

Meeting room projectors

Get the bigger picture with our definitive test of 15 projectors

CONTRIBUTORS Ian Robson, Jim Martin

PHOTOGRAPHY Hugh Threlfall, Julian Hawkins

With prices dropping, image quality rising and noise levels sinking, there's never been a better time to buy a projector. And with the bonus of high-quality DVD playback, we suspect home movie enthusiasts as well as corporates will be tempted to buy now rather than wait.

Projectors fall into three general categories, based on unit size, the capacity of the intended venue and the number of features on offer. Large-venue units employ super-bright bulbs and tend to be permanently installed by professional audiovisual companies. Ultra-portables concentrate on mobility, but are capable of presenting in smaller meeting rooms.

The third category, meeting room projectors, is the focus of our attention this

month. This is currently the most competitive arena, where the majority of sales to both companies and home cinema enthusiasts is occurring. We asked 15 of the top manufacturers to supply a unit that will be mostly resident in its presentation room and with enough brightness to be viewable even with all the room lights on.

Since companies require professional presentation abilities, we asked for a minimum feature set revolving around optics and image adjustment. All projectors on test have a native resolution of 1,024 x 768 – the norm for the majority of notebooks likely to drive the displayed images. Basic image-adjustment features include keystone correction for an image distorted through a projected angle of incidence off the horizontal or vertical, as well as a true optical zoom.

Finally, with no need for expensive miniaturisation technology or other premium features, we stipulated a maximum price of £3,500 where possible. This ensures you can choose an excellent presentation tool without breaking the bank.

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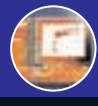
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82 Plus U2-1150

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Performance analysis

Details of how we test and what to look for in your ideal projector

Regardless of how advanced presentation material can be these days, many presenters resort to static PowerPoint slides, with sales and marketing teams still squinting at large spreadsheets. For these reasons, we use a carefully chosen selection of DisplayMate's (www.displaymate.com) battery of static tests as the main image quality assessment.

Beyond the objective testing, we also factor in our subjective findings. A projector that has no perceivable light leakage outside the framed image is considered superior, while spots of impure colour concentrations are penalised. Finally, we consider the quality of projected video, specifically DVD playback.

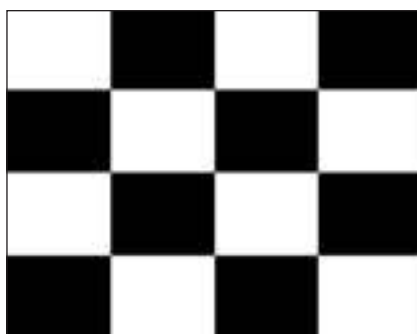
PROJECTOR SETUP

For the initial setup and testing environment, we follow the guidelines prescribed in ANSI IT7.215. Less than 1 per cent of external light must enter our test room. The projector has to face the screen square on, so the optical zoom is set to its minimum and a 4:3 aspect ratio image is framed to a width of 0.7m at both the top and bottom, adjusting the height of the projector where necessary. The left and right frame heights have to be identical.

Under these conditions, all the units projected an identical area of light, and we gauge brightness using a Sekonic L-246 lux meter. For displaying the test patterns, we use a notebook capable of displaying resolutions from SVGA (800 x 600) to SXGA (1,280 x 1,024) through a 15-pin analog D-SUB

as well as a digital DVI connection. It's worth noting that for all the projectors on test, no discernable difference in image quality was perceived by switching between analog and, where present, digital connections.

All the projectors' brightness and contrast levels are set manually, so that the six squares shown in the ANSI setup pattern can be viewed simultaneously. We allow a 30-minute warm-up time, and any power-saving modes that dim the maximum brightness are disabled before measurements are taken, although the effectiveness of these modes is also scrutinised.



We use the ANSI contrast grid for measuring the quality of realistic contrast levels.

BRIGHTNESS AND CONTRAST

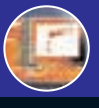
Don't buy a projector just because it's got a huge lumens rating – not everyone needs 1,500 lumens, let alone 3,000. One point to remember, though, is that all projectors' bulbs lose intensity over time – as much as half the ANSI lumens rating can be lost during the manufacturer's stated bulb life.

Making a decision on how much you need isn't straightforward, but two important factors are the size of your projected image and the level of brightness in your meeting room. As a rough guide, for a projected distance of around 3m, in a well-lit room with no windows, a measured ANSI lumens rating of 1,000-plus produces perfectly acceptable results. A rating of 2,000-plus will be acceptable at around 5m. Some manufacturers claim a 10m throw distance for this rating, which we found to be grossly optimistic, with a very washed-out image displayed. But this is a rough guide. If you're unsure, ask the reseller if you can try the projector before you buy.

A lux reading is taken at the same point in each of the nine squares of the ANSI brightness grid. An average of these values is multiplied by the area of light projection in square metres to get the measured brightness in lumens. Note that when measuring lux levels, we set up the display for optimal viewing, which may mean the maximum achievable brightness isn't being recorded.

● DISPLAYMATE TEST RESULTS

	3M MP8749	ASK C105	Canon LV-7345	Eizo FlexScan IX460P	Epson EMP-800	Hitachi CP- X380W	InFocus LP530	Mitsubishi XD200U	NEC MultiSync MT1050	Panasonic PT- L712NTE	Philips cBright XG2 Impact	Plus U2-1150	Sanyo PLC-XU35	Sharp PG-C30XE	Toshiba TDP-T3
INTENSITY AND FOCUS															
Defocusing and blooming	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1
White screen uniformity	1	0	1	1	1	1	1	2	1	1	1	2	0	1	1
Even edge brightness	1	1	2	2	2	1	1	2	1	1	2	2	1	1	2
GEOMETRY AND DISTORTION															
Pincushion/barrel distortion	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1
Full-screen geometric linearity	2	2	2	2	2	2	1	2	2	1	2	2	2	1	2
SHARPNESS AND RESOLUTION															
Horizontal resolution	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1
Vertical resolution	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Page of text at 1,280 x 1,024	1	1	1	1	1	0	0	1	1	0	1	1	1	1	1
Page of text at 1,024 x 768	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Focus matrix at 1,024 x 768	1	1	0	1	1	2	1	1	2	0	1	2	2	2	1
Focus matrix at 800 x 600	0	1	0	1	0	1	1	1	0	0	1	1	1	1	1
COLOUR AND GREYSCALE															
Static colour registration	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Greyscale reproduction	2	1	2	2	2	2	1	2	1	2	2	2	2	1	2
Colour spectrum blending	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Red colour purity	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
Green colour purity	1	0	1	1	1	1	0	1	0	1	1	0	0	1	0
Blue colour purity	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Text colour combinations	0	2	0.5	2	0.5	2	2	2	0.5	2	2	2	1	1.5	1.5
KEYSTONE CORRECTED															
Circular test pattern	1	0	1	1	1	1	0	1	1	0	1	0	1	1	1
Point shape and dot visibility	1	1	1	1	1	1	0	1	0	0	1	0	1	1	1
Moiré pattern	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
TOTAL	21	18	20.5	25	22.5	24	17	26	19.5	16	24	24	22	22.5	23.5



