

B&W Printing with

Epson 1400 and

Claria Inks

www.PaulRoark.com

1-8-2012c

The Claria advanced dyes combine nearly artifact-free glossy printing with longevity that, while less than the Epson or HP pigments, is better than some third party color pigments. Although I will continue to use the top 100% carbon pigments for collectable quality fine art and museum work, the very good lightfastness tests of the Claria dyes, particularly when protected by a sprayed coating, opens up a new medium for B&W printing. Unlike old dyes, Claria dyes are stable enough for most print uses. Of particular interest to me are cards and snapshots on high gloss media, as well as books that do not show the rub-off of pigments.¹ Any hand-held, non-glazed print use might benefit from this technology. The dyes in an Epson 4000 were a great success in a September 2013 show.² People react strongly to the images dyes can produce.

The existing Epson 1400 driver “grayscale” profile results in prints with, among other things, an unacceptable magenta color cast in the shadows, at least on the papers of interest to me, as well as other significant color artifacts.³ It is not an advanced B&W type of approach.

To minimize the problems of using color inks to make B&W prints, Epson recommends its printer models that use 2 gray inks (Light Black and Light Light Black). The Epson “Advanced B&W” (ABW) mode uses these relatively neutral inks as the core of the B&W image, adding, however, color inks to increase smoothness and control the tone of the print.

¹ For fine art and long term display the highest quality pigments are recommended. 100% carbon pigments on cotton-based papers continue to be the ultimate in lightfastness.

² See <http://www.paulroark.com/BW-Info/4000-Noritsu-2K.pdf> for large format dye information; see also <http://www.gallerylosolivos.com/Roark.html> for information on the September 2013 Gallery show.

³ See <http://www.paulroark.com/BW-Info/1400-Grayscale-RR-Metallic.jpg> for a comparison of the print tones between the Epson driver and QTR “ABW” type print. Many B&W photographers tried to make good prints with older dye printers and failed. There were two primary reasons. First, it is very hard to make a B&W image from high gamut color inks. Most profiles were and are not good enough to produce a neutral print. Any variation in paper, ink, or printer will throw the profile off and cause un-wanted color hues. The colors changed from dry-down and fast fade such that a neutral B&W did not stay that way long. High gamut color inks suffer from artifacts such as metamerism, which causes the print to look different colors in different lights. See <http://www.paulroark.com/BW-Info/EpsDrvr-UPGPP-24hr.jpg> for the tones of Epson Ultra Premium Glossy Photo Paper, with the Epson driver, including the tone shift in 24 hours.

Using QuadToneRip (QTR),⁴ we can follow this same ABW mode strategy to minimizing color ink artifacts through the use of a neutral black core image. While gray inks might make a technically smoother print,⁵ the 1400's very small 1.5 picoliter drop allows one to make prints that are smooth enough for most purposes while using mostly the black ink.

Printing with the 1400 and the Claria inkset, as is, does, still have its limits, but with modern LED, outside, and tungsten lighting, even the high content "ABW" type B&W prints look very good to most people. This PDF will focus on getting the most out of the inkset as is.⁶

Why Use Claria Dyes?

The simple answer is that B&W prints made with Claria dyes on glossy papers can look stunning – significantly better in a number of respects than the pigment alternatives. Pigments sit on top of glossy papers and are subject to many different artifacts and problems: bronzing, gloss differential, pizza wheel marks, rub-off, and veiled highlights and shadows, among them. Dyes soak into the paper, leaving the surface free of ink and free of the issues that have plagued pigments on glossy media.⁷

Of particular note are the "metallic" types of printing papers. They have a more reflective base that causes the apparent dynamic range near the highlights to be enormous and details appear to be sharper than on any other media – think of the dynamic range of a color slide and the detail of an 8x10 contact print. My gallery brochures and cards are now printed with dyes and Red River Polar Pearl Metallic paper.⁸ Because this effect is related to the angle of the light, it is most effective in hand held prints or cards,⁹ where the viewers will naturally move the print around to avoid glossy reflections and accentuate the effect.

