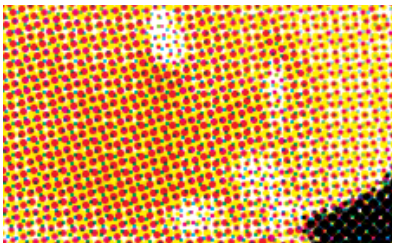
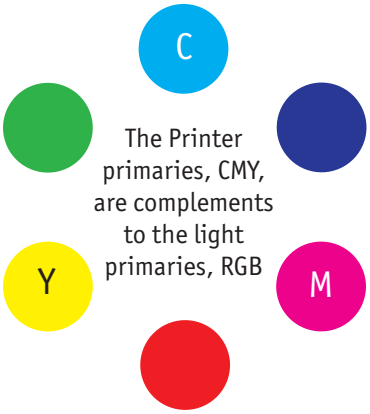
Controlling Color

These appetizing hues don't happen by accident

Stochastic or "FM" screening is used by ink jet printers and ultra-high-end offset presses.



Standard or "AM" screening is used by laser printers and most offset presses.



The Printer primaries, CMY, are complements to the light primaries, RGB

Screen color ≠ Print color

All colors, on screen or in print, are built out of one or more **primary hues**. The light primaries are Red, Green and Blue and the print primaries are Cyan, Magenta and Yellow. When you mix cyan and magenta you get blue, when you mix magenta and yellow you get red, and when you mix cyan and yellow you get green. Notice a pattern? The light primaries are the print secondaries and visa versa. Color printing also adds black which deepens shadows.

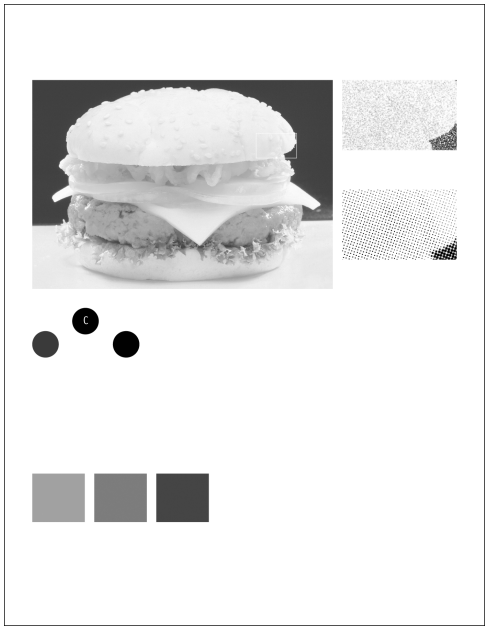
When you use RGB colors for print jobs, you are letting software determine how to convert RGB into CMYK which may result in disappointing or inconsistent colors. Converting RGB to CMYK always comes with compromises because the range and volume of color visible in light is greater than what can be reproduced on press or with a desktop printer. But, if you convert the colors, you (not software) decides where the compromises are made.

More than one way to build a color

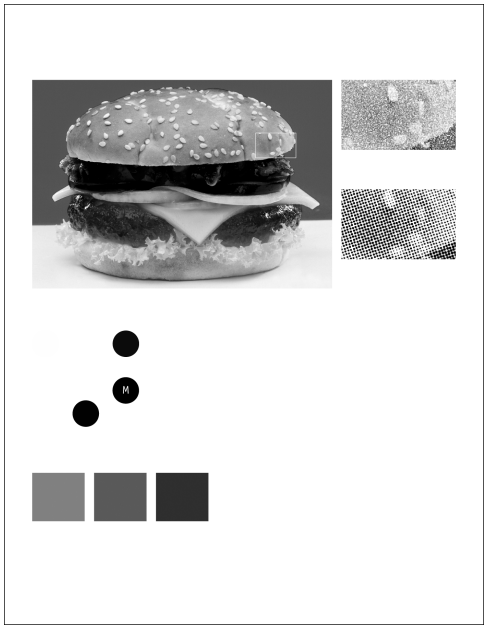
RGB	GCR	UCR
R = 81	C = 50	C = 73
G = 49	M = 65	M = 82
B = 55	Y = 0	Y = 25
CMYK = ?	K = 47	K = 25

Printers often refer to CMYK colors as **builds** because the colors are built out of primaries, black, and the white of the paper. A purple, for example, would be built of of C & M. The color could be then darkened by adding its complement (yellow) or black. If you choose to mostly darken colors with complements you are making **Under Color Removal** (UCR) colors. If you darken colors with black, you are making **Gray Component Replacement** (GCR) colors. Which do you choose? UCR is used for high-end jobs (UCR colors are richer and shinier) But for budget jobs and papers, (such as newsprint) and *ink jet printing*, use GCR. Why? Imagine you're running low on magenta. if the darkness is provided by yellow, your printed color will shift green. Because GCR colors are built out of two and not three primaries (and black) surprises are less likely. (You'll also replace your color ink cartridge less frequently.) The top of each chip is imported from Photoshop, the bottom is generated in Quark, but the values are the same. CMYK colors match more reliably.

