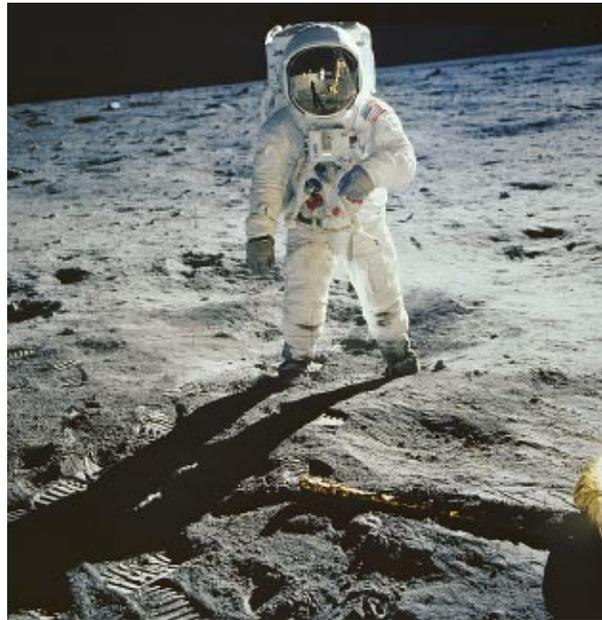


Black and White from color – the best way is not always the easy way

by Brian P. Lawler

Some of the work we do in graphic communication today requires the scanning of color photographs for reproduction in black and white.

Traditional process camera techniques for this required shooting on panchromatic film, processing in total darkness, and making a run of exposure variations to choose the one which was the best.



This famous photo is nearly monochromatic in nature, yet provides a good example of how conversion from color to black and white can be improved for some images. At right are the individual channels red, green, and blue.

With the desktop scanner and Photoshop we can do a much more effective job of converting even the most challenging color original into a good black and white image. Unlike working in total darkness, we can examine the individual components of a color scan to determine the visual strengths of an image, then blend color channels together to get a better image than any single-color analysis of the same photo.

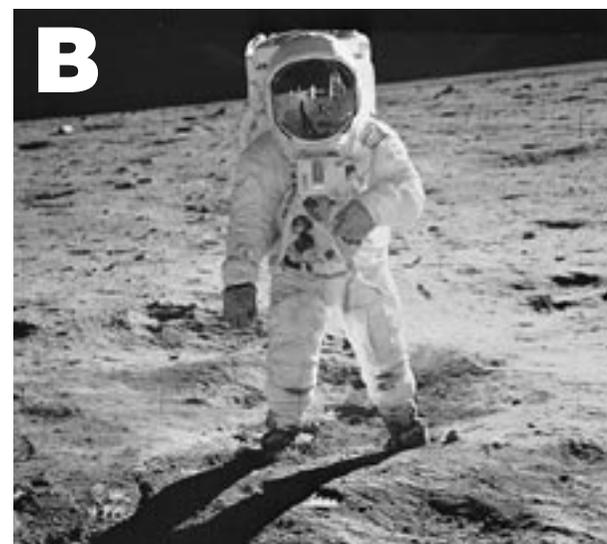
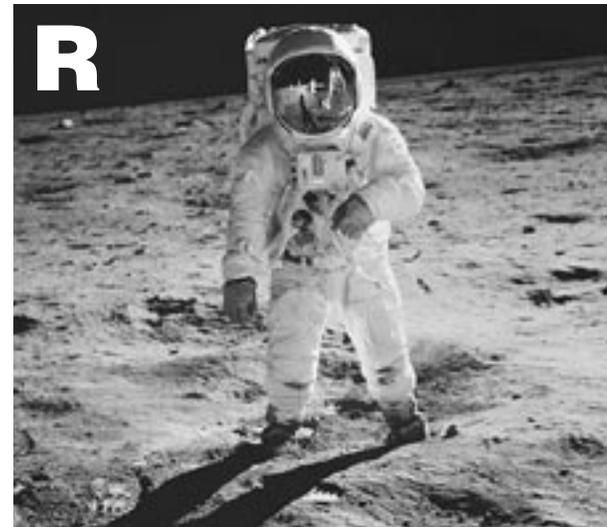
Scanning in color for good black and white

