

**Universal -- Glossy or Matte -- Carbon Variable-Tone
(Originally written 2016)
Black and White Inkset
Epson 7800, 9800 and other Epson printers**

www.PaulRoark.com

(as amended 1/2023)

This PDF discusses a B&W inkset using mostly glossy compatible carbon pigments, along with matte black and a light blue toner. With this combination, a wide variety of papers/substrates can be printed on the 7800/9800 or other similar Epson printers. The inkset uses the same pigments that were discussed in the Epson 1430 version.¹

I sometimes print on Arches watercolor paper, which requires two MK (matte black ink) positions in the printer to achieve its best dmax. (And beware of head strikes from Arches' deckled edges; iron and trim them as needed.) As such, this implementation of the glossy carbon inkset has a second MK in the Y position. Those who do not want the second MK might want to put the light blue toner in the Y position. This allows the inkset to be more Epson driver compatible.

The 7800/9800 version of the inkset is designed to be printed with QuadToneRip.² It can also print on matte paper with the Epson driver, but with limited control.

The tonal range of the inkset is cold tone to mild sepia. The single best measure of relative warmth is the change in the Lab B from the paper white. This inkset can print from a negative Lab B to a "delta Lab B" (change in Lab B) of about 14. Lab A is set by the toner mix. The default mix I use is set to produce a level to slightly increasing Lab A from the paper white to deep shadows. This gives some papers a slight "selenium toned" look, which is what I did most often in the wet darkroom with the traditional silver print. I found that an inkset that varies both Lab A and B became too complex for most printers and was not needed for the traditional range for B&W prints.

As usual with my carbon pigment based inksets, one goal is to have the most carbon possible for a given print tone. The reason to have the highest percentage of carbon in the inkset is because, among other things, it is by far the most lightfast printing substance available, with up to 10 times the image stability of even the selenium toned silver print.³ Carbon prints also lack the visual color artifacts that appear when too much color is used.

Having the color toner separate from the carbon pigments has a number of advantages. It makes the approach flexible in terms of substituting different carbon and color toners. All of the print tones can have all of the carbon positions firing, adding to the smoothness of the print. Profile blending with the QTR sliders appears to result in more reliably linear prints when the cool and carbon profiles used have the same carbon core. Also, I've consistently found that all the pigments within a single ink need to have exactly the same dispersion technology and otherwise be similar. Otherwise they tend to separate. Mixing colors with different characteristics with carbon or other colors (from a different inkset) is chancy. Here the carbons within any ink are all identical. The colors are in a different position, are from the same source, and been tested for stability as a blend, using a centrifuge, among other things.

¹ See <http://www.paulroark.com/BW-Info/Glossy-Carbon-Variable-Tone.pdf>. For those who do not need to print on glossy paper, the "Ebony" MK based carbon inksets remain the most economical and best tested.

² See <http://www.quadtonerip.com/html/QTRoverview.html>. Profiles can be downloaded from <http://www.paulroark.com/BW-Info/GlossyCarbon-Profiles.zip>.

³ See Appendix 1, below.

The pigment liquid medium that is used in this inkset also acts as a gloss optimizer. This results in far less bronzing and gloss differential than with most coated inkjet pigments. The trade-off is that this inkset is optimized for satin, not high glossy papers.⁴ If *matte* paper is the only type you print on, one economical option might be to use of Eboni MK as the carbon source and the generic base c6b as the dilution medium. Note that the “Eboni” variable tone inkset is for matte paper only, and I no longer use or support this approach beyond what is in my PDFs, which may not be 100% complete or up to date.⁵

In January 2017 the inkset below was loaded into the 9800, replacing the Eboni-6 version that was there. That I still use this mix is an indication of my satisfaction with it. The 9800 with this inkset is currently the only setup I use for fine art.

Ink Arrangement – 9800 Glossy Carbon Variable Tone

Carbon pigment inks:

Y = 100% MK (Eboni [“Eb”] 1.1 or, currently, STS WJ1082)
K = 100% MK (same as above)

Dilutions of PK (Photo Black, now STS “wj1122”, diluted with STS “wj824”)

LM = 9% PK (aka Photo Carbon; this is not a blended color-carbon ink)
M = 30% PK
LC = 15% PK
C = 50% PK
LK = 100% PK

Toner:

LLK = (13.75% Blue, 11.25% Cyan Canon Lucia pigments,⁶ 75% clear base.)⁷
(The toner color pigment mix is 55% Canon Blue, 45% Canon Cyan. This is then

⁴ I think the best looking high gloss I have used are dyes. See <http://www.paulroark.com/BW-Info/4000-Noritsu-2K.pdf> and <http://www.paulroark.com/BW-Info/1400-Claria-BW.pdf>. But, of course, they will fade much faster than carbon prints.

⁵ See, e.g., <http://www.paulroark.com/BW-Info/Eboni-Variable-Tone.pdf>, <http://www.paulroark.com/BW-Info/3880-Carbon-Variable-Tone-2015.pdf>, <http://www.paulroark.com/BW-Info/7800-Carbon-Variable-Tone-2015.pdf>, and <http://www.paulroark.com/BW-Info/9800-Eboni-Variable-Tone.pdf>. Printers always do best when run at least once a week. With the matte-printing-only “Eboni” (the old, original MIS name for its matte black ink) based inksets you may need more cart agitation than with the smaller glossy pigments. The generic base plus Eboni inkset makes a very inexpensive and very lightfast inkset, which can look reasonably neutral on Arches watercolor (uncoated & very durable) paper.

