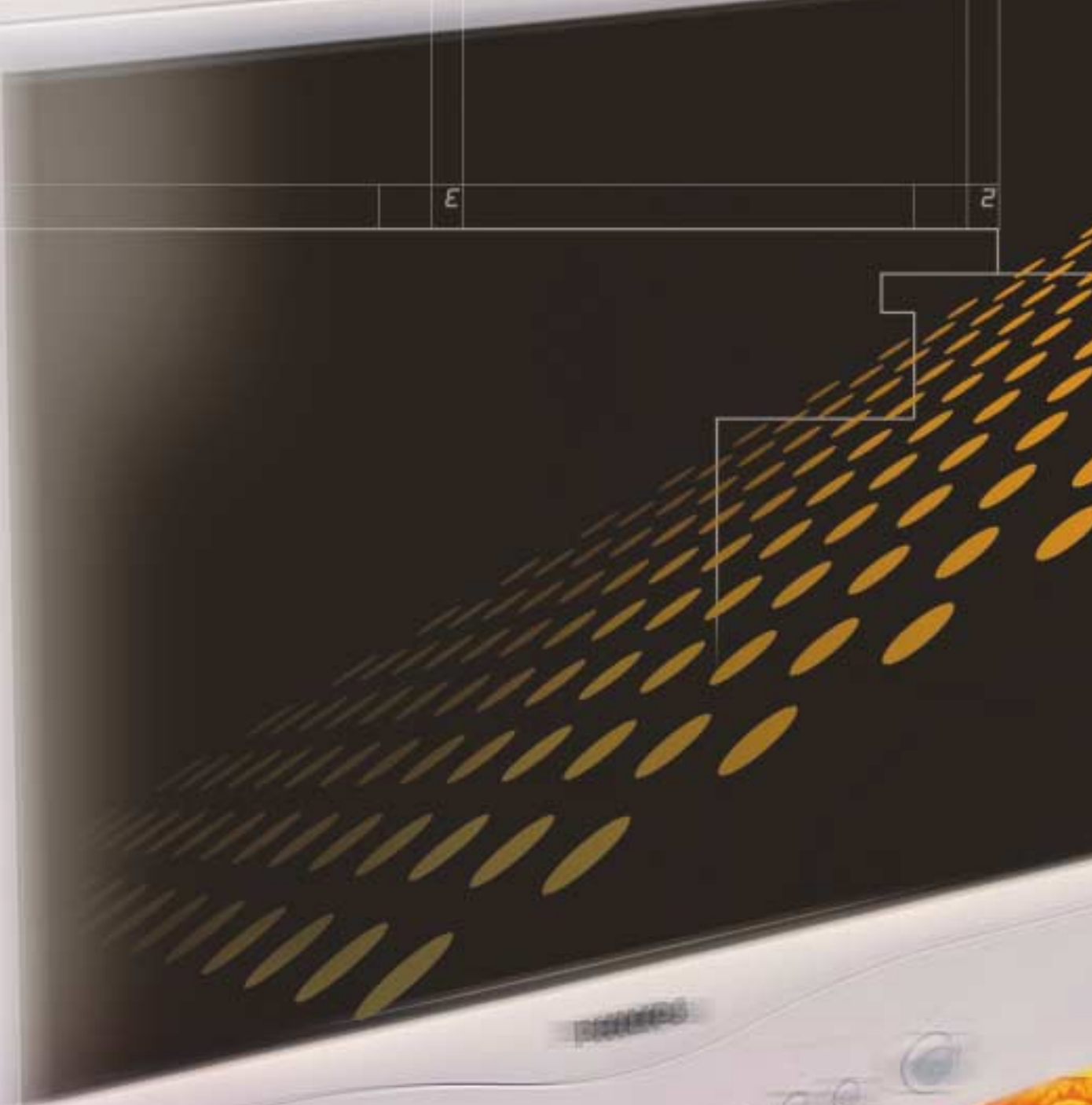


BRILLIANCE



BRILLIANCE

WORDS: BENNY HAR-EVEN PHOTOGRAPHY: HUGH THRELFALL

The big picture

Itching to upgrade to a larger monitor that's as gentle on your eyes as it is on your wallet? Well, before you take the plunge, have a look at 18 of the best 19in CRT monitors on the market

CONTENTS

- 162 ADi Microscan G910
Belinea 10 60 80
- 163 CTX EX950F
CTX VL950T
- 164 Eizo Flexscan T761
Hitachi CM772ET
- 165 IBM P96
Iiyama SM900MT1
- 167 Iiyama Vision Master Pro 453
LG Flatron 915FT Plus
- 170 Mitsubishi Diamond Plus 92
Philips Brilliance 109P
- 173 Philips Brilliance 109S
Samsung Syncmaster 900IFT
- 174 Samsung 900NF
Sony G420
- 177 Taxan 985
Viewsonic P95f
- 178 Table of features
- 179 How we test
- 180 Editor's Choice

While LCD panels are the upcoming display technology, they still can't come close to competing with CRTs where value is concerned. Put simply, a CRT can provide the most desktop real estate for the least cash. Furthermore, as LCDs have fallen slightly, CRT prices have got even more competitive, while the experts strive to extend the life of this 100-year-old technology by continuing to refine picture quality.

This makes it a perfect time to upgrade that 15in or 17in unit that's started to show its age, and while 21in monitors are cheaper than ever, they can't help but eat up a good chunk of your desk space, if not your bank balance.

You could buy an LCD, but the inches you'd gain in desk space you'd lose in Windows desktop, unless you're willing to pay through the nose. This leaves only one serious alternative – the 19in monitor – as the perfect fit. With an optimum resolution of 1,280 x 1,024 and the possibility of going higher if you pick the right one, you'll get the best of everything: more Windows desktop, more wooden desktop and more change in your pocket.

We've lined up a comprehensive range of 18 models and sorted the wheat from the chaff, so you can make that upgrade in confidence.



GROUP TEST 19IN MONITORS

ADi Microscan G910

PRICE £346.63 (£295 ex VAT) **CONTACT** ADi 020 8327 1900

PROS Vivid colours; built-in microphone **CONS** Average sharpness; colour streaking

OVERALL Good strength of curves and built-in microphone, but performance is average

IMAGE QUALITY  **CONTROLS** 

VALUE FOR MONEY  **OVERALL** 

The ADi proudly sports a sticker proclaiming it to have an FD Trinitron CRT, which means it uses a Sony-sourced aperture-grille tube. This model has a slot pitch of 0.24, a common specification in this group test. The sticker also states that the ADi is bundled with Colorific, which is used to match the colours that you see on screen with your printed output.

