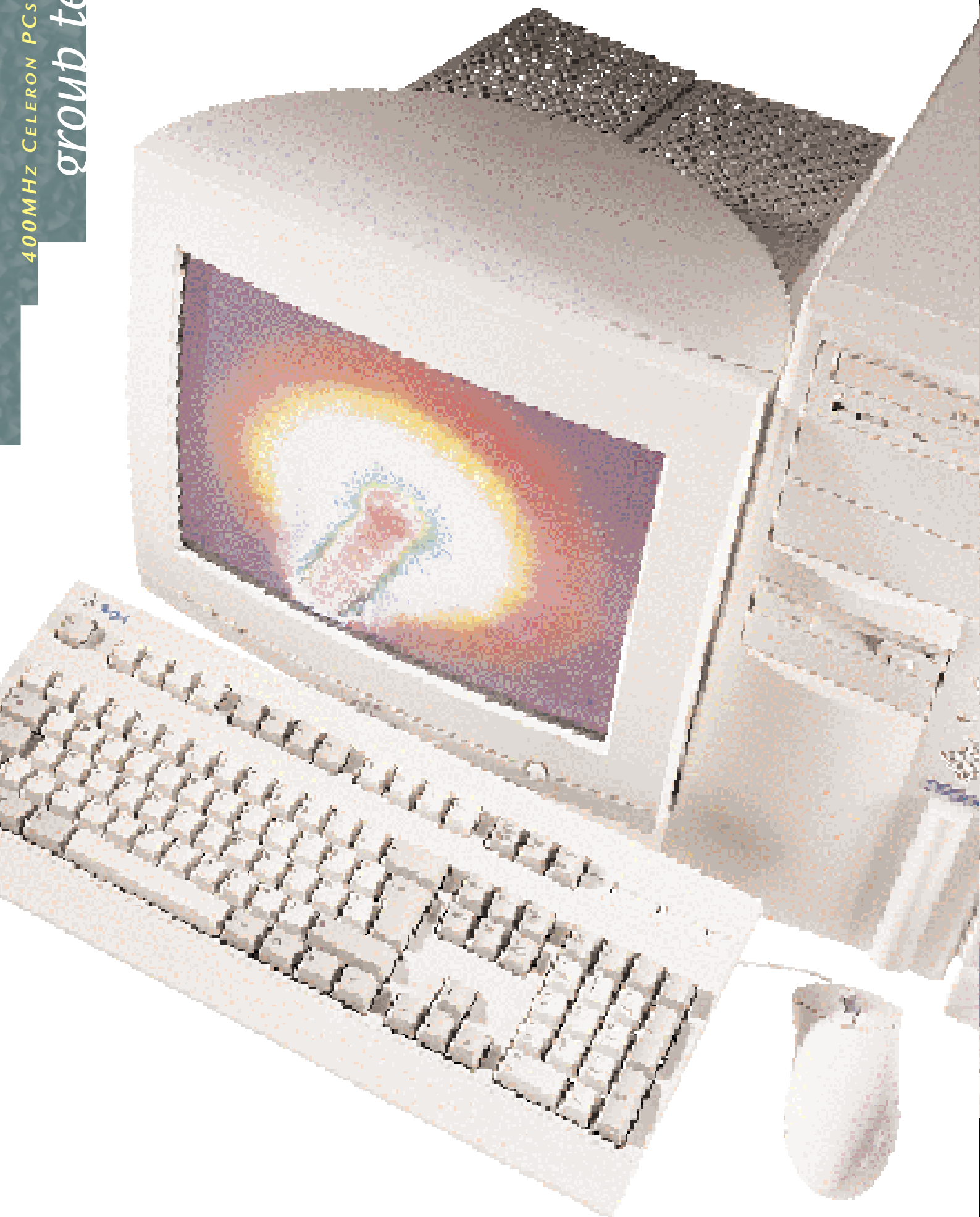
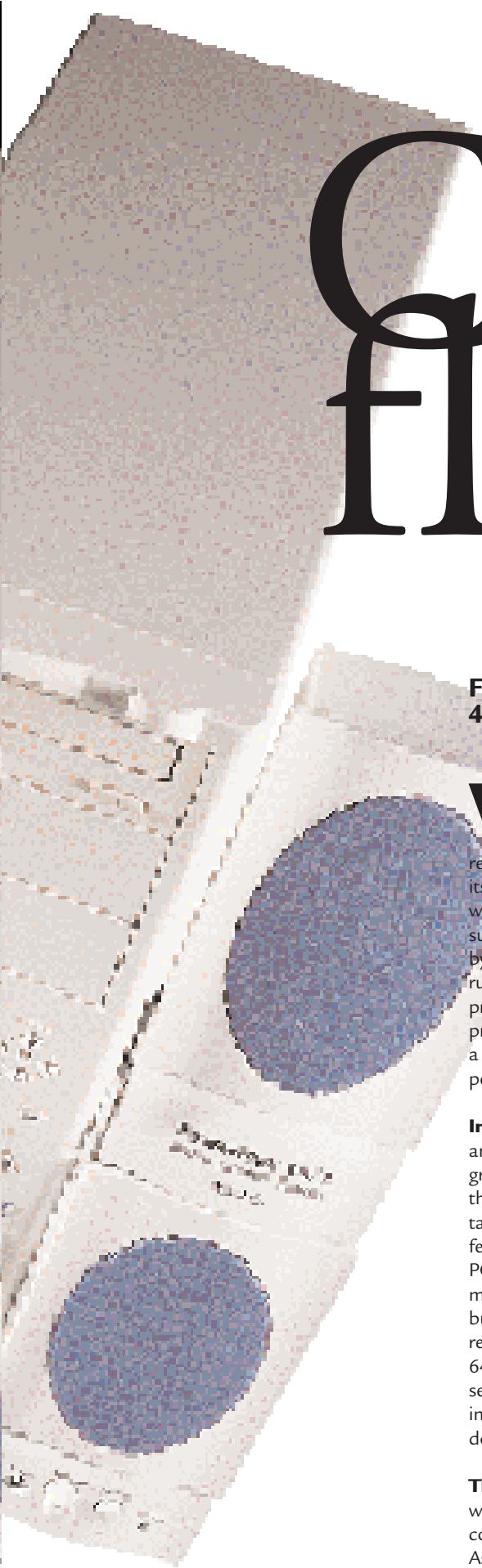




Cache flow

For the home and small-business user on a budget, these 400MHz Celeron systems offer high-quality solutions.

When Intel released the first CPU in its budget Celeron range, it had a cool reception from many quarters due to its lack of L2 cache. But this oversight was soon rectified in the 300A and all subsequent higher-clocked Celerons, by the inclusion of 128Kb of L2 cache running at the same core speed as the processor. Since then, the Celeron has proved to be a competent performer and a popular OEM choice, offering good performance at a budget price.

Intel recently introduced the 366MHz and 400MHz Celerons, and in this PC group test we test ten systems based on the 400MHz Celeron. As the Celeron is targeted at budget users, it is likely to feature in both home and small-business PCs. We therefore asked vendors for machines which would suit both the budget and the performance requirements of these users. We specified 64Mb of RAM and a 15in monitor, and set a maximum price limit of £799 including VAT. Any other hardware was down to the vendor.

The emphasis on judging these systems was firmly on ease of use, quality of components and value for money. As these PCs are expected to be used by relatively inexperienced users, we kept an eye out for the presence of well written setup manuals and other useful documentation. And, as always, we were looking for excellent build quality.