A full-screen contrast ratio – the ratio of the brightness value of a full white screen contrasted with a full black screen – is generally what manufacturers state as the ability of a projector to produce contrasting deep blacks and bright whites. We measured this value in addition to the tougher ANSI contrast grid ratio, which comprises 16 alternating black and white squares – a more realistic representation of what might actually be projected by users.

The contrast grid ratio is substantially lower than the full-screen contrast ratio, because light from the white squares scatters across the black squares. When considering a projector for quality of general contrast levels, look for a high-contrast grid ratio rather than the unrealistic full-screen contrast ratios.

IMAGE QUALITY

The strengths and weaknesses of the optics and imaging technology are initially assessed with a selection of DisplayMate tests split into five categories; intensity and focus, geometry and distortion, sharpness and resolution, colour and greyscale, and keystone corrected.

When it comes to image adjustment, most modern projectors have an auto-image setup function that generally produces the best



The text colour combinations test is one of the most difficult in DisplayMate.

image achievable. The quality of this function, where present, is scrutinised before fine-tuning is applied. Often, you'll want to adjust the image manually, and menus that use layman's terms assist in making the OSD more navigable. Few projectors on test offer the facility for repositioning the OSD menu, and in some cases it obscures the very areas of the image you're trying to adjust.

We also consider the general quality of projection in addition to the battery of standard tests, as well as DVD playback, and combine this into the final assessment. The results can be viewed below.

If you want a projector for entertainment purposes, the next time you watch a movie consider how much black is in the displayed frame, be it the actual scene or borders. With almost all the DLP projectors on test, the production of large black areas proved most difficult, with off-putting sparkling and shimmering apparent. As viewing will tend to be in dimmer conditions, lower brightness will combat some of this shimmering. Plus, some projectors run their fans slower at lower brightness, resulting in quieter running.

DLP vs LCD

The most compact and lightweight projectors currently available use Texas Instruments' single-chip DLP (Digital Light Projection) technology. DLP's Digital Micromirror Device (DMD) requires no colour-combining prisms or complex separation optics. It relies on reflective technology for a more tightly folded optical system than transmissive LCD systems.

On the downside, DLP projectors are less suitable for motion video, partially due to the high cooling requirements resulting in loud ventilation systems. Also, due to DMD dithering, large changes of information in projected scenes result in motion artefacts.

Polysilicon LCD projectors are usually

less noisy than their DLP counterparts, and the use of TFT technology for image production results in sharper, high-definition pictures. But, the inherent nature of transmissive technology, which is varying degrees of light transmitting through the LCD panels, also gives rise to pixellation, or screen door image artefacts.

BULB LIFE

Our final word is dedicated to the bulb. In the feature table (see p76), we list the manufacturer's claims, but these should be treated with some scepticism.

In general, the life of the bulb could range from 1,000 to 2,000 hours, but only if you look after it. Always turn the projector off properly rather than just cutting the power, or you could reduce 2,000 hours of life to 20.

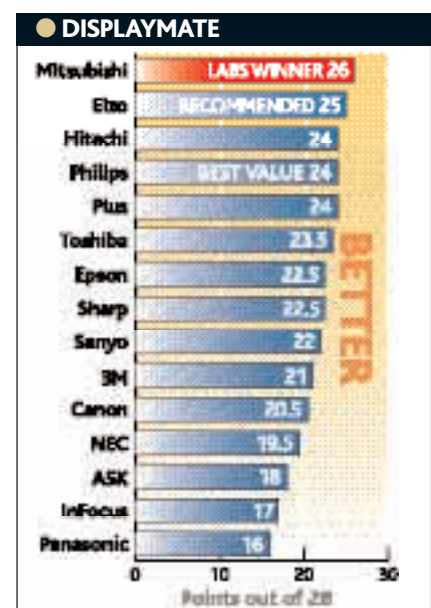
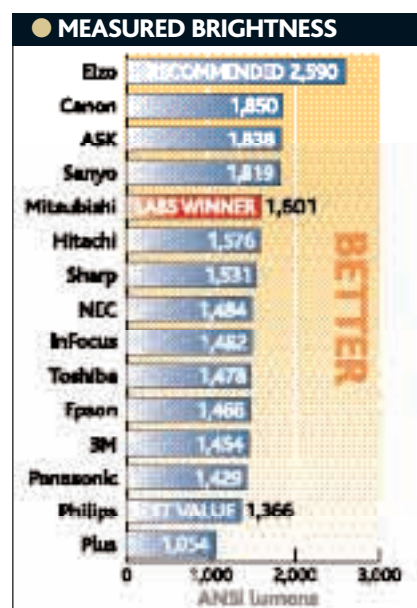
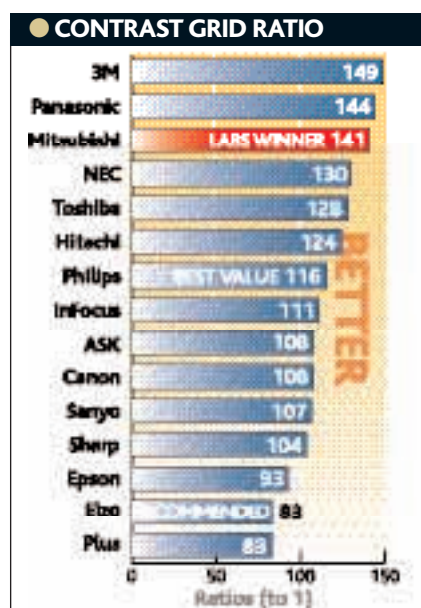
Also, make sure the air filters are cleaned regularly – every quarter is good practice. Otherwise, less air gets to the bulb, it gets too hot and its life is reduced.