Though the bezel is large, its curved edges make it easier on the eye and a microphone is built into the top centre. Speakers are optional as is a USB hub, but these were not present on our test unit. The OSD controls were fairly comprehensive, but we found the arrangement of the buttons counter-intuitive, often making us scroll the wrong way.

At the end of our rigorous testing, the ADi found itself mid-pack. As ADi's top-of-the-range 19in monitor, it was a surprise to find that minor, but persistent, imperfections caused it to fail the geometry and distortion

tests. The lines weren't off by much, but after much adjusting we still couldn't get everything as perfect as we'd have liked. However, it bounced back in the sharpness and resolution tests with a majority of passes. We were also concerned about the grey lines in the Video Bandwidth test that should have been black, indicating a lack of transient response. The fine line moiré test also tripped up the ADi, despite the presence of adjustments.

In the colour tests, the G910 got the same scores as the similarly-specified IBM. It passed the vertical convergence test thanks to some tweaking using the OSD controls, but fell foul of noticeable colour-streaking effects. Colour scaling was impressive, with evenly-changing and vivid colours. We didn't see too much of our reflection during the dark screen test, garnering another pass for the ADi.

However, in this group test the ADi finds itself left out in the cold, with the LG offering more for less money.




Belinea 10 60 80

PRICE £389 (£331 ex VAT) **CONTACT** Belinea 01344 788 910

PROS Good geometry; BNC connections **CONS** Not the sharpest nor best looking monitor

OVERALL A decent monitor with good geometry and colour characteristics

IMAGE QUALITY  **CONTROLS** 

VALUE FOR MONEY  **OVERALL** 



The Belinea proved to be something of a surprise in this group test. Its appearance, with a rather boring boxy casing, doesn't do it any favours. The OSD buttons are in a half-moon shape at the bottom of the bezel, and two pieces on either side have been added in an attempt to impart some style. However, as it looks like a plastic moustache, we felt it had failed at this attempt. A dial underneath lets you scroll through the comprehensive OSD, but, as it didn't move far for each turn, it made doing so harder work than it should have been.

The Belinea employs a 0.25 slot pitch aperture-grille tube for its display. It's pretty bare on the features side with no audio or USB present, but it does have BNC connectors on the back. Unfortunately, switching inputs involves moving through the OSD five times, and we couldn't help thinking that one of the moustache pieces would have been better employed as an input switching button.

The Belinea passed the geometry tests with flying colours, with a full two marks each for vertical and horizontal curvature. Its lower slot pitch than many of the other monitors meant that it wasn't as super-sharp as some, failing one of the tests. Despite this lack of sharpness it still suffered from an unwanted moiré effect. A moiré cancellation control was present, but it only served to make things worse and was better left untouched.

The Belinea pulled back by being one of only three monitors in the test to achieve a distinction in the dark screen test, thanks to three types of screen coatings. And it did well in all the colour tests, achieving distinctions in the horizontal convergence and colour purity tests.

All in all, the 10 60 80 put in one of the best scores of the group test. The best bit, though, is the price at less than £350. On this front, LG steals its thunder.

CTX EX950F

PRICE £270.25 (£230 ex VAT) **CONTACT** CTX 01923 810 800

PROS Flat screen; relatively cheap **CONS** Lacklustre image quality

OVERALL A flat aperture-grille tube doesn't help this monitor to make the grade

IMAGE QUALITY ■■■■■ **CONTROLS** ■■■■■
VALUE FOR MONEY ■■■■■ **OVERALL** ■■■■■

CTX has some good 17in monitors, so we were fairly hopeful for this 19in unit. Aesthetically, the EX950F is uninspiring. On CTX monitors we've seen previously, we appreciated the large number of buttons on the fascia for direct access to the OSD. However, this has only four, making scrolling through a slow process.

Unfortunately, we weren't bowled over by its performance and it received one of the lowest ratings under our DisplayMate tests. The main feature CTX promotes on the EX (Executive) series is its flat screen, which these days is hardly headline-grabbing material. The maximum resolution is 1,600 x 1,200 at 77Hz, which is average. Still, for those unlikely to foray above the 18in viewable area's optimum resolution, 1,280 x 1,024 is available at 90Hz.

Although the 0.25mm slot pitch is a respectable specification, the EX950F produced some of the muddiest images in the group test.

Geometry was also difficult to set up correctly, with the tops and bottoms of lines proving troublesome to get straight. The problem in Windows will be compounded by the lacklustre power regulation, with the test's flashing bars producing a lot of movement at the edges.

The EX950F seemed to suffer from poor shielding, producing some troubling defects in the bottom right of the colour purity screens. Colour fading was also not quite right, with the yellow turning into green as it moved along. And looking into the monitor for the dark screen test, we saw ourselves clearly reflected back.

Despite its flaws, the EX950F is easy on the eye and, unless you're doing particularly detailed work, you're unlikely to be bothered by its less desirable points. Furthermore, it is a relatively cheap 19in monitor. However, there are better-performing and even cheaper screens elsewhere in this group test.



CTX VL950T

PRICE £215.03 (£183 ex VAT) **CONTACT** CTX 01923 810 800

PROS Good colour purity **CONS** Unattractive styling; poor geometry; lacking in sharpness

OVERALL Due to the poor image quality the price still doesn't make it an attractive option

IMAGE QUALITY ■■■■■ **CONTROLS** ■■■■■
VALUE FOR MONEY ■■■■■ **OVERALL** ■■■■■



The CTX VL950T is a 19in version of a monitor we often see included with budget systems in PC group tests, and its presence is a clear indication of cost cutting that manufacturers feel they can get away with.

The VL950T seemed to be having its own private competition with the Belinea 10 60 80 for being the least attractive monitor in the group test. We think the CTX wins thanks to a huge bezel, especially at the base, that makes it look like it's got a fat lip. However, this is the only competition the VL950T is likely to win. It's a budget monitor, but has one of the most noticeably bulbous screens on test, as well as generally dull and lifeless image quality.

Overall, geometry was poor, with the VL950T failing all but one of the tests in this area. Power regulation was particularly insipid, with the borders jumping across the flashing screen by several pixels. More unusual were the irregularities in the

monitor's linearity. This test features a grid of many small squares that should be identical across the screen, but we found that some were smaller than others.

The VL950T did manage to pass the moiré test. This result is no surprise, though, as moiré is generally an indication of a monitor's sharpness – something that did not feature heavily in the CTX's abilities, with a failure in all these tests. Vertical and horizontal colour registration was respectable, as was colour purity. However, we found the VL950T to be one of the most susceptible to interference from magnetic fields, such as from unshielded speakers. The CTX also proved to have an ineffective anti-reflective coating, which would prove disturbing in brightly-lit home or office environments.

