Image Quality Tools for Twain Users

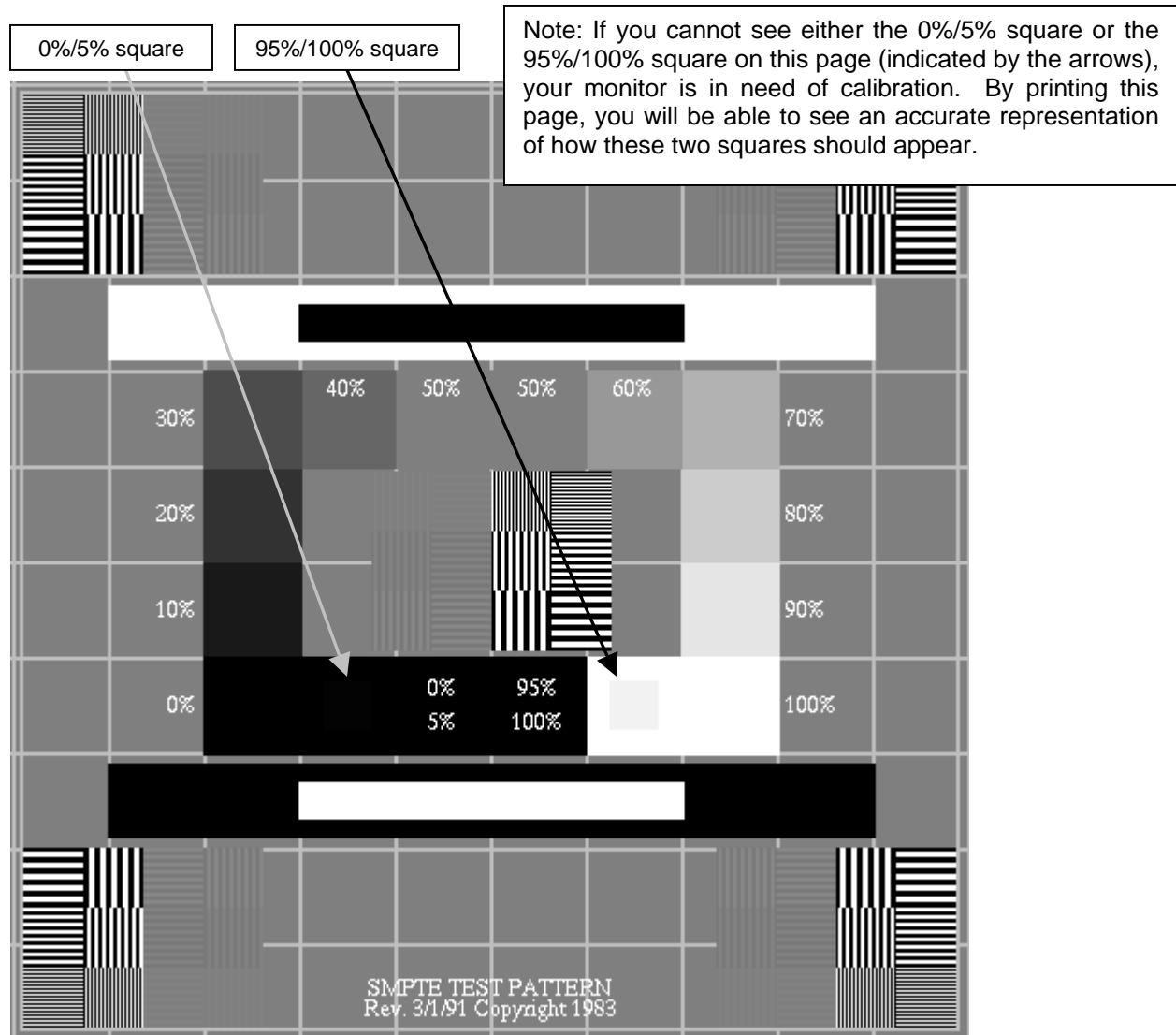# I. Monitor Calibration

The first step toward achieving good image quality is the physical adjustment of the monitor to assure proper monitor output.

The following instructions offer one easy method of accomplishing monitor calibration:

1. Open an SMPTE pattern image; an SMPTE pattern can be accessed via the following Internet link: http://www.dclunie.com/images/smpte.512.512.8.gif.

2. Start with the contrast and brightness turned all the way down. Next, turn the brightness up just until you see the raster scan bars. Then turn the contrast up to 80% or greater until you can see the 0%/5% and 95%/100% squares on the image as well as possible.

