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Week in Review
This is the inaugural issue of The Peddie Report. As we said in last week’s newsletter, the computer graphics industry isn’t exactly a niche anymore, and it not just about graphics either, so our charter, like that of the companies we cover, has broadened. Juggling digital media types on the PC has become the challenge for the industry, whether it’s the 2D graphics of Windows, a television signal to a desktop computer, a 3D game on the Internet, or compressed video from a DVD ROM. The digital media revolution is just beginning, and despite the hype, computer technology has a long way to go to meet its demands.

If you noted a brief interruption in service, it’s because we’ve changed the ship date of the newsletter. We’ll now be printing and mailing the issue at the end of the week rather than at the beginning with the hope that this schedule results in getting news to you faster.

On the subject of getting to you faster, we’ve heard your repeated requests for electronic distribution of the newsletter, and I’m happy to say that we’re making progress on that front as well. Last week we hired Mr. Tommy McClain, who for the past year-and-a-half has been running the popular Website Dimension3D.com. As Webmaster, Tommy will be responsible for building a dynamic presence for JPA on the Web. We plan to offer subscribers access to a special section of our Website where The Peddie Report can be downloaded (in MS Word format) on the day of its publication. Our goal is to make this service available in June, and we’ll keep you posted on our progress. In the meantime, keep your eyes on www.jpa.com.

The 3D market saw two significant events last week. Ziff-Davis surprised us all by an early release of its much anticipated 3D WinBench 97 in time for CGDC. It didn’t take but one weekend for 3D WinBench test results to start appearing in press releases from 3D hardware companies, and we know lots of software driver engineers who already have their noses to this particular grindstone. We expect more than a few new drivers in May and a whole new set of new white papers from companies whose products aren’t in the sweet spot of ZDBOp’s new test. Engineering never needs marketing as much as when Ziff ships a new test – some things never change.

The other big news didn’t arrive by press release, it simply flashed across the grapevine – Microsoft canceled the Escalante project. Escalante was the Talisman reference design board, and it is now history. There were a few reasons for bagging the reference implementation, and a bit of finger-pointing going on between the set of companies involved. However, the bottom line is the reference board whose spec. was nailed down in late 1995 and wasn’t slated to arrive until late this year didn’t look compelling (when running non-optimized Talisman content) next to some of the upcoming second or third generation 3D chip implementations, or next to some first generation Talisman derivative products currently in the pipeline. A few participants in buzz confused the cancellation of Escalante with the cancellation of Talisman, which this is not. Read more about Talisman, and the differing acceleration needs of different types of 3D applications in this week’s “Shifting the Bottleneck” article.
Peripherals and Systems

Chips and Technologies’ design win at Hitachi
• *HiQV32 chosen for Hitachi’s new Pentium MMX notebook family*

Chips and Technologies (San Jose, CA) announced that its HiQVideo multimedia accelerator chip was chosen for use in Hitachi’s new MX-Series of notebook computers.

Based on Intel Pentium Processors with MMX technology, the MX-Series notebooks include C&T’s HiQV32 (65550) accelerator with 2 Mbytes of display memory, and a 12.1-inch active matrix TFT flat panel display supporting 64,000 colors at 800 x 600 resolution.

The Hitachi MX-Series notebook computers include 16 Mbytes of EDO DRAM with 80 Mbyte maximum, a 2 Gbyte hard drive, a removable 8X CD-ROM (optional 10X), stereo speakers, and Windows 95. (408.434.0600, http://www.chips.com)

Diamond lowers Fire GL and Monster 3D prices
• *Voodoo Graphics-based Monster 3D now $199.95*
• *8 Mbyte Permedia-based Fire GL 1000, now $399.99*
• *40 Mbyte Glint 500TX board now under $2,000*

Diamond Multimedia has announced new prices on several of its 3D products:

<table>
<thead>
<tr>
<th>Product</th>
<th>Former pricing</th>
<th>New pricing</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monster 3D</td>
<td>$249.95</td>
<td>$199.95</td>
<td>20%</td>
</tr>
<tr>
<td>Fire GL 1000 (Permedia), 4 Mbyte SGRAM</td>
<td>$399.95</td>
<td>$299.95</td>
<td>25%</td>
</tr>
<tr>
<td>Fire GL 1000 (Permedia), 8 Mbyte SGRAM</td>
<td>$499.95</td>
<td>$399.95</td>
<td>20%</td>
</tr>
<tr>
<td>Fire GL 3000 (Glint 500TX), 8 Mbyte VRAM/8 Mbyte DRAM</td>
<td>$1,995.00</td>
<td>$1,699.00</td>
<td>15%</td>
</tr>
<tr>
<td>Fire GL 3000 (Glint 500TX), 8 Mbyte VRAM/16 Mbyte DRAM</td>
<td>$2,095.00</td>
<td>$1,799.00</td>
<td>14%</td>
</tr>
<tr>
<td>Fire GL 3000 (Glint 500TX), 8 Mbyte VRAM/32 Mbyte DRAM</td>
<td>$2,295.00</td>
<td>$1,999.00</td>
<td>13%</td>
</tr>
</tbody>
</table>

Elsa provides Powerview 3D viewer for AutoCAD R13 users
• *Powerview 3D uses OpenInventor Interface*
• *stand-alone implementation allows extensions for other CAD products as well*

Elsa (San Jose, CA) is extending its support for AutoCAD with a new 3D viewing tool which allows users to view and manipulate shaded 3D wireframe, surface and solid models in real time. Powerview 3D is a fully integrated 3D viewer for AutoCAD which uses the OpenInventor interface and opens an independent window to view and interact with AutoCAD or Mechanical Desktop models. The product is compatible with AutoCAD’s named views and allows for use of AutoCAD defined lights or OpenInventor’s lighting features. Powerview 3D is also compatible with Autodesk Mechanical Desktop. Views in Powerview 3D may be output as hard copy, bitmaps or VRML 1.0 models. Powerview 3D supports Windows NT 3.51 and 4.0, and Windows 95. Elsa is shipping the product free with all its Elsa Gloria 3D accelerators and it is also available to Elsa’s customers (for its Gloria products) via their ftp site (ftp.elsa.de).
AutoCAD has been slow to catch the 3D wave and companies such as AccelGraphics, Intergraph, SpaceTec and now Elsa have stepped in to take up the slack. With the announcement of Release 14 for AutoCAD, Autodesk admits that it still doesn’t have full implementation of 3D, which probably explains why Elsa has waited until now to release this viewer. Joy Li, Elsa’s Manager of New Business Development, also says that the company saw an opportunity in the use of the OpenInventor technology. The ability to create a stand-alone product to view AutoCAD and Mechanical Desktop models allows the product to be used with other CAD programs such as ProE, Microstation, or Solid Edge. However, Elsa is still evaluating what drivers it will write to other CAD programs, and when. Elsa would much prefer to accelerate a 3D AutoCAD via Heidi or OpenGL, but clearly that option will not be available any time soon. By this time, AutoCAD users must be kind of resigned to their fate. Elsa’s drivers for AutoCAD so far, Superview, Magniview, and the Cockpit, have been thoughtful enhancements to the AutoCAD interface and have helped the company with its target customers, AutoCAD power users. Contact Thomas Neubert or Joy Li at Elsa at 408.935.0350.

Matrox announces Millennium II
• adds 250 MHz internal RAMDAC, texture mapping, PCI bus master and 32-bit Z-buffer
• can accommodate up to 16 Mbytes of WRAM
• SRP of $349 for 4 Mbyte base model

The MGA-2165W is the latest chip from Matrox (Montreal, Canada) and it will be used on the Millennium II. The Millennium II supports up to 16 Mbytes of WRAM and incorporates a 250 MHz RAMDAC supporting true color display formats up to 1920 x 1080 at 65 Hz and 16-bit color up to 1800 x 1440 resolution. The 3D features of the Millennium have been upgraded to include perspective correct texture mapping and a full scatter-gather PCI bus master like the Matrox Mystique, and, unlike the Mystique, a 32-bit Z-buffer. The Millennium II is also compatible with Matrox’s video hardware add-on suite, Rainbow Runner Studio (see PCGR, February 4, p.126), which is now scheduled to ship in the middle of this month.