The VL950T may be one of the cheapest monitors in this group test, but, as it's also one of the worst, we can't recommend it.

GROUP TEST 19IN MONITORS

Eizo Flexscan T761

PRICE £598.08 (£509 ex VAT) **CONTACT** Avnet 01483 719 500

PROS First-rate power regulation with strong colours **CONS** Colour streaking; high price

OVERALL A high-quality monitor, but the price is steep for all but the corporate buyer

IMAGE QUALITY ■■■■■ **CONTROLS** ■■■■■

VALUE FOR MONEY ■■■■■ **OVERALL** ■■■■■

Eizo's main customers are in the corporate and professional world. Indeed, as soon as we picked up the T761 we knew it meant business owing to its weight, which at 28kg is the heaviest on test. A heavier tube is often an indication of quality.

The design is angular and the bezel is large, but the overall effect is smart. The Eizo could be swivelled easily on its base, although it did have a tendency to head southwards as it moved, making it awkward to turn. A USB hub is present with one downstream and three upstream ports integrated into the rear of the monitor. And, if you've got a device you need to detach and re-attach frequently, there's a fourth port conveniently placed underneath the left-hand side of the bezel.

The OSD is unusual, with a single button that you press in four directions to get to the various functions. For hooking up a second system BNC connectors are featured at the rear,

while an input switching button and a settings reset button are located on the front fascia.

When it came to testing we found that, despite a flat screen, we could not get perfectly straight lines in the initial geometry test. But what did impress us was the rock-solid power regulation, with the edges remaining true – on other monitors they moved about considerably. This is testament to the Eizo's quality electronics. Sharpness was also very fine, with the image being clearly focused and sharp right into the corners.

Colour registration was spot on and we were most impressed with the uniform intensity and vividness of the colours. However, streaking did rear its smudgy head, while reflectivity was too pronounced for our liking. Also, the price is too high. The LG, which costs £230 less, performed even better overall and, as such, it's impossible to recommend the Eizo, despite its class.



Hitachi CM772ET

PRICE £358.38 (£305 ex VAT) **CONTACT** Hitachi 01628 643 307

PROS No damping wires **CONS** Poor colour purity and convergence errors

OVERALL Hitachi has produced a monitor with a generally dull and uninspiring image

IMAGE QUALITY ■■■■■ **CONTROLS** ■■■■■

VALUE FOR MONEY ■■■■■ **OVERALL** ■■■■■



Hitachi is best known for monitors that use invar shadow-mask tubes over the more popular aperture-grille technology available from most of its rivals. Hitachi offers two key benefits for invar shadow mask over aperture grille. The first is that the shadow mask does not require the two damping wires that cause visible lines to run across the screen, while the second is a claimed improvement in colour purity.

The first is empirically true but, judging by this unit, the latter is a dubious claim. In fact, this was the only monitor to fail all but one of the colour tests. The CM772 suffered from a light yellow patch in the red colour purity test, which, as there were no colour purity controls, couldn't be removed. Also, convergence errors were present and, with no controls to correct them, they resulted in a failure.

The second claim that Hitachi makes is that the CM772ET has a 0.22mm dot pitch, which would be

the lowest and hence most impressive figure on test. But this figure is reached by measuring the horizontal position between two mask holes, rather than the longer diagonal between two phosphor dots. It does this as Hitachi uses what it calls an Enhanced Dot Pitch (EDP) to increase horizontal resolution without affecting brightness. As EDP increases the amount of space between the pixels vertically, Hitachi would come off worse if it quoted the regular dot pitch, so it chooses to quote the horizontal mask pitch.

Hitachi failed to impress us in the sharpness and resolution test with only average passes. It also suffered from moiré, which could not be entirely removed despite the use of OSD controls.

All this conspires to give the Hitachi the second lowest score on test. It's not an appalling monitor, but it does struggle in the sea of strong competition.



IBM P96

PRICE £521.70 (£444 ex VAT) **CONTACT** IBM 0800 169 1460

PROS Good sharpness reveals fine detail **CONS** Colour streaking and power regulation

OVERALL An excellent example of an FD Trinitron, but flaws fail to make it worth the price

IMAGE QUALITY  **CONTROLS** 

VALUE FOR MONEY  **OVERALL** 

The P96 is an impressive piece of kit, featuring the classic aperture-grille tube, a Sony FD Trinitron, which in terms of image quality is up there with the best. Considering the P96's pedigree we were expecting even more, but it failed to pose a serious challenge for the top spots.

The IBM design makes an impact with an aggressively square frontage, but we were disappointed not to have received the black variant available at the same price. The striping of the front matches IBM's desktop line of PCs, but might look out of place next to a generic beige box.

We were concerned to find that even with brightness and contrast set to zero, the screen didn't go fully black, but any fears about a lack of contrast proved to be unfounded. The super flat Trinitron screen proved its worth in the geometry tests, with some near perfect straight lines. However, the power regulation tests fazed it, indicating some hidden cost

cutting. The P96 scored the full two points on the first demanding sharpness and resolution test, proving that specs such as the quoted 0.24 slot pitch do make a difference. The P96 passed the moiré test, thanks to an effective moiré cancellation control.

Full marks evaded it for the convergence tests with some very minor imperfections, but it let itself down once again when we looked for colour streaking, with some of the most noticeable defects on test.

Full screen colour purity was fine if a little pallid, while colour scaling was steady. The anti-reflective coating also saw a pass in the dark screen test. Despite featuring a captive VGA cable the P96 sports a second VGA input, while a rocker lever on the fascia wins the IBM points for the best input switching method on test.

As impressive as the P96 is, it's a little too far down the quality chart, and inevitably, being IBM, too expensive to vie for an award.

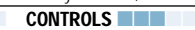


Iiyama SM900MT1

PRICE £213.85 (£182 ex VAT) **CONTACT** Iiyama 01438 314 417

PROS Swivels easily on its base **CONS** Relatively blurry image

OVERALL A cheap, but not particularly cheerful, monitor. Best to save up for a better unit

IMAGE QUALITY  **CONTROLS** 

VALUE FOR MONEY  **OVERALL** 



If Iiyama's VisionMaster Pro 453 is evidence that the company makes fine monitors, the S900MT1 is proof that it can make unexceptional ones too.