Contents

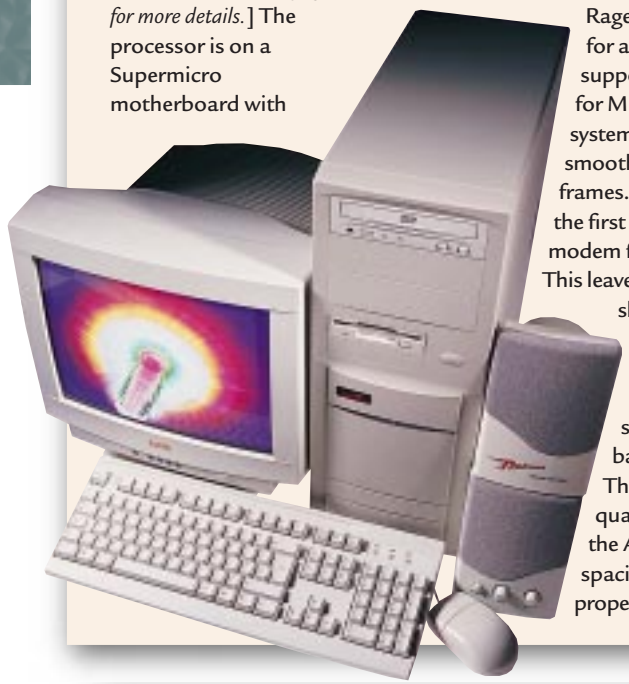
F *Tested and reviewed by Ajith Ram*

Ratings

★★★★★ **Highly recommended**
★★★★ **Great buy**
★★★ **Good buy**
★★ **Shop around**
★ **Not recommended**

Carrera **Gemini C400**

The Carrera system is the only one in this group to come with a Socket 370 Celeron 400 fitted into a Slot 1 riser card. This lets you put a Socket 370 processor into a standard Slot 1 motherboard. [*See page 149 for more details.*] The processor is on a Supermicro motherboard with the 440BX chipset, so the PC can be upgraded to all varieties of Intel CPU. The 64Mb of RAM comes in a single module, leaving two slots free for further upgrading. An ATi Xpert 98 with 8Mb of RAM takes up the AGP slot. The Rage Pro chipset is quite sufficient for a general-purpose PC and supports motion compensation for MPEG-2 playback, so the system's LG DVD will provide smooth playback without dropped frames. The SoundBlaster 64 sits on the first PCI slot. Next to this is a 56K modem flash upgradeable to V.90. This leaves two PCI and three ISA slots free for upgrading. A large 6.4Gb hard drive takes up one of the 3.5in bays just below the DVD drive, with a single 3.5in and two 5.25in bays left free for upgrading. The Gemini has very good build quality. Due to the large size of the ATX case, the interior is very spacious, with components properly secured and easy to access.



HIGHLY COMMENDED
PERSONAL COMPUTER WORLD

The 15in LG 57M monitor can support resolutions as high as 1280x1024 although not at a refresh rate you could look at for long. At a lower 1024x768, refresh rate is 70Hz. Image quality is very good and the controls are easy to use.

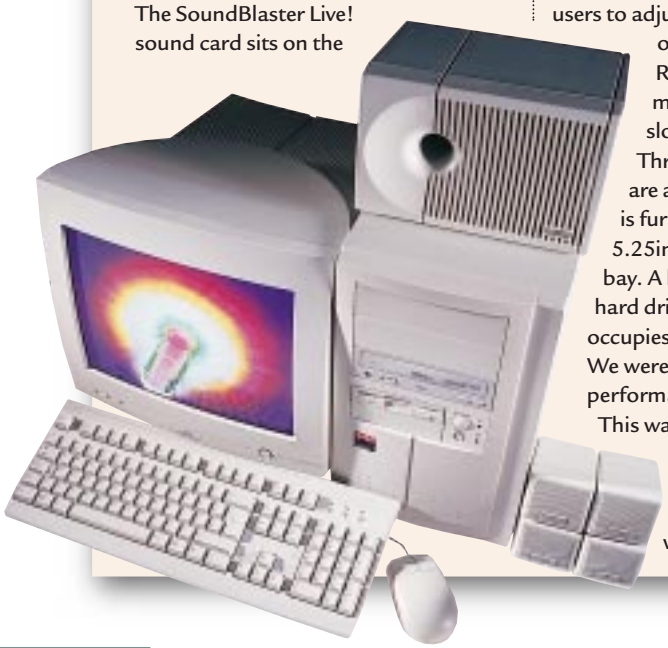
PCW DETAILS

Price *£799 (£680 ex VAT)*
Contact *Carrera 0181 307 2800*
www.carrera.co.uk
Good Points *Excellent build quality. Easily upgradeable.*
Bad Points *Documentation not comprehensive.*
Conclusion *A well-equipped system.*

Build Quality	★★★★
Performance	★★★
Value for Money	★★★★
Overall Rating	★★★★

Dabs Direct **Atlantis 3D**

The graphics display on the Atlantis is provided by the 3D Blaster Banshee from Creative Labs. An impressive performer in 3D applications, it provides sharp images at high resolutions. The 3D Blaster has 16Mb of RAM, but unlike the TNT chipset does not support full 32-bit colour. The SoundBlaster Live! sound card sits on the first PCI slot, and a generic 56K PCI modem which supports the V.90 standard is also included. All these components sit on the equally impressive Abit BH6 motherboard. The dream motherboard of overclockers the world over, the BH6 provides a CPU Soft Menu in the BIOS, which allows users to adjust CPU speed without opening the PC. 64Mb of RAM comes in a single DIMM module, leaving two DIMM slots free for upgrading. Three PCI and two ISA slots are also left free. Upgradeability is further enhanced by two free 5.25in bays and a single 3.5in bay. A large 6.4Gb Maxtor hard drive spinning at 7200rpm occupies the second 3.5in bay. We were impressed by the performance results of the Atlantis. This was the fastest PC in our SYSMark 98 tests, and graphics performance in the 3DMark tests was also impressive.



The 15in ADI ProVista monitor provides crisp images at a resolution of 800x600 while sustaining a refresh rate of 85Hz. Clarity and refresh rates both fall dramatically at higher resolutions, down to just 70Hz at 1024x768.

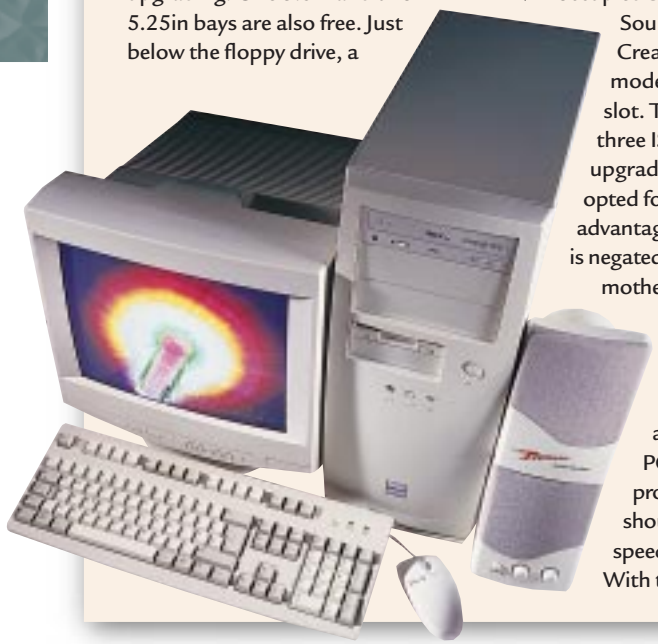
PCW DETAILS

Price *£799 (£680 ex VAT)*
Contact *Dabs Direct 0800 558866*
www.dabs.co.uk
Good Points *High performance. Good-quality components.*
Bad Points *Little documentation.*
Conclusion *A fast PC with good components.*

Build Quality	★★★
Performance	★★★★
Value for Money	★★★★
Overall Rating	★★★★

DCS **Business**

DCS provided a high-quality PC for this group test. The excellent manual is exhaustive, and a two-hour video on Windows 98 is also provided. 64Mb of RAM occupies a single DIMM slot, leaving two free for upgrading. One 3.5in and two 5.25in bays are also free. Just below the floppy drive, a Creative Labs 36X CD-ROM occupies one of the 5.25in bays. A large 6.4Gb Fujitsu hard drive is in another 3.5in bay. The Matrox Millennium G200 with 8Mb of memory provides excellent 2D and 3D display, the first PCI slot is occupied by the powerful SoundBlaster Live! from Creative Labs, and a Jetway 56K modem takes up another PCI slot. This leaves two PCI and three ISA slots empty for further upgrading. Although DCS has opted for a Slot 1 Celeron, the advantage is negated by the Supermicro motherboard with Intel's BX chipset. This chipset supports a bus speed of 100MHz so the PC can be upgraded to faster Celerons and Pentiums. And with the PC100 RAM, replacing the processor with a Pentium should bring much faster bus speeds. Build quality is excellent. With the IDE cables tucked well away from the hot components, air circulation is unhindered.