A high-value software bundle is included with the board, consisting of Micrografx Simply 3D 2, Picture Publisher 7, and Kai’s Power Tools. In addition, the board includes Compcore’s softMPEG software MPEG decoder, Netscape Navigator 3.0, Vream’s WIRL, a Direct3D compatible 3D Website viewer, and Sonnetech’s Colorific color management utility.

Pricing for the 4 Mbyte base model of the Millennium II is set at an SRP of $349. Memory modules will be available to expand the board to 8, 12, or 16 Mbytes of WRAM.

Other recent news from Matrox comes from the Association of Information and Image Management (AIIM) conference in New York. IBM has chosen a bundle consisting of the Millennium Power Doc Edition and a high-resolution color Hitachi monitor for its electronic document management suite. Matrox has also shown what it says is the first MMX-enabled scale-to-gray viewer, which increases the page flip performance on the Matrox board by about 30%.

Last week, Matrox also announced its intention to provide a hardware MPEG-2 decoder for its Rainbow Runner series of video companion products. No specifics or release date were provided. (514.969.6300, http://www.matrox.com)
With the Millennium II, Matrox has brought its higher-end board’s 3D features up to and beyond the capabilities of the company’s consumer targeted Mystique. By pushing the RAMDAC to 250 MHz and the memory capacity to 16 Mbytes, Matrox aims to keep some distance between itself and the hungry hoard of competitors seeking the high-end office automation/low-end professional graphics segment — a segment in which Matrox has been unchallenged for the past two years.

The ability to support the Rainbow Runner video options means a wider range of platforms for these add-ons. Matrox will be testing the theory that there is a broad market for video editing. In a recent demonstration of the Rainbow Runner the hardware looked fine, but the bundled U-Lead editing software didn’t do it justice. Easy to use, yes... but slow as the dickens.

**OPTi supplying multimedia and core functions for Sharp’s Copernicus PDA**

- core logic, graphics and audio chips for new PDA
- new pen tablet incorporates multimedia features of PCs

OPTi (Milpitas, CA) announced it is shipping its core logic, audio, and graphics chipsets for Sharp’s new pen tablet PC, the Copernicus RW-A250.

Powered by AMD’s AM5x86 and running the full version of Windows 95, the Copernicus is a small, lightweight (3.1 lbs.) PDA with an 8.4-inch TFT color active matrix screen. The Copernicus is manufactured for the Japanese market. It has also been licensed by Norand as the Pen*Key 6622 for distribution in the U.S.

The Copernicus uses OPTi’s 92C178 low power graphics accelerator chip to drive the LCD, OPTi’s 82C465MVB mobile core logic chipset, and the OPTiSound 931 audio chip. These chipsets are provided under OPTi’s embedded program which guarantees availability over a 5-year product life.

“OPTi’s mature core logic and multimedia silicon provide a perfect platform for implementing very low-cost, high-function X86 embedded products,” said Stephen Dukker, President of OPTi. “This is a new and growing market in which OPTi looks forward to participating.”

The Copernicus includes a fast, 8.4-inch TFT (640 x 480 pixels), touch screen display, an integrated keypad suited to many data entry tasks, and an infrared LAN or a card-based wireless radio connection. The base memory configuration includes 16 Mbytes of RAM, which can be upgraded to a maximum of 32 Mbytes. It includes SoundBlaster Pro-compatible circuitry, built-in speaker and microphone, and audio in/out connectors.

The 92C178 supports 3.3V/5V mixed voltage operation and provides three power saving modes. It supports a variety of dual scan color/mono STN, single scan color/mono STN and TFT panels, and panel resolutions of 640 x 480 and 1024 x 768. Up to 16.7 million colors are supported on color panels, and up to 256 gray scales are supported on monochrome panels. (408.486.8000, http://www.opti.com)

**Credit OPTi for being nimble enough to move into this market. As the big guys arrive to squeeze margins and most of the little players out of the desktop arena, it behooves smaller companies to seek opportunities where Intel doesn’t roam.**
Radius lowers price of its Thunder 3D

• revised pricing on the original board, and new lower cost version introduced

Diamond isn’t the only company reducing prices of its Glint products this week. Radius (Sunnyvale, CA) announced a price reduction of its Glint 500 TX-based Thunder 3D PCI graphics board for Mac OS systems from $3,399 to $2,999. The company also announced a new version of the technology, the Thunder TX-1152 with a list price of $1,699. The Radius Thunder 3D is also based on the 3Dlabs Glint 500TX and the Glint Delta geometry set-up and pipeline processor. The chart below outlines the features of the two products.

<table>
<thead>
<tr>
<th>Thunder 3D PCI</th>
<th>Thunder TX-1152</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D Labs Glint 500TX Chip</td>
<td>3D Labs Glint 500TX Chip</td>
</tr>
<tr>
<td>Delta Pipeline Processor</td>
<td>Delta Pipeline Processor</td>
</tr>
<tr>
<td>Super Resolution: 1600 x 1200, in 24-bit mode</td>
<td>Super Resolution: 1600 x 1200, in 16-bit mode</td>
</tr>
<tr>
<td>Triple-Ported Memory Architecture</td>
<td>Triple-Ported Memory Architecture</td>
</tr>
<tr>
<td>24 Mbyte Texture Mapping Memory</td>
<td>12 Mbyte Texture Mapping Memory</td>
</tr>
<tr>
<td>32-bit Z-buffer</td>
<td>32-bit Z-buffer</td>
</tr>
<tr>
<td>$2,999</td>
<td>$1,699</td>
</tr>
</tbody>
</table>

Like the Thunder 3D PCI, the Thunder TX graphics card incorporates ChromaFlow technology which allows users access to a 30-bit color palette, providing users with more than one billion colors which can virtually eliminate color banding and more accurately display subtle nuances in shadowing and highlights. (408.541.6100, http://www.radius.com)

Semiconductors

Oak Technology whispers about 64317 3D part

• mid $20s opening price
• uses 64217 2D engine and pinout
• multiple memory types supported

Oak Technology (Sunnyvale, CA) is fighting multiple wars at once. Changes in the CD-ROM industry and the resultant inventory correction brought on a disappointing quarter. Also, Oak Technology is also late to market with its long awaited 3D chip, now named the 64317. Like many OEMs, we’ve seen simulations of the chip and if it all comes true, Oak will have a powerful and exciting part to show, and they say they’ll show it at E3.

The first version, however, will not have features like AGP or a set-up engine that companies such as ATI, Nvidia, and Rendition are offering today.

It will have some innovative features such as Talisman-like chunk-based image processing; however, Oak is not a licensee of Microsoft. The chip will do most of its processing in local memory, does sub-pixel processing, has anti-aliasing (Ed. See Oak’s rather well done white paper), and can use either SGRAM, SDRAM, or EDO.
For the 64317, Oak started with their 2D part, the Eon 64217 (see PCGR, July 16, 1996, p. 978), kept the same pin pattern (256-BGA), and added the 3D engine.

Here’s the scary part for the other 30 suppliers hawking their 3D parts: opening price will be mid-$20s. Scott Albert, Director of Marketing at Oak, says he sees the Free-D parts dropping to <$10, and we agree (Ed. Especially if you’re buying them in mainland China — see PCGR, March 25, 1996, p. 345). We can’t tell you any more now; our E3 edition will have a full discussion of this interesting new part.

Oak still controls over 50% of the CD-ROM market, and is moving into a DVD-based design. However, the rules there are different and a more integrated part is needed. We don’t expect to see a DVD controller from Oak this year, but we do expect them to announce one.

One reason we feel that way is because of the imminent release of their MPEG-2/AC-3 part that will be popping out of the oven soon. In fact, it may see the light of day before the 65317 3D part. The MPEG device will also be a JPEG decoder/encoder, aimed at the emerging digital camera and the copier markets.

