

Best Practices and Guidelines

Digitization at Franklin Furnace Archive, Inc.

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About This Document

The purpose of this document is to establish standards and a workflow that ensures Franklin Furnace's digitization process efficiently and consistently produces quality archival scans of its collection of materials documenting performance art, installation art, and historic exhibitions.

The stated guidelines will ensure that the digital assets created meet the current archival standards for preservation and access. The goal of digitization at Franklin Furnace is to freely disseminate the archival collection online through the institution's website and ARTstor's Digital Library while preserving the collection.

About the Franklin Furnace Archives

The Franklin Furnace archives contain early artifacts of live, ephemeral, variable media works by an eclectic group of artists. The collection provides a unique snapshot that is representative of the avant-garde art world from 1976 to the present. Some of the artists exhibited by Franklin Furnace have gone on to great critical acclaim. For instance, Franklin Furnace alumni Barbara Kruger, Louise Lawler, Sherrie Levine, Paul McMahon, Matt Mullican, and Michael Smith were exhibited in 2009 in New York City in the Metropolitan Museum of Art's *The Pictures Generation, 1974 – 1984*. This exhibition focused on a highly influential group of New York artists who, working in all media, investigated how images shape our perceptions of ourselves and the world.

Other artists presented by Franklin Furnace at early stages of their careers include Eric Bogosian, monologist and star of stage and screen; Jenny Holzer, subject of a major, 2009 exhibition at The Whitney Museum of American Art; Ann Hamilton, representative of the United States in the 1999 Venice Biennale; Guillermo Gomez-Peña and Liza Lou, winners of the MacArthur "Genius Award"; Mona Hatoum, the first artist ever awarded the prestigious Sonning Prize; Shirin Neshat, world-renowned Iranian artist and filmmaker; Leon Ferrari, one of two artists presented in 2009 at the Museum of Modern Art, New York, in *Tangled Alphabets*; and Ana Mendieta, a Cuban-born artist whose retrospective was presented in 2004 at The Whitney.

The "Culture Wars" of the 1990s had an impact on Franklin Furnace and the works that were presented during its second decade. Franklin Furnace presented three of the four "NEA Four" artists, John Fleck, Holly Hughes, and Karen Finley, before the Culture Wars brought them to national notoriety. The individual and collective impact of artists such as these upon larger culture is documented in the unique materials held in the archives of Franklin Furnace. Its variable media records also trace the rise of collaboration among artists, writers, photographers, architects, historians, and scientists, and the new creative practice of collaborative authorship, which fostered the presentation of multiple perspectives on a single subject.

About the Archival Holdings

Franklin Furnace's event records document the organization's initial focus on exhibiting artists' books and providing a venue for artists' readings, tracing how exhibits of the books grew into site-specific installations at the same time as artists' readings evolved into performance art. The organization's archives include event files, audio works, calendars, mail art, moving images, press clippings, institutional publications, reference

books, and artists' books. Except for the original art works held in the special collections, all materials in the archives serve as support collections that enhance and enrich the central importance of the event files.

Primary Collection: Event Documentation, 1976-present. This collection consists of analog and digital documentation and support material from the 1,417 events produced at Franklin Furnace. Physical event files may include posters, drawings, printed matter, slides, photographs, negatives, CD's and DVD's which document performances and installations. Digital files may include still and moving images, text, and email. In addition, both file types contain support materials such as correspondence between the artist and Franklin Furnace, formal proposals to present work at Franklin Furnace, contracts, budgets, notes, and other ancillary material related to the event. All events are cataloged to the folder level. Event images from the first decade have been cataloged to an item level. Physical files are stored in archival folders within document boxes that sit atop metal shelving in a climate-controlled space; this physical collection measures 94 linear feet. Digital files are stored on an in-house server in an arrangement that mirrors that of the analog collection.

Support Collection: 1976-present. This collection consists of moving images, calendars, publications, references books, press clippings, and audio works that relate to the event files in Franklin Furnace's primary collection. It contains:

- **Moving Images:** There are 717 moving images in various formats. Franklin Furnace has both the original and mini DV duplicates stored onsite in 30 record storage boxes and cataloged at an item level. The moving image collection is partially digitized according to best practice archival standards.
- **Press Clippings:** There are 738 articles written about Franklin Furnace. The clippings are cataloged to an item level and are arranged chronologically in three ring shelf binders. Each article is stored in an archival sleeve. The content of this collection is not digitized.
- **Audio:** 62 items of audio in various media exist that relate to the event files. They are stored in 1 record storage box and are cataloged to an item level. The audio from 34 artists have been digitized according to best practice archival standards.
- **FF Publications:** This collection contains one copy of all fifty-six Franklin Furnace publications. The items are stored in three record storage boxes and are cataloged to the item level. The content of this collection has not been digitized.
- **Reference Books:** Franklin Furnace has a collection of 200 books that relate to Franklin Furnace artists and performances presented at Franklin Furnace. The books are cataloged to an item level and specific pages are linked to individual event records.
- **Calendars:** There are 54 printed calendars that document months or seasons of performances scheduled at Franklin Furnace. The calendars are stored in archival folders and document boxes but have not been cataloged or digitized.

Special Collection: 1976 – present. This collection consists of artists' books and mail art collected and received by Franklin Furnace. The mail art collection has not been processed and is cataloged to the folder level. The artists' books that remain in the

archives are extra copies from the collection that was transferred to the MoMA and are cataloged to the item level.

A Brief History of Digitization at Franklin Furnace

In 2006, Franklin Furnace began an effort to digitize, describe, and publish online the visual records of events presented and funded by Franklin Furnace over the past 30 years. The principal goal of this project is to embed the value of variable media art practice in art and cultural history by increasing access to our collection. The NEH, with matching support from Booth Ferris Foundation, and the New York State Council on the Arts' Digitization initiative, funded the first phase of the project – to digitize and publish online records from the first decade of events. During this time, Franklin Furnace also became the first “alternative space” to partner with ARTstor.

The first year of the NEH grant coincided with Franklin Furnace's first year of collaboration with ARTstor. The original work plan of our 2006 grant was modified so ARTstor would take the responsibilities for scanning in exchange for the right to publish Franklin Furnace's event documentation on their site. A test bed of 26 alphabetical events were digitized by ARTstor and then cataloged by Franklin Furnace; this served to create digitization and documentation standards and a defined workflow between the two organizations. As a direct result of this experience, Franklin Furnace was able to establish and write best practice guidelines for scanning and cataloging of its materials.

In 2008, Franklin Furnace received a one-year extension for the NEH grant. This extension resulted from a slower-than-expected turn-around time for images being scanned by ARTstor. Franklin Furnace and ARTstor jointly decided that the scanning of all images would be faster if done in-house by Franklin Furnace. In May 2008, ARTstor contributed \$20,000 to Franklin Furnace in order to support this effort. Scanning of event documentation from the first ten years was completed in the spring of 2009.

During the first phase of this project, we budgeted for a web developer to export our database to our website, but when it came time to publish the database, for reasons of cost effectiveness and sustainability, we decided to publish and host it ourselves. We set up a host computer with a static IP address and purchased FileMaker Server Advanced to allow for more files and users. An online database containing catalog records of events and images was added to our website using FileMaker Instant Web publishing in the summer of 2009. This database can be accessed through the splash page on our website (www.franklinfurnace.org). Images and catalog records were also shared with ARTstor for publication on its website.

Digitization Workflow Overview

This digitization workflow established at Franklin Furnace consists of seven stages of activity:

1. [Material Selection](#)
2. [Preparation of Materials](#)
3. [Scanning](#)
4. [Image Processing](#)
5. [Derivative Creation](#)
6. Database Integration
7. Publish Online

Material Selection

Selection Policy

Analog archival documentation of each performance art event is stored across five physical folders: event documentation, correspondence, support material, duplicates, and updates. While each folder is inspected for materials that may have been misfiled, only the materials in the event documentation folder should be considered for digitization. In particular, the contents of the duplicates folder are carefully compared to those of the event documentation folder to ensure that they are, in fact, duplicates.

The best copy of every document and all original photographic slides must be physically located in the event documentation folder.

Selection Criteria for Photographic Images

In general, the majority of images in the event documentation folder are scanned and a selection is included in the Image Database. The following guidelines apply to the selection of images for processing:

- Exclude duplicates

NOTE - Duplicate slides can be identified by the word "duplicate" imprinted by the lab on the mount or by visual inspection and comparison. Duplicates have more contrast than originals; whites are whiter and blacks are blacker with a noticeable reduction in middle tones. A color corrected light box and loupe are used for all evaluations.

