

## 100% Carbon Print Tones

[www.PaulRoark.com](http://www.PaulRoark.com)

9-7-2010

MIS Eboni-6, Epson 7800, Premier Art Smooth BW



Clearing Storm, Yosemite

Paul Roark

MIS K4-LK, Epson 1400, Crane Silver Rag



Dustman Wedding, 1885

Digital Restoration

The images at the top represent end points of the tonal range for 100% carbon printing.

On the neutral-cool end of the range, at the left, above, is Premier Art Smooth BW paper<sup>1</sup> printed with Eboni-6 or Carbon-6.<sup>2</sup> The image shown is based on an Epson 7800 print. A print from an Epson 7500 would be slightly cooler, and one from an Epson 1400 would be slightly warmer. Premier Art Smooth BW uses optical brightening agents (OBAs), so it would slowly warm up, but the carbon image itself would not fade significantly.

On the warm end of the scale, at the right, above, MIS K4-LK & PK<sup>3</sup> make a 100% carbon print on Crane Museo Silver Rag<sup>4</sup> that is in the true sepia range. This natural, non-brightened paper should result in a very stable image, limited only by the paper life, which is probably hundreds of years.

<sup>1</sup> See [http://premierimagingproducts.com/pm\\_smoothbwfineart.php](http://premierimagingproducts.com/pm_smoothbwfineart.php) & <http://www.atlex.com/premier/premier-supplies-paper-part-number.htm>

<sup>2</sup> See <http://www.paulroark.com/BW-Info/Eboni-6.pdf> & <http://www.paulroark.com/BW-Info/Carbon-6.pdf>

<sup>3</sup> See [http://www.inksupply.com/arcink\\_k4.cfm](http://www.inksupply.com/arcink_k4.cfm) - The MK (Eboni), PK, LK, and LLK are 100% carbon.

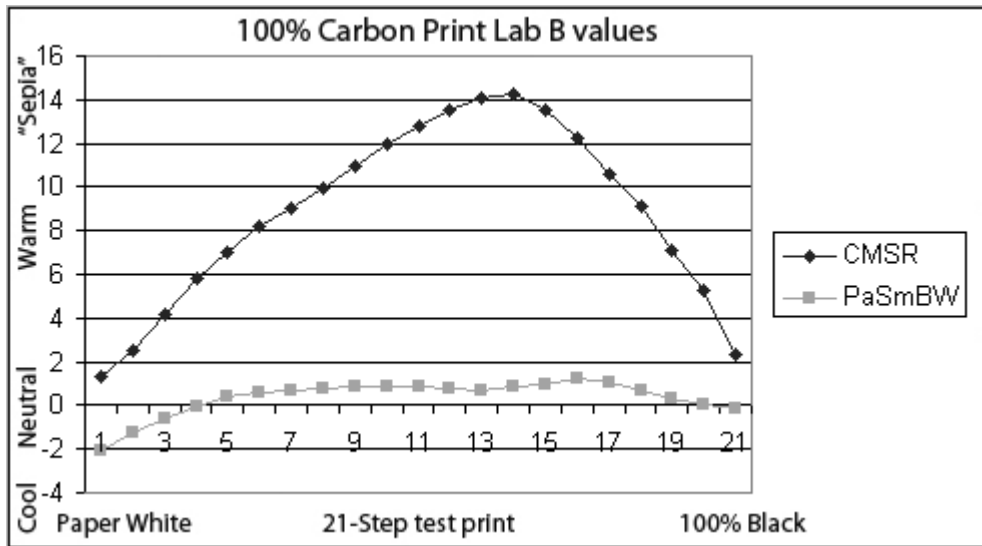
<sup>4</sup> See <http://www.museofineart.com/museosilverrag.aspx>. Search for best price. See <http://www.calumetphoto.com/ctl?ac.ui.pn=search.Search&query=museo%20silver%20rag>

The tones that are shown by the above images can be more objectively shown in graphs of the Lab A and B values for the different Lab L values of 21-step test strips. With carbon printing, the main variable is the Lab B value. A positive Lab B is a yellowish warm, a negative Lab B value is bluish-cool. The Lab A values (positive is red/magenta, negative green) tend to follow the Lab B values, but vary to a much less extent.<sup>5</sup> As such, the relative warmth of a carbon images can be graphically represented most simply by showing the graphs of the Lab B values of 21-step test strips.

The graph below shows the Lab B values for the coolest and warmest papers & inks, as shown visually, above. Crane Museo Silver Rag (CMSR) shows a pattern that is typical of glossy paper printed with the warm MIS glossy-compatible K4 carbon inks. CMSR differs from most other glossy papers, in part, in that it has no optical brightening agents (OBAs) in it.