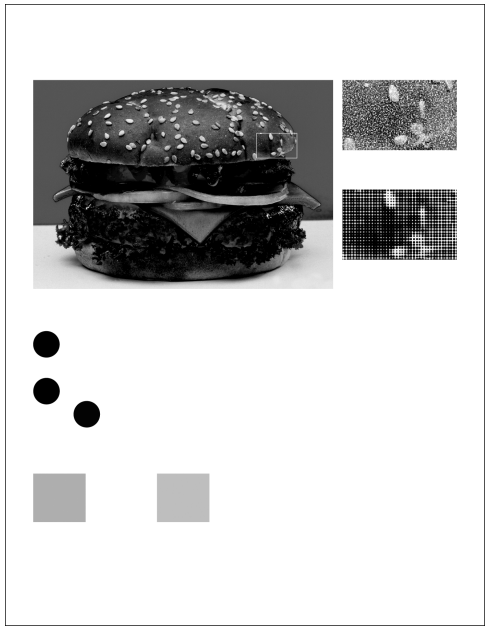
Color Separations



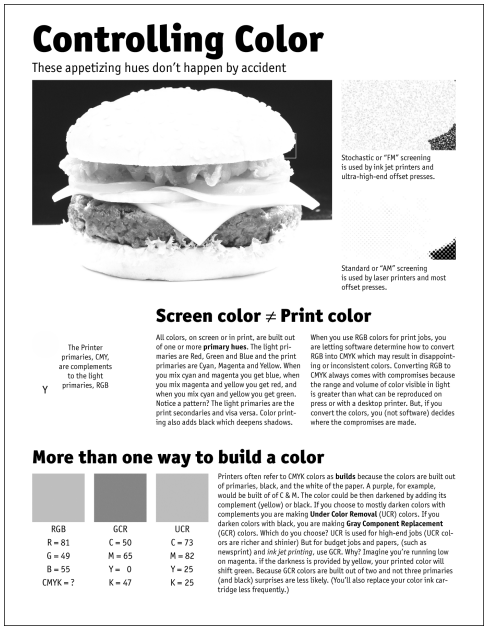
Cyan



Magenta

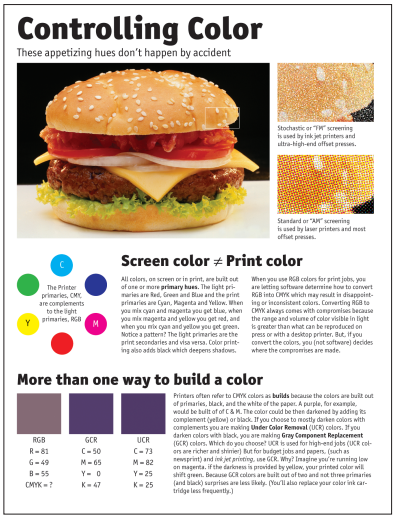


Yellow



Black

Back in the day, color separations were created by filtering each printer primary through its complement (yellow, for example would be created by taking a picture of full-color art through a purplish-blue gel. Today, computer algorithms take care of separations, but the science is the same. Even if colors are separated correctly, (each plate accurately represents color present and is "balanced" with the others) good color is not guaranteed. Too much or two little ink on one of the printer's plates could throw colors off—just like a clogged nozzle can lead to bad color on a modern inkjet printer.



All printed color pages are a blend of (most usually) the four printer's primaries tightly "registered"on top of one another. These are referred to as **color separations**, because the range of color is separated into its primary components.

The black that makes up the background behind the hamburger is, as you can see, made from black, but also tints of the three primaries. This makes it darker and richer but less controllable than a black made from black ink alone.

Trapped Untrapped

Trapping

Colors registration is rarely exact. For this reason, a rich black like the black behind the burger is inappropriate for finely detailed printing—such as text. A light color on a dark background is usually trapped. The lighter color is spread slightly so that the two will overlapped. You can control trapping in Quark, or use auto-trap.