

# Paul Gallagher

## LANDSCAPE PHOTOGRAPHER

*Printing Using Epson's Advanced Black and White Driver*

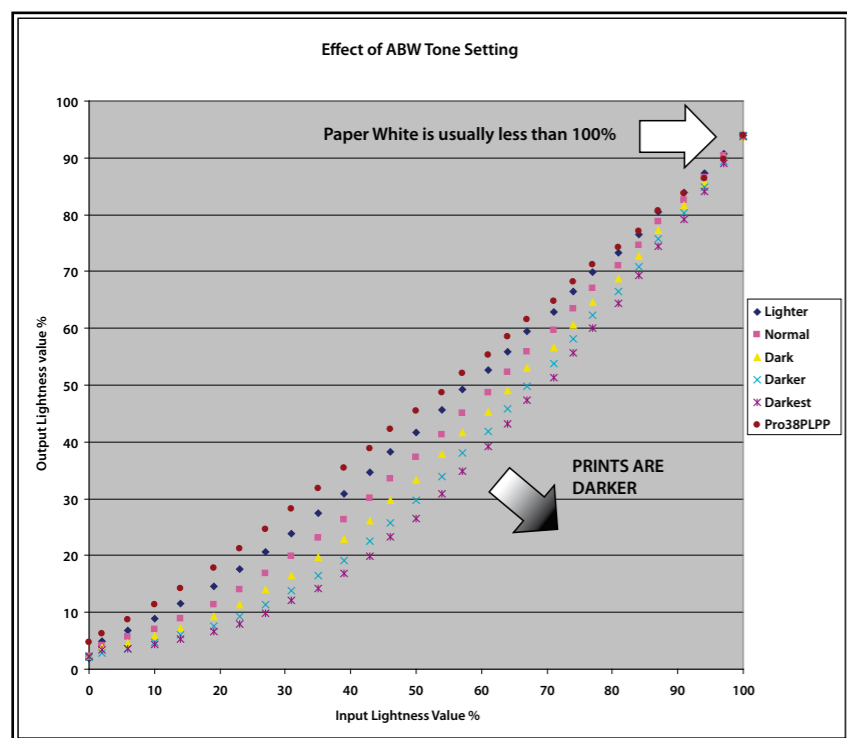
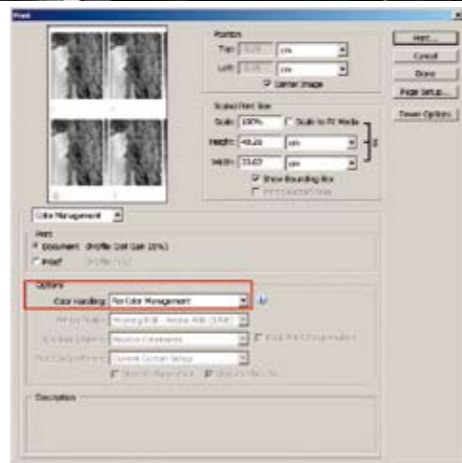
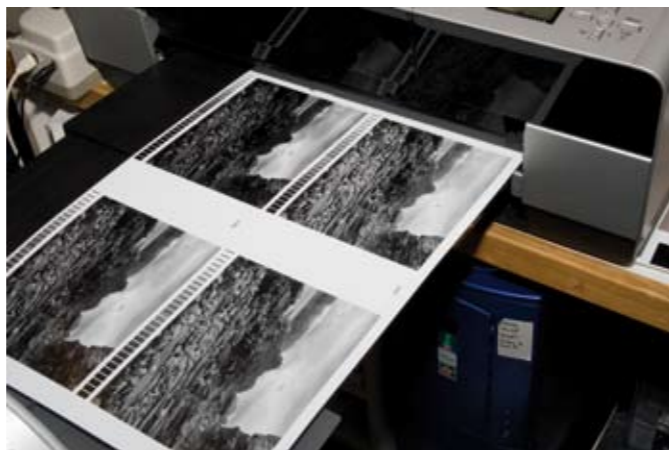
Experience has taught us that if you employ Photoshop's colour management, a good profile, and then print using the Advanced Black and White (ABW) driver, you end up about 11% down on density and about 5–6% lacking in contrast. This has always been a puzzle to us and we have written about it before, without being challenged or enlightened. On the recent Nikon Solutions Expo we had the opportunity to spend time with Epson Technical Specialist, Peter Tinson, to receive his thoughts on the matter. He uses a radically different approach to ours and we decided to investigate. Armed with McNamee's usual mass of graphs and statistics, here is what we have found after several weeks of testing.

