu*) and a dropdown list on the **Import export toolbar**.

# Notes dialog box

Use this dialog box to edit notes that you want to record with the project or with an image in the project. For example, you might want to record the date, location and exposure of the photographs.

The same type of dialog box is used for the **Notes** command (Image menu) and the **Project notes** command (File menu)



# **Options dialog box**

The Options dialog box controls attributes that are shared by all projects.

# Language



Select the language you want The Panorama Factory to use for commands, dialog boxes and messages. The list of languages that are available may expand after the initial release of The Panorama Factory.

To download updated language files or if you are interested in creating a string table for your own language, visit http://www.panoramafactory.com/language.html.

# Popup tips



Use this panel to restore popup tips that have been disabled by selecting the **In the future, do not show this message** checkbox. To restore a particular message, select its checkbox. To restore all messages, select the **AII** checkbox.
## Toolbars

Options		×
Language     Popup tips     Toolbars     Colors       Image: Colors     Image: Colors     Image: Colors     Image: Colors     Image: Colors	Sounds Folders Automatic recover	y Thumbnails Compatibility Threads
Toolbars  Standard  Project  Import export  Tools  View  New  Rename  Delete  Reset	Toolbar contents         New project         New project wizard         Open project         Save project         Save project archive as         Save project archive as         Page setup         Print preview         Print current image         Cut         Copy	Menu         All         Commands         ····································
Reset all	Paste .	T Drink annual innear

Use this panel to customize the contents of the toolbars or to create new toolbars. As you make changes on this panel, the changes are instantly reflected by the toolbars shown on The Panorama Factory's window. The changes are not made permanent until you select the **OK** or **Apply** button. Selecting the **Cancel** button reverses the changes.

# ?**??**

Controls the size of the toolbar buttons.

### Toolbars

Lists the standard and user-defined toolbars. Select a checkbox to make the toolbar visible. Remove the checkmark to hide the toolbar. Click the name of a toolbar to display its contents or to rename, delete or reset the toolbar.

### New...

Creates a new, empty toolbar. You'll be prompted to enter the name of your new toolbar.

### Rename...

Renames the selected toolbar. You'll be prompted to enter the name of your new toolbar. You are not allowed to rename standard toolbars.

### Delete

Deletes the selected toolbar. You are not allowed to delete standard toolbars.

### Reset

Resets the contents of the selected toolbar to its default state. This applies only to standard toolbars.

### **Reset all**

Resets the contents of all standard toolbars to their default states.

### **Toolbar contents**

Lists the commands in the selected toolbar. Click a command to select it and then use the <--, -->, Move up and Move down buttons to change the contents of the toolbar.

#### Menu

Select the name one of The Panorama Factory's menus to display its contents in the **Commands** list.

#### Commands

Lists the commands in the selected menu. Click a command to select it and then use the <--, -->, Move up and Move down buttons to change the contents of the toolbar.

#### <---

Adds the selected item from **Commands** to the toolbar.

#### -->

Removes the selected item from **Toolbar contents**.

### Move up

Moves the selected item in Toolbar contents upwards

#### Move down

Moves the selected item in Toolbar contents downwards

# Colors



Click the color wells to choose colors for the decorations drawn on the current image.

### Selected decorations

Sets the color for the selected decorations.

### Active decorations

Sets the color to use when the current image is active.

#### Inactive decorations

Sets the color to use when the current image is inactive (i.e. the thumbnail pane is active).

### Sounds

Options	
Language Popup tips	Toolbars Colors Sounds Folders Automatic recovery Thumbnails Compatibility Threads
Play a sound after o	operations that are longer than:
30	seconds
Oefault sound	Specified sound file:
	Play Browse

Control the alert sound that is played when a long operation completes.

### Play a sound after operations that are longer than:

Select this checkbox if you want to play an alert sound when long operations complete.

### seconds

Enter the amount of time that determines when an operation will play a sound upon completion.

#### **Default sound**

Select this radio button to play the default sound provided with The Panorama Factory.

### Specified sound file:

Select this radio button to choose a different sound file. Support formats are Windows WAV, [TDB].

### Folders

lons				
anguage Popup tips Toolbars Col	ors Sounds Folders	Automatic recovery Thumbnails	s Compatibility Threads	
Initial Project folder				
Most recent folder		Specified folder:		
				Browse
Initial Import folder Most recent folder		Specified folder:		
Initial Import folder  Most recent folder  Initial Save Image folder		Specified folder:		Browse

### Initial Project folder Initial Import folder Initial Save Image folder

Use these controls to determine the initial folders to show in the project **Open dialog box**, the **Import Images dialog box** and the **Save Image As dialog box** the first time you use the corresponding dialog box after starting The Panorama Factory.

- **Most recent folder** Select this radio button to remember the most recently used folder from the last time you ran The Panorama Factory.
- **Specified folder:** Select this radio button to reset to the same folder each time you run The Panorama Factory. Enter the folder name in the text field or use the **Browse...** button to select a folder.

## Automatic recovery

Options											X
Language	Popup tips	Toolbars	Colors	Sounds	Folders	Automatic recovery	Thumbnails	Compatibility	Threads		
C Enat	ole automatic r	ecovery				Charified fold					
	ystem temp it	nuer				Specified fold	er:			Browse.	
🔽 Enat	ole automatic r	ecovery of	the Wiza	ard state							

Use these controls to determine whether The Panorama Factory will create a project recovery file as you work on your project. If your computer crashes (stops working or stops responding), the next time you run The Panorama Factory it may be able to recover your work from the project recovery file.

Note: Automatic recovery does not replace the **Save project command** (*File menu*). You must still save your project before you leave The Panorama Factory.

### Enable automatic recovery

Select this checkbox to enable creating project recovery files.

### System temp folder

Select this to save project recovery files in the system temporary folder.

### **Specified folder:**

Select this radio button if you want to select the folder for project recovery files. Enter the folder name in the text field or use the **Browse...** button to select a folder.

### Enable automatic recovery of the Wizard state

Select this checkbox to enable automatically restarting the Wizard after a crash that happens while the Wizard is active.

### Threads

Options										X
Langu	ge Popup tip	s Toolbars	Colors	Sounds	Folders	Automatic recovery	Thumbnails	Compatibility	Threads	
			Numb	oer of proc Numbe	cessor con	es 4 ds Same as number o	f processor c	ores 🔻		

Controls the number of threads of execution to be used during image processing operations.

Using multiple threads of execution improves stitching speed on multi-processor systems (including multi-core systems) by performing image computations in parallel.

*NOTE:* The **Threads** tab is available only in The Panorama Factory m32 Edition, The Panorama Factory x64 Edition and The Panorama Factory Mac Leopard Edition . It is not present in The Panorama Factory Legacy Editions.

