Nanov FAQ before purchase

1. How to choose a flat panel display: what features determine quality?

We recommend looking at the following major features when evaluating the quality and price/performance ratio of an LCD monitor.

Resolution:
Make sure you measure the maximum true resolution – i.e., the resolution achieved by the number of pixels the monitor contains, without scaling the screen contents up or down.

Size:
Size is measured diagonally from one corner of the glass to the opposite corner.

Aspect Ratio:
This is related to resolution, the ratio of the monitor's width to height. Most displays have a 1.25:1 ratio. Some, like Silicon Graphics 1600SW, have a wider format, 1.6:1 ratio. The amount of horizontal space is critical in determining how much information can be displayed at once, particularly when viewing side-by-side pages, or spreads.

Dot Pitch:
This is a measure of the amount of space between each pixel. The smaller the dot pitch, the sharper the image. The dpi, or dots per inch (also called 'pixels per inch'), is related to dot pitch; the smaller the dot pitch, the higher the dpi is.

Analog/Digital:
All LCDs are natively digital (unlike CRTs) but whether it is analog or digital is determined by the kind of input it requires. Digital monitors usually have better picture quality because the output is not the result of an analog to digital conversion. Digital LCDs require a digital-output graphics card in the CPU to drive the display. Silicon Graphics 1600SW is bundled with a digital graphics card so that users can take advantage of all-digital display performance.

2. Brightness:
Brightness is determined by the intensity and quality of the backlighting; in displays, it is usually measured in luminance (candelas per square meter). A brighter monitor will be easier to view and have greater color intensity.

Color resolution:
The number of colors that can be represented on a display without dithering. Higher quality LCDs have 24-bit color, allowing for a color gamut, or range, of 16.7 million.

Contrast:
Related to brightness, this is a measure of the range between the lightest tones and the darkest tones that the LCD is capable of producing. A higher contrast ratio makes the information on the display more readable.

Viewing angle:
This determines how far above, below, or to either side of the display a person can be and still accurately view the image on it.

Pixel response rate:
Measured in milliseconds or microseconds, this is the time it takes for a pixel to respond to voltage (to be turned "on") and then return back to its normal state. The shorter the pixel response rate, the more quickly the panel will be able to display and refresh images.

Additional features:
Additional features that are important to some users are color calibration capability, a

removable stand (for mounting the monitor on a wall or adjustable arm), a pivoting head (for viewing in portrait mode), and additional connectors (for USB, video inputs, etc.)

A critical consideration in determining a display's overall value is TCO, or total cost of ownership for the product.

2. How are digital LCDs different from analog ones?

Unlike CRTs, all LCDs are inherently digital (that is, the pixels that generate screen images are operated by digital signals) so whether an LCD is analog or digital is determined by how it receives information from the CPU, or computer. Because CRT technology has been so ubiquitous prior to LCD adoption, many computer graphics cards still convert digital data to analog for output to CRTs. For this reason, many LCD manufacturers opt to make their displays analog-only inputs in order to be compatible with older, analog graphics cards. Converting the display information from digital to analog (in the graphics card) and back into digital (in the monitor) can limit the display's performance and compromise image quality. All-digital displays, like Silicon Graphics 1600SW, require a digital-output graphics card to drive them. SGI bundles the 1600SW with a high-performance digital graphics card so that users can take advantage of all-digital display performance.

3. What is the difference between CRT and LCD size measurements?

CRTs have two specifications for screen size: the CRT size (the actual size of the picture tube) and the viewable screen size (the usable screen area). Because the CRT picture tube is enclosed in the plastic casing, the viewable screen size is smaller than the overall CRT size. Though CRTs are commonly referred to by the picture tube size, it is the viewable area that is important in comparing a CRT to an LCD. Unlike CRTs, the viewing area of an LCD is the only valid measurement of its size. This is why many LCD specifications list a CRT equivalent size to identify the picture tube size that is required to achieve the same viewable size display. For example, the Silicon Graphics 1600SW has a diagonal screen size of 17.3 inches, which is equivalent to a 19-inch CRT display's viewing area.

