

UT-3D

INFORMATION AND SETTINGS

By

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Key features of this B&W inkset:

- Three dimensional color space in the Lab format with the Epson driver;¹
- Carbon-based, with only the minimum color pigments needed for neutral, cool or mild selenium tone printing;²
- Uses MIS cyan and R800 blue pigments to cool carbon;
- Prints on matte and glossy paper without the need to change black ink types;
- Multiple workflows, including ICCs made with “Create ICC-RGB” and semi-automatic profiling with ColorVision PrintFixPro;
- With the ICC workflow it is “color managed” in that the monitor’s display will match the relative densities of the print;
- Will run on most Epson 6, 7 and 8 ink printers; currently running on the 220, 2200, 2400, and 4000;³
- Tonal range from carbon warm to cool, along the Lab b* axis, and from neutral to “selenium” along the Lab a* axis;
- UT-3D can be purchased from MIS Associates. See http://www.inksupply.com/ut_3d.cfm

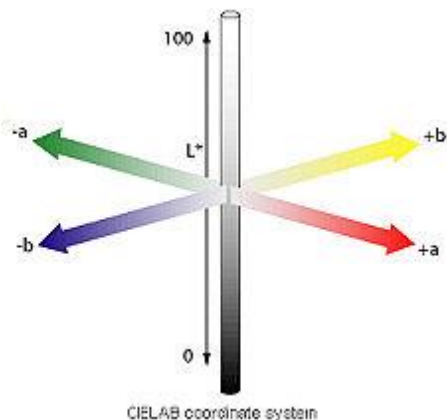
¹ I currently use Eboni-6 for the most lightfast 100% carbon pigment, matte paper printing – <http://www.paulroark.com/BW-Info/Eboni-6.pdf> , or for “3D” variable-tone, glossy and matte, I use the 6K plus LC and LM approach. See <http://www.paulroark.com/BW-Info/4000-6K-Plus.pdf> .

² Note that for wide format printers, carts with the blended inks will need to be agitated routinely to avoid separation. For wide format, the 6K+ approach (URL above) makes the most stable system in terms of very little settling and potentially most lightfast.

³ Gray substitution in k3 printers limits the Epson driver control. QTR recommended for k3 printers to avoid this issue.

A. Inkset Features

Lab Space



This Ultra Tone (UT) inkset has a small gamut three dimensional color space that allows more accurate profiling than monotone or simpler variable-tone B&W inksets. Although the UT7 inkset allowed tone control along a single Warm/Carbon-to-Neutral/Cool axis (essentially the Lab b^* axis), the UT-3D inkset takes the approach one dimension more by giving control of the Lab a^* axis as well. Unlike the UT7 inkset, this inkset does not contain a sepia tone ink as such. However, the 100% carbon is what I use for a light sepia tone print that is also much more lightfast. The 3D inkset is designed for very high control of the relatively neutral to light sepia, traditional range of B&W printing. See <http://www.paulroark.com/BW-Info/3D-Comparison.pdf> for some examples of the smooth tonal distributions that one can achieve with this inkset approach.

Carbon Based

Like all the Ultra Tone inksets, this one is a dedicated B&W inkset for black and white printing. It is pigment-based, using carbon pigments for most of the density and color pigments blended with carbon to control the color.

Carbon is an extremely stable image forming substance. The most lightfast inksets are 100% carbon. Warm by nature, the carbon image can be printed neutral only with the addition of color pigments.⁴ These color pigments limit the tonal stability and lightfastness of the carbon. By keeping the color pigments to a minimum carbon, dedicated B&W

⁴ Some carbon is more neutral than others on matte paper. That is what makes Eboni-based inksets unique and able to print the most lightfast near-neutral B&W images. See <http://www.paulroark.com/BW-Info/Eboni-6.pdf>

inksets can achieve the good lightfastness, though not as good as 100% carbon pigment inksets. The quality of the color added to these inksets is largely what controls the image stability.⁵

Matte and Glossy Paper Compatibility

With Eboni matte black ink installed, the UT-3D inkset can print on both matte and glossy papers. The dark grays are designed such that they, together, can print as deep a black as a dedicated Photo Black ink. By not having to switch black inks for different paper types, continuous flow inking systems become economical and convenient for both matte and glossy papers.