### Number of processor cores

Displays the number of processor cores detected on your computer.

### Number of threads

Sets the number of threads of execution to be used during image processing operations. You can set this to a specific number or set it to **Same as number of processor cores**. Setting it to a different number is recommended only for timing comparisons. You will receive the best performance from the **Same as number of processor cores** settings, even on a single-processor computer.

# Thumbnails

(	Options										X
	Language	Popup tips	Toolbars	Colors	Sounds	Folders	Automatic recover	y Thumbnails	Compatibility	Threads	
					T	مر المراجع	-1 -1				
					umporte w 1		H 70	10			
					Comput	ed thumbr	nail size				
					W 5	500	Н 15	0			

### Imported thumbnail size

Use these entry fields to set the maximum size of thumbnail images in the imported thumbnails pane.

### Computed thumbnail size

Use these entry fields to set the maximum size of thumbnail images in the computed thumbnails pane.

# Compatibility



### Store project files and image files separately

When this checkbox is selected, project files (.PFP) and their image files are stored as individual files. When the checkbox is not selected, project files and their image files are collected together into project folders. On Windows, these folders are given a Panorama Factory icon, but can be opened like ordinary folders. On Mac, these folders are *packages*, which means that they appear to be single files. You can view the contents of a Mac package with the Finder **Show package contents command**.

### Store project files in V4.4 format

When this checkbox is selected, project files (.PFP) are saved in a format compatible with V4.4 (or later). Saving a project file this way lets you open it with The Panorama Factory V4 if you wish.

*NOTE:* Not all features of The Panorama Factory V5 can be represented in V4 format. These features will be discarded when this option is selected.

*NOTE:* This command is provided only to help smooth the transition from V4 to V5. It will be removed in a future release of The Panorama Factory.

### Correct brightness falloff like V3.x

The Panorama Factory V4 makes a small change to the way that the brightness falloff correction is calculated. In V3, brightness falloff is corrected after barrel distortion. In V4, it is corrected before barrel distortion.

In V3, changing the barrel correction also could cause corner brightness to change slightly. This change keeps the falloff correction stable when the barrel correction is changed.

This option is provided to maintain compatibility with older projects. By default, the option is selected only for projects originally started with V3.

# Overlap region dialog box

The **Overlap region dialog box** appears when you open the overlap between one image and the next. You use the **Overlap region dialog box** to adjust the alignment between the images, adjust focal length, adjust the correction for barrel distortion, control alignment fine tuning, adjust image-to-image exposure matching and adjust the correction for brightness falloff.

## Common controls for all overlap tasks

The top portion of the **Overlap region dialog box** controls navigation and selects the task you want to perform.

<--- Prev

Closes the current overlap region and opens the one to its left. This performs the same action as the *Previous image or seam command* (*Image menu*).

Overlap region	X
Seam	
< Prev Close	Next>
Choose an Overlap task	
Image alignment	
Focal length & barrel correction	
Fine tuning	
Exposure & falloff correction	
	Help

Shortcuts ALT+LEFTARROW (Windows) OPTION+LEFTARROW (Mac) Context menu in current image pane

### Next --->

Close

Closes the current overlap region and opens the one to its right. This performs the same action as the *Next image or seam command* (*Image menu*).

Shortcuts ALT+RIGHTARROW OPTION+RIGHTARROW (Mac) Context menu in current image pane

# $\checkmark$

Closes the current overlap region and returns to the stitched image. This performs the same action as the *Approve command* (*Image menu*).

Shortcut Context menu in current image pane

### Choose an Overlap task

Four different overlap tasks can be performed with the **Overlap region dialog box**. Selecting a task determines the set of controls that are available on the dialog box.

Image alignment — Adjust overall alignment of the overlapping images.

**Focal length & barrel correction** — Adjust the camera focal length setting and the correction for barrel distortion so that the images match properly.

Fine tuning — Make small-scale adjustments to correct for local mismatches in the image alignment.

**Exposure & falloff correction** — Adjust the image-to-image exposure matching and correct for brightness falloff in the corners of the images.

# Image alignment

The image alignment task provides the ability to adjust overall alignment between one image and the next.

Refer to "Manually aligning images" in Chapter 6, "Correcting stitching problems" for step-by-step instructions.

View overlap	
Image alignment Adjust image	

### View overlap

- **Blend** Select this option to show the overlap region normally, as a blend of the two images.
- **Compare** Select this option to highlight differences between the images in the overlap region. A medium gray color is shown when the images match exactly. Brighter or darker colors indicate mismatches between the images.

### Adjust image

Use the arrow buttons to move the right hand image relative to the left hand image. Individual clicks on the buttons move the image by single pixels. Holding a button down causes the image to move continuously. If you hold the button for a long time, the motion accelerates.

## Focal length & barrel correction

The focal length and barrel correction task provides the ability to interactively adjust the focal length and barrel correction settings.

Refer to "Adjusting focal length and barrel correction" in Chapter 6, "Correcting stitching problems" for step-by-step instructions.

### View overlap

**Blend** — Select this option to show the overlap region normally, as a blend of the two images.

View overlap Blend Compare	
Focal length 24.6 mm	Refine ±50%
Correct barrel distortion	Refine with focal length

**Compare** — Select this option to highlight differences between the images in the overlap region. A medium gray color is shown when the images match exactly. Brighter or darker colors indicate mismatches between the images.

### **Focal length**

Enter the focal length of the lens in millimeters. This may be the actual focal length of the lens or the 35mm equivalent focal length, depending upon the options you selected on **Wizard step 3/9 – Describe your camera** or the **Camera properties dialog box**.

You can click the up and down arrows to adjust the focal length value by small steps. Holding a button down continuously adjusts the value. If you hold the button for a long time, the adjustment accelerates.

*NOTE:* The focal length setting applies to all overlap regions in your panorama and may slightly affect the image-to-image alignment. You should check the alignment in each overlap region after changing this setting.

### Refine ±50%

Select this button to refine the focal length setting based upon the current pair of images at their current relative alignment. You may get erratic results if the overall image alignment is incorrect, so adjust overall alignment before refining focal length.

### **Correct barrel distortion**

If your camera and lens combination exhibit barrel (or pincushion) distortion, you can use this value to correct it. Use small negative numbers (-0.05 is a large correction) to correct

barrel distortion. Use small positive numbers (0.05 is a large correction) to correct pincushion distortion. To disable the correction, enter zero.

You can click the up and down arrows to adjust the focal length value by small steps. Holding a button down continuously adjusts the value. If you hold the button for a long time, the adjustment accelerates.

*NOTE:* The correction for barrel distortion applies to all overlap regions in your panorama and may slightly affect the image-to-image alignment. You should check the alignment in each overlap region after changing this setting.

