

## **4K+cm Inkset for 6-ink and 5K+cm Inkset for 7-ink Large Format and Other Printers**

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This is the inkset approach I'll be using in the 7500 and 2200 for a while, and it may be the approach I use in all 6 and 7 ink printers for variable-tone printing. It gives me full Lab A and B controls within the carbon to neutral tone range and, of course, allows printing on both matte and glossy papers. The main reason I switched to this approach was to cure the tone shift problems I've experienced in large format printers running "blended" B&W inksets. However, there are also a number of other benefits, including the same, standard or easily mixed inks for multiple printers and much easier profiling.

This approach will only work with a rip, with QTR (<http://www.quadtonerip.com/html/QTRoverview.html>) and IJC (<http://www.bowhaus.com/services/IJCOPMmain.php4>) being the logical ones for most B&W printers. I'm using IJC, which is the only one I'm used to. The profiles I've made for my 7500 and IJC can be downloaded from [http://home1.gte.net/res09aij/7500\\_IJC\\_Profiles.zip](http://home1.gte.net/res09aij/7500_IJC_Profiles.zip). The ones with the most recent dates are probably the best. The 2200 profiles will be in [http://home1.gte.net/res09aij/2200\\_IJC\\_Profiles.zip](http://home1.gte.net/res09aij/2200_IJC_Profiles.zip).

I use Gray Gamma 2.2 for my working space. So that prints edited in this working space match the prints through IJC, I use an adjustment layer that coordinates the view on the monitor with the IJC output. The Photoshop curve for this layer is in the above files along with the profiles.

While I have not made many profiles yet, they are easy to modify for other than their original intended use, at least if one is able to linearize the curves with a spectrophotometer (or maybe even a flatbed scanner – see [http://home1.gte.net/res09aij/Making\\_B-W\\_ICCs.htm](http://home1.gte.net/res09aij/Making_B-W_ICCs.htm)). For example, with this approach the neutral curves contain a carbon core that makes a good carbon curve if one just de-activates the color toners in the rip and re-linearizes the resulting profile. Some think carbon is a bit too yellow and that a warm print with hue angle of about 45 degrees is better. To get to this, just take the carbon core, activate the LM ink, and set the ink limit at 1 instead of the usual 3. If one wants a curve that is warm, but not as warm as carbon, make a carbon curve as noted above, and then use the sliders in the rip that allows one to blend profiles – here the neutral and carbon curves. In short, if one can linearize profiles, this approach is very flexible.

My old 7500, with its relatively large and non-variable dots, does show a very fine-grained dot structure on test strips when viewed with the strongest reading glasses. However, for display prints, the smoothness is fine. Compared to the blended inkset I was using previously, the current one is about 15% less smooth according to the average Standard Deviation measures of 1600 dpi scans. Again, the fine grained structure of the image is essentially irrelevant to me for display prints. The stability of the tones and full Lab A and B controls are far more important.

In the 2200 the prints are very smooth with any of the various variations on this theme.

### **7500 Ink Order**

This is what I have loaded in the 7500 (source of ink in parentheses), and I think it will work fine for all 7000 and 7600 generation printers:

Four pure carbon inks (the "4Ks"):

- MK (MIS Eboni, in the K position),
- PK (MIS MP-PK, in the Cyan position),
- LK (MIS K4-LK, in the Magenta position),
- LLK (MIS K4-LLK, in the Yellow position);

Plus colors:

- Light Light Cyan (50% MIS K4 Light Cyan, 50% clear base for 7500, In the LC position);
- LM (I am currently using Epson UC, in the LM position. I may use Epson Archival later because it's pre-loaded. Of course, MIS LM can also be purchased in 7500 carts, and I assume that is what MIS will sell with this inkset.)

### **2200 Ink Order**

Four pure carbon inks (the 4 or 5 k's):

- MK (MIS Eboni, in the K position),
- PK (MIS MP-PK, in the Cyan position),
- LK (MIS K4-LK, in the LK position),

- LLK (MIS K4-LLK, in the M position),
- Optionally, a 5<sup>th</sup> K in the yellow position.

Currently I have a 1/3 LLK to 2/3 Base (or glop) dilution.

Plus colors:

- Light Light Cyan (50% MIS K4 Light Cyan, 50% clear base, In the LC position);
- LM (I am currently using Epson UC LM, in the LM position. Of course, MIS LM can also be used.)