The 64217 didn’t take off like Oak thought it would. Could be just a case of bad timing, or OEM ignorance. The part might be well suited for an entry-level PC to compete with Compaq’s Cyrix-based system and/or the NetPC market. Given the dearth of games employing 3D accelerator engines, you’d think the OEMs would have been attracted to the 64217 as a low-cost “2½D” part.

### Software

**Adrenaline Software announces Charts 1.0 for Windows platform**

- new product uses ActiveX and QuickDraw 3D
- Adrenaline promises true 3D using 3DMF objects

Adrenaline demonstrated its Charts 1.0 product at MacWorld earlier this year, and it was notable on a number of fronts. It was one of the first products to make use of Apple’s improved QuickTime capabilities, giving the Apple OS data exchange capabilities more in line with Microsoft’s ActiveX (OLE/DDE) in Windows. In addition, Adrenaline is one of the first companies to deliver on the possibility of useful 3D products for the business world. Adrenaline’s product allows users to integrate existing 3D content into their charts — the user can create interesting charts with details from graphics software. Also, any 3DMF object can be brought into Adrenaline as an element. The 3DMF file format is a cross-platform 3D file format supplied by QuickDraw 3D. QuickTime’s built-in rendering capabilities let users interact with their charts in real time. The cross-platform capabilities extend to saving Adrenaline charts as well. Charts can be saved as standard Windows bitmap files and they can be saved to 3DMF for cross-platform exchange. And naturally, Adrenaline has made use of Microsoft’s ActiveX capabilities to allow charts to be embedded in other products and updated dynamically, just as you can now with Excel. (418.658.9909; http://www.adrenaline.ca/)
Duck Corp. licenses TrueMotion 2.0 video codec to Microsoft
• Duck’s video/animation codec to be integrated into DirectX media

Since its introduction in 1995 the TrueMotion software only video codec by the Duck Corporation (New York, NY) has been used by numerous developers to enable full screen/full motion video. At the Game Developers conference held last week in Santa Clara, Microsoft announced it has licensed The Duck Corporation’s TrueMotion 2.0 video codec for inclusion in DirectX, now its use will be ubiquitous.

The advantages of TrueMotion’s video codec are:

• lower computational complexity for decoding video
• improved data rate control
• optimization for rendered as well as live material input, which allows the use of both types of images in a single environment
• scaleability and optimization for multiple device platforms such as set-top boxes, kiosks, arcade machines and person computers

The TrueMotion video codec will ship as part of the next version of DirectX media due this summer.

The Duck Corporation also has a Multi-Platform Video Engine, which includes TrueMotion and DK3/DK4 video and audio compression and decompression. These software libraries allow software developers to create high performance, full screen full motion video components for hard disk based, CD-ROM and even DVD-ROM titles. The features according to platforms are listed below:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Sega Saturn</th>
<th>Sony Playstatio n</th>
<th>Win95</th>
<th>DOS (Wavcom 4GW)</th>
<th>Apple Mac PPC</th>
<th>Apple Mac M68K</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 bit video</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<td>16 bit video</td>
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<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>8 bit video</td>
<td>No</td>
<td>No</td>
<td>Yes *</td>
<td>Yes*</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>DK3/DK4 audio</td>
<td>Yes</td>
<td>No***</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2x CD</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>&gt;2x CD</td>
<td>No**</td>
<td>No**</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Video Sprite</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Coding samples for 16-8 bit conversion, ** limitation of platform, *** Platform restricted to VAG audio

As an aside, Cross platform development was an interesting issue at the Game Developer’s Conference. For one thing, when developers talked about cross platform they meant between consoles and PCs and not between PC and Mac. Also, some developers begged for multi-purpose tools while manufacturers and more experienced developers pointed out that the mediums are so fundamentally different that most cross platform tools would demand too much compromise. A
dynamite game on one platform would suffer on another. However, in the realm of compression, the Duck Corporation is able to give developers what they’re looking for. (212 941-2400).

**Numerical Design introduces Netimmerse API**
- *C++ game engine provides scaleability, ray tracing and radiosity*
- *supports OpenGL, D3D*

What the world needs now is another 3D API? Well, maybe. At the Game Developers Conference, Numerical Design (Chapel Hill, NC) introduced their object oriented C++ toolkit which, says the company, provides fast rendering with ray tracing and radiosity. Netimmerse automatically scales the data according to the PC’s capabilities. Real time scene management features include frustum culling, automatic LOD, frame rate regulation, texture and geometry caching. Netimmerse supports Z-buffer, binary separating planes, and NDL’s own proprietary algorithms, all of which can be mixed in the same scene to get the best performance. Other features include collision detection, spatialized sound, and behaviors. Netimmerse can read in 3D Studio, MultiGen and VRML files. In addition to Netimmerse, the company has additional modules including a proprietary software renderer, morphing terrain module, visual occlusion culling module, photorealistic renderer and a World Viewer base on the Netimmerse toolkit that lets game developers prototype their games. The company is selling full source code without royalties for about $20,000, depending on the type of deal. (We talked to Bill Oliver, president of the company, who explained that in some cases a deal may be made which includes royalties, and there are different support options as well as additional modules.) The company opened its doors at the start of this year and already they have sold five licenses of the software. On the show floor we saw MagBall by GreyStone Technology which was developed with Netimmerse. It’s a simple game that owes much to air hockey and it attracted a steady stream of already overstimulated game players. It was indeed fast. (Contact Bill Oliver, Numerical Design, 919.929.2917, boliver@ndl.com)

**Vertigo adopts ThinkFish’s non-photorealistic 3D renderer for Photoshop plug-in**
- *3D functionality comes to Photoshop*
- *further use of 3DMF QuickTime format in cross-platform products*

Vertigo 3D Dizzy adds 3D capabilities to Photoshop by giving users the ability to load 3DMF models, change their size and orientation, and create custom lighting effects. The models themselves come from Vertigo and Viewpoint Datalabs (Salt Lake City, CA). Last week, Vertigo announced a licensing deal with ThinkFish (San Francisco, CA) to add ThinkFish’s LiveStyles technology to 3D Dizzy. ThinkFish calls its product a “non-photorealistic renderer.” It applies different styles to the lines that make up models, so they can look more like cartoons or like sketches. Vertigo 3D Dizzy 1.0 will ship with three ThinkFish styles and will sell for $99.95. Vertigo’s customers can also download two more styles from the ThinkFish Website (http://www.thinkfish.com) free of charge. ThinkFish will sell additional styles directly for $24.95 per style or $59.95 for a family of 5-7 styles. Styles will include those inspired by famous artists such as Klee and Picasso as well as variations on cartoons such as Japanese manga. In addition to Vertigo, Apple and Fractal Design have also licensed LiveStyles from ThinkFish. Contact Ben Calica, Director of Marketing/Creative Development at ThinkFish Productions, at 415.252.1525.
Xing releases XingMPEG Encoder 2.0
• software-only MPEG-1 encoder optimized for operation with MMX
• world’s fastest software encoder, can achieve real-time rates
• end user price of $89

Xing Technology Corp. (San Luis Obispo, CA) has announced the next generation of its software-only MPEG encoding technology — the XingMPEG Encoder 2.0. The product is optimized for MMX and Xing claims its product is the world’s fastest software-based encoder available. Indeed, the company can demonstrate faster than real-time encoding of low bit-rate MPEG-1 content on a 200 MHz MMX-enabled system.

The software doesn’t require MMX for its operations, it just doesn’t achieve real-time encoding speeds on lesser systems (166 MHz MMX Pentium with 32 Mbytes of memory is the ideal base system). Xing says MMX is used to advantage for color space conversion. The product can encode down to data rates of 100 Kbps suitable for Internet playback at ISDN speeds. Pre-defined profile settings make it easy for users to create content for different playback scenarios without expert knowledge of the encoding process. Multiple encoding jobs can be prioritized and run automatically in a batch mode. A match profile can examine an existing MPEG file and create the settings to generate another MPEG file with the same parameter settings.

The product takes any .AVI or .WAV file as input and uses IP and B frames in generating MPEG-1 video with levels 1 and 2 audio. Xing’s encoder can also generate MPEG-2 level 3 audio for higher-quality sound, and Xing’s own MPEG player will take advantage of the MPEG-2 audio.