*NOTE:* Correcting barrel distortion will increase the time required to compute your panorama.

### Refine with focal length

If you select this checkbox, the barrel correction will be refined with the focal length when you select the **Refine \pm 50\%** button.

Enter the focal length of the lens in millimeters. This may be the actual focal length of the lens or the 35mm equivalent focal length, depending upon the options you selected on **Wizard step 3/9 – Describe your camera** or the **Camera properties dialog box**.

### **Fine tuning**

The fine tuning task provides the ability to make smallscale adjustments to correct for local mismatches in the image alignment.

Refer to "Fine tuning the image alignment" in Chapter 6, "Correcting stitching problems" for step-by-step instructions.

#### View overlap

**Blend** — Select this option to show the overlap region normally, as a blend of the two images.

view overlap	
Compare	
Fine tuning	
Adjust tile	
< >	
V	
Auto fine tune	Clear fine tuning
	-

**Compare** — Select this option to highlight differences between the images in the overlap region. A medium gray color is shown when the images match exactly. Brighter or darker colors indicate mismatches between the images.

### Adjust tile

Use the arrow buttons to move the right hand image relative to the left hand image within the selected fine tuning tile.

Individual clicks on the buttons move the image by single pixels. Holding a button down causes the image to move continuously. If you hold the button for a long time, the motion accelerates.

### Auto fine tune

Use this button to discard the fine tuning of the current overlap region and then automatically fine tune the region.

#### **Clear fine tuning**

Use this button to discard the fine tuning of the current overlap region.

# **Exposure & falloff correction**

The exposure and falloff correction task provides the ability to adjust exposure matching between one image and the next and the brightness falloff correction.

Refer to "Fine tuning the image alignment" in Chapter 6, "Correcting stitching problems" for step-by-step instructions.

## <---> Brightness --->

Use this slider to adjust the exposure matching between adjacent images. Moving the slider to the left increases the brightness of the lefthand

Exposure matching < Brightness Brightness>
Correct brightness falloff
Amount
7 %
Size
5 %
Refine falloff now

image (or decreases the brightness of the righthand image). Moving the slider to the right increases the brightness of the righthand image (or decreases the brightness of the lefthand image).

# Correct brightness falloff

If your camera and lens combination exhibit brightness falloff in the corners you can use these values to correct it.

- **Amount** The brightness falloff factor in the extreme corners of the image. The value represents the brightness in the corner of the image relative to the center of the image. For example, a value of 0.1 means that the brightness has fallen off by one tenth (i.e. to 90% brightness) in the corner.
- Size The spread of the falloff outward from the corners of the image. The value represents the distance from the corner at which the falloff reaches approximately 50% of its maximum. For example, a value of 0.1 means that the brightness falloff is at 50% of the maximum falloff at about one tenth the distance from the corners to the center.

*NOTE:* Correcting brightness falloff will increase the time required to compute your panorama.

*NOTE:* The brightness falloff correction applies to all overlap regions in your panorama. You should check each overlap region after changing this setting.

# Page setup dialog box

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The **Page setup dialog box** controls the paper size, the margins, the orientation of the image on the page (portrait or landscape) and the layout of the image. These options are stored in your project.

As a convenience, if there is more than one printer connected to your computer you can also select the printer and printer-specific options you want to use. The printer-specific choices are not saved in the project.

### Orientation

Sets the orientation of the image with respect to the paper: **Portrait** or **Landscape**.

### Margins

Sets the left, right, top and bottom margins of the page.

You can display the margins in inches or centimeters.

### Layout

Sets the layout of the image on the page.

- Fit page Scales the image to the maximum size that fits within the margins.
- **Full size** Scales the image to its actual size as defined with the **Image properties dialog box**. This may cause the image to extend to multiple pages horizontally and/or vertically.
- **Fit height** Scales the image so that its vertical dimension fits exactly within the top and bottom margins of the page. This may cause the image to extend to multiple pages horizontally.
- **Fit width** Scales the image so that its horizontal dimension fits exactly within the left and right margins of the page. This may cause the image to extend to multiple pages vertically.

### **Multi-page printing**

- **Overlap pages by drawing in margins** Causes the image to extend into the margins by 0.2" (about 5mm) to create an overlap between one image and the next. This overlap is on the left and right sides and/or top and bottom depending on the **Layout** selection.
- **Draw registration marks in margins** Draws small "x" marks in the margins to help you align multiple page panoramas. The registration marks are drawn above and below and/or left and right of the image depending on the **Layout** selection.

			•••• []
Orientation Portrait Landscape	Margins Left: 1 Top: 1	Right: Bottom:	1
Layout Fit page Full size Fit height Fit width	<ul> <li>inches</li> <li>cm</li> <li>Multi-page printing</li> <li>Overlap pages by dr.</li> <li>Draw registration mages</li> </ul>	awing in margins rks in margins	
	Select printer and p	aper size	
	ОК	Cance	el Help

These options are designed to work together to help you assemble multiple page panoramas. For example, if you select **Fit height** for a horizontal panorama, the images are overlapped on the left and right sides and registration marks are drawn above and below the image on each side. You cut each page through the registration marks on its lefthand side and overlay each page on its predecessor. You slide the pages around to match the registration marks. Using a light table is not necessary (although you may find it helpful) — the diagonal lines in the registration marks are sufficient for correct alignment.

### Select printer and paper size...

Runs a dialog box to choose a printer (when your machine offers more than one printer) and to set printer properties like paper size and paper source. You may also choose the printer and set printer properties when you select the *Print current image... command* (*File menu*). This button is included for your convenience in the Page setup dialog box, but only the paper size and paper source selections made with this dialog box are stored in the project.

# Panoramic image properties dialog box

This dialog box shows the type of projection and the field of view for stitched panoramic images and for crops of stitched images. You can also use this dialog box to assign panoramic attributes to a previously stitched image after importing it. This is useful if you obtain a panoramic image from some other application or if you export an image, edit it outside The Panorama Factory and then re-import it.

### Panoramic image

Indicates whether an image is a panoramic image. For example, when you import a previously stitched panoramic JPEG image, you can use these controls to assign panoramic attributes to the image.

**This is a panoramic image** — Select this radio button to mark the image as panoramic.



#### Projection

The type of projection (warping) used by The Panorama Factory to make the images fit together seamlessly. Some output formats require a particular choice. In this case, the other choice will be unavailable.

Spherical projection
Cylindrical projection
Cubic projection (native)
Cubic projection (QTVR)
Cubic projection (cruciform) — To learn more about projections, please refer to Chapter 10, "Panoramic projections".

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### Horizontal field of view (degrees)

**HFOV**—The horizontal field of view of the panorama. If you enter this value, The Panorama Factory will automatically the vertical field of view.