Note: If you cannot see either the 0%/5% square or the 95%/100% square on this page (indicated by the arrows), your monitor is in need of calibration. By printing this page, you will be able to see an accurate representation of how these two squares should appear.

II. Software

This document outlines quick adjustments that can be made to images in order to compensate for the lack of a display look-up table in non-clinical scanning applications. The following applications have been heavily tested as host applications for the Vidar Twain module, **and are only recommended as a means for baselining film digitizer operation, not as a substitute for a high quality medical imaging/PACS system.**

PaintShop Pro version 7

Adjusting the Image Gamma

Use the Gamma Correction command to adjust the brightness and contrast of an image in unison. On a computer monitor, a small change in brightness at a low brightness level is not equal to the same change at a high level; gamma correction compensates for this.

To use the Gamma correction command:

- Choose Colors>Adjust>Gamma Correction, or
- Press <Shift> + <G>, or
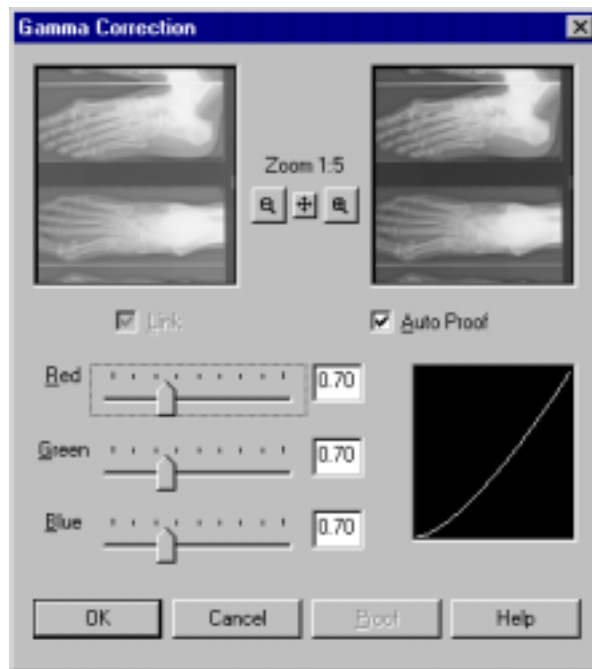- Click the Gamma Correction button on the toolbar.

Fig. 1

By default, the Red, Green and Blue slider bars in the gamma correction window (Fig. 1) are linked so that they move in unison. The graph to the right of the sliders represents the shadows and highlights of the image. Click and drag any slider or type a number into any box to move the curve in the graph. Dragging to the right pushes more pixels into a higher lightness value, which lightens the image. Dragging to the left darkens the image.

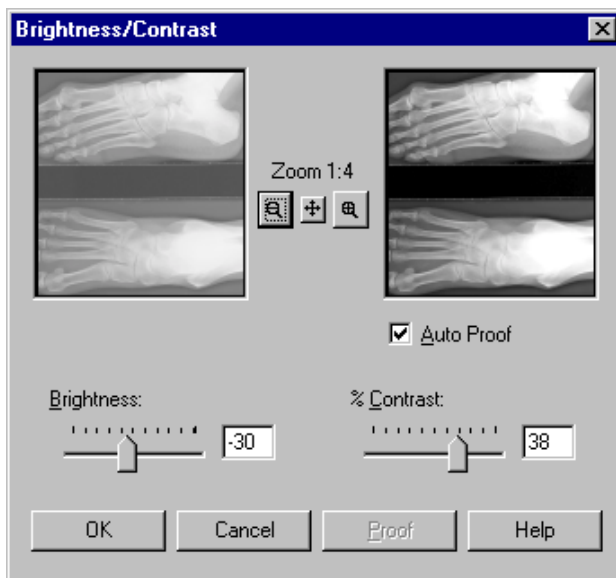Click OK to close the dialog box and apply the settings.

Because gamma correction can leave an image looking somewhat "flat," it may be necessary to increase the contrast after you have corrected the gamma.

Adjusting the Brightness and Contrast

The Brightness command lightens or darkens the entire image or selection. The Contrast command changes the amount of shading between areas. You can use it to sharpen an image and make specific areas stand out.

To open the Brightness/Contrast dialog box, do one of the following:

- Choose Colors>Adjust>Brightness/Contrast, or
- Press <Shift> + <B>, or
- Click the optional Adjust Brightness/Contrast button on the toolbar.

