

Recommended Equipment

The Digital Darkroom

It is becoming increasingly possible to create a good quality digital darkroom at home with relatively affordable equipment. For those with the interest, time and skills to master these tools, fine quality prints can be made. In this white paper, we at Color Folio present our recommendations for equipment with which to build your own digital darkroom.

It is, of course, impossible for us to actually use and test all the equipment on the market. Not only is there too much of it but it is constantly changing. So there is undoubtedly good equipment available that is not on our recommended list - but we believe you will do well with the equipment we recommend.

The other dimension is your budget. We're mainly targeting price points where we feel there is the best value. There are probably more expensive products that are better and cheaper products that can be found as well. We've tried to pick equipment we feel provides the greatest return on your investment. This document will be periodically updated as new developments occur in the marketplace.

Scanners

You will probably need a dedicated film scanner in order to create large enough scans for prints, especially if you shoot 35mm film. Flatbed scanners with resolutions over 3000dpi can serve this purpose if you are scanning medium format or 4x5 film but otherwise you will want the resolution offered by film scanners.

We believe that the best price performance in film scanners for 35mm and medium format for personal use is the Nikon 5000ED (35mm only) and 9000ED (35mm and medium format). We have used the 5000ED on several occasions and have tested it against our Tango drum scanner with the same film. The quality of the 5000ED scans is quite good, particularly considering its price point (street price ~\$1500). The interface provides you many useful tools, including both RGB and LCH curves, and offers good color management support.

In spite of Nikon's marketing information, we did not find that the shadow detail exhumed by the 5000ED approached that of our drum scanner (no surprise) but it was acceptable, certainly better than their previous generation of scanner. These scanners have a narrow focusing range so there are occasional out of focus areas - medium format film should be scanned using their optional glass film holders.

It is often very useful to have a flatbed scanner as well for those times when reflective art must be scanned or if you have a medium or large format piece of film to scan. We like the Epson Perfection scanners - Their 3170 (3200 dpi) and 4870 Pro (4800 dpi) scanners are excellent choices. We recommend the 4870 Pro as it comes with Monaco profiling software and the LaserSoft scanner software to run the scanner (it's much better than the Epson software).

Monitors

Traditional CRT Monitors often have a useful life of only 2-3 years for the type of critical color work needed in a digital darkroom. So if your monitor is older than that consider purchasing a new monitor. As the production of high-end CRTs has ceased, LCD displays are the only available option for those seeking a new monitor for the digital darkroom.

There are some characteristics of the LCD technology that are superior to CRTs, such as a smaller footprint and more energy efficiency. But the display quality and fine-tuning that was easy to find in traditional CRT monitors is much more expensive on a LCD monitor. LCD monitors are more difficult to profile accurately than CRT monitors. The quality needed for this type of work is confined to only the most expensive LCDs currently, so avoid the standard, off-the-shelf variety.

The features needed for color-critical work is usually found in expensive models, such as those made by Eizo and NEC -- models that often cost well over \$1500. While we do not have first hand experience with them, these companies have excellent reputations and should offer models with the features you will need.

Monitor size is a personal taste issue. We strongly recommend that you use two monitors for Photoshop work. Ideally a 17" monitor to run your application palettes and a larger monitor (19 or 21") for the image. You will need either two video cards or a single dual ported card for this. Your productivity will increase greatly as you will not waste time moving and hiding palettes obscuring your image. The palette monitor can be a very inexpensive monitor (as can it's video card) as color accuracy, etc is not as critical. Spend the money on the image monitor and video card. Video cards are not too critical - anything with at least 24 bit color and 32mb of RAM should be sufficient for your image monitor. There are many models available. You can get something less than this for the palette monitor.

You may find shopping online for monitors will yield better pricing - we like www.monitoroutlet.com and www.outpost.com. However, buying locally might be worth the extra expense--it will make returning or exchanging the monitor easier in case it does not meet your needs.

It is critical that you invest in a good monitor calibration package, otherwise all of your other investments are compromised. We recommend ColorVision's SpyderPro2 package - it comes with a Spyder 2 sensor and software. It creates excellent profiles, is easy to use and affordable.

Printers

We currently recommend the Epson line of desktop printers for fine art reproduction in a home digital darkroom, though HP and Canon are coming out with some interesting printers using pigment inks that are worth watching.

Recommended Equipment

We highly recommend the Epson Ultrachrome K3 printers. Epson's previous generation of printers (the 2200, 7600 and 9600) made excellent prints but the reformulated K3 inkset produces superior results, especially on photo papers. The 2400 has been the obvious choice for desktop printing, especially if your typical print sizes are no wider than 13".

The Ultrachrome K3 inks make very archival prints with a very wide color gamut. Epson has just come out with an interesting new printer, the 3800 which appears to have solved the one problem we have with the other printers in this family - it's lack of ability to print on both photo-type papers and fine art cotton rag papers without changing black ink cartridges. It is more expensive than the 2400, but produces prints up to 17" wide.

The Epson profiles for their papers are quite good these days. If you want profiles for other papers, check out www.chromix.com.

Use one of the comparative price shopping sites (such as pricegrabber.com or shopper.com) to find the best current price on new Epson printers.

Computers

We are often asked whether a Mac or PC is better for digital fine art printing. At Color Folio we use only PowerMac desktops for our critical imaging work. While it is not impossible to achieve the same results on a PC, we believe you are likely to encounter more "speed bumps" along the way. The Mac remains our choice.