The 32-bit application runs on Windows 95 or Windows NT and boasts an end user price of $89. Contact Tam Adamski, Product Marketing Manager, at 805.783.0400, x2232 or tadamski@xingtech.com.

Xing says there are over 15 million copies of its MPEG-1 software player in the world, which they estimate to be a 25% to 30% market share. Now that both Microsoft’s ActiveMovie and Apple’s QuickTime have built-in support for the MPEG-1, they (like others before them) have declared the MPEG-1 format ubiquitous. Now that the client side is ubiquitous, the money is in the encoders and the servers. Xing views its primary competition as Progressive Networks, whose Real Audio and Real Video formats require proprietary client-side players, and against which Xing emphasizes the standards-based advantage of its solution.

Ziff-Davis releases 3D WinBench 97
• new focus of benchmarking for consumer-targeted 3D

On Friday, April 25th, the Ziff-Davis Benchmark Operation (ZDBOp of Morrisville, NC) released the long awaited 3D WinBench 97, which measures the 3D performance of PCs running Windows 95. The new benchmark which takes advantage of Direct3D performance profiling technology donated to Ziff-Davis by Intel along with input from virtually every major vendor of graphics chips and boards, will be the tool all ZD media worldwide will use to measure PC 3D performance.
Mark Van Name, VP of product testing for Ziff-Davis, said, “3D WinBench 97 represents a leap forward in 3D performance measurement and should help buyers and vendors alike. Buyers now have a 3D performance tool from the world leader in benchmarking, and vendors have a goal to shoot for as they create coming generations of 3D accelerators.”

Ziff-Davis says 3D WinBench 97 focuses on the types of 3D scenes the games of today and tomorrow will use. It provides objective performance scores as well as guidelines for noting subjective impressions. The product is available for free download (20 Mbytes) from ZDBOp’s Website. CDs containing the benchmark are also available for a modest shipping and handling fee. (http://www.zdbop.com)

ZDBOp surprised us by delivering the much discussed benchmark well before the mid-year deadline it had set for itself. In less than one week’s time, 3D WinBench test results have already started to appear in press releases from hardware companies. Still other companies are formulating criticisms. This is an expected and necessary part of the understanding process.

Market Intelligence

Computer Associates acquires equity share in 3Name3D
• more 3D digital content for CA’s Unicenter
• a boost for the application of 3D in business

Computer Associates (CA of Islandia, NY) has gained an equity stake in 3Name3D, a 3D model production company and computer graphics firm. The agreement allows CA to leverage 3Name3D’s technical expertise, multimedia experience and creative talents for the ongoing advancement of CA’s Unicenter TNG (The Next Generation) and Jasmine solutions.

“3Name3D is one of the world’s most respected developers of authentic, precisely crafted 3D computer environments and models for the motion picture, theme park, real-time entertainment, video game and television industries,” said Marc Sokol, CA’s Senior VP of advanced technology. “Our investment in 3Name3D provides an excellent opportunity to tap the market’s most talented 3D designers and advanced 3D visualization technologies to complement CA’s enterprise management and multimedia database offerings.”

3Name3D’s capabilities are a particularly good fit for CA’s enterprise management technology development efforts. CA’s Unicenter TNG features a 3D real world interface that enhances the ability of managers to visualize and pinpoint problems in IT environments. 3Name3D’s technology and programming expertise will complement Unicenter TNG’s 3D object rendering and animation features, making it even easier to visualize and immediately grasp complex relationships between enterprise resources. (CA – 516.342.5224; 3Name3D – 310.314.2171)

It’s a 3D interface, it’s commercial, it requires some pretty high-end graphics horsepower, and it exists in the real world. CA’s Unicenter TNG is about the only killer application of 3D on the market today that doesn’t involve amply endowed female protagonists or ghostly combatants.
Dataquest forecasts Windows NT and operating system growth
• NT grows 156%

Dataquest (San Jose, CA) predicts the worldwide operating system market is on track for another strong year with unit shipments projected to reach 86.5 million units in 1997, up 18.8% over 1996 shipment totals. While Windows 95 showed the best growth in 1996, Dataquest anticipates Windows NT will show the largest growth in 1997, of 156%.

<table>
<thead>
<tr>
<th>Operating System</th>
<th>1996</th>
<th>1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 95, 98...</td>
<td>38,929</td>
<td>63,194</td>
</tr>
<tr>
<td>Windows 3.1x</td>
<td>20,619</td>
<td>6,384</td>
</tr>
<tr>
<td>Windows NT</td>
<td>2,223</td>
<td>5,684</td>
</tr>
<tr>
<td>Total Unix</td>
<td>1,271</td>
<td>1,384</td>
</tr>
<tr>
<td>Others</td>
<td>9,763</td>
<td>9,864</td>
</tr>
<tr>
<td>Total</td>
<td>72,805</td>
<td>86,510</td>
</tr>
</tbody>
</table>

(Thousands of Units)

Selected worldwide operating system end-user shipment estimates

Gateway 2000 reports 39% increase in shipments
• 555,000 PCs shipped during the quarter

Gateway 2000 (North Sioux City, SD) reported increased revenues and earnings for the quarter ended March 31, 1997. The March quarter was the second most profitable in the history of the company. Strength in international markets, the popularity of MMX, and solid demand across all segments led to the strong performance over the first three months of 1997.

Gateway 2000 shipped nearly 555,000 PCs during the first quarter, a 39% increase from first quarter 1996 shipments of 400,000. Quarterly revenue was $1.42 billion, a 24% increase from the $1.14 billion recorded a year ago. First quarter net income rose 34% to $67.5 million from $50.5 million in the first quarter of 1996.

International unit shipments increased 63% and shipments of portable products were up 83%. Average selling prices were down 10.5% from the abnormally high levels of the first quarter of 1996, causing sales to grow at a rate slower than the growth in shipments.

In Europe, unit shipments increased 41% in the first quarter over the first quarter of 1996. As a result of a 15% decline in average selling prices from the first quarter of 1996, sales in the first quarter increased 20% to $177.7 million. Unit shipments in the Asia/Pacific region were up 155% over the first quarter of 1996 and revenues were up 89% to $78.5 million. In total, sales from international operations represented 18% of total company sales, a record high.

Selling, general and administrative expenses for the quarter increased by 21% over the first quarter of 1996, but as a percentage of revenues dropped to 12.0% from 12.4% in the first quarter of last year. The positive trend is an indication that the company is beginning to leverage the significant infrastructure investments made over the last 18 months.
Pentium processors with MMX technology systems represented 28% of total global shipments for the quarter. In the Americas, the shift to Windows NT continued to generate momentum as more than 9% of all desktops and 20% of all major account business migrated to Windows NT.

Gateway believes the market is feature and technology driven, and foresees most of their expansion in coming quarters from the corporate area. On the back of Dell’s announcement of the formation of a workstation division, expect Gateway to come up with their own spin on a workstation division, very soon. The company has some plans, but doesn’t want to be seen in the same light as their competitors, for obvious reasons. So how long before Dell comes up with some real home multimedia systems? It’s going to be an interesting Christmas face-off between the two mail order giants.

**Intelligent Electronics to sell Reseller Network Division to Ingram Micro**
- *indirect business unit sold to Ingram*

Following on the heels of Ingram’s healthy financials, Intelligent Electronics (IE of Exton, PA) has signed a definitive agreement with Ingram to acquire IE’s indirect business, the Reseller Network Division (RND), for approximately $78 million.

According to Richard D. Sanford, Chairman and CEO of IE, “As a result of this transaction, the company will gain a single focus on the direct business market.” IE presently operates in two business segments, indirect and direct. The indirect business segment is addressed through RND, which provides distribution of microcomputers and related equipment to its network of computer resellers. The direct business segment is addressed through XLSource, IE’s technology sales organization, and XLConnect Solutions, IE’s 80%-owned professional services subsidiary.