⁴ See <http://www.quadtonerip.com/html/QTRoverview.html> . This \$50 "shareware" that can be downloaded for free for testing.

⁵ See, for example, <http://www.paulroark.com/BW-Info/1400-Claria-Noritsu-2K2LK.pdf> .

⁶ A number of variations of the Claria inkset have been made to explore the options of the Epson dyes. See <http://www.paulroark.com/BW-Info/BW-Dye.pdf> for general information. See <http://www.paulroark.com/BW-Info/1400-Claria-Noritsu-2K2LK.pdf> for the dedicated B&W Claria dye setup that I currently believe is the best answer for the best prints.

⁷ The only place where pigments have a slight visual advantage with glossy paper is with respect to metamerism. Here the Claria prints show slightly more under fluorescent lights. The Claria performance with respect to metamerism is much better than the other dyes I've tested. Older dyes also showed a bad color shift when drying. With mostly black only printing there is insignificant dry-down color shifting with Claria. If a B&W image is made with only the color inks, dry down is about a 1 – 2 Lab B unit increase in the midtones. For more information on Claria's dry-down color shift, see <http://www.paulroark.com/BW-Info/Claria-drift.pdf> .

⁸ See <http://www.redrivercatalog.com/cardshop/scored/66-polar-pearl-metallic-framecard.html> and <http://www.redrivercatalog.com/browse/66lb-polar-pearl-metallic-inkjet-photo-paper.html>

⁹ For a brief description of my procedure formaking cards, see

Claria dyes are lightfast enough for most uses. Wilhelm Research rates Claria color photos at 98 years of display life when displayed under glass. (I believe Wilhelm's standards are not what I want in a B&W print, making the fade estimate too optimistic in my personal view.) Wilhelm rates the dyes at over 200 years when in an album or dark storage.¹⁰ When Claria black only prints are sprayed with Premier Art Print Shield, they appear to be in the Epson UltraChrome pigment class in terms of lightfastness.¹¹ Interestingly, however, the color dyes are more lightfast than the black dye. So, the ABW approach is actually better than a black only approach here.

Printing and Profiling Characteristics

I have found no Epson driver based workflow that produces acceptable prints, particularly on the papers I'm interested in.¹²

Quad Tone Rip (QTR) can produce very good results, with full control of the color space.

To minimize the problems associated with color inks, printing should use mostly the black ink. While QTR can produce a 100% black only ("BO") print, that approach has some weaknesses. First, the print tone is too greenish (low Lab A) to be pleasing, and second, it can be too rough or show some banding, particularly when printing close to the leading edge of the paper – like with greeting cards. Both of these weak areas of 100% BO printing can be significantly improved with profiling controls in QTR. The profiles I've been making all have at least some light color inks in them. How much depends on the target tone and how much is needed to cure any BO printing artifacts. My profiles are available at <http://www.paulroark.com/BW-Info/1400-Claria-Profiles.zip>

To achieve a very good, relatively neutral print tone, all that is usually needed is a very little Light Magenta ink. This is easily set and fine tuned in QTR via the Light Magenta ink load

<http://www.paulroark.com/BW-Info/Card-Procedure.pdf>

¹⁰ See <http://www.wilhelm-research.com/epson/RX595.html> and http://www.wilhelm-research.com/epson/WIR_Ep_Artisan800_2008_09_06.pdf

¹¹ See <http://www.aardenburg-imaging.com/> fade test data. Compare the results of the 1400 black only, sprayed print on Canson paper with UltraChrome ABW results. For a comparison of Claria Dyes with MIS color pigments, see page 4 of Aal&A_Summary_2009.pdf, <http://www.aardenburg-imaging.com/documents.html> bottom of the page. Another comparison: at 70 MLux Hours of exposure, a Claria black only print on Canson Baryta, sprayed with Premier Art Print Shield, has an average I* Color score of 88.8 and Delta E of 2.3. This compares to an I* Color score of 68.1 and Delta E of 5.0 for the Cone Piezo "Carbon Selenium MPS K7" on Ilford Galerie Gold Fibre Silk and sprayed with Hahnemuhle protective spray. The 50% test patch delta E's were 2.6 for the Claria, 6.3 for the Piezo print.

