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Printing from Digital Files Instead of Film ***What You Need To Know...***

Digital Photography has arrived! Simple capture, instant access, easy sharing, reusable film, new possibilities; it's a whole new ball game. And as in any good ball game, you can expect some surprises. That's what this article is about. Digital is changing the rules of photography, but the final version of the rulebook isn't done yet. At Color Services, we have fully embraced digital photo technology. It is exciting, challenging, and we are thrilled with the new levels of quality we can provide. We are learning and expanding our capabilities every day. One of the big challenges we are working with is blending the new possibilities of digital photography with the best attributes of tried-and-true photographic printing services. The following addresses one such blend: making economical photographic prints from digital files.

Traditional photo printing from film is a highly evolved process. All of the critical components are covered by well-established standards. You can walk into a photo lab anywhere in the world with a 35mm negative and get a decent print without having to provide much more information than your name. This is because the lab knows what to expect. Once the image is on that film, there is little you can do to change it. Digital changes all that. In fact, that is one of the attractions of digital. It's easy to change pictures! Fun, too! Now however, the photo lab no longer knows what to expect when called upon to make a print from a digital source. After having done this for a while, there is something we have come to expect: The unexpected!

To make things a bit more interesting, digital photo printing equipment can be much like an absent-minded professor. They are absolutely brilliant at their specialty, but incomprehensibly inept at seemingly simple things. In practice, this means the printer must be provided with precisely configured files and numbingly explicit instructions. If something is not exactly right, expect the unexpected! Sometimes it is easy to figure out what the problem is, other times it requires real detective work. It always takes the time and attention of a skilled technician.

We have found that more than three quarters of the files we receive will not print to client expectations without intervention. In order to keep to our delivery schedules and minimize waste, we have started checking each file before printing, a process called "preflighting". This extra work is not allowed for in our existing print pricing, yet it has significantly increased our costs. As a result we have added a \$2.00 preflight charge for each file we receive for standard printing on our Fuji Frontier. We are willing to waive this charge for clients who have demonstrated that they can consistently provide print-ready files and will accept responsibility for the results. If you are willing to accept responsibility for preflighting and organize your jobs

to conform to our production methods, you can actually get lower prices with our DD&P service. Following are our present guidelines for preparing files for the Frontier. These may change as we discover new facets of the software.

File Names:

Files must conform to Windows naming conventions and have the correct three-character extension. This means you can use the 10 numeric characters, 26 alphabet letters and -, _. There may only be ONE period (.), which must immediately precede the three-character extension. File naming is particularly important if you are working on an Apple computer. The Frontier software runs on Windows NT. Some characters and symbols that are used on the Mac OS get translated to non-keyboard characters when the files are moved to Windows. The Frontier cannot see files with names that contain the off-keyboard characters. Punctuation characters cause problems too. For instance, apostrophes (') and exclamation marks (!) will prevent files from printing without any other indication of error. Windows users must also be aware of the file display settings in Windows Explorer. By default, Windows hides file extensions it can recognize. If most of the files on your system appear to have no three-letter extension, contact us for instructions to make extensions visible.

File Formats:

The Frontier can only print the following three file types:

<u>Format Name</u>	<u>Filename Extension</u>
Tagged Image File Format	.tif
Windows Bitmap	.bmp
JPEG	.jpg

All three must be 24-bit RGB, PC byte order, flat files. This means no layers, no extra channels, no paths, no indexed color, no greyscale, no high bit depth color, no CMYK, no LAB, and no LZW compression. Windows Bitmaps do not support most of these features, making it a safe format to use. JPEG also works well as long as the compression rate is not set too high. If you are transmitting your file to us over the Internet, JPEG is probably the best choice. The JPEG standard mainly applies to the decompression part of file encoding. The compression part is left to application developers, and much variation in implementation exists. Our tests are based upon the Adobe Photoshop implementation. We have found almost no visible artifacting to occur if you use JPEG compression level 9 or higher in Photoshop 6. Please DO NOT use Progressive JPEG compression.