(610.458.5500)
Microsoft cancels Escalante
• Talisman reference design bagged
• Talisman architecture lives on

Microsoft has officially closed the book on the Escalante project, the Talisman reference design board which was being jointly developed by Philips, Cirrus Logic, and Fujitsu. Many in the community reacted to this news by confusing the cancellation of Escalante with a cancellation of Talisman. Don’t make that mistake, Talisman is alive and kicking.

The reasons for the cancellation vary depending on whether you’re talking to Microsoft or Cirrus, however, both performance concerns for the reference hardware compared to other Talisman products currently in development by IHVs, and Cirrus’s financial woes (see story below), played a part in the decision.

Cirrus Logic’s part of the Talisman reference design (the tiler and sprite chip) was running a bit behind schedule, but worse for Cirrus was a significant expense without much revenue potential. Microsoft never intended its reference board to compete for consumer dollars; it was meant to inspire the development community. Cirrus hoped to leverage the experience of working on the reference board in a second generation higher-performance implementation that would compete — and they say they still will. In the meantime, the Escalante reference board was looking like a 40 megapixels/sec. renderer when running traditional (non-Talisman optimized) content which, by the time the product would be delivered at the end of this year, wouldn’t be a compelling offering. Microsoft’s feeling was that this could have disrupted developers rather than inspiring them.

Microsoft claims to have enlisted a healthy set of Talisman licensees and they’re all under strict NDA, so for the time being we just need to take Microsoft’s word for it. Lacking a reference board, the Talisman architectural document and the DDK are serving as the design target for these companies. Microsoft is still working with Philips’ TriMedia as a Talisman front end, and will deliver a driver for some as yet undetermined hardware combination to serve as an example implementation.

At the CGDC, Jay Torborg said most of the companies he’s familiar with who are working with Talisman are implementing between 70% and 80% of Talisman’s features. For Cirrus Logic’s part, a company spokesman said Escalante technical development is completed and has provided the source for quite a few derivative products to be put into play in 1998.

For more Talisman insights, read Danielle Forsyth’s article later in this issue.

Samsung buys 3DO hardware unit
• $20 million goes into 3DO war chest for games development

Samsung will purchase 3DO’s hardware systems business for $20 million in cash. The transaction, which will close as soon as Korean and U.S. government approvals are obtained, gives 3DO significantly increased capitalization and completes 3DO’s transformation into a video game software company under the leadership of Trip Hawkins.
Samsung will form a new company based in Silicon Valley to focus on multimedia systems and semiconductor products. Approximately 75 3DO employees, currently in 3DO’s hardware systems business, will be offered positions in the new organization. Tobin E. Farrand, currently 3DO’s Senior VP of Engineering, will become President and CEO of the new Samsung subsidiary.

The original $100 million license agreement with Matsushita and the new $20 million deal with Samsung puts 3DO on a strong footing in the video game business.

“We are well-known for our troubles on our first generation hardware system,” said Mr. Hawkins. “But we followed that with a significant profit from our second generation M2 system, and now we’ve made another major transaction that is highly profitable. While we learned our lessons, and made two deals that gave us significant profits, we have realized that the hardware business is for large companies like Samsung and Matsushita.” (415.261.3000)

What a strategy: don’t make a successful product, have 3D technology that is no better or worse than any number of chip companies we know of, and come off with a $120 million sale of that technology. We are humbled by the awesome conceit, but are glad that 3DO’s talented hardware engineers continue the fight. So the question is, can 3DO be a content partner for all those 3D chip makers looking for killer content? Hmmm.

Research on home and consumer market
• beware of the consumer category called avoiders

Sherwood Research (Wellesley, MA) has identified, as a result of their research, five home/consumer market segments: hunters, early adopters, mainstream adopters, reluctant adopters, and avoiders. These home/consumer categories are derived from the information technology purchase patterns of U.S. consumers along the Technology Adoption Timeline. This timeline shows at what point in the life of a product a particular group of consumers will most likely purchase the product.

According to Sherwood, hunters represent only 1% of U.S. consumers. However, they represent a significant market with regard to technology spending. They also indirectly impact technology spending through their power to influence others to acquire new technology. Hunters are fundamentally eager to adopt, and are willing to purchase and try new technologies for their homes and/or personal lives.

Early adopters are among the first third of the home/consumer market segments to adopt new technologies. Early adopters, although representing only 5% of U.S. consumers, are a critical market for technology developers and marketers. Early adopters provide the most significant boost with regard to publicity and sales for new technologies, and are probably the most significant market for vendors of new technologies to reach early in a product’s life cycle. This market segment has the highest median household income, which allows it to satiate its thirst for new technologies.

Mainstream adopters represent 24% of consumers in the U.S. They are a group that tends to acquire a technology once it has been around for a while, and has been proven to be a reasonable
and useful investment. They may be early adopters of some technologies, but may not see any need at all for others. Mainstream adopters acquire most of their technology products at retail outlets, including consumer electronics stores and computer superstores.

Reluctant adopters, at 45%, comprise the largest group of consumers. They wait to make their purchase decisions until devices and services have been on the market for several years. This group has higher than average price sensitivity, a finding that is reflected by this segment having the lowest home/consumer median household income.

Avoiders, representing 25% of consumers, narrowly beat out mainstream adopters as the second largest group of consumers in the U.S. This market segment is, in general, the last group of consumers to adopt various technologies, if ever. This group tends to fear new technologies that they do not have experience with or an understanding of, and are likely to be generally skeptical of most technologies. This group’s technology buying practices are not necessarily constrained by income, but contain a higher than average proportion of consumers over the age of 50.

(617.416.1000)

We can’t quite make up our minds whether JPA is full of avoiders, reluctant adopters, or if everyone here is just a hunter at heart.

**Financial Reports**

3Dlabs reports first quarter 1997 results

- net income up 150%
- revenues up 773%

3Dlabs (San Jose, CA) announced record financial results for the first quarter ended March 31, 1997. Revenues in the first quarter were $15.76 million, up 773% from the $1.81 million reported in the first quarter of 1996 and up 83% from the $8.61 million reported in the fourth quarter of 1996.
Three months ended

<table>
<thead>
<tr>
<th></th>
<th>March 31, 1997</th>
<th>Percent</th>
<th>March 31, 1996</th>
<th>Percent</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product revenues</td>
<td>$ 15,082</td>
<td>100.0%</td>
<td>$ 1,372</td>
<td>100.0%</td>
<td>999.3%</td>
</tr>
<tr>
<td>License, royalty and other</td>
<td>682</td>
<td>4.5%</td>
<td>433</td>
<td>31.6%</td>
<td>57.5%</td>
</tr>
<tr>
<td>Total revenues</td>
<td>15,764</td>
<td>104.5%</td>
<td>1,805</td>
<td>131.6%</td>
<td>773.4%</td>
</tr>
<tr>
<td>Cost of revenues</td>
<td>5,862</td>
<td>38.9%</td>
<td>679</td>
<td>49.5%</td>
<td>763.3%</td>
</tr>
<tr>
<td>Total cost of revenues</td>
<td>5,862</td>
<td>38.9%</td>
<td>857</td>
<td>62.5%</td>
<td>584.0%</td>
</tr>
<tr>
<td>Gross profit</td>
<td>9,902</td>
<td>65.7%</td>
<td>948</td>
<td>69.1%</td>
<td>944.5%</td>
</tr>
<tr>
<td>Research and development</td>
<td>1,354</td>
<td>9.0%</td>
<td>991</td>
<td>72.2%</td>
<td>36.6%</td>
</tr>
<tr>
<td>Sales and marketing</td>
<td>2,261</td>
<td>15.0%</td>
<td>744</td>
<td>54.2%</td>
<td>203.9%</td>
</tr>
<tr>
<td>General and administrative</td>
<td>569</td>
<td>3.8%</td>
<td>198</td>
<td>14.4%</td>
<td>187.4%</td>
</tr>
<tr>
<td>Income (loss) from operations</td>
<td>5,717</td>
<td>37.9%</td>
<td>(985)</td>
<td>(71.8%)</td>
<td>680.4%</td>
</tr>
<tr>
<td>Other income</td>
<td>275</td>
<td>1.8%</td>
<td>20</td>
<td>1.5%</td>
<td>1275.0%</td>
</tr>
<tr>
<td>Income (loss) before taxes</td>
<td>5,992</td>
<td>39.7%</td>
<td>(965)</td>
<td>(70.3%)</td>
<td>720.9%</td>
</tr>
<tr>
<td>Provision for income taxes</td>
<td>$ 608</td>
<td>4.0%</td>
<td>$ 45</td>
<td>3.3%</td>
<td>1251.1%</td>
</tr>
</tbody>
</table>

3Dlabs’ consolidated statement of operations

Net income for the first quarter was $5.38 million, compared with a loss of $1.01 million in the first quarter of 1996, and up 150% from the $2.15 million reported in the fourth quarter of 1996.