This monitor looks drab with the shadow-mask tube set in an undistinguished bezel. This is offset by four OSD buttons in the centre, with the power switch on the right. The OSD is straightforward, if basic, with no convergence or linearity controls, though those were two areas that the Iiyama dealt with successfully.

Geometry was a mixed bag, although curved screens are always at a disadvantage to flat units. We corrected most of the initial flaws, but we weren't prepared for the poor power regulation which caused the edges of the flashing boxes to jump about all over the place. When we maximised and minimised folders in Windows, the edges of the screen could clearly be seen to move about.

The sharpness and resolution tests highlighted the SM900MT1's

inability to deal with detail, resulting in a majority of failures in this area, with the exception of the focus test which proved acceptable. Colour registration was passable and, though we could see some evidence of streaking and ghosting, purity was acceptable. However, shielding was below average and when we placed the unit near a source of interference, such as close to a fluorescent light, the image purity was strongly affected. The dark screen test also generated reflections.

In its favour, the SM900MT1 is very cheap – less than £215 inc VAT. This may seem a remarkable achievement for a 19in monitor, but clearly this has been done with some considerable cost cutting. Another plus point is its ability to easily swivel 90 degrees on its base to the left and right.

The SM900MT1 might appear to be a bargain, but we'd still recommend going for a better quality 17in than investing in a poor larger unit.

Iiyama Vision Master Pro 453

PRICE £440.63 (£375 ex VAT) **CONTACT** Iiyama 01438 314 417

PROS Great image quality; USB **CONS** DVI compatibility issues; overly reflective screen

OVERALL Good all-round image quality combined with a future-proofing DVI connection

IMAGE QUALITY ■■■■■ **CONTROLS** ■■■■■

VALUE FOR MONEY ■■■■■ **OVERALL** ■■■■■

Iiyama has earned itself a strong name for high-quality screens and the Vision Master Pro 453 certainly won't do that reputation any harm. It's the most distinctive looking monitor on test, with a grey rather than beige finish. The bezel isn't as overpoweringly large as some other monitors, while its curved edges are accentuated by a large bulbous base. This contains the OSD controls, a four-port USB hub and a pair of speakers, although at only one watt each these are only suitable for the most basic Windows bells and whistles.

The Vision Master Pro is the first CRT in the UK to feature a Digital Visual Interface (DVI) connection, but we ran into problems when attempting to evaluate this. Two DVI-equipped GeForce3 cards failed to produce a picture in Windows and, while we managed to get a picture with an ATI Radeon VE, the card limited the image to 60Hz, which offset the improved clarity.

Even with the VGA connection the Vision Master Pro 453 produced very fine pictures, gaining the second highest scores in our DisplayMate tests. Geometry was good with passes in each test, but the 453 only achieved a borderline pass in the power regulation test. The Iiyama's ability to resolve detail was even better, with distinctions for three of the tests. However, the moiré test proved to be too much of a challenge.

Colour characteristics were spot on, with excellent convergence and almost no streaking or ghosting. Colours were striking with distinctions for colour purity and colour scaling. However, the screen was too reflective to handle the dark screen test, which means that the 453 will be sensitive to lighting conditions.

This unit might be one of the more expensive 19in monitors, but with decent image quality, the future-proofing DVI connection, speakers and a USB hub, it's money well spent.



LG Flatron 915FT Plus

PRICE £327.83 (£279 ex VAT) **CONTACT** LG 01753 500 400

PROS Excellent sharpness; BNC and USB connectivity **CONS** Less than perfect geometry

OVERALL The LG Flatron boasts great image quality, good connectivity and a low price

IMAGE QUALITY ■■■■■ **CONTROLS** ■■■■■

VALUE FOR MONEY ■■■■■ **OVERALL** ■■■■■

This CRT sports cool futuristic styling with a flat screen and heat-sensitive OSD controls. Placing your finger on the silver slivers causes the OSD to unfold in the centre of the screen. The controls are comprehensive and fortunately include an option to silence the activation beep if you find it irritating.

The LG also uses a slightly thicker mask than regular shadow masks, allowing for slot rather than circular-shaped holes through which the electrons are directed. This enables LG to get more light through to the phosphors, competing with the brightness offered by aperture-grille tubes while doing away with the need for the damping wires, the shadow of which on the screen can often irritate users.

Things got off to a shaky start with geometry that couldn't quite be perfected despite the number of controls available and it just about passed the power regulation tests.

But the LG stormed ahead in the sharpness and resolution tests with several distinctions. Unfortunately, as is inevitable with sharp displays, moiré was present. This is because the electrons produced by the CRT gun don't always hit the phosphors on the screen dead centre.

Colour on the LG was good though not outstanding. The red in the colour purity test was even over the screen but looked a tad washed out compared to the rich colours produced by the likes of the Sony. LG boasts of placing six layers of special coatings on the screen and, in the case of the dark screen test, this seems to have paid off, with this being one of only three monitors in the group test to manage a distinction.

However, what sets the LG up for an award is its price, which at £327.83 inc VAT is an absolute bargain for a good-quality 19in monitor with both a USB hub and BNC connections.

GROUP TEST 19IN MONITORS

Mitsubishi Diamond Plus 92

PRICE £339.58 (£289 ex VAT) **CONTACT** Mitsubishi 01707 278 684

PROS Decent sharpness and convergence **CONS** Poor power regulation and no extras

OVERALL A reasonably performing monitor, but not competitive enough to make an impact

IMAGE QUALITY  **CONTROLS** 

VALUE FOR MONEY  **OVERALL** 

Mitsubishi is one of the largest companies in the world. Its Diamond-Tron tubes are a major aperture grille alternative to Sony's Trinitron displays, with Taxan being a long-standing customer.

Despite the class of the Diamond-Tron NF's (Naturally Flat) tube, the casing has a cheap feel to it. In its favour, the Diamond Plus 92 has a relatively small footprint compared to some 19in monitors on test, and at 445mm deep comes close to rivalling the Philips for the shortest 'neck'. This model has been available for some time, and is showing its age with only an above-average performance in this comparative test.

That said, it only failed four of the DisplayMate tests we ran. Geometry was reasonable, with only its power regulation preventing it from achieving a clean sheet in that section.

The Mitsubishi was impressive enough at producing the fine black and white lines of the first sharpness

and resolution test to earn itself a distinction, and kept it up with distinct gaps in the horizontal wedge test and good focus right to the corners. Horizontal and vertical convergence were acceptable as was colour purity, but there was evidence of streaking and ghosting. The Diamond Plus 92 passed the dark screen test, as well as the defocusing and blooming test.