4. How does the total cost of ownership (TCO) compare to an equivalently sized CRT monitor (19 or 21-inch)?

Total cost of ownership includes the actual purchase price for the monitor as well as all other costs of owning and using the monitor. Studies show that the purchase cost for computer-related equipment often is less than a quarter of the total cost of ownership. LCD panels offer excellent value compared to CRT monitors when viewed from the total cost of ownership perspective. The 1600SW operates on less than 20% of the power of typical 21-inch CRT monitors, in addition to offering three times the brightness and up to five times the contrast. This efficiency not only saves on power consumption costs, but also translates into significant cooling power savings. Flat panel displays take up far less space than CRT monitors and can be easily mounted on flexible arms, saving on furniture expense and allowing a higher density of both people and information displayed. For applications requiring close communication of workers or large amounts of information, flat panels can enable dramatic productivity gains.

5**. What is the difference between active matrix LCDs (AMLCD) and passive matrix LCDs?**

For an LCD to work, each pixel must be energized to either let light through or block light out. The difference between active matrix and passive matrix displays is the way in which the pixels are electrically addressed, or "energized." Passive matrix flat panel displays consist of a grid of horizontal and vertical wires. At the intersection of each grid is an LCD element that constitutes a single pixel. Active matrix flat panels are a higher quality and more expensive type of display in which transistors are built into each pixel within the screen. For example, the 1600x1024 screen size of the 1600SW requires over 14 million transistors, one for each red, green, and

blue subpixel. Active matrix, sometimes also called TFT (thin film transistor) displays typically have higher resolution, higher contrast, and much faster pixel response rates than passive matrix LCDs.

6. What is 24-bit color?

The number of colors an LCD monitor can display is dependent on the number of grayscale levels that it can display, which is essentially a measure of how well it is electrically addressed. Each subpixel in the 1600SW is addressed by 8 bits of data, allowing it to have 256 (or 28) gray levels. In a color monitor, each pixel is made up of three subpixels, one for each primary color. These red, green, and blue dots are energized to different intensities (or grayscales) to create a range of colors that we perceive as the mixture of these dots. Because the shade of each of the three subpixels is determined by 8 bits of data, the monitor displays in 24 (3x8) bit color. That means the monitor is capable of displaying 256 (R) x 256 (G) x 256 (B), or over 16,700,000 colors! Imagine painting a picture with only four colors. With such a limited selection, your level of expression is greatly suppressed. With display devices, higher color depth effectively gives you more colors with which to "paint" your image. Some LCD monitors can only display 18 bits of color and cannot show 24 bits of true color. While this may be fine for some noncritical applications, serious professionals require the full color range for their work. SGI flat panels all are 24-bit color capable, giving you a fantastic color range, with no dithering.

7. What is color management?

Color management, such as SGI ColorLock, consists of hardware and software components that enable the monitor to achieve a very high level of color accuracy and consistency. SGI ColorLock technology is used exclusively with SGI flat panels and the Silicon Graphics 320 and Silicon Graphics 540 workstations. It allows the precise control of gamma and color temperature over a wide dynamic range and supports the adjustment of display characteristics to meet a variety of industry display values, including sRGB, broadcast, graphic arts D-50, Mac legacy, and Web viewing.

8. What is HDTV?

Simply put, all High Definition Televisions (HDTVs) are Digital TVs, but not all Digital TVs are HDTVs. Similarly, all High-Definition (HD) programs are digital, but not all digital broadcasts are HD.
TV stations are changing from an analog method of sending programs to a digital method. HD is the type of digital format with the best picture and sound capability, but there are 18 digital formats approved by the group that oversees the guidelines for digital TV, the Advanced Television Systems Committee (ATSC).
For simplification, the other digital formats that affect you are Standard Definition (SDTV) and Enhanced Definition (EDTV). Even though these formats aren't HD, they're still superior to the analog method that's been used since TVs were introduced more than 60 years ago.