The main issues to look at in your computer are processor speed, memory and storage features. We recommend at least a 1ghz G5 PowerMac- all new Macs exceed this specification. If budget is an issue we would recommend that you put your money into memory to improve performance, rather than faster (or more) processors.

Photoshop really uses a lot of memory - on the order of 4-5 times the size of the files you have open. When working with 100mb+ files, you can see that a lot of memory will be needed. If Photoshop runs out RAM, it will use your hard disk as extended memory (scratch disk). We recommend that you allocate a partition on your hard disk as a dedicated scratch disk area for Photoshop in any case - at least a couple of gigabytes is good (fortunately hard disk prices are really low!). We recommend at least 1gb of memory to make your editing experiences tolerable. Check www.thechipmerchant.com for good prices on memory.

With larger files you will consume a lot of hard disk space as well. Speed, size and heat generation are the critical factors for hard disks. We recommend at least a 7200rpm drive, at least 100gb in size with low heat generation (which improves the reliability of the drive over time). We recommend the Western Digital drives, which meet all of these requirements. Hard drives are incredibly cheap these days so there is no reason to not buy a second drive of at least 100gb. You will experience a per-

formance boost by having this second drive and keeping all of your image files and the Photoshop scratch partition on it, while maintaining all applications on your system drive. This optimizes the way in which the disk heads operate while performing operations on image files.

You must have some backup strategy in place to ensure your hard work isn't lost due to hard drive failure or unforeseen events. At Color Folio we have external Firewire hard drives that we back up our working images on. These are also incredibly affordable and easily to find.

Once the image is complete you should record the master file to CD. The Lacie Firewire burners offer good value - speeds continue to increase, with 48x the current standard for CDs. Avoid generic CD media as they are less reliable - unfortunately Kodak, who used to make the best CDs, is no longer manufacturing them at all. The Cadillac of the CD manufacturers is now Mitsui, who still makes both gold and silver. If you have the money, archive your final masters on the gold - we think their silver CDs offer the best balance of price and stability. If you can't find Mitsui CDs, we recommend you stick with name brands such as Sony or TDK for CDs. We purchase our CDs from www.cdrom2go.com which offers great values and choice if you are buying in large quantities. Although recordable DVDs are available, CDs are still our preference -- the archival quality of DVDs is not proven and if there is a disk error your risk is minimized as CDs will not hold as many files as the DVD.

Lighting

Lighting is a critical but often ignored part of the digital darkroom. It is important to work in a lighting environment that you can control. Otherwise, it will be impossible to make decisions based on the matching between prints and your monitor. Ideally, a print box is used for matching. These boxes use controlled lighting (usually 5000 degree) with adjustable brightness levels. Usually situated near your monitor, they are used to examine prints and proofs to compare with the displayed image. Ideally, you will calibrate the temperature of your monitor to match a white sheet of the paper you print on viewed in your print box. GTI is the main manufacturer of these boxes. Unfortunately they are quite expensive. Available in different sizes with different features, expect to pay anywhere from \$400 to \$1500 for a print box. An alternative is a BlueMax desk lamp from Full Spectrum Solutions. (www.fullspectrum.com). These are less expensive, offers dimming controls and offer high quality lighting at different temperatures.

Photoshop

Finally, you will need Adobe Photoshop™ - it's not cheap (\$600+) but worth every penny. Don't bother with anything else for your serious imaging work. You will have to pay for upgrades and some may be skipped without missing much. If you are not already using Photoshop™ CS3 (for Creative Suite) you should definitely upgrade from an earlier version. There are number of important features in this release such as support for layers in 16 bit files and the embedded Camera Raw plugin.

Recommended Equipment

Additional Software

We are often asked about additional products like Apple's Aperture and Adobe's Lightroom. As these products are created for photographers who must organize and process large volumes of images, they are not designed to replace Photoshop. Most photographers will likely find themselves using products like these to supplement their Photoshop image editing and printing. While we do not use them in our studio, your needs may be well served by them.

Books

While there is no substitute for practice and training with a master printer in Photoshop, there are several books we highly recommend. Beware most Photoshop books on the market - most are little more than rewrites of the manual and/or focus on uses of Photoshop other than fine art printing, such as web, collage, etc. Here are our favorites:

- *Real World Photoshop CS2 or CS3* by David Blatner and Bruce Fraser [Peachpit Press]

The bible of Photoshop, a book everyone should have. Contains a superb chapter on color management. Probably will be used more as a reference book than a training guide, but it contains tons of useful information. CS3 version available in August 2007.

- *Real World Camera Raw CS2 or CS3* by Bruce Fraser [Peachpit Press]

If you are shooting digitally, you should be shooting raw files, and this book explains not only the advantages of capturing raw files, but also the underlying concepts of raw capture and processing. CS3 version available in August 2007.

- *Photoshop Artistry: For Photographers Using Photoshop CS2 and Beyond* by Barry Haynes and Wendy Crumpler [New Riders Press]

This book is aimed at photographers and artists and contains a series of very useful hands-on tutorials that cover many of the strategies and techniques we find most useful.

A Color Folio Imaging Station

What does a Color Folio workstation consist of?

- Apple Powermac G5 with dual processors, 2 internal hard drives, CD/DVD burners, and 3 gigabytes ram
- 23" Sony G520 monitor and secondary tool palette monitor
- External firewire hard drives for backup
- UPS (uninterruptible power supply) for computer, monitors, and external hard drives
- Adobe Photoshop™ CS3
- Spyder2pro colorimeter and monitor calibration software
- Mitsui silver CDs for archival backup
- GTI Soft-View desktop viewing station for prints and film