¹² The modified inkset arrangement that uses a dilute "LK" version of the black ink can print with the Epson driver. See <http://www.paulroark.com/BW-Info/1400-Claria-Noritsu-2K2LK.pdf>

adjustment.¹³ More complex profiling to make warm prints or even sepia prints is also relatively straight forward. Although the full inkset is available to be used as toners, as a practical matter, simply adjusting the ink loads of the LM and Yellow inks reaches all normal B&W print tones.¹⁴ QTR allows blending of profiles, so the existing neutral to sepia profiles can be blended to achieve intermediate print tones, including split tones – without the need to re-linearize the profiles.

To achieve a smoother print, I have made some QTR profiles that use all of the light color inks to make an LK ink substitute. These can be used as needed – what I call a “variable ABW” mode. These profiles avoid the dark color inks. This avoids the color hues in the shadows, as they remain predominantly black ink. While one of these profiles uses just the color inks in the light midtones, the better ones use 50% color and 50% black for the first half of the scale. As a practical matter, using 20% to 50% color in the midtones brings, for example, greeting card edge performance of the approach up to reasonable levels.

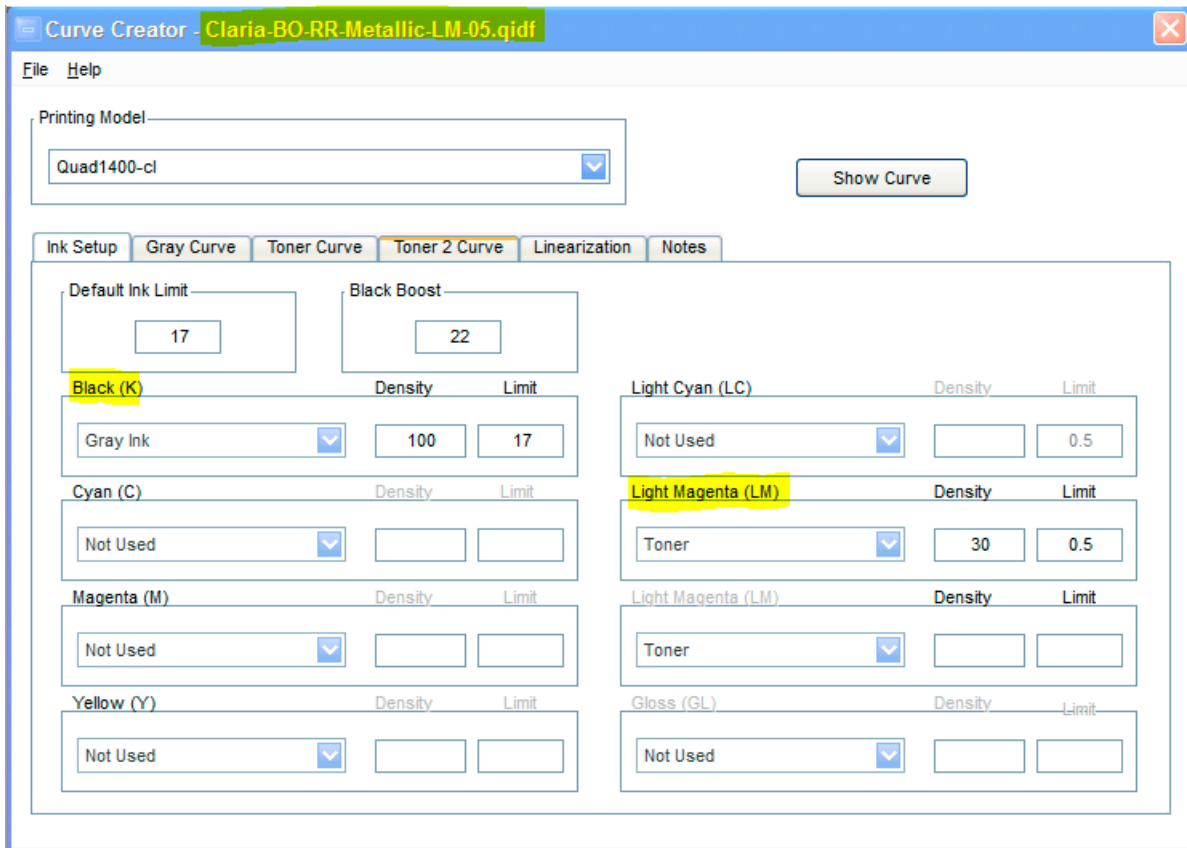
It appears that many if not most of the glossy paper coatings are so similar (if not the same) that profiles are quite portable among papers, at least within large classes of paper type.