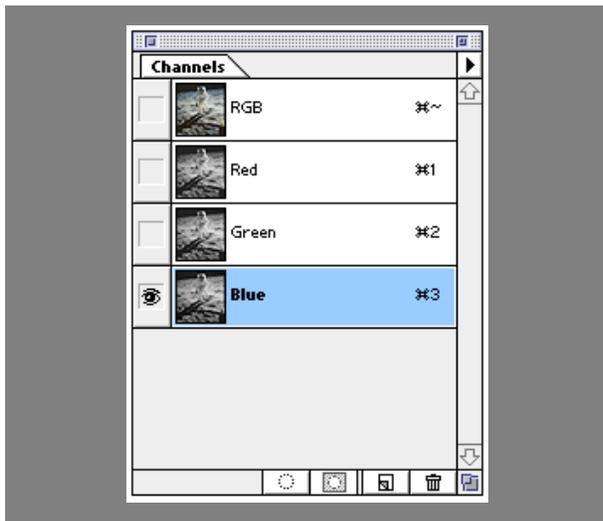
Interestingly, it is best to scan color photos in color than to scan them in black and white. The reason for this is that most reflective scanners, and some film scanners, scan only one color (usually green) to obtain a digitized black and white image from the color photo. In doing so, they rob the operator of much of the control available in converting from one color mode to another.

Photoshop's mode for "monochrome"

Photoshop users have the luxury of simply changing

© 1994-1998 Brian P. Lawler. All rights reserved.





Here is the channels palette in Adobe Photoshop 4.0. Notice that an individual channel can be viewed simply by clicking on the label to the right of the thumbnail image. To select two channels simultaneously, hold the shift key down, and click on the additional channel.

the mode of an image from RGB or CMYK to monochrome, resulting – often – in a pleasing black and white image.

Yet despite this ease, the “easy” methods for conversion of color into black and white often yield a result that is less than perfect. On these pages I present a scheme for experimentation on color images. After completing this experimentation, you will get a feel for the techniques available to you in converting from color to black and white.

Scan a test image in color, and then view the image in the following ways:

- Red channel only
- Green channel only
- Blue channel only
- Red-Blue blend
- Red-Green blend
- Green-Blue blend

Be aware that the conversion technique used for one photo may not work as well on other images. Different colors are favored by different techniques.

Scanning challenging color originals – in color – and making a series of conversions will always yield one image that is visibly superior to the others. Choose the one that looks best, and save that for black and white purposes. Discard the others.

Some of the more challenging photos to convert are images of people in groups. Variations in skin color and brightly colored clothing can throw a curve to the “normal” conversion process. It’s always wise to go through the motions by looking at the individual channels to choose one that will either yield a good image, or blend with another channel to yield the best black and white image.

What to look for in monochrome

When viewing the individual channels of an image, try to find the best channel – look for tonality that describes the image to your liking.

Once you have identified the “best” channel, choose the blending channel for its crisp contrast and bright highlights.

Making the calculation

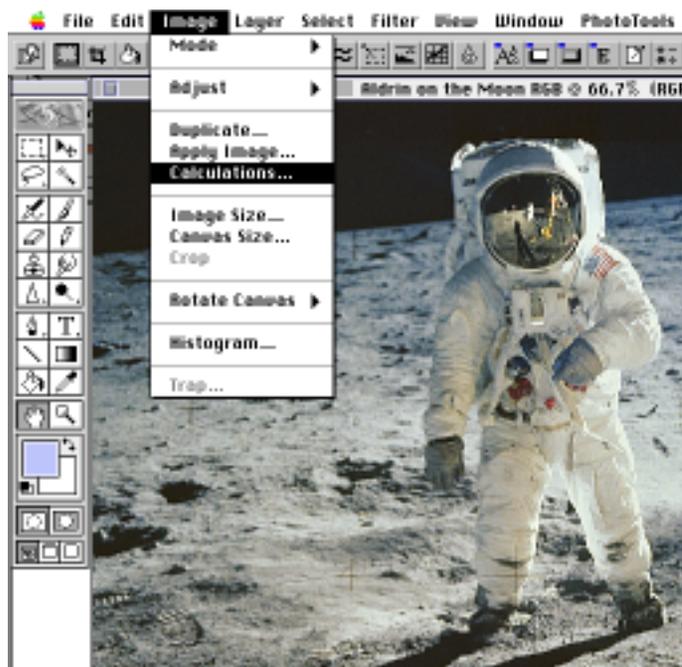
Once you have chosen your two working channels, pull-down the Image>Calculations menu. A dialog box will appear that allows you to select the channels on which to operate, and the variables possible within the selection of channels.