The 15in Samsung monitor provides impressive image quality at 1024x768 with a refresh rate of 70Hz, rising to 75Hz at 800x600. The controls are intuitive and easy to use.

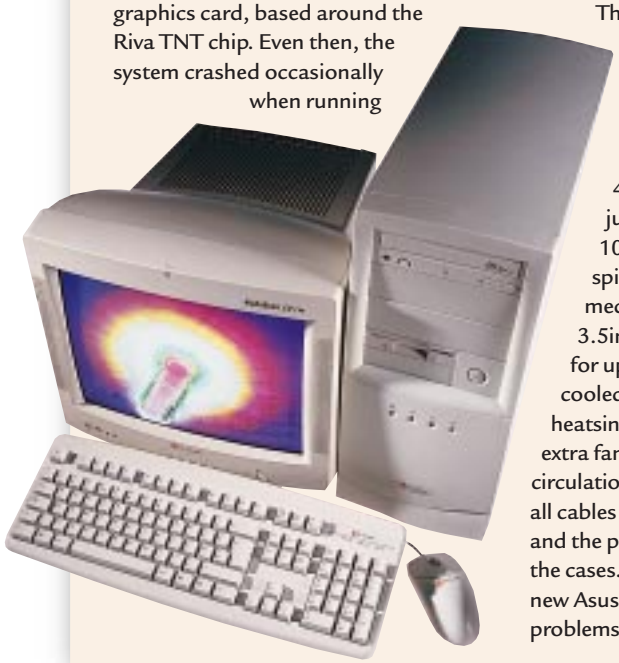
PCW DETAILS

Price *£799 (£680 ex VAT)*
Contact *DCS 0121 414 7575*
www.dcsplc.co.uk
Good Points *Excellent build quality. Useful manual and video. Good performance and components.*
Bad Points *Not easily upgradeable to a Pentium CPU.*
Conclusion *A well-built PC let down slightly by the choice of motherboard.*

Build Quality	★★★★
Performance	★★★
Value for Money	★★★
Overall Rating	★★★

Hi-Grade **Ultis PV2 400**

We initially encountered problems with this Hi-Grade PC, as it would not reboot. A few phone calls to the manufacturer later, the solution arrived in the form of a new BIOS for the Asus graphics card, based around the Riva TNT chip. Even then, the system crashed occasionally when running graphics applications. The Ultis has a Slot 1 Celeron sitting on an Asus P2B motherboard. The TNT graphics card comes with 16Mb of RAM and occupies the AGP slot. The high-fidelity SoundBlaster Live! from Creative Labs, along with a PCI modem, take up two PCI slots. This leaves another two PCI and three ISA slots free. An Asus 40X CD-ROM is included, and just below it sits a large, fast 10Gb Maxtor hard drive spinning at 7200rpm. Despite the medium size of the ATX case, two 3.5in and 5.25in bays are available for upgrading. The CPU itself is cooled by the standard Celeron heatsink and fan, plus there are two extra fans to provide adequate air circulation. Build quality is good, with all cables neatly clipped out of place and the power supply unit well inside the cases. However, the inclusion of the new Asus card did create certain problems in the software configuration.



These should be sorted out by now, but do check this if you want the Asus card.

The 15in Sampo monitor has a flicker-free refresh rate of 70Hz at a resolution of 1024x768, rising marginally to 75Hz at 800x600. The controls are intuitive and image quality is acceptable.

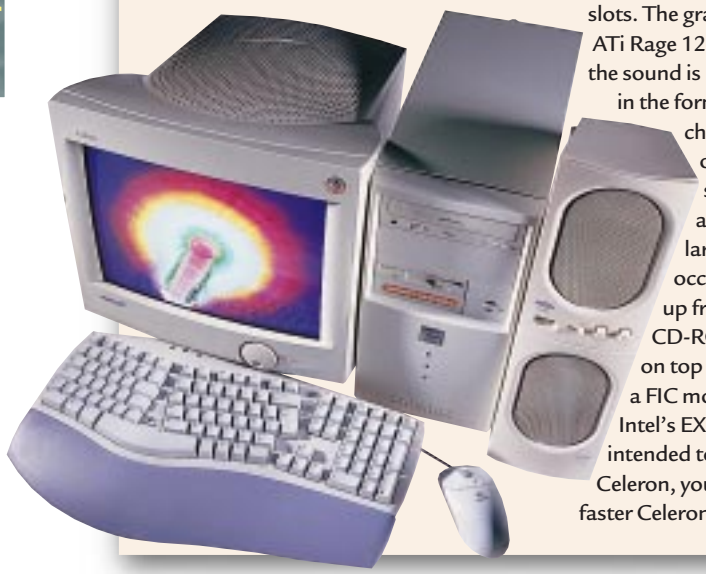
PCW DETAILS

Price *£799 (£680 ex VAT)*
Contact *Hi-Grade 0181 532 6123*
www.higrade.com
Good Points *High graphics performance. Decent monitor.*
Bad Points *Initial problems with the graphics card.*
Conclusion *A decent system let down by teething problems with the graphics card.*

Build Quality	★★★
Performance	★★★
Value for Money	★★★★
Overall Rating	★★★

Impact **High Impact**

When we first turned on the High Impact, it wouldn't boot up. We tracked down the problem to a loose-fitting CPU: the Slot 1 Celeron had not been properly secured and so had a tendency to wobble. Build quality is generally disappointing. In addition to the loose CPU, the interior is a litle overcrowded. The problems did not end there, however. After booting up, we had difficulty benchmarking the system. We found over 15 programs running in the background, including Internet Explorer, PC Cillin anti-virus and Lotus SmartSuite functions. These, along with Windows 98, took up a large chunk of the system resources. 64Mb of RAM occupies one of only two DIMM slots. The graphics card is the powerful ATi Rage 128GL with 16Mb RAM, and the sound is built into the motherboard in the form of the Yamaha OPL3 chipset. A 56K modem occupies one of the PCI slots, leaving a single PCI and two ISA slots free. A large 8.4Gb IBM hard drive occupies one of the 3.5in bays up front, and a 32X Samsung CD-ROM sits on the 5.25in bays on top of it. The High Impact has a FIC motherboard which uses Intel's EX chipset. As this chipset is intended to work only with the Celeron, you could only upgrade to a faster Celeron, not to a Pentium II. The BX chipset, which supports front-side bus speeds of 100MHz for faster RAM access and works with both Celeron and Pentium II, might be a better choice.



The Mag XJ530 monitor has good picture quality at all resolutions. The refresh rate is a flicker-free 75Hz at 1024x768, rising to 85Hz at 800x600.