Despite there being seven buttons on the front of the monitor, the OSD is somewhat fiddly to control. Scrolling is done sideways, and once you reach your selection you press the downwards buttons to access it. But these buttons feel insubstantial and it's not a particularly intuitive process.

The Mitsubishi comes in at just under £340 ex VAT, which isn't bad for a DiamondTron tube. However, with no USB or BNC connectivity, this is strictly a no-frills affair. Considering the better LG model is available for less, the Mitsubishi is left firmly out of the running.




Philips Brilliance 109P

PRICE £475.88 (£405 ex VAT) **CONTACT** Philips 020 8665 6350

PROS Attractive styling and BNC connectors **CONS** Geometry and moiré issues

OVERALL A stylish monitor, but it needed more effort to optimise the picture quality

IMAGE QUALITY  **CONTROLS** 

VALUE FOR MONEY  **OVERALL** 



The 109P stood out from the crowd as soon we took it out of the box, thanks to its distinctive looks. The silver buttons on the front impart a futuristic feel and are curved to offset the flat square screen. Philips claims that the 109P has the shortest depth for a flat-screened monitor at 440mm, a fact that is borne out by this group test.

The monitor sits on an integrated base and swivels around well over 200 degrees to the left and right, and benefits from a fair amount of vertical movement. The aperture-grille tube has a low slot pitch of 0.24mm and employs what Philips calls Image Clear Enhancement. This is designed to compensate for the illusion of line curvature that a flat screen can sometimes produce, and to make automatic adjustments to the monitor's colour purity. In fact, the 109P needed manual adjustment for the latter, but impressively has purity adjustments for each corner of the

screen, and once tweaked performed well in this area. While the 109P managed a pass in the sharpness and resolution tests, we were a little disappointed that it wasn't outstanding.

The maximum resolution is 1,920 x 1,440, which we managed to sustain at a refresh rate of 60Hz. More usefully, we were able to run the optimum resolution of 1,280 x 1,024 at up to 103Hz. Meanwhile, 1,600 x 1,200 could be run at 85Hz, although there was a slight but noticeable trade-off in sharpness to go with the increased desktop area. At the rear, the 109P sports BNC connectors, allowing connection of a second PC, although you'll have to buy the necessary cable.

Controls for switching between the two inputs are present on the front panel. In terms of style, the Philips is the sort of screen that would look good on your desktop, but it doesn't quite deliver if you're after the very best in image quality.

Philips Brilliance 109S

PRICE £240.88 (£205 ex VAT) **CONTACT** Philips 020 8665 6350

PROS Short neck tube; low cost **CONS** Deficient in sharpness and geometry

OVERALL The monitor with the shortest depth, but you'll be squinting to pick out fine detail

IMAGE QUALITY **CONTROLS**

VALUE FOR MONEY **OVERALL**

Although the 109S has the same nominal diagonal as the 109P, we can't describe it as the little brother. In fact, it would be fairer to call it its dumpier and cheaper-looking sibling. Unlike the 109S' more upmarket partner, its box doesn't proclaim that various advanced technologies have been employed in this monitor. The 0.27mm dot pitch is nothing to shout about, while TC099 compliance is almost a given in a new screen.

One three-letter acronym that Philips does proudly announce is XSD, which stands for eXtra Space Design. This refers to the fact that the 109S has, as Philips claims, 'the world's shortest depth', though we can only state for certain that it's the shortest in this group test.

Philips has also managed to cut swathes out of the side of this monitor, with a narrow neck to house the CRT. This is one monitor to go for if you need a large screen but have a small desk. But it's not the

one to choose if you're picky about image quality.

The shadow-mask 109S is one of only three monitors here that doesn't have a flat screen. This exacts an inevitable toll on the geometry tests. The 109S is unable to generate perfectly straight lines, with adjustments in one area causing problems in another. It exhibited fine geometric linearity, however, and decent power regulation. But the 109S embarrassed itself in the horizontal resolution test, producing a grey block where we wanted to see finely delineated black and white lines.

Things were better with the colour tests, with no failures and a distinction at colour purity. However, the final two tests, including the reflective dark screen test, saw more failures. The 109S is one of the cheapest 19in monitors on test, and will save you desk space as well as cash. If that's more important to you than quality, it's the monitor to go for.



Samsung Syncmaster 900IFT

PRICE £410.08 (£349 ex VAT) **CONTACT** Samsung 020 8391 0168

PROS Strong on geometry and sharpness **CONS** Lacks a USB hub as standard

OVERALL A clear example of how good a shadow mask can be

IMAGE QUALITY **CONTROLS**

VALUE FOR MONEY **OVERALL**

Samsung, like Sony and Mitsubishi, is one of the major players in most areas of consumer electronics. It was one of the first to follow Sony's lead in producing a perfectly flat CRT screen. The tube in the 900IFT is based on shadow-mask technology, which Samsung refers to as 'DynaFlat'.

Samsung claims a fabulously low dot pitch of only 0.20mm, but don't believe the hype – like Hitachi's, the measurement between the dots is made horizontally rather than on the diagonal. The 900IFT offers an unimpressive maximum resolution of 1,600 x 1,200 at only 75Hz, so you won't want to be using that resolution for any length of time.

The monitor is large and evidently well built, although in terms of looks it won't set the pulse racing. Its base is relatively tall, allowing it to stand quite high off the desk. The OSD controls are contained within a drop-down panel in the bottom of the bezel. A thoughtful feature is that the

OSD keeps the number of the setting on screen so you can see exactly how the screen was set up, enabling you to make precise adjustments.

Geometry was generally very good, although there was a problem in the bottom left that couldn't quite be corrected, causing it to fail the vertical curvature test. However, the 900IFT achieved a distinction in the power regulation tests, with very little movement on the borders.

There was also a distinction obtained thanks to the detail in the corners being almost as strong as in the centre. This sharpness made the pass in the moiré test all the more impressive. Colour was also strong, with very good colour purity and scaling – often one of the inherent benefits of a shadow-mask tube.

In quality terms, this leaves the Samsung 900IFT on level pegging with the LG, but it loses out in the value stakes to the latter's USB hub and lower price.



GROUP TEST 19IN MONITORS

Samsung 900NF

PRICE £421.83 (£359 ex VAT) **CONTACT** Samsung 020 8391 0168

PROS High base keeps monitor away from desk **CONS** Less convincing image quality

OVERALL Considering the price, we expected a little more from this monitor

IMAGE QUALITY  **CONTROLS** 

VALUE FOR MONEY  **OVERALL** 

The 900NF has many features in common with its sibling, such as its hefty looks and a high base that allows it to stand tall off the desk. This reduces its desktop footprint, despite its large size, giving you more actual desk space.