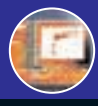
FEATURE RATING

We evaluated a broad set of attributes when awarding feature points to each projector. From the warranty to how many cables were supplied, from the projection distance to the cost of replacement bulbs, from connectivity to portability, we've covered all the factors that should influence your buying decision (see p55 for an explanation of our number ratings).

PERFORMANCE RATING

The main factors determining our performance rating – shown at the bottom of each review – are brightness levels, contrast ratios and performance in our DisplayMate tests. We show how each projector performed in these areas in the graphs below, while the table opposite gives an exact breakdown of the DisplayMate results.



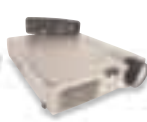
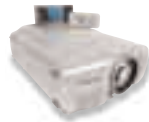


● SPECIFICATIONS AND FEATURES

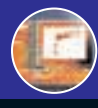


	3M MP8749	ASK C105	Canon LV-7345	Eizo FlexScan IX460P	Epson EMP-800	Hitachi CP-X380W	InFocus LP530
Overall score	100	99	103	107	95	107	89
Street price* (inc VAT)	£2,999 (£3,524)	£3,340 (£3,924)	£2,637 (£3,098)	£3,795 (£4,459)	£3,699 (£4,346)	£2,800 (£3,290)	£2,895 (£3,402)
Supplier/distributor	MJ Audio Visual 01243 780816	GBI 01908 340507	Simply Computers 0870 727 2100	Avnet Applied Computing 01483 719505	Micro Partners 0800 253550	MJ Audio Visual 01243 780816	Steljes 08000 151603
Supplier's Web site	www.mjvisual.com	www.gbint.co.uk	www.simply.co.uk	www.aac.avnet.com	www.micro-partners.co.uk	www.mjvisual.com	www.steljes.co.uk
Manufacturer's Web site	www.3m.com/meeting	www.askprojectors.com	www.canon.co.uk	www.eizo.co.uk	www.epson.co.uk	www.hitachidigitalmedia.com	www.infocus.com
Warranty	3yrs RTB (1yr for lamp)	2yrs RTB	1yr RTB	3yrs RTB	3yrs RTB	3yrs RTB (6mths for lamp)	2yrs RTB
SPECIFICATION							
ANSI lumens rating (economy mode)	2,000 (1,600)	2,000 (no economy mode)	2,100 (1,800)	3,000 (no economy mode)	1,500 (no economy mode)	2,000 (1,600)	2,000 (1,250)
Image display technology	LCD	LCD	LCD	LCD	LCD	LCD	DLP
Image panel size	3 x 0.9in	3 x 0.9in	3 x 0.9in	3 x 1.3in	3 x 0.9in	3 x 0.9in	0.7in
Native resolution	1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768
Compatible resolutions	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA
Colour palette (millions)	16.7	16.7	16.7	16.7	16.7	16.7	16.7
Horizontal refresh rates (kHz)	31-80	15-100	15-100	15-92	15-107	15-80	25-91
Vertical refresh rates (Hz)	56-120	44-130	50-100	50-85	43-120	50-120	50-85
Video compatibility	NTSC, PAL, SECAM	NTSC, PAL, SECAM	NTSC, PAL, SECAM	NTSC, PAL, SECAM	NTSC, PAL, SECAM	NTSC, PAL, SECAM	NTSC, PAL, SECAM, 1080i/720p, HDTV
Dimensions W x H x D (mm)	298 x 76 x 228	250 x 98 x 340	332 x 90 x 232	299 x 133 x 367	348 x 104 x 274	298 x 95 x 228	260 x 85 x 280
Weight (kg)	3.2	3.4	4	6.7	4	3.3	2.6
OPTICS							
Projection distance (m)	1.2-7.3	1.1-10	1.6-10	1.5-11.8	0.9-12.5	1.2-15.7	1.5-6.6
Projection image size (diagonal measure, in)	30-300	21-253	31-300	40-300	30-300	30-300	35-259
f-range (mm)	27-33	36-47	37-48	52-66	2-2.2	37-48	Not supplied
F number	1.7-2.1	1.8-2.1	1.7-2.2	1.8-2.1	1.7-2	1.7-2.1	2.7-3
Optical zoom ratio	1.2x	1.3x	1.3x	1.26x	1.35x	1.3x	1.2x
Contrast ratio	400:1	450:1	350:1	400:1	400:1	400:1	400:1
DIGITAL IMAGE ADJUSTMENT							
Digital zoom operation	✓	✓	✓	✓ (picture-in-picture only)	✓	✓	✓
Digital zoom ratio	4x	1.9-2.5x	0.3-8x	4x	4x	4x	10x
Keystone correction (degrees)	+/-15	+/-30	+/-20	+/-15	+/-10 horizontal, +/-30 vertical	+/-20	+/-20
Rear projection	✓	✓	✓	✓	✓	✓	✓
Remote control supplied	✓	✓	✓	✓	✓	✓	✓
LAMP AND RUNNING COSTS							
Lamp power (W)	200	200	220	250	200	200	270
Cost of replacement bulb (exc VAT)	£340	£309	£385	£395	£396	£335	£245
Manufacturer's lamp expectancy ** (hours)	1,500	2,000	1,000	1,500	1,500	2,000	2,000
User serviceable	X	✓	✓	✓	✓	✓	✓
POWER AND ENVIRONMENT DETAILS							
Power consumption in operation (W)	310	253	300	360	220	310	350
Power consumption on standby (W)	24	29	32.2	25	9	18	32.2
Acoustic noise level (dB(A))	41 (35 in low power mode)	34	37	37	38	40 (34 in low power mode)	39
CONNECTIVITY PORTS							
VGA input (D-SUB)	2	2	✓	2	✓	2	✓ (DVI split to analog VGA/USB)
DVI/I input	X	✓	✓	✓	✓	X	✓ (DVI split to analog VGA/USB)
S-Video input	✓	✓	✓	2	✓	✓	✓
Composite video input	✓	✓	✓	2	✓	✓	✓
VGA output	✓	✓	✓	✓	✓	✓	✓
PS/2 (mouse)	X	✓	✓	X	✓	✓	✓
USB (downstream)	X	X	X	X	✓	✓	✓
USB (upstream)	✓	✓	X	✓	✓	X	X
3.5mm audio mini-jack	2 inputs, 1 output	2	✓	2	1 input, 1 output	2	✓
Other	Component video, RCA audio in	RCA audio in and out	X	8-pin RS232 mini-DIN	X	Control terminal	Component video, wired remote input, RS232C
CABLES SUPPLIED							
VGA	✓	✓	✓	✓	✓	✓	✓
DVI	X	✓	Optional	X	Optional	X	✓
S-Video	X	✓	X	X	✓	X	✓
Composite video	X	✓	X	✓	✓	X	✓
RCA video/audio	✓	✓	X	✓	✓	X	✓
S/PDIF	X	X	X	X	X	X	X
USB	X	✓	X	✓	✓	X	See VGA
Other	Component video, 3.5mm audio mini-jack	PS/2 and serial mouse cable, scart adaptor	X	X	PS/2 mouse cable	Component video, PS/2 mouse cable	MAC adaptor, RCA-to-mini-jack audio adaptor, PC audio
OTHER							
Ceiling mountable	✓	✓	✓	✓	✓	✓	✓
Internal speaker(s)	2 x 1W	2 x 1W	1 x 1W	2 x 2W	1 x 5W	2 x 1W	1 x 3W
Carry case	X	✓	✓	X	Optional	✓	✓
Software supplied	X	X	X	X	X	X	X