Other Yellow position options:

This is rather open. Glop for glossy paper, yellow for maximum color flexibility, or a super-light ("LLK") for the smoothest highlights.

I have tried a super-light carbon (LLLK) that is 2 parts base (or glop) and 1 part MIS LLK. That is a rather standard and easy to make dilution ratio that will not overload the highlights. It may make a barely perceptible improvement in prints. With this one could call the 2200 and other k2 inksets the "K5+" inkset.

There are no blends of more than one type of pigment in any ink.

Most inks are off-the-shelf. (For MIS inks, see [http://www.inksupply.com/arcink\\_mispro.cfm](http://www.inksupply.com/arcink_mispro.cfm) and [http://www.inksupply.com/arcink\\_k4.cfm](http://www.inksupply.com/arcink_k4.cfm).)

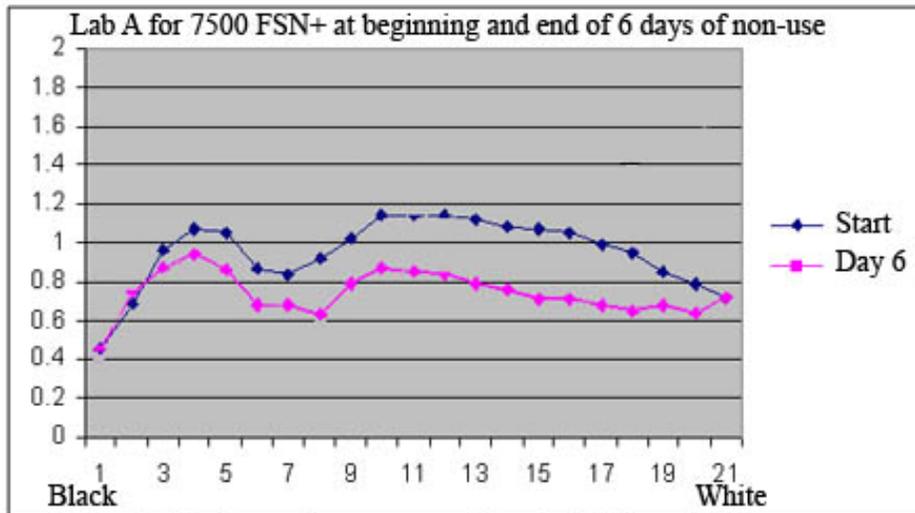
For the 7500 the lighter 50% LC ("LLC") is worth the effort for smoother highlights. It's an easy 1:1 mix, and MIS will be supplying it. If you have any problems obtaining this, contact me at [paul.roark@verizon.net](mailto:paul.roark@verizon.net) .

For the 2200 and other modern printers, straight LC works fine. However, the light cyan pigments appear to be the limiting factor in the smoothness of this approach. At a 14 inch viewing distance I can barely detect the difference between 2200 prints made with the LC and those made with LLC. With a magnifier and when viewed at 6 inches I can see fine dots with the LC, whereas the LLC print is still virtually dotless. So, for the smoothest prints I'm using the LLC in the 2200. If one uses straight LC, just cut the ink limit in half on my profiles.