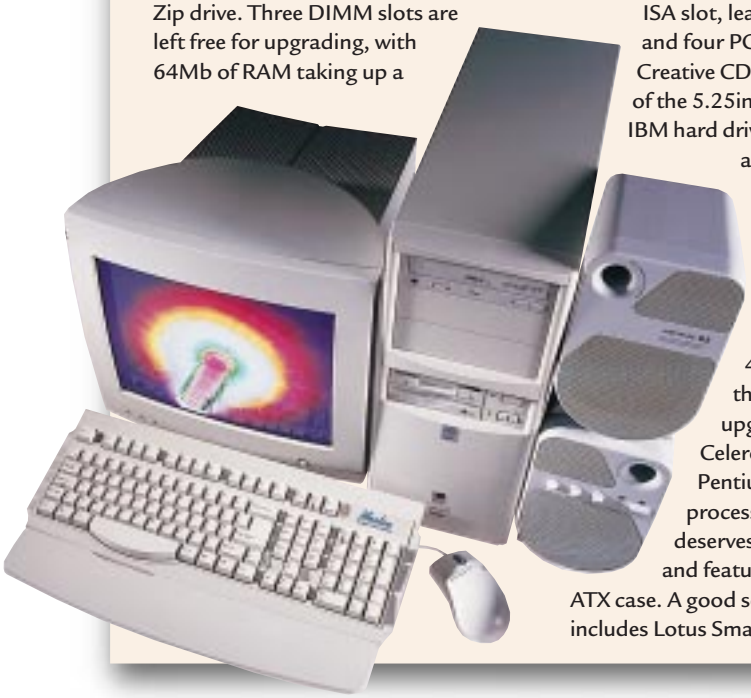
PCW DETAILS

Price *£799 (£680 ex VAT)*
Contact *Impact 0800 833157*
www.impact-net.co.uk
Good Points *High graphics performance. Good software package.*
Bad Points *Poor software installation. Loose CPU. Poor build quality.*
Conclusion *Failed to make an impact.*

Build Quality	★★
Performance	★★★
Value for Money	★★★
Overall Rating	★★★

Mertec **Merit C400**

Mertec has always provided high-quality PCs for our group tests, and the Merit C400 did not disappoint. Built around a Slot 1 Celeron, it is the only PC in this test to come with an Iomega Zip drive. Three DIMM slots are left free for upgrading, with 64Mb of RAM taking up a single slot. The Matrox Millennium G200 sits in the AGP slot, and the SoundBlaster PCI 128, one of the few PCI sound cards with two outputs, is included. A 56K modem takes up an ISA slot, leaving a single ISA and four PCI slots free. A 36X Creative CD-ROM occupies one of the 5.25in bays. A huge 8.3Gb IBM hard drive takes up an adjacent internal 3.5in bay, leaving another 3.5in and two 5.25in bays free. The FIC motherboard sports Intel's SE 440BX chipset, so the Merit can be easily upgraded to faster Celerons as well as Pentium II or Pentium III processors. Build quality deserves special mention and features a well-ventilated ATX case. A good software bundle includes Lotus SmartSuite Millennium, IBM Via Voice and the Microsoft Consumer Value pack.



The 15in ADI Pro Vista monitor provides excellent image quality. It supports a refresh rate of 85Hz at 800x600 resolution, dropping to 70Hz at 1024x768.

PCW DETAILS

Price *£799 (£680 ex VAT)*
Contact *Mertec 01792 473700*
www.mertec.co.uk
Good Points *Excellent build quality. Large hard drive. Zip drive.*
Bad Points *None.*
Conclusion *An extremely competent system for home or office use.*

Build Quality	★★★★
Performance	★★★★
Value for Money	★★★★
Overall Rating	★★★★★

Mesh **Elite 400 CE**

HIGHLY COMMENDED Personal Computer World

The Elite 400CE is an excellent performer with high-quality components. Built around a Slot 1 Celeron, the Mesh system has 64Mb of RAM in a single DIMM module, leaving two DIMM slots free for upgrading. The Intel motherboard uses the SE 440BX chipset, so the Elite is easy to upgrade to Pentium II or Pentium III. The display is driven by the excellent Matrox Millennium G200 graphics card. Its high 250Hz Ramdac provides high resolutions without flickering, while its 2D and 3D image quality is among the best provided by any graphics card.

The SoundBlaster PCI 64 chipset is built onto the Intel motherboard, which frees up a slot but makes upgrading tricky. One of the PCI slots is filled by a 56K modem, leaving two PCI and three ISA slots free.

The Elite 400CE has a 32X Teac CD-ROM and a massive 8.4Gb Western Digital hard drive. With an average access time of 9ms, the drive is fast enough for home or office use.

The build quality of the Mesh system is outstanding, with all components enclosed in a large ATX case. With the power supply unit and cables tucked out of the way, the interior is easy to access. A setup manual is provided.

The 15in ADI Provista E44 monitor is more than capable of handling the sharp images produced by the graphics card. Its refresh rate is a decent 70Hz at a high resolution of 1024x768, and the controls are easy to manipulate.

PCW DETAILS

Price *£799 (£680 ex VAT)*
Contact *Mesh 0181 208 4706*
www.meshplc.co.uk
Good Points *Good-quality components. Useful manual.*
Bad Points *Sound on the motherboard.*
Conclusion *A fast system with build quality to match.*

Build Quality	★★★★★
Performance	★★★★
Value for Money	★★★★
Overall Rating	★★★★

Nebraska **HQ Multimedia MT PC400**

The MT PC400 comes in a rather cute-looking case with colourful switches at the front. Inside, a Slot 1 Celeron sits on an Abit BX6 motherboard which uses the Intel 440BX chipset. Therefore, it supports Pentium II and Pentium III processors as well as front-side bus speeds higher than 66MHz. This new Abit board can even support speeds up to 133MHz with an 8X multiplier, so in theory at least, it can support CPUs faster than 1GHz. All five PCI slots are free. The AWE 64 sound card and the modem are ISA devices. The display is provided by a QDI Legend graphics card with the Rendition V2200 chipset.

Although it supports 32-bit colour, it is not a brilliant performer. The 6.4Gb hard drive is from Fujitsu and the Creative 36X CD-ROM takes up a 5.25in bay above it, leaving one 3.5in and two 5.25 in bays free.

The interior of this system is a world apart from its eye-catching exterior. The IDE and power cables are coiled together inseparably, and the hard-drive cable had found its way around the lone DIMM module. And in addition to background applications eating up system resources, DirectX 6 had not been installed.

The 15in monitor has large, pushbutton controls and on-screen menus. Refresh rate is a flicker-free 75Hz at 800x600, dropping slightly to 70Hz at 1024x768.

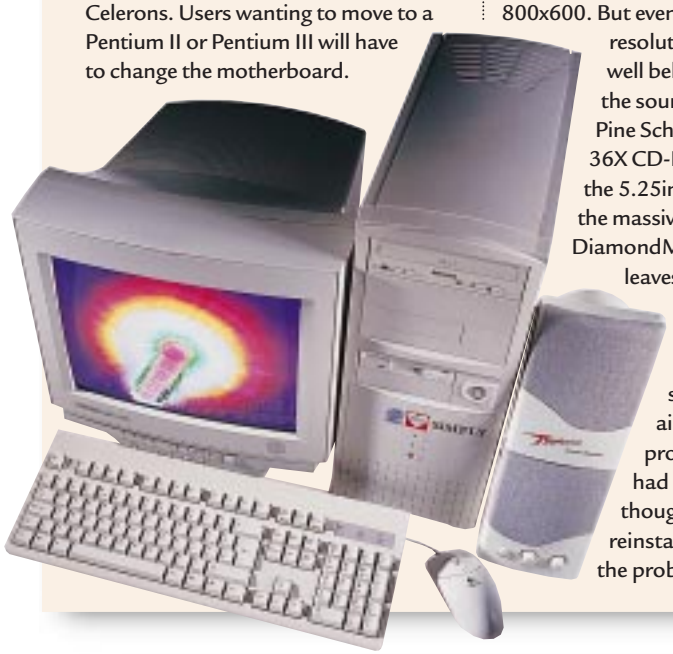
PCW DETAILS

Price *£799 (£680 ex VAT)*
Contact *Nebraska 0171 702 0702*
www.nebraska.co.uk
Good Points *Good monitor. Motherboard.*
Bad Points *Poor build quality. No PCI devices.*
Conclusion *Disappointing in most areas.*

Build Quality	★★
Performance	★★
Value for Money	★★★
Overall Rating	★★

Simply **Power 400 PPGA**

The Simply Power 400 PPGA is the only PC in this group to have Intel's new Socket 370 Celeron. The motherboard is from Supermicro and has the new ZX-66 chipset. Although adequate for running the Celeron, it does mean that upgradeability is limited to faster Celerons. Users wanting to move to a Pentium II or Pentium III will have to change the motherboard.