Fig. 2

To use the Brightness/Contrast dialog box (Fig. 2):

The box on the left shows the original image; the one on the right updates as you adjust the settings. To update the original image as you change the settings, select the "Auto Proof" check box.

1. To brighten the image, move the Brightness slider to the right or type a positive number in the box. To darken the image, move the slider to the left or type a negative number in the box. The number you enter is added to or subtracted from the Brightness values (0 – 255) of all the pixels.

2. To increase the contrast, move the Contrast slider to the right or type a positive number in the box. To decrease the contrast, move the slider to the left or type a negative number in the box.

Click OK to close the dialog box and apply the settings.

Equalize Command

The Equalize command distributes the lightness values of the pixels more evenly across the light spectrum from black to white. It makes the darkest pixel as close to black and the lightest pixel as close to white as possible. It then distributes the remaining pixels evenly between these two values. This produces an averaging, or tempering, of the brightness in the image.

To equalize the Histogram, either:

- Choose Colors>Histogram Functions>Equalize, or
- Press <Shift> + <E>.

Stretch Command

If the Histogram does not cover the entire lightness spectrum, the image lacks contrast. The Stretch command stretches the graph closer to both ends so that it covers more of the spectrum.

To stretch the Histogram, either:

- Choose Colors>Histogram Functions>Stretch, or
- Press <Shift> + <T>.

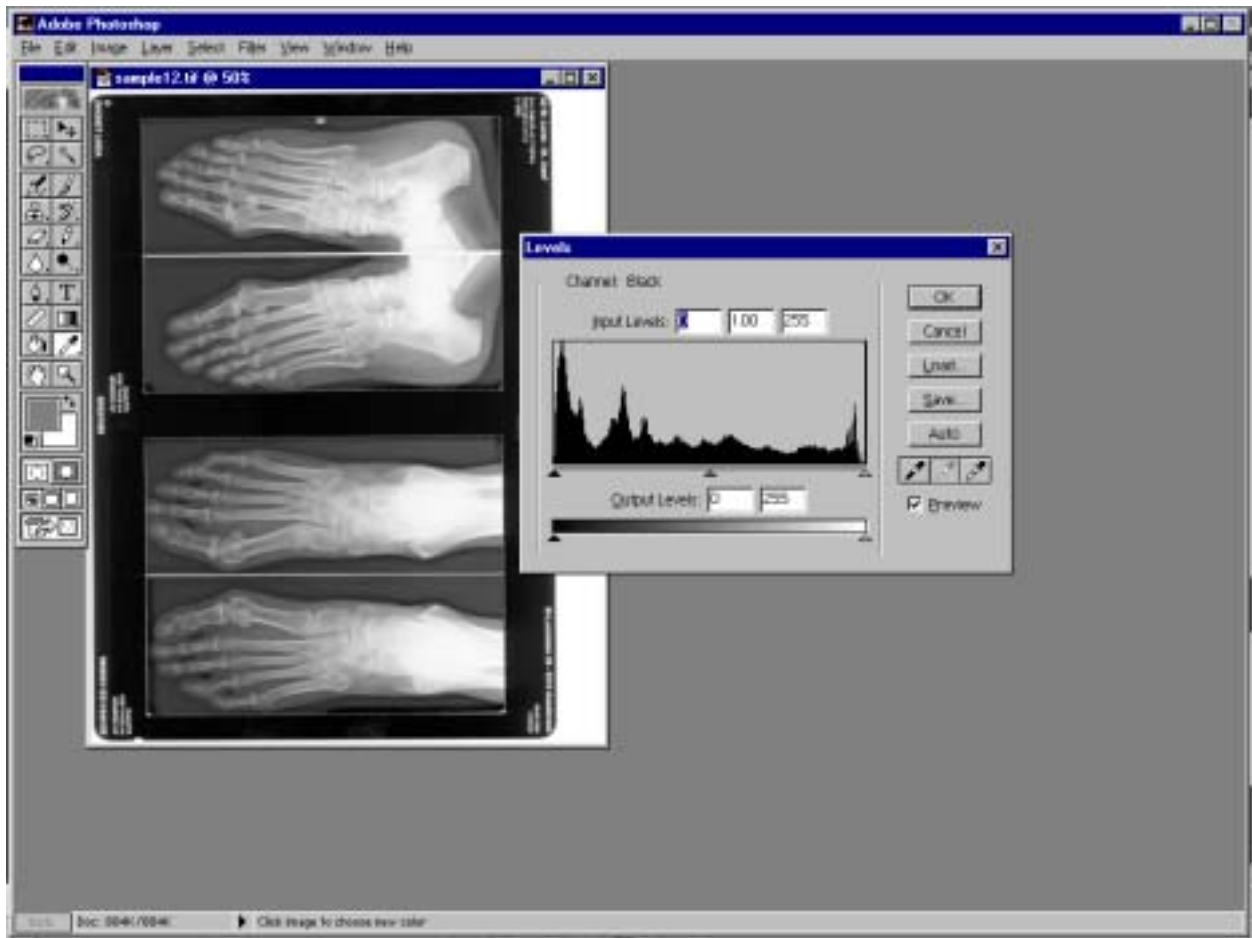Save the image when you are satisfied with the settings.