### Vertical field of view (degrees)

**Vertically symmetric** — If you select this option, The Panorama Factory will constrain the field of view to be symmetric above and below the horizon.

### VFOV

### Above

**Below** —The total vertical field of view, the field of view above the horizon and the field of view below the horizon. If you enter any of these values, The Panorama Factory will automatically the horizontal field of view.

Profile organizer

# Profile organizer dialog box

The **Profile organizer dialog box** lets you edit, load and save profiles. The Panorama Factory profile feature provides a convenient way to store dialog box values that you want to use later. You can create multiple profiles by assigning each one a different name.

# Using profiles to load and store settings for individual tool dialog boxes

A profile can hold settings for a single tool dialog box. For example, if you find settings on the **Alignment properties dialog box** that work better for you than the default ones, you can store them in a profile and load them later when you need them.

To load settings from a profile for a single tool, select the profile name from the dropdown list



titled Load settings from profile: when the tool dialog box is active.

To save settings to a profile for a single tool, select **Save settings to a profile**... when the tool dialog box is active.

### Using profiles to load and store settings for many tools

A profile can hold settings for multiple tools. For example, you might find a collection of settings on the **Camera properties dialog box** and the **Alignment properties dialog box** that work well for a particular camera and lens combination. You can store these settings in a profile and then call them up whenever you are using this particular camera and lens combination.

To load settings from a profile for all tools, select the profile name in the profile organizer and press the **Load all tools from the profile** button.

To save settings to a profile for all tools, select the profile name in the profile organizer and press the **Save all tools to the profile** button.

# Using profiles to initialize new projects

The values in the profile named "New project default settings" are used by the **New project command** (*File menu*) to initialize new projects. You may edit this profile but you cannot delete it. If you update this profile, the settings you choose will be used the next time you create a new project.

# Restoring settings to their initial default values

The profile named "Factory default settings" contains the initial default settings that were in effect immediately after you first installed The Panorama Factory. You may neither edit nor delete this profile. You can use this profile to return the settings to their initial default states.

To return all settings to their initial default values, select the profile named "Factory default settings" in the profile organizer and press the **Load all tools from the profile** button.

To return settings to their initial default values for a particular tool dialog box, select the profile name from the dropdown list titled **Load settings from profile:** when the tool dialog box is active.

### Select a profile or enter a new name

Select the profile to edit. The values in the profile named "New project default settings" are used by the *New project command* (*File menu*) to initialize new projects.

To create a new profile, just type its name in the text field.

### Load all tools from the profile

Loads all values stored in the selected profile into the current project. This potentially changes all of the attributes of the current project depending on which tools are stored in the profile.

### Delete the profile

Removes the profile.

### Individual tools

Use these controls to edit individual tool values stored in the selected profile.

- Indicates that the selected profile contains settings for the corresponding tool.
- Deletes the corresponding tool settings from the selected profile.
- Edits (after creating, if necessary) the corresponding tool settings in the selected profile.

# Project properties dialog box

### Copy imported images

These checkboxes control whether or not to copy imported images to the destination directory when saving the project. The **Project** checkbox controls images written during normal saves and the **Archive** checkbox controls images written during archival saves. If the checkbox is unchecked, The Panorama Factory saves only the filenames of imported images in the project. In this case you must not delete the imported image files.

#### Save images

These checkboxes control which .tiff or .bmp images are written to disk when you save the project. The column of checkboxes titled **Project** controls which images are written during normal saves and the column titled **Archive** controls which images are written during archival saves.

Project properties
Profile organizer Load settings from profile:
Save settings to a profile
Copy imported images
Project Archive
Save images (default)
Project Archive
Image: Converted     Image: Converted       Imag
A recipe for recreating each image is always saved. If you select a checkbox, an image file will be saved in addition to the recipe.
Time, space, quality trade-offs Keep all images in memory Use 45-bit pixels Enable color tool
OK Cancel Help

**Trimmed** — Images trimmed from the imported images using one of the trimming tools.

- Warped Images warped according to the focal length of the camera as a preprocessing step before stitching the panoramic image.
- **Stitched** The stitched panoramic image.

**Cropped** — Images produced with the cropping tool.

- **Enhanced** Images produced with the image enhancement tool.
- **Resized** Images produced with the image scaling tool.
- **Thumbnail** Small images displayed in the imported thumbnails and computed thumbnails panes.

The save images checkboxes set the defaults for images within the project. The settings can be overridden for particular images with the **Properties command** (**Image menu**).

### Time, space, quality trade-offs

These checkboxes control performance versus quality trade-offs. Generally, increased quality costs either time or space. For all of these options, leaving the option unselected is the most conservative of RAM at the expense of either speed or quality or both.

### Keep all images in memory

Selecting this checkbox causes The Panorama Factory to retain all images in memory,

even if they are not required for the current command. Leaving this option unselected causes The Panorama Factory to write inactive images to disk files which improves your ability to create large panoramas at the expense of input/output time.

### Use 45-bit pixels

Selecting this checkbox causes The Panorama Factory to represent images with 45 bits per pixels (15 bits each for red, green and blue). This increases image quality at the expense of RAM and disk usage. Leaving this option unselected causes The Panorama Factory to represent images with 24 bits per pixel (8 bits each for red, green and blue). This improves your ability to create large panoramas at the expense of image quality. The Panorama Factory automatically selects this checkbox if the first imported image has more than 24 bits per pixel.

### Enable color tool

Selecting this checkbox allows the use of The Panorama Factory's color balancing tool. This tool is normally used when working from scanned negatives, slides or prints. It causes The Panorama Factory to use 45 bits per pixel for imported images. It is always selected when Use 45-bit pixels is selected. Leaving this option unselected saves memory and disk space but prevents you from making changes in the color balance. This improves your ability to create large panoramas at the expense of color quality.

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

#### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

To learn more, see the **Profile organizer dialog box** and the **Save settings to a profile dialog box** in Chapter 14, "Dialog boxes."

# Resize image dialog box

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The **Resize image dialog box** controls the new size of the image when you use the **Resize command** (*New image menu*). See "Classic step 5 – Resize the cropped image" in Chapter 4, "Using the Classic interface, step by step" to learn more about resizing images.

#### Source image size

Shows the width and height of the source image in pixels.

#### New image size

The width and height of the resized image in pixels.

#### Keep aspect ratio

Selecting this checkbox causes The Panorama

Factory to preserve the aspect ratio when creating the new image. It does this by computing the corresponding width or height when you enter height or width. The

Resize image
Profile organizer Load settings from profile:
Save settings to a profile
Source image size (pixels)
W 11576 H 2315
New image size (pixels)
W 1500 H 300
✓ Keep aspect ratio
OK Cancel Help

Panorama Factory remembers whether you entered width or height so that if the **Resize command** (**New image menu**) is applied later to an image with a different aspect ratio it can recompute the corresponding value.