SDTVs and EDTVs are a more affordable alternative to HDTV - you still get digital programming, but your TV won't reproduce HD content in the high-resolution format that defines HDTV

ATSC TV Tuner

ATSC is the 8-level vestigial sideband modulation method adopted for the Advanced Television Systems Committee standard of digital television in the United States. thereby doubling the effective bandwidth. and ATSC tuners included to enable the set to receive digital cable-in-the-clear signals, as well as digital terrestrial broadcasts.

HDMI™ (High-Definition Multimedia Interface)

HDMI™ (High-Definition Multimedia Interface) is the first industry-supported, uncompressed, all-digital audio/video connection. HDMI™ provides the best interface between a DVD player and compatible products, such as a digital television (DTV). When matched with a compatible TV, this single interconnecting cable combines: Multi-channel audio, uncompressed digital video, intercommunication between devices and simple control Protocols. This single cable connection ensures that all signals remain in their pure digital form and secure by use of High Definition Copy Protection (HDCP) regardless of signal output resolution.

8. Glossary

Color Calibration
The process of adjusting a display's output characteristics so as to modify its appearance to conform to predetermined standards or settings. Usually accomplished through the use of a color or luminance measuring device and a lookup table (LUT) of values accessible to the computer's graphics controller. See Gamma.

Color Filter
A red-, green-, or blue-dyed gelatin or pigment placed above each LCD subpixel. Combinations of various light levels passing through these color elements can produce all the visible spectral colors.

Color Gamut
The entire range of colors available on a particular device such as a monitor. On an LCD with true 24-bit color, the color gamut is 16,700,000 colors.

Color Resolution
The colors that can be represented on a display depending on the number of Grayscales resolved by the LCD element.

Color Temperature
The definition of a monitor's white point, whose chromaticity coordinates can be somewhat arbitrary, existing in color space from red-white to blue-white. Expressed in Kelvins (K), color temperature refers to the amount of light radiated by a perfect thermal radiator. Values at or below 5000K appear reddish; higher numbers, for example 7000K, appear bluish.

Column Drivers
Microelectronic circuits that provide the correct voltages to the individual subpixls through the source lines. For example, 8-bit drivers provide 256 gray shades, or 256 distinct colors per subpixel.

Contrast
The range between the lightest tones and the darkest tones in an image. The lower the number value, the more closely the shades will resemble each other. The higher the number, the more the shades will stand out from each other.

Contrast Ratio
The ratio between the amount of light transmitted by a pixel in its unselected ("off") state and its selected ("on") state. In an AMLCD, this ratio is usually greater than 150:1.

Controller
A digital signal source that puts data in the correct "order" to the display. It provides H and V sync, data enable, clock and 8-bits each of R, G, and B information.

Convergence
The clarity and sharpness of each pixel.

LCD
(Liquid Crystal Displays). These displays are fabricated using semiconductor processes, with each pixel comprising transistors set up in a grid. LCDs are inherently digital displays. In their most common computer application, notebook computers, video drivers take the digital information in the graphics frame buffer and digitally interface to the row and column drivers that set the colors at each pixel in the display.

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MTS Stereo/SAP

An MTS (Multi-channel Television Sound) decoder enables the television to accept and decode a broadcast stereo signal. Unlike some systems that delete, MTS provides the full quality of the original stereo broadcast. SAP (Secondary Audio Program) enables the reception of bilingual broadcasts, when available.

Benefit: Full broadcast stereo sound quality, plus access to bilingual or secondary audio signals.

Pixel
The smallest addressable unit on a display screen. The resolution of a monitor is determined by the number of pixels covering the width and height of the complete on-screen image.