They have had the market all to themselves, and they have taken it at full gallop. Diamond is going to push the 3Dpro, and Hewlett-Packard is going 3Dpro courtesy of AccelGraphics. We have to wait and see how the market reacts to 3Dlabs’ counters in products coming in the third and fourth quarters of 1997. We are also anxious to see how Permedia shapes up as a more mainstream product, and particularly in the Direct3D arena. Permedia and its successors are essential to 3Dlabs’ plans for the future because they don’t want to get into a wrestling match at the high end of the OpenGL accelerator market. Far too messy and expensive for anyone, if that happens.

We think 3Dlabs is up to the challenge. Besides, how can any of their competitors match 3Dlabs in trade show appearances? No one except Neil Trevett has that much stamina for the exhibition floor.

Alliance Semiconductor reports financial results for the quarter and fiscal year end

• revenues for the quarter grow 46%
• net loss of $2.8 million recorded

Alliance Semiconductor (San Jose, CA) reported net revenues of $30.1 million and a net loss of $2.8 million for the fourth quarter of fiscal 1997 ended March 29, 1997. This compares to net revenues for the same quarter last year of $20.7 million and net loss of $26.4 million. For the prior quarter ending December 28, 1996, Alliance reported net revenues of $25.2 million and a net loss of $1.3 million.

For fiscal 1997, Alliance reported net revenues of $82.6 million and net loss of $16.7 million. This compares to net revenues of $201.1 million and net income of $10.7 million for fiscal 1996.
Three months ended

<table>
<thead>
<tr>
<th></th>
<th>March 31, 1997</th>
<th>Percent</th>
<th>March 31, 1996</th>
<th>Percent</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net sales</td>
<td>$ 30,105</td>
<td>100.0%</td>
<td>$ 20,684</td>
<td>100.0%</td>
<td>46%</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>27,438</td>
<td>91.1%</td>
<td>59,498</td>
<td>287.7%</td>
<td>(54%)</td>
</tr>
<tr>
<td>Gross profit</td>
<td>2,667</td>
<td>8.9%</td>
<td>(38,814)</td>
<td>(187.7%)</td>
<td>107%</td>
</tr>
<tr>
<td>Research and development</td>
<td>4,261</td>
<td>14.2%</td>
<td>2,891</td>
<td>14.0%</td>
<td>47%</td>
</tr>
<tr>
<td>General and administrative</td>
<td>3,003</td>
<td>10.0%</td>
<td>2,650</td>
<td>12.8%</td>
<td>13%</td>
</tr>
<tr>
<td>Income from operations</td>
<td>(4,597)</td>
<td>(15.3%)</td>
<td>(44,355)</td>
<td>(214.4%)</td>
<td>90%</td>
</tr>
<tr>
<td>Interest and other income, net</td>
<td>213</td>
<td>0.7%</td>
<td>1,070</td>
<td>5.2%</td>
<td>(80%)</td>
</tr>
<tr>
<td>Income before taxes</td>
<td>(4,384)</td>
<td>(14.6%)</td>
<td>(43,285)</td>
<td>(209.3%)</td>
<td>90%</td>
</tr>
<tr>
<td>Provision for taxes</td>
<td>(1,544)</td>
<td>(5.1%)</td>
<td>(16,881)</td>
<td>(81.6%)</td>
<td>91%</td>
</tr>
<tr>
<td>Net income</td>
<td>$ (2,840)</td>
<td>(9.4%)</td>
<td>(26,404)</td>
<td>(127.7%)</td>
<td>89%</td>
</tr>
</tbody>
</table>

(in thousands) (unaudited)

**Alliance’s consolidated statement of operations (table 1)**

<table>
<thead>
<tr>
<th></th>
<th>March 31, 1997</th>
<th>Percent</th>
<th>March 31, 1996</th>
<th>Percent</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net sales</td>
<td>$ 82,572</td>
<td>100.0%</td>
<td>$201,098</td>
<td>100.0%</td>
<td>(59%)</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>84,630</td>
<td>102.5%</td>
<td>158,159</td>
<td>78.6%</td>
<td>(46%)</td>
</tr>
<tr>
<td>Gross profit</td>
<td>(2,058)</td>
<td>(2.5%)</td>
<td>42,939</td>
<td>21.4%</td>
<td>(105%)</td>
</tr>
<tr>
<td>Research and development</td>
<td>15,012</td>
<td>18.2%</td>
<td>14,664</td>
<td>7.3%</td>
<td>2%</td>
</tr>
<tr>
<td>General and administrative</td>
<td>10,344</td>
<td>12.5%</td>
<td>17,202</td>
<td>8.6%</td>
<td>(40%)</td>
</tr>
<tr>
<td>Income from operations</td>
<td>(27,414)</td>
<td>(33.2%)</td>
<td>11,073</td>
<td>5.5%</td>
<td>(348%)</td>
</tr>
<tr>
<td>Interest and other income, net</td>
<td>1,753</td>
<td>2.1%</td>
<td>6,498</td>
<td>3.2%</td>
<td>(73%)</td>
</tr>
<tr>
<td>Income before taxes</td>
<td>(25,661)</td>
<td>(31.1%)</td>
<td>17,571</td>
<td>8.7%</td>
<td>(246%)</td>
</tr>
<tr>
<td>Provision for taxes</td>
<td>(8,990)</td>
<td>(10.9%)</td>
<td>6,852</td>
<td>3.4%</td>
<td>(231%)</td>
</tr>
<tr>
<td>Net income</td>
<td>$ (16,671)</td>
<td>(20.2%)</td>
<td>$ 10,719</td>
<td>5.3%</td>
<td>(256%)</td>
</tr>
</tbody>
</table>

(in thousands) (unaudited)

**Alliance’s consolidated statement of operations (table 2)**

Price erosion in the SRAM and DRAM markets adversely impacted revenues and margins. The company made strides towards diversification of its portfolio by enriching the product mix with new DRAM, graphics and Flash offerings, as well as enhanced SRAM products. Revenues in the past two quarters were derived from a more balanced mix of products than in previous quarters, with DRAMs, SRAMs and graphics products contributing approximately 60%, 30% and 10%, respectively, to the current quarter’s total net revenues. (408.383.4900; http://www.alsc.com)

Alliance is on the road back to recovery, but has some way to go on their balance sheet.
Arrow Electronics reports first quarter results
• sales gain 9%
• authorizes additional share repurchases

Arrow Electronics (Melville, NY) reported sales gains of 9% in the three months ended March 31, 1997. Net income for the quarter was $50.3 million on sales of $1.9 billion, compared with 1996’s first quarter net income of $56.8 million on sales of $1.7 billion. The company noted that its 1997 results include the activities of the volume electronic component distribution businesses (FES Group) of Premier Farnell subsequent to their acquisition on January 31, 1997. Excluding the FES Group, sales for the quarter were a record $1.8 billion.

“This quarter, driven by strong sales gains in our businesses in North America and the Asia/Pacific region, represents the second consecutive quarter of improving results following our industry’s severe dislocation in 1996,” said Stephen P. Kaufman, Chairman and CEO. “Daily business activity levels in North America remain strong,” he added, “and orders entered remain ahead of shipments.”