Like the 900IFT, the 900NF's OSD control panel slides out from underneath. The brightness and contrast controls are also analog which may at first sound less precise, but this makes it easier to make any adjustments during the working day.

The major difference is that the 900NF uses an NF aperture-grille tube with a slot pitch quoted at 0.25mm. It also quotes a much higher maximum resolution of 1,920 x 1,440 at 73Hz. However, our DisplayMate testing revealed that the geometry even at 1,280 x 1,024 was less than perfect, with the 900NF failing to pass all these tests. Power regulation was solid enough, if not quite as steady as its siblings.

When it came to the sharpness and resolution tests the level of detail rendered was impressive, with distinctions in three of the four challenges. However, the cancellation control couldn't clear enough of the distortion patterns caused by moiré.

The detection of streaking and ghosting effects also blotted the copybook in the colour and greyscale tests, which otherwise saw good performances for colour registration, colour purity and scaling. The best result, though, was the distinction in the dark screen test, with almost no reflection in the glass.

At the back of the monitor the VGA cable is not captive, and a set of BNC connections are present allowing connection of a second computer. A self-powered USB hub is an option, but one was not included with our test monitor. Overall, the 900NF doesn't have what it takes to compete with other better-value and higher-quality monitors.




Sony G420

PRICE £492.33 (£419 ex VAT) **CONTACT** Sony 08705 424 424

PROS Sharp images; side-mounted USB hub **CONS** Slight ghosting and streaking

OVERALL Not quite good enough for the money, but it will look great on your desk

IMAGE QUALITY  **CONTROLS** 

VALUE FOR MONEY  **OVERALL** 

As Sony produces many of the tubes used by other manufacturers, we were keen to see how its own branded monitor would fare. As it turned out, it failed to blow us away, with a good, though not outstanding, DisplayMate score and two failed tests.

The Sony started out strong, gaining a distinction in the first geometry test, but it merely passed the remainder. For sharpness and resolution it picked up two distinctions and even managed to pass the moiré test. Contrast levels were just right and text appeared crisp right into the corners.

As expected, the Sony reproduced rich and vivid tones and did well in the colour and greyscale tests. Horizontal registration was perfect, so we were surprised that vertical registration could not be completely aligned even with the convergence controls. However, further tests saw the first failure with noticeable streaking and ghosting effects following the coloured strips. Another failure came

in the dark screen test, with our reflections clearly visible in the glass under the fluorescent lights.

The Sony battles with the Taxan for the title of coolest-looking monitor. The fascia is stylishly plain save for the central Sony logo, with the monitor case and matching base a battleship grey. A great feature is that the USB hub is on the right of the monitor rather than the back, making for much easier access. Less successful is the joystick for controlling the OSD. This is a flashy way of getting round the menus, but is a pain to use.

We were surprised to see a captive cable on the Sony, but it's accompanied by a second video port and there's a button for switching inputs on the bezel. Another switch offers three presets for brightness levels for different tasks.

Despite producing excellent pictures the Sony doesn't do well enough to justify its cost over the likes of the Iiyama.



Taxan 985

PRICE £410.08 (£349 ex VAT) **CONTACT** Taxan 01344 484 646
PROS Great image quality in all areas **CONS** No BNC or USB connections
OVERALL The best image on test. However, the lack of extras spoils things somewhat

IMAGE QUALITY	■■■■■	CONTROLS	■■■■■
VALUE FOR MONEY	■■■■■	OVERALL	■■■■■

The first thing that strikes you about the Taxan is the minimalist styling. The flat screen is offset effectively by the large plain bezel that is bare except for two circular buttons: one for the power and one for the OSD. Pressing the latter activates the OSD and you scroll through the menus by using a dial underneath the bezel.

The 985's Mitsubishi Diamond-Tron NF tube is characterised by its bright picture and the shadows of the two damping wires that run across the screen keeping the aperture grille in place. The Taxan has a slot pitch of 0.25mm and can reach a maximum resolution of 1,600 x 1,200, but only at 76Hz, which isn't really enough to work with unless you're immune to flicker.

The Taxan turned in a fine performance under our DisplayMate tests, producing the highest score of the group test. Geometry was flawless and regulation was fine, with no exaggerated movement of borders.

More distinctions followed, thanks to the sharply resolved fine black and white lines, with resolution and focus proving to be as good in the corners as it was in the centre. But what really amazed us was how well it dealt with the fine-line moiré test, with the OSD adjustments doing a good job.

Convergence was marginally better horizontally than vertically, but it wasn't until we spotted streaking effects that we had to fail the Taxan in that test. All the others were duly dispatched, with colour purity being particularly impressive.

With such a great performance, it's disappointing that there were no BNC connections to make the very best of the monitor. Also, there's no USB hub included. With its no-frills approach the Taxan is clearly all about the image quality, as other manufacturers offer more features for the price. However, if you're willing to sacrifice the extras, it's worth going for.



Viewsonic P95f

PRICE £433.58 (£369 ex VAT) **CONTACT** Viewsonic 01293 643 900
PROS A good all-rounder **CONS** No USB as standard; confusing OSD
OVERALL One of the best for image quality, but it's still eclipsed by the winners

IMAGE QUALITY	■■■■■	CONTROLS	■■■■■
VALUE FOR MONEY	■■■■■	OVERALL	■■■■■

Viewsonic monitors are always quite individual with distinctive bird logos, but the styling is a little too retro for our liking with the screen inset from the bezel.

The OSD uses four buttons to access different features in different modes. This is confusing enough to ensure you'll be pressing the wrong buttons during initial setup. The buttons and the OSD are also a bit on the ugly side, although one neat touch is the arrow that points to the centre of the base, allowing you to straighten the monitor easily.

The images produced by the P95f were among the clearest and brightest on test. The Viewsonic uses a 0.25mm slot pitch aperture-grille tube, spreading to 0.27mm at the edges. Geometry was good, with lines appearing straight and true to the naked eye and close up. At maximum resolution the lines were clearly delineated, thanks to the high 300MHz specification of the video

bandwidth. Corner resolution was good and corner focus was superb. The only drawback was the amount of moiré. Horizontal and vertical colour registrations were in order, with the former gaining a distinction.

There was no discernible colour streaking, while colour purity was first rate. However, when moving in stages across the screen the scaling was only average. The Viewsonic finished off its DisplayMate testing with passes in both the dark screen and blooming test.

On the features side, the presence of a BNC connection means that the best can be made of the monitor. However, the USB option is not present at this price.