Key: VGA=640 x 480, SVGA=800 x 600, XGA=1,024 x 768, SXGA=1,280 x 1,024, UXGA=1,600 x 1,200. *Prices correct at time of going to press. **Life expectancies of bulbs vary considerably, according to how manufacturers measure.



Mitsubishi XD200U	NEC MultiSync MT1050	Panasonic PT-L712NTE	Philips cBright XG2 Impact	Plus U2-1150	Sanyo PLC-XU35	Sharp PG-C30XE	Toshiba TDP-T3
108	104	93	106	90	104	99	95
£3,470 (£4,077)	£3,375 (£3,966)	£2,950 (£3,466)	£2,349 (£2,760)	£2,800 (£3,290)	£3,200 (£3,760)	£3,295 (£3,872)	£3,495 (£4,107)
GBI	MJ Audio Visual	Avnet Applied Computing	GBI	MJ Audio Visual	MJ Audio Visual	MJ Audio Visual	Steljes
01908 340507	01243 780816	01483 719505	01908 340507	01243 780816	01243 780816	01243 780816	08000 151603
www.gbint.co.uk	www.mjvisual.com	www.aac.avnet.com	www.gbint.co.uk	www.mjvisual.com	www.mjvisual.com	www.mjvisual.com	www.steljes.co.uk
www.mitsubishi-projector.com	www.nec-pj.com	www.panasonic.co.uk	www.ce-europe.philips.com	www.plus-vision.com	www.sanyo.co.uk	www.sharp.co.uk	www.projectors.toshiba.co.uk
3yrs RTB	3yrs on-site	2yrs RTB	3yrs RTB	3yrs RTB	2yrs RTB	1yr RTB	3yrs RTB
2,000 (no economy mode)	2,100 (1,700)	1,600 (800)	1,600 (no economy mode)	1,500 (no economy mode)	2,000 (no economy mode)	1,700 (no economy mode)	2,000 (1,250)
DLP	LCD	LCD	LCD	DLP	LCD	LCD	DLP
0.7in	3 x 1.3in	3 x 0.9in	3 x 0.9in	0.7in	3 x 0.9in	3 x 0.9in	0.7in
1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768
VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA	VGA, SVGA, XGA, SXGA, UXGA	VGA, SVGA, XGA, SXGA
16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
15-91	15-100	24-97	15-108	15-85	15-100	15-126	25-91
50-85	20-120	50-120	50-120	50-85	50-100	43-200	58-05
NTSC, PAL, SECAM, HDTV	NTSC, PAL, SECAM	NTSC, PAL, SECAM	NTSC, PAL, SECAM, HDTV	NTSC, PAL, SECAM	NTSC, PAL, SECAM	NTSC, PAL, SECAM	NTSC, PAL, SECAM, 1080/720p, HDTV
300 x 90 x 245	281 x 121 x 364	233 x 118 x 330	328 x 102 x 226	235 x 58 x 297	333 x 86 x 231	229 x 121 x 310	264 x 85 x 282
3	5.6	4	3.6	2.6	3.9	4.8	2.6
1.3-12.1	1.3-11.2	1.2-11.7	1.1-12	1.2-12.3	1.6-12.2	1.4-14	1.5-6.6
40-300	30-300	30-300	20-300	25-300	31-300	40-300	35-259
23-28	49-58	29-36	37-47	35-42	37-48	33-43	Not supplied
2.5-3	2.3-2.7	1.8-2.1	1.8-2.2	2.7-3	1.7-2	1.7-2	2.7-3
1.22x	1.2x	1.3x	1.3x	1.2x	1.3x	1.3x	1.2x
450:1	400:1	400:1	300:1	800:1	350:1	250:1	400:1
✓	✓	✓	✓	✓	✓	✓	✓
4x	4x	9x	Not supplied	4x	4x	8x	10x
+/-45	+/-30	+/-15	Fixed 6-8 degrees	+/-15	+/-20	+/-30	+/-20
✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓
210	200	160	200	150	200	200	270
£375	£350	£210	£360	£339	£300	£305	£360
1,500	1,500	4,000	1,500	1,000	1,000	1,500	2,000
✓	✓	✓	✓	✓	✓	X	✓
280	350	240	250	220	300	300	350
22.8	10	5	5	26.4	11	4	32.2
34	42 (38 in low power mode)	32 (28 in low power mode)	37	40	37	40	39
2	✓	2	✓	✓	✓	2	✓
X	X	X	X	X	X	X	✓
2	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
✓	✓	X	✓	X	X	✓	✓
See Other below	✓	✓ (optional)	USB	✓	✓	X	X
See Other below	X	✓ (optional)	X	X	✓	X	X
See Other below	X	X	X	X	X	X	X
3 inputs, 1 output	✓	✓	✓	✓	✓	1 inputs, 1 output	✓
Single socket for PS/2 mouse, USB mouse and RS232C/USB control of projector functions	Type II PC Card slot	Type II PC Card slot, nine-pin RS232C D-SUB	X	X	DVI/D input	Component (via PC in) and mono RCA audio	Component video, wired remote input, RS232C
✓	✓	✓	✓ (combined with USB cable)	✓	✓	✓	✓ (DVI split to analog VGA/USB)
X	X	X	X	X	X	X	✓ (DVI split to analog VGA/USB)
✓	X	X	✓	✓	X	X	X
✓	X	X	X	✓	X	X	✓
X	X	✓	✓	✓	X	X	X
X	X	X	X	X	X	X	X
✓	X	Optional	See VGA	X	X	USB mouse control cable	See VGA
RCA-to-mini-jack audio adaptor	Serial with mouse adaptors	X	Scart adaptor, audio converter plug	Serial mouse cable, mouse adaptor (Mac and PS/2),	PS/2 mouse cable	DIN-D-SUB RS232C cable, audio cable, PS/2 mouse control cable, remote mouse receiver	Mac adaptor, RCA-to-mini-jack audio adaptor
✓	✓	✓	✓	✓	✓	✓	✓
1 x 2W	2 x 1W	2 x 2W	1 x 3W	1 x 1W	1 x 1W	1 x 2W	1 x 3W
✓	✓	✓	✓	✓	✓	X	✓
X	Presentation Viewer	Wireless Manager, JPEG Converter	X	X	X	Presentation Viewer	X



