

Introduction to Widescreen

What is Widescreen?

If you've ever been to the cinema - and let's face it, who hasn't? - you've sat in front of a widescreen. A widescreen display/monitor/projector is one whose aspect ratio is 1.60 (16:10), or greater. This is in contrast to a "traditional" (or fullscreen) aspect ratio of 1.33 (4:3).

Widescreen Aspect Ratios

For a more detailed explanation, please see the article on [Aspect Ratio](#)

Common aspect ratios for widescreen displays are 16:9 and 16:10. Aspect ratio is also commonly expressed in a "decimal figure to one" ratio, such as 1.78:1 (16:9) or 1.6:1 (16:10) The 16:9 aspect ratio is standard for widescreen televisions, while 16:10 is common for computer displays. The 15:9 aspect ratio can also be found in both televisions and computer monitors.

Support for 15:9, 16:9 and 16:10 is required for a game to be WSGF Certified.

Additionally, common cinematic (theatrical movie) aspect ratios are 1.85:1 and 2.35:1. Even on a widescreen display, these will create a "letterbox" effect.

To make it easier to see exactly what aspect ratio does to an image, here's a simple comparison. All of these are the same height - 60 pixels, with the width dictated by the aspect ratio.

Hopefully from this, it's evident that 5:4 is actually a disadvantage when playing games, since it narrows the view, while the later images show how widescreen provides a more natural viewing area.

Common Widescreen Resolutions

While widescreen displays vary greatly in physical size, a few common resolutions are most often found. These are: 1280x720, 1280x768, 1280x800, 1440x900, 1680x1050, 1920x1080, 1920x1200, and 2560x1600..

Notes:

- While the 1280x720 is a 16:9 pixel ratio, and 1280x768 is a 15:9 pixel ratio, they can both still be found on displays with a 16:10 physical aspect ratio. The resolutions are seen in 15" desktop displays, and notebook displays ranging from 12.1" to 15.4"
- 1280x720 and 1920x1080 are common resolutions found in HDTVs
- 1680x1050 is a common resolution for 22" widescreens
- 2560x1600 is found in 30" computer displays. This should not be confused with 30" HDTVs, which are often 1280x720 or 1280x768.

Field of Vision

The FOV (horizontal FOV, for our discussion) determines how much we can actually see at the sides (e.g., the horizontal plane; "left to right"). With a low FOV, it's like looking through a tunnel - only a small area directly in front of you can be seen. With a high FOV, greater amounts of the surroundings can be seen, making for a more like a normal viewing experience. An unnaturally wide FOV provides distortion, and will end up with a "fish eye" effect.

Movement from a 4:3 display, to a widescreen display, should produce an appropriate increase in horizontal FOV. If the horizontal FOV is not increased, the image change will either be Vert- (a decrease in Vertical FOV) or Stretched.

Different games use a variety of different FOVs. Widescreen displays do not dictate a specific FOV. The issue is that widescreen should provide a proportional increase in FOV, versus "fullscreen."

Why Should I Go Widescreen?

The positioning of the human eye (on the face) means that we naturally have a greater horizontal FOV, than vertical. Human field of vision can range from between 170° and 190°, with an overlap from each eye of around 140°. Widescreen takes advantage of this wide horizontal FOV by "filling in the sides," so to speak. This provides a more natural viewing experience - particularly for games and films.

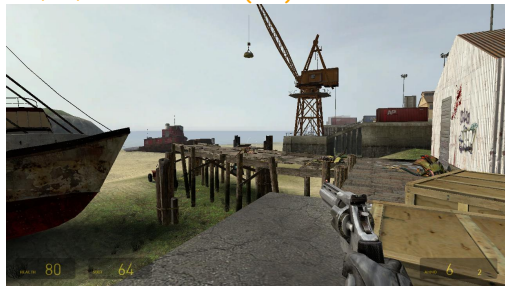
But, what about "productivity?" Have you ever wanted to have two windows at the same time, and still be able to see what was in them without having to flip back and forth? Or maybe have a word processor and a spreadsheet visible at the same time? How about two Firefox windows? These scenarios are a lot easier with widescreen. Additionally, applications with "palettes" or "side panels," such as Dreamweaver or Photoshop, specifically lend themselves to widescreen displays. Users can now keep all of these palettes and panels open, while still leaving enough screen space for a "work area." Applications for audio and video production/editing can also be greatly enhanced by utilizing the "real estate" in a widescreen monitor.

Screenchange

- **Hor+ (Horizontal Plus):** A hor + game is a game that when played on a widescreen monitor with a widescreen resolution, expands the horizontal component of the FOV while keeping the vertical component roughly or exactly the same. This is often considered the ideal solution for widescreen games, as it grants widescreen users a wider picture.



