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Macintosh II: How It Handles Color Versus CGA, VGA, and EGA

Revised: 7/8/92
Security: Everyone

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Article Created: 23 August 1989
Article Last Reviewed: 7 July 1992
Article Last Updated:

TOPIC ----------

This article discusses how the Macintosh handles color in comparison to CGA (Color Graphics Array), VGA (Video Graphics Array), EGA (Enhanced Graphics Array) and other color standards.

DISCUSSION ----------

Background

CGA
The first color standard for the MS-DOS PC-style computers was CGA (Color Graphics Adapter or Color Graphics Array). The CGA standard can display two colors from a palette of 16 colors at its maximum resolution of 640 by 200. The output of this card is a TTL digital RGB signal.

PGC
The next standard for color on MS-DOS computers was the IBM PGC (Professional Graphics Card), which has a 640 by 480 resolution with 256 colors from a palette of 4096. The PGC provides an analog output. This card gained very little acceptance because EGA, the next standard, provided better price/performance.

EGA
EGA (Enhanced Graphics Array) provided some backward compatibility with the CGA standard. The first EGA had a maximum resolution of 640 by 350 with 16 colors from a palette of 64. The current EGA standard (EGA enhanced) is 640 by 480 with 16 colors. Both EGA standards use a TTL digital RGB output.

VGA

When the PS/2 computers were introduced, the VGA standard came into existence. There are three color graphics modes on the VGA (Video Graphics Array) card: 640 by 480 with two colors, 640 by 480 with 16 colors, and 320 by 200 with 256 colors. The 16- and 256-color modes have a palette of 262,144 colors. The lower resolution of the 256 colors has limited its use with commercial software. With the VGA standard, an analog RGB output is used.

MS-DOS Color

With the CGA, EGA, EGA enhanced, and VGA, it is possible that each card may require a different driver to be installed for each of the individual applications that is run on each computer. It is possible, for example, for a company with five MS-DOS computers to have five different drivers for the same program: on System One a CGA card from Manufacturer A, on System Two an EGA card from Manufacturer B, on System Three an EGA enhanced card from Manufacturer C, on System Four an EGA enhanced card from Manufacturer D, and on System Five a VGA card from Manufacturer E. Each of these systems is running Lotus 1-2-3. For each system to display the 1-2-3 graphs, each system may need a driver for each individual card. Each of these systems will most likely be displaying in different resolutions and with a different number of colors.

Even within one graphics card standard, when moving from one card manufacturer to another, different drivers may be required for the same program. Also, within one graphics card standard, some third parties may have decided to change the rules; that is, 640 by 480 by 16 colors is the standard in EGA enhanced, but there is a card that uses 800 by 560 by 16 colors.

These resolutions remain constant whether a 9-inch or a 19-inch screen is used--creating a situation where an application cannot depend on the screen display to represent any type of "what you see is what you get" environment. A graphic object that is 2 inches by 2 inches on one screen may become 4 inches by 4 inches on another screen.

With the wide variety of possible color display devices for the MS-DOS world, consistency is very difficult to maintain.

Macintosh Color

On the Macintosh, there is more consistency, even when moving from black and white graphics to full 32-bit color graphics. Card developers and software developers need not be concerned about which application or which video card they are going to work with. Both the hardware companies and the software companies focus their resources on QuickDraw. A driver for a particular application is not necessary in the Macintosh environment. Users needn't be concerned about installing drivers to use a particular application.

The typical Macintosh screen is 72 pixels per inch. There is a difference from one screen product to the next--but only a small difference. This allows for a consistent display. A 2-inch by 2-inch

image remains very, very close to 2 inches by 2 inches from screen to screen.

If you have a smaller screen, you have fewer pixels; however, the pixels are very, very close to the size of any other Macintosh screen. This constant pixel size has been a tremendous benefit for the publishing market because an image on Macintosh "A" is very close to the same image on Macintosh "B"-- unlike the MS-DOS world. Since all Macintosh video cards use the same reference (QuickDraw) for image work, it doesn't matter who manufactured the video card: the image appears the same.

With 32-Bit QuickDraw now available, the Macintosh can also display photo-quality images--not available in the CGA, EGA, and VGA environments.

When the graphics environment is enhanced, applications do not need to undergo major changes to continue to work in the new and enhanced graphics model. For example, programs that ran in Macintosh 1-bit display configuration continue to run in the 32-bit display configuration. These applications may not take advantage of the new environment, but they generally continue to work without modification.

CGA and EGA cards require a digital RGB display monitor. VGA and Macintosh can, in many instances, use the same multisync monitors.

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Tech Info Library Article Number:4414