Upgradeability is further limited by the single free PCI and ISA slots. 64Mb of RAM comes in a single DIMM module, leaving two slots free, and a Diamond SpeedStar A70 graphics card sits in the AGP slot. Despite its 8Mb RAM, 3D resolutions are limited to 800x600. But even at this lower resolution, performance is well below average. Similarly, the sound card is the modest Pine Schubert Solo. A Philips 36X CD-ROM takes up one of the 5.25in bays, and below it is the massive 10Gb Maxtor DiamondMax hard drive. This leaves one 3.5in and two 5.25in bays free. Build quality is above average. In spite of only one fan, air circulation is not a problem. The Power 400 had difficulty rebooting, though, and we had to reinstall Windows to rectify the problem. On the plus side, Simply does provide a good software bundle which includes Corel WordPerfect Suite 8 and some games.

The 15in Taxan monitor supports a refresh rate of 70Hz at 1024x768 and its image quality is excellent. The pushbutton controls with on-screen menus are easy to learn and use.

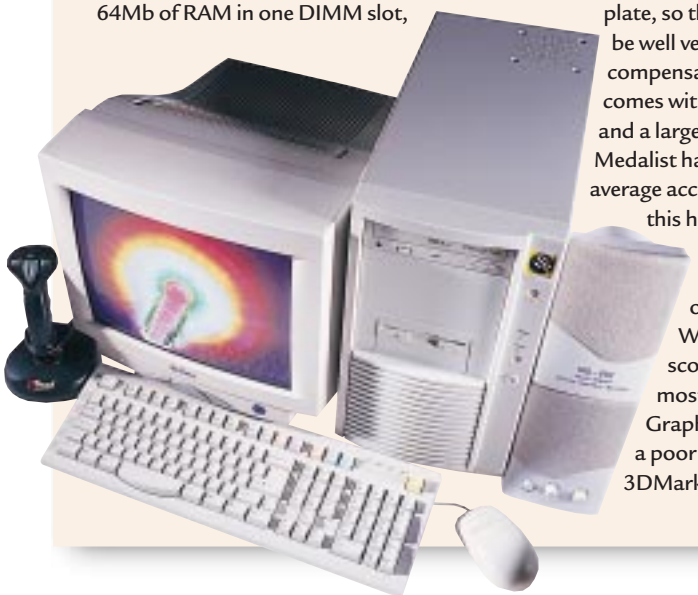
PCW DETAILS

Price *£799 (£680 ex VAT)*
Contact *Simply Computers 0181 498 2130 www.simply.co.uk*
Good Points *Large hard drive. Good monitor.*
Bad Points *Poor graphics performance. Limited upgradeability.*
Conclusion *Excellent in parts, disappointing in others.*

Build Quality	★★★
Performance	★★
Value for Money	★★★
Overall Rating	★★★

Strand **3D Plus**

Immediately after setting up the 3D Plus, we encountered a problem with the ATi Rage II graphics card. Strand had apparently not installed the latest drivers for Windows 98 and DirectX 6 for this card. As the Rage II is now a relatively old chipset, its image quality is also well below more recent offerings like the Matrox G200. The 3D Plus has 64Mb of RAM in one DIMM slot, leaving three slots free. There are also two 3.5in and 5.25in bays free. The Chaintech motherboard uses the 440BX chipset from Intel, so the 3D Plus is easy to upgrade to other, more powerful Intel CPUs. The SoundBlaster PCI 64 chipset is built on to the board. The Slot1 Celeron has a heatsink without the common heat-conducting graphite back plate, so the case will need to be well ventilated to compensate. The 3D Plus comes with a 36X CD-ROM and a large 4.3Gb Seagate Medalist hard drive. With an average access time of 11ms, this hard drive was a factor in lowering the performance of the Strand system. With a SYSMark 98 score of 147, it trails most other PCs. Graphics is worse, with a poor score of 310 in 3DMark 99.



The 15in Belinea 10 20 10 monitor has excellent picture quality, with a refresh rate of 70Hz at 1024x768. However, the controls are extremely difficult to understand and operate.

PCW DETAILS

Price *£799 (£680 ex VAT)*
Contact *Strand Computers 01392 860077 www.strand.co.uk*
Good Points *Large ATX case. Decent build qualit.y*
Bad Points *Poor system and graphics performance. Improper driver installation. Slower hard drive than others in this test.*
Conclusion *A slow PC with average-quality components.*

Build Quality	★★★
Performance	★★
Value for Money	★★★
Overall Rating	★★★

Celeron **processor:**
the best choice for your PC?

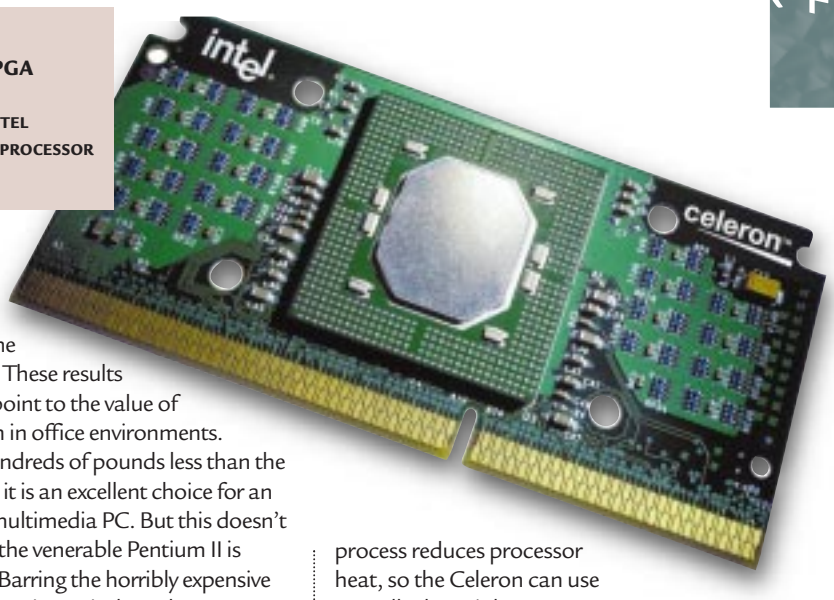
Early last year, the first batch of Celerons was released at clock speeds of 266MHz and 300MHz. Although in terms of clock speed they were only slightly slower than their Pentium II counterparts, performance in business applications left much to be desired because the early Celerons did not have a L2 cache. Business applications like Excel use the L2 cache to store frequently accessed data. Without it, the CPU had to retrieve the data from system RAM, which takes longer than fetching it from the cache memory.

Intel rectified this ommission when it introduced the Celeron 300A, which has 128Kb of L2 cache on the processor die itself. More importantly, this cache runs at the same core clock speed as the CPU. The Pentium II has 512Kb of L2 cache, but it only runs at half the core speed of the processor.

With the introduction of the 400MHz Celeron, the clock speed gap between Intel's premium and budget CPUs has narrowed dramatically. It also brings into sharp focus the performance difference between the Celerons and the Pentium IIs. Our lab tests show that Celerons and Pentium IIs of the same clock speed have virtually identical performance. In most business applications like Excel and PowerPoint, the cheaper Celerons matched the more expensive Pentium IIs. In some games, the Celeron is actually slightly faster.