⁶ Canon Lucia Blue (PFI-106B) and Cyan (PFI-106C) are the inks used in Canon’s iPF6300 printer. See for example, <https://www.itsupplies.com/Canon/Canon-imagePROGRAF-iPF6300/iPF6350> or <http://www.atlex.com/canon-pfi-106b-pigment-blue-ink-tank-130ml-for-ipf6400-ipf6450-ipf6300.html> and <http://www.atlex.com/canon-pfi-106c-pigment-cyan-ink-tank-130ml-for-ipf6400-ipf6450-ipf6300-ipf6300s.html>. To drain Lucia tanks, I just poke holes in the soft plastic with a clean awl – one high on the side for air to enter and one near the bottom on the side for the inks to pour out of into a 4 oz. bottle. I do this over a sink.

⁷ The “amber” base (WJ824) is what I recommend. I have also used my “c6b” base. (See <https://www.paulroark.com/BW-Info/Ink%20Mixing%20Generally.pdf>) Initially, both appeared to work well. For details on the color pigments, see <http://www.paulroark.com/BW-Info/Color-Toner-Approach-for-Carbon-Variable-Tone-inksets.pdf>. As of 2022, I started to see microbanding at 1440 resolution. The 2880 setting cleared it up. Whether the appearance of banding is an artifact of my aging Epon 9800 or other factors is not known. Overall, this neutralized carbon + toner compares favorably to a wet process silver print, in my view. Under magnification, one can see the inkjet printer artifacts, but the advantages of the modern inkjet process outweigh my concerns with microscopic artifacts. The carbon pigment itself is so solid the strength of the toner is the only real issue. Canon Lucia pigments are the most lightfast color pigments that are compatible and readily available. And, as to paper, I don’t trust the old silver print to stand up to atmospheric acids and other very long term affects of aging.

mixed 25% color pigments, 75% clear base.)

As noted earlier, this is for wide format Epson printers, QTR printing, and where Arches is one of the papers of choice. For most potential users, a setup that mostly follows the 3880 Eboni Variable Tone might make sense.⁸ A single MK (not enough for Arches) and the toner in the Y position can be simpler to profile and, generally, easier.

Printing Characteristics and Profiles

My profiles are and will be posted at (among other places)
<http://www.paulroark.com/BW-Info/GlossyCarbon-Profiles.zip> and
<http://www.paulroark.com/BW-Info/7800-GCVT-Profiles.zip>

(Expect to need to re-linearize these profiles; I do not update old profiles.)

Epson Driver

This inkset is compatible with the Epson driver only for matte paper.



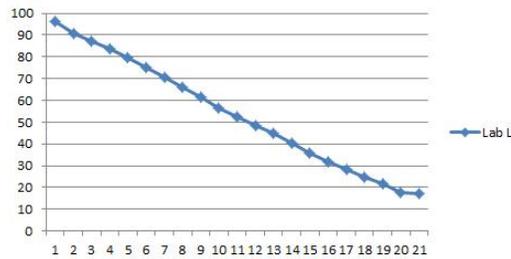
The image above is a scan from a single print that used the Neutral and Warm curves to print on the same piece of satin paper at the same time.⁹

With Photoshop curves on different layers, the different tones can be blended in a single image. With some software separate images can use different ICCs with different images (very handy with canvas and batch printing). The images show the print range that can be achieved on matte paper (here Epson Hot Press Bright) when using the Epson printer.

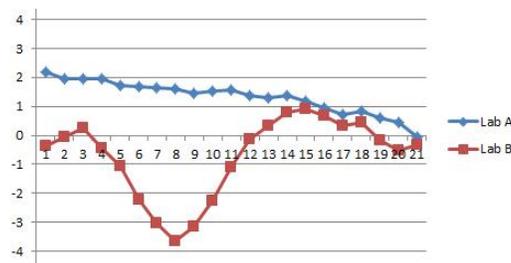
⁸ See <http://www.paulroark.com/BW-Info/3880-Eboni-Variable-Tone.pdf>. This might be what would work very well: Y = Toner (13.75% Blue, 11.25% Cyan Canon Lucia pigments, 75% base.); LM = 6% PK, M = 18% PK, LC = 9% PK, C = 30% PK, LLK = 15% LK = 50% PK (Eb6-M), K=MK or PK. (The 50% PK is very useful in maximizing dmax with QTR.)

⁹ The image on the left is my Oceano Dunes image with a Hubble image added. See <http://www.paulroark.com/Hubble-Monocerotis-Dunes.html> for more information, including using the Hubble images (which we the public paid for and own through our government). The “Migrant Mother” image on the right was taken by Dorothea Lange while she was employed by the US Farm Security Administration during the “Great Depression.” As such, it is publicly available through the US Library of Congress. Both (non-Hubble) images were taken just north of where I live, along the California Central Coast.

With matte paper and with relatively default Epson driver settings (Automatic Mode, standard sRGB), the resulting print has a rather standard gamma 2.2 Lab L grayscale ramp. The graph below is for Epson Hot Press Bright (quality settings at #5).¹⁰ While I won't be using the Epson driver with no controls, there are situations where printing from a non-photo application is useful and may not allow much in the way of control. Having a good Lab L gray ramp at default is useful.



Because the toner is in the LLK position, if a print is made from a grayscale file, the light blue toner ink (in the LLK position) is injected in the lighter areas, causing them to be cooler than the rest of the print. The Epson driver uses a “gray substitution” algorithm to substitute its gray/LLK when R=G=B. For smoothness and other reasons, “color” ink positions are also used, but the closer to the neutral gray point R=G=B, the more LLK is injected in the highlights. The graph below shows the effects of this toner/LLK gray substitution with a grayscale file.