Workflows

This inkset supports several printing procedures or workflows. First, any application, including Word, page-layout programs, and of course Photoshop can be used to print a grayscale file with tones (used here to indicate “hues” or “color casts”) that are close to neutral on matte paper (and glossy if a Photo Black is installed) just by using the standard Epson print driver with mostly default settings, including the Epson driver being set with Color Controls at 0. However, more – not less – control is the point of this inkset. So, this is primarily a default, fall-back position if needed.

Second, like a number of other inksets, this one can be more fully controlled through the use of Photoshop image adjustment curves, and a number of these are available. However, I recommend the use of these curves as normally applied to RGB versions of the file only for certain split toning situations. These same curves are best used when embedded in ICCs.

When the printer driver is set to “No Color Adjustment,” the Photoshop curves become cross-platform, working on both Windows and Mac platforms. As such, that is usually the setting I use for curves and the ICCs that are made from them. However, very simple curves can also be used when the driver is set to “Color Controls.” I’ve used such curves to demonstrate a split-toning example I’ve posted at http://www.paulroark.com/BW-Info/Split_tone.pdf

The advantages of the inkset can be best realized with a “color managed” workflow that utilizes ICCs. Initially, I made ICCs that were loaded in the “Print Preview” of image editors Photoshop and Photoshop Elements. With this workflow one prints from the final grayscale file. After inserting the ICC in the Print Preview stage, the standard Epson driver is used.

The ICCs I have made were created using Roy Harrington’s “Create ICC-RGB” program. These ICCs and the curves that they contain are posted on my Download page at

⁵ See http://www.paulroark.com/BW-Info/Dot_Structure.pdf for a comparison of the Epson ABW printing v. blended carbon + color, 3D printing. See page 2 of <http://www.paulroark.com/BW-Info/Eboni-6.pdf> for a good comparison of lightfastness and image stability of the different types of B&W inksets and approaches.

http://www.paulroark.com/BW-Info/UT-3D_Downloads.html . All of my Photoshop curves to control the UT-3D inkset are also at <http://www.paulroark.com/BW-Info/UT-3D-Profiles.zip> . These can be made into ICCs.

The “Create ICC” program is available from Roy’s web page at <http://www.quadtonerip.com/html/QTRdownload.html> . It and supporting files are in the Eye-One folder of the QTR download. Most serious printers will want to have the power of the Create ICC applet on their computer Desktops.

With the use of the ICCs, the printing system allows users to easily linearize their systems and achieve smooth prints that match the grayscale image on the monitor. This turns the otherwise “canned” profiles (the Photoshop curves) into custom profiles that take into account the variables and differences among printers, ink and paper batches. It also eliminates the need for custom dot gain curves or other adjustments to obtain a good monitor to print match.

Many papers will use the same curves such that a quick linearization of a new paper with an old curve is all that is needed for making a new custom profile for your system. While I’m using the ColorVision Print Fix Pro system (about \$500), others will work fine, and even a flatbed scanner can be used. For a tutorial on how to make these ICCs, see [http://www.paulroark.com/BW-Info/Embedding Photoshop Curves in ICCs.pdf](http://www.paulroark.com/BW-Info/Embedding_Photoshop_Curves_in_ICCs.pdf)

Of course, a “RIP” (third party driver or “raster image processor”) can also be used to print and control the UT-3D inkset. I do not have pre-made profiles for these, however. The most popular and affordable rip for B&W printing is Roy’s QTR, which you’ll have if you download the Create ICC program as recommended.

The latest workflow that can be used with this inkset is a somewhat standard ICC profiling approach that uses ColorVision’s PrintFIXPro to generate the ICCs. This makes the inkset the first fully color managed, carbon-based B&W inkset. I have not thoroughly tested this approach. My initial tests showed it to be very good for making neutral prints, but the ability to tone to other shades was more difficult.

Targeted Printers

While the inkset is currently running on the R220, 2200, 2400 and 4000, it is intended to run on many similar Epson printers – in fact, most modern Epson printers.

Tonal Range

This is a dedicated B&W inkset that is aimed at making the best relatively neutral prints. An essentially pure carbon warm image is possible and establishes the warm end of the scale. On glossy paper the 100% carbon inks make an excellent, extremely lightfast sepia tone. I use carbon inks on Museo Silver Rag for museum old photo reproductions.

The cool end of the UT-3D range is quite cold, more so than any traditional B&W silver print. The main toner – M and LM inks – pull the carbon warm tone down the Lab b* axis.