This puts the Viewsonic at a disadvantage in this test. While its image quality is decent, it's got nothing to offer over the best of its rivals, with the LG far outdoing it for value and the Iiyama Vision Master Pro 453 beating it for quality and features.



TABLE OF FEATURES

MANUFACTURER	ADI	BELINEA	CTX	CTX	EIZO
PRODUCT	MICROSCAN G910	10 60 80	EX950F	VL950T	FLEXSCAN T761
Price in VAT (ex VAT)	£346.63 (€295)	£389 (€331)	£270.25 (€230)	£215.03 (€183)	£598.08 (€509)
URL	www.adiuk.com	www.belinea.co.uk	www.ctxmonitors.com	www.ctxmonitors.com	www.eizo.co.uk
Tube type	Aperture grille	Aperture grille	Shadow mask	Shadow mask	FD Trinitron aperture grille
Nominal tube size/actual viewable diagonal	19in/18in	19in/18in	19in/18in	19in/18in	19in/18in
Dot/slot pitch (mm)	0.24	0.25	0.25	0.26	0.24
Power consumption in watts (max)	140	135	110	120	130
Power consumption (watts) standby/suspend	15/5	15/3	15/5	15/5	10/3
USB hub (upstream ports, downstream ports)	x (optional)	x	x	x	✓
Integrated microphone	✓	x	x	x	x
Video inputs	VGA	VGA, BNC	VGA	VGA	VGA, BNC
Maximum VESA refresh at 1,024 x 768 (Hz)	85	130	120	17	Not stated
Maximum VESA refresh at 1,280 x 1,024 (Hz)	85	100	90	85	107
Maximum VESA refresh at 1,600 x 1,200 (Hz)	85	85	77	75	92
Maximum resolution and refresh quoted	1,792 x 1,344 at 80Hz	1,920 x 1,440 at 75Hz	1,600 x 1,200 at 77Hz	1,600 x 1,200 at 75Hz	1,600 x 1,200 at 92Hz
Dedicated front-panel input select	N/A	x	N/A	N/A	✓
Highest emissions compliance	TCO 99	TCO 99	TCO 99	TCO 99	TCO 99
Dimensions (mm) (w x h x d)	470 x 463 x 470	456 x 463.6 x 463.2	460 x 453.5 x 456	460 x 461 x 476	452 x 455 x 478
Net weight (kg)	25	23.5	22.5	19.5	28

TABLE OF FEATURES



MANUFACTURER	PHILIPS	SAMSUNG	SAMSUNG	SONY	TAXAN	VIEWSONIC
PRODUCT	BRILLIANCE 109S	SYNCMaster 900IFT	900NF	G420	985	P95F
Price inc VAT (ex VAT)	£240.88 (€205)	£410.08 (€349)	£421.83 (€359)	£492.33 (€419)	£410.08 (€349)	£433.58 (€369)
URL	www.pctest.philips.com	www.samsungmonitor.com	www.samsungmonitor.com	www.sony-cp.com	www.taxan.co.uk	www.viewsonic.co.uk
Tube type	Invar shadow mask	DynaFlat shadow mask	Aperture grille	FD Trinitron aperture grille	DiamondTron aperture grille	Aperture grille
Nominal tube size/actual viewable diagonal	19in/18in	19in/18in	19in/18in	19in/18in	19in/18in	19in/18in
Dot/grille pitch (mm)	0.27	0.20 (horizontal)	0.25	0.24	0.25	0.25
Power consumption in watts (max)	95	130	140	130	130	130
Power consumption (watts) standby/suspend	7/3	5/5	5/5	N/A/3	15/3	15/15
USB hub (upstream ports, downstream ports)	x (optional)	x (optional)	x (optional)	✓	x	x (optional)
Integrated microphone	x	x	x	x	x	x
Video inputs	VGA (captive)	VGA, BNC	VGA, BNC	Captive VGA, VGA	VGA	VGA, BNC
Maximum VESA refresh at 1,024 x 768 (Hz)	85	119	119	139	119	140
Maximum VESA refresh at 1,280 x 1,024 (Hz)	85	89	85	104	89	107
Maximum VESA refresh at 1,600 x 1,200 (Hz)	70	76	89	89	76	92
Maximum resolution and refresh quoted	1,920 x 1,440 at 60Hz	1,600 x 1,200 at 75Hz	1,920 x 1,440 at 73Hz	1,600 x 1,200 at 89Hz	1,600 x 1,200 at 76Hz	1,600 x 1,200 at 76Hz
Dedicated front-panel input select	x	✓	✓	✓	N/A	N/A
Highest emissions compliance	TCO 99	TCO 99	TCO 99	TCO 99	TCO 99	TCO 99
Dimensions (mm) (w x h x d)	440 x 447 x 440	470 x 480 x 460	470 x 460 x 490	451 x 471 x 461	465 x 460 x 475.5	470 x 470 x 477
Net weight (kg)	19.7	23	25	25.5	25	25



HITACHI	IBM	IYAMA	IYAMA	LG	MITSUBISHI	PHILIPS
CM772ET	P96	SM900MT1	VISION MASTER PRO 453	915FT PLUS	DIAMOND PLUS 92	BRILLIANCE 109P
£358.38 (€305)	£521.70 (€444)	£213.85 (€182)	£440.63 (€375)	£327.83 (€279)	£339.58 (€289)	£475.88 (€405)
www.hitachi-eu-img.com	www.ibm.co.uk	www.iiyama.co.uk	www.iiyama.co.uk	www.lge.co.uk	www.mitsubishi-monitors.com	www.pcstuff.philips.com
Invar shadow mask	FD Trinitron aperture grille	Invar shadow mask	Aperture grille	Slot mask	DiamondTron aperture grille	Aperture grille
19in/18in	19in/17.9in	19in/18in	19in/18in	19in/18in	19in/18in	19in/18in
0.22 (horizontal)	0.24	0.26	0.25	0.24	0.25	0.24
110	140	130	138	140	95	120
15/3	15/3	15/5	10/5	8/3	5/5	6/3
x	x	x	1/4	✓ 1/4	x	x (optional)
x	x	x	x	x	x	x
VGA	Captive VGA, VGA	VGA	VGA, DVI-D	VGA, BNC	Captive VGA	VGA, BNC
Not stated	85	Not stated	120	85	119	85
Not stated	85	85	110	85	85	103
85	85	75	90	85	76	85
1,800 x 1,350 at 75Hz	1,600 x 1,200 at 85Hz	1,600 x 1,200 at 75Hz	1,800 x 1,440 at 75Hz	1,600 x 1,200 at 85Hz	1,792 x 1,344 at 68Hz	1,920 x 1,440 at 60Hz
N/A	✓	N/A	✓	✓	N/A	x
TCO 99	None	TCO 99	TCO 99	TCO 99	TCO 99	TCO 99
448 x 442 x 450	462 x 462 x 474	460 x 466 x 470	450 x 450 x 447	470 x 480 x 470	442 x 449 x 445	456 x 469 x 438
24	27	20	24	26.5	23	23.5

HOW WE TEST

Monitors must be tested in carefully controlled environments that remain the same throughout the testing procedure.