Additionally, the second MK in the Y position causes some graininess in the print's light values when a straight grayscale file is printed.

Nonetheless, the Epson driver compatibility can be useful. The simple, standard PS workflow can be profiled to print relatively neutral as well as warm toned matte prints. The graininess of the neutral print's highlights can be reduced some, making them fine for larger prints. The warm prints are extremely smooth because the Y-position MK can be totally eliminated from the lighter values.

Using Photoshop image adjustment curves, the image color tone can be controlled over a range of “Neutral” (a level Lab B from paper white to maximum black) to “Warm” (an increase of 7 Lab B units from paper white to midtone warmth). These PS curve can be embedded in ICC using QTR's Create ICC-RGB. The ICCs and underlying PS curves are in my Profiles Zip file. They can be used as a baseline and starting point for other curves and ICCs. I do not anticipate making many of these; it's up to users to do the work of refining what I have posted.¹¹

¹⁰ The “toe” (95 to 100 black spacing) is more compressed than normal because the dmax is reached at 97, not 100. This is easy to correct.

¹¹ The Epson driver settings for an ICC include: UltraSmooth Fine Art Paper, Quality Level #5, High Speed Off, “No Color Adjustment.” The PS Print Settings include: Photoshop Manages Colors, the Neutral or Warm ICC profile, Perceptual with Black Point Compensation. The way to control the LLK/toner/print color tone is by varying the distance between the R, G and B

Regarding Arches watercolor paper, while the Epson driver is usually considered to render a weak dmax with Arches and other un-coated watercolor papers, it can, with this inkset and the Neutral ICC in the Zip file, make a print that is quite good. The key to the dmax is that the Epson driver in the “Paper Configuration” setting must be set to the maximum “Color Density.”

Warm Arches prints with the Epson driver are still a problem, as the Epson driver overloads the paper in the midtones. The second MK in the mix is essential to keep the total ink load down there.

Arches does not print as smoothly as a coated inkjet paper. For this reason, I recommend it only for “full sheets” (22x30”) if a very smooth appearance is wanted.¹²

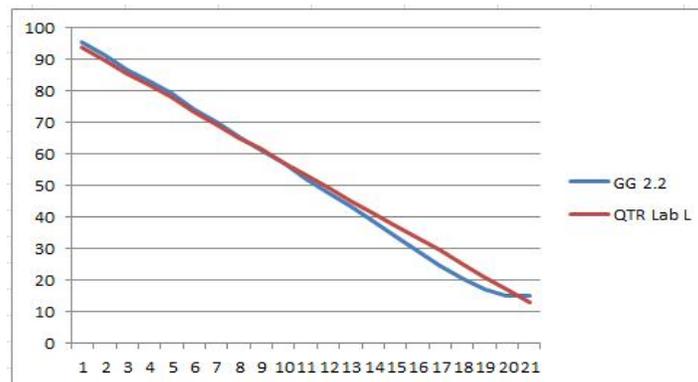
Printing with QuadToneRip

QTR is the printer utility I use for most of my serious printing. It results in, usually, superior prints and is easier to profile for all types of paper and canvas. The print tone with 100% carbon can vary between near neutral (Black Only on some matte papers) to light sepia (delta Lab B = 14) on glossy papers. With the toner, even glossy papers can make cold tone prints.

Printing Adjustment Curve for Windows

Note that I have used various Windows versions as well as the QTR Windows GUI. Mac users will have a different interface and workflow, but the profiles should be compatible.

At the outset, know that QTR, when printed from the Windows GUI, prints with a straight line Lab L characteristic curve after the profile is “linearized”. See the comparison of the Gray Gamma 2.2 and the QTR Lab L curves, below.



curves in the Photoshop image adjustment curves. The dmax with the Epson driver appears to be highest with curves ending at R=G=B=97. QTR profiling is much easier.

¹² With Arches there can also be batches that seem to have an excessive amount of fibers sticking out of the paper surface. Interestingly, the front is usually different than the back side of the paper in this respect, though they print with the same profiles. At <http://www.wetcanvas.com/forums/archive/index.php/t-1324017.html> a commenter noted that the watermarked, front side “had this kind of very fine, fuzzy texture to it, almost like pilling. ... You can see the fibers sticking up off the paper surface when you look closely.” Blick Art Materials responded, “The Arches Watercolor Paper ... is meant for watercolor, it has to remain slightly more absorbent and thus the fuzzy texture you are describing.” So, I often print on the back side of Arches.

If one edits in Gray Gamma 2.2, the QTR print will match the monitor best if it is adjusted to compensate for the differences in how they print. To do this, I apply a Photoshop curve, after I have saved my master file, that offsets this printing difference just before I print the file. I save this printing file to the Desktop with "QTR" in its name. It can just be dragged and dropped into the QTR GUI. After printing, I delete the QTR-adjusted file. The Photoshop image adjustment curve I use is called "GG22-to-QTR.acv" and is in the Profiles Zip file.

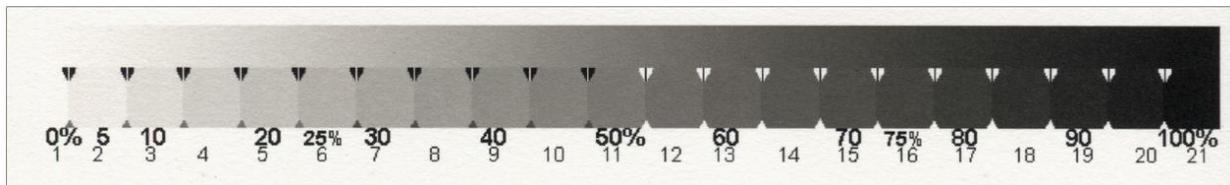
Most recently, I use the Microsoft Studio computer, with its very good, very bright monitor. I have to cut the lightness of the monitor to about 60% with a curves layer on the image to be able to see a reasonable "preview" of the print. I make slight adjustments to this profile if the print and monitor didn't match with the first effort.