Image Size:

A lot of people have trouble with this. It is important to understand that the Frontier is designed to print on cut sheets of paper. The image from the file is interpreted to fill the selected size sheet of paper, without borders. If the proportions of the file do not match the proportions of the sheet, the image is scaled to fill the paper and the mismatch is cropped off and discarded. The sheets are cut from rolls. The rolls come in standard widths. We use 4 inch, 5 inch, and 8 inch wide rolls at present. The software allows for up to 50 different print size specifications. We have used 40 of these to define standard sizes that are used for our normal production work. The remaining 10 are reserved by the operating software. The interface that is used for setting up the sizes is counter-intuitive and obtuse. Setting up a size involves some trial and error testing to be

sure the setup works as anticipated. Consequently, we are reluctant to set up special sizes of prints for individual orders. Therefore, the files need to be constructed to work on one of the existing sheet sizes. We have configured our sizes to be consistent with standard photofinishing print sizes and proportional to the most popular film formats. We also have a set of sizes that are proportional to digital camera format. On the last page is a table that shows the size combinations available at the time this document was prepared.

Layout:

Standard practices for designing your image layout are applicable. Most notably, it is a good idea to pay attention to the relationship of your image to the edges of the sheet of paper. As is true with almost every printing device, there are mechanical considerations to be accommodated when full-bleed printing is being carried out. "Full-bleed" means you are printing edge-to-edge on the paper, with no border. The Frontier is similar to an optical enlarger in the way it approaches this goal. The image projected onto the sheet of paper is sized to be slightly larger than the actual size of the paper. The exact amount of overspill depends on the print size. Prints up to and including 4"x6" have a 12 pixel overspill on each edge. Larger prints have an 18-pixel overspill on each edge. Keep in mind that the purpose of the overspill is to accommodate slight misalignments that occur as the paper is moved through the printer. The actual overspill may not be uniform on all sides of the print. As a practical matter, this means that there should not be significant components of the image that are quite close to the edge. We suggest that a minimum of 36 pixels space from the image edge be allowed for important parts of the image. In designing graphics, hairline borders should be avoided, as they require both centering and skewing tolerances that are beyond the capabilities of the Frontier print engine.

File Size:

A balance must be struck in file size to allow for enough data to preserve adequate picture quality, but not so much as to choke the computer. Problems arise when very different print sizes are to be made from a single file. The pixel dimensions in the Image Size table represent the optimum file size for a given print size. As a rule of thumb, you can print one size larger and two sizes smaller from a given file size without running into any problems. To go more than two sizes smaller, the file should be interpolated down in an image editing application such as PhotoShop and saved as a different file. Magnifying the image more than one size can be successful, but much depends on the original image.

Color Management:

We can make overall color and density adjustments to most images, however we face two conflicting demands in deciding whether or not to do so. If you are a digital camera user seeking an easy way to get good-color prints, you will probably want us to employ our expertise in optimizing your images. On the other hand, if you have put a lot of effort into perfecting an image in Photoshop, you would not want us tweaking it behind the scenes. You are encouraged to instruct us to make adjustments or not. In the absence of instructions, our decision to adjust will be based upon the following logic: If the files appear to be unedited images from a digital camera, with camera-generated names, we will adjust color and density as we see fit. If the files appear to be edited in any way, we will print them as-is.

If you are working in Adobe Photoshop 6 or later, you can use ICC* profiles to help improve the accuracy of soft proofing. Since the Frontier ignores profiles and assumes all files to be sRGB, it is not necessary to convert to the profile unless you want to control the rendering intent. Please remember, that under an ICC workflow, good monitor calibration is essential. Evidence

indicates that visual calibration routines are inadequate, and hardware-based calibration is necessary. We strongly recommend that you do not consider using the profiles unless you have a hardware-calibrated monitor and are using Adobe Photoshop 6 or later. We are not prepared to provide support if you do not meet this condition. Current profiles are available on our web site at <http://www.colorservices.com/profiles.html>. We have separate profiles for Glossy and Matte finish papers.