In order for a monitor to produce its best, it must be fed as clean a signal as possible. To make sure the graphics card was not a weak link in the chain, we used two identical systems each equipped with Matrox Millennium G400 Max graphics cards with a RAMDAC of 360MHz. These boards are renowned for the clarity of their 2D displays. Two identical systems were used so that direct and fair A-B comparisons could be quickly and easily made.

As monitors can be affected by and generate their own magnetic fields, each display was kept at least one metre away from the other. Before testing commenced, each monitor was warmed up for at least an hour. This is because the electrons that are shot onto the screen are liberated from the cathode by a heater, and this takes time to get to its optimal operating state. Additionally, as shadow masks warm up they

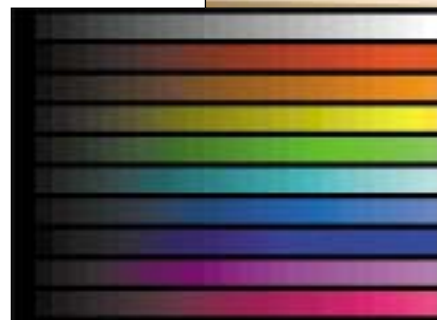
change in shape before reaching their nominal positions. Until that time the accuracy of the electrons hitting the phosphors is affected, so judgements should not be made until the tubes have settled down.

Once warmed up, testing was conducted using DisplayMate (available at www.displaymate.com). To begin, each unit was calibrated by setting its black levels, so that whites were suitably bright and all shades of grey could be distinguished.

DisplayMate tests for geometry, sharpness and resolution, colour and greyscale and a range of miscellaneous factors. In each DisplayMate test the monitor was awarded a pass, a distinction or a failure if it proved to be very poor.

We also examined the monitors under Windows using our own subjective judgment – here, issues such as power regulation and poor convergence can be clearly assessed. We tested under constant fluorescent lighting in an office environment to give a realistic setting

Right: This is what happens to displays that are too close together – note the colour change in the bottom left-hand corner



Left: The colour fading test shows that the monitor can gradually de-intensify the gun

that replicated the surroundings in which the monitors would most often be used.

All tests were conducted with the monitors set to their default colour temperatures and at a resolution of

1,280 x 1,024 at a 32-bit colour depth. To avoid any strain on the graphics card's bandwidth, we set the refresh to 75Hz. Greater resolutions and refresh rates were examined where appropriate.

Editor's Choice

In this group test we've looked at 18 monitors, each with approximately 18in of viewable area.

However, not all 19in monitors are created equal. The difference in price range is substantial, with the cheapest having a retail price of just £182 ex VAT, while the priciest will set you back £509 ex VAT. Equally, there has been an inevitably large differential in quality. Out of a possible 34 points in our DisplayMate tests the highest scoring unit achieved 25, while the stragglers managed just eight. However, the winners certainly did not go strictly in order of price.

As we have seen, the different technologies employed by manufacturers can vary dramatically. With so many virtually flat screens we would have expected perfect geometry all round, but this is not the case, with quite significant differences between brands and price points. The calibre of a monitor comes down to build quality and where the manufacturers have made compromises. Though the CRT may be a 100-year-old technology, it's still impossible to make a perfect monitor. It all boils down to what kind of sacrifices you're prepared to make.

Shadow mask is a more conventional technology, and its manufacture is cheaper than that of aperture-grille tubes. But the quality of a monitor isn't purely dependent on its tube technology. As Samsung has proved, shadow-mask tubes can compete with aperture grille for image quality, yet Samsung's monitor is expensive.

To stand out in such a hotly-contested market, a monitor must have something special to separate it from the crowd. Manufacturers approach this in different ways. For example, the Philips 109S offers Lightframe, which is software that allows you to select an area and greatly increase its brightness. Some users may find this useful, but we'd be more interested in having better all-round image quality than gimmicks, even from a low-cost monitor.

Where monitors were close in quality and price we looked to features to differentiate them. A second input allows you to run two PCs from the same monitor. This can be very useful if you've a system, such as a server, that isn't used all the time. Purchasing a monitor will waste cash and

take up space when, for the price of a second cable, you can double the utility of your existing unit. With many PCs limited to just two USB ports, a monitor with a hub is a very desirable piece of kit, especially if it is conveniently placed to the side, as on the Iiyama and Sony monitors seen here.

The winners

So which displays make it to the top of this very large pile of screens? A near miss was the Belinea, which achieved a joint third position in the DisplayMate tests. Considering its price this was no mean feat. Its thunder was firmly stolen by our first **Highly Commended** recipient, though, the **LG Flatron 915FT Plus**. This tied with the Belinea ahead of the likes of Sony, IBM and Eizo, yet the LG only costs £279 ex VAT. This would normally be enough, but the LG includes a second input in the form of high-quality component BNC connections and a USB hub as well. On top of that it sports stylish futuristic looks and a fabulous touch-sensitive OSD.

Our second **Highly Commended** award goes to the **Taxan 985** in recognition of its first place in the DisplayMate tests. Defeating the other contenders in such company reflects just how good the picture is on the Taxan. It even manages to match this with what is arguably the best-looking exterior in the group test. This is a monitor that you'll appreciate having on your desk for many years. The likes of Sony and IBM are close behind, but you'll be paying more for them, and when it comes down to it they just aren't quite as good. True, it doesn't have any extra features, but the Taxan is all about the picture – if you're after extras as well as quality, you'll go for our overall winner.

The **Vision Master Pro 453** from Iiyama wins PCW's **Editor Choice** award thanks to a genuinely special combination of quality, features and affordability. Only a single point behind the Taxan in our DisplayMate tests, it not only offers BNC connections, a convenient side-mounted USB hub and speakers, it also boasts unique future-proofing DVI connectivity. DVI may only support up to 1,280 x 1,024, but this is the optimum resolution for a 19in monitor. And all this will cost you a mere £25 more than the Taxan. Now that's what we call a bargain.

It all boils down to what sacrifices you're prepared to make



Iiyama Vision Master Pro 453



LG Flatron 915FT Plus



Taxan 985