Matte Paper

Arches Watercolor Paper

Arches printed with 100% glossy carbon has no greater warmth than when it is printed with Eboni-6 v.1.1.¹³ As such, making the most archival prints, using Arches, is just as possible with this inkset as with the Eboni-based inksets. The Arches "dB3" profile (delta Lab B rise of 3 units over the paper base) makes a very good 100% carbon print.¹⁴ In fact, the "dB2" profile even makes a good image. See the image below. When displayed on the wall with appropriate natural paper mat board, prints made with these profiles will be seen as simply good B&W prints with no obvious color.

This is the 100% carbon test strip from the "dB2" profile.



(Note that the texture of the paper is what you also see in the inked patches.)

With the Arches "dB2" profile the maximum Lab B is 2.4 Lab B units above the paper base. Lab A is essentially flat, staying at the paper base level. Both Lab A and B drop in the deep shadows.¹⁵

¹³ In my spectro reads of straight/standard "serial" QTR profiles for Arches with the Eboni v. 1.1 based inkset versus this inkset, the delta Lab B (maximum Lab B over the paper base) was 3.79 for the Eboni based inkset and 3.56 for this one. The difference may well be within the normal accuracy error for the spectro. On the other hand, I believe the 100% carbon profiles for this inkset are now better than for Eboni-6. The delta B 2 profile is good enough to use.

¹⁴ The delta-B=3 curve uses QTR profiling for the main carbon partition but then manually (QTR curve point list) controls the 30% K ink, using it in the highlights with the second MK also being utilized in the midtones to reduce warmth. Visually, without a loupe, I do not believe anyone can see a these dense denser inks. Particularly when one considers that the target is Arches full sheets (22x30 inches), and no serious purchaser or viewer judges such prints with a loupe.

¹⁵ A scan of an 8x10 Arches print using the "delta B = 2" profile and Northernlight test image is posted here: <http://www.paulroark.com/BW-Info/Arches-GCVT-d2B-NorthernLight-test.jpg>. Minor artifacts are visible in the top, small circular gradient. The non-linearity appears to be an artifact of linearization that just shows up worst in the black ink and small, high contrast gradients. I have been unable to trace the exact cause(s). They show up in a 2 inch print using a linearized Black Only profile gradient, but not in a 6 inch print, even when the 6 inch gradient is compressed to 2 inches after it is scanned. They do not show up in the un-linearized profile gradient. I have never seen evidence of this artifact in actual pictures. They do not show in the "db3" carbon test print, which is posted at <http://www.paulroark.com/BW-Info/NorthernLight-Arches-GCVT.jpg>.

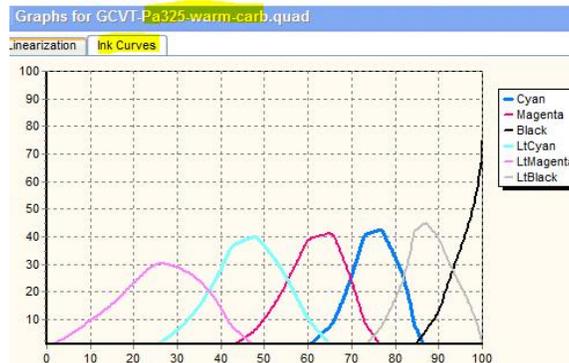
The neutral profile based on this carbon core used the least toner in the highlights. The Arches dB3 (v. 1) carbon core is used for the Arches Neutral profile. It uses the least toner at 50% and below.¹⁶ With the neutralized dB3 profile, the toner accounts for about 5% of the density of the print.

Matte Inkjet Paper

While Arches prints essentially the same with the glossy carbons as it does with the matte carbon, inkjet coated papers print warmer with the glossy carbon. As a starting point I look at Premier Art 325, my old standard.

Premier Art Fine Art Smooth Hot Press, 325 gsm (“Pa325”)

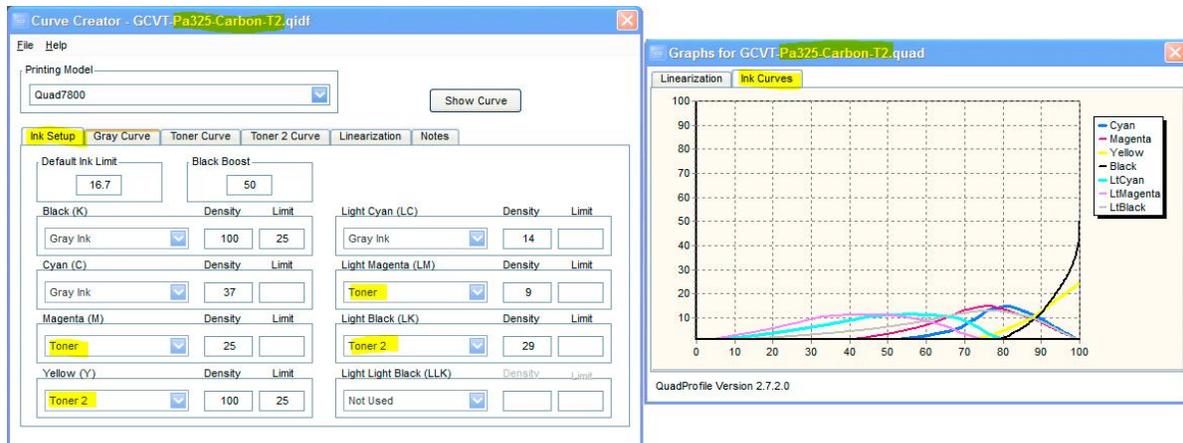
The denser the ink, the more neutrally it prints. As such, the warmest print is that where the carbon inks have been arranged in what I call the standard “serial” single partition, as shown below.