The Y-position ink pulls the space out along the Lab a* axis, allowing tones similar to what silver printers achieved with the use of selenium toners. For example, the tones of the much liked Oriental Seagull selenium toned silver print have been replicated and can be achieved on Crane Museo Silver Rag by just printing with the appropriate ICC.

B. Ink Positions

“C” is for “Carbon.” This warm dark gray ink is pure carbon in suspension and the same as UT7-C.

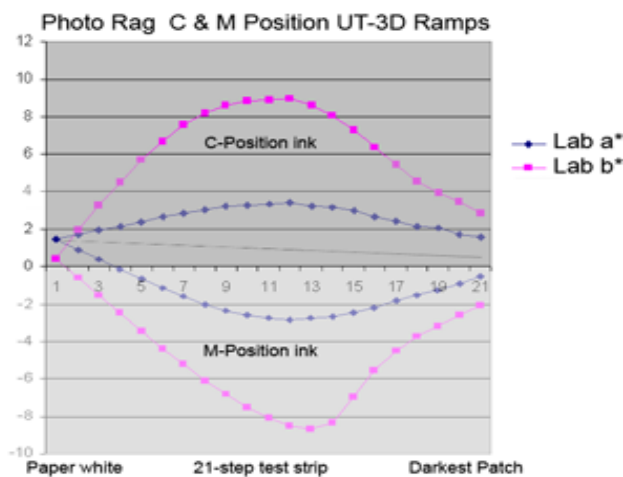
“LC” is for “Light Carbon.” This warm light gray carbon ink is the same as UT7-LC.

“M” is the “Main” toner. This cool combination of carbon, cyan and blue has a hue that is essentially opposite to that of carbon, allowing a neutral tone to be reached in the midtones on most papers.

“LM” is the light main toner, similar to M and with the same density as the LC. At 50% the LC and LM are the primary inks. As such, off-setting moves of those curves leaves the midtone print density essentially unchanged.

The M and LM inks are new and not the same as those in the UT-7 inkset.

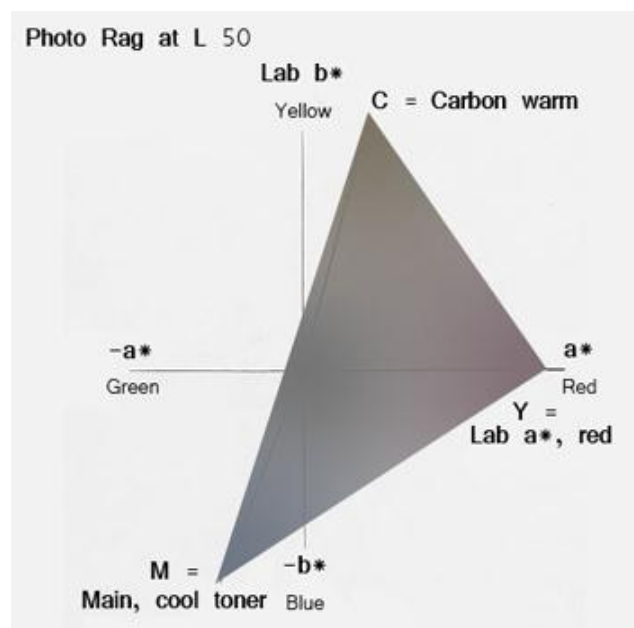
The structure of how the carbon and main toner inks work is seen in the graph below. 21-step test strips of the C & LC, and M & LM inks were printed and measured with a spectrophotometer. On the horizontal axis, the paper white is at the left and the darkest (100%) patch on the right. The vertical axis shows the amount of color in terms of the Lab a* and b* readings.



Y position Lab a* axis toner – This is a new mix of light carbon that is toned with blue just enough to lie on the Lab a* axis and allow control of that axis. My usual goal is to have a neutral print match the lightly-selenium-toned silver prints I made for years. This toner allows that and more on a wide selection of papers.

After the b* axis and approximate Lightness values are set with the C and M channels (Red and Green Photoshop curves), the fine tuning of the a* axis is done with the Y-position toner (Blue Photoshop curve).

The chart below shows the approximate ink positions and relationships, displayed in the Lab (a*, b*) coordinate system. With most good spectros reading in Lab, the structure of the inkset makes it relatively easy to translate those readings into curves adjustments and results. The relatively high degree of directness between the controls and the results will be appreciated by those making profiles.



