

Noritsu K2 Inkset (“NK2”) Color + LK Dyes in an Epson 4000 Printer

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3-2014; 4-2015 note regarding profiles, page 3; 4-2016 color profile link p.1

The Noritsu dye K2 inkset now loaded into the Epson 4000 printer is taking the success of my 2013 “NK5” B&W inkset¹ to the next step in terms of image stability. This uses Epson-Noritsu dyes in the standard color ink (“K2”) arrangement the 4000 was intended to support.² However, the aim is B&W printing. I have no intention of producing color ICC profiles for this setup.³

The irony that I am moving to a K2 “color” inkset to improve my B&W glossy printing is not lost on me. With the old style dyes, many of us tried to print B&W and failed. The unstable color casts, metamerism and color inconstancy with differing light sources, not to mention fast fade were the reasons behind the B&W inksets we developed and loaded into our Epson (originally color dye) printers.

The Epson-Noritsu dyes are not the old style dyes.⁴ The defects of the old color dyes have been sufficiently solved to allow very good B&W. I have been using the Epson Claria (and Noritsu) dyes in a standard Epson 1400 color setup to print B&W brochures for the last year. I use what I’ve called a Claria “Advanced B&W” mode of printing with the 1400 and QTR, where I combine the color inks with a Black Only channel that runs through the entire scale.⁵ With the 1400’s 1.5 picoliter dots, no LK is needed. With the 4000, the LK is needed.⁶

¹ <http://www.paulroark.com/BW-Info/4000-Noritsu-5K-Plus.pdf>

² The LK made with 30% Noritsu K and 70% clear dye base. MIS Associates sells the base pre-mixed. See <http://www.inksupply.com/product-details.cfm?pn=PR-CLEARBASE-PT>. The Noritsu black (“BK”) cart is #H086075-00 Dye. Dry lab photo finishing suppliers are numerous. This is a partial list of Noritsu suppliers.

<http://www.fotoclubinc.com/> (Los Angeles area);

http://www.imagingspectrum.com/noritsu-d703-digital-dry_photo_printer-d703.html (TX);

<http://serranorey.com/222-noritsu-dry-supplies.html> (FL);

http://www.desktopdarkroom.com/noritsu_d701_ink.html (FL);

<http://www.sgaimaging.com/catalog/printers-scanners/noritsu-compact-inkjet-printers> (GA & FL);

<http://www.southpointphoto.com/productcart/pc/viewPrd.asp?idcategory=115&idproduct=1064> (TX & TN);

<http://www.fotoclubinc.com/Departments/Printer-Media/Noritsu-Media/Noritsu-D701D703D1005-Inks.aspx> (Santa Fe Springs, CA); <http://www.pfsny.com/M/Noritsu/Noritsu-Dry-Lab/Noritsu-D703.html> (NY). If

purchasing on eBay and the price is less than \$187, check the expiration date.

The clear dilution base formula, by weight, is as follows:

- 10% glycerol,
- 10% Kodak Photo Flo,
- 10% Dow Butoxytriglycol,
- 1% Edwal LFN,
- 69% distilled water.

If mixed by volume, reduce the glycerol to 8%; the other ingredients are close enough to leave as is by volume or weight.

³ For color profiles, see, for example, <http://profilesbyrick.com/>.

⁴ Although I use Noritsu inks, note that the Epson SureLab D3000 “UltraChrome D6” may be the same. I have only tested the D6 K, however. See <http://www.paulroark.com/BW-Info/UltraChrome-D6-Noritsu-blacks-compared-b.pdf>

⁵ See <http://www.paulroark.com/BW-Info/1400-Claria-BW.pdf>

⁶ The Epson SureLab D3000 uses the “UltraChrome D6” inkset and is promoted as producing “archival” prints that will “last for generations,” including B&W prints. The UltraChrome D6 inkset is, in fact, a dye inkset that is very

I have found that if the black only (1400 K or 4000 LK) channel carries as little as 1/3 of the density load, the color artifacts are sufficiently under control. This is particularly the case if old-style fluorescent lighting is not used to view the prints. Not by coincidence, I removed all such lights from Gallery Los Olivos and installed LED spots in January. They work very well – more efficient than the old fluorescents and good enough light to allow these dyes to look good.

As good as these dyes can be, they are not in the same league with high quality carbon pigment prints when long term display, collecting, and museum quality, top fine art is the intended product. These are two different B&W media.