When the carbon inks are arranged in this manner, the change in the Lab B from paper base to maximum (“delta B”) is 7.7.

Some of the inks can be put into “toner” partitions. Where this is done with the LM-M, and LK-Y (an MK), all inks are used and the denser inks are moved up. The ink limits are split as needed. The QTR Ink Setup and resulting curves are shown below.

¹⁶ The differences relate to where the denser carbon pigments were used in the profiles.



With the Pa325 Carbon T2 (two toners) the delta lab B = 4.27. If this carbon core is used for a neutral profile, the amount of the color ink needed becomes much less. This is good for longevity. Obviously, as the denser inks are moved up the scale, the smoothness decreases. How one weighs these considerations depends on the print size and image. Since I am looking at printing mostly large images with the 9800, the smoothness of the T2 appears to be more than adequate. It'll be more lightfast, and printing will take less ink. The more the crossovers are spread, the more tolerant the profile is to slight ink batch variations, cross-over artifacts and the like.

Epson Hot Press Natural prints like the above Pa325, but with a slightly higher d_{max} . The profiles are nearly the same, including the same toner curves. The Epson HP Bright prints the same as the Natural, but with some OBAs in the image for a brighter base.

Red River's Polar Matte and Aurora Art Natural also take essentially the same profiles, as does the Premier Art Smooth Bright White.

With the Carbon T2 core, the Aurora and Premier Art Smooth Bright White 300 are the inkjet papers tested so far that print the least warm, with an approximate delta Lab B = 3. As such, they also take the least amount of color toner to make a neutral print. They are also characterized by a rather modest d_{max} .

Breathing Color Art Peel -- A specialty paper

(A third party asked me to take a look at this paper. It is not for most uses, but could be of interest for some purposes.)

An interesting and different type of "matte paper" is the Art Peel line of rolls from Breathing Color.¹⁷ It has an adhesive side that is exposed after peeling away a backing. Their web page shows illustrations like wall paper. It reminds me of the texture of shelf paper. There is some rub-off potential at the black end of the scale. How practical the material is remains to be seen. As a wallpaper, with my printers that require a side border, it would seem difficult to have sections abut each other accurately. In any case, there are profiles for it in the Zip file, and it prints quite well, with a d_{max} of about 1.65 (after a one day dry down).

I was interested how this would work if stuck onto foam core. Working with a 13x18 inch print and foam core size, I laid the print on a smooth, flat surface, face down, and removed the backing. I don't know, but it seemed like this material ought to "relax" for 15 minutes just in case the removal of the backing

¹⁷ See <https://www.breathingcolor.com/art-peel>

stretched the “paper” a bit. This “standard” thickness paper was easy to see through well enough to align the foam core with the image, where the paper was larger than the print. If I had wanted a signing border left, I probably would have printed on cutting dots at the corners and used a pin to transfer those markers to the back of the paper.

Glossy & Satin Papers – QuadToneRip (QTR) or other RIP is Required

The primary reason to use this inkset instead of the “Eboni-6” and its variable tone permutations is the ability to print on glossy or satin papers. Secondly, however, the glossy carbons tend to settle less quickly, requiring less frequent agitation of wide format carts. The glossy/satin paper compatibility gives me the ability to achieve a light sepia tone print with a delta Lab B of about 14. It also provides a very good B&W image on the baryta papers and the glossy, inkjet compatible canvas substrates. The main reason I primarily use this glossy-compatible inkset is that it opens up large size, unglazed print capabilities using canvases and satin/glossy papers. For un-glazed display, the ability to spray a satin print with Premier Art’s Print Shield to make it waterproof is a major advantage for the individual photographer/printer.¹⁸ My standard wall display print has been for several years Red River Satin paper, dry mounted, sprayed with Print Shield, framed, and sold, with no need for me to deal with glass or acrylic over the image, both of which reduce the dynamic range of the print. In over seven years of using and selling sprayed, un-glazed prints like this, I have had no indications of any damage or other problems with my un-glazed pigment prints. I did see an example of an unglazed Epson dye print that got damaged by cleaning and other physical contact. While the sprayed satin finish carbon prints I currently make can be wiped off, one does have to be reasonably gentle with the physical contacts. I recommend a standard, popular lens bulb blower to get the dust off, with a soft cotton cloth a backup if needed.

Matte finishes that require the thicker water based coatings to be protected are not suitable for people without a professional spray booth.¹⁹ My experiments with spray-coated matte papers has not been encouraging. I do not recommend that route.