In the case of the Buzz Aldrin photo here, I determined by viewing the channels independently that red and green were the best two (blue was OK, but too flat to meet my needs).

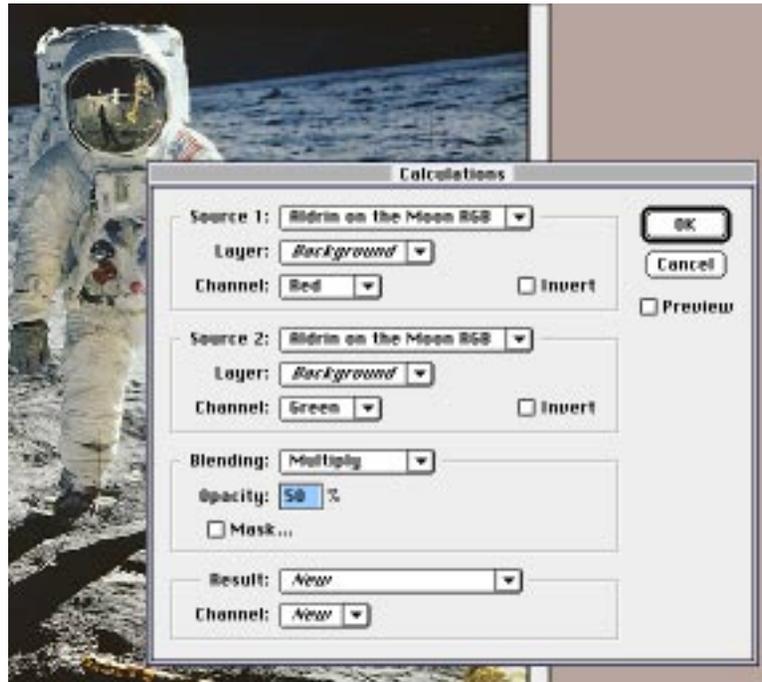
Neither channel was visibly superior to the other, so I blended them at 50 percent. The result is that each channel is favored the same. If you wish to strongly favor one channel, set the percentage to a higher number to favor the top color channel selection, and a lower number to favor the lower channel.

The blending menu allows you to select a method for combining the two source images into a new destination image. In this example I used the multiply command to darken the resulting blend slightly. Normal will do a nice job, also.

Under Result, choose *Result–New* and *Channel –New* so that you get a new image and not a new layer or problem with the original images.



Photoshop features a powerful set of functions called *Calculations* which allow you to make conversions and derivative images from any original image or channels of an original.



Here the calculations are defined. The source images are the red and green channels of the Aldrin image (though it certainly would be easy to use channels from different images). The blending is set to multiply to make resulting blended channels darker, and to balance the qualities of each channel equally (50% opacity). Note that Result and Channel are both set to *New*; this results in a new document.

Saving and working in LAB

There is a group of people who believe in the LAB color format – especially when converting to monochrome.

In LAB, there are three channels: Luminance (L), and A-B, two values that allow one to plot a color in a theoretical spherical space in terms of off-axis rotational position.

To convert from LAB to monochrome, all one must do is choose the L channel independently of the other two channels. The Luminance channel by itself will be a reasonable monochrome image.

