

STAR Watch

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LCDs vs. CRTs

With its lighter weight, smaller footprint and flicker-free image display, Liquid Crystal Display (LCD) monitors are the latest in a long list of “must have” computer peripherals. Or are they? Liquid crystal displays are the standard for laptop computers because they are flat, lightweight and use very little power. When it comes to laptops, there is no alternative to LCDs.



On the other hand, size, weight and power consumption have almost no importance when it comes to desktop computer displays. Users of desktop computers have no need to worry about these issues. Users of desktop computers need only be concerned with capability and cost.

Any computer techie worth his or her salt can spout a long list of advantages of LCD monitors over traditional CRT monitors and most, if not all of it is true. LCD monitors are superior to CRTs in many ways:

- LCDs have less problems with glare. Because of their perfectly flat surface, they can be adjusted to eliminate reflected light.
- Image geometry of a displayed image is always perfect because each pixel is displayed by a specific set of liquid crystals.
- Images displayed on an LCD screen are crisper than on a CRT.
- LCDs do not flicker. Unlike CRTs that use a moving beam of electrons to refresh the displayed image 60 – 85 times



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per second, the light source for an LCD is always on. Eyestrain and fatigue can be significantly reduced.

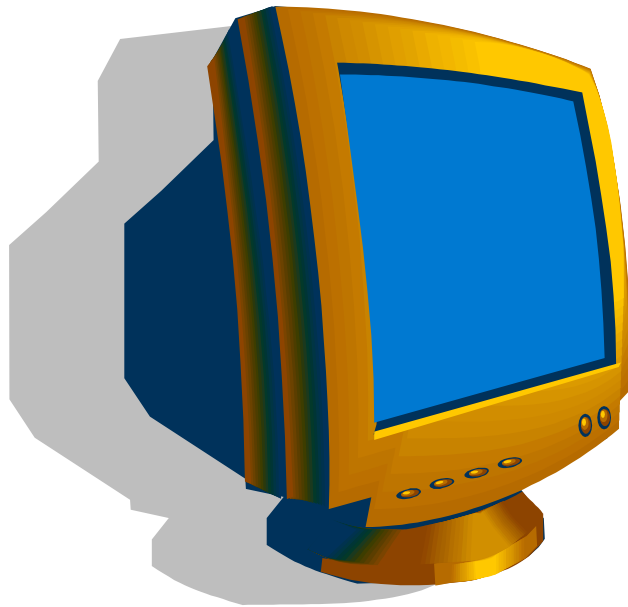
- LCDs look really cool.

Reality Check

- LCDs consume less energy than a CRT. Typically, an LCD will use less than half the power of an equally sized CRT.

That is not the whole story. There are other issues to be considered:

- LCDs are smaller and lighter than CRTs of the same display size. If desktop space is at a premium, an LCD might be the only option.



- An LCD cannot display as many color variations as a CRT.

- An LCD cannot react as quickly to changes in the displayed image as a CRT.

- An LCD has a limited viewing angle. A CRT does not. Viewing a displayed image on an LCD at even a slight angle results in changes to colors and

- LCDs are less prone to interference from other devices. CRTs use powerful electromagnetic fields to sweep the beam of electrons across the display. When two CRTs are placed next to each other, the magnetic field in one CRT can distort the image on the second CRT.

brightness.

- LCDs cannot match the brightness and color saturation of CRTs
- The contrast ratio (brightest vs. darkest of displayed pixels) on an LCD is much lower than CRTs.
- Changing the resolution of an LCD affects the quality of the displayed image. Unlike CRTs, LCDs have a single “native

- For those people who have concerns about low-frequency electromagnetic emissions, LCDs emit much lower levels than CRTs.