The company also announced that its Board of Directors has renewed the stock repurchase program initiated last year and has authorized Arrow to purchase, from time to time, up to $50 million of the company’s common stock. The purchases will be made in the open market or in privately negotiated transactions, as determined by management. (516.391.1300)

Cirrus Logic reports fourth quarter and 1997 fiscal year results
• FY ’97 net sales of $917.2 million, down 20% from previous year
• net loss for the year of $46.2 million, down from loss of $36.2 million in FY ’96
• company restructures product operations and forms Office of the President

Cirrus Logic (Fremont, CA) reported net revenues for the fiscal year ended March 29, 1997, were $917.2 million, a decrease of 20% from $1,146.9 million for fiscal 1996. The company posted a net loss of $46.2 million for fiscal 1997, compared to a net loss of $36.2 million for fiscal 1996. The company also plans lay offs of approximately 400 people, or 15% of its work force.

Net revenues for the fourth quarter of fiscal 1997 were $212.9 million, down from $233.1 million from the corresponding quarter a year ago. Net loss for the quarter was $51.9 million, compared to a net loss of $88.4 million for the previous year’s quarter.


<table>
<thead>
<tr>
<th></th>
<th>Three months ended</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>March 29, 1997</td>
<td>Percent</td>
<td>March 30, 1996</td>
<td>Percent</td>
</tr>
<tr>
<td>Net sales</td>
<td>$ 212,917</td>
<td>100.0%</td>
<td>$ 233,073</td>
<td>100.0%</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>163,905</td>
<td>77.0%</td>
<td>222,894</td>
<td>95.6%</td>
</tr>
<tr>
<td>Research and development</td>
<td>51,249</td>
<td>24.1%</td>
<td>70,215</td>
<td>30.1%</td>
</tr>
<tr>
<td>Selling, general and administrative</td>
<td>33,745</td>
<td>15.8%</td>
<td>45,791</td>
<td>19.6%</td>
</tr>
<tr>
<td>Restructuring costs</td>
<td>20,954</td>
<td>9.8%</td>
<td>11,566</td>
<td>5.0%</td>
</tr>
<tr>
<td>Gain on sale of assets</td>
<td>7</td>
<td>0.0%</td>
<td>--</td>
<td>n/a</td>
</tr>
<tr>
<td>Total costs and expenses</td>
<td>269,860</td>
<td>126.7%</td>
<td>350,466</td>
<td>150.4%</td>
</tr>
<tr>
<td>Loss from operations</td>
<td>(56,943)</td>
<td>(26.7%)</td>
<td>(117,393)</td>
<td>(50.4%)</td>
</tr>
<tr>
<td>Interest and other (expense) income, net</td>
<td>(2,653)</td>
<td>(1.2%)</td>
<td>(493)</td>
<td>(0.2%)</td>
</tr>
<tr>
<td>Loss before benefit for income taxes</td>
<td>(59,596)</td>
<td>(28.0%)</td>
<td>(117,886)</td>
<td>(50.6%)</td>
</tr>
<tr>
<td>Benefit for income taxes</td>
<td>(7,737)</td>
<td>(3.6%)</td>
<td>(29,530)</td>
<td>(12.7%)</td>
</tr>
<tr>
<td>Net loss</td>
<td>$ (51,859)</td>
<td>(24.4%)</td>
<td>$ (88,356)</td>
<td>(37.9%)</td>
</tr>
</tbody>
</table>

(in thousands) (unaudited)

**Cirrus Logic’s condensed statement of operations (table 1)**

<table>
<thead>
<tr>
<th></th>
<th>Year ended</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>March 29, 1997</td>
<td>Percent</td>
<td>March 30, 1996</td>
<td>Percent</td>
</tr>
<tr>
<td>Net sales</td>
<td>$ 917,153</td>
<td>100.0%</td>
<td>$ 1,146,945</td>
<td>100.0%</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>598,795</td>
<td>65.3%</td>
<td>774,350</td>
<td>67.5%</td>
</tr>
<tr>
<td>Research and development</td>
<td>230,778</td>
<td>25.2%</td>
<td>238,791</td>
<td>20.8%</td>
</tr>
<tr>
<td>Selling, general and administrative</td>
<td>126,729</td>
<td>13.8%</td>
<td>165,267</td>
<td>14.4%</td>
</tr>
<tr>
<td>Restructuring costs</td>
<td>20,954</td>
<td>2.3%</td>
<td>11,566</td>
<td>1.0%</td>
</tr>
<tr>
<td>Gain on sale of assets</td>
<td>(16,615)</td>
<td>(1.8%)</td>
<td>--</td>
<td>n/a</td>
</tr>
<tr>
<td>Non-recurring costs</td>
<td>--</td>
<td></td>
<td>1,195</td>
<td>0.1%</td>
</tr>
<tr>
<td>Total costs and expenses</td>
<td>960,641</td>
<td>104.7%</td>
<td>1,191,169</td>
<td>103.9%</td>
</tr>
<tr>
<td>Loss from operations</td>
<td>(43,488)</td>
<td>(4.7%)</td>
<td>(44,224)</td>
<td>(3.9%)</td>
</tr>
<tr>
<td>Interest and other (expense) income, net</td>
<td>(8,131)</td>
<td>(0.9%)</td>
<td>2,501</td>
<td>0.2%</td>
</tr>
<tr>
<td>Loss before benefit for income taxes</td>
<td>(51,619)</td>
<td>(5.6%)</td>
<td>(41,723)</td>
<td>(3.6%)</td>
</tr>
<tr>
<td>Benefit for income taxes</td>
<td>(5,463)</td>
<td>(0.6%)</td>
<td>(5,540)</td>
<td>(0.5%)</td>
</tr>
<tr>
<td>Net loss</td>
<td>$ (46,156)</td>
<td>(5.0%)</td>
<td>$ (36,183)</td>
<td>(3.2%)</td>
</tr>
</tbody>
</table>

(in thousands) (unaudited)

**Cirrus Logic’s condensed statement of operations (table 2)**

Simultaneously with the release of fiscal 1997 year end results, Cirrus announced it has established an Office of the President and integrated its product operations into four divisions to focus on key markets.

“Fiscal 1997 was a year of focus and transition as we divested ourselves of non-core businesses and made major architectural transitions in key product platforms,” said Michael L. Hackworth, President and CEO of Cirrus Logic. “Our recovery has proceeded slower than expected. As a
result, we are accelerating the implementation of our new organizational structure to ‘reinvent’ Cirrus Logic. Our intent is to build greater synergy among complementary product lines and technologies, improve our focus and reduce costs. With our new market segment oriented structure, we expect to leverage the technology portfolio we’ve developed for the PC sector into emerging growth opportunities.”

Hackworth announced that the new Office of the President will be held by Tom Kelly, formerly Cirrus Logic’s Executive VP and CFO, and by George Alexy, formerly Senior VP of corporate marketing. This office will focus on the day-to-day operations of the company.

With this reorganization, Hackworth expects to shift his focus from managing operations to driving the strategic growth initiatives of the company. Kelly, as Chief Operating Officer, will manage overall operational performance of the four product divisions while Alexy, as Chief Products and Marketing Officer, will oversee product strategy, key product development programs and marketing.

Reporting to Hackworth, the Office of the President is chartered to manage Cirrus Logic’s four product divisions and worldwide sales. Hackworth continues as President/CEO, responsible for longer-term strategic growth programs, worldwide manufacturing and major customer relationships. Reporting to Hackworth and assuming expanded responsibilities for financial management is VP of finance Ron Shelton, who becomes the CFO.

Cirrus is now comprised of the following four market focused divisions:

**PC Products Division**, which includes all of the graphics/video products of the former Graphics Company, the PC audio products from Crystal Semiconductor and the PC modem chipsets from the former Personal Systems Division.

**Communications Products Division**, which incorporates the wide area and local area networking products from Crystal Semiconductor and adds enterprise networking and Internet access chip solutions from the former Personal Systems Division.