But, even these LAB photos can profit from the channel analysis described in this essay. Convert from LAB to RGB (virtually lossless conversion) and analyze as described here for the best results.

Photo CD as a source for monochromes

Kodak Photo CD scanners – like all scanners – scan in Red, Green and Blue. Then the Photo CD Data Manager computer converts the RGB information to a color space called YCC.

The YCC space is comprised of a luminance channel (y) and two chroma channels (c,c) which are compatible with television systems and which also convert to RGB or CMYK with ease.

Theoretically, the Y channel should be an excellent black and white image of a photo stored in YCC format, but you may find that converting the

image to RGB and processing it through the comparison methods described here will yield a better image. For most images you can improve on the quality, for some it's very hard to beat the image as it is converted by Kodak's software into a monochrome image.

Dot gain control and sharpness

These images were modified for dot gain control by applying a curve for known effects of gloss coated paper in offset printing at 150 lpi.

In addition, 70 percent unsharp masking was applied to all the images shown here. Unsharp masking affects the images in a positive way, imparting edge definition that the originals will otherwise not display through the halftone process.

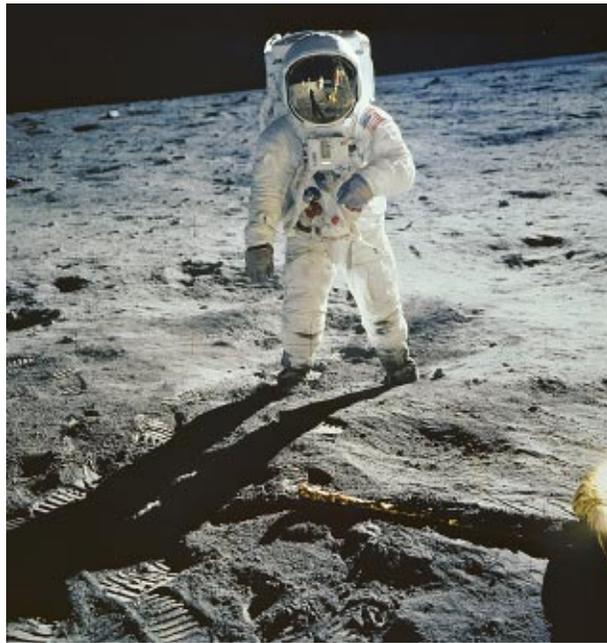
Watch the levels!

With any image that is scanned into, or acquired in Photoshop, it is a good idea to adjust Levels to maximize the range of the image.

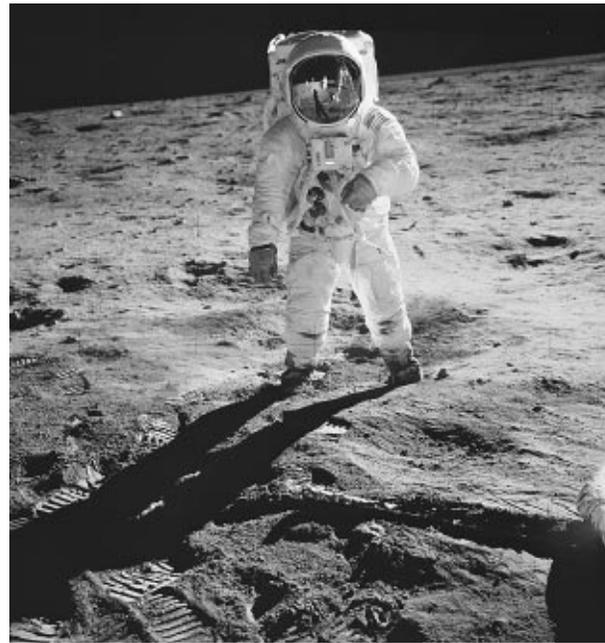
Even with a properly-calibrated scanner and known image source, the Levels of an image may need adjustment.

■ This is one of a series of essays on computers in the graphic arts. Others include scanning, Photo CD, calibration of desktop systems, and a variety of World Wide Web essays.