QTR Profiles and Printing

The goal of printing in terms of color artifacts is to use as much black ink and as little color ink as possible. However, most papers need at least some Light Magenta (LM) ink for good tone. The following screen grab from a QTR Curve Creator shows a typical setup for a profile that is basically Black Only but also has some LM in it:

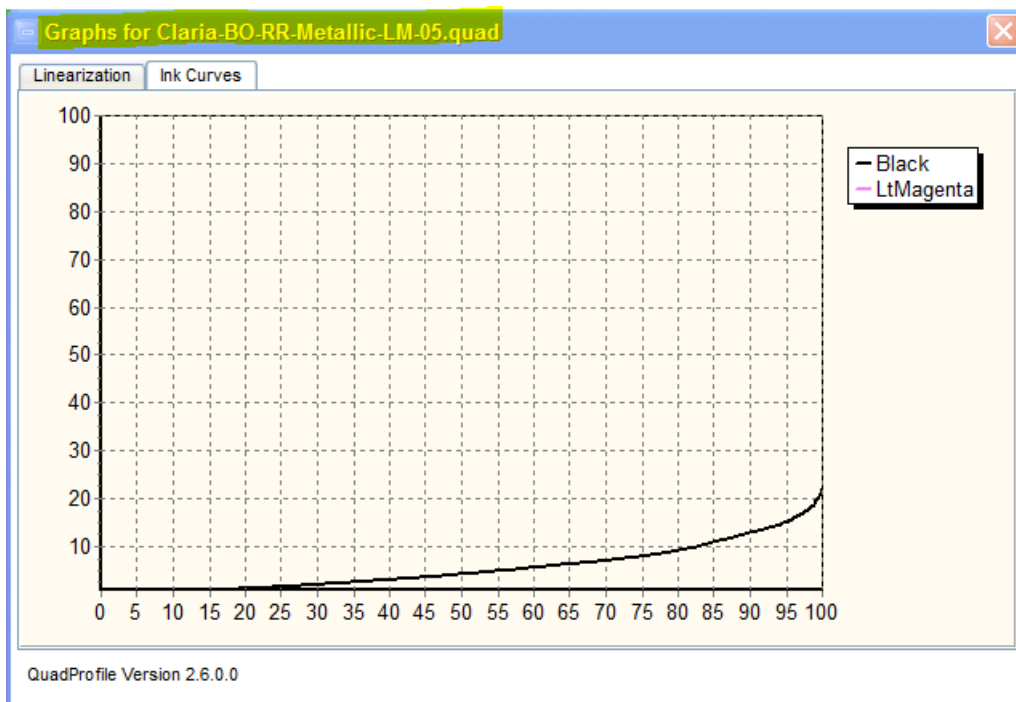
¹³ So little ink is used that user adjustments of the QTR profiles will not even need to be re-linearized.

¹⁴ The Profiles Zip file contains a warm profile that is reminiscent of the old LensWork medium warm tone. I’ve included 2 levels of sepia tone profiles.



(Note that I use Windows. The interfaces and workflows may be different with Mac's.)

Below is the graph of the inks used in the above profile.



Notable is that the LM is so low it does not even show. In part this is due to the graphing program cutting off some of the lowest values, but it's also because very little LM is needed.