### Background

The ABW driver works by dropping the full cyan and full magenta from the mix and then building the grey density from the remaining inks (namely Black, Light Black, Light Light Black, Light Magenta, Light Cyan and (full) Yellow). This has two advantages: there are less strong colourants to drift the tones away from pure colour-neutral and a reduction in any long-term fading of strong colourants to cause a loss of density in the print, along with a colour shift away from neutral. Monochrome prints, therefore, are expected to last longer in fade-resistance testing.

### ABW in practice

The way currently taught in the Epson Print Academy is to turn the colour management OFF in the 'Print' dialogue box (CS3) or the 'Print with Preview' dialogue box (CS2). This is slightly counter intuitive as, to print in colour, we normally turn the colour management ON at this stage and OFF in the 'Advanced' dialogue box of Photoshop, within the Epson driver. When you change from 'Color' to 'Advanced Black and White' you see the ABW Custom button, then the Advanced button, which will bring up a dialogue box with a host of other options. We firstly concentrate on the 'Tone' drop-down. This offers the following options: Lighter, Normal, Dark, Darker and Darkest. It is claimed by some that Dark is the equivalent of a linear response but this is challenged by our own data, as we will show.



**Commentary on Graph, Left:** The measured lightness values are compared with the values input from the swatch set. The brown circles, from the full colour print, show almost complete in-to-out compliance, ie a linear response. In all ABW settings the print tones are darker than the input values. At the darkest setting, the shadow and highlight end-points remain the same but the middle tones are darker and more contrasty while the shadows are darker but less contrasty, a typical change of the curve's gamma value. Our experience with 3800, 4800 and 7800 printers on papers and canvas suggests that the Light or Normal tone settings are best for accurate reproduction.

*Elgol, Isle of Skye*

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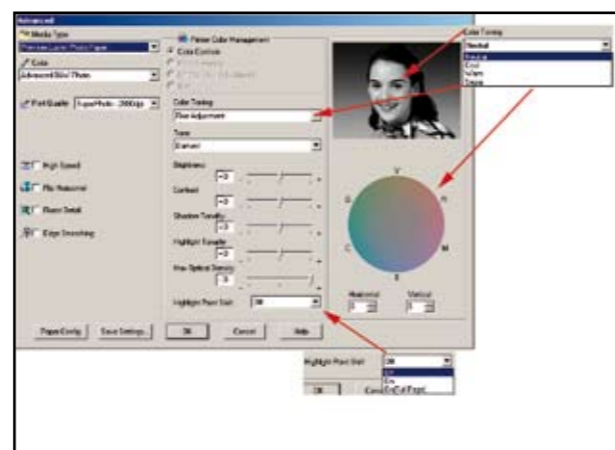
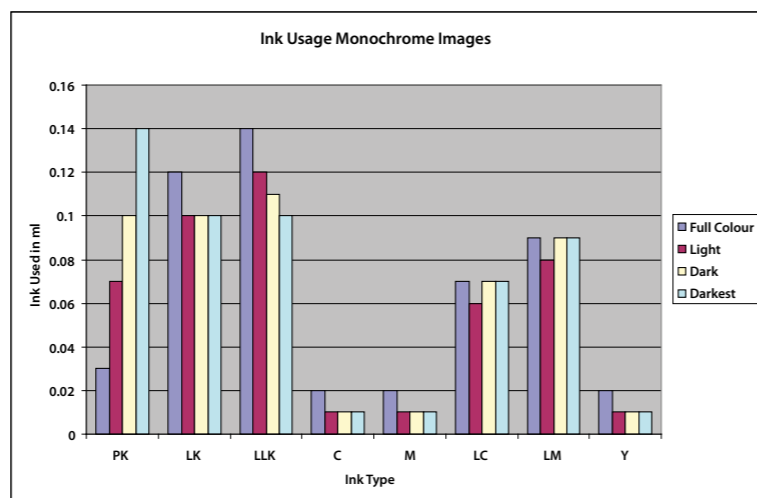
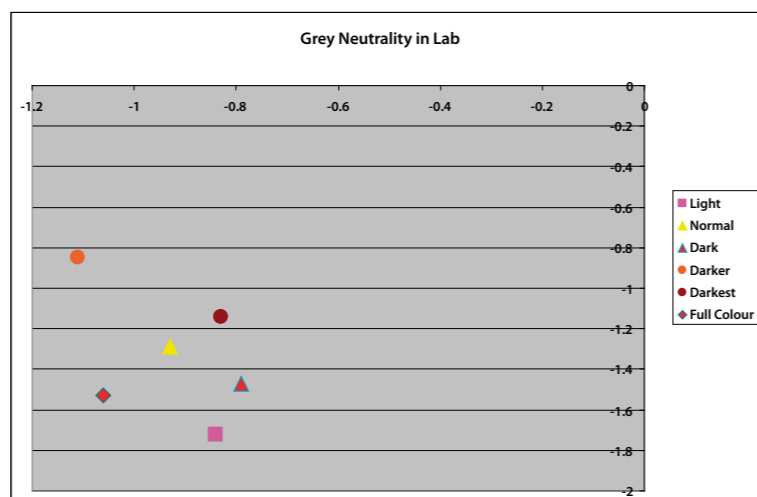
### Testing