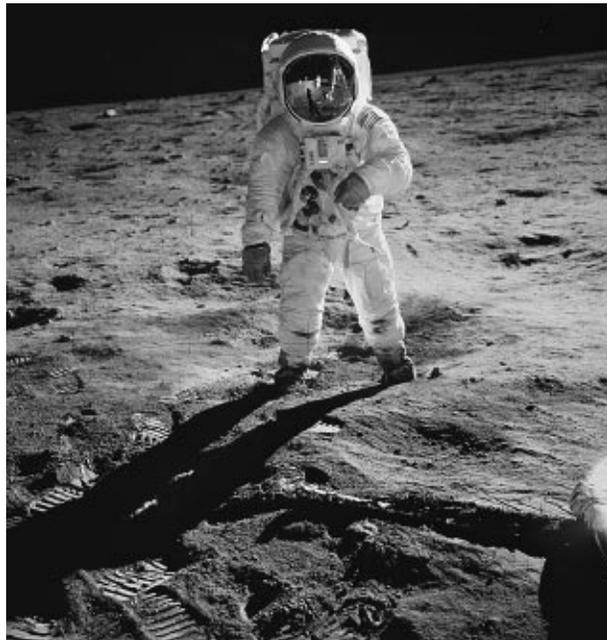
Brian P. Lawler
 Graphic Arts Consultant
 6045 Madbury Court
 San Luis Obispo, California 93401 USA
 Fax: (805) 544-8445 Phone: (805) 544-8814
 email: bplawler@callamerica.net
www.callamer.com/bplawler/



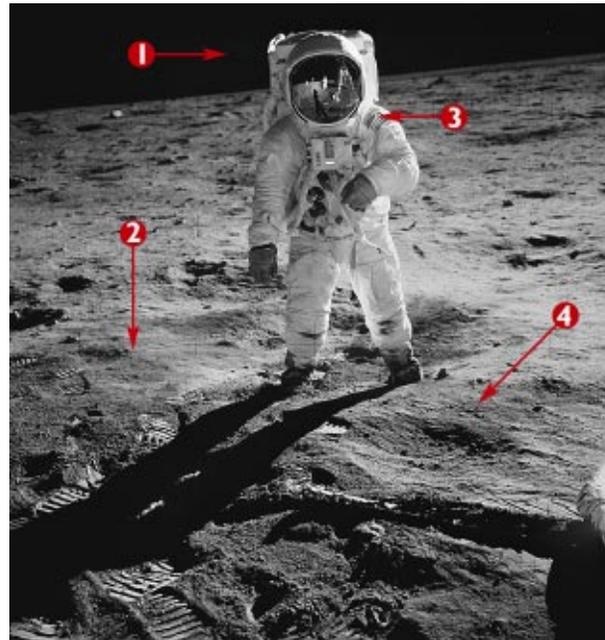
The color “original” is nearly monochromatic, but still has some important information in its individual channels. I have found in many cases that manual conversion to black and white yields a visibly better monochromatic image than Photoshop’s grayscale function. Not every image benefits from manual conversion, so you’ll have to determine from experience and experimentation which images can be improved by the process.



Photoshop’s conversion to grayscale yields a uniformly *correct* image, but one that, in this example, in my opinion lacks the “soul” of the original image. While the image is infinitely reproducible, it lacks a solid black, a clean white, and fails to move me emotionally.



This monochrome was made by multiplying the Red and Green channels evenly in the *calculate* window of Photoshop. Multiply causes all the pixel values to be multiplied by each other, and the resulting value to be divided by 128 to get new values. When multiplying image pixels, the result is always darker. The “weighting” of the blend in this case was 50-50, though you can choose to favor one channel over the other by modifying the percentages.



Compare this image (same as the image at left) with the monochrome conversion above. Notice that the contrast is better overall. At ❶ the sky is blacker; at ❸ the highlight is whiter, resulting in a better tonal quality overall. Shadows are enhanced by the contrast at ❷ and ❹. Overall, this image looks like an excellent black and white rather than a milquetoast image that is the result of simple mathematical conversion.