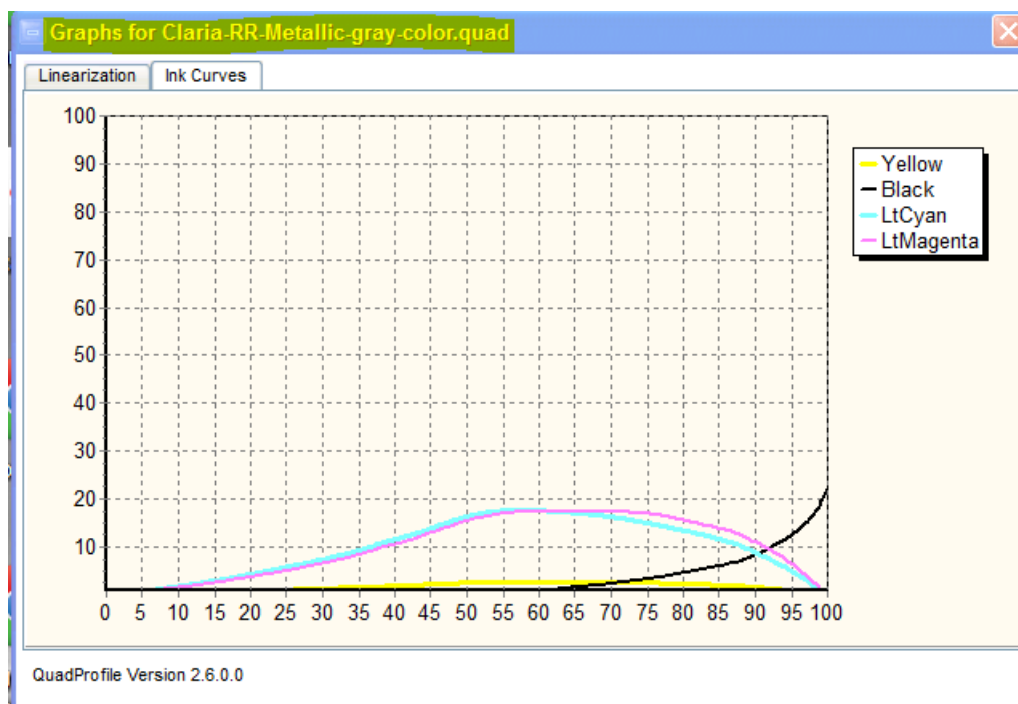
The black curve was hand drawn. It should be close enough to linearize for most papers. I often use hand-drawn curves because they can be tailored to the ink and paper better.

The name of the profile indicates that it is predominantly a Black Only (BO) profile, but that there is a small amount of LM – 0.5 ink limit – in the mix.

The Density of 30 was somewhat arbitrary initially. The higher the “density” number entered, the further to the right (black end) the high point is. If the “density” number is lowered the peak amount of toner will occur more toward the highlights, and the ink limit will probably need to be lowered.