We used a smooth greyscale, made in *Lab* mode and ranging from 0% Lightness (ie black) to 100% Lightness (ie white) in 4% density increments. This was then printed using ABW at all the tone settings (five) and then using colour-managed, full-colour printing and the standard Epson profile (PRO38PLPP.icm) and a Relative Colorimetric rendering intent. These data were then used to generate the graph shown on the previous page. Four prints were made onto the same piece of Premium Luster Photo Paper successively using full colour, then ABW using Lighter, Dark and Darkest tone settings. The Epson LFP Remote utility was used to track how much ink was used on each sector of the print (the paper was placed into the printer a total of four times). The test printer was our Epson Stylus Pro 3800, using Photo Black ink and the K3 UltraChrome ink set.

### The Results

Our findings are as follows:

1. Using ABW produced a deeper maximum black, averaging a Dmax around 2.50 compared with 2.22 obtained using full colour and Epson's Pro3800PLPP profile. This difference in density is not detectable by eye, indeed, to most viewers, all densities lower than around 1.8 or 1.9 (a *Lab* value of about 12%) look the same. This is also true if you look at the Kodak Q13 test patches – in all but the strongest light it is difficult to separate the shadow end of the scale.
2. Use of ABW at all tone settings darkened the print by between 5% and 20% *Lab* lightness units. The effect was even and progressive from Lighter to Darkest. The 'full-colour profiled' print gave the most linear response and provided the print which best matched the original, both statistically and visually.
3. Metamerism was slightly improved by the use of ABW, although this was a difficult feature to improve upon because K3 UltraChrome has good metameric characteristics anyway.
4. Print neutrality was visually identical in all ABW versions even though the spectrophotometer detected some small differences at around the 0.5  $\Delta E$  mark. The full colour version of the print was slightly greener in natural, north daylight by a just detectable amount. Any of the prints would be regarded as 'acceptably neutral' by most observers.
5. The ink usage was in accord with what we expected from the discussions on the way the ABW driver works, namely a reduction in the use of full Cyan and full Magenta. Full colour used less Black but more of all the other inks. In the ABW set, the total ink used rose as the prints became darker.
6. Overall the full colour version was the best visual match between a calibrated screen and the print. It was also statistically more correct. This is not the same thing as saying it was the preferred print outcome. Some viewers would prefer the slightly increased drama brought on by the Dark setting, especially to the sky. We guess that most viewers would find the print made on Darkest setting too dark. All this is conjecture, however! The entire image was almost mid-toned, ie of average density. The histogram in Photoshop reported an overall luminance equivalent to 122.24 RGB points, an 18% grey patch is usually placed at 120 RGB points for a Gamma 2.2 image. Other images with different key (ie a higher key landscape) might be preferred with a different interpretation and factors such as image size and display conditions would have an influence. The upshot of all this discussion is that our findings point to the use of Lighter as the preferred setting (in most cases) but some experimentation may be needed, on a case-by-case basis, for really critical printing.