- Exclude contact sheets when original negative film exists
- Exclude images unrecognizable due to errors in exposure and focus and/or images that contain excessive motion blur
- Process only the best image from a set of bracketed exposures
- Exclude redundant images of installations - when multiple images of the same section of an installation are taken from the same perspective, process the best image from the group
- Include different viewpoints of the same section of an installation
- Reduce through selection an overabundance of images and/or excessive documentation of a single aspect of a performance or installation – select images that proportionately represent the different aspects of an event
- For time-based events such as performances that are well documented with many images, edit as follows. Include two images of each significant action. For example if there are seven similar images of the performer standing at a podium, pick the best two. If the next ten images are similar shots of the performer dancing on stage, pick the best two (two that are as different from each other as possible).

Creating a balanced representation might not always be possible; performances and installations are often under-documented in which case every image must be utilized.

Selection Criteria for Textual and Printed Materials

The following guidelines apply to textual and printed materials:

- Exclude duplicates
- Exclude press articles, reviews, and listings clipped from publications
- Include ads clipped from publications that were created and paid for by Franklin Furnace
- Exclude paste ups, unless they contain original artwork or significant notations by the artist
- Exclude correspondence from outside parties to Franklin Furnace or its staff since we do not have copyright to publish this material
- Include Franklin Furnace press releases
- Include carbon copies of correspondence originating from Franklin Furnace, if it is of particular significance to the event

Determining Chronology for 35mm Slides

The vast majority of visual documentation in the collection is in 35mm slide format. The chronological sequence of these slides is significant in the case of dynamic time-based performance art, but generally not relevant for documentation of static installation art works. To understand the scope and nature of the event being documented, the contents of all files for each event should be examined prior to determining image series and order.

Identifying Image Series

Separate and group slides by examining the following criteria:

Different names of the labs that processed and mounted the film

- Lab names and logos are usually printed on the verso (emulsion side) of mounts

Variations in lab number imprint sequences

- Slide mounts usually have a sequential frame number and date of development imprinted on them
- Imprints often vary in color – red, blue, and black are common

NOTE – Mounts without imprints may be placed into sequence through examination of visual cues and/or by removing the film from the mount to read the frame number embedded on the film.

Additional information on slide mount

- Slide mount has a rubber stamp or handwritten note listing the photographer's name

NOTE - Any written information on mounts must be verified because slides were frequently labeled long after the images were processed and cannot be considered authoritative.

General content information

- Multiple photographs of the same instance taken from different perspectives

- Look for distinct lighting, style, coloration, or quality that sets images apart

Duplicates

- Mounts that have the word “duplicate” printed on the verso (emulsion side)
- Duplicate slide film, when removed from the mount, does not have a frame number embedded in the film
- Duplicates have increased contrast compared to originals (e.g. highlights look washed out without detail, blacks are too dark and a noticeable reduction in middle tones)

NOTE – Duplicates with corresponding originals must be moved to the Duplicate file. Likewise, the contents of the duplicate file should be compared to the Event Documentation file to ensure that a version of each image is included in the latter.

Note mounting materials

- Cardboard mounts are usually original
- Plastic mounts may be original or may indicate remounting
- Remounted slides are nearly always in a plastic mount and rarely in a cardboard mount

In the event of multiple slide sources or photographers, some general rules apply to establishing the order of image series:

- The largest series should be entered first in the database, as it is the most complete record of the event
- Each distinct series should be sequenced separately in the Image Database and when physically re-housing the slides (e.g. 1 of 5, 2 of 5, etc.)

Identifying Image Order within a Series

Determine the image order within each image series by examining the following criteria:

Numbers on mounts

- These numbers are more accurate than handwritten numbers on the slide mount

Numbers embedded in film

- Slides must be removed from mount to read these numbers

Directions for removing film from cardboard mounts:

1. Locate the corrugated hinge of the slide mount
2. Slit and pull the opposite edge to open the hinge like a book
3. Wearing cotton gloves, remove the film from the mount
4. Place the film on a clean polyester slide sheet in order of the numbers printed on the film (duplicate film is unnumbered)
5. Repeat this process until the order of all slides is determined
6. Remount exposed slide film in new plastic mounts

Specific content information

- Slide is placed on color-corrected light box and use loupe to see details

- Evidence of the natural progression of the result of actions such as building or painting
- Evolution of facial expressions, gestures, and/or costume changes
- Changes in light sources and shadow formations help situate image order

Preparation of Materials

Preparing 35mm Slides

Labeling 35mm Slide Mounts

Add to and/or correct existing labels on 35mm slide mounts in pencil

- Duplicates: "Duplicate, no original," "Duplicate, do not use" or "Duplicate of duplicate"
- Slides: artist surname, artist first name, # of #, performance/installation, mm/dd/yy, and photographer's credit, if available

Enter a note in the Image and/or Event database

- The "Note" field in the Image Database should capture information about individual images (e.g. Duplicate status)
- The "Note" field in the Event Database should capture information about the whole series of images documenting an event (e.g. Yikes! notes that highlight problems or notes regarding multiple photographers)

Cleaning Procedures for 35mm Slides

Cleaning is always done prior to scanning.

Standard Physical Cleaning

Prior to scanning, brush the slide lightly with an anti-static brush followed by a few blasts of pressurized air using a hand-held bulb blower. Nothing else should be done.

Intensive Physical Cleaning

Regarding solvents, Franklin Furnace has found 91% isopropyl alcohol to be an acceptable cleaner. 99% pure isopropyl would be better, but it must be specially ordered from a chemical supply firm. The cleaning product PEC-12 works well for exceptionally dirty slides.

Careful cleaning is time consuming, exposes the staff to potentially harmful vapors, and can unintentionally bring abrasive materials into contact with the film surface. Manual cleaning of slide film should be avoided because it heightens the risk of scratching the emulsion layer. Scratches destroy image detail by causing permanent damage to the emulsion layer.

Franklin Furnace prefers PEC*PAD non-abrasive photo wipes when cleaning slides; cotton swabs are too abrasive and photographic anti-static cloths quickly accumulate dirt and grit.

Damage can occur even when using approved non-abrasive wipes if gritty dirt on the slide's surface lodges in the wipe and is rubbed over the slide surface. Compressed air canisters often spew damaging and difficult to remove liquid onto the film surface.

Digital Scratch and Dust Removal

Do not use dirt and scratch removal tools when scanning.

Minor scratch and dust removal can be achieved using the clone tool in Photoshop.

Preparing Oversized Material

If material is stored rolled in a tube, it has to be unrolled and stored flat in a protected environment prior to shooting.

Scanning Procedures

Event documentation is scanned according to the pre-established technical specifications that are outlined by format below. Ideally, like formats should be grouped and scanned in sequence to maintain file-naming consistency.

SilverFast scanner software is used to produce all uncompressed archival scans. Slides are scanned using the Nikon Super Coolscan 5000 ED Film Scanner or the Epson Perfection v750 Pro. Flat reflective materials are scanned using the Epson Perfection v750 Pro flatbed scanner.

35mm Slides (on the Nikon film scanner)

Open SilverFast software

- Select the FF_Nikon5000ED.icc profile

Check and adjust SilverFast settings

- See [SilverFast Settings for Slide Scanner](#)
- Resolution is set to 3000 dpi at 100%

Insert slide into scanner

- Insert emulsion side facing down with the slide in portrait orientation

Pre-scan the Image

- Click the pre-scan button to preview the image

Generate the Uncompressed Archival Scan

- Reposition the selection marquee outside the image at a minimum of 4000 pixels on the long side leaving a thick black border (min. 75 pixels/side) to ensure that the scan can be cropped to the established processing specifications

Click the Scan button

- Name and save the image as a TIFF in its appropriate folder on the Image Server by following the [File Management](#) guidelines

35mm Slides (on the Epson flatbed scanner)

Open SilverFast software

- Original is set to Transparency (full area) in the General tab

Check and adjust SilverFast settings

- Resolution is set to 6400 dpi at 100%

Place Slides on Flatbed Scanner

- Place emulsion side facing up in the center of the scanner
- Remove the scanner's document mat

Pre-scan the Image

- Click the pre-scan button to preview the image

Generate the Uncompressed Archival Scan

- Reposition the selection marquee outside the image leaving a thick black border (min. 75 pixels/side) to ensure that the scan can be cropped to the established processing specifications

Click the Scan button

- Name and save the image as a TIFF in its appropriate folder on the Image Server by following the [File Management](#) guidelines
- Note: Though slides are scanned at 6400 dpi on the flatbed, the uncompressed image should be resampled down to 3000 dpi prior to creating a master file.

35mm Slide Details

Slide detail scans are performed in cases where the full frame image would insufficiently convey details of the performance that the image documents. Detail scans are scanned at the full image height, with the width cropped to dimensions that are inversely proportionate to full frame scans.