All carbon pigments that are used in inkjet printing have at least some warmth in the highlights and midtones. The small glossy-paper-compatible carbon pigments that are used are much warmer than what can be used on a matte paper. As such, the glossy carbons cannot print neutral B&W, and the matte carbon blacks cannot reach the sepia tone or stick to glossy papers.

MIS Eboni is the most neutral printing carbon pigment I've tested, and that is why I use it the most. I like prints that look like the "cool" silver prints I used to make. As shown by the print on Premier Art Smooth Bright White, the highlights can even be cool, with a negative Lab B value, which makes it look noticeably "brighter" and "cooler" than my silver prints. However, the only way to get a cool image is to have a cool paper, using OBAs. So, it's the paper that is cool, not the carbon (or silver fiber prints). OBAs are dyes that will fade relatively quickly. So, while the carbon image will be stable, it will appear to warm up with extended display and exposure to light as the OBAs fade.

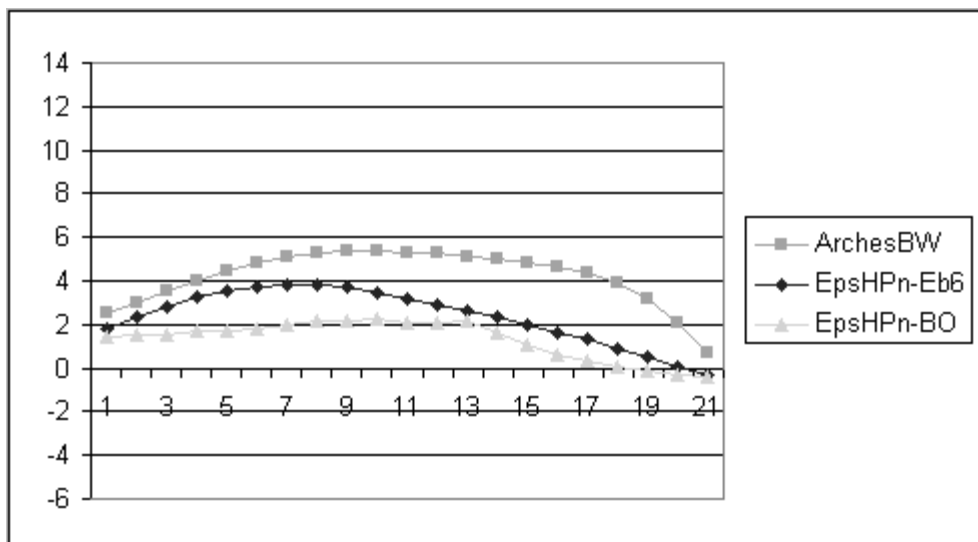


<sup>5</sup> Papers and photographers almost always prefer and paper companies set the Lab A values as slightly positive. The "selenium" look is a bit more of a positive Lab A. Premier Art Smooth BW has such a tone.

Two papers of special note for Eboni printers are the new Epson Hot Press Natural (EpsHPn) and Arches Hot Press Bright White uncoated watercolor paper. These are the papers I use the most. They combine a natural paper tone with a very low Lab B rise from the Eboni carbon image. The Lab B graphs for these papers are shown below.

The Epson HP is printed both with Eboni-6 and Eboni Black Only in a 1400. The Epson HP Natural with the 1400 BO profile has less than a single unit increase in its Lab B. One unit difference in the Lab color model is a barely perceivable difference. As such, it looks almost totally neutral (as long as a bright white paper is not next to it). The 1800 3MK process ought to produce the same results as the 1400 BO.

The Epson HP with a standard profile will have a Lab B rise of about 2, as shown in the graph below.



Note that the Eboni-6 Lab B rise can be reduced to 1.5 with a profile that uses the maximum amount of the lightest Eboni-6 ink. Even with the Epson driver with a simple ICC<sup>6</sup> holds the rise in Lab B to 1.5 units. This is a very slight increase. The barely perceptible difference between the BO and Eb6 approach that uses the highest amount of the most dilute ink is where the warm reaches its peak. The bottom line is that the BO approach has cooler highlights. When the black only highlights and Eboni-6 smoothness are combined in QTR, an even cooler appearing print can be made.

<sup>6</sup> QTR's Create ICC-RGB is used to make an ICC that contains a Photoshop curve that controls the ink distribution. I make all my profiles public in Zip files linked to my BW-Info pages and PDFs.