3M MP8749

PRICE £2,999 (£3,524 inc VAT)

SUPPLIER MJ Audio Visual 01243 780816

VERDICT The whisper mode and one-year bulb guarantee both add to this projector's attractions, but Hitachi sells a better-specified unit for less.



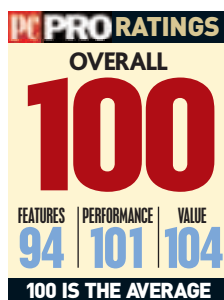
The MP8749 is almost identical in specification to Hitachi's CP-X380W, so we immediately questioned why its price is £199 more. The only obvious extra is a one-year guarantee on the 200W bulb. But despite being cheaper, the Hitachi is slightly better specified than the 3M, with a greater optical zoom and projection distance.

The differences in specification could explain why the 3M had marginally poorer quality results (although variance between batches of units is another factor). In particular, the MP8749 failed one of the focus tests. That said, it still produced equally good colour reproduction as the Hitachi, failing only the colour text combinations test through its lack of text sharpness.

While DVD playback doesn't demand sharp focus, it's an important consideration for general presentations. Thankfully, the 3M is adept at playing DVD movies – our test produced fluid playback with rich, vibrant colours.

Another factor in the 3M's favour is its whisper mode, which makes it perceptibly quieter than most others on test. This means it's a good choice for smaller presentation rooms and even home entertainment. Switching this off raises the brightness and noise levels significantly, with the fans audible above the air-conditioning unit in the test room.

One nice touch is backlit image-adjustment controls on the projector and the remote, which will come in handy in dimly lit rooms. Another bonus is a sliding cover for protecting the lens when not in use. But, unless you can negotiate a lower price, you might as well choose the Hitachi.



ASK C105

PRICE £3,340 (£3,924 inc VAT)

SUPPLIER GBI 01908 340507

VERDICT Excellent brightness levels, high build quality and a responsive OSD are all plus points, but some image quality tests let it down.



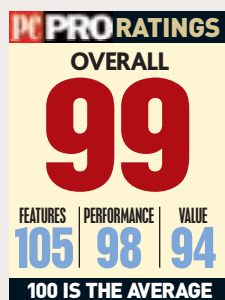
For a while, it looked like the C105 could be a serious contender. It came close to its specified brightness – 1,838 tested lumens against 2,000 – and was evenly lit across the screen. Near-perfect keystone correction enhanced its chances further, and it's quiet enough to not be noticeable in an air-conditioned room.

It fared reasonably in our focus tests too, but our colour purity tests proved its downfall, as it failed three of the eight checks. Further concerns were highlighted when a deposit of red in the left-hand corners appeared during both black and white full-screen projections.

We had high hopes for the C105 as a home entertainment unit due to such low sound levels, and looked to DVD playback as a possible highlight. However, despite the fluid motion, the black bars caused by widescreen movies suffered from the same colour impurities as before.

We were also disappointed by the automatic setup routine. This is only activated when switching from one display source to another, but its poor results meant we had to manually adjust the settings. Thankfully, the OSD is responsive and clear, especially with the help of the remote's ball-driven navigation.

Build quality is good, and tilt is applied through two sturdy front feet. The optical zoom and focus are well designed and offer good response. These factors all boost the C105's claims and, if colour purity isn't vital, it should be considered.



Canon LV-7345

PRICE £2,637 (£3,098 inc VAT)

SUPPLIER Simply Computers 0870 727 2100

VERDICT A bright projector for an attractive price, with all the features most people need. The only disappointment is its colour reproduction.



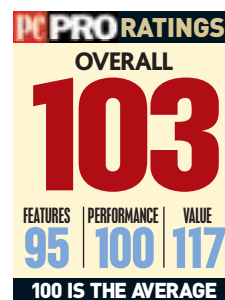
At a glance, you'd be forgiven for thinking that Canon's relatively compact unit is the same as Sanyo's PLC-XU35, even down to the green carry case. But they're not quite physically identical, as the Canon's control buttons include one dedicated to the bright mode.

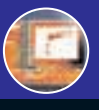
By default, the unit is powered up with a stated ANSI lumens rating of 1,800, but on pressing the Bright button the ANSI rating is claimed to jump to 2,100. After a worrying mechanical grating sound, the brightness certainly did increase, with our measurements returning a more than respectable rating of 1,850.

Testing was performed with the bright mode switched on to ensure fair comparison. Sadly, this high brightness resulted in poor blacks, and a full red screen more closely resembled orange. Switching the bright mode off marginally improved viewing. The Canon's strengths were in sharpness, geometry and focus, which all remained admirable even on a keystone-corrected image.

We were also impressed by the range of features on show, despite the relatively low price. The projection distance of 1.6–10m is better than some of the more expensive units, as is the maximum image size of 300in. We also gave full marks to the excellent remote control, which was one of the better featured and best designed on test.

The only disappointment is that this is a noisy projector, being audible above air conditioning, but at this price there's no doubt that the Canon offers excellent value for money.





Eizo FlexScan IX460P

PRICE £3,795 (£4,459 inc VAT)

SUPPLIER Avnet Applied Computing
01483 719505

VERDICT This resident meeting-room projector may be expensive, but it boasts excellent image quality and superb brightness.



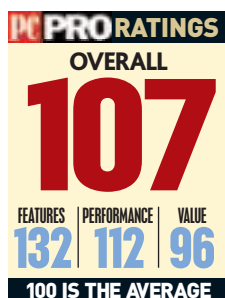
Eizo's FlexScan IX460P clearly means business. It's easily the largest projector on test – obviously a resident meeting room projector like the NEC MultiSync, unlike the majority of more portable offerings this month – and boasts the highest ANSI lumens rating of 3,000. This fact was backed up in our tests with a rating of 2,590 lumens – over 600 more than its nearest rival in this Labs.