Vita brevis, Ars longa
(Life is short , Art is long)

Dyes will usually win the short term “Wow” factor, but carbon pigments are forever.

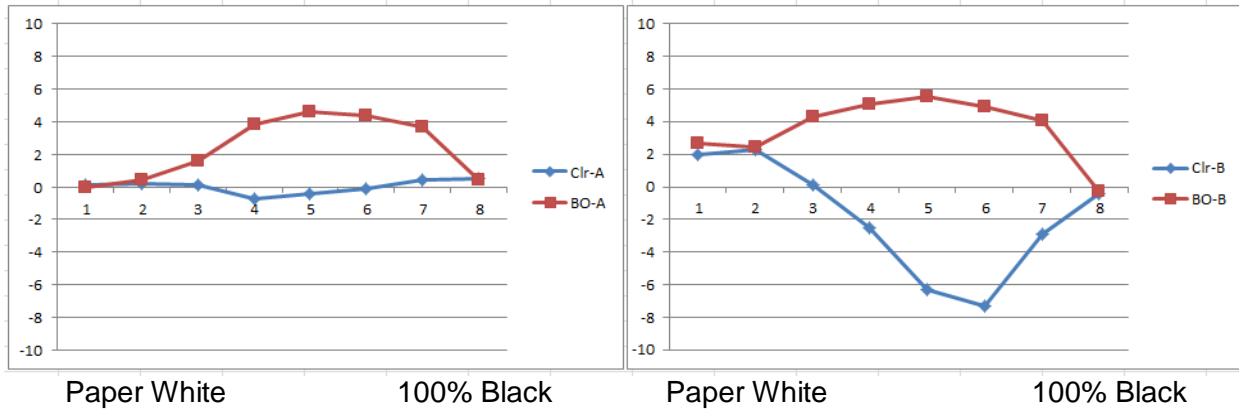
The alteration of my Epson 4000 ink setup to rely mostly on the color dyes should increase the lightfastness of the prints and limit the color shift with time.

Dyes do not use carbon for their black ink. The black is composed of a combination of color dyes that are chosen for density, low color artifacts, and other reasons, but not so much for their longevity when they are at partial load. The grayscale patches in <http://www.Aardenburg-Imaging.com/> fade testing do better when generated by the Claria color dye inks than they do when generated by the black ink only. After 90 Mlux-hours of exposure, the average delta-e (which measures the total fade and color shifts) of the neutral gray test patches generated by color inks was 2.5 times better than that of the gray patches printed with black ink only. On the other hand, the Claria black only test print that was protected by being sprayed with PremierArt Print Shield had a delta-e for the same test patches that was over 3 times better than the un-sprayed test print. We do not have a sprayed v. un-sprayed comparison for the color prints. I assume there would be a significant improvement there also.⁷

similar to if not exactly the same as the Claria and Noritsu dyes. In Wilhelm style testing it produces results in terms of display life similar to the Epson UltraChrome K2 inkset used in the 2200. However, that testing protocol misses the black dye weakness where it is not at 100% load.

⁷ The black only v. color comparison tests were on Epson Premium Glossy paper and were not sprayed. See <http://www.paulroark.com/BW-Info/Claria-color-v-BO-test-patches-90Mlux-hrs.jpg> for a visual look at the changes at 90 Mlux-hours of exposure (46 Wilhelm years). A 30% BO/70% color approximation was accomplished with layers from the other tests; it is not an actual separate fade test. Look at the color changes only. The colors of the original patches will vary with the profile used, and mine are more neutral than what was submitted to Aardenburg-Imaging.