Open SilverFast software

- Select the FF_Nikon5000ED.icc profile

Check and adjust SilverFast settings

- See [SilverFast Settings for Slide Scanner](#)
- Resolution is set to 4000 dpi at 100%

Insert slide into scanner

- Insert emulsion side facing down with the slide in portrait orientation

Pre-scan the Image

- Click the pre-scan button to preview the image

Generate the Uncompressed Archival Scan

- Reposition the selection marquee inside the image at a minimum of 3600 pixels on the long side of the image
- Verify that the dimensions of the detail scan remain in proportionally consistent with the full-frame slide scans by using the chart¹ below:

¹ This chart was calculated using the following formula: original short side (2150) / original long side (3150) x new long side (3600). The original dimensions are taken from the size of the cropped and resized full frame master files.

image long side (pixels)	image short side (pixels)
3680	2512
3675	2508
3670	2505
3665	2502
3660	2498
3655	2495
3650	2491
3645	2488
3640	2484

Click the Scan button

- Name and save the image as a TIFF in its appropriate folder on the Image Server by following the [File Management](#) guidelines

Offset Lithography Prints

Images printed with offset lithography generally contain a halftone screen. The pre-existing halftone screen interacts with the scanning grid during digitization, which can result in visible moiré-pattern artifacts on the digital image file. As a result, these materials should be scanned according to the guidelines for all other flat materials, with the exception that they must be positioned on the scanner at an appropriate angle.

Black and white offset lithography: To minimize the moiré on these materials, scan these at a 15° degree angle by using the prepared angle template.

Color offset lithography: These materials will require examination in order to determine at which angle they should be scanned in order to minimize moiré. Make a note of these materials in the “List of Events – Second Decade” Excel file, so that the Senior Archivist can locate, scan, and process these materials.

Contact Sheets

Contact sheets should only be scanned in the absence of corresponding photographic negatives or prints. If the only photographic documentation for an event is a contact sheet, a small selection of frames should also be scanned and processed individually.

To scan individual frames from a contact sheet, please adhere to the following steps and specifications:

Open SilverFast software

- Select the FF_Epson5000ED.icc profile

Check and adjust SilverFast settings

- See [SilverFast Settings for Flatbed Scanner](#)
- Select either the 48-bit HDR RGB or 16-bit HDR Grayscale scan type
- Resolution is set to 300 dpi

Pre-scan the Image

- Click the pre-scan button to preview the image

Generate the Uncompressed Archival Scan

- Reposition the selection marquee outside an individual frame leaving a small black border to ensure that information is not cropped from the scan
- Change Silverfast output to 4.6 inches in height by 6.8 inches in width

Click the Scan button

- Name and save the image as a TIFF in its appropriate folder on the Image Server by following the [File Management](#) guidelines

Back-up Images

- Save copies to the appropriate external hard drive connected to the scanning station
- The folder management system on these drives should mirror the Image Server

All Other Reflective Materials

Open SilverFast software

- Select the FF_Epson5000ED.icc profile

Check and adjust SilverFast settings

- See [SilverFast Settings for Flatbed Scanner](#)
- Select either the 48-bit HDR RGB or 16-bit HDR Grayscale scan type
- Resolution is set to the appropriate dpi based on original size of the material at 100%

Position material on scanner bed

- Material smaller than 8.5 x 11 inches: Position at 90° just out from the top and left side of the scanner
- Letter size: Position at 90° with the length flush to the side, but the top lowered
- Cover material with the black background paper before closing the scanner lid

Pre-scan the Image

- Click the pre-scan button to preview the image

Generate the Uncompressed Archival Scan

- Reposition the selection marquee outside the image leaving a small black border to ensure that information is not cropped from the scan

Click the Scan button

- Name and save the image as a TIFF in its appropriate folder on the Image Server by following the [File Management](#) guidelines

Back-up Images

- Save copies to the appropriate external hard drive connected to the scanning station
- The folder management system on these drives should mirror the Image Server

Image Processing

Image processing occurs in two stages. Straightening the uncompressed image—except in the case of slide details—prepares it for the creation of the first derivative copy – a master TIFF file. The master TIFF file is then optimized so that it may be used to create the viewing, reference, and thumbnail derivatives. The goal of image processing is to improve image quality so that the images portray the event or installation that they document as accurately as possible.

How to Create the Master Derivative

Create the master derivative by opening the uncompressed image file in Photoshop and performing the following sequence of actions:

Straighten the image – except in case of slide details

- Use the ruler tool to draw a straight line across the bottom or side of the image
- Zoom in closely to ensure that the beginning and end of the ruler tool are as evenly positioned in relation to the image as possible
- Image > Rotate Canvas > Arbitrary > OK

Save the uncompressed file

Create the master derivative file

- Image > Duplicate As > Save
- Select TIFF format, Click Save
- Refer to [File Naming Conventions](#) section when naming the file
- Select the following TIFF Options when saving: Image Compression – None; Pixel Order – Interleaved; Byte Order – IBM PC; Layer Compression – RLE

The Byte Order setting should be IBM PC regardless of whether the file is being created on a Mac or PC.

Complete processing of the master derivative file as per the relevant set of instructions below

35mm Slides

Crop

- Display grid lines: Ctrl + ' (apostrophe)
- Use the crop tool to create a black border of 75 pixels per side to the slide (this is the equivalent of adding one square in default grid per side)
- The black border should appear to be evenly distributed around the image²

² This is a departure from previous scanning protocol, but is desirable because the rounded mounts and frayed image edges of slides make a tighter crop difficult without losing information or leaving unsightly artifacts in the image's corners.

Convert color profile

- Run the relative rendering “Convert Profile” script to convert to Adobe RGB 1998

Perform contrast and/or color correction, if necessary

- See the [How to Correct Contrast and Color](#) section of this guide

Retouch in rare cases and only if it interferes with the reading of the image

- Select Background layer
- Layer > Duplicate Layer > Name as: Retouch Layer
- Use the Spot Healing Brush, Healing Brush, and/or Clone tools
- Only retouch significant visible damage to the slide, rescan if it is possible to improve the scan quality
- Zoom in while retouching, but zoom out to identify the areas that need work

Convert tonal resolution³

- Image > Mode > 8 Bits/Channel
- Converts image from 48-bit RGB to 24-bit RGB

Standardize pixel dimensions

- Standardize pixel dimensions to 3150 pixels on the longest side: Image > Image Size > Width or Height: 3150 pixels
- Ensure that the *Resample Image* and *Constrain Proportions* boxes in the Image Size dialog box are checked

35mm Slide Details

Convert color profile

- Run the relative rendering “Convert Profile” script to convert to Adobe RGB 1998

Perform contrast and/or color correction, if necessary

- See the [How to Correct Contrast and Color](#) section of this guide

Retouch in rare cases and only if it interferes with the reading of the image

- Select Background layer
- Layer > Duplicate Layer > Name as: Retouch Layer
- Use the Spot Healing Brush, Healing Brush, and/or Clone tools
- Only retouch significant visible damage to the slide, rescan if it is possible to improve the scan quality
- Zoom in while retouching, but zoom out to identify the areas that need work

Convert tonal resolution⁴

³ All adjustments to the image must be made in 48-bit RGB. Reducing to 24-bit RGB before flattening will apply changes to the image in a smaller color space.

- Image > Mode > 8 Bits/Channel
- Converts image from 48-bit RGB to 24-bit RGB

Standardize pixel dimensions

- Standardize spatial resolution to 3150 pixels on the longest side: Image > Image Size > Width or Height: 3150 pixels
- Ensure that the *Resample Image* and *Constrain Proportions* boxes in the Image Size dialog box are checked

Standardize spatial resolution

- In order to normalize the slide detail masters in accordance with the full-frame slides, downsample these master files to 3000 ppi. Reopen the Image Size dialog box Image > Image Size > Resolution: 3000 pixels
- Ensure that the *Resample Image* box in the Image Size dialog box is unchecked

Reflective Materials

Crop

- Set crop tool to constrain to the original width by original height at 300 ppi
- Do not leave any black edge around the image

Convert color profile, if color material

- Run the relative rendering "Convert Profile" script to convert to Adobe RGB 1998
- If colors don't look right, try perceptual rendering

Perform contrast and/or color correction, if necessary

- See the [How to Correct Contrast and Color](#) section of this guide

Retouch in rare cases and only if it interferes with the reading of the image

- Select Background layer
- Layer > Duplicate Layer > Name as: Retouch Layer
- Use the Spot Healing Brush, Healing Brush, and/or Clone tools
- Only retouch significant visible damage if it is distracting (e.g. black hair embedded in the emulsion against a white wall)
- Rescan if it is possible to improve the scan quality
- Zoom in while retouching, but zoom out to check your work and identify areas that need work

Convert tonal resolution²

- Image > Mode > 8 Bits/Channel

⁴ All adjustments to the image must be made in 48-bit RGB. Reducing to 24-bit RGB before flattening will apply changes to the image in a smaller color space.