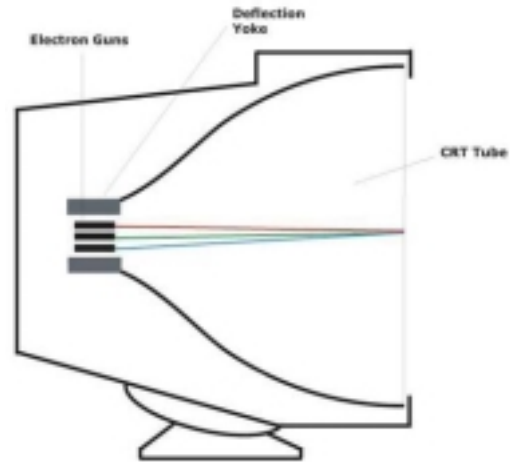


mode resolution". When the resolution is changed, images must be scaled before they are displayed on the screen. The best quality images are displayed at the native mode resolution of the LCD.

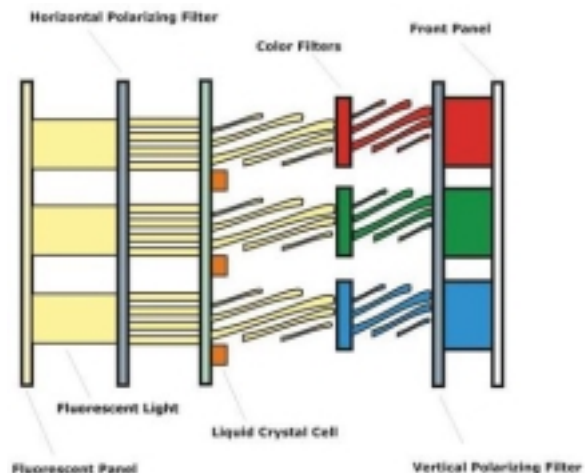
- LCDs cost more than CRTs; a lot more. The cost of an LCD is almost double the price of a premium CRT of equivalent size.

What's the Difference Between an LCD and a CRT?

There are three main components in a CRT: the electron gun, the deflection yoke, and the shadow mask or aperture grill. At the back of the tube sits the electron gun that consists of three different streams, one for each of the primary colors: red, green and blue. The streams are focused and directed by the deflection yoke that uses electromagnetic fields to bend the streams. Then after the electron streams have been focused and aimed, they will pass through a metal plate. This is either called a shadow mask, which is filled with little holes, or an aperture grill, which are parallel vertical slots. Passing through this plate ensures a tight focus. After this pass, the electrons will hit phosphors on the inside of the screen, resulting in a color. The electron gun makes sweeps across the entire screen, to form the final picture.



Liquid crystal displays work very differently. In the back of the screen is a fluorescent light that radiates through a polarizing filter only allowing horizontal frequencies to pass through. Next, they pass through a layer of liquid crystal cells. When an electrical charge is applied to the liquid crystals, they rotate anywhere from 0 to 90 degrees. As the rotation increases, the amount of light passing through the crystal layer increases. Once past the liquid crystal cells, the light passes through color filters, one for each of the primary colors. The final result is an image created by millions of liquid crystal cells.





What to look for in an LCD

Choosing which liquid-crystal display monitor to buy is quite different from evaluating a typical CRT. While most people have some idea about what to look for in a CRT monitor, the issues are very different with an LCD.

- Contrast ratio and Luminance**
 The contrast ratio is the ratio of the maximum vs. minimum brightness. The absolute minimum is 200:1. Top of the line LCDs have a contrast ratio of 500:1. Luminance is how bright the fluorescent tubes are. The minimum acceptable brightness should be 200 cd/m (candela per square meter). Most quality LCDs have a brightness of at least 250 cd/m.
- Response time** This is a measurement of how quickly a pixel can change color when displaying an image. An LCD monitor is far slower than a cathode ray tube, and therefore



are poorly suited toward gaming and video, due to the rapid frame changes in which the twisting action of the crystals cannot keep up. A response time of 25 milliseconds is good for an LCD.