Generally, Eizo's products are regularly noted for producing fine image quality, and the IX460P is no exception. Of particular note was near-flawless geometry and perfect colour representation, including a clean sweep of the text colour combination test. The only major failing was moiré seen during keystone-corrected testing, whose cancellation was hindered by huge steps in the adjustment control.

With no economy or quiet mode, the IX460P will only run with the cooling fans at full speed. Fortunately, the FlexScan was hardly noticeable above the air conditioning. If you decide to ceiling-mount this projector, the motorised zoom (up to 1.26x) and focus will come into their own – thankfully, they can be controlled from the fully featured remote as well as the main unit.

Although there's no automatic image setup, the OSD menu controls are fairly intuitive. You can also choose between two OSD positions should the first obstruct your image setup.

Despite the high price, there's no doubt that the FlexScan is a projector to be reckoned with. Others might be portable and have more frills, but if you can afford it the IX460P is a natural choice for the meeting room.



Epson EMP-800

PRICE £3,699 (£4,346 inc VAT)

SUPPLIER Micro Partners 0800 253550

VERDICT One of the most expensive projectors on test isn't the brightest, but it offers superb image quality, excellent usability and whisper-quiet running.



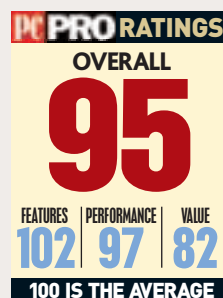
At £3,699, Epson's portable projector is one of the most costly on test.

But, unlike the similarly priced Eizo, the EMP-800 is only a 1,500 ANSI lumens unit – although to Epson's credit, we measured a brightness of only 44 lumens less in our testing. Another factor in the EMP-800's favour is ColourReality, which gives users the choice of six colour settings.

We selected sRGB for testing, and the Epson certainly delivered superb image quality, passing all of the geometry and focus checks, plus the colour and greyscale tests. Our only concerns were with the depth of blacks and the minor light leakage surrounding the framed image, but neither detracted from a generally satisfying display. The auto-image adjustment feature was also one of the better efforts we saw.

There are plenty of connectivity options, all clearly labelled and situated conveniently together on the rear of the projector along with the power input. The usability extends to ergonomic focus and optical zoom controls, plus an informative OSD, which is only let down by a lack of position options. The unit's image controls are also clearly labelled, although there's no backlight for dimmed rooms.

The EMP-800 was one of the quietest projectors on test and its DVD playback was perfectly acceptable, with rich colours and no streaking or artefacts. However, its size and price puts it out of reach for home entertainment.



Hitachi CP-X380W

PRICE £2,800 (£3,290 inc VAT)

SUPPLIER MJ Audio Visual 01243 780816

VERDICT The CP-X380 delivers better image quality than most of the projectors on test, despite its aggressive price. Definitely worth shortlisting.



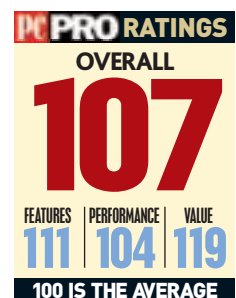
Turn to the review of 3M's MP8749 and you'll be struck by its uncanny similarity to Hitachi's offering this month. But don't be fooled – they may share the same chassis, the same technology and the same 2,000 ANSI lumens rating (although both struggled to reach these dizzy heights in our tests), but we soon found some clear variations.

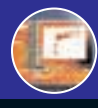
In fact, despite being £199 cheaper, the Hitachi delivered slightly better results in our image quality tests, particularly in the area of colour and greyscale representation, where it passed every check with some ease. The CP-X380W also displayed exemplary results at 800 x 600, and we were similarly pleased with its results at its native 1,024 x 768.

It shouldn't prove too difficult to set up either. The auto-image setup button produced unremarkable results, but the OSD uses intuitive graphical indicators to rectify this. We appreciated the smaller details such as the temperature warning indicator, not to mention the backlit image-adjustment controls. Unfortunately, this isn't followed through to the unlit remote control.

Considering the CP-X380W is one of the cheaper units on test, it's not too much of a surprise that only a VGA cable is supplied and that there's no DVI/I input. At least a carry case is included in the price, which could be handy if the projector isn't to be resident in one place.

Thankfully, the low price hasn't led to shortcuts in build quality, with no light leakage around the framed display and no dead pixels on the review unit. If you want a well-priced 2,000 ANSI lumens projector, this is the one to choose.





InFocus LP530

PRICE £2,895 (£3,402 inc VAT)

SUPPLIER Steljes 08000 151603

VERDICT It's highly portable and boasts excellent contrast levels, but disappointing results in our general image quality tests let it down.



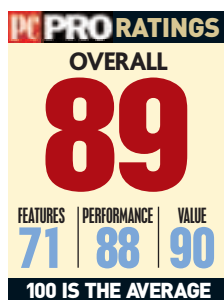
There are just four projectors in this Labs that weigh 3kg or less, and it's no coincidence that they all use DLP (Digital Light Processing) technology – see an explanation of this and LCD technology on p79. It's no coincidence that the LP530 and Toshiba TDP-T3 look similar either, with the two sharing an identical specification.

But this doesn't mean they perform identically. In fact, the LP530 – cheaper by some £595 – couldn't quite match its twin in our quality tests. Its biggest problem came in the keystone-corrected arena, as it failed all three checks. And even if you use this projector head on, don't expect the greatest results.

The InFocus performed much better in the focus tests and sailed through the colour and greyscale checks with relative ease. But its real triumph was for contrast, with our test result of 465:1 excelling even the company's 400:1 claims. Unfortunately, it couldn't carry this form through to the brightness tests; we measured 1,482 ANSI lumens against a claimed 2,000. It's clear where some of the brightness goes, with the LP530's light leakage beyond the displayed frame being the worst on test.

Another design fault stems from the slow-to-respond OSD. This lands dead centre of the screen, which is inconvenient if this is where your test image is located.

Despite these issues, we had high hopes for the InFocus LP530 for DVD playback – after all, it's quiet (especially in low power mode) and extremely light. But, even with fluid motion and rich colours, a shimmering caused by over-bright sparkling left little to lift this projector from the crowd.



Mitsubishi XD200U

PRICE £3,470 (£4,077 inc VAT)

SUPPLIER GBI 01908 340507

VERDICT Excellent image quality, build quality and design leave little to quibble about, except, perhaps, that you pay for the privilege.