- Converts image from 48-bit RGB to 24-bit RGB

Standardize spatial resolution

- Standardize spatial resolution to 3000 pixels on the longest side: Image > Image Size > Width or Height: 3000 pixels

When and How to Increase Image Resolution

It is always preferable to work from a high-resolution image because increasing the resolution of a low-resolution image will always result in blurry details.

In cases where the only available images are low-resolution, the resolution should be increased during the process of creating a high-resolution master derivative. This will ensure that the image used to create the derivatives files is of the best possible quality that can be obtained from a low-resolution image.

To create this best-practice procedure, a comparison of tests made to one image. First, the number of steps (1 step: 72dpi to 300 dpi; 2 steps: 72dpi to 150dpi, then to 300dpi; 3 steps: 72dpi to 120dpi, then to 180 dpi, then to 300 dpi) in increasing the resolution were tested. The two-step increase gave the best results, producing a sharper and more detailed image.

Once a staged resolution increase procedure was established, different resampling algorithms were tested: Bicubic, Bicubic Smoother and Bicubic Sharper. The order and combination of these algorithms were also evaluated. The combination of Bicubic and Bicubic Sharper gave the best results, although the use of only Bicubic also gave good results.

To judge of the quality of the image and its details, an emphasis was placed on details such as hair, hand and clothing, because those elements are common of images processed by Franklin Furnace.

Create an Uncompressed File

- If the image depth is 8 Bits/Channel, change it to 16 Bits/Channel before the procedure. This helps in reducing flat surfaces in the resulting image.
Image > Mode > 16 Bits/Channel
- Increase the resolution in two steps, using a combination of algorithms.
 - Image > Image size...
From 72 to 150 dpi, use the Bicubic algorithm, by selecting it under Resample image
 - Image > Image size...
From 150 dpi to 300 dpi, use the Bicubic Sharper algorithm.
In the case of a sharp or high-contrast image, the algorithm Bicubic could also be used as a second step. Try both options and select the one that looks the best.
- Name and save the image as a TIFF in its appropriate folder on the Image Server by following the [File Management](#) guidelines

Create a Master Derivative File

- Change the depth to 8 Bits/Channel: Image > Mode > 8 Bits/Channel

- Name and save the image as a TIFF in its appropriate folder on the Image Server by following the [File Management](#) guidelines

Describe at the Image Level

In order to avoid confusion about the quality of the uncompressed files created from lower resolution originals, the following note should be recorded in the image_notes field when cataloging at the image level: "Low resolution original; resolution artificially increased for processing."

How to Correct Contrast and Color

The goal of contrast and color correction procedures at Franklin Furnace is to ensure that, to the greatest extent possible, digitized visual images reproduce the color as it was experienced by someone who witnessed the event. To this end, an emphasis is placed on cast reduction, restoring a full tonal range, and establishing believable flesh tones.

The simplest strategy that requires the least intervention is always preferred when correcting images. However, a variety of circumstances including poor lighting at the time of image capture, damage to the original documentation, and the digitization process itself may result in the need to pursue some combination of the methods outlined below, which have been determined appropriate for use by Franklin Furnace staff.

It is best practice to always work with the uncompressed file open alongside the master (Window > Float All) so that immediate feedback is provided on whether your adjustments improve image quality.

Images with a severe colorcast or other issues that defy correction are earmarked for processing by the Senior Archivist. For a more detailed and nuanced understanding of the methods briefly described here, please refer to Professional Photoshop: The Classic Guide to Color Correction.⁵

Evaluate Images

A color-corrected light source for reflective and transparent material positioned at a 90 degree angle to the monitor so that you can look back and forth, but cannot see them both simultaneously.

Either contrast or color will be the most significant problem with the image and a separate adjustment curve should be created in Photoshop for each issue, unless the changes made are extremely subtle. As a rule, contrast and color curves should be created in the order of their importance.

Most often, a single contrast curve adjustment layer will be sufficient to correct the image; however, in some cases it is difficult to accurately adjust contrast because of color distortion in the image. In such scenarios, the procedure is to create a color adjustment curve first, followed by a contrast curve to correct the tonal range.

Identify Light and Dark Points

- Layer > New Adjustment Layer > Threshold - Temporarily create this adjustment layer to locate the darkest and lightest points with detail (i.e. avoid selection of light sources although they are technically the brightest points)

⁵ Margulis, Dan. Professional Photoshop: The Classic Guide to Color Correction. Berkeley, CA: Peachpit Press, 2007. Print.

- Drag the threshold level to its extremes to locate the darkest and lightest points
- Using the color sampler tool set to 5 by 5 Average sample size, clicking the image on the darkest and lightest points
- Delete the threshold adjustment layer, which will leave the sampled color points for you to add to a contrast curve

How to Create a Contrast Curve

In images where black and white are dominant and there are no mid-tones, alter the quartertones. Alternatively, for images with a good tonal range, address contrast by adjusting the blacks and whites.

- Layer > New Adjustment Layer > Curves... > Name as: contrast
- Must be applied as a luminosity layer
- Adjust the contrast curve by modifying the points missing a full range of color. If necessary, set anchor points on the curve in areas where there is a perfect tone that should not be altered when adjusting the other areas of the image.
- Adjustments are made by moving the sampled points the contrast curve up and down to achieve target numbers:
 - Target RGB numbers for a white with detail are minimum of 220 and, ideally, 245 in each channel
 - Target RGB numbers for a black with detail are maximum of 20 and, ideally, 15 in each channel
- Improve the contrast by selecting each point and using the up and down arrow keys to bring the numbers to these target levels

How to Create a Color Curve - *used only when the image requires color correction*

- Layer > New Adjustment Layer > Curves... > Name as: color
- Must be applied as a color layer
- Add the sampled points separately to each channel in the color curve
- Correct the color by selecting each point in each channel and using the up and down arrow keys to bring the numbers to the target numbers outlined above
- Channel Blend –strategy to correct a color cast on its own or in addition to a color curve

How to Correct Tungsten Lighting Cast

The most common problem to resolve will be a yellow cast due to the fact that daylight film was used for Tungsten lighting. In this case, the following procedure is effective:

- Raise the worst quality channel's numbers by blending it into one of the other channels
- Don't blend the worst channel into the channel of a color that you want to showcase in the image because it will be reduced in the image by the act of channel blending
- View each RGB channel to determine the worst quality channel (grainy, poor contrast)

- In the “Layers” panel, duplicate background layer, and highlight this duplicate layer
- In the “Channels” panel, select and highlight only the worst quality channel
- Image > Apply Image, then adjust settings - Layer: Merged, Channel: Target channel, Blending: Normal, Opacity: adjust percentage until desired effect is achieved, click OK
- Right-click duplicate background layer > Layer Properties > Name to reflect process: eg. 25% green into blue
- Create a Contrast Curve and adjust the tonal range

How to Create a Hue Saturation Layer

- Use this tool in exceptional cases to reduce a strong color cast or posterized color without draining all the color away from the image
- Layer > New Adjustment Layer > Hue/Saturation...
- Select cast color from the drop-down menu in the Adjustments panel
- Adjust saturation levels until cast color is reduced
- Right-click Hue/Saturation layer > Layer Properties > Name to reflect process (i.e. - 65% yellow)

Processing Black and White Textual Documents

- Create a contrast curve
- Using the color sampler tool, select a white and black point and add them to the contrast curve, adjusting to target numbers:
 - Target RGB numbers for a white with detail are minimum of 220 and, ideally, 245 in each channel
 - Target RGB numbers for a black with detail are maximum of 20 and, ideally, 15 in each channel
- Stamp all visible layers: Shift + Ctrl + Alt + E
- Sharpen in the Master copy (Filter > Sharpen > Unsharp Mask) with a high radius, low amount (HiRaLoAm) setting: Amount = 15, Radius = 50, Threshold = 0.⁶
- Textual documents will be sharpened again in the viewing and reference derivatives using the typical high pass sharpen

⁶ The conventional sharpen on darken mode, creates too many artifacts, therefore the HiRaLoAm sharpen is preferred for textual documents.

Derivative Creation

How to Create Derivative Images

The archival master image is the source for the three derivative versions of the image that are created: the viewing, reference, and thumbnail images. Once processing of the master file has been completed, derivative copies are created. It is essential to create each derivative in sequence from highest to lowest resolution as resolution can only be removed from an image and not added to it.

Like the uncompressed and master TIFF files, all three derivatives should be saved on Franklin Furnace Image Server. Eventually, the derivatives will be embedded directly into the Franklin Furnace Image Database.