Half Life 2 - 1024x768 (4:3)



Half Life 2 - 1280x720 (16:9)

* **Vert- (Vertical Minus):** A vert - game is a game that when played on a widescreen monitor with a widescreen resolution, decreases the vertical component of the FOV. The aspect ratio is generally correct, there is little or no stretching or distortion. This is often unappealing to widescreen users, as it reduces the are of the picture available to them.



City of Heroes - 1600x1200

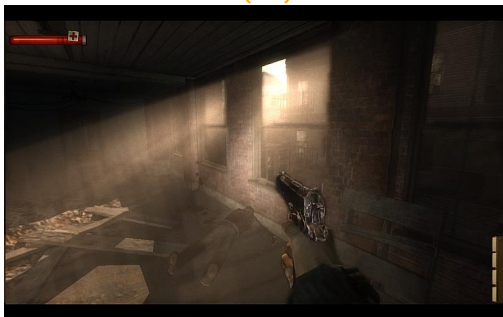


City of Heroes - 1920x1080

- **Anamorphic:** Is a specific behavior of letterboxed pictures. If a picture with a wide aspect ratio is letterboxed on a 4:3 monitor, and when the same image is shown on a widescreen monitor, the aspect ratio is unaltered, but the black bars are either reduced or removed, it is said to be anamorphic. This behavior is very common for widescreen DVD movies, fairly common for cut-scenes in PC games, but very uncommon in proper gameplay of PC games.



Condemned - 1024x768 (4:3)



Condemned - 1280x800 (16:10)

- **Pixel-Based:** Pixel based refers to a behavior that usually only appears in a number of 2D games. The horizontal component of the FOV is directly tied to the number of horizontal pixels, and the vertical component of the FOV is directly tied to the number of vertical pixels. The larger your resolution, the more the game will display. For example, 1280x800 will show more, both horizontally and vertically, than 1024x768. But 1280x1024 will show more vertically than 1280x800 while showing the same horizontally. And 1440x900 will show more horizontally than 1280x1024, but less vertically. Windows behaves this way.



C&C: RA2 - 1280x1024



C&C: RA2 - 1920x1080

- **Stretch:** Stretch refers to a type of screen change where the 4:3 image is stretched across the widescreen display. In these games, the image is stretched (and distorted), even though a widescreen resolution is in use. This is due to a fixed FOV being forced. This causes images to stretch and objects to appear "fat." This is the poorest type of widescreen implementation.



Warcraft III - 1024x768



Warcraft III - 1280x768

Widescreen Method

- **Native:** A game with native support offers access to widescreen resolutions through in-game menus.
- **.ini:** With .ini support, a configuration file must be editing. Values may changed and/or lines added. Changes include adding widescreen resolutions, or setting a proper widescreen FOV. The name comes from the fact that configuration files often have ".ini" as their file extension. ".Cfg" is also a common file extension.
- **Cmd Line:** This type of widescreen method enables widescreen by launching the game's executable with specific parameters, usually specifying the resolution. Creating a shortcut and adding parameters is often the easiest way to do this.
- **Console:** A game whose widescreen method is "Console" is a game where enabling widescreen requires typing a command in the ingame console. The command is usually one that increases the FOV. Most games with this solution "forget" the FOV setting as soon as you quit the game, and require the command to be typed in every time you restart the game. Many of them "forget" it at the beginning of each level, or even during cut-scenes.
- **Registry:** A game with Registry support requires editing the Windows registry. Caution and familiarity with the Windows registry is advised for these solutions, because changing the wrong thing in your registry can prevent your software from working, and as a worst case scenario, can render your system unstable and

require a reinstall of Windows. The common directory structure to find any potential registry keys is ""HKEY_LOCAL_MACHINE\SOFTWARE\

- **Hack:** This type of game requires a small 3rd Party program to change a specific part of the game code, or memory address. Hacks are often created so that users to not have to manually edit HEX code to add widescreen resolutions (often replacing a "low-end" resolution such as 640x480 or 800x600). Examples include tools such as those released by Toca Edit (Racer_S) ,the UniWS from the WSGF or the Multi-Game Widescreen Fixer released by Dopefish.

Other Terms

- **HUD:** Refers to a game's "Heads of Display." These are the "overlay" items such as health bars, icons, or maps. Discussion about a game's HUD is generally concerned with whether the HUD "stretches" when moving from 4:3 to widescreen. A clear example of this is where a round "radar" map, or round icons, stretch into ovals.