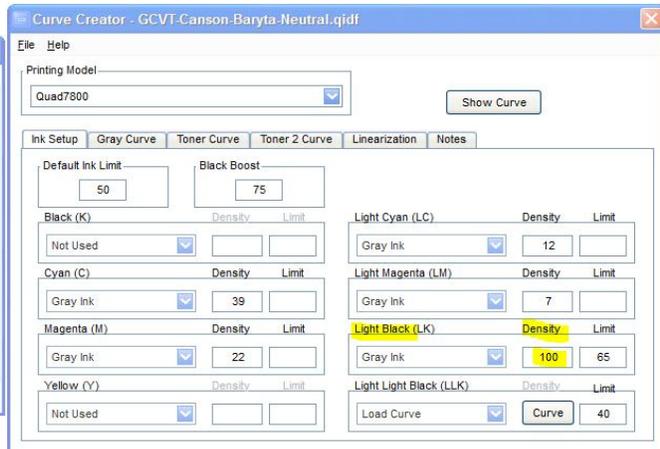
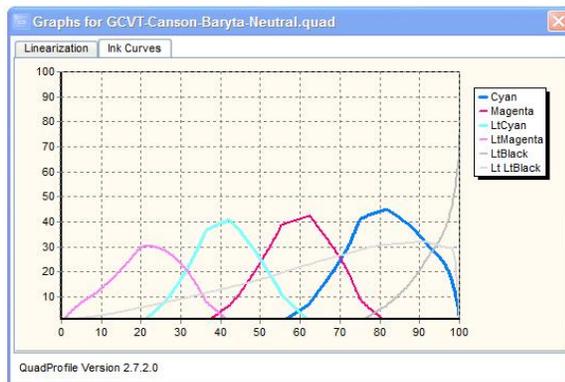
Having now printed a number of canvas and satin prints, my experience with this inkset indicates that all glossy and satin finish papers can probably be profiled very well. That said, the inkset is, in my view, best with the more subtle finishes, such as on the baryta or satin papers. Without a post-printing spray, however, some reflective artifacts (“bronzing” and “gloss differential”) can be detected. Typically, I print on satin paper and then spray it with Print Shield.

Achieving the best Dmax

One of the more interesting variables is how to get the best dmax. Some papers, such as Canson Baryta Photographique, are in the 2.4 range when profiled in the normal manner with QTR.

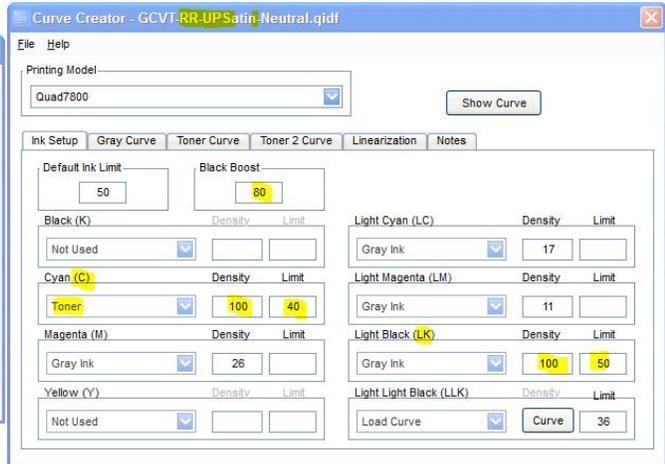
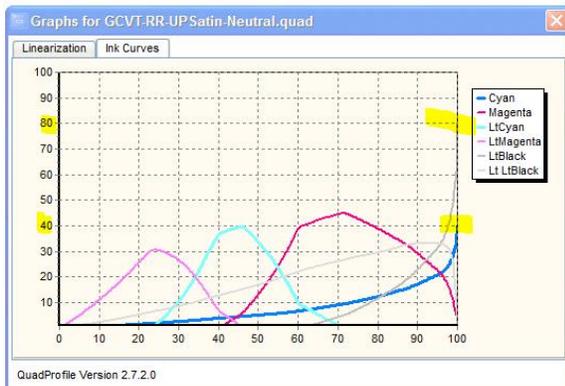
¹⁸ I use 4 coats on a satin print. This is done in a single session with just a few minutes of dry time between coats.

¹⁹ For matte canvas, a heavy, water-based coating is recommended for best durability. For glossy or satin finishes, Epson believes coating is not required. See https://www.epson.com/alfresco/proimaging/media/EPSON_Exhibition_Canvas_Printing_and_Finishing_Guidelines.pdf. Due to this, my initial interest was in Epson Exhibition Canvas Natural Satin. However, initial printing tests suggest it is not a suitable product for my type of work. Also, while it may have good abrasion resistance with no spray, no inkjet paper is waterproof without a spray.



I refer to the above as standard or “serial” QTR profiling, where one marches up the ladder of ink density to the 100% PK, which in this case is in the LK position.²⁰

With many papers the PK is going to reach about a d_{max} of 2.0. However, when it is combined with the 50% PK (C position here) the d_{max} can jump up into the 2.4 range. (See illustrations, below.) In the calibration mode print, if the 50% PK achieves a higher d_{max} than the PK, I use a 50/50 blend in the profile. If the PK reaches a higher d_{max} than the 50% PK, but still only about 2.0, then a profile mix of 2/3 PK and 1/3 50% PK usually achieves a more dramatic d_{max} . For example, see the Red River Ultra Pro Satin profile, below. Here the PK (LK position) boost is at 80, with the 50% PK (C position) a “toner” with density 100 and ink limit of 40. Note that the “toner” tab in QTR had the gamma increased from the default 1 to 1.5 to give it less impact in most of the print and more at the black end of the scale.



On some papers and with some images “pizza wheel” or roller marks may be caused by the higher total ink load on the paper when the 50% PK is used in this manner. So far, the only paper I’ve noticed a potential issue with this is the Epson Exhibition Canvas Satin Natural, which seemed to suffer from some type “vertical” banding that was probably related to the rollers, but the cause is uncertain. The problem disappeared when a “standard” QTR profile was used.

²⁰ In this profile I held the black boost down to 75. The d_{max} is reached at 90. Deeper black can sometimes cause more of a color difference, however. If the print is sprayed, this difference becomes less relevant.