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

To learn more, see the **Profile organizer dialog box** and the **Save settings to a profile dialog box** in Chapter 14, "Dialog boxes."

# Rotate image dialog box

The **Rotate image dialog box** controls the rotation angle for the **Rotate command** (*New image menu*).

### Image rotation

Enter the image rotation angle in degrees.

### Clockwise

Select this radio button to rotate clockwise.

### Counter clockwise

Select this radio button to rotate counter-clockwise.

### Fit rotated image

Select this radio button to set the size of the result image to include the entire rotated image without cropping.

### Same as source image

Select this radio button to keep the result image the same size as the unrotated source image.

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

To learn more, see the **Profile organizer dialog box** and the **Save settings to a profile dialog box** in Chapter 14, "Dialog boxes."

state image		
Profile organizer		
Load settings fro	m profile:	
		•
Save s	ettings to a profile	
Image rotation (	degrees)	
30		
Olockwise		
Counter clock	wise	
Image size		
Eit satatad im		
Fit rotated in	aye	
Same as sour	ce image	
OK	Cancel He	D

# Save Image As dialog box

When you use the **Save** current image as... command (File menu) to save the current image, the **Save Image As dialog box** provides additional options to let you to specify the dimensions and resolution of the saved image.

#### Save as type

Selects among the file types supported by The Panorama Factory.

### JPEG settings...

Opens a dialog box that contains controls specific to the output format. For example, the

ave as type	File size	
JPEG (*.jpg)	Compute file size	
JPEG settings	738 KBytes	
Image properties	V Automatically resize:	
Panoramic image properties	KBytes	
Title & description		
Veb page	Thumbnail index	
No web page	Insert thumbnail into index page	
Create new web page from template		
Update existing web page	Create new thumbnail index	
Web page to create or update	Thumbnail index page	
Browse	thumbnails.html Browse	
Template for new web pages	Title: Landscape thumbnails	
Default preview page  Preview	Maximum thumbnail size 120 x 80	
Default preview page with help	Insert newest thumbnail first	
View in browser after saving	Change thumbnail settings	
	,	

JPEG settings dialog box controls the JPEG image quality and compression amount.

### Image properties...

Opens the **Image properties dialog box** for the current image. This is a convenience feature that permits you to update image resolution if you need to before saving the image.

### Panoramic image properties...

Opens the **Panoramic image properties dialog box** for the current image. This is a convenience feature that permits you to update field of view, etc. if you need to before saving the image.

### Title & description...

Opens the **Notes for image dialog box**. This is a convenience feature that permits you to enter the image title and/or description before saving the image file. The title and description are used by the web page templates.

#### File size

Controls creation and update of web pages containing your images. These options may be time consuming for certain file types.

**Compute file size** — Computes and displays the image file size for the currently selected output format and settings.

Automatically resize: — Selecting this checkbox and entering a value into the text field causes The Panorama Factory to enforce a maximum image file size when saving. It will resize your image to a smaller size if necessary to achieve the requested size. The resulting image file may be somewhat smaller than the requested size.

### Web page

Controls creation and update of web pages containing your images.

- No web page Choose this option if you do not wish to create a web page.
- **Create new web page from template** Choose this option to create a new web page containing the image.
- **Update existing web page** Choose this option to update an image that you previously saved into a web page. You may update the image with a different file type from the one originally used, but the image file name must match the name originally saved to the web page.
- Web page to create or update Enter the web page file name or use the Browse... button to select a file. When creating a web page, you may leave this field blank to create a web page whose name matches the image file name.
- **Template for new web pages** Select the template file to use for creating new web pages.
- **Preview** Displays a sample of the web template in your computer's web browser. The sample includes nonsense text as placeholders for the image title and description. A plain rectangle is shown as a placeholder for the image itself.
- View in browser after saving Select this checkbox to automatically open the web page in your computer's web browser after creating or updating.

#### Thumbnail index

Controls creation and update of web pages containing thumbnail images.

- **Insert thumbnail into index page** Select this checkbox to create a thumbnail at the same time the main image is saved. The thumbnail will be inserted into a thumbnail index web page. If the thumbnail image is already present in the page, it will be updated.
- **Create new thumbnail index...** Opens the **Thumbnail index properties dialog box** to create a new thumbnail index.
- **Thumbnail index page** Enter the file name of an existing thumbnail index web page or use the **Browse...** button to select a file. The attributes of the selected thumbnail index page are shown below this text field.
- **Change thumbnail settings...** Reopens the **Thumbnail index properties dialog box** to change the attributes of the selected thumbnail index page.

# Save settings to a profile dialog box

The **Save settings to a profile dialog box** runs whenever you select **Save settings to a profile...** on a tool dialog box. You use this dialog box to save the tool settings to an existing profile or to create a new profile to hold the tool settings.

This dialog box shows a text entry field, a list box, a Cancel button and an OK button. The list box shows all existing profiles and indicates with a checkmark which profiles already contain settings for the active tool.

To save the settings to an existing profile, select the profile name in the list box and press the OK button. You can also save the settings by double-clicking the profile name.

Save	settings to a profile
Sele	ct a profile or enter a new name
New	/ profile
✓ N S	lew project default settings ample profile
~	Profiles containing settings for Blending properties
	OK Cancel Help

To save the tool settings to a new profile, type the profile name into the text entry field and press the OK button.

### Select a profile or enter a new name

Use this text entry field and list box to select or enter the name of the profile.

### Cancel

Exits the **Save settings to a profile dialog box** without saving the tool settings to a profile.

### οκ

Saves the tool settings to the selected profile.

To learn more, see the Profile organizer dialog box in Chapter 14, "Dialog boxes."

# Sharpen image dialog box

This dialog box controls the parameters used by the **Sharpen command** (**New image menu**). As you change the parameters, The Panorama Factory shows you the effect interactively within the preview rectangle.

The **Sharpen command** sharpens images using unsharp masking. This method locates areas of high contrast (edges) and increases the contrast to enhance edge sharpness. This can help correct loss of sharpness introduced by scanning, printing and image sampling.

### Amount (percent)

The amount of sharpening. 100% is a good starting point. Larger values produce more a stronger sharpening

Sharpen image	×
Profile organizer Load settings from pro	ofile:
Sa	we settings to a profile
Amount (percent)	
Radius (pixels)	-0
Threshold (levels) 5	-0
	OK Cancel Help

effect and smaller values produce a more subtle sharpening effect.