Additional Display Options

Image Scaling

These terms deal with how an image is display on the actual computer display. Scaling can be handled by either the video card, or the display itself (when dealing with external monitors)

- **Scaling:** This stretches any given image across the full screen, regardless of aspect ratio. This will cause 4:3 images to stretch and appear distorted.
- **Aspect Scaling:** This type of stretching is often used when playing a non-widescreen game on a widescreen monitor. This stretches the game image to fill the vertical resolution of the display, while maintaining the 4:3 aspect ratio. This will produce a "pillarbox" effect (e.g., black bars down the left and right side).

- **1:1:** This option offers no real scaling. It simply uses the smaller number of pixels, and centers them on the display. Thus, a 1680x1050 image scaled 1:1 on a 1920x1200 panel would produce "black bars" on all four sides of the image.

Multiple Monitors (Surround Gaming)

Matrox offers an ever greater "widescreen" experience through their Surround Gaming technology. Surround Gaming is enabled through their TripleHead2Go device. This device allows three monitors of the same size (and aspect ratio) to be connected to one video card. This allows Windows to see the three individual monitors as one large display. The maximum horizontal resolution allowed in DirectX 9 is 4k (4,096) pixels. This means the largest resolution possible for 3x displays is 3840x1024 (3x1280x1024). The next highest resolution (1440x1050) would push the horizontal pixels to 4,320 (and exceed what DX9 allows).

Matrox has recently released the TripleHead2Go - Digital Edition, which provides for DVI connections to the individual monitors (rather than the analog VGA connections in the original). Due to the ultra high resolution (and needed bandwidth) and graphics card with a Dual-Link DVI connector is required.



Guild Wars - In Surround.

Choosing a Widescreen Display

Which Display is Right For Me?

Well, we're afraid that on that front, we can't help too much. Since a person spends most of their computing time staring at a screen, a monitor - much as with a mouse or a keyboard - is a very individual thing. The best we can do is explain which monitors we like and why. Everyone will prefer one company over another, so brand name can play a role, as much as - or more than - specifications or style.

For a general rule of thumb, find the screen that offers the best mix of response time and colors for you. Many panel technologies trade features such as 8-bit color for pixel response time. The res and size of a screen is up to the individual, although in our opinion (and in the words of that terrible Renault advert), "Size matters!" The larger the diagonal and the higher the resolution, the better. Within reason, of course - pixel 'pitch' plays an important role in image quality. 1680x1050 or 1920x1200 is the ideal resolution for many.

Reviews of Widescreen Monitors

Reviews?

Don't trust them. Though they can give you an indication of the product, the review is usually subjective and you could feel the diametric opposite. Some companies live on others paying for rankings and so on, so their review can be colored by money.

Personal reviews? Good for an indication, but usually its a subjective opinion that can be colored from everything between service and loyalty to certain brands or just have bad luck receiving a bad piece. In the end; hard facts are the closest one can come to objectivity.

Color Depth

Finally, color depth of most LCD monitors these days are either 6-bit or 8-bit. The more colors a LCD monitor has to display, the slower the pixel response rate is bound to be. Colors are comprised of three layers of dots that make up the final pixel. For each color to display, a current is applied to each color layer to give the desired intensity which generates the color that is needed. What does all this mean? While most of all this take place in milliseconds, it all builds up and the more colors being used, the longer it can take to display the proper image on your monitor. Most LCD monitor manufacturers sacrifice color for speed, so most cheap LCD monitors tend to be 24-bit instead of True Color of 32-bit.

So what is this 6-bit vs. 8-bit nonsense then? Well LCD monitors work with a number of levels that each color can render. Only mathematics can explain how it works, and the equation goes as thus for 8-bit:

$$2^8 \times 2^8 \times 2^8 = 256 \times 256 \times 256 = 16,777,216 \text{ (Also represented as } 2^{24}\text{)}$$

That is a True Color display of 24-bits. Most LCD monitors that sacrifice color for speed get this for 6-bit:

$$2^6 \times 2^6 \times 2^6 = 64 \times 64 \times 64 = 262,144 \text{ (Also represented as } 2^{16}\text{)}$$

Which is a 16-bits color depth. For most professionals that work with images and art a lot, this is unacceptable, but for gaming and movies, manufacturers considered it acceptable. However, the whole thing is entirely subjective, and it all depends on how sensitive you are to colors, but the average consumer is not likely to notice much of a difference, if any at all between 6-bit and 8-bit.

So how do you tell whether a monitor is 6-bit or 8-bit? Unfortunately most manufacturers do not list the color depth for their display unit, and some that do do not list the actual color depth. Usually if they list 16.7 million colors, then that mean it's 8-bit. Anything lower than that is likely 6-bit. If they do not list anything, a pixel response of 12ms or lower will likely be 6-bit, and those with higher pixel response times will likely be 8-bit.