It brings into sharp focus the performance difference between the Celerons and the PIIs

At first glance, this high performance may be rather surprising. However, a closer look at the design of the two CPUs helps to identify the reasons. Both the Celeron and the Pentium II are based on the same Deschutes core, which means that their integer and floating-point units are identical. Therefore, the only difference is the L2 cache on the CPUs. Our tests show that 128Kb of L2 cache on the Celeron running at full CPU speed is more than a match for the 512Kb half-speed cache on the Pentium II. These results inevitably point to the value of the Celeron in office environments. Costing hundreds of pounds less than the Pentium II, it is an excellent choice for an all-round multimedia PC. But this doesn't mean that the venerable Pentium II is worthless. Barring the horribly expensive Xeon, the Pentium II is the only x86 CPU capable of running in multiprocessor configurations. This makes it an excellent choice for dual-processor workstations and entry-level servers. The Pentium II's support for the 100MHz front-side bus counts in its favour. The full range of Celeron processors is provided in the single edge processor package (SEPP) also known as Slot 1, while 400, 366, 333 and 300A megaherz processors also come in a plastic pin grid array (PPGA) form factor. PPGA is compatible with the Socket 370, a new socket which looks like Socket 7 but with an extra row of pins. Socket 370 is proprietary and Super/Socket 7 chips such as AMD's K6-2 are not pin compatible. In this test, all but one of the vendors opted for Slot 1 as the more readily upgradeable.



▶ **The PPGA version of the Intel Celeron processor**

The SEPP packaging technology is very similar to the Pentium II's single edge contact (SEC) cartridge, but without the PII's BSRAM componentry, it is much cheaper to produce. It does not have a thermal plate or cover, although Intel claims the 0.25 micron manufacturing process reduces processor heat, so the Celeron can use a smaller heatsink.

The Celeron is Intel's answer to AMD's K6-2, which has 21 3D Now! instructions that help to improve floating-point performance. To get this improved performance, applications had to be specifically written to take advantage of the instructions. The performance of the K6-2 varies greatly depending on whether the applications used are 3D-Now! compatible or not.

The K6-2 runs on a Super 7 motherboard with a 100MHz bus speed, and like the Pentium II, the K6-2 has 512Kb of L2 cache. But unlike Intel's CPU, the speed of this L2 cache is tied to the front-side bus speed of the motherboard. As the Pentium II's clock speeds increased, the speed of its L2 cache increased correspondingly. But the speed of the cache on the K6-2 remained locked at around 100MHz.

Intel's Pentium III is already available in 450MHz and 500MHz clock speeds, and has 70 new instructions which enhance floating-point performance. AMD, meanwhile, has just released its K6-3 processor. This has 256Kb of on-die L2 cache which runs at the same speed as the CPU, so removing one of the limitations which beset the K6-2.

Ajith Ram and Ian Robson

Table of features

Manufacturer	Carrera	Dabs Direct	DCS	Hi-Grade	Impact Systems
Model	**Gemini C400**	**Atlantis 3D**	**Business PC**	**Ultis PV2 400**	**High Impact**
Price (ex VAT)	£680*	£680*	£680*	£680*	£680*
Price (inc VAT)	£799*	£799*	£799*	£799*	£799*
Telephone	0181 307 2800	0800 558866	0121 414 7575	0181 532 6123	0800 833157
Fax	0181 307 2850	0870 129 7000	0121 414 7565	0181 532 6110	01527 576025
URL	www.carrera.co.uk	www.dabs.com	www.dcsplc.co.uk	www.higrade.com	www.impact-net.co.uk
Main specification					
Processor	Celeron 400MHz	Celeron 400MHz	Celeron 400MHz	Celeron 400MHz	Celeron 400MHz
RAM	64Mb PC100	64Mb PC100	64Mb	64Mb PC100	64Mb
No of DIMM slots occupied/free	1/2	1/2	1/2	1/2	1/1
Hard disk manufacturer	IBM 6.4Gb	Maxtor 6.4Gb	Fujitsu 6.4Gb	Maxtor 10Gb	IBM 8.4Gb
Hard disk access time/interface	11ms / IDE	9ms / IDE	10ms / IDE	9ms / IDE	9ms / IDE
Motherboard components					
Motherboard	Supermicro SBA	Abit BH6	Supermicro P6SBA	Asus P2B	FIC EX VL603
Chipset	Intel 440BX	Intel 440BX	Intel 440BX	Intel 440BX	Intel 440EX
L2 cache/Max cache	128Kb/128Kb	128Kb/128Kb	128Kb/128Kb	128Kb/128Kb	128Kb/128Kb
I/O					
No of spare 3.5in / 5.25 bays	1 / 2	1 / 2	1 / 2	2 / 2	1 / 1
No of PCI only/ISA only/shared slots	3 / 3 / 1	4 / 2 / 1	3 / 3 / 1	3 / 3 / 1	2 / 2 / 1
No of USB/serial/parallel/PS2 ports	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2
Multimedia					
CD-ROM/DVD drive	LG 2X DVD	Creative Labs 36X	Creative Labs 36X	Asus CD-5400	Samsung SCR-3232
CD-ROM/DVD speed/interface	20X / IDE	36X / IDE	36X / IDE	40X / IDE	32X / IDE
Sound card	CL SoundBlaster PCI 64	CL SoundBlaster Live! Value	CL SoundBlaster PCI 64	CL SoundBlaster Live! Value	Yamaha OPL3-Sax
Speakers	Turando	CL Four Point Surround	Typhoon	On monitor	Platinum sound P5630
Graphics and Monitor					
Graphics card	ATi Xpert 98	Creative Labs 3D Blaster	Matrox Millennium G200	Asus V3400TNT	ATi Fury Rage 128GL
Graphics card interface	AGP	AGP	AGP	AGP	AGP
Graphics card RAM/Max RAM	8Mb/8Mb	16Mb/16Mb	8Mb/16Mb	16Mb/16Mb	16Mb/32Mb
Monitor	LG 57M	ADI ProVista E44	Samsung CXK15E	Sampo 711m	Mag XJ530
Monitor size	15in	15in	15in	15in	15in
Max refresh rate at 800x600	75Hz	85Hz	80Hz	75Hz	85Hz
Max refresh rate at 1024x768	70Hz	70Hz	70Hz	70Hz	75Hz
Bundled Extras					
Modem	Generic Rockwell 56K	Generic Rockwell 56K	Jetway 56K	Accord	Generic Rockwell 56K
Modem-highest supported standard	V.90	V.90	V.90	V.90	V.90
Other hardware					
Other software	Lotus SmartSuite Millennium IBM Via Voice	Lotus SmartSuite 97 plus 13-title pack		Norton anti-virus Lotus SmartSuite Millennium Home multimedia pack	Lotus SmartSuite 97
Service and Support					
Sales hours	M-F 9-6, 10-6 Sat	M-T 8-8, F 9-5, Sat 9-3, Sun 10-3	M-F 9-5.30, Sat 10-4	Mon-Fri 9am - 5.30pm	M-F 9-6, Sat 10-2
Standard warranty	1 yr parts, 3 yrs labour RTB	1 yr OSM + 4 yrs labour only RTB	5 yrs RTB, 1 yr parts	1 yr on-site	1 yr on-site, 4 yrs labour RTB
Warranty options	1 yr OSM £39	3 yrs OSM £149		3 yrs on-site £95	3-5 yrs on-site
Technical support	Lifetime	Lifetime	Lifetime	Lifetime	Lifetime

* All prices correct for the on-sale period of *PCW* May 99. All prices exclude delivery.