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### The Other Buttons and Boxes

We have concentrated so far on the tonality of the print and the effect of the Tone settings. However, the colour of the image may be changed by several methods. The drop-down offers Neutral, Cool, Warm and Sepia. For old hands 'Cool' is like Agfa Brovira (a bromide, cold-tone paper, no longer available) and 'Warm' is like chlorobromide paper such as Agfa Record Rapid (a warm-tone paper, no longer available). Sepia is akin to a thiocarbamide toned silver halide paper. For yet further control there is a colour wheel which may be adjusted by movement of the mouse or typing values, for more precision. There is a preview box which, quite frankly, provides a poor representation of what is going to pop out of the printer!

The Brightness, Contrast, Highlight Tonality and Shadow Tonality sliders perform a variety of undisclosed curve tweaks to the tone response. The Highlight Point Shift can be set to place a low intensity dot pattern over the image, or the entire print (or not used at all, in the 'off' position). This places ink on all parts of an image, including pure highlights, so that there are no bare patches, which seem to trouble only those people who insist on looking at prints on an oblique angle. This is a particular trait of photographers, I have yet to see anybody in the Louvre, head pressed against the wall trying to look for gloss differential on an old master – some people should try to get to the pub more often!

### Other Matters

We did not limit our Expo discussions to monochrome printing, although the following is equally pertinent to both colour and monochrome printing. It concerns the ideal resolution for printing to the Epson '800 – UltraChrome K3' series and '880 UC K3 Vivid magenta' series of printers. Peter Tinson had some convincing evidence to suggest that you should keep to either 180ppi or 360ppi as your image resolution, **at the size you intend to print**. This takes account of the spacing in the dot-generation algorithm of the driver software.

Now this is best practice we are talking about and you may not notice the difference in a busy scene with no strong diagonals or repeating patterns. For general work, McNamee (in particular), has been guilty of using 200ppi (on the old 'just in case let's give it a bit more' principle) or (even worse!) hitting the 'scale to fit media' check box and letting Photoshop sort it out. We got our wrists really slapped on this one, so here is the Peter Tinson, preferred method for best practice, especially when enlarging prints:

1. Decide on the size that you wish to print your image, then in your 'Image Size' pane in Photoshop make your image 20% larger than your destination size, check the 'Resample' box and set the resolution to 180 pixels per inch (or 360ppi). (use Bicubic Smoother as interpolation)
2. Make a duplicate layer of your image (Ctrl-J).
3. Click Filter>Other>High Pass and set the Radius to 1.8 – that is a hundredth of the working resolution.
4. Set the duplicate layer's mode to Hard Light.
5. So far this is the typical Gallagher method of sharpening – you could now selectively mask the High Pass duplicate layer to protect the sky from sharpening.
6. You may, if you wish, set the image zoom to 100% and adjust the opacity of the High Pass Duplicate layer to suit your taste (and, importantly, your experience and the image).
7. Now reduce the image size by 20% with 'Resample' checked, to bring the image back to your desired size (using Bicubic Sharper as interpolation mode), adding any titling and borders as desired. This 'tightens' the sharpening just a little.
8. Print your masterpiece.

### FINAL THOUGHTS

Good as it is the ABW is not a universal solution to monochrome printing and some experimentation would be needed for exhibition-quality printing and fine art monochrome. If you are unsure of your system profiles then ABW will almost certainly create a more pleasing result and in all cases create a commercially acceptable product. It does, however, provide superb fine-tuning capabilities for those with an inclination to tweak their output and of course, once you have settled on a settings group, consistency will follow along.

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