DVI vs. VGA

DVI, which stands for Digital Visual Interface, allows a digital-to-digital connection between the monitor and the graphics card. In fact, the DVI cable is the only cable that can create a digital-to-digital connection (although it can support analog as well). A digital connection is required for image scaling on the panel. DVI is the obviously the superior technology. The one caveat was the original TripleHead2Go by Matrox, which only supported VGA connections. Matrox has recently released the TripleHead2Go - Digital Edition, which provides for DVI connections.

VGA, or Video Graphics Array, has been the standard monitor connection for many years. It's analog, which wasn't a problem with CRT's since they are analog displays. With digital TFT's, though, an analog signal means that detail is lost: the conversion from digital to analog and back to digital again lowers the quality.

For those interested in a history lesson, the earlier graphics standards (CGA, EGA etc...) were digital, and VGA was analog. So it was a case of 'one step forward...'

The Cold, Hard Facts (Specs and Techs)

This is meant to be general info about TFT and not about specific monitors or brands - as objective a view as possible. Among other things, I will include a section about the different panel technologies and their pros and cons.

A quick recap of terminology for techs and specs. Explanations and what they mean put to practical use:

Brightness

Brightness is measured in candelas per meter squared (cd/m²). High brightness capabilities can be good for viewing video, playing games and general use. However, too high brightness can also increase stress level, give poor focus and lose some image contrast. Brightness is especially useful when adjusting the screen to the environment. Very bright environments tend to dim out the screen. Adjusting brightness is usually best to do by hardware (OSD) then through software to reduce washing out the colors. The importance of brightness is mainly determined by your environment. Brightness should be adjusted in conjunction with contrast.

Contrast ratio

Contrast ratio is the difference between the brightest white and the darkest black. 500:1 means it's 500 times darker than white. Higher number usually means better image and easier to read text. However, you must take into consideration that the contrast sensitivity of your eyes are about 300:1. Still, the environment plays a big part here and higher ratio gives more opportunity to adjust accordingly. Contrast should be adjusted in conjunction with brightness.

Diagonal size

Measured in inches diagonally. Bigger is NOT necessarily better! It all depends on what you will use it for and the distance you will have between you and the TFT. When far away, big is best. Closer up you will want high resolution and small pixel pitch.

Pivot

The ability to rotate the monitor from landscape to portrait view. Very useful for reading/editing a lot of text.

Pixel Pitch

The pixel pitch is measured in mm and the size depends on the resolution used. Lower number means sharper image. Since TFT has a fixed number of pixels, all TFT's at the same size and resolution have the same pixel pitch. So, why do they write the size on the specs?

As an example: Brand A is a 23" TFT with a native resolution of 1920*1200. Brand B is a 23" TFT with a native resolution of 1920*1200. Both have a pixel pitch of 0.258 mm. Brand C, however is a 24" TFT with a native resolution of 1920*1200 and its pixel pitch is 0.270 mm. For you this will mean that the 24" will give you a larger screen at the cost of picture sharpness. On bigger screens, the pixel pitch would play a much larger role.

Refresh rate

Unlike CRT which need a constant redrawing of the picture, the TFT's refresh rate isn't so much of importance. This is because the pixels stands still until they are asked to be moved. On TFT you need to look for lower response time instead of higher refresh rates.

Resolution

Resolution is described by the columns and rows of pixels that can be displayed. (1920 columns * 1200 rows of pixels). TFT's are a fixed-matrix display. That means they have an exact number of pixels on a screen, unlike CRT which adjust the size of the pixel according to need. This gives the TFT an advantage over the CRT in providing a crispy clear image at native resolution.

However, at non-native resolutions, the TFT needs to use complex algorithms by doubling and dividing the pixels in different ways in order to display the selected resolution. This might result in different degrades in the picture at none native resolutions. Usually higher resolution is better, provided that your machine is capable of running such resolutions.

Response time

Response time is measured in milliseconds. There are two parameters quantifying the response time: gray to gray and black to white. Unlike CRT, the TFT pixels stays put until they are asked to change. The gray to gray measures how fast one pixel turns from one color shade to another of the same color. The black to white measures how fast one pixel can turn to another color. Lower response time is better. This is very important when using the screen to watch video and play games, and has been one of the factors the hard core gamers consider when going from CRT to TFT. Be very careful when reading manufacturer specs on response time. Many will not indicate whether they are measuring gray to gray, or black to white. Also, there is no consistent way to measure response time, so one manufacturers 8ms will not necessarily be the same as another. Your best bet is to see the panel in question.

Viewing angle

The viewing angle is measured in degrees and shows you how big angle you can watch the screen on without getting a picture distortion. Its important to have a big viewing angle for many purposes. If you pivot the monitor, if several are watching the same monitor and if you need to see the picture from different angles.

