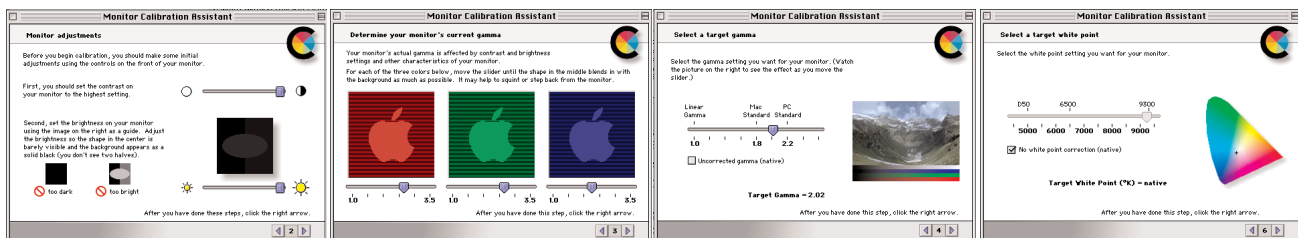




Pixel Wrench Calibration Curves

CALIBRATE PRINTER OR MONITOR

Monitor: Use with your computer's on-board monitor control panel calibration utility. Set the room lighting to match -- as closely as possible -- the type of lighting in which you will be doing your work. Set the user settings to Expert Mode, if you are offered this option. Follow the software's instructions for a first-pass calibration. Shown below are the calibration screen for Macintosh, System 9.X



Next, take a second pass through the monitor's calibration setup, this time with the **Galaxy_PixelWrench_screen** file displayed behind the control panel. Make minor adjustments in the colour and gamma settings to make the on-screen image match most closely with the printed Pixel Wrench (you'll have to view the Pixel Wrench under good, neutral lighting, like a viewing box, daylight or halogen lighting, and you'll need to shield the monitor from this direct lighting, possibly with a hood). This is a difficult step, because your screen is *transmitting* its colours, while the Pixel Wrench is *reflecting* its colours. If you like to work in a dark room, you'll need to find some way of illuminating the Pixel Wrench, with a neutral-coloured light source (fluorescent and incandescent are not neutral, while halogen is neutral). Some users find that it is easier to judge the colours when they step back from the screen. The spectrum chart may be useful here.

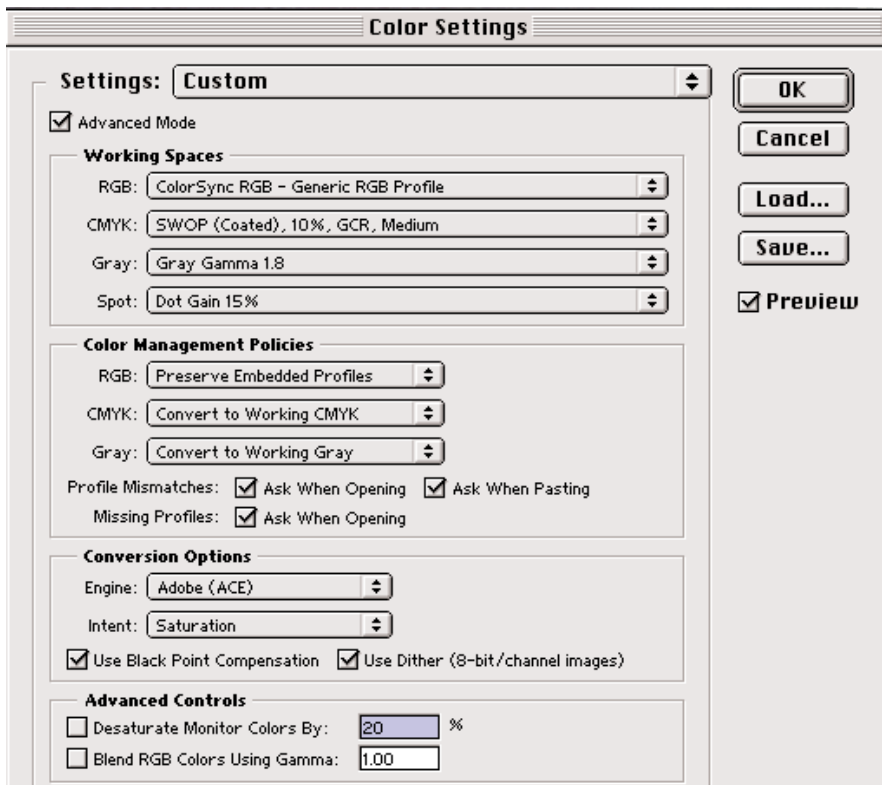
Printer: Open the **Galaxy_PixelWrench_print** file from Photoshop or comparable image-editing program, and convert to CMYK using your own separation preferences. The output size will closely match your Pixel Wrench. Use printer's calibration utility to adjust output colour to match your Pixel Wrench as closely as possible. Save monitor calibration settings.