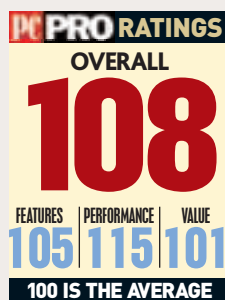
As one of the relatively expensive projectors on test, the XD200U dutifully packs in the features plus a plethora of connectivity options. Build quality is also reassuring, and design details such as the four independent corner feet add to its usability.

The remote is similarly well designed. Despite its diminutive size, it features a laser pointer and an underside left-mouse button, which falls naturally under the index finger. A minor quibble is the lack of a backlight on both the remote and the main unit, making image adjustment difficult in dim conditions.

But it's in a dimmed room, giving presentations or playing DVDs, where the XD200U really shines. Super-low noise levels lift the excellent viewing experience immeasurably. Another plus is that the shimmering effect on black backgrounds inherent with DLP projectors is almost absent here.

Two missing features are economy and auto-setup modes. However, the accurate response of the tracking and phase-synching features in the OSD menu provide an excellent image in no time. Plus, one bonus feature is the ability to reposition the OSD itself.

Ultimately, it's the exemplary image quality that brings the XD200U to the forefront in this Labs. It passed all but one test, which is an amazing achievement. Add the high build quality and plentiful features, and it's clear why the Mitsubishi XD200U wins this Labs.



NEC MultiSync

MT1050

PRICE £3,375 (£3,966 inc VAT)

SUPPLIER MJ Audio Visual 01243 780816

VERDICT A huge range of features mark the MT1050 out from the crowd.



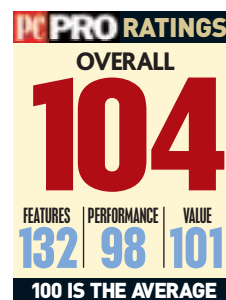
NEC and Eizo stand apart this month, opting for resident meeting room projectors rather than the more mobile offerings on show elsewhere. The MT1050 separates itself still further, thanks to a Type II PC Card slot and the built-in Presentation Viewer software, allowing PowerPoint presentations to be shown without the need for a notebook.

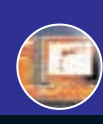
Yet another unusual design feature is that the unit can be tipped on its side for portrait mode presentation. Also, all four sides of the MT1050 sport infrared receivers, ensuring perfect response to the well-featured remote from any angle.

With all these factors in its favour, the MultiSync was well-placed to impress in our tests. We soon discovered it produced a well-focused image, especially at its native 1,024 x 768 resolution, although its keystone correction was less impressive.

Worse still were this projector's brightness measurements. Its result of 1,484 ANSI lumens suggested it was in its 1,700 lumens economy mode rather than the standard 2,100, but this wasn't the case. Nevertheless, even when switching to economy mode, the MultiSync was adequately bright for most situations, and this has the added benefit of reducing the noise output. This may be useful if you want to use the MT1050 in a home cinema situation.

A recent price drop brings the MT1050 in line with others on test, and the on-site warranty is the only one on offer here. Although the MultiSync can't rival the Eizo for brightness, its unique features make it one to consider.





Panasonic PT-L712NTE

PRICE £2,950 (£3,466 inc VAT)

SUPPLIER Avnet Applied Computing

01483 719505

VERDICT Wireless data transmission is unique, but poor image quality was disappointing.



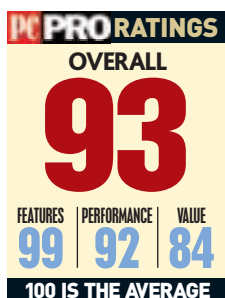
Wireless is the buzzword of the moment, and Panasonic embraces it with some aplomb via the PT-L712NTE. It's all thanks to the unit's PC Card slot and the wireless PC Card that Panasonic bundles, which combines – with a suitably equipped notebook – to offer the user a way of wirelessly transmitting slides.

Unfortunately, current wireless transmission bandwidths prohibit video transmission, so Panasonic supplies software to compress PowerPoint slides and other images into JPEGs for transmission. However, there can still be a delay of up to ten seconds in sending the slide from the notebook to it appearing on screen.

The PT-L712NTE features some other nice touches too. Most notably, its attractive design includes a discreet place to store the credit card-sized remote control. The remote's size inevitably prohibits the number of buttons, but there are no unforgivable omissions.

An auto-image setup button present on both the remote and main unit requires only a couple of presses to produce satisfactory results. Switching to economy mode dims the brightness – but not to detrimental standards – and the fan noise reduces appreciably. Along with the high-quality DVD playback, this makes the Panasonic ideal for home entertainment.

Sadly, though, the PT-L712NTE failed many of our image quality tests, including the basic geometry and focus checks, and it delivered some poor sharpness and resolution results. We also observed five blue spots in our test frame, most noticeable on a full black screen. These problems spoilt the Panasonic's chances this month.



Philips cBright XG2 Impact

PRICE £2,349 (£2,760 inc VAT)

SUPPLIER GBI 01908 340507

VERDICT Generally good image quality and reasonable sound levels at a tempting price.

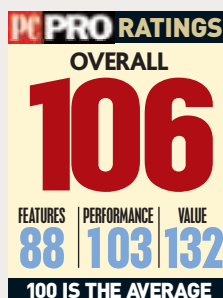


Philips' XG2 immediately appeals with its silver casing and clean design, as do the translucent plastic ring surrounds that light up in the dark for easy navigation. However, as a consequence of overdesign, perhaps, the lens' zoom and focus adjusters aren't very ergonomic.

Some thoughtful design is more obvious with the OSD menu, which is simple yet functional. It's easy to navigate, thanks to graphical icons that make the brief text explanations obvious. One letdown, however, was the reliance on a translucent OSD as opposed to simply offering a reposition option.

In the image quality tests, our only concerns were over some blooming, which led to the XG2 failing the horizontal resolution test. However, the colour representation was stunning, with perfect uniformity from each of the red, green and blue screen tests. The XG2 also managed a clean sweep in the text colour combinations and was one of the few projectors to produce excellent keystone-corrected moiré results.

During DVD playback, the excellent colours and smooth movement, combined with the relatively low noise levels, helped affirm this projector's claims for home entertainment, as do the tempting price and bundling of a smart adaptor. Its excellent all-round image quality should also appeal to the cost-conscious business buyer.



Plus U2-1150

PRICE £2,800 (£3,290 inc VAT)

SUPPLIER MJ Audio Visual 01243 780816

VERDICT Disappointing brightness and contrast levels hinder this projector's use, but modest size and reasonable image quality are in its favour.