Prepare the Master TIFF for Duplication

- Flatten the master by merging all visible layers: Shift + Ctrl + E
- Rotate the image into landscape view

Duplicate the Master TIFF

- Image > Duplicate As > (3 times)
- As each duplicate is generated, add the appropriate suffix to the Save as... dialog box
- Close the master TIFF without saving the rotation and layer merge

Process the Viewing Derivative

- Run the viewing size action script
- Increase the image zoom to 100%
- Sharpen appropriately using the high pass sharpen setting: Filter > Other > High pass
- Save as a JPG, with Quality set to 8

Process the Reference Derivative

- Run the reference size action script
- Increase the image zoom to 100%
- Sharpen appropriately using the high pass sharpen setting: Filter > Other > High pass
- Save as a JPG, with Quality set to 5

Process the Thumbnail Derivative

- Run the thumbnail action script
- Save as a GIF

How to Create Derivative Textual Documents

Once processing of the master file has been completed will the following derivative copies be created: one thumbnail and one PDF/A-1b format reference file. Only the first image of textual documents will have a thumbnail created from the archival master image.

Like the uncompressed and master TIFF files, the derivatives should be saved on Franklin Furnace Image Server. Eventually, the derivatives will be embedded directly into the Franklin Furnace Image Database.

Prepare the Master TIFF for Duplication

- Flatten the master by merging all visible layers: Shift + Ctrl + E
- Rotate the image into landscape view

Duplicate the Master TIFF

- Image > Duplicate As > (once)
- As each duplicate is generated, add the appropriate suffix to the Save as... dialog box
- Close the master TIFF without saving the rotation and layer merge

Process the Viewing Derivative

- Run the viewing size action script
- Increase the image zoom to 100%
- Sharpen appropriately using the high pass sharpen setting: Filter > Other > High pass
- Save as a JPG, with Quality set to 8

Process the Thumbnail Derivative

- Run the thumbnail action script
- Save as a GIF

Create the PDF/A-1b Reference File

- Open Acrobat Pro X
- Run the Compound_OCR_PDF_A action script (File > Actions >)
- Select all pages of the document by clicking Add Files... in the dialog box
- During the pause in the action script, correct the OCR by reviewing all suspects (Tools > Recognize Text > Find First Suspect)
- Once completed, click Continue in the action script dialog box
- Save as a reference file

Appendix 1: Equipment

Items documenting performances, installations, and other events at Franklin Furnace Archive are scanned and processed on-site using the following scanning station configurations:

Scanning Station One

Hardware

- HP Intel Core2 Quad CPU w/ EIZO ColorEdge CE 240W 24" LCD Monitor
- Nikon Super Coolscan 5000 ED Film Scanner
- Nikon SA-21 Strip Film Adapter
- Nikon SF-210 Auto Slide Feeder
- Epson Perfection v750 Pro flatbed scanner
- Graphiclite Professional Desktop color viewer

Software

- SilverFast scanner software
- Adobe Photoshop CS5
- Adobe Bridge CS5
- ColorNavigator CE monitor hardware calibration software

Scanning Station Two

Hardware

- Mac Pro Quad-Core w/ EIZO ColorEdge CE 240W 24" LCD Monitor
- Epson Perfection v750 Pro flatbed scanner
- Graphiclite Professional Desktop color viewer

Software

- SilverFast scanner software
- Adobe Photoshop CS5
- Adobe Bridge CS5
- ColorNavigator CE monitor hardware calibration software

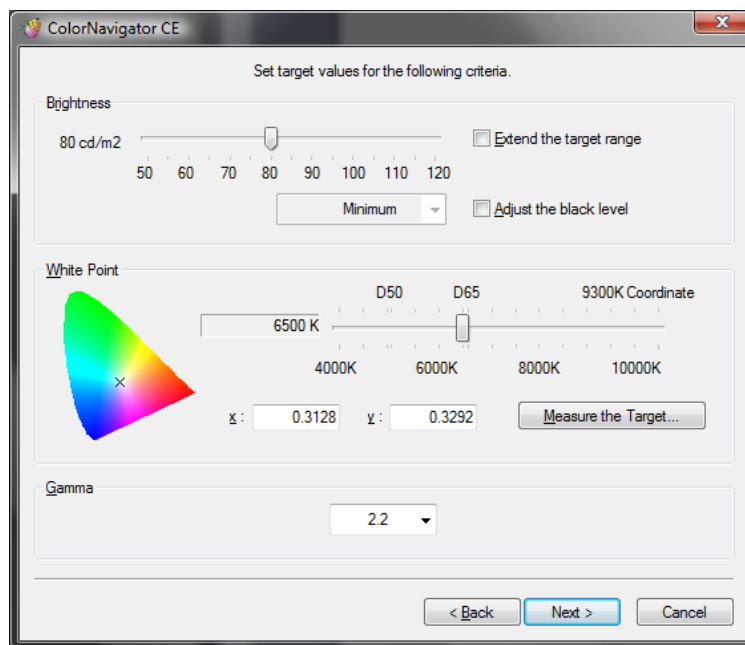
Hardware Maintenance

The flatbed scanner and monitors should be kept dust free. Fingerprints and other visible blemishes on these surfaces should be cleaned using a dry soft cloth.⁷

Monitor Calibration

It is important to calibrate each monitor bi-weekly using the ColorNavigator CE software. The operator initials and date of calibration should be recorded in the Monitor Calibration Log.

1. Initiate the ColorNavigator CE software
2. Plug the X-Rite measurement device into either of the two USB ports on the scanning station's tower face
3. Select the Eye-One Display / ColorEdge CX1 measurement device
4. Review and adjust the target values for the Brightness, White Point, and Gamma settings according to the following parameters:



5. Open the monitor hood and place the X-Rite device over the mouse image
6. Initiate the calibration process; when completed, save the settings over the previous reading and remove the X-Rite device from the screen

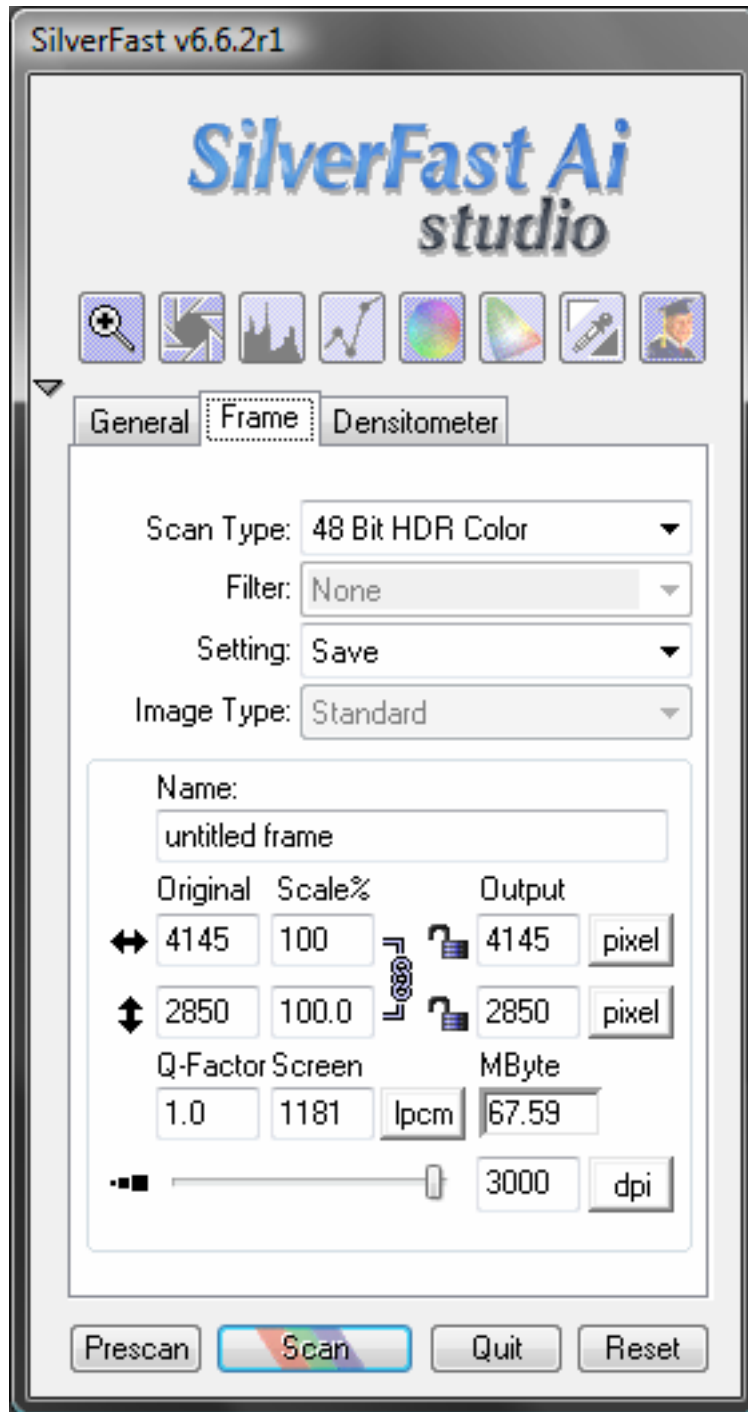
⁷ For example, Ilford Antistaticum Resuable Cloth.