USE WITH MAIN COLOUR-CONTROL CHARTS

(Note: these instructions are for use with Adobe Photoshop, but other image editing programs can be used.) You will use the 1-colour black swatches to do most of the work here. If you have problems with any of these balancing instructions, you can open the **Galaxy_PixelWrench_screen.jpg** file, then convert it to CMYK using your separation settings. This will let you see what the target values should be, *in relation to each other* ... your image will likely have a different values, but you will be able to adjust them to get the same *type* of relation as the sample image.

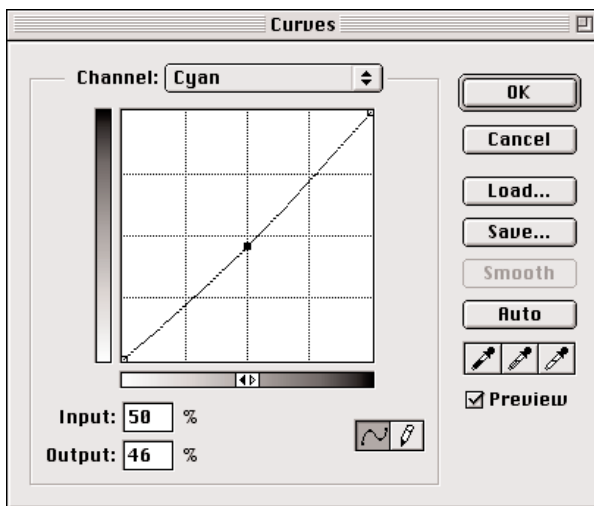
A. Set Photoshop's eyedropper tool to 5 x 5 average sample size.

B. Convert image to CMYK mode, using standard RGB to CMYK separation settings. Here is a screen grab of the settings (Edit:Colour Settings) we have found to give consistently good results, but you may need to adjust your settings to best fit your application.



C. Look at values on the 1-colour black and 4-colour black charts to get an idea of where the colour shift has occurred.

D. Bring up the Curves tool (Image:Adjust:Curves) to make the adjustment. The Curves tool is the tool of choice for professional colour correction.



E. Start with the 50k swatch on the 1-colour black chart, which will correspond to your image's midtone. Check a few spots on it (not too close to the edge) and note the average values for C, M, Y, K as they appear on the info box. Adjusting only the 50% inputs for the individual Cyan, Magenta, Yellow channels, change the outputs so that the values on the info box show approximately equal values for Magenta and Yellow, and about 25% more Cyan than the Magenta or Yellow channels. Try to adjust your curves so that you have to add or reduce colour as little as possible to get your swatches to the correct colour balance. (If you put a point down on a curve that you don't want, drag it off of the chart to erase it.)

- F. Next do the same for the 30k swatch (corresponding to slightly above your image's one-quarter tones). Adjust the 25% inputs for the individual Cyan, Magenta, Yellow channels, so that the info box shows approximately equal values for Magenta and Yellow and about 25%-40% more Cyan than the Magenta or Yellow channels. Make somewhat more subtle adjustments here, than on the midtones, even if it means letting your image's Cyan fall slightly out of range.
- G. Next do the same for the 70k swatch (corresponding to slightly less than your image's three-quarter tones). Check the info-box values to make sure the swatch shows approximately equal values for Magenta and Yellow and about 20%-25% more Cyan than the Magenta or Yellow channels. Only adjust the curves here if any of these values are significantly out of range, because the eye does not detect colour differences in dark areas of the photograph, and curves with too many anchor points tend to make the image look a bit unnatural.
- H. Check the 0k swatch and adjust the curve's highlight endpoints to show approximately 5-8 points of Cyan, and approximately 2-3 points of Yellow and Black. After making this adjustment, check that your photograph has similar values for the lightest larger areas (i.e. NOT highlights, like reflections and light sources). If not, adjust the endpoints as necessary.
- I. Check the 100k swatch to make sure it does not exceed approximately 280 combined density (C+M+Y+K). Adjust endpoints as necessary.
- J. If you have taken out a lot of weight from the individual Cyan, Magenta and Yellow channels, or if you have added "weight" by too much upward adjusting of the curves, you may need to adjust the overall brightness of the image by SLIGHTLY adjusting the Black curve's midtone. You can use the 4-colour black chart to get an idea of what the relative weight of the black should be compared to your CMY values.
- K. Steps H, I and J most likely altered your image's colour balance, so repeat steps E, F and G, this time make minor adjustments to the points you've already put on the curves to obtain the desired colour balance.
- L. You can look at your image's colour sections, as well as the finer gradations of the black charts now. Due to composite nature of CMY inks, you can't simply assume that these swatches should will show only these inks in your scan. Instead, look at the **Galaxy_PixelWrench_screen.jpg** file to see what range of values these swatches should have. If necessary, make further adjustments. (Adjustments in this step will usually be very slight, and usually not necessary at all.)
- M. Save the curve to apply to your following images. Click OK to accept changes.