Canvas or Satin finish

My experience with canvas is mixed. The large matte canvasses that I have printed with the 9800 sold. They look good, but with just a light solvent base spray, as opposed to the heavy water based coating, they are more fragile than I'm comfortable with. That said, third parties I know have had them displayed, un-glazed, for 6 years now with no problems.

I have also done some printing on glossy canvas. With some images and with spot lighting, my view is that glossy canvas texture can sometimes cause annoying highlight reflections off every high point of the canvas weave.

The Innova Ultra Glossy canvas seems to have less of a problem with reflections off the weave than does the Epson version, but the problem is still there for some images. The Innova has a very high dmax, unlike most of the canvas I've used. One practical note is that Innova Ultra Glossy Canvas prints very well with the Innova F-Type profiles. Additionally, a spray coating with Premier Art Print Shield, which makes the canvas rather waterproof, does not affect the profile. So, the bottom line is that profiling is relatively easy.

After having these canvas prints mounted several ways over the last few years, I recommend professional mounting for the large ones. The simple spray mounting on foam core that I've tried has had too high a failure rate (bubbles or failure to adhere in places) to recommend. The overall impact of the image with no glazing, a very white (yet no OBA) base, and a deep dmax can make for a very dramatic B&W display.

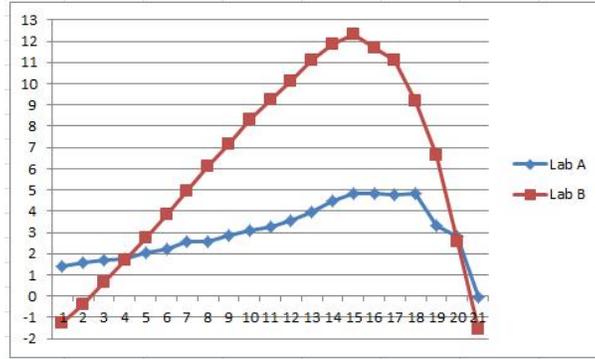
Currently, I favor the satin finish and recommend professional service bureau mounting of the very large ones. My dry press and Elmer's pre-coated, heat-sensitive foam core worked well up to 24 x 36 inches for a number of years. Ultimately, however, the old heat press and form of mounting started to get bubbles between the print and foam core. As such, I switched to pressure sensitive adhesive from 3M (3m positionable mounting adhesive 568, 24 inches x 50 feet) and acid free foam core. The adhesive is first pressed onto the foam core with a Drytac ML-25 Manual Table-Top Laminator. It is working well.

Beyond the 24 x 36 inch sizes, I farm out the mounting to a service bureau.

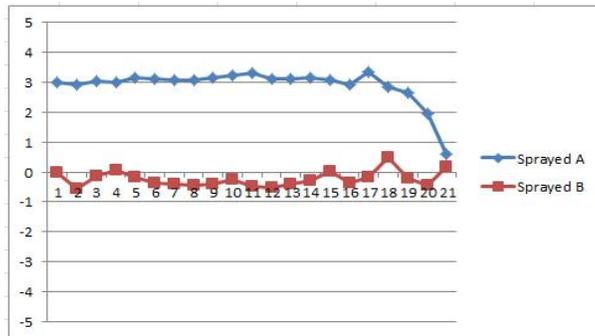
Print Color Tones-Hues

Being able to vary the tone of the print easily is obviously a major point of this inkset. The light blue toner is in the LLK position; all the other positions are 100% carbon. So, the profiles are often very much the same, with the neutral print profiles simply having one extra ink in them.

By itself, the glossy carbon prints with a very warm tone on glossy papers. The Lab A and B curves for the Innova F type, below, are rather typical.



On the other hand, the Canson Baryta neutral profile (shown on a previous page) results in an image where the Lab A and B stay essentially unchanged from the paper base throughout the image. See the graph of the (sprayed) Canson Baryta Lab A and B below:



Different papers have different starting Lab A and B values, of course.²¹ A natural paper will have an elevated Lab B. One with OBAs will have a negative Lab B, The Canson paper has a slightly elevated Lab A, which gives the image what we darkroom types would have called a light “selenium” toned look.

The 100% black point is usually near neutral or cool. Carbon itself reflects almost no light. The warmth we see from dilute carbon inks is the light that is reflected by the paper and affected by the edge of the carbon particles or dots. At the dark end, the paper is covered with carbon, so what little light is reflected is not warm. The cooler 100% black point helps make the black seem deeper, particularly in indoor, lighting, which tends to be warm. A cooler black end of the scale was, again, one of the characteristics of the “lightly selenium toned” silver print that I favored in the wet darkroom days.

QTR Sliders for Split Tone Prints

I generally make a carbon/warm profile as well as a neutral profile. With these two profiles and the QTR sliders, one can achieve any level of warmth up to about a Lab B of 13 (light sepia) as well as split tones. Where the underlying carbon profile is the same, the sliders, in effect, are simply adjusting how much light blue toner is injected. The Lab L is usually un-affected and remains straight. This has not been the case in some inksets I’ve worked with where the inks are composed of either carbon or blended carbon plus color pigment and use entirely different profiles.

²¹ Although my spectro is quite stable and consistent regarding Lab L, Lab A and B can shift slightly over 1 unit rather randomly. So, a more expensive spectrophotometer might show different values for these. For perspective, one unit is barely visible in side by side viewing.

