## Color LaserWriter 12/600 PS: Cause of Banding (10/96)

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TOPIC -------------------------------------------------------------

When I print from Color LaserWriter 12/600 PS, I can see banding. What causes banding?

DISCUSSION --------------------------------------------------------

Banding is very difficult to measure with instruments, but the human eye is very good at discerning it. With the Color LaserWriter 12/600 PS or the Color LaserWriter 12/660 PS printer it can arise from a number of areas. These include software, image development area, high voltage power, and basic mechanical factors.

Software
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One cause of banding is when applications generate colors that do not exist in the printer colorspace*. When this happens, substitute colors are placed next to colors the printer does not have. Some software applications can read the output devices' colorspace, so they will warn you if you are selecting a color outside the colorspace of the device. Unfortunately at time, only a limited number of applications can do this, most will not warn you if you chose a color outside the colorspace of the device.

* Colorspace: The term for the range of colors a device can produce. In general, a monitor has a larger colorspace than a printer.

You will see the banding effect with artwork where blends are used since the colors are adjacent to each other. Images that use a lot of shading, such as photographs, also make this effect more apparent.

A "stepping" effect, which can be confused as banding, can be caused by blends where not enough steps are sent to the printer.  If the artwork is created with large gaps between color gradations, blends will develop.  Some programs automatically generate the number of steps that should exist between the two colors. Changing this value is not recommended, even if it decreases the file size. As a general rule, 256 steps should minimize the effect when blending between two solid primary colors.

The best way to test for banding problems, is to use the test print function on the Color LaserWriter 16/600 PS control panel on the back of the printer.

How To Create A Test Page On The Color LaserWriter
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Test Page Pattern Selection
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This feature allows you to select one of six test page patterns based upon which pattern would best confirm a print quality issue. Test pattern selection is non-persistent, and after restarting, the test page reverts to the vertical line pattern.

Step 1
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Hold down the COLOR SELECT button and press the ENTER button eight times. The four toner lights flash to indicate that you are in the test pattern selection mode.

Step 2
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Using the plus or minus buttons, advance the density gauge to illuminate the LED corresponding to the desired pattern. The density gauge flashes when the selected setting differs from the previously entered setting.

NOTE:
Only LEDs 4 through 9 on the density gauge correspond to available patterns.

Step 3
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Press the TEST PAGE button to choose the desired test pattern.

Note:
You can press the TEST PAGE button before or after pressing the ENTER button.

Step 4
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Press the ENTER button to engage the setting. If you make no further adjustments, the panel exits from the test pattern selection mode in 30 seconds.

Usage Tips
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Once the printer has entered the Energy Saving Mode, a test page is no longer produced, and you must restart the printer in order to print additional test pages. You can either use the printer utility, or cycle the power switch to restart the printer.


Hardware
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The engine manufacturer and Apple have worked very hard to minimize the banding. No band that repeats on the page should be greater than 2mm in width. To evaluate the banding print out large vertical solid areas of each color (CMYK) at about 60% coverage, from an application. Look at each and determine if one color is banding worse than the other colors.

NOTE:
The human eye does not detect banding in yellow, so do not expect to see it there.

You should expect to see small bands of variations because of mechanical factors. If there are predominate bands about 50mm apart in any one color it is likely the developer roller in the toner cartridge is causing the banding. If the predominate bands are spaced 38mm or 129mm the cause is likely the Photoconductor cartridge. For additional details on photoconductor banding see the Tech Info Library article titled "Color LW 12/600 PS: Image Defects at Regular Intervals".

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