In the absence of a well-calibrated monitor, the only way to judge color is by the numbers. This does require some practice. Here is how to get started: Double-click the Eyedropper Tool and set the sample size to 5x5. Position the cursor over relevant image areas and examine the Red, Green, and Blue values displayed in the Info Palette. Neutral tones should have roughly equal values for all three colors. The darkest shadow tones with detail should be around 15 to 20. The lightest highlight tones with detail should be 240-245. Be sure you are sampling a shadow or highlight that has detail, as opposed to a specular highlight (which should be 255 255 255) or an area that you want to be pure black (0 0 0). Natural skin tones always have a higher Red value than either Green or Blue value. If the values are not what you want, you can adjust them with levels or curves.

*ICC stands for International Color Consortium, an organization established in 1993 by eight industry vendors for the purpose of creating, promoting and encouraging the standardization and evolution of an open, vendor-neutral, cross-platform color management system architecture and components. The ICC web address is <http://www.color.org>. An ICC Profile is a standardized description of a device's color reproduction characteristics.

Monochrome Images:

The Frontier prints on standard COLOR photographic paper. It is possible to send an image with no color tones to the printer. One would expect a perfectly neutral black-and-white print to be the result. In practice, the results are good, but not perfect. Because of the overall lack of color in such an image, tiny shifts in color become evident. Since the image is constructed of color dyes that must perfectly cancel each other out, even variations in the light falling on the print can cause changes in the color appearance of the print. Minor variations in the chemical process, which would be insignificant on a color print, cause easily visible color shifts on monochrome prints. If the prints are being created when archival considerations are in effect, one must also be aware that dye-based photo prints have not yet achieved the same life expectancy as silver-gelatin prints. If you need a truly black-and-white print, then a real black-and-white print is what you should get. Unfortunately, we are aware of no production-level digital printing devices that can expose real black-and-white paper at this time. That leaves printing on color paper as the practical alternative, although there are limitations, which must be recognized. We cannot guarantee perfectly neutral prints, and variations in the "color" of greyscale prints is to be expected.

Digital Camera Files:

Generally the quality of prints from digital cameras is proportional to the camera cost. In most cases, the color balance is acceptable, particularly if the camera has a good automatic white balance feature. One should be aware that the image dimensions of many (but not all) digital camera sensors are a different proportion than 35mm film. Many people are accustomed to asking for 4x6 prints, which will result in some cropping of the image from a digital camera.

The actual print size proportional to digital format is 4x5.3. We can print both sizes, but you should know which one you prefer and ask for it. Digital camera files straight from the camera can be printed reliably without preflighting as long as they have not been modified in ANY way. Once any modifications whatsoever have occurred, we expect the unexpected.

Media:

We accept CD-ROM, Zip 100 and 250, Compact Flash, Smart Media, Memory Stick, xD cards, Floppy, LS-120, Jaz, and several other media types. NEVER give us (or anyone else) your only copy of a file you cannot afford to lose. Be aware of what is on your media and be able to describe accurately which files you want us to print. It is not a good idea to give us a disk with several similarly named versions of an image. A good practice is to keep a disk for the sole purpose of moving jobs between your system and your service provider. Put only the files needed for the job at hand on the disk and nothing else. Write your name and phone number on the disk and the case if it has one. If we can print directly from your media, we do not copy the files to our drives. If we cannot print directly, your file is copied to one of our servers and we retain it for two weeks. It is our policy to never make changes to files on clients' disks. CD-RW media is acceptable, as long as your files are in their original format. Some CD-RW drives are delivered with "Packet-Writing" software. This allows the CD-RW to function like a regular hard drive. It is convenient, but the data is converted to a special format that is specific to the packet-writing software. In order to read the discs, you need to have the software installed. Efforts are underway to standardize a packet-writing format that would be universally readable, but at present we do not support packet-written CDs.