Any number of different split tones are possible. Many like warm highlights and cooler shadows. Frankly, I prefer a cooler highlight for clouds, snow, and water white, occasionally with warmer shadows. Usually, however, as a former traditional silver print/darkroom worker, I have a bias to just printing a straight neutral print and not trying to have any color differentials in the print.

Clear Films for Internegatives

I do not make alternative process B&W prints, but I have had some people express interest in using this or similar inksets for that purpose. I was also curious how the inkset would do in that respect. Just looking at the densities that are achievable, it appears that the high densities needed for platinum/palladium printing are possible. There are two profiles in the Zip file for Pictorico (clear) film (PictFilm). The first has a lower contrast, the second a bit higher, close to a density of 2.²² Because these had to be linearized on a white piece of plain paper, I am not sure how accurate that step is. For a transmission density of close to three, the MK can be used with the PK.²³ Where the PK load is twice the MK load, the pigments appear to stick well without the need to spray the film. The density at the black end probably exceeds what is needed. Pulling the black (PK, and two MKs in my case) ink limits down to match the print medium should be done before final linearization of the workflow. The profile PictFilm-3-Draft is a suggested format, which can be modified to match similar inksets.

I also have a profile in the Zip file for Pictorico White Film. This one linearized well and may be a good starting point for clear films. It would be more similar to the second of the clear film profiles mentioned above.

Bottom Line

There are a number of variables in this process. I strongly recommend finding an approach that achieves the look you like and sticking with it. There is a lot to be said for simplicity. I also think that, as a black and white photographer, a display of prints that all simply look like neutral B&W prints is preferable to having even subtle differences among the prints. So, while I need carbon warmth for some printing purposes (for example, warm “old photo” reproductions or simulations), my home and gallery displays all use the same neutral profile.

²² Although a silver print may need a negative with a density range of only 1.2, a good platinum/palladium print may need a negative with a range of 2.0. (“The Book of Alternative Photographic Processes,” by Christopher James).

²³ I have simply used my light meter to measure the light blocking of 2 inch square prints. The glossy inks by themselves can get up to about 7 f-stops. When the MK is added over 9 f-stops can be blocked. Because there are just carbon inks, I do not anticipate there will be significant differences between visible and UV light.

Appendix 1

Carbon Pigment Lightfastness

Fade Test Data²⁴

Aside from the toner, which does not need to be used, the inkset I am describing is 100% carbon, and 100% carbon pigment images have resulted in the best digital prints tested by Aardenburg Imaging and Archives.

Comparing the Midtone $L^* = 50$ test patches among the popular alternative B&W printing approaches, all at 140 Mlux-hours of light exposure and all on Hahnemuhle Photo Rag, these are the delta-e²⁵ values reported. Lower is better.

MIS Eboni/STS wj1082 carbon = 0.6
Cone Carbon Sepia = 0.5
Epson 3800 ABW = 3.6²⁶
HP Z3100 = 1.9
Cone Piezo Neutral K6 = 3.5²⁷

Basically, all carbon pigments are going to be about as strong as the MIS, STS and Cone carbons shown above. It is the color inks used to pull the print tone to neutral that makes the difference. Canon Lucia EX pigments are the strongest, with HP probably second. See the comparison of the cyan and blue colors fade test results at 100 Mlux-hours, below:

Canon Lucia EX blue delta-e = 1.8
HP blue delta-e = 3
Canon Lucia EX cyan delta-e = 1.0
HP cyan delta-e = 2.4

Based on these tests, I believe that carbon pigments toned with Canon Lucia EX pigments are better than the HP Z3100 tested above. Typically cyan is the strongest color. In addition to the information above, note that the Epson UC-HD blue test patch at 60 Mlux-hours had a delta-e twice that of the Canon Lucia EX.

Another comparison former darkroom printers may relate to looks at a wet-process, fiber based, selenium toned silver print. Aardenburg Imaging had not tested the silver prints to 100 Mlux-hours of exposure when I did this comparison. So, below I list the delta-e values for the $L^* = 50$ Mlux-hour test patch for the best inkjet print versus the selenium toned silver print that is most similar to what most of us used to print in the darkroom.

²⁴ <http://www.aardenburg-imaging.com/> is simply the best database of fade test information that is available to those of us who are serious about our medium. Note that carbon can be in a base that is either glossy compatible or only matte paper compatible. The carbon pigments of both have the same lightfastness characteristics.

²⁵ Delta-e measures the total movement in Lab L, A and B – i.e., density fade as well as color shift.

²⁶ Epson ABW does better with a more neutral print, however, I did not find a test of one on H. Photo Rag. In general, the Epson pigments can be close to the HP test values.

²⁷ See <http://www.paulroark.com/BW-Info/Eboni-v-Cone-N-HPR-140hrs.jpg> to get a better feeling for what these numbers mean.

MIS Eboni, PremierArt Fine Art Smooth 205 gsm paper, Print shield spray = 0.1
Ilford Galerie FB Silver print, Selenium toned 1:20, Durst Theta printer = 1.2²⁸

This, no doubt, exaggerates the extent to which the carbon print is more lightfast than the silver print in that most inkjet prints are going to be toned neutral with color pigments. However, when one also looks at the fact of un-buffered silver print paper being destroyed by airborne acids, whereas the buffered inkjet paper is protected, maybe these comparisons are not too far off. Add the problems of the gelatin coating on silver print compared to an un-coated Arches watercolor paper, and it becomes even more apparent that the expected life of a high carbon content inkjet print probably is significantly longer than that of a silver print.

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²⁸ Part of the silver print's problem was that the paper contained some OBAs. If we look just at the Lab L values or the test patches, the changes were as follows: Eboni carbon = 0.1, silver print = 0.3.