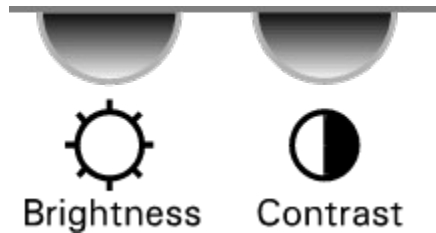


Before You Start

Pressing the 'Display Set-up' button in the 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 of the monitor sets the minimum, or background level of brightness on the screen. The optimum setting is for the background to be set to be as dark as possible without reducing the maximum overall brightness.

If the brightness is too high there may not be enough 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 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.

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.

If you right click on the master test pattern, and click on the box next to a feature, you can turn on or off any of the elements that make it up to develop your own test pattern.

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. The grey screen is also good for looking at moiré patterns.

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 displayed.

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

Colour - LCDs

Although the 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 driving circuitry.

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.

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The contrast control sets the ratio between the lightest and darkest parts of the screen image. Too little contrast means little difference between grey levels, reducing the visual impact of images and potentially reducing legibility.

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 (DSTN) displays, the screen is effectively divided into two halves and the interference is just seen within the upper or lower half.

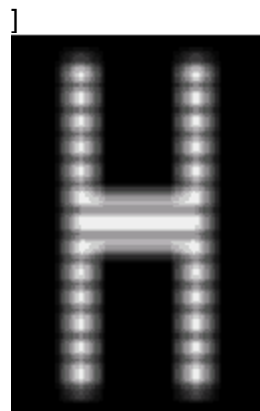
Focus

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 bad 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 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 may be 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). This will tend to highlight any misconvergence and you will probably find that adjustment is easier with this colour on the screen.

LCD Tests

Although a number of the test patterns used in the 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.

Moiré is a kind of 'wavy line' pattern seen on monitors when the resolution of the beam and the resolution of the mask are in a close relationship. The better the focus of the monitor, the more likely it is to have moiré effects

Monitors Matter Campaign

*Monitors
Matter!*

The Monitors Matter project and this Monitor Test 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 +44 (0)1905 727610 or fax +44 (0)1905 727619 or email on info@csf.org.uk.

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

Pixels (short for picture cells) are the smallest single dots from which computer display images are made. The computer can individually set the colour for each pixel.

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

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.

Program Operation

Checksreen Version 1.2

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

Mouse Operation

- ✦ Left click to cycle through the tests
- ✦ Right click to exit back 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.

Command Line Start-up

Command Line Arguments

CheckScreen accepts two types of command line arguments: one to specify a test screen to jump to after the program has loaded and one to load a custom master test screen configuration file. Either or both may be added to a program shortcut or typed on the command line or in the Run menu item's dialogue box.

ChkScrn.exe [s:screen] [i:infile]

Automatic Screen Display

The 's:' argument is used to display a specific test screen automatically. To specify which screen to display, add the name of the test as it appears on the button you would normally use to access it, the program will then 'click' that button for you once it has finished loading. For tests with names consisting of more than one word, use the first word only.

E.g. To simulate clicking the Pixel Check button on the LCD test page, use:

s:pixel

To specify one of the test icons to the right of a button, add the icon's number to the button name. E.g. To specify the Pixel Check screen used to identify faulty pixels against a black background, the second Pixel Check icon, use:ChkScrn.exe s:pixel2

Loading a Custom Master Test Screen

The 'i:' argument is used to load an existing master test screen configuration file or to create a new one. CheckScreen automatically saves the state of the master test

screen on exit. By default, it saves this information in a file called 'ChkScrn.ini' in the directory from which the program was loaded. The next time the program is run, it looks for this file and, if it finds it, uses it to restore the test's state. If it doesn't find the file, it sets all of the screen elements to 'on'.

If an alternate configuration file name is then found on the command line, the program looks for the specified file in its home directory and, if successful, loads configuration information from the file. If the file isn't found, the program makes no configuration changes but uses the file name instead of 'ChkScrn.ini' when it saves the configuration information on exit.

To create a new configuration file, load the program, specifying a new file name on the command line:

```
ChkScrn.exe i:newfile
```

When the program loads, use the 'Configure' menu option, or right click on the master test screen, and chose which elements you want to include in your custom screen. When you exit the program, your custom configuration will be saved in the file 'newfile.ini' in the ChkScrn directory. To display your custom screen when CheckScreen loads, use the command line:

```
ChkScrn.exe i:newfile s:master
```

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.

The speed of the moving block can be altered by pressing the left or right cursor keys and the colours can be cycled using up and down arrows.

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The Computing Suppliers Federation is a trade association representing specialist sectors of the Information and Communications Technologies industry in the UK. The Federation has supplier forums and special interest groups covering a variety of sectors including Monitors, Data Storage, Digital AV, Document Management, Engineering Solutions and Design Technology. Formed in 1985, the Federation is a not-for-profit body, with some 200 member companies, including most of the world's leading monitor suppliers.

Member companies comply with a strict Code of Conduct. 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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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.

Topic 18

Topic 19

Topic 20

Tracking

The pixel tracking screen has been included to allow you to optimise the set up of an analogue LCD monitor.

When an LCD monitor is connected to an analogue (e.g. VGA) connection, it has to map the analogue signal that it receives over the precise number of pixels on the screen. The screen provided is designed to make this a little easier.

For a digital monitor, the tracking should be perfect.

The aspect ratio is the ratio between the width and height of the image. Most computer displays have resolutions in a 4:3 ratio (e.g. 640 x 480, 1024 x 768). In order to make the geometry of the display accurate, the actual screen image may be adjusted to match the ratio of the resolution, using the horizontal and vertical size controls.

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 mis-convergence, where the beams do not perfectly align.

The linearity of a monitor is a measure of the accuracy with which the pixels are displayed on the screen. On a screen with poor linearity, objects of the same size and shape will look a different size or shape depending where they are on the screen.