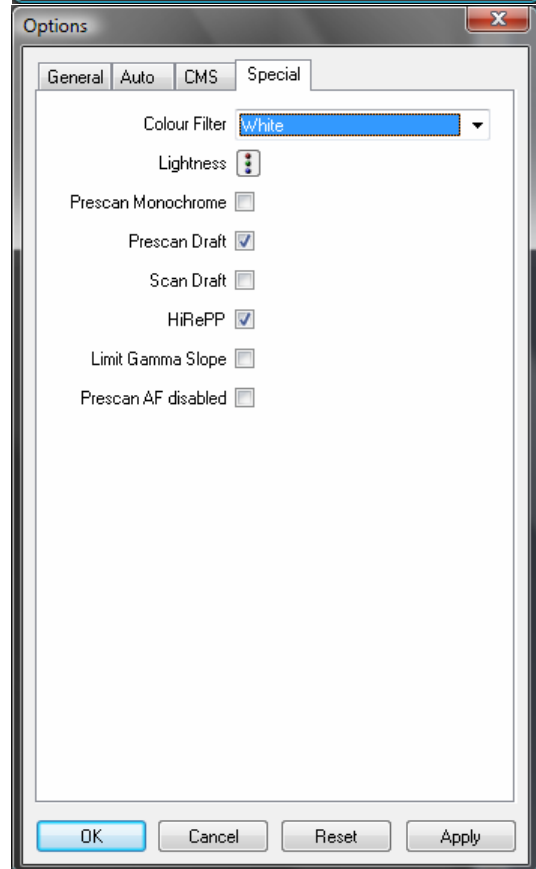
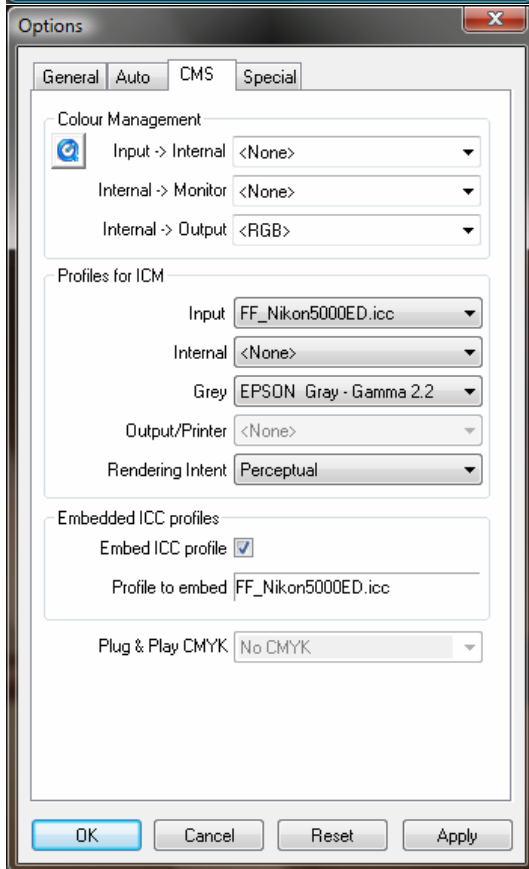
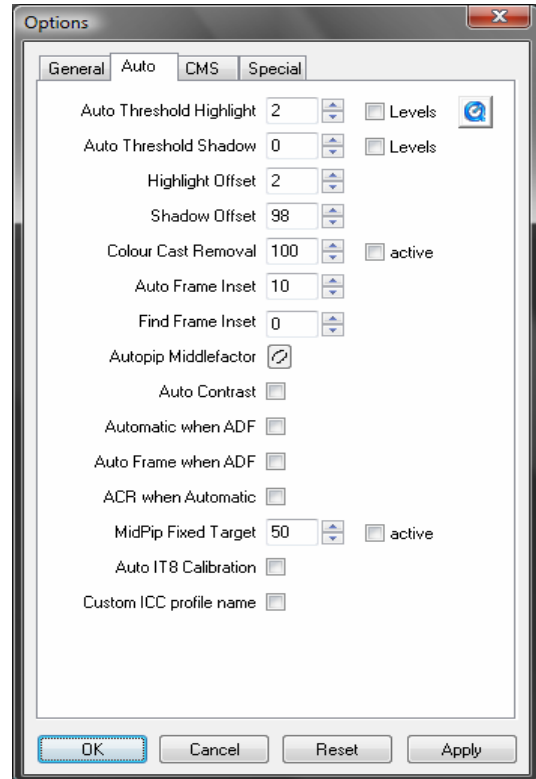
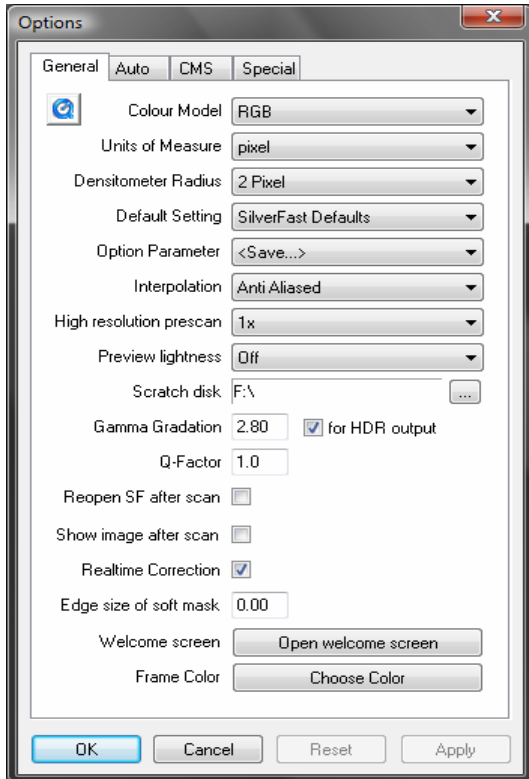
Software Maintenance

Check for software updates monthly.