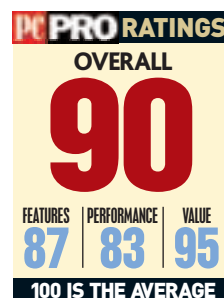
Plus ambitiously chose to rate the U2-1150 with an absolute contrast ratio of 800:1.

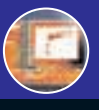
While our measurements showed all other manufacturers' claims were within reasonable boundaries, the results for the Plus came in at 150:1 with consequently low-contrast grid ratios too (see *Performance analysis*, p78). We also found the Plus had the lowest brightness levels on test – 1,054 ANSI lumens against the claimed 1,500 – so we checked the lamp counter and were bemused to find that it claimed to be brand new, with just one hour recorded.

Thankfully, the brightness and contrast levels didn't affect image quality, and focusing and sharpness were near perfect. It was only in the keystone-corrected tests that some concerned eyebrows were raised, with the Plus failing all the tests.

We also found its auto-image setup to be unsatisfactory, with manual adjustment required to produce an acceptable image. Unfortunately, this was hindered by the poor response of the remote control's rubber keys and the relatively slow response of the basic OSD menu. This was despite infrared receivers on the front and back of the unit, as with most of the products on test.

On a more positive note, the Plus is well constructed, with obvious and smooth focus and zoom rings. Measuring only 235 x 58 x 297mm (W x H x D) and weighing just 2.6kg, its relative portability means it can be easily taken around the office or on the road. However, home entertainment fans shouldn't consider the Plus. Although it performed well when playing back DVDs, it was simply too noisy.





Sanyo PLC-XU35

PRICE £3,200 (£3,760 inc VAT)

SUPPLIER MJ Audio Visual 01243 780816

VERDICT Solid image quality and excellent brightness. Add the motorised zoom and good looks, and this projector will lend kudos to any meeting room.



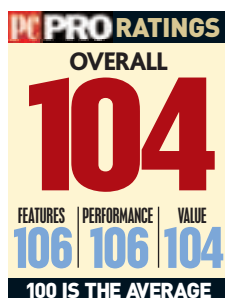
Sanyo's projector is one of the smartest units on test, with its two-tone finish and a fetching green carry case. The PLC-XU35 is also built to last, with a strong side carry handle that belies its diminutive proportions.

The image adjustment controls on the unit are tidily enclosed and there are four LED indicators for temperature and lamp-replacement warnings, as well as readiness indicators and lamp. The motorised zoom and focus controls can be accessed from dedicated buttons on the main unit and, more usefully, through the well-featured remote.

The auto-image setup feature was near perfect; a good thing, as the OSD menu is over-complicated, relying mostly on obscure icons rather than text. Having said that, all the features you could ask for are there.

During the image quality tests, the PLC-XU35's excellent brightness was immediately apparent – we measured it at 1,819 ANSI lumens. It's just a shame there's no economy mode should you feel the full brightness isn't required at times. The greyscale tests were promising, highlighting good achievable contrast levels, although this didn't follow through to colour contrast, as the poor showing in the text combination tests proved.

As the unit was audibly quieter than the test room's air conditioning, we had high hopes for DVD playback. Colour representation was flawless, but the exceptional brightness caused a shimmering that couldn't be adjusted out. This projector is really for professional use, though and the motorised zoom, bright image and all-round quality make it ideal for the meeting room.



Sharp PG-C30XE

PRICE £3,295 (£3,872 inc VAT)

SUPPLIER MJ Audio Visual 01243 780816

VERDICT Excellent attention to design detail and relatively good image quality tests are offset by a poor warranty and high price.

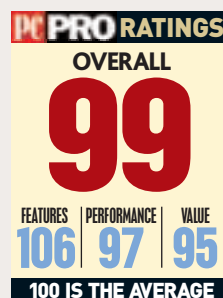


When it comes to paying attention to detail, the Sharp PG-C30XE leads the way. There's a spare air filter, and both the controls on the main unit and the remote light up to aid navigation in dim light. The remote was also one of the better featured in the test. It includes a laser pointer, an underside left mouse button and access to on-screen markers and pointers to assist in your presentation.

For initial setup, the auto-image feature produced superb results, with only a reduction in brightness required for an acceptably contrasted image. If you do need to use the OSD menu, the PG-C30XE again excels, with intuitive icons giving access to advanced functions. Another nice touch is the remote mouse receiver that sits by you to transmit the signals – ideal for ceiling-mounted scenarios.

During our image quality tests, the Sharp came through with a good set of results, failing just one check. However, it couldn't match the best on test, as its results tended to be solid rather than excellent. We measured brightness at 1,531 ANSI lumens, which compares well with the specified 1,700.

Acoustic levels were on a par with our relatively noisy air-conditioning unit, so despite the good DVD playback it shouldn't be top of your list for home use. We were also disappointed by the one-year warranty. However, what really prevents this unit from challenging for awards is its comparatively high price.



Toshiba TDP-T3

PRICE £3,495 (£4,107 inc VAT)

SUPPLIER Steljes 08000 151603

VERDICT Apparently identical to the InFocus LP530, but with better warranty and image quality results. Neither justifies the extra £500, though.



The Toshiba is almost identical to the InFocus LP530 – indeed, the internals and casing are shared. However, image quality results couldn't be further apart. Where the InFocus returned some disappointing results, the Toshiba was close to challenging the leaders. As wear and tear was discounted due to the LP530's relatively short operating life, the most likely cause is simply manufacturing variance.

It's not all roses for Toshiba, however, as during the brightness tests we noticed that the light levels occasionally dropped down by 10 per cent and then back again within a few seconds. This showed up in general viewing as an occasional dip in brightness in bright images such as the commonly projected black text on a white background. Thankfully, the large amount of light leakage we saw with the InFocus unit wasn't as obvious here.

As with the LP530, the remote control is small and lacking in features, with no laser pointer, underside mouse button or backlight. Plus, the OSD menu system again frustrates with its basic functionality and slow response.

Finally, the TDP-T3 showed a failing that was true of almost all the DLP projectors on test, in that a shimmering or sparkling could be observed in large areas of a single colour, although this shouldn't be noticeable when playing DVD movies. The low noise output in economy mode makes it a candidate for home entertainment use as well.

However, there are stronger contenders this month, such as the Philips XG2, that offer more for your money, meaning the TDP-T3 was some distance away from the awards.

