

On a black-and-white monitor, there is a simple correspondence between bits in memory and dots on the screen. A dot is white if the bit controlling it is on (1), and the dot is black if the bit is off (0). On a black-and-white television set, pairs of dots blur together; alternating black and white dots merge to a continuous gray.

On an NTSC color monitor or a color television set, a dot whose controlling bit is off (0) is black. If the bit is on, the dot will be white or a color, depending on its position, the dots on either side, and the setting of the high-order bit of the byte.

Call the left-most column of dots column zero, and assume (for the moment) that the high-order bits of all the data bytes are off (0). If the bits that control dots in even-numbered columns (0, 2, 4, and so forth) are on, the dots are purple; if the bits that control odd-numbered columns are on, the dots are green—but only if the dots on both sides of a given dot are black. If two adjacent dots are both on, they are both white.

You select the other two colors, blue and orange, by turning the high-order bit (bit 7) of a data byte on (1). The colored dots controlled by a byte with the high-order bit on are either blue or orange: the dots in even-numbered columns are blue, and the dots in odd-numbered columns are orange—again, only if the dots on both sides are black. Within each horizontal line of seven dots controlled by a single byte, you can have black, white, and one pair of colors. To change the color of any dot to one of the other pair of colors, you must change the high-order bit of its byte, which affects the colors of all seven dots controlled by the byte.

For more details about the way the Apple IIe produces color on a TV set, see the section “Video Display Modes” in Chapter 7.

In other words, high-resolution graphics displayed on a color monitor or television set are made up of colored dots, according to the following rules:

- ☐ Dots in even columns can be black, purple, or blue.
- ☐ Dots in odd columns can be black, green, or orange.
- ☐ If adjacent dots in a row are both on, they are both white.
- ☐ The colors in each row of seven dots controlled by a single byte are either purple and green, or blue and orange, depending on whether the high-order bit is off (0) or on (1).