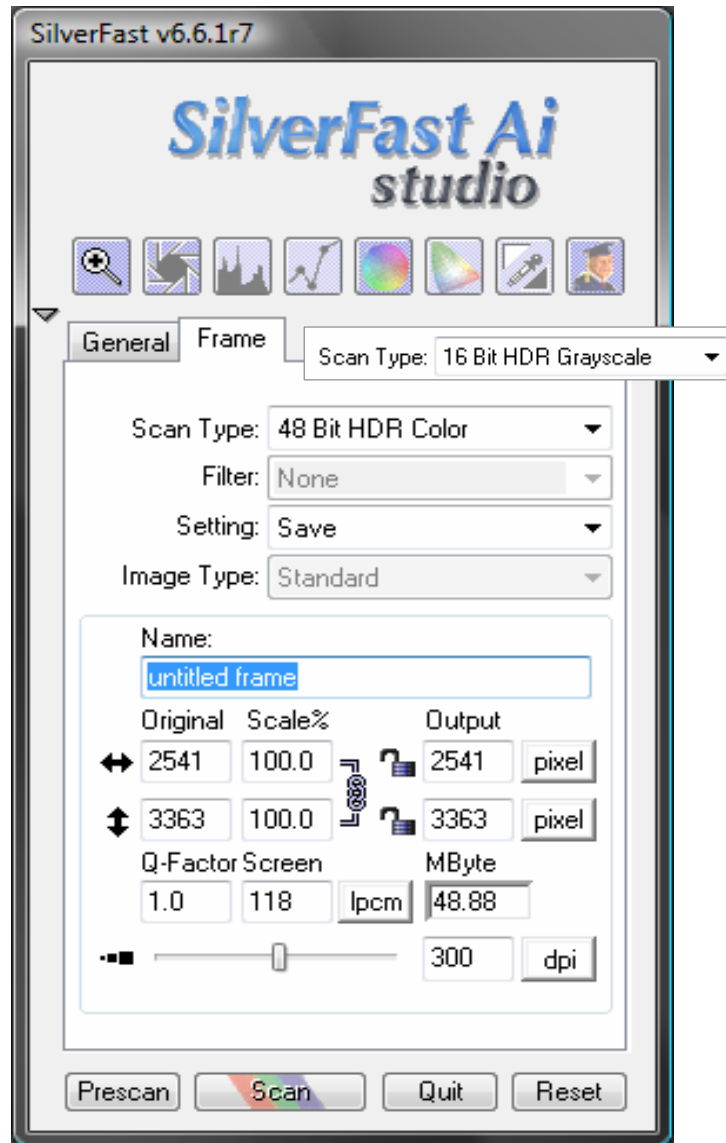
Appendix 2: SilverFast Scan Settings

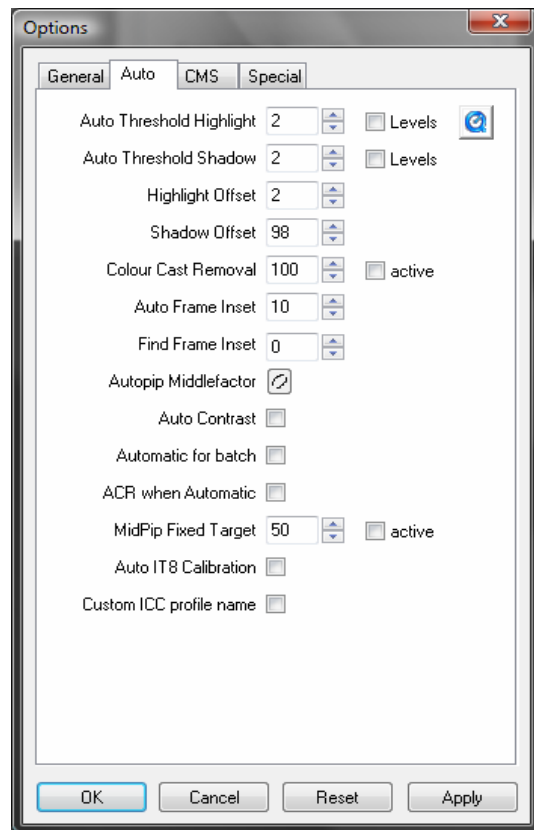
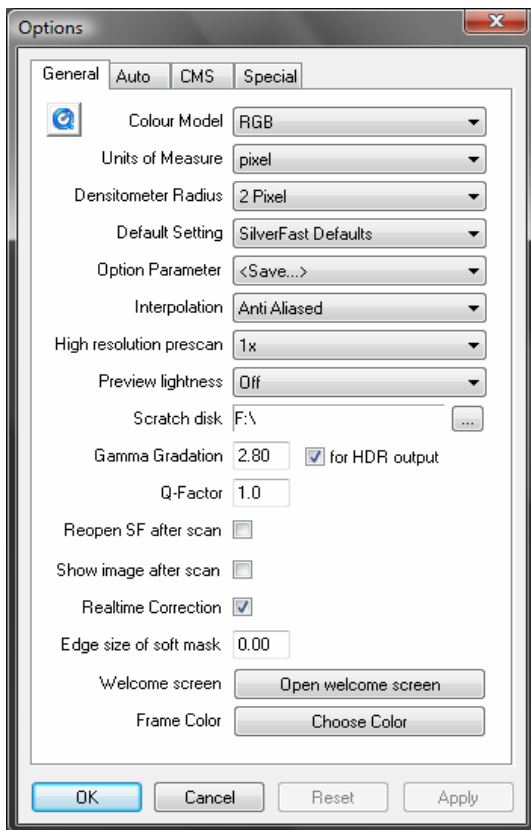
SilverFast Settings for Slide Scanner

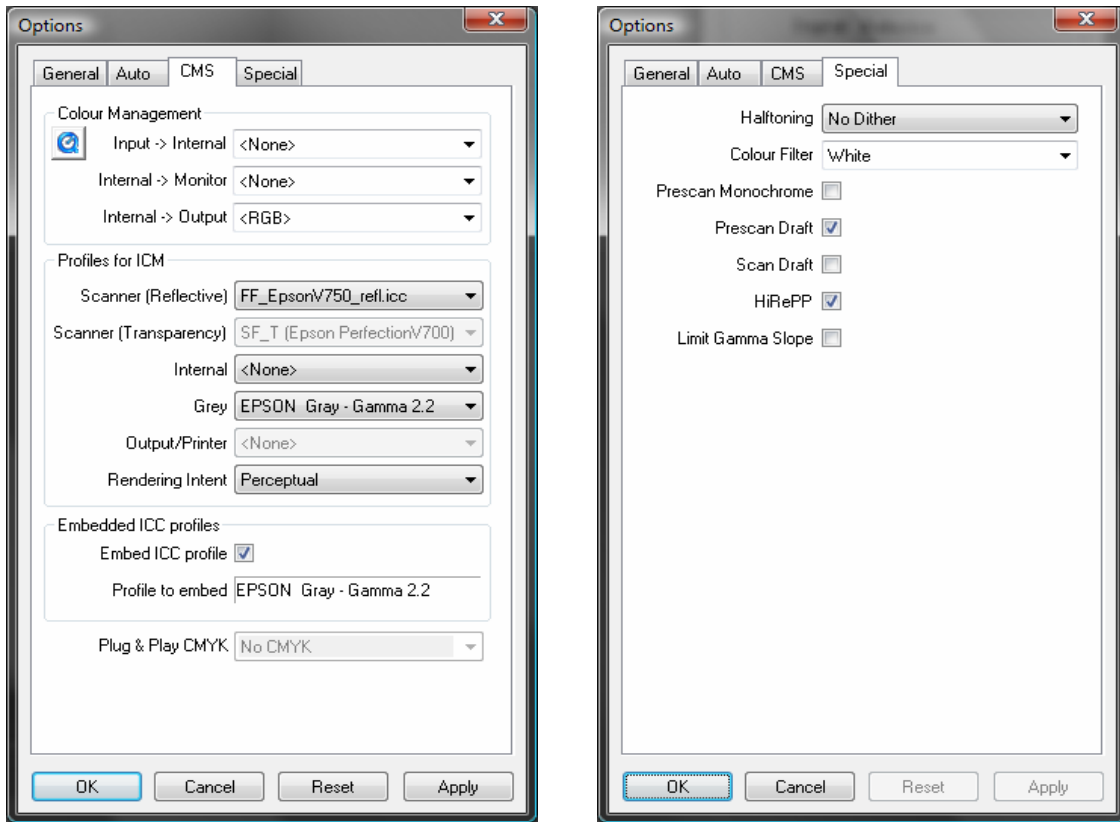




SilverFast Settings for Flatbed Scanner







Appendix 3: Technical Specifications

The event documentation archives contain two broad categories of material: transparencies (e.g. 35mm slides, black and white negatives, and color negatives) and reflective materials.

While no single set of image quality parameters can be universally applied across formats, Franklin Furnace has developed a generalized scanning protocol based on Library of Congress research for each of these categories of material.⁸

The following tables contain the technical specifications for the four derivative image types that are created from unedited and uncompressed archival copies (master, viewing, reference, and thumbnail versions).

Flat reflective material larger than 8.5 x 11 inches will be digitized using a digital camera

⁸ Library of Congress. "Digital Master Images - Sample Technical Specifications for Photograph Collections." June 2004, e-document. 28 June 2010
http://www.loc.gov/rr/print/tp/DgtlMastersSampISpecsSelctdRcmdFinal7_2004.pdf

Technical Specifications for 35mm Transparencies

File Type	Spatial Resolution (PPI)	Pixel Dimensions	Tonal Resolution	Target File Size	File Format	Color Space (Embedded)	Notes
Archival (u) (uncompressed)	Full Frame: 3000 ppi Detail Scan: 4000 ppi at 100% of original size	Full Frame: 4000 pixels Detail Scan: 3600 pixels minimum on the long side	16-bit RGB or 16-bit Gray	70 MB	TIFF	Custom ICC profile for Nikon Super Coolscan 5000 ED	No color correction or sharpening
Master (m)	3000 ppi at 100% of original size	3150 pixels on the long side	8-bit RGB or 8-bit Gray	30 MB	TIFF	Adobe RGB 1998	Cropped, color corrected, minimal retouching for dirt and scratches, and sharpened
Viewing (v)	96 ppi (monitor resolution)	1920 pixels on the long side*	8-bit RGB or 8-bit Gray	Maximum 7 MB Compressed 500 KB	JPEG	Adobe RGB 1998	Created from master
Reference (r) (web)	72 ppi (web resolution)	640 pixels on the long side*	8-bit RGB or 8-bit Gray	Maximum 821.3 KB Compressed 50 KB	JPEG	sRGB IEC61966-2.1 (web colors)	Created from master
Thumbnail (t) (database, web)	72 ppi web resolution	150 pixels on the long side*	8-bit RGB or 8-bit Gray	Maximum 10 KB	GIF	sRGB IEC61966-2.1 (web colors)	Created from master

* Pixel dimensions are based on standard monitor resolutions 1920 x 1080 and 1920 x 1200 (widescreen)