iPhoto Discs

Newer Apple Macintosh computers come with a file organizing and sharing program called iPhoto. It includes a feature which allows a selection of image files to be burned to a CD for sharing with other iPhoto users. Unfortunately, it creates several versions of the image files, most of which are unusable for printing, and scatters them throughout a host of cryptically named folders. The end result is that we cannot be sure if we are printing the right files. Please do not use iPhoto to deliver files to us. Rather, select your image files and burn them to a CD with conventional CD-writing software.

Is there anything else to worry about? Probably. This is all we could think of at the moment. We will update this guide as new information appears. The most recent version of this document will also be posted on our website at <http://www.colorservices.com>. If you have any suggestions, comments or questions, we would like to hear from you! Call or email us at mylab@colorservices.com.

Currently Available Frontier Print Dimensions for Prints from Files

Size Name	Nominal Size	Paper Size		Image Size				Proportional to:	File Size (MB)		
		H(Pixel)	W(Pixel)	H(inch)	W(inch)	H(mm)	W(mm)			Image H(inch)	Image W(inch)
102P	4x12	3638	1240	12.01	4.02	305	102	12.13	4.13	1:3 Panoramic, APS-P	13.22
3X135	3.5x5	1074	1524	3.50	5.00	89	127	3.58	5.08	35mm Full Frame, APS Classic	4.80
102C	4x6	1818	1228	5.98	4.02	152	102	6.06	4.09	35mm Full Frame, APS Classic	6.54
5X135	5x7.5	2280	1536	7.48	5.00	190	127	7.60	5.12	35mm Full Frame, APS Classic	10.26
8X135	8x12	3638	2434	12.01	7.99	305	203	12.13	8.11	35mm Full Frame, APS Classic	25.94
3X645	3.5x5	980	1500	3.50	5.00	89	127	3.27	5.00	4.5x6	4.31
4X645	4x5.5	1662	1228	5.43	4.02	138	102	5.54	4.09	4.5x6	5.98
5X645	5x7	2076	1536	6.77	5.00	172	127	6.92	5.12	4.5x6	9.34
8X645	8x11	3296	2434	10.87	7.99	276	203	10.99	8.11	4.5x6	23.50
5R	5x7	2126	1536	6.97	5.00	177	127	7.09	5.12	5x7	9.57
4X6x7	4x5	1502	1228	4.92	4.02	125	102	5.01	4.09	6x7	5.40
5X6x7	5x6.25	1876	1536	6.10	5.00	155	127	6.25	5.12	6x7	8.44
8X6x7	8x10	3036	2434	10.00	7.99	254	203	10.12	8.11	6x7	21.65
102H	4x7	2138	1240	7.01	4.02	178	102	7.13	4.13	APSH	7.77
8xAPS	8x14	4236	2434	13.98	7.99	355	203	14.12	8.11	APSH	30.21
4XDg	4x5.3	1630	1228	5.35	4.02	136	102	5.43	4.09	Digital Camera Format	5.86
5XDg	5x6.6	2036	1536	6.65	5.00	169	127	6.79	5.12	Digital Camera Format	9.16
8XDg	8x10.6	3232	2434	10.63	7.99	270	203	10.77	8.11	Digital Camera Format	23.05
4Xsq	4x4	1228	1228	4.02	4.02	102	102	4.09	4.09	Square Formats, 6x6, 127	4.42
5Xsq	5x5	1524	1524	5.00	5.00	127	127	5.08	5.08	Square Formats, 6x6, 127	6.80
8Xsq	8x8	2434	2434	7.99	7.99	203	203	8.11	8.11	Square Formats, 6x6, 127	17.36