

Dream on

AFTER LOSING ITS WAY WITH THE ILL-FATED SATURN, SEGA IS BACK WITH THE DREAMCAST, SPORTING AN IMPRESSIVE TECHNICAL SPEC AND SOME SIZZLING GAMES. CHRIS CAIN GETS HIS HANDS ON IT.

While Sega is still the undisputed king of the arcades, the Japanese games giant has lost its crown on the home

front. Once the market leader in games consoles, the company has seen arch rival Nintendo and newcomer Sony run rings around its Saturn hardware. There are many reasons for this, but perhaps the most obvious is that Sega geared Saturn towards traditional 2D action just as the rest of the world, and Sega's own arcade divisions, started to explore the third dimension. The Playstation and Nintendo 64 were designed with the future in mind, boasting dedicated 3D graphics facilities.

Claiming to have learned from past mistakes, Sega is back in the game with its next-generation console. Developed in conjunction with Microsoft and built with fast 3D in mind, Dreamcast aims to bring all of Sega's arcade knowhow into the home. The gloves are off, and there's even an all-new Sonic the Hedgehog game for the system. But is Dreamcast good enough to give its rivals nightmares?

With the hardware due to hit our shores in nine months' time, PCW takes an early look at the console that's already making it big in Japan.

External

Abandoning traditional black for a light Playstation-like grey, Dreamcast is certainly more stylish than its predecessor. That said, the machine is only half the size of Sony's Playstation, measuring a mere 190x195x78mm,

and it has a solid feel to it. Even from the outside Dreamcast looks and feels a lot more *designed* than the Saturn ever did.

The front sports the Sega name, four control-pad ports, and a curious 'Designed for Windows CE' logo giving some clue as to Microsoft's involvement. The rear houses power, serial and AV-out connectors, and on our Hong Kong model the latter provides composite and S-Video NTSC output together with stereo audio. RGB will be available via a separate signal connector box from Sega. UK machines will substitute a PAL video signal for NTSC. Sega bundles a composite video cable in the box to get you going, but by the time you read this, S-Video and VGA monitor leads should have been released. It is likely that an RF modulator will also

come with the UK model. The right of the unit reveals a covered expansion slot for future development. In Japan,

Dreamcast ships as standard with a 33.6Kbit/sec modem installed in this slot, for multiplayer gaming and other online activities. This was missing from our unit, and Sega has yet to confirm that a modem will be included in the UK model. A 56Kbit/sec model is rumoured for the US.

GB-ROM

Like the Saturn, the Dreamcast is a top-loading CD-based unit with Power and Eject buttons positioned either side of the 12-speed CAV (constant angular velocity) drive. However, Dreamcast CDs are actually GB-ROMs, holding 1Gb of information instead of the standard 660Mb. Developed by Yamaha, GB-ROM is a proprietary format which works by packing the pits on the discs closer together to store more information. The GB-ROM drive is fully compatible with music CDs.

Along with more storage, GB-ROMs provide an extra level of copy protection for Dreamcast software developers, as they cannot be reproduced using a standard CD-writer.



With the rise of cheap CD-writers, piracy is a growing concern in the Playstation and PC world, and Sega has come up with what looks like a practical alternative to the more expensive cartridge system used by Nintendo.

➤ Taking control

There's certainly a look of Nintendo about the Dreamcast control pads. Each one features a small analogue joystick, a digital joypad, five buttons on top and two analogue triggers underneath. Though comfortable to grip, the pads take some getting used to, and you really have to fight the urge not to automatically pull the triggers every time your fingers wander over them.

Each pad has a small window in the centre that looks down over two expansion slots in the front. These slots are used for Sega's intriguing VMS (Visual Memory System) memory cards. The VMS looks like a miniature

Nintendo GameBoy and features 128Kb of RAM, a 48x32 pixel mono LCD, a d-pad and four buttons. It not only acts as a memory card but can also be used to play small games, downloaded from Dreamcast software titles. These 'sub-games' could include classic 'tamagotchi' virtual pets or puzzles to solve: in fact, Sonic Adventure uses the VMS for a series of sub-games involving characters you meet along the way. The screen on the VMS is visible when the unit sits in the control pad — ideal for displaying things like weapons or map data during play.

The VMS is compatible with Sega's new Naomi arcade system, which is basically a Dreamcast with double the video memory and oodles of RAM. If manufacturers allow for it, players can take game data from home to use in the arcades and vice versa. The first Naomi-based games to hit our streets will be Sega's own House of the Dead 2 and Power Stone from Capcom.

➤ Inside

At the heart of Dreamcast is a custom version of Hitachi's SuperH4 RISC processor running at 200MHz. This sits on a 100MHz system bus and delivers some 360MIPS, with 1.4 billion floating-point operations per second. Sega and Hitachi claim this floating-point performance is four times that of a Pentium II 266MHz. The processor also has a 128-bit graphics engine built-in — operating on two 64-bit words of graphical data simultaneously — used for 3D calculations.

The processor is backed by 16Mb of main RAM and 8Mb of video memory, eight times that of the Sony Playstation. Dreamcast's extra main RAM will allow for larger games and reduced disc access, while the extra video RAM will be handy for housing valuable textures and image maps.

Sega has opted for a second-generation PowerVR chipset, the 2DC, to handle graphics.