### Radius (pixels)

The size of the sharpening effect near edges. Larger values are needed for high resolution images, but larger values can tend to create "halos" at edges. When images are printed at high resolution, the effect is less noticeable. Typically, a radius of 1 is appropriate for web display (computer displays are typically about 72 dpi). For printing high resolution images, 2 or 3 may be a good starting point. You may need to make test prints to determine the best value.

### **Threshold (levels)**

The amount of difference between neighboring pixels that is needed to trigger the sharpening effect. Setting a threshold can help avoid increasing noise in areas of low contrast. A threshold of 5 is a good starting point, but you can use the preview display to decide what value works best.

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

### Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

To learn more, see the **Profile organizer dialog box** and the **Save settings to a profile dialog box** in Chapter 14, "Dialog boxes."

# Thumbnail index properties dialog box

The **Thumbnail index properties dialog box** opens to create a new thumbnail index web page when you select the **Create new thumbnail index**... button on the **Save Image As dialog box**. Selecting the **Change thumbnail settings**... button on the **Save Image As dialog box** reopens the **Thumbnail index properties dialog box** to change the attributes of the selected thumbnail index page.

### Template for new index

Select the template file to use for creating the new thumbnail index web page. This control is disabled if you are updating an existing thumbnail index page.

### Preview

Displays a sample of the thumbnail index template in your computer's web browser. The sample includes nonsense text as placeholders for image titles. Plain rectangles are shown as placeholders for the thumbnails.

### X Thumbnail index properties Template for new index Simple index Preview Floating thumbnails on gray background Title for new index Landscape thumbnails Maximum thumbnail size (pixels) W 120 н 80 Method for creating thumbnail images Scale image to fit height, then crop width Scale image to fit width, then crop height Scale image to fit width and height Position for new thumbnails Insert the newest thumbnail first Insert the newest thumbnail last OK Cancel Help

### Title for new index

Enter a title to show at the top of the thumbnail index web page. This control is disabled if you are updating an existing thumbnail index page.

### Maximum thumbnail size

Enter the maximum width and height for the thumbnails on the page. The actual thumbnail image size depends upon the maximum size and also on the **Method for creating thumbnail images**.

### Method for creating thumbnail images

- Scale image to fit height, then crop width If this radio button is selected, the thumbnail images will be scaled so that their height matches the maximum height. Then the left and right sides of the image will be cropped if necessary to fit the image within the maximum width. You should use this setting to show the central portions of horizontal panoramas.
- **Scale image to fit width, then crop height** If this radio button is selected, the thumbnail images will be scaled so that their height matches the maximum height. Then the left and right sides of the image will be cropped if necessary to fit the image within the maximum width. You should use this setting to show the central portions of vertical panoramas.
- Scale image to fit width and height If this radio button is selected, the thumbnail images will be scaled to show the entire image within the maximum width and height.

### Position for new thumbnails

- **Insert the newest thumbnail first** If this radio button is selected, each new thumbnail will be inserted into the index page at the top of the page. This creates a *reverse chronological* list.
- **Insert the newest thumbnail last** If this radio button is selected, each new thumbnail will be inserted into the index page at the bottom of the page. This creates a *forward chronological* list.

# **Timing panel**

The **Timing panel** shows the number of seconds spent on various The Panorama Factory tasks. The purpose of this panel is to help The Panorama Factory developers figure out what performance tuning tasks are worth pursuing.

The Timing panel offers the following controls:

**Reset** Resets the timers to zero.

The Timing panel measures the following times:

Wizard — Total time for all Wizard tasks.

- **Stitch** Total time for panoramic stitching tasks.
- **Read** Reading image files.
- **Crop** Trimming imported images and cropping other images. Sorry, these times are not accumulated separately.

Warp — Warping trimmed images according to the focal length prior to alignment them.

**Resample** — Resampling warped images to have a convenient width and height for alignment.

**Decimate** — Low-pass filtering during alignment and image resizing. Sorry, these times are not accumulated separately.

**Align** — Panoramic alignment – low resolution.

Final align — Panoramic alignment – high resolution.

Fine tune — Image fine tuning (de-ghosting).

**Render** — Drawing warped images into the panoramic image.

**Render blend** — Drawing overlap regions into the panoramic image.

**Refine focal length** — Automatic detection or refinement of the focal length value.

**Refine barrel correction** — Automatic detection or refinement of the barrel correction value.

**Refine falloff correction** — Automatic detection or refinement of the falloff correction value.

Enhance — Image enhancement.

Improve quality — Improve quality (Q+).

Write — Writing image files.

# Top and bottom caps dialog box

Full-sphere panoramas usually have holes at the top and bottom. These are areas that the original photographs did not cover. This happens especially at the bottom of the image because of the tripod. For VR display, you usually want to fill the holes with something—a color, a small image (a company logo for example), or something like the The

Тор сар	
Fill with color	
Border or fill color	
Image filename	Browse
Bottom cap	
Image 🔹	
Border or fill color	
Image filename H:\Jps\smokycity_logo.bmp	Browse

Panorama Factory's "mirror ball". The **Top and bottom caps dialog box** controls the way that The Panorama Factory fills these holes. Top and bottom caps allow the user to look up to the zenith (north pole) and down to the nadir (south pole) even if the vertical field of view is less than 180 degrees.

# Тор сар

#### Bottom cap

Use the dropdown menu to choose the type of top or bottom cap

Mirror ball — Fills the hold with a simulation of a mirrored sphere sometimes used as a garden ornament known as a "gazing ball". If the bottom cap is set to Mirror ball you will see the rest of the image, including the zenith, reflected in the ball.

Fill with color — Fills the hole with a color.

**Image** — Fills the hole with an image. The largest circle that fits within the image is copied into the hole.

# Border or fill color

Click the color well to select a color for the top cap.

# Image filename

Enter an image file name in the text field or use the **Browse**... button to browse for the image file name.

# Trimming properties dialog box

The **Trimming properties dialog box** controls the method used for trimming imported images so they are all exactly the same size. This is usually used only for images scanned from negatives, transparencies or photographic prints. You probably do not need to use this dialog box if you are using pictures from a digital camera

To learn more about trimming images, refer to "Trim the images" in Chapter 5, "Extra steps when working from scanned photos."

### Trimmed image size

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Use these entry fields to set the width and height of the trimmed image in pixels. When you are trimming by marking corners, The Panorama Factory computes the default trimmed size from the first set of corners you mark, but you can use these entry fields to

Trimming properties
Profile organizer Load settings from profile:
Save settings to a profile
Trimmed image size (pixels)
w о н о
Trimming tool
© Corners
Fixed size rectangle     Cropping-style rectangle
Trim edges (pixels)
L 10 R
10 B 10
OK Cancel Help

override the computed values. If you have overridden the values, setting them to zero will cause The Panorama Factory to recompute the default size.