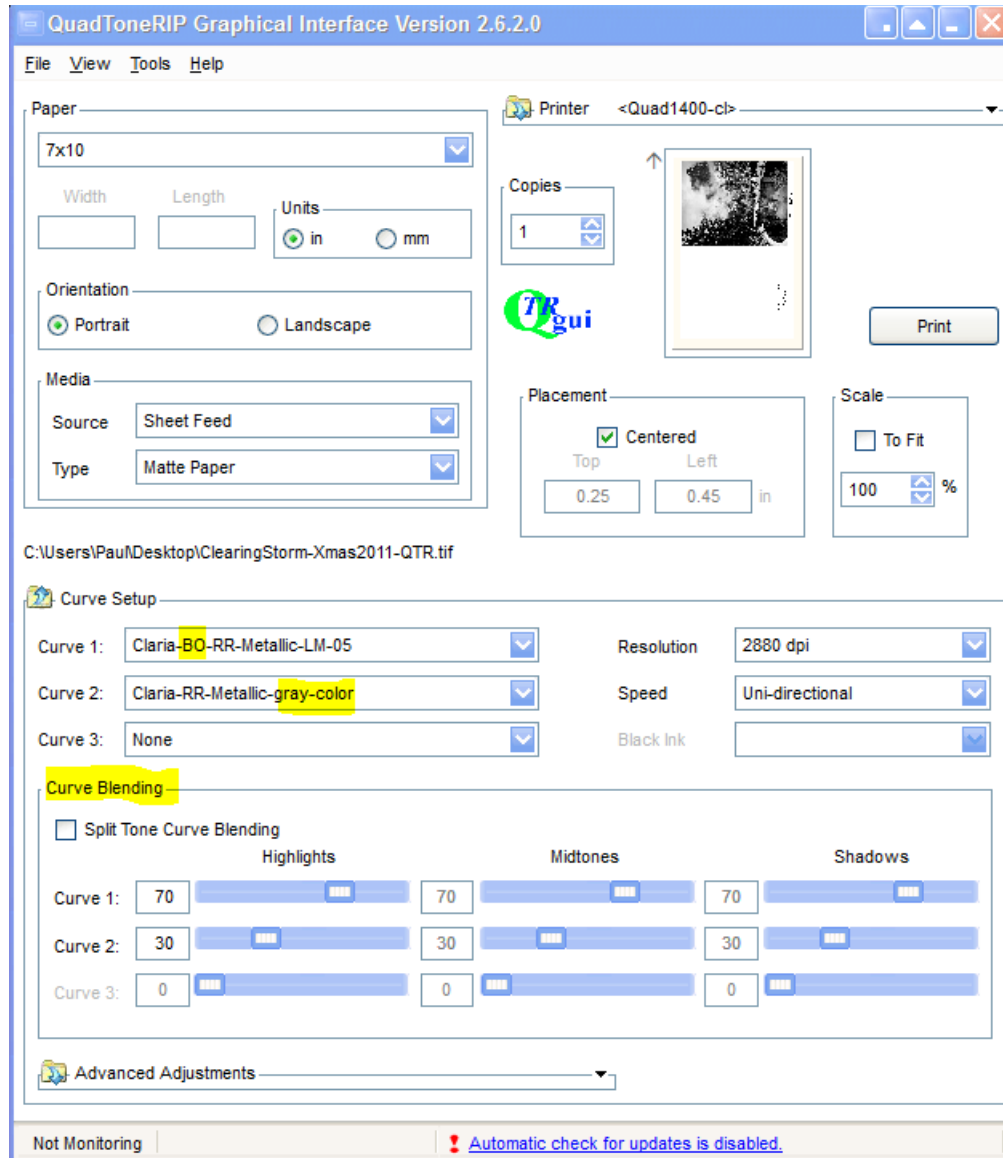
The warmer profiles obviously also contain some yellow ink.

There is a second type of profile included in the <http://www.paulroark.com/BW-Info/1400-Claria-Profiles.zip> file. As noted above, because a Black Only profile can be somewhat rough in print areas where there are no details or near the leading edge of the print, the “color-gray” and “HalfColor” profiles use only or half light color inks (LC, LM, & Y) in the highlights and midtones. The graph below shows the ink distribution where only the color inks are used in the first half of the scale. With the HalfColor profile one of the black inks carries half the load from the highlights to where the color inks start to decline, where both black inks start to predominate, as in the graph below.



The specific ink curves for the profiles were manually drawn. They will probably be close for many papers.

Note that QTR allows one to blend different profiles. Below is an example of how this is done. The idea would be to use only as much color as needed to smooth the print. I have also made a few profiles that combine the Y, LC, LM and BO approaches in a single QTR profile so that it can be linearized easily in a single step. I sometimes call these “half black only” or “half color” profiles. See for example Claria-BO-RR-Metallic-HalfColor.qidf in the Profiles Zip file.

