Colour - CRT Monitors

The Colour test screens show Pure Red, Green and Blue screens followed by Black, Grey, White and colour blocks. Colour variations are often caused by magnetic and alignment problems which are more obvious using screens of primary colours. You should look for an even colour over the whole screen.

Colour Impurities

Some colour impurities can be reduced by using a Degauss button, if fitted to your monitor or by turning the monitor off and on again if not.

Colour impurities which are the result of magnetic effects can also be caused by improperly shielded loudspeakers or other magnetic objects being placed near the screen. They can also be induced if the monitor is rotated after it is 'powered up' .

Black, White and Grey Screens

The white screen can be used to assess flicker. Some users are much more sensitive than others to flicker. The peripheral vision is usually more sensitive to flicker, so looking past the monitor is often a better way of detecting flicker than looking directly at the screen.

The white screen is also useful in assessing the brightness uniformity. Is the whole screen the same brightness, or are some patches dimmer or brighter than others?

The black screen is useful to assess the reflections from the monitor. If you are using the program to help assess a monitor installation, look for bright lights or reflections that are visible and try to reduce their brightness if possible.

On the grey screen you may become aware of fine defects that are not visible on the full white screen because the beam will be finer than when running at full power.

Colour Blocks

The colour blocks include patches of bright red, green and blue. These patches represent the pure colours of the phosphors used in the manufacture of your monitor. The colour patch screen is useful if you want to compare the colour characteristics of two different monitors. different CRT makers use different phosphors which can have markedly different colour characteristics.

The names of the colour blocks are also useful to check that the cable is connected properly. Sometimes when a cable with individual BNC connectors is attached, the wrong colours are connected.

The final pattern looks different according to the number of colours that your system can display.

Crosstalk

Crosstalk is a particular problem on passive matrix LCDs. If the display suffers from crosstalk, then especially bright or dark areas on the screen will affect other adjacent areas.

With dual scanned displays, the screen is effectively divided into two halves and the interference is just seen within the upper or lower half.

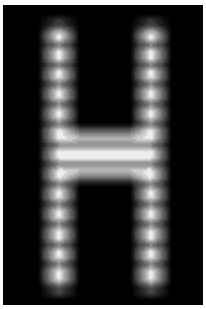
Focus

The Focus Test displays a pattern of 'H's over the screen. The patterns are displayed in black on white and then white on black. This is a difficult test for most monitors when close to their maximum rated resolution.

In particular, watch out for differences between the centre and edge performance, or for patches of the screen which are unclear.

Bandwidth Limiting

You can also use these two screens to get an idea of any potential bandwidth limiting. In particular, when looking at the white on black screen check that the horizontal lines in the middle of the H are not brighter than the verticals. If there is a noticeable difference, then you may have bandwidth limiting in your system.



This is a simulation of poor bandwidth. Note the weak verticals and bright horizontal bar in the character.

Check the cable, the graphics card and the monitor in turn. Remember that the resolution chain is only as strong as the weakest link and that no monitor can compensate for a poor quality signal coming from a graphic card.

If the performance is still unacceptable, you may need to reduce the displayed resolution.

Geometry

There is no single absolutely correct way to set the size and position controls on a monitor, but the geometry test is designed to help you set up the screen the way that you want. For some applications such as word-processing or spreadsheets, you may want the largest possible image. For CAD or design work, an accurate aspect ratio, or precise sizing may be more important.

Distortions

The Geometry test helps you to spot any geometric distortions on the monitor. If the squares are different sizes or shapes in different areas of the screen then the monitor is showing poor linearity.

The eye is also very sensitive to any misshaping of the circle. Depending on the way that you have adjusted any size controls, the circle may become an oval, but if there is a tendency to an egg or pear shape, then once again the linearity may not be good.

The grid provides a useful pattern to help adjust screen size and geometry.

Convergence

This image also gives a good opportunity to evaluate the convergence of the screen. If you look at the grid very carefully you may see some colour fringing. Even the very best quality monitors may have some fringing, but you may be able to adjust any controls on the monitor to minimise the effect.