In storage, pixels are made up of one or more bits. The greater this bit depth, the more shades or colors can be represented. Grayscale and color displays typically use from 4 to 24 bits per pixel, providing from 16 to 16 million colors.

On screen, pixels are made up of one or more dots of color (subpixels). For grayscale, the pixel is energized with different intensities, creating a range from dark to light. Color systems use a red, green, and blue dot per pixel, each of which is energized to different intensities, creating a range of colors perceived as the mixture of these dots. Black is all three dots dark, white is all dots light.

Pixel Clock
The pixel clock that resides in the LCD is critical to ensure that as each line is scanned, the red, green, and blue components of each pixel precisely align with each other. If there is a slight error in the clock, this error accumulates as the line is scanned from the left to the right edge of the display.

Pixel Pitch
The distance from the edge of one pixel to the similar edge on an adjacent pixel.

Pixel Resolution
The number of addressable pixels in a display. Several standard display sizes are:

VGA: 640 x 480
SVGA: 800 x 600
XGA: 1024 x 768
SXGA: 1280 x 1024
SXGA-Wide: 1600 x 1024
UXGA: 1600 x 1200
HDTV: 1920 x 1080
UXGA-Wide: 1920 x 1200
QXGA: 2056 x 1536

Refresh Rate
How many times per second the screen is refreshed (redrawn).

Response Time
The speed at which the orientation of a liquid crystal material can change in response to a charging/discharging cycle. Typically noted as "rise plus fall," for twisted-nematic structures, this time ranges from 20 to 50 ms.

SVGA
Super video graphics array is a set of graphics standards designed to offer greater resolution than VGA. There are several varieties of SVGA, each providing a different resolution. All SVGA standards support a palette of 16 million colors, but the number of colors that can be displayed simultaneously is limited by the amount of video memory available. The SVGA standards are developed by a consortium of monitor and graphics manufacturers called VESA.

SXGA
(Super Extended Graphics Adapter) A graphics standard offering a display resolution of 1280x1024 pixels. SXGA-Wide has a display resolution of 1600x1024.

TFT
(Thin Film Transistor) An a-Si, p-Si, or CdSe used as a switch to a charge storage device beneath each subpixel of an AMLCD.. A type of LCD flat-panel display screen, in which each pixel is controlled by from one to four transistors. The TFT technology provides the best resolution of all the flat-panel techniques, but it is also the most expensive. TFT screens are sometimes called active-matrix LCDs.

TMDS
(Transition Minimized Differential Signaling). TMDS is similar to LVDS in concept but very different in execution. TMDS is a proprietary specification defined by Silicon Image, Inc. TMDS is the generic form of Silicon Image's PanelLink interface technology. VESA is currently exploring the definition of TMDS as an open standard, but today it remains proprietary to Silicon Image.

TTL
(Transistor-Transistor Logic). A common type of digital circuit in which the output is derived from two transistors. The term is commonly used to describe any system based on digital circuitry, as in TTL monitor.

UXGA
(Ultra Extended Graphics Adapter). A graphics standard offering a display resolution of 1600x1200 pixels.

VGA
(Video Graphics Array). VGA has become one of the de facto standards for PCs. In text mode, VGA systems provide a resolution of 720 by 400 pixels. In graphics mode, the resolution is either 640 by 480 (with 16 colors) or 320 by 200 (with 256 colors). VGA remains the lowest common denominator among PC displays.

Viewing Angle
The bounding angles generated from a point normal to the display surface within which can be found acceptable contrast ratios and linear grayscales.

XGA
(Extended Graphics Array). A high-resolution graphics standard introduced by IBM in 1990. XGA was designed to replace the older 8514/A video standard. It provides the same resolutions (640 by 480 or 1024 by 768 pixels), but supports more simultaneous colors (65,000 compared to 8514/A's 256 colors). In addition, XGA allows monitors to be non-interlaced.