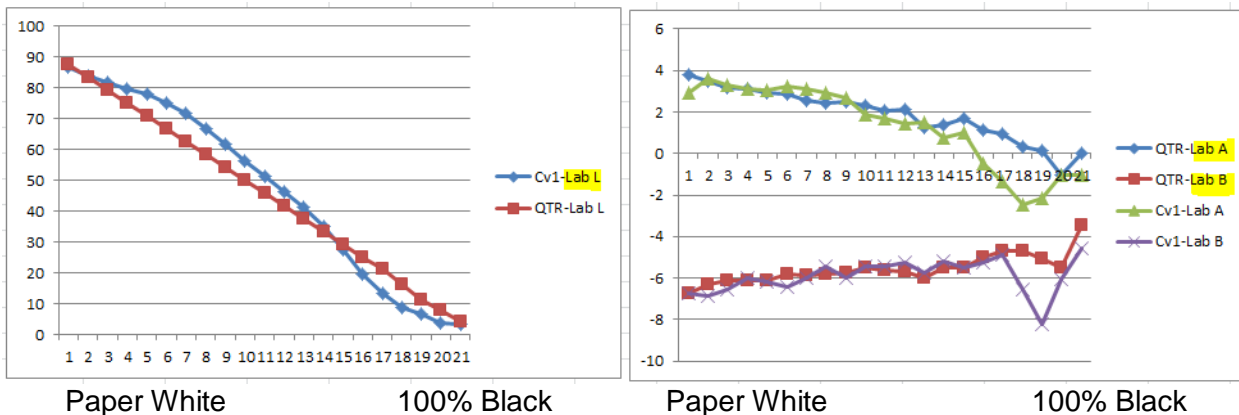
The gray test patches made with the color inks shift in the opposite directions from those made with black only inks. This will allow the two approaches to be combined and somewhat offset each other in terms of color shifts, which are a significant component of the total visual changes that occur with aging. The Lab A and B color shifts for the color (“Clr”) and black only (“BO”) test prints are graphed below.



QuadToneRip (“QTR”)⁸ is the best way I know of to print B&W. I have been able to somewhat control the print tones with the Epson driver, but QTR does a much better job.

That said, the **Epson Driver** when tweaked a bit with a Photoshop curve or (best I’m sure) an ICC, can make both good color and B&W. It’s an easier workflow, but I’ll use QTR for B&W for its better control of the inks, particularly with respect to the ratio of black to color dyes used.

Below are two graphs that show the Lab L, A and B distributions on Red River’s Polar Pearl Metallic paper. “Cv-1” is the abbreviation for the Photoshop image adjustment curve (*.acv) that I used with the Epson driver. It is in my usual Profiles Zip file, as are the QTR profiles.⁹ (**Note** that after I re-loaded the cartridges in 4-2015, the prints were way too magenta. The LM ink limited needed to be reduced. I suspect the original LM was mixed too dilute. This, of course, makes the old profiles incorrect. There may still be some too-dilute LM in the cart affecting the 4-2015 profile also. So your LM ink limit in QTR may need alteration.)



⁸ See <http://www.quadtonerip.com/html/QTRoverview.html>

⁹ <http://www.paulroark.com/BW-Info/4000-NK2-Profiles.zip>

In my view, **dye-based prints are for dramatic, high gloss display**. They can show off an image with an apparent sharpness and dynamic range that is beyond the alternative media. B&W dyes particularly on metallic paper are often described as having a “three dimensional” look to them.¹⁰ The corollary to the sharpness of these dye prints is that it takes a very good original file to take advantage of this display medium. For my very best, high-megapixel digital files, however, no other display comes close to transmitting the high degree of visual information and dynamic range to the viewer.

The dyes are clearly aimed at glossy media, where they soak into the coating instead of laying on top of it like pigments. The result is high gloss images that do not have the artifacts, including bronzing, and veiled look that have limited the quality of glossy printing with popular pigment inksets.¹¹ Not being on the surface, dyes do not rub off the way pigments can. Dyes do not have particles and binders to clog, nor do they settle.

This is a work in progress. However, the 4000 NK2 project, including the higher difficulty of profiling a color inkset, appears to be worth the effort due to the unique visual qualities of the B&W dyes, particularly on high gloss metallic papers. My B&W dye display prints have sold better in competition with color paintings than any other approach I’ve tried. For me it makes a differentiated product from my carbon pigment prints that allows me to satisfy different tastes and price points. And it’s just plain fun.

There are some very good reasons Epson decided to use dyes in its SureLab D3000 minilab (“dry lab”) printer. Taking this technology to wider format allows one to make prints that are nicely differentiated from the usual commercial products.¹²

Enjoy.

Paul

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[All donations to the cause of free inkset designs and profiles are appreciated.](#)