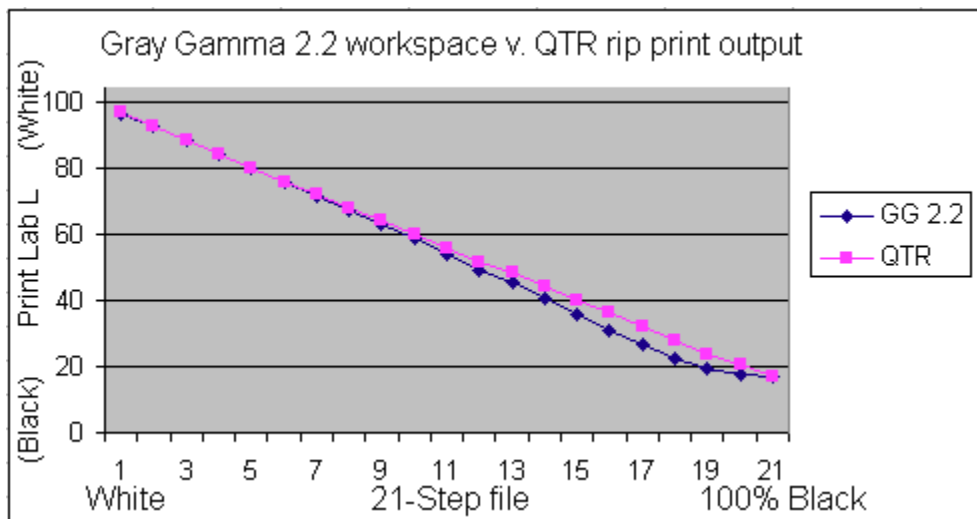


The other settings shown, specifically Matte paper, 2880 dpi, and Uni-directional, are used in all situations and are what the profiles assume.

Profiling new papers will probably be able to be done by modifying existing profiles. That is, if an existing profile is not right, I suspect slight altering of the ink limits and re-linearization if needed will handle most papers. If one does not have a spectro to do this, a flatbed scanner and the Photoshop script in QTR's StepWedge Tool make a good substitute. There is a Readme file in that download that explains how to use the tool.¹⁵

QTR File Preparation

QTR is not a "color managed" printing program. That is, it will not "read" the color space of incoming file and adjust its printing characteristics to match how the image was displayed on the monitor. QTR prints with a linear characteristic curve that is different than the popular color spaces typically used. The graph below shows the differences between the popular Gray Gamma 2.2 workspace and QTR's. Basically, Gray Gamma 2.2 compresses the shadows, whereas QTR does not.



The QTR download includes ICCs that allow one to edit in a linear space or convert to that space. I, however, prefer to edit in Gray Gamma 2.2, which is a subset of Adobe RGB and sRGB, which are the most popular spaces and used by most digital cameras. Since I often print with the Epson driver as well as QTR, I choose to not alter the character of the file until printing, when I make a specific QTR print file that has a Photoshop curve applied to it to offset the differences shown above. The "GG-to-QTR.acv" curve is in the Profiles Zip file.

¹⁵ See the StepWedge tool at <http://www.quadtonerip.com/html/QTRdownload.html>.

Specifically, what I do to prepare a file for printing with QTR is to save my final Gray Gamma 2.2 file, do a final sizing for the print, apply the GG22-to-QTR curve, and save the file to the Desktop with “QTR” in the name so that I know it has had the curve applied. Then I can drag and drop it into QTR and print.

In sum, I don’t recommend this as the ultimate B&W approach, but rather an alternative that can print visually stunning color and B&W on glossy paper that exceeds in many respects what the pigment alternatives can achieve. As a B&W printer who does not print color, I have moved on to a dedicated B&W version of inkset, one that uses an LK version of the black ink to smooth the prints. In fact, it uses two Lks and two blacks – thus the “2K2LK” name I’m using for it. This makes the 1400 into a “QuadTone” (4 black/gray inks) B&W printer that can vary the tone of the prints from neutral to sepia.¹⁶



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

Enjoy the journey,

Paul

www.PaulRoark.com

¹⁶ See <http://www.paulroark.com/BW-Info/1400-Claria-Noritsu-2K2LK.pdf>