Developed jointly by British multimedia specialist VideoLogic and NEC in Japan, this is a vastly improved version of the low-cost 3D accelerator that first appeared on PC graphics cards. Designed for arcade use, it can render between 3 to 3.5 million polygons/sec. Sony's Playstation peaks at around 1 million polygons/sec

— 350,000 when complex textures are applied. The more polygons a system can display simultaneously, the more detailed 3D models and images can be.



Many observers believed Sega would

opt for a graphics solution from 3Dfx for Dreamcast. It has been confirmed that there were two versions of the system under development. Black Belt was the codename for a 3Dfx system in the US, while PowerVR was used in a Japanese project known as Dural and later Katana. The Japanese model ultimately proved better suited to Sega's needs.

➤ 3D features

Dreamcast's main 3D features include perspective-correct texture mapping, gouraud shading, point, bi-linear, tri-linear and anisotropic mip-map filtering, 16 levels of transparency, fogging, texture compression, bump mapping and full-scene anti-aliasing to help smooth out harsh jagged edges. VideoLogic claims this is similar to the forthcoming 3Dfx Voodoo 3 system. Output to TV is at 640x480 pixels with 24-bit colour, but images can be super-sampled down from 1024x768 pixels. The PowerVR 2DC chip can look at the extra information in the high-resolution image and use it to produce the best approximation for display on the TV, giving the appearance of a higher-resolution display. However, none of the current titles use this facility.

➤ The speed of PowerVR

PowerVR's speed is partly due to the fact that it only calculates and renders that which is visible to the user. This is very different to traditional 3D technology, where pixels can be textured, shaded, drawn and then completely obscured by other

The Windows CE connection

Microsoft was heavily involved in the development of Dreamcast, and as a result the system runs a streamlined version of the Windows CE operating system. This incorporates key elements such as the WinCE kernel, for pre-emptive multitasking and managing system resources, file handling, communication APIs

for dealing with the internet, and special support for Japanese language characters. Functions such as window management and cursor support have been removed, and all critical loops are coded in Assembler. Windows CE also incorporates the DirectX components DirectDraw, Direct3D, DirectSound, DirectPlay, DirectInput

and DirectShow, hand-tuned to take full advantage of Dreamcast's features. A key weapon in Sega's battle with the competition, this allows Windows developers to easily port their titles to Dreamcast and vice versa. Instead of waiting a year for a cut-down conversion of the latest PC blockbuster,

Dreamcast owners could see a high-quality transfer in a matter of months. The only danger here is that this could lead to a flood of poor-quality titles hitting the machine, and Sega must set up a strict quality control program to ensure this does not happen. Microsoft has produced an SDK for Dreamcast developers

based on Visual C++, but developers don't have to use Windows CE to program their titles and none of the launch titles employed it. There have also been questions raised about possible performance overheads, although some developers who've used the system have been impressed by the speed on offer.



FAR LEFT EASILY THE MOST IMPRESSIVE LAUNCH TITLE, **VIRTUA FIGHTER 3TB** HITS THE DREAMCAST
LEFT **GOZZILLA** TAKES ON TOKYO (AGAIN)



▲ **SONIC ADVENTURE** SEES SEGA'S STAR RETURN IN A 3D WORLD THAT'S LIGHT YEARS AHEAD OF MARIO 64

pixels later on. PowerVR also breaks its displays into small regions, or 'tiles', which can be rendered independently — even by multiple processors. This approach makes the technology scalable and it is likely that we will see more powerful Naomi arcade machines featuring additional PowerVR chips.

Perhaps that expansion slot on the Dreamcast has another use, too...

For audio Sega has opted for a 32-bit Yamaha processor with its own 2Mb of audio memory. The chip features 64-voice polyphony, hardware audio compression, pseudo 3D sound (it would have been nice to see Dolby Digital) and a DSP

for real-time effects.

Other items of interest inside include 128Kb of flash RAM for storing time and date information, and an amazing liquid cooling system for the main processor and PowerVR chip that actually uses purified water along with a traditional heat sink and fan to prevent the system from overheating.

Conclusion

Dreamcast's impressive technical specification puts it head and shoulders above the competition, and with its fast 3D engine and Windows CE/DirectX compatibility (see box, above) it is far more what we expect from the arcade

innovator that produced the MegaDrive.

The launch titles, Virtua Fighter 3tb and Sonic Adventure, are on a par with the latest PC offerings, and Sega will no doubt sell thousands of units on the strength of Virtua Fighter 3tb and Sonic Adventure alone. It will certainly be interesting to see the first PC-ported games.

However, it is unlikely that Sony or Nintendo will initially lose much sleep over Dreamcast. While Sega is obviously a threat, both companies have large installed bases, and with graphics power ever increasing you can bet that Playstation 2 and Nintendo's next machine will offer yet another leap in performance. But if Sega works hard in the interim period and can produce flawless conversions of its arcade hits, the blue hedgehog may be leader of the pack once more.

PCW CONTACTS

Price 29,800 Yen (approx £150).

Review machine from Playtronix 01329 312211

Price £389 (Dreamcast, one controller, AC cable, AV stereo cable, Virtua Fighter 3tb, VMS memory, 240-110V transformer, UK next-day delivery).

No UK price set. Launch expected September 1999

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