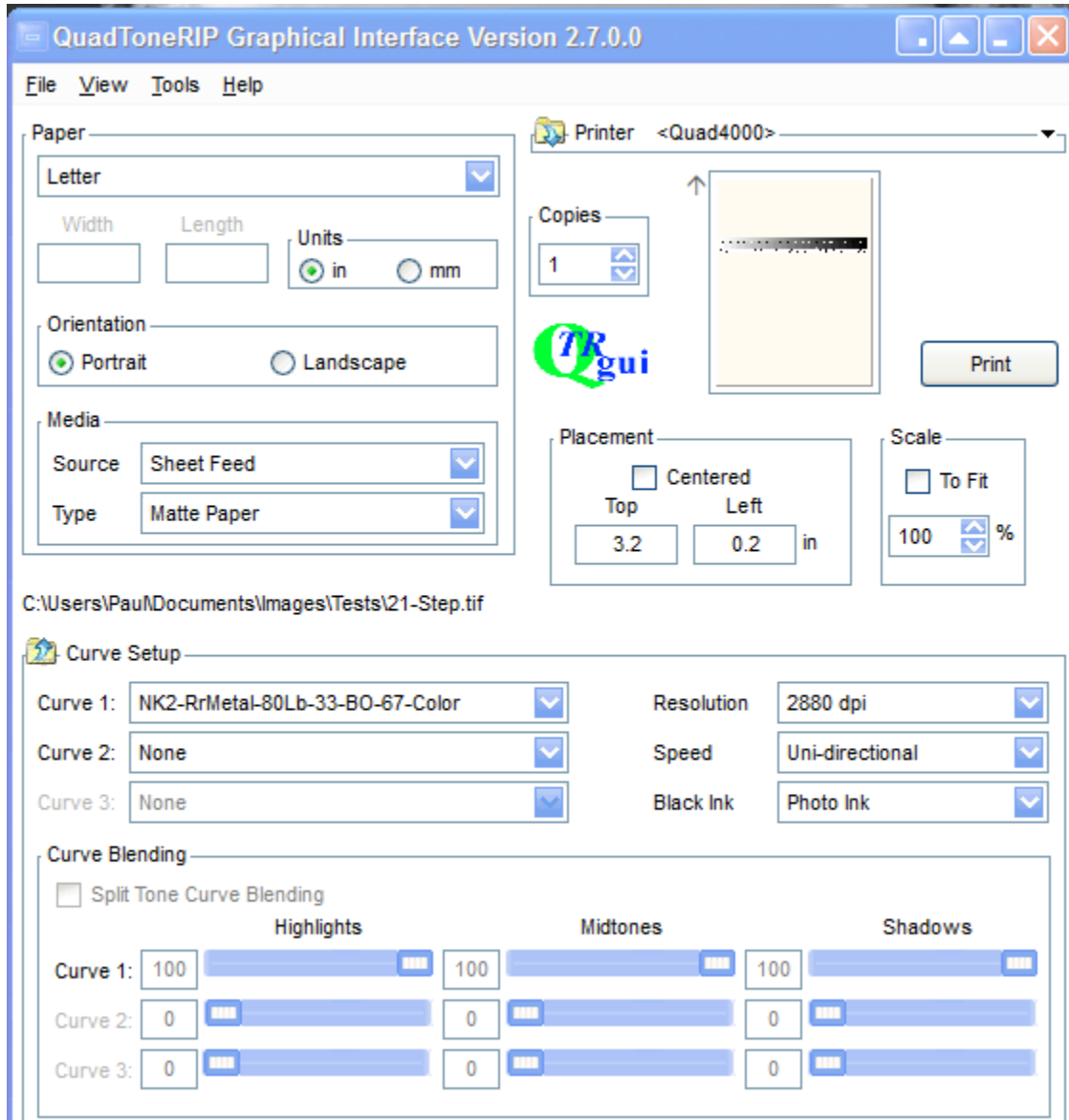
¹⁰ I primarily use Red River Paper’s “Polar Pearl Metallic” paper for these dyes. My September 2013 Gallery Los Olivos show <<http://www.gallerylosolivos.com/Roark.html>> used all 17” roll metallic paper in the front room and Red River’s 80 Lb. version for the cards. See <http://www.redrivercatalog.com/browse/photo-metallic-inkjet-glossy-media-paper-metal.html> for Red River’s metallic paper.

¹¹ Most matte papers have a rather low dmax with these dyes. Although H.Photo Rag has the best dmax, it requires a lot of magenta toning. The matte paper that may be the best combination of excellent dmax, low magenta toning requirement, and price is Red River Premium Matte. See <http://www.redrivercatalog.com/>

¹² Note that Epson may never make a K2 or K3 version with this inkset. I always spray the B&W prints I make for sale. Spraying makes a very significant difference. Where the black dye is not sprayed, its fade and color shifting might be considered inappropriate for professional use. So, until the black dye is improved, there may not be a K2 or K3 wide-format dye printer. The 1400/1430 with Claria, however, is a good approach for those who do not want to get into ink mixing. See <http://www.paulroark.com/BW-Info/1400-Claria-BW.pdf>