Technical Specifications for Flat Reflective Material

File Type	Spatial Resolution (PPI)	Pixel Dimensions	Tonal Resolution	Target File Size	File Format	Color Space (Embedded)	Notes
Archival (u) (uncompressed)	Variable ppi at 100% (see below)	3000 pixels minimum on the long side	16-bit RGB / 16-bit Gray	Varies depending on size of original	TIFF	Custom ICC profile for Epson V750 scanner.	No color correction, cropping or sharpening
Master (m)	size	ppi	3000 pixels on the long side	8-bit RGB / 8-bit Gray	TIFF	Adobe RGB 1998	Minor retouching for dirt and scratches, color corrected, cropped and sharpened
	8x10	300					
	5x7	450					
	4x6	600					
	4x5	600					
smaller	900+						
Viewing (v)	96 ppi (monitor resolution)	1920 pixels on the long side*	8-bit RGB / 8-bit Gray	Maximum 7 MB Compressed 500 KB	JPEG	Adobe RGB 1998	Created from master
Reference (r) (web)	72 ppi (web resolution)	640 pixels on the long side*	8-bit RGB / 8-bit Gray	Maximum 821.3 KB Compressed 50 KB	JPEG	sRGB IEC61966-2.1 (web colors)	Created from master
Thumbnail (t) (web)	72 ppi (web resolution)	150 pixels the long side*	8-bit RGB / 8-bit Gray	Maximum 10 KB	GIF	sRGB IEC61966-2.1 (web colors)	Created from master

* Pixel dimensions are based on standard monitor resolutions 1920 x 1080 and 1920 x 1200 (widescreen)

Appendix 4: File Management

Event image files are stored alphabetically either by artist last name or artist group name; however, large group shows are interfiled alphabetically by title. Long-term preservation of digital master files requires a storage and migration strategy. The established procedure is to store digital objects in several places:

- Network > Server > Images (M Drive)
- External Hard Drives (01A, 02A, 03A)
- Franklin Furnace Database (only thumbnail, reference, and viewing versions)

The server is updated daily to three back-up hard drives one of which is rotated offsite on a weekly basis.

Archival Storage Directory Structure

Digitized event documentation is stored in the Images server in the following directory structure:

Order	Level	Naming Series	Example
1	Folder	Alphabet Group	a_archive_event\ b_archive_event\ c_archive_event\
2	Folder	Name or Title	aayamaguchi_m_archive\ andrews_nancy_archive\ arresting_artists_archive\
3	File	Images	aayamaguchi_101884_001sl_u aayamaguchi_101884_001sl_m aayamaguchi_101884_001sl_v aayamaguchi_101884_001sl_r aayamaguchi_101884_001sl_t

Archival Folders by Alphabet Group

Example: a_archive_event

This folder contains groupings of artists filed under the same letter of the alphabet. It is stored on a series of hard drives and contains a single subfolder for each event title or artist name, depending on how the event is cataloged.

Archival Folders by Artist Name or Event Title

Example: aayamaguchi_m_archive

This folder contains the uncompressed archival scans, corrected masters, and all derivative files for one event—if cataloged by title—or multiple events—if cataloged by artist. For instance, an artist name folder contains all images from every funded event attributed to that artist.

Archival Image File Naming Conventions

The filename of each item of event documentation contains six sections of information, as described in detail below. The total number of characters for all file names, including the period and file extension, must not exceed thirty-one characters. File naming conventions are strictly adhered to in order to permit identification of distinct events.

Example: aayamaguchi_101884_001sl_u.tiff

Event Documentation				
Order	Naming Series	Max. Char.	Description	Example
1	Artist or Event Name	11	<p>Must describe the file as it appears in the database and in physical storage.</p> <p>Common surnames may require addition of part or whole first name.</p> <p>Choice of characters and underscore placement are flexible.</p> <p>If last name is abbreviated, delete letters at end of the name to ensure files appear in alphabetical order.</p> <p>Short names may use fewer than 11 characters and/or include the full first name.</p> <p>The same principles are applied when creating files cataloged by event name.</p>	<p>Artist Name: aayamaguchi</p> <p>Event Name: ff_fights</p>
2	Event Date	6	<p>Preceded by an underscore.</p> <p>Defines the month, day, and two-digit year of event, in that order (MMDDYY).</p> <p>If date information is missing, substitute the letter "x".</p>	_101884

Event Documentation, continued																				
Order	Naming Series	Max. Char.	Description	Example																
3	Image Order	3	<p>Preceded by an underscore.</p> <p>Numbers must be assigned in unbroken consecutive numerical order (001, 002, 003, etc.)</p> <p>Each image must have a unique number.</p> <p>Three characters must be used.</p> <p>For time-based works like performance, images should be numbered chronologically by image series.</p>	_001																
4	Form	2	<p>Describes the physical manifestation of the original.</p> <p>If a slide is taken of a photo or printed matter, it is considered to be a slide original.</p> <p>Note: pm is printed commercially and typically contains images and text.</p>	<table border="0"> <tr><td>sl</td><td>slide</td></tr> <tr><td>ng</td><td>negative</td></tr> <tr><td>tx</td><td>text-only document</td></tr> <tr><td>pm</td><td>printed matter</td></tr> <tr><td>ph</td><td>photograph</td></tr> <tr><td>dg</td><td>digital original</td></tr> <tr><td>ar</td><td>artwork</td></tr> <tr><td>ob</td><td>object</td></tr> </table>	sl	slide	ng	negative	tx	text-only document	pm	printed matter	ph	photograph	dg	digital original	ar	artwork	ob	object
sl	slide																			
ng	negative																			
tx	text-only document																			
pm	printed matter																			
ph	photograph																			
dg	digital original																			
ar	artwork																			
ob	object																			
5	File Version	1	<p>Preceded by an underscore.</p> <p>Describes the technical specifications for the image.</p>	<table border="0"> <tr><td>_u</td><td>uncompressed</td></tr> <tr><td>_m</td><td>master</td></tr> <tr><td>_v</td><td>viewing</td></tr> <tr><td>_r</td><td>reference</td></tr> <tr><td>_t</td><td>thumbnail</td></tr> </table>	_u	uncompressed	_m	master	_v	viewing	_r	reference	_t	thumbnail						
_u	uncompressed																			
_m	master																			
_v	viewing																			
_r	reference																			
_t	thumbnail																			
6	File Extension	5	Reserves characters for a period followed by a file extension.	.tiff																

The filename of each calendar and publication contains six sections of information, as described in detail below.

Example: 050184_053184_001pm_u.tiff

Calendars and Publications				
Order	Naming Series	Max. Char.	Description	Example
1	Date From	6	<p>Specifies the beginning date of a publication or calendar.</p> <p>For example, a May 1984 publication would have a "date from" of 050184</p> <p>Defines the month, day, and two-digit year of event, in that order (MMDDYY).</p> <p>When the calendar is for a full season, but the specific start and end dates are unknown, use the date of release as "Date From" and xxxxxx as "Date To".</p> <p>If any part of the date is missing, substitute the letter "x".</p>	050184
2	Date To	6	<p>Same as above.</p> <p>Specifies the end date of a publication or calendar.</p> <p>For example, a May 1984 publication would have a "date to" of 053184</p> <p>If any part of the date is missing, substitute the letter "x".</p>	_053184
3	Image Order	3	<p>Preceded by an underscore.</p> <p>Numbers within a series must be assigned in unbroken consecutive numerical order (001, 002, 003, etc.)</p> <p>Each image must have a unique number.</p> <p>Three characters must be used.</p>	_001

Calendars and Publications					
Order	Naming Series	Max. Char.	Description	Example	
4	Form	2	<p>If a slide is taken of a photo or printed matter, it is considered to be a slide original.</p> <p>Note: pm is printed commercially and typically contains images and text.</p>	sl ng tx pm ph dg ar	slide negative text-only document printed matter photograph digital original artwork
5	File Version	1	<p>Preceded by an underscore.</p> <p>Describes the technical specifications for the image.</p>	_u _m _v _r _t	uncompressed master viewing reference thumbnail
6	File Extension	5	Reserves characters for a period followed by a file extension.	.tiff	

Batch Renaming of Image Files

Adobe Bridge can be used to efficiently rename large groups of files which need any part of their filename to be corrected. In order to successfully rename files, sort files by size and batch rename each derivative type separately using the appropriate combination of text and sequence number options.

Franklin Furnace Image Database Structure

Digitized event documentation for artists can be accessed in-house through the Franklin Furnace Database (FFDB). In the database, users will find each digitized image referenced alongside event-level information provided by the event record. A thumbnail, reference, and viewing version of each image is embedded directly in the database.

- A unique event identification (EV) number is generated for all events in the FFDB.
- Every image added to the image database is also assigned the corresponding EV number as part of the image cataloging process.
- Events have a one-to-many relationship with images in the FFDB.
- Images can be sorted and viewed in any configuration in the FFDB.
- A selection of descriptive fields from the event database is viewable from the image database.