- Digital vs. Analog input**
 Most quality LCDs will accept analog or digital input. Digital interfaces provide the best LCD images, but not all video cards can output digital video.
- Multiple inputs** Some LCDs have multiple input sources with a single front-panel control to switch input sources.
- Adjustable height setting**
 Since viewing angle can greatly influence the quality of the viewed image, an LCD monitor should be at eye level. Better LCDs have built-in height adjustments.
- Native resolution** As discussed earlier, the resolution of the LCD cannot be changed. In order to change the size of objects displayed on the screen, the size of the object is



scaled up or down and then displayed with an unavoidable loss in image quality. This loss in quality is most noticeable in line drawings and text. It is least noticeable in photographs and video.

built-in speakers, USB hubs, etc.

- **Antitheft lock** An LCD is still relatively expensive and fairly small, which makes them attractive to thieves. Some models include security features that might deter pilfering.
- **Warranty issues** Read over the warranty before you buy anything, especially an LCD. Do not even consider an LCD that has less than a 3-year warranty. Make sure that the warranty includes coverage for the backlight in the display—some do not. And then there is the issue of “dead pixels:” most warranties state that a specific number of pixels on the screen must be malfunctioning before the LCD is considered to be defective.

LCD Price List			
Size	Native Resolution	Price Min.	Price Max.
15"	1024x768	\$300	\$800
16"	1280x1024	\$500	\$750
17"	1280x1024	\$550	\$1250
18"	1280x1024	\$700	\$1600
19"	1280x1024	\$800	\$900
20"	1600x1200	\$1300	\$2700
23"	1920x1200		\$2700

What do LCDs cost?

LCDs cost more than a quality CRT of the same size. The following is a list of price ranges for LCDs of various sizes. The LCDs at the higher end of the price range usually include other additional features, such as

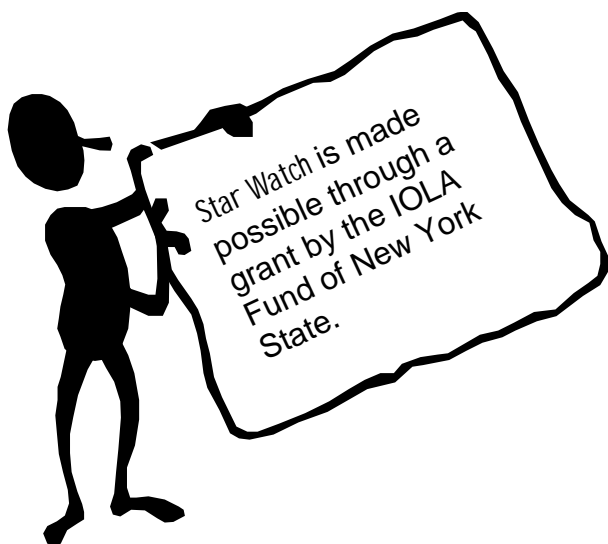
There is no substitute for seeing the LCD configured in the way you want to use it and running your chosen software. Get the seller to show you how to use the controls for brightness and contrast, and think about how effectively the monitor will fit into your workspace. You will be paying premium prices for an LCD monitor. Make sure that you get your money’s worth.



WNYLC Web Statistics For November 2002

Total Hits 887,425
 Total User Sessions 19,356
 Average Hits/Day
 (Monday—Friday) 31,784
 Average User Sessions/Weekday . . . 789
 Number of Pages Viewed 691,236
 Average Number Of Pages
 Viewed Per Day 23,041
 Average Visit Length 25:01 minutes
 Number of Documents Viewed . . 72,181

Accessed Using Internet Explorer . . . 96%
 Accessed Using Netscape 3%
 Operating Systems Used:
 Windows 98 11%
 Windows 2000 81%
 Windows XP 3%
 Windows 95 2%
 Windows ME <1%
 Windows NT <1%
 Macintosh 0.3%



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