Light Black & Light Light Black – These are new, relatively neutral inks. Particularly in the 2400 and other k3 printers, a considerable amount of these inks are injected by the Epson driver when the incoming RGB values are close, making toning in K3 printers more difficult unless the QTR rip is used. With the Epson drive, to profile around the K3 neutral core, I often start with a simple curves set that has R=G=B at 25%, 50% and 75%. I set just those points where I want them density-wise first, and then start to move the R & G curves away from the neutral setting in equal moves as needed to achieve the b* tones I want. Then I move the Blue curve as needed to set the Lab a* values.

Black – Eboni matte black is recommended so that both matte and glossy papers can be printed with no need to switch inks. However, Photo Black (PK) or a neutralized version

of such (PKN) also works very well for glossy paper. On the other hand, the only time I'd consider using it would be if I needed to print glossy prints from a non-Photoshop program. I prefer the look and tone control of the dual dark gray approach to generating high glossy dmax, and that dmax can be as high as if a Photo Black ink was used.

While I like Eboni installed, I also like all the paper types displayed in the Epson driver. So, I put a "Photo Black" chip on the Eboni MK cart.

C. Settings

1. Photoshop & Elements Color Settings (Edit > Color Settings)

I recommend Gray working space Gray Gamma 2.2 and Color Working space Adobe RGB (1998). These are the most widely used standards. The ICCs made for one gray space also work with others. In Elements I recommend "No Color Management." This defaults to Gray Gamma 2.2.

2. Print Preview Settings

When a grayscale file is fully edited and ready to print, go to the Print Preview. Just below the small version of the image, one of the options is "Color Management."



Color Handling – Let Photoshop Determine Colors when an ICC is used. (This would be "No Color Management" if the curves were being use on an RGB version of the file and no ICC was used.)

Printer Profile – This is where the ICC is selected. The ICCs made with "Create ICC" will be grouped alphabetically and start with the letters, "QTR." In the ICC name,

like that above, I then list the printer (2200), inkset (UT-3D), paper (Hahnemuhle Photo Rag), paper type driver setting if different than the usual for the printer, and tone. (Note that I'm tending to call "neutral" those profiles that start with the paper tone and move to the black tone without going outside those bounds.

Rendering Intent – Perceptual

Black Point Compensation – Checked.

3. Epson Driver Settings

In general, in the driver the following settings are used:

Media Type – "Enhanced Matte Paper" for the 2200 unless otherwise stated. "Matte Heavy Weight" for the 220 and most matte paper, with Ultra Premium Glossy Photo Paper ("UPG") for most glossy papers and some matte papers. The ICC name will often include a note of this setting.

Print Quality – 1440, High Speed unchecked, works well for most prints; 2880 gives marginally better quality but is slower.

Color Management – "No Color Adjustment" is used. This might be visible only after checking "ICM." Because this setting is used, the curves should work equally well with both Windows and Mac computers.

4. Print Tones

Print tones are controlled with Photoshop RGB image adjustment curves that are embedded into the ICC. Curves as well as the ICCs with them embedded will be made available for a number of papers and print tones.

In general, the "Neutral" curves have a slightly positive Lab a* reading, with the b* readings varying with the paper tones and black ink used.

How to make the ICCs and curves is or will be discussed elsewhere.

For an example of profiling, see <http://www.paulroark.com/BW-Info/Profiling%20UT-3D.pdf>

For how to embed curves in ICCs, see http://www.paulroark.com/BW-Info/Embedding_Photoshop_Curves_in_ICCs.pdf

Using curves to control tones also allows one to make split-tone prints by using one curve in one selected area and another curve in the other part of the image. This can be done

by applying different curves to different selected areas of the image, or it can be done by making a curve and ICC that has, for example, warm highlights and neutral midtones, or vice versa. See, for example, http://www.paulroark.com/BW-Info/Split_tone.pdf

The curves and ICCs I made were posted at http://www.paulroark.com/BW-Info/UT-3D_Downloads.html . Current browsers may not download the profiles as originally posted. Thus the profiles can also be downloaded in the following zip file:
<http://www.paulroark.com/BW-Info/UT-3D-Profiles.zip>



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

Enjoy the journey.

Paul
www.PaulRoark.com

PS: For an open forum where I hang out, join the B&W Digital Print form at <http://groups.yahoo.com/group/DigitalBlackandWhiteThePrint/>