Table of features





Manufacturer	Mertec	Mesh	Nebraska	Simply	Strand
Model	**Merit C400**	**Elite 400CE**	**HQ MT PC400**	**Power 400 PPGA**	**3D Plus**
Price (ex VAT)	£680*	£680*	£680*	£680*	£680*
Price (inc VAT)	£799*	£799*	£799*	£799*	£799*
Telephone	01792 473700	0181 208 4706	0171 702 0702	0181 498 2130	01392 860077
Fax	01792 473887	0181 208 4493	0171 702 0808	0181 523 4002	01392 860220
URL	www.mertec.co.uk	www.meshplc.co.uk	www.nebraska.co.uk	www.simply.co.uk	www.strand.co.uk
Main specification					
Processor	Celeron 400MHz	Celeron 400MHz	Celeron 400MHz	Celeron 400MHz	Celeron 400MHz
RAM	64Mb PC100	64Mb PC100	64Mb PC100	64Mb PC100	64Mb PC100
No of DIMM slots occupied/free	1/3	1/2	1/3	1/2	1/3
Hard disk manufacturer	IBM 8.3Gb	Western Digital 8Gb	Fujitsu 6.4Gb	Maxtor 10Gb	Seagate 4.3Gb
Hard disk access time/interface	9.5ms / UDMA	9ms / IDE	11ms / IDE	8ms / IDE	11ms / IDE
Motherboard components					
Motherboard	FIC VB-601	Intel SE440BX	Abit BX6	Supermicro 370SBA	Chaintech 6BTM
Chipset	Intel SE 440BX	Intel 440BX	Intel 440BX	Intel 440ZX-66	Intel 440BX
L2 cache/Max cache	128Kb/128Kb	128Kb/128Kb	128Kb/128Kb	128Kb/128Kb	128Kb/128Kb
I/O					
No of spare 3.5in/5.25 bays	1 / 2	1 / 2	1 / 2	1 / 2	1 / 2
No of PCI only/ISA only/shared slots	4 / 2 / 1	3 / 2 / 1	4 / 0 / 1	2 / 1 / 1	3 / 2 / 1
No of USB/serial/parallel/PS2 ports	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2
Multimedia					
CD-ROM/DVD drive	Creative Labs 36X	Teac 32X	LG CDR-8360B	Philips 36X	Creative Labs 36X
CD-ROM/DVD speed/interface	36X / IDE	32X / IDE	36X / IDE	36X / IDE	36X / IDE
Sound card	CL SoundBlaster PCI 128	CL SoundBlaster PCI 64 V	Creative Labs AWE 64 V	Pine Schubert Solo	Creative Labs PCI 64
Speakers	Mertec 80W	PowerMax 80	Aiwa SC-C57	Typhoon	Multimedia speaker
Graphics and Monitor					
Graphics card	Matrox Millennium G200	Matrox Millennium G200	QDI Legend	Diamond SpeedStar A70	ATI CardExpert
Graphics card interface	AGP x 2	AGP	AGP	AGP	AGP
Graphics card RAM/Max RAM	8Mb/16Mb	8Mb/16Mb	8Mb/8Mb	8Mb/8Mb	8Mb/8Mb
Monitor	ADI ProVista E44	ADI ProVista E44	Shino TMS87D	Taxan 550 TCO 95	Belinea 10 20 10
Monitor size	15in	15in	15in	15in	15in
Max refresh rate at 800x600	85Hz	85Hz	75Hz	75Hz	85Hz
Max refresh rate at 1024x768	70Hz	70Hz	70Hz	70Hz	70Hz
Bundled Extras					
Modem	Generic Rockwell 56K	Diamond Supra Express 56K	Generic Rockwell 56K	Modular Technology	Modem on Earth
Modem-highest supported standard	V.90	V.90	V.90	V.90	V.90
Other hardware	Iomega Zip drive				Trust joystick
Other software	Lotus SmartSuite 97 IBM Via Voice Ms Consumer Value Pack	Lotus SmartSuite Millennium, IBM ViaVoice		Corel WordPerfect Suite 8 Norton Anti-Virus Rescue Me	
Service and Support					
Sales Hours	Mon-Fri 9am - 5.30pm	M-F 9-6, Sat 10-4, Sun 10-2	Mon-Fri 9.30am - 6pm	Mon-Fri 9am - 6pm	M-F 9-5, Sat 10-1
Standard warranty	5yrs RTB, 2yrs P&L, 3yrs L	1 yr on-site, 2 yrs BTB	3 yrs, 1st yr on-site	1 yr on-site	3yrs RTB, 1 P&L, 2/3 L only
Warranty options	Up to 3 yrs on-site	3 yrs on-site	3 yrs on-site	3 yrs on-site	3 yrs next day support
Technical support	Lifetime	Lifetime	Lifetime	Lifetime	Lifetime

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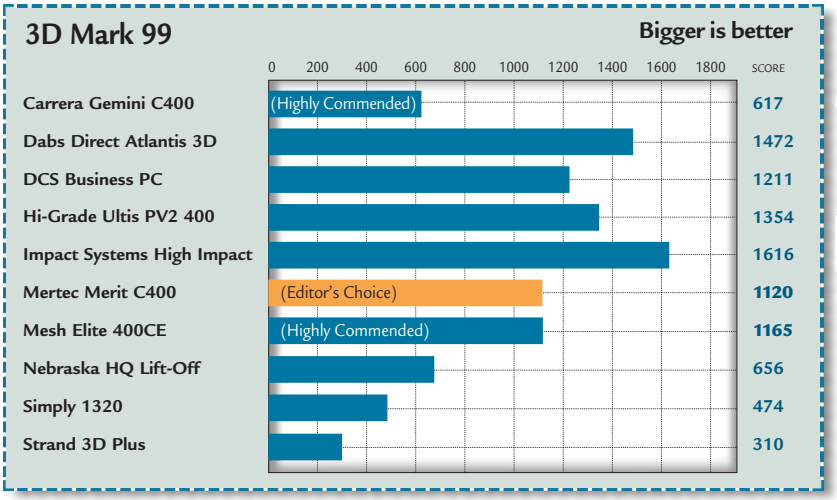
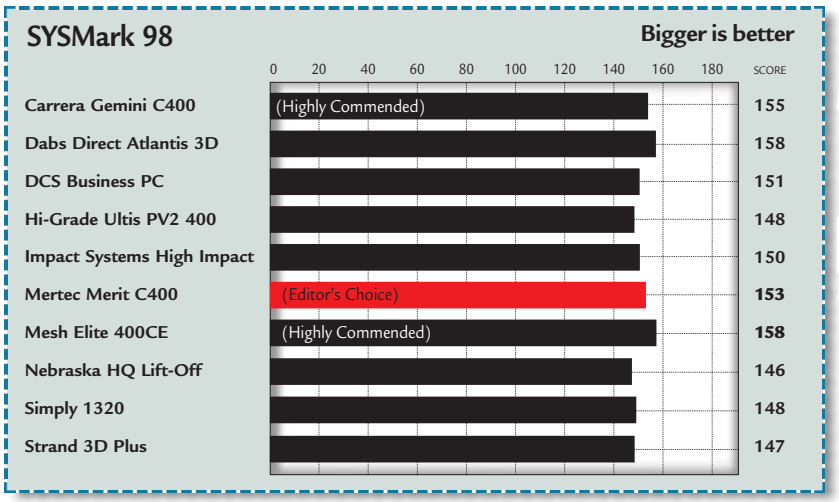
PCW Labs Report



3DMark99 specifically tests the graphics card and AGP throughput and it's here that real variation in performance shows up. This is mainly due to the amount of RAM on the graphics card, the type of RAM and the actual abilities of the graphics chipsets. Graphics cards with TNT chipsets, such as in the Hi-Grade, easily beat the competition. A full 128-bit chipset, the TNT has support for AGP 2X and 16Mb of RAM. This produces much better results than the 64-bit chipsets such as the Rage II, which supports only 8Mb of RAM.