PhotoShop version 6

Using Levels for Tonal Adjustment

The Auto Levels command and Auto buttons in the Levels dialog boxes automatically define the lightest and darkest pixels in each channel as white and black and then redistribute the intermediate pixel values proportionately. This feature gives good results when an image with an average distribution of pixel values needs a simple contrast adjustment.

To set the black and white points automatically:

- Choose Image>Adjust>Auto Levels, or
- Open the Levels dialog box (Fig. 3 on next page) by selecting Image>Adjust>Levels, and click Auto.

You can also enter values directly into the Input and Output Levels text boxes.   Entering values into the Output Levels text box decreases the contrast in highlight areas, darkening the image.

Fig. 3

Using Equalize for tonal adjustments

The Equalize command redistributes the brightness values of the pixels in an image so that they more evenly represent the entire range of brightness levels. When you choose this command, Photoshop finds the brightest and darkest values in the image and attempts to equalize the brightness—that is, to distribute the intermediate pixel values evenly throughout the grayscale.

To equalize the brightness values of pixels:

    Choose Image>Adjust>Equalize.

Using Auto Contrast for tonal adjustments

The Auto Contrast command is used to automatically adjust contrast or highlights and shadows. Adjusting contrast maps the darkest and lightest pixels in the image to black and white. The Auto Contrast command clips the white and black pixels by 0.5%—that is, it ignores the first 0.5% of either extreme when identifying the lightest and darkest pixels in the image. This clipping of color values ensures that white and black values are representative areas of the image's content, rather than extreme pixel values.
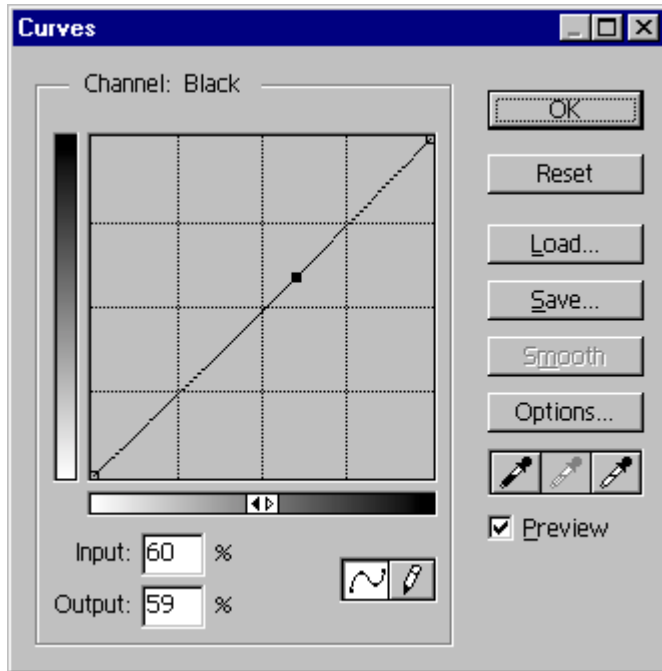
To adjust contrast automatically:

Select Image>Adjust>Auto Contrast

Using Curves for tonal adjustments

The Curves feature lets you make precise adjustments to one area of the tonal range while controlling the effect on the others.

1. Open the Curves dialog box by selecting Image>Adjust>Curves.

2. Click the part of the curve you want to adjust. Drag until the image looks as you want; or

    Click to fix a point on the curve. Click and drag to adjust, or enter an input and output value for the selected point on the curve.

Save the image when you are satisfied with the settings.

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