### Trimming tool

Use this control to change the choice of trimming method. (Note that the *Trim menu* and the tool bar offer two of these three choices.)

- **Corners** Trims imported images by marking the four corners of the images. See "Trim marking corners" under "Trim the images" in Chapter 5, "Extra steps when working from scanned photos."
- **Fixed size rectangle** Trims imported images with a fixed size rectangle. See "Trim rectangle" under "Trim the images" in Chapter 5, "Extra steps when working from scanned photos."
- Cropping-style rectangle Trim imported images using the same type of rectangle used by the Crop command (New image menu).

### **Trim edges**

Use these entry fields to set margins on the trimming source.

Positive numbers reduce the size of the trimming region. When you use the Corners method, the edges of the trimming region typically skim along the edges of the source image. Slightly reducing the size of the trimming region eliminates the possibility of including a few pixels that are actually outside the frame.

Negative numbers enlarge the trimming region. You can use this to add a border around the trimming region.

### Load settings from profile:

Select a profile from this dropdown list to load all settings that apply to the current tool dialog box.

# Save settings to a profile...

Select this button to activate the **Save settings to a profile dialog box**. You can save the current settings to an existing profile or create a new profile to hold the settings.

To learn more, see the **Profile organizer dialog box** and the **Save settings to a profile dialog box** in Chapter 14, "Dialog boxes."

# CHAPTER 15 Panorama Factory projects

A Panorama Factory project is actually a collection of files.

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# Panorama Factory project organization

A Panorama Factory project is actually a collection of files. The project consists of a single file with the .pfp extension (Panorama Factory Project). This file contains recipes for creating computed images from a set of imported images, but doesn't actually contain any image data. The image data are stored in separate .tiff,.bmp or .pfi files.

The .bmp files contain Windows device independent bitmap images with 24 bits per pixel (8 bits each for red, green and blue). The .tiff files contain TIFF (Tagged Image File Format) files with 45 bits per pixel (15 bits for each color). The .pfi files contain Panorama Factory image files with 24 bits per pixel (8 bits each for red, green and blue), 36 bits per pixel (12 bits each for red, green and blue) or 45 bits per pixel (15 bits for each color).

Since the image recipes are stored in the .pfp file, if you delete the computed image files (intentionally or by accident) you can recreate your project as long as you do not delete the imported image files.

The *Project properties command* (*File menu*) lets you control which computed images are written when you save your project and which are written when you archive your project. You can also choose between 24 bit images and 45 bit images.

# .TIFF & .BMP files in the project

The Legacy Edition, the m32 Edition and the Mac Editions use .bmp and .tif files. The x64 Edition uses .pfi files because .bmp and .tiff cannot represent images larger than 2 GB.

Under the Legacy Editions, the m32 Edition and the Mac Edition, when you choose 45-bit image files, image data are stored in individual files with .tiff extensions (double f). These are TIFF (Tagged Image File Format) files with 48 bits per pixel - 16 bits per color. Only the most significant 15 of the 16 bits are used to store image information. The least-significant bit is used for housekeeping information such as noting which areas of a warped image do not correspond to areas of its original, unwarped image.

Under the Legacy Editions, the m32 Edition and the Mac Edition, when you choose 24-bit image files, image data are stored in individual files with .bmp extensions. These are Windows device independent bitmap files with 32 bits per pixel - 8 bits per color. Only 24 bits of each 32 are used to store image information. The additional 8 bits are used for housekeeping information such as noting which areas of a warped image do not correspond to areas of its original, unwarped image.

Under the x64 Edition, .pfi images are used because .bmp and .tiff cannot represent images larger than 2 GB. The appropriate .pfi format (24 bits per pixel, 36 bits per pixel, or 45 bits per pixel) is chosen automatically by The Panorama Factory depending upon the characteristics of your image data.

Color data stored in .tiff [TBD] files within the project remain unaffected by color correction values. That is, the color correction values affect only the display of the .tiff files.

When you save image files with the **Save current image as... command (File menu)**, BMP and JPG files are always color corrected. For TIFF and PNG formats, you may choose to store corrected or uncorrected colors. See the **TIFF settings dialog box** and the **PNG settings dialog box** for more information.

Images with uncorrected color information are probably unsuitable for printing or importing into other applications.

# Release notes

# V5.3 release notes

- 1. A new edition, the Mac Leopard Edition is now available. The old Mac edition has been renamed the Mac Legacy Edition. It delivers improved stitching speed on multi-processor systems (including multi-core systems) by performing image computations in parallel. The new Mac Leopard Edition requires Mac OS X 10.5 or newer. If you are running OS X 10.3 or 10.4 you must use The Mac Legacy Edition.
- 2. Support for Windows Imaging Component (WIC) has been added to the m32 and x64 Editions. WIC supports a variety of image file formats, notably many camera RAW formats, through plug-ins that are available from camera manufacturers and third parties. We do not provide WIC plug-ins, but will take advantage of any WIC plug-ins that are installed on your computer. Image files formats that are available through WIC are automatically recognized by The Panorama Factory and are listed in the Files of type drop down list on the Import Images dialog box. For more information about WIC and for a list of available plug-ins, refer to "Windows Imaging Component" in Chapter 9, "Image file formats".
- 3. 76 new cameras were added to the camera library in V5.3.
- 4. The following trouble reports are corrected in V5.3:
  - TR 1158 Meta keys (SHIFT, CONTROL, ALT, COMMAND) sometimes do not work on a secondary Mac keyboard
  - TR 1166 Abnormal termination using some non-Apple keyboards
  - TR 1486 Abnormal termination upon choosing the Crop command

# V5.2 release notes

- 1. Stitching speed is improved on Mac, bringing it closer to the (single-threaded) performance of the Windows Editions.
- 2. Japanese, Norwegian and Turkish translations were added in V5.2.2748 (June 5, 2008). The Catalan, Chinese-Traditional, French, Hungarian, Japanese, Russian and Turkish translations were updated in V5.2.2760 (January 12, 2009).
- 3. As of January 12, 2009, some translations are incomplete:

Norwegian is 63% complete, Slovak is 81% complete, Spanish is 98% complete, Turkish is 24% complete.

Other translations supplied with V5.2 are 100% complete. Untranslated commands and messages will be displayed in English. Updated translations will be released as they become available. We are seeking additional translators and reviewers for these and other languages. Please visit http://www.panoramafactory.com/call\_for\_translators.html if you would like to help translate or provide feedback on existing translations.