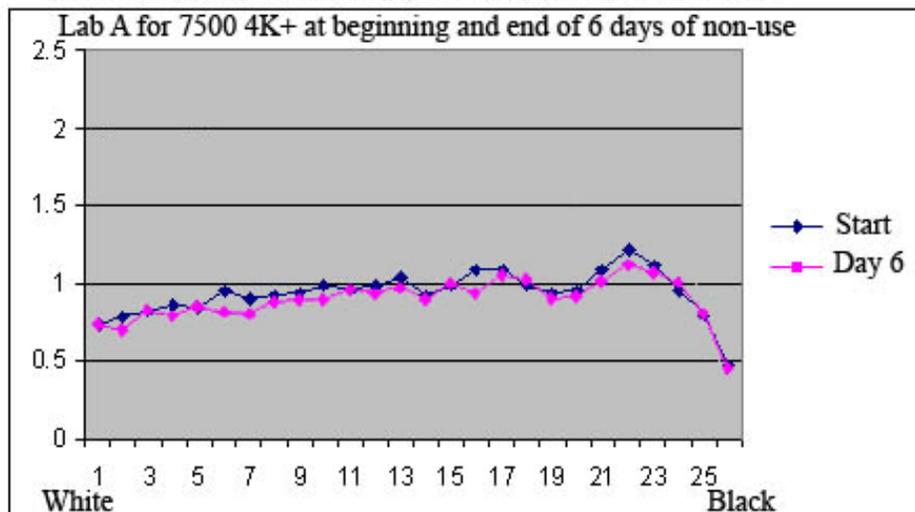
## Large Format Tone Shifts

Note that the tone shifts discussed in this section do not affect desktop printers. The tone shift problem appears to be caused by an interaction of the inks and large format tubes that connect the cartridges to the print head. **I have experienced NO problems using blended inksets in desktop printers and will continue to develop them for such printers.**

The most troublesome tone shift with the blended inkset approach was the decrease in the Lab A values – i.e., a green shift. To compare the stability of the 4K+ inkset approach to my previous blended FSN+ inkset, I printed test strips at the start and end of 6-day periods where the printer was not used. I read the test patches with the PrintFixPro Spectro and graphed the Lab A values with Excel. I've overlaid the graphs, matching the paper white and black points (which are at different ends of the graphs due to different printing software) to adjust for spectro and other variables to at least some extent. The results are below:



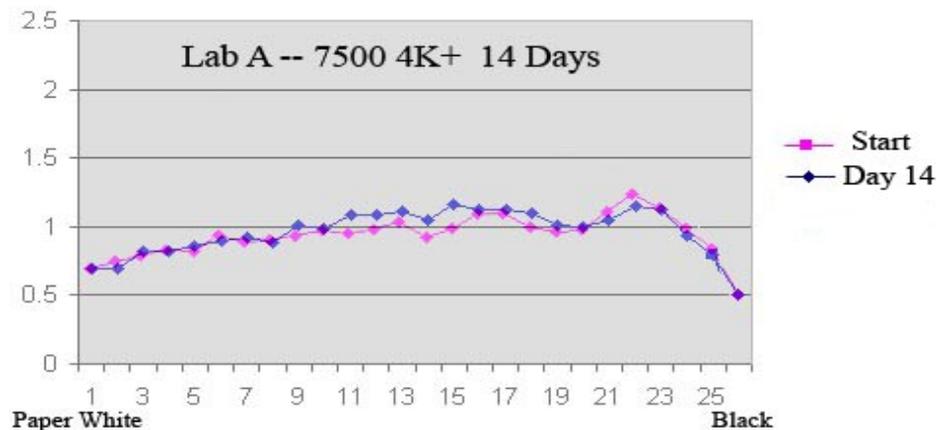
Blended inkset above, non-blended inkset below



As is apparent, the non-blended 4K+ had almost no Lab A change, whereas the older blended approach had a significant green shift.<sup>1</sup>

Needless-to-say, I'm very pleased with the results. The deviations shown on the graph for the 4K+ approach are close to the expected random errors from the spectro, printer, and other factors.

The 4k+ stability continued to hold very well for a 2 week test also. See the graph below:



Again, the variances on this graph are probably the random differences I regularly see in reading test strips.

Based on these results and the trouble I've had with blended inksets in large format printers, I no longer recommend blended inksets for such printers unless the owner understands that the printer must be used regularly to avoid tone shifts. One solution to the problem with the blended inksets is to use the MIS autoprint program. See <http://www.inksupply.com/cobra.cfm#ap> This program prints a purge pattern daily to keep the system in good working order. Note again, that I have had no problems with blended inksets on desktop printers and continue to develop and support blended B&W inksets for those printers.

The "4K+" approach above – four standard carbon inks plus "LLC" (50% standard LC) and LM – is the approach I now recommend for all 7000/7500 class printers, and I expect it might also be the inkset that is most practical for most variable-tone ink systems if one is comfortable with a rip.

<sup>1</sup> For another example, here a one-week idle 7500 with FSN, see <http://www.paulroark.com/BW-Info/7500-FSN-Idle-Printer-Color-Shift.jpg>

## **Profiling**

This inkset approach appears to be easier to profile than the blended variable-tone inksets I've work on in the past. For an example of profiling, see [http://home1.gte.net/res09aij/PM\\_Split\\_Tone.pdf](http://home1.gte.net/res09aij/PM_Split_Tone.pdf)

For other topics, see my general B&W printing information index at <http://home1.gte.net/res09aij/index.htm>.

Enjoy the journey.

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