The second screen shows the grid in magenta (pure red + pure blue), with subsequent screens showing cyan (green + blue) and yellow (red + green). The magenta will tend to highlight any misconvergence as the red and blue guns are usually either side of the green in the CRT gun and you will probably find that adjustment is easiest with this colour.

Power Supply

The power supply tests flash a block on and off. Just as the lights may dim on a car when the engine is being started, if the power supply of the monitor is either of limited capacity, or has poor regulation, then the screen may change shape as the block flashes.

A well regulated, high capacity power supply is usually a good indicator of the quality of engineering in a monitor and can often be a clue to the expected reliability.

Poor power supply regulation can be a particular irritation if you want to use the monitor for multimedia purposes, as live video often changes brightness levels abruptly. On a poorly regulated screen, this can lead to the whole background moving or changing colour.

Smearing

LCDs, especially the passive matrix type, tend to have a slower response time than CRTs. That is to say there is some delay after a pixel is switched on or off before the pixel gets to full brightness or darkness.

This test is designed to show this effect. The time to turn on is shown by the sharpness of the leading edge of the pattern as it moves round the screen. The time to turn off again is shown by the 'tail', The contrast between the dark centre line of the pattern and the 'tail' of the object give a good clue to the response time.

Displays with a slow response time will not be suitable for multimedia applications with full motion video.

Streaking

The streaking tests are designed to detect any problems in the monitor or the cabling that might cause streaking, ghosting or shadows.

Look to the right of the vertical edges in the patterns for any effects, as the beam moves from left to right on the screen.

Before You Start

Pressing the 'Display Set-up' button in the CheckScreen program will activate a screen which will help you to adjust the controls of your monitor.

The best setting for brightness and contrast will give the maximum contrast between the text and background, avoiding too much brightness which would cause a deterioration in focus, an effect known as 'blooming' The precise settings for any monitor will change at different times of the day according to the light falling on the screen.

If monitors have been calibrated for colour performance using a utility such as Colorific, the contrast and brightness should not be adjusted without re-calibration.

Warm-up Period

CRT-based monitors only reach their best performance after a 'warm-up' period. Some of the energy from the beam that produces the image on the screen is converted to heat and the heat causes the CRT to change shape slightly. This is enough to change the screen performance, including focus, colour purity and geometry. After 20/30 minutes the temperature will reach working levels and at that point you will be able to make a proper judgement of the quality of the monitor.

The Brightness control on the monitor sets the minimum, or background level of brightness on the screen. The optimum setting is for the background level to be as dark as possible without the maximum brightness being diminished.

If the brightness is set too high there may be insufficient contrast between the brightest and darkest parts of the screen.

CRT Technology (Cathode Ray Tube) is the most economical and widely used computer display technology.

CRT Monitor Tests

The tests presented in CheckScreen have been developed to help you to characterise a CRT monitor, although they can be used for testing other display technologies. In general, the tests are at their best when used to help understand the differences between monitors in a comparison, rather than judging individual monitors on their own. Remember that no monitor is perfect and that even the very best of monitors will show some imperfection when all the tests have been run.

Before using the tests to evaluate a monitor, please check that it has been properly adjusted for brightness and contrast and that the monitor has warmed up.

Colour - LCDs

Although the CheckScreen colour tests used for LCDs are the same as those used for CRT monitors, the effects to look for are different.

Colour Screens

The individual colour screens should be used to look for pixel defects on active matrix displays. Because of the complexity of the manufacturing process, no active matrix screen is perfect, although makers differ widely in their 'acceptable' defect level. If a transistor for a pixel is faulty, it will show up as a dark or wrongly coloured pixel on the colour screens or as a bright pixel on the grey or black screens.

Even Illumination

The white screen should be used to check for even illumination of the screen, with no 'hot-spots' from the backlight. There should be no visible flicker on an LCD screen.

The black screen should be used to check for reflections. LCDs can differ in the quality of their anti-reflective treatment.

Colour Performance

The colour patches can be used to assess the performance of the LCD and are particularly useful when comparing screens from different makers. Colour performance can be influenced by the Liquid Crystal material, the type of backlight used and the colour filters that are over each pixel, as well as the drivng cicuitry.

Viewing Angles

The colour screens and patches can also be used to assess the effect of different viewing angles on the screen. LCDs vary widely in their ability to display consistent colours when viewed from different angles.

