

### Overview

Gamma correction is a built-in printer feature that allows users to adjust the lightness/darkness level of their prints. The amount of correction is specified by a single value ranging from 0.0 to 10.0. Gamma correction may be specified on both a printer default and user-specific basis across the network and on a printer default basis through the printer's front panel.

### Why Use Gamma Correction?

Gamma correction allows users to better match the intensity of their prints to what they see on their computer screen (CRT). For instance, an image that appears just fine on the CRT might print out darker on the printer. This is because the printer "gamma" (the characteristic traversal from dark to light) is different from that of the monitor.

### The Gamma Curves

To fix this problem, the user can select a "gamma curve" to be applied to the image before printing that will lighten or darken the overall tone of the image without affecting the dynamic range. The shape of the gamma curve is determined by a number ranging from 0.0 to 10.0 known as the "gamma value". Figure 1 shows several gamma curves demonstrating the effect that the gamma value has on the shape of the gamma curve.

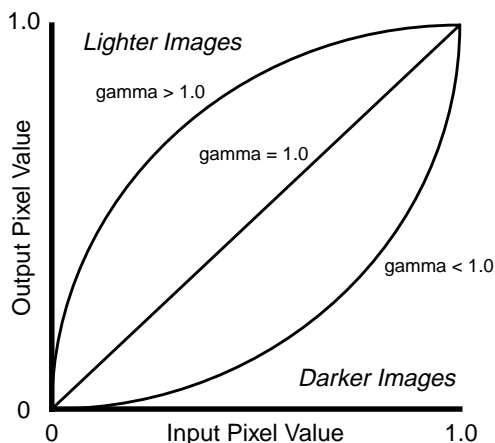


Figure 1: Gamma Curves

In Figure 1, the pixel values range from 0.0 representing pure black, to 1.0, which represents pure white. As the figure shows, gamma values of less than 1.0 darken an image. Gamma values greater than 1.0 lighten an image and a gamma equal to 1.0 produces no effect on an image. The actual gamma function used within the printer is given as follows:

$$\text{newval}(x) = x^{\left(\frac{1}{\text{gammaval}}\right)}$$

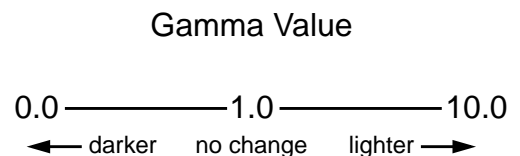
Figure 2: Gamma Function

Where x is the original pixel value and gammaval is the gamma value ranging from 0.0 to 10.0.

This curve is valuable in keeping the pure black parts of the image black and the white parts white, while adjusting the values in-between in a smooth manner. Thus, the overall tone of an image can be lightened or darkened depending on the gamma value used, while maintaining the dynamic range of the image.

### Setting Gamma Values

The amount and direction of gamma correction is specified by a single number as follows:



The printer gamma setting can be adjusted two ways. First, the printer default gamma value may be set using the printer's front panel. Second, users may set their individual gamma value preference on the printer by sending a text file to Logical Device 0.

### Setting Printer Default Gamma Value

Setting the gamma value through the printer's front panel specifies the **printer default value**. This value is used for any users who have not stored a personal settings file on the printer.

This value is entered into the printer as follows:

Use the following front panel key sequences to select the Gamma Value. When an **<Up-arrow>** or **<Down-arrow>** is indicated, press the key repeatedly until the correct response is showing on the LCD.

Start from the READY display.

<u>Use Key</u>	<u>Until LCD Displays</u>
<b>&lt;Setup&gt;</b>	SETUP: NETWORK
<b>&lt;Down-arrow&gt;</b>	SETUP: IMAGE
<b>&lt;Setup&gt;</b>	IMAGE: TCR
<b>&lt;Down-arrow&gt;</b>	IMAGE: GAMMA
<b>&lt;Setup&gt;</b>	<i>The LCD will display the current Gamma Value.</i>

To change the Gamma Value, use the following front panel commands:

<b>&lt;Up-arrow&gt; or &lt;Down-arrow&gt;</b>	<i>Until the desired Gamma Value is shown on the LCD.</i>
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Once the desired Gamma Value is displayed, exit from the setup menu and return to the READY state as follows:

<b>&lt;Setup&gt;</b>	IMAGE: GAMMA
<b>&lt;Down-arrow&gt;</b>	IMAGE: EXIT
<b>&lt;Setup&gt;</b>	READY

The front panel menu hierarchy just described is summarized below:

READY → IMAGE → GAMMA → *default\_value*

Where *default\_value* is a number from 0.0 to 10.0.

### **Setting Personal Gamma Preference**

Users may store a file on the printer specifying their personal image processing preferences. The file must be a plain text file. To specify the gamma value, first create a file with the following text:

**GAMMA value**

Where **value** signifies a number from **0.0** to **10.0**. Then, send the text file to Logical Device 0 of the printer using the FTP or LPR programs. The user must be logged in under his/her own username for LPR and must use their own username and binary transfer mode when using FTP.

*Note:* The text file is stored on the printer and is referred to any time that user makes a print. **If the user previously stored a personal settings file on the printer, this will overwrite the original.** Therefore, all other personal preferences should be included in this file, as well. An invalid file sent to Logical Device 0 will clear any existing file which would return all settings to factory defaults.

### **Querying Printer Status**

The printer default gamma value can be determined by querying the front panel as described in the previous section. The printer default and user-specific settings can also be determined using the **root** login from a Telnet session and running the **stat** command. Users that are familiar with Telnet can log into the printer as follows:

1. Telnet to printer's **hostname** or **IP Address**
2. Login as **root**
3. Run **stat username** command.

This command displays a page of useful information about the printer status. All of the image processing options for both **root** (printer default settings) and the specific **username** are displayed.

### **Choosing the Gamma Value**

An easy approach for choosing the appropriate gamma value is to use the Bracketing feature of the printer. An image that is sent to Logical Device 9 (Bracketing Logical Device) on the printer will be printed in a 4 x 5 grid in which TCR (TrueColorRendering) and gamma values are varied. Just send the desired image to Logical Device 9. To determine the desired gamma value look across the row of images in which TCR = 0.0 (no TCR correction) and see how the gamma setting will affect the look of the image. This method will give a starting point for the gamma setting. Fine-tuning may then be performed by manually varying gamma within the desired range found on the Bracketing print.

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