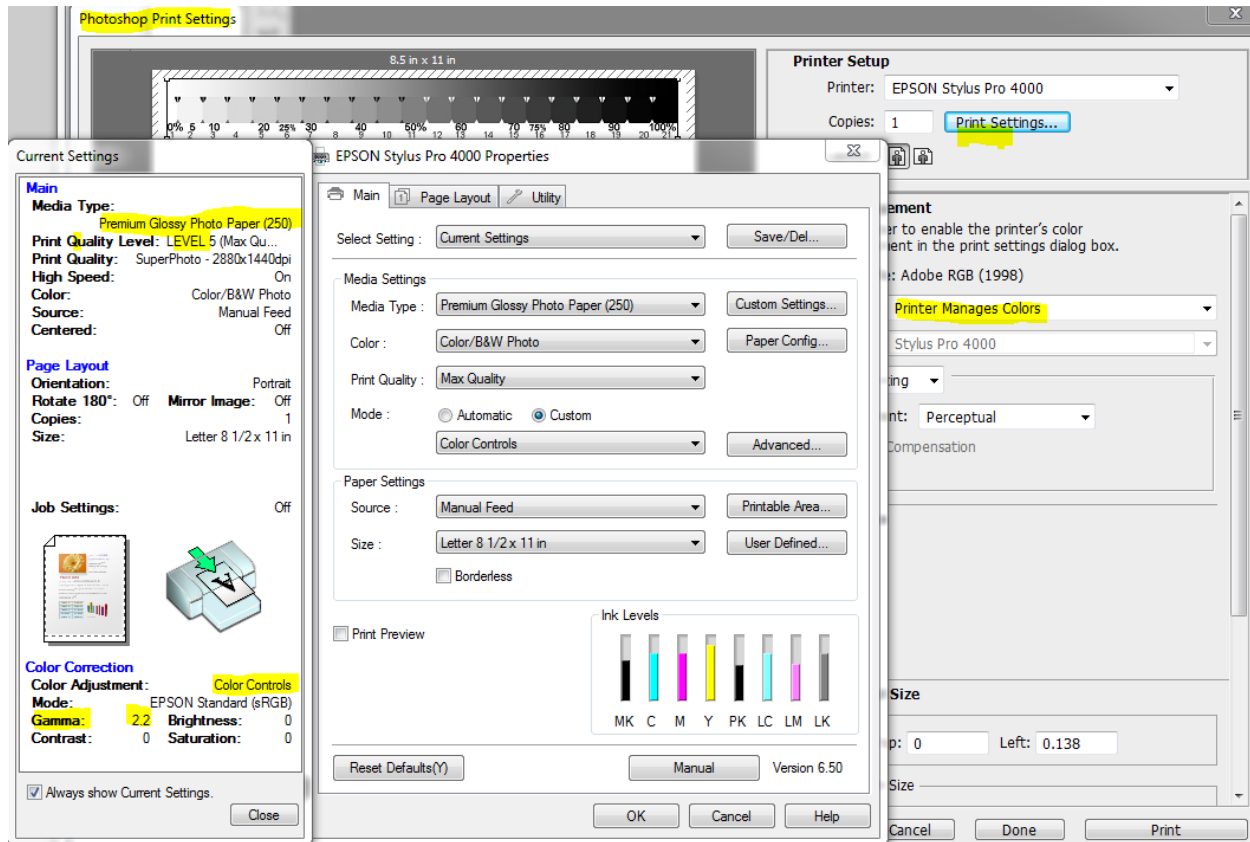
Screen grab of QTR settings

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I generally start by making separate QTR profiles for color-generated grayscale and for black only grayscale. These can be used together with the QTR sliders to determine what mix of color and BO works best. Then, however, I combine the profiles into a single QTR profile so that re-linearization is a simpler task. Also, my experience is that the use of more than a single QTR profile at a time results in a less than perfectly straight Lab L ramp. The profiles for Red River Polar Pearl Metallic are at <http://www.paulroark.com/BW-Info/4000-NK2-Profiles.zip>.

Appendix 2 Screen grab of the Epson driver settings



Note that ICCs could, no doubt, do a better job. However, for B&W I'll use QTR, and I don't do serious color work. The "color" printing this allows me to do is low gamut toning of an essentially "B&W" print. Color Controls got me much closer to neutral than did No Color Adjustment.