Contents

Degauss buttons are usually fitted to monitors of 17" and above.

The shadow mask in the CRT is made of iron-based material that can become magnetised. The magnetism can make the beam land at the wrong angle causing the wrong colour phosphor to glow - making a discoloured patch.

The degauss button removes magnetism from the shadow mask.

LCD Tests

Although a number of the patterns used in the CheckScreen LCD tests are similar to those found in the CRT monitor tests, the effects to look out for are usually different.

The effects can also be different for LCDs that are built-in to the computer and use digital interfaces than for those that are designed for Plug & Play operation when connected to standard graphics controllers, when the additional circuitry may have an effect on the image quality.

CheckScreen Master test

The CheckScreen Master test card is designed to test a number of aspects of the display's performance.

The grid and circles are intended to give you an idea about the screen's geometry

The squares in the centre and the corners of the screen show vertical and horizontal lines in full and half resolution to give you an idea of the screen's resolution and sharpness.

The text lines help you to adjust brightness and contrast and judge sharpness.

The colour blocks will help you to judge the colour performance of the display.

Monitors Matter Campaign

The Monitors Matter project and the CheckScreen program are supported by the Computing Suppliers' Federation.

Monitors Matter is a user education initiative sponsored by the members to advise and educate computer users about the importance of correct display selection when purchasing or upgrading a computer system. Users or prospective users of computer graphics products may seek help and advice from the Federation through its Information Line.

A booklet explaining some of the technology issues involved in monitor evaluation and purchase is available from the Information Line.

To contact the Information Line, call (01905) 613236 or fax (01905) 29138 or email on 100013.427@ Compuserve.com.

The CSF has a web site with more information at http//www.csf.org.uk

Pixel Check

The Pixel Check screen is displayed so that you can concentrate on a small area at a time when looking for dead pixels that are likely to appear in LCDs.

Perfect TFT LCDs do not exist and all commercial LCDs will have some pixel defects - pixels that are permanently lit or dark.

The coordinates on the screen allow you to note where there are pixel defects and reproduce the position.

The arrow keys or q (up), a (down), o (left) or p(right) are used to move the block.

Program Operation

The CheckScreen program can be operated from the keyboard or with a mouse.

Mouse Operation

Left click to cycle through the tests

Right click to return to the menu

Keyboard Operation

Press the space bar to cycle through the tests with the keyboard

Press 'Esc' to return to the main menu.

Test Selection

Selecting the left hand button will cycle through the tests in order.

Selecting a test image will go immediately to that test.

Getting Help

Press F1 to get help appropriate to the test being displayed.

or Select help from the menu bar.

Software Licence

The CheckScreen software is freeware and may be freely distributed for non-commercial purposes providing that no changes are made to the program, the installation routines, help files or any associated data.

No warranty, either express or implied is given for any use of this software and by using the software, the user agrees that neither the Computing Suppliers' Federation nor Meko Ltd can be held liable for any claims or damages arising from the installation or use of the software.

(http://www.meko.com)

Sponsors

Computing Suppliers' Federation

The Computing Suppliers Federation is a professional association representing specific sectors of the computing and IT industries in the UK. The Federation has supplier forums in Computer Graphics, Document Mangement, Product Data Management & Engineering Document Mangement and CADCAM. There are more than one hundred and fifty member companies and these include most of the world's leading monitor suppliers. Formed in 1985, the CSF is a not-for-profit body, owned by it's members and constituted as a company limited by guarantee.

Member companies comply with a strict code of conduct which covers their product sales, service and support. Any complaints received by the Federation are investigated thoroughly to maintain the highest trading standards. By this approach, the Federation believes that people can "Buy with Confidence" from a member of the CSF.

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The contrast control sets the ratio between the lightest and darkest part of the screen image. Too little contrast means little difference between grey levels, reducing the impact of images and potentially reducing legibility.The image on a CRT monitor is formed from three separate beams landing on different phosphors which glow with a characteristic colour. A monitor with perfect convergence would have all three beams landing on exactly the same point on the shadow mask, causing adjacent phosphor dots to glow. Most monitors have some misconvergence, where the beams do not perfectly align.