The impression of image coolness, neutrality, or warmth comes not only or even primarily from the absolute Lab B values, but from the difference in the Lab B values (color) from the paper white to the midtones. What we see as “neutral” usually is relative. For example, we adjust to different lighting conditions. Our eyes appear to do a “white balance” on whatever white values are in our field of view. If the mat board is warmer than the print, even a non-brightened paper will appear cool. The relatively cool highlights appear to make them “brighter.” So, my “gallery white” un-brightened mats are creamier looking than the natural paper I often print on and about the same as color as the maximum Eboni-6 image values. On the wall, even in my office not far from a bluish monitor, the natural paper, Eboni-6 prints look neutral with bright highlights. The slight natural spit tone may have the effect of slightly increasing the apparent dynamic range.

Printers and print viewers must be aware that if the print is viewed next to a bluish (6500 K) monitor or highly brightened paper, including standard copy paper, the prints will look warm. The way to judge a print is next to the mat board that will be used and in the viewing environment that is expected. “Neutral,” as we perceive it, is relative.

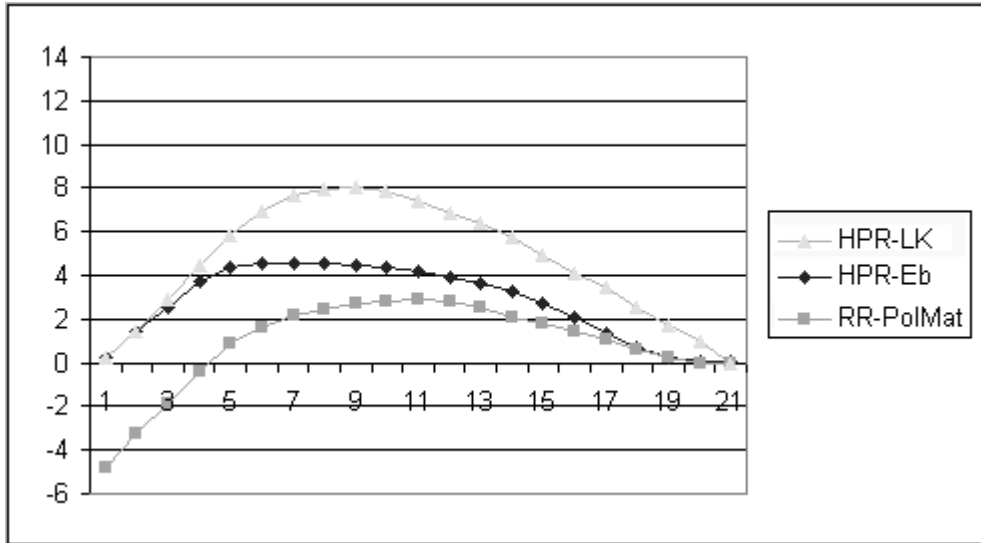
Epson Hot Press paper, graphed above, has the lowest change in Lab B values that I have measured with Eboni-6 100% carbon printing. Because it also contains no OBAs and has a very high dmax, this paper is becoming one of my top recommendations for neutral fine art carbon printing.

Arches watercolor papers have been used and trusted by artists for hundreds of years. While even the “bright white” version of this classic paper has a relatively creamy look, the change in its Lab B values is relatively low. As such, it makes a print that looks just slightly warm – as long as there are no bright white papers next to it. Because the paper has no coating and can even be rinsed with water to remove loose carbon that might smudge or remove dirt, this paper may well result in the most archival B&W print we can reasonably make. It is not as smooth as a coated inkjet paper, nor can it achieve the high dmax of the better inkjet papers.<sup>7</sup> On the other hand, people have commented to me on what great blacks some of my Arches prints have. It can work very well.

---

<sup>7</sup> See <http://www.dickblick.com/products/arches-bright-white-watercolor-paper/> 140 lb. for desktop printers. Use a rip with low midtone ink limits and a high K limit. Arches Bright White uses no OBAs and is not bright white compared to inkjet papers, but is slightly whiter than the standard Arches. Note that many art stores carry Arches.

The graphs of the Lab B values for Hahnemuhle Photo Rag and Red River Polar Mat, below, show typical values for most inkjet papers. While the lower lines are for prints made with Eboni-based inks, the top graph shows the Lab B values for Photo Rag printed with MIS warm K4 LK carbon. It reaches a warmth of just over Lab B = 8, which is the same as the Cone Carbon Sepia Piezotone on Photo Rag. Compare this to the Lab B=14+ for the glossy paper with MIS LK.



The papers above – and most inkjet papers – have larger changes in their Lab B values than do, for example, Epson Hot Press, Premier Art Smooth BW, or Arches watercolor paper. Note that while the Polar Mat paper is heavily brightened, it has a very substantial change in its Lab B values. This makes it look warmer than its absolute Lab B value might suggest.

Most matte inkjet papers have print tones similar to the above papers.

Enjoy the journey,

Paul

[www.PaulRoark.com](http://www.PaulRoark.com)