USE WITH SMALL COLOUR-CONTROL BARS

(Note: these instructions are for use with Adobe Photoshop, but other image editing programs can be used.) You will use the Black (k) swatches to do most of the work here. If you have problems with any of these balancing instructions, you can open the **Galaxy_PixelWrench_small.jpg** file, then convert it to CMYK using your separation settings. This will let you see what the target values should be, *in relation to each other* ... your image will likely have a different values, but you will be able to adjust them to get the same type of relation as the sample image.

- A. Set Photoshop's eyedropper tool to 5 x 5 average sample size.
- B. Convert image to CMYK mode, using standard RGB to CMYK separation settings.

- C.** Look at values for the 100k, 75k, 50k, 25k, and white areas of the card, to get an idea of where the colour shift has occurred.
- D.** Bring up the Curves tool (Image:Adjust:Curves) to make the adjustment. The Curves tool is the tool of choice for professional colour correction.
- E.** Start with the 50k swatch, which will correspond to your image's midtone. Check a few spots on it (not too close to the edge) and note the average values for C, M, Y, K as they appear on the info box. Adjusting only the 50% inputs for the individual Cyan, Magenta, Yellow channels, change the outputs so that the values on the info box show approximately equal values for Magenta and Yellow, and about 25% more Cyan than the Magenta or Yellow channels. Try to adjust your curves so that you have to add or reduce colour as little as possible to get your swatches to the correct colour balance. (If you put a point down on a curve that you don't want, drag it off of the window to erase it.)
- F.** Next do the same for the 25k swatch (corresponding to your image's one-quarter tones). Adjust the 25% inputs for the individual Cyan, Magenta, Yellow channels, so that the info box shows approximately equal values for Magenta and Yellow and about 25%-40% more Cyan than the Magenta or Yellow channels. Make somewhat more subtle adjustments here, than on the midtones, even if it means letting your image's Cyan fall slightly out of range.
- G.** Next do the same for the 75k swatch (corresponding to your image's three-quarter tones). Check the info-box values to make sure the swatch shows approximately equal values for Magenta and Yellow and about 20%-25% more Cyan than the Magenta or Yellow channels. Only adjust the curves here if any of these values are significantly out of range, because the eye does not detect colour differences in dark areas of the photograph, and curves with too many anchor points tend to make the image look a bit unnatural.
- H.** Check the white paper around the colour-control bar, and adjust the curve's highlight endpoints to show approximately 5-8 points of Cyan, and approximately 2-3 points of Yellow and Black. After making this adjustment, check that your photograph has similar values for the lightest larger areas (i.e. NOT highlights, like reflections and light sources). If not, adjust the endpoints as necessary.
- I.** Check the photograph's shadows to make sure that the darkest parts do not exceed approximately 280 combined density (C+M+Y+K). Adjust endpoints as necessary.
- J.** If you have taken out a lot of weight from the individual Cyan, Magenta and Yellow channels, or if you have added "weight" by too much upward adjusting of the curves, you may need to adjust the overall brightness of the image by SLIGHTLY adjusting the Black curve's midtone. You'll have to do this by how the picture looks on the screen, so make sure your screen is somewhat calibrated with either the Gamma Control panel, or by using the Pixel Wrench (see Calibrate Printer or Monitor section). Sometimes, as in the case of some skin tones, the image doesn't have enough Black in it to allow for significant adjustment, so you'll need to SLIGHTLY adjust the (composite) CMYK channel.
- K.** Steps H, I and J most likely altered your image's colour balance, so repeat steps E, F and G, this time make minor adjustments to the points you've already put on the curves to obtain the desired colour balance.
- L.** Save the curve for later use or reference. Click OK to accept changes.