- 4. 99 new cameras were added to the camera library in V5.2.2748 (June 5, 2008) and 84 more in V5.2.2760 (January 12, 2009).
- 5. When exporting to QTVR format, The Panorama Factory now automatically converts the projection to cubic or cylindrical if it can determine that one projection will produce a significantly smaller output file than the other. Otherwise, it will convert spherical panoramas to cubic and leave cylindrical panoramas unchanged. However, cubic projection is always used if you have selected the Add top and bottom caps to saved image on the QTVR settings dialog box.
- 6. V5.2 adds several new customer support features. For more information about these, please refer to http://www.panoramafactory.com/support\_extras.html.
- 7. The following trouble reports are corrected in V5.2 2747 (June 5, 2008):
  - TR 822 Some QTVR files show a broken film strip icon
  - TR 982 Abnormal termination when exporting QTVR that contains polygon hotspots
  - TR 985 Could not write abcd.mov. Is the disk full or write protected?
  - TR 986 It is not possible to enter the letter 'd' into the Hotspot properties dialog box
  - TR 1105 "Cannot convert from the charset windows-utf8" when selecting a language
  - TR 1112 Abnormal termination immediately after starting the application
  - TR 1113 "Bookmark" type hotspots do not work
  - TR 1114 "http://url#bookmark" notation doesn't work for QTVR images displayed by Internet Explorer
  - TR 1115 Double-clicking a PFP file from Explorer (Windows) or Finder (Mac) sometimes causes abnormal termination
  - TR 1145 Does not work properly if installed into a folder with extended characters in its name
- 8. The following trouble reports are corrected in V5.2 2760 (January 12, 2009):
  - TR 1170 Quitting the program sometimes shows a message saying PFactory quit unexpectedly
  - TR 1206 Starting the program by double-clicking a PFP file from Finder sometimes causes abnormal termination
  - TR 1346 Double-clicking a PFP file from Finder (Mac) when a dialog box is open sometimes causes subsequent abnormal termination

# V5.1 release notes

- 1. V5.1 adds the **Check for software updates dialog box** which can be used to manually or automatically check The Panorama Factory's web site for newer versions of the software including patches, free updates and upgrades.
- 2. Several new cameras were added to the camera library.
- 3. The following trouble reports are corrected in V5.1.2702:
  - TR 759 One or more "Duplicate file name" messages displayed at startup
  - TR 761 QTVR export fails with message "In VRPano\_MakeCylinder, wImage==1234 is not a multiple of 96"
  - TR 762 The application appears to freeze when you choose Print preview
  - TR 776 The Reverse selected images command doesn't work properly

- TR 792 The Help button opens two browser windows and shows an incorrect help page under Vista
- TR 794 PFBatch adds watermarks even after entering a valid Registration Key
- TR 797 The default directory for the Save image command is not always set correctly
- TR 802 QTVRs have missing parts or incorrect colors when made from 16-bit-per-color images
- TR 805 UNC path names do not always work properly
- TR 806 Cannot export to QTVR format if image width is less than height
- TR 811 Abnormal termination exporting to 16-bit-per-channel Photoshop format
- TR 819 OS X 10.5 Leopard reports that The Panorama Factory's setup and patch DMG files are corrupted
- TR 823 Abnormal termination immediately after starting the application (on Mac)
- TR 842 Overlap region is speckled or completely blank
- TR 854 Export to Photoshop sometimes creates a bad file
- TR 856 Thumbnail indexes don't work properly in V5.0
- TR 858 Text values for Amount and Size of falloff correction do not update when you move the sliders
- TR 895 Fine tuning rectangles display incorrectly when zoomed
- TR 899 Black-and-white TIFFs display incorrectly on Mac
- TR 900 Next image / Next seam commands do not work from popup menus
- 4. The following trouble reports are corrected in V5.1.2707:
  - TR 905 "Out of memory" error during printing
  - TR 912 Abnormal termination with the Overlap region dialog box

# V5.0 release notes

- 1. V5.0 is a major update with significant improvements to image quality and functionality. For information about the differences between V4.x and V5.0, visit http://www.panoramafactory.com/whatsnew.html.
- 2. V5 may be installed without uninstalling previous version (V1.x, V2.x, V3.x or V4.x). By default, the setup will not replace previous versions. If you wish to replace the previous version, you should uninstall the previous version after installing V5.
- 3. If you are upgrading from V4 to V5, we recommend you install and run V5 before removing V4 from your computer. This will permit V5 to access your V4 Registration Key for upgrade purposes.
- 4. If you purchased V4.x on or after August 1, 2007, your V4 Registration Key will also be recognized by V5. You do not need to purchase an upgrade from V4 to V5.
- 5. If you wish, you may leave V1.x, V2.x, V3.x or V4.x installed on your computer after installing V5. V5 can read project files written by previous versions, but the reverse is true *only if* you select the **Store project files in V4.4 format** checkbox on the **Compatibility** tab of the **Options dialog box**. Once you save a project file with V5 format, you will no longer be able to open it in a previous release . If you wish to be able to open an existing project with a previous release, you should open it and then save it with a different name before you open it with V5.

- 6. The V5 update to the Slovak translation was not completed before release of The Panorama Factory V5. Some commands and messages remain untranslated. These commands and messages will be displayed in English.
- 7. The Chinese (Simplified) translation included with The Panorama Factory V5 is incomplete. Some commands and messages will be displayed in English.
- 8. The Chinese language versions require the x64, m32 or Mac Edition. Neither one is included with the Legacy Edition.
- 9. QTVR import and export are not supported in The Panorama Factory x64 Edition. QTVR format is supported through the QuickTime DLLs that are included with Apple's QuickTime viewer. These DLLs are not available in 64-bit versions. Therefore it is not possible to export QTVR format directly from the x64 Edition. Fortunately, there is a workaround:
  - Stitch your panorama using the The Panorama Factory x64 Edition.
  - Save the final image as a TIFF or BMP file.
  - Before leaving The Panorama Factory, exit the Wizard, right-click the thumbnail for the cropped image and select the **Panoramic properties command**. Write down the **VFOV** values and note whether **Spherical** or **Cylindrical** is selected and note whether **Vertically symmetric** is selected. You'll need these settings later.
  - Exit the The Panorama Factory x64 Edition and start the m32 Edition (included with the x64 Edition).
  - Import the adjusted image back into The Panorama Factory with the **Import command** (File menu).
  - Right-click the image and choose the **Panoramic properties command**. Click **This is a panoramic image** and then enter the values you wrote down in the earlier step. The **HFOV** value will be computed automatically.
  - Double-click the thumbnail for the image and use the **Save as command** (File menu) to save the image in QTVR format.
  - Image Quality Note: When a panorama is saved to a cylindrical QTVR, the horizontal dimension of the image must be a multiple of 96. If it is not a multiple of 96, The Panorama Factory will resize it automatically. This resizing may affect image quality if it is done as an additional step (after importing into the m32 Edition). You can avoid this resizing by making sure the panorama you save after stitching has a width that is a multiple of 96 in the first place.