We set a level playing field in this group test, asking for Celeron 400s and 64Mb of RAM in every case. As a result it is not surprising that the performance of the fastest machine was not greatly in excess of that of the slowest. In general, the fastest PCs were those with an excellent software configuration: for instance, the fast Mesh Elite 400CE and the Atlantis 3D from Dabs Direct have the latest drivers installed. They also have minimal applications running in the background. The faster hard drives of these systems would have made a difference, too.



How we did the tests

We ran two sets of tests on the PCs in this group test: **SYSMark 98** to test the speed of the machines when running 2D and 3D applications, and **3DMark 99** to test the graphics capabilities.

☛ **SYSMark** measures the speed of the PC running 14 common office and content creation applications, and the time it takes to perform a variety of tasks in each application. Each test is run three times to ensure consistent results. The applications are divided into two categories:

☛ **Office Productivity**: CorelDraw 8, Microsoft Excel 97, Dragon Systems NaturallySpeaking 2.02, Netscape Communicator 4.05 Standard Edition, Caere OmniPage Pro 8.0, Corel Paradox 8, Microsoft PowerPoint 97 and Word 97.

☛ **Content Creation**: MetaCreations Bryce 2, Avid Elastic Reality 3.1, Macromedia Extreme 3D 2, Adobe Photoshop 4.01, Adobe Premiere 4.2, and Xing Technology XingMPEG Encoder 2.1.

The number of tests run, and the type of applications used in this benchmark, ensure that all PCs are pushed to the limit, and that even those machines with very powerful processors are given a thorough workout. Performance depends on processor speed, RAM, graphics card and disk I/O. As the tests are based on widely available software packages, SYSMark scores accurately reflect how the machine will perform in a real-world situation.

☛ **3DMark 99** is a suite of tests designed to examine the 3D performance of your PC. It uses a Real World DirectX6 3D game engine, MAX-FX, from Remedy Entertainment, and 3D Realms. It produces one result from a balanced testing methodology that includes image quality, rendering speed and CPU capability. For comparison, all 3Dmark 99 benchtests are performed at a resolution of 1024x768 in 16-bit colour depth with the test suites set to loop three times. Again, the higher the score, the better the result. You can get a taster by downloading 3DMark 99 Lite from www.3dmark.com.

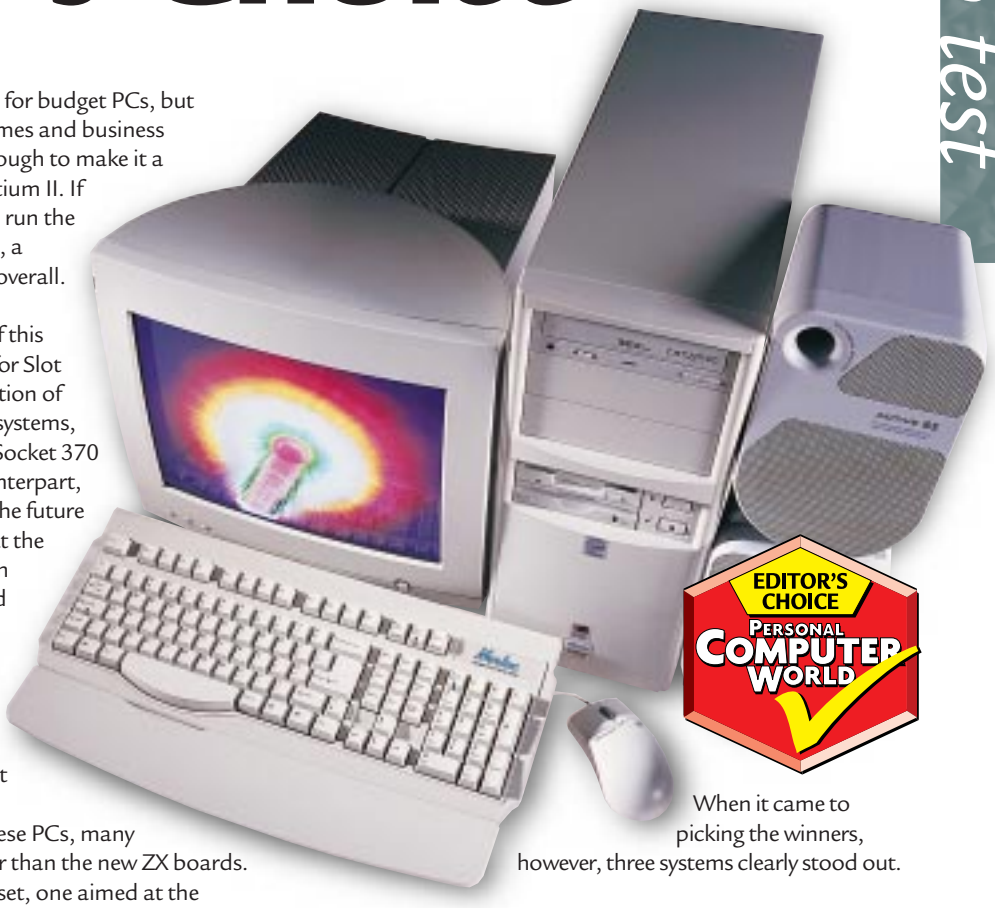
Editor's **Choice**

The Celeron is a low-cost CPU for budget PCs, but its overall performance in games and business applications is impressive enough to make it a serious alternative to the costlier Pentium II. If you're looking for a budget system to run the more common business applications, a Celeron processor is a very good bet overall.

One interesting fact to come out of this group test is the vendors' preference for Slot 1 Celerons. Although they had the option of supplying either Slot 1 or Socket 370 systems, many of them chose the former. The Socket 370 Celeron is cheaper than its Slot 1 counterpart, and while Intel assures us that this is the future direction for many of its processors, at the moment it does not provide as easy an upgrade path as Slot 1. Also, provided you have the right version of the BX chipset on your Slot 1 motherboard, you will be able to upgrade later to a Pentium III. One manufacturer opted for the best of both worlds by using the Socket 370 Celeron 400, but inserted it in Intel's Slot 1 riser board.

Despite the low price points of these PCs, many had superior BX motherboards rather than the new ZX boards. There are two versions of the ZX chipset, one aimed at the Pentium II and the other, the ZX-66, intended for use with the Celeron. The ZX-66 has more limited functionality than the ZX, keeping the front-side bus speed static at 66MHz, rather than the 100MHz speed of the ZX and BX chipsets.

Most of the PCs in this group test have good build quality. Some, like those from Mesh, Mertec and Dabs Direct, also have excellent software configurations in the form of the latest drivers and few applications running in the background.



When it came to picking the winners, however, three systems clearly stood out.

☛ **If there's one system** that had exceptional build quality, it's the **Mesh Elite 400CE**. Like the Mertec PC, the Elite comes with the Matrox Millennium G200, a good all-round graphics card. For everyday office use, the 15in ADI monitor has few peers, and the accompanying instruction manual is second to none.

☛ **Carrera's Gemini C400** sports a DVD drive, a 6Gb hard drive and an excellent monitor. The Gemini is also the only one that can accommodate faster Socket 370 and Slot 1 processors, with its combination of a Socket 370 processor in a Slot 1 riser card. Overall system performance is well above average and the extensive software bundle gives the package an extra edge. So, for providing high-quality solutions for home or office use, the **Carrera** and **Mesh** systems get our **Highly Commended** awards.

☛ **The Editor's Choice award** goes to the **Mertec Merit C400**. It's the only PC in the group test with an Iomega Zip drive, and the hard drive is a massive 8.3Gb. A flicker-free high-quality 2D display is an absolute necessity in office environments, and is provided in this case by the combination of a Matrox Millennium G200 graphics card and the ADI ProVista E44 monitor. A good software bundle and setup manual complement the Merit C400's excellent build quality.

● *Next month we take an in-depth look at Intel's Pentium III, running it head to head against the Pentium, and recommend which technology to go for.*

● *For buying advice, see the PCW Best Buys section at the back of the magazine [see Contents, pp6/7].*