**Mass Storage Products Division**

**Crystal Semiconductor Products Division**, formerly the Industrial Products Division of Crystal Semiconductor.

By integrating its PC-related products into a single division, Cirrus Logic expects to build more synergy into its product development, as well as provide key customers with a single-point contact for all PC chip solutions. The company also expects its new Communications Division to bring a sharper focus to extending the company’s technology expertise beyond the PC.

“Throughout fiscal 1997, we’ve divested a number of non-core businesses and development programs. These divestitures, combined with the restructuring and our decision to outsource production testing, should enable us to reduce expenses, shorten cycle time and improve our competitive posture,” noted Hackworth. (510.249.4200, http://www.cirrus.com)
Cirrus Logic’s graphics division has been unable to break back into the top tier OEM market against S3, ATI, and Matrox. OEM slots and sockets are hotly contested and jealously guarded by their current owners. It takes both a strong device and a compelling roadmap to unseat an incumbent at this level, and Cirrus hasn’t been able to bring all its strengths into a single part that meets both 2D and 3D performance requirements. Focusing on the synergies of Crystal’s strong new generation of PCI audio may encourage OEMs to adopt a wider range of Cirrus technology, and may eventually result in a hybrid controller; and the company’s Talisman efforts so far indicate derivative products for 1998. Both trends, Cirrus’ strength in audio, and its need for a bold approach suggest that Cirrus’ next best shot at the OEMs might require a big leap in technology. It won’t be easy — none of Cirrus’ competitors are sleeping — but it is necessary.

**CompUSA has record Q3 income**
- sales for the quarter go up to $1.27 billion from $1.07 billion

CompUSA (Dallas, TX) earned a record $32.7 million in its fiscal third quarter, benefiting from improved operating margins and higher sales. CompUSA said it achieved a record 4% operating margin for the quarter. Sales for the period increased to $1.27 billion, up from $1.07 billion last year. Profits for the third quarter of fiscal 1996 were $22.9 million. Comparable store sales were up 5.6% in the third quarter of fiscal 1997 for the 95 stores open one year or more.

“We are extremely pleased to report record earnings for our third quarter,” James F. Halpin, CompUSA President and CEO, said in a statement. “One of the highlights for the quarter was our achievement of a pretax operating margin over 4% — a first for CompUSA.”

CompUSA also said gross margins were 14.4%, the highest in its history. (214.982.400)

*CompUSA is benefiting from the high levels of competition between PC manufacturers and the general upswing in demand for low-cost PCs. They just have to sit back and ring up the credit card number. Again, like most companies’ announcements, revenue increase was not as important as solid balance sheet statistics.*

**Creative Technology announces third quarter fiscal 1997 results**
- gross profits up from 4.4% to 31%
- revenues flat

Creative Technology (Singapore) announced financial results for the third fiscal 1997 quarter and nine months ended March 31, 1997. Sales for the third quarter of fiscal 1997 were $282.8 million, compared to $282.1 million for the same quarter last year. Net income for the quarter was $44.2 million, compared to a net loss of $33.1 million for the same quarter last year. Sales for the nine months ended March 31, 1997, were $952.9 million, compared to $1,015.8 million for the comparable period last year. Net income for the first nine months of fiscal 1997 was $115.8 million, compared to $0.5 million for the corresponding period of the prior year. (408.434.5700)
Three months ended

<table>
<thead>
<tr>
<th></th>
<th>March 31, 1997</th>
<th>Percent</th>
<th>March 31, 1996</th>
<th>Percent</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net sales</td>
<td>$282,818</td>
<td>100.0%</td>
<td>$282,062</td>
<td>100.0%</td>
<td>0%</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>195,264</td>
<td>69.0%</td>
<td>269,557</td>
<td>95.6%</td>
<td>(28%)</td>
</tr>
<tr>
<td>Gross profit</td>
<td>87,554</td>
<td>31.0%</td>
<td>12,505</td>
<td>4.4%</td>
<td>600%</td>
</tr>
<tr>
<td>Research and development</td>
<td>7,459</td>
<td>2.6%</td>
<td>7,392</td>
<td>2.6%</td>
<td>1%</td>
</tr>
<tr>
<td>General and administrative</td>
<td>32,406</td>
<td>11.5%</td>
<td>31,201</td>
<td>11.1%</td>
<td>4%</td>
</tr>
<tr>
<td>Income from operations</td>
<td>47,689</td>
<td>16.9%</td>
<td>(30,735)</td>
<td>(10.9%)</td>
<td>255%</td>
</tr>
<tr>
<td>Interest and other income, net</td>
<td>1,273</td>
<td>0.5%</td>
<td>(1,824)</td>
<td>(0.6%)</td>
<td>170%</td>
</tr>
<tr>
<td>Income before taxes</td>
<td>48,962</td>
<td>17.3%</td>
<td>(32,559)</td>
<td>(11.5%)</td>
<td>250%</td>
</tr>
<tr>
<td>Provision for taxes</td>
<td>(4,896)</td>
<td>(1.7%)</td>
<td>(142)</td>
<td>(0.1%)</td>
<td>(3348%)</td>
</tr>
<tr>
<td>Net income</td>
<td>$44,239</td>
<td>15.6%</td>
<td>$(33,116)</td>
<td>(11.7%)</td>
<td>234%</td>
</tr>
</tbody>
</table>

(in thousands) (unaudited)

Creative’s consolidated statement of operations (table 1)

Creative’s feeling peppy. Net income for the nine months increased 24 fold. So maybe the mantra in the industry is, maintain revenues, that’s good, but get profits up, that’s great. How things change in the matter of a few months. Maybe Creative did the right thing by not being too graphics oriented. They certainly benefited from the opportunities that continue to exist in the audio business with PCI audio, AC3, and a whole host of other features coming to the fore.

Engineering Animation reports fifth consecutive quarter of record results
- 148% increase in revenues
- healthy visualization business continues to grow

Engineering Animation, Inc. (EAI of Ames, IA) announced record revenues for the first quarter ended March 31, 1997, of $7,676,000, a 148% increase over first quarter 1996 revenues of $3,101,000.
“The top and bottom line performance increases were driven by the continuing acceptance of our 3D product visualization software,” said EAI President and CEO Matt Rizai. “We also established several new publishing relationships in our interactive division and generated larger custom animation projects.”

During the first quarter, EAI also ported its 3D product visualization software to the IBM RS/6000 workstations. In addition to the porting agreement, EAI provided interfaces for SRDC’s I-DEAS Master Series and Dassault Systemes CATIA CAD software running on IBM RS/6000 workstations. With the addition of the IBM porting agreement, VisMockUp is now available on every major workstation platform. EAI also entered into a strategic alliance with Sense8 Corporation to develop a virtual reality device server plug-in module for VisMockUp and VisFly.

(515.296.9908)

You have to check EAI out for yourselves. There’s a lot of good technology, and a lot of talent in the company. The jury is out on their ability to get into the content creation business, but they certainly have an interesting mix of 3D disciplines at their disposal.

**IBM announces first quarter 1997 results**

*steady growth and focus on core competencies is a model for the industry*

IBM (Armonk, NY) announced first quarter 1997 net earnings of $1.2 billion. This compares with earnings of $1.2 billion in the first quarter of 1996, excluding a charge associated with acquisitions. Including this charge, first quarter 1996 earnings were $774 million. Revenues for the first quarter of 1997 totaled $17.3 billion, a 5% increase (9% at constant currency) over the same period of 1996.

On an as-reported basis, first quarter revenues in North America were $7.9 billion, an increase of 14% from the same period a year ago. Asia/Pacific revenues increased by 3% to $3.4 billion, while revenues from Latin America were up 2% to $701 million. Revenues from Europe/Middle East/Africa declined by 7% to $5.3 billion. On a constant currency basis, Asia/Pacific revenues grew by 14% and Europe/Middle East/Africa revenues grew by 1%.

Hardware sales totaled $7.8 billion in the first quarter, essentially flat compared with the same period last year. Personal computer and PC server revenues increased, while RS/6000, AS/400, and System/390 revenues declined. Revenue from the company’s storage business increased, due in part to continued strong sales of hard disk drive products. (914.766.3700)

*The financial community is in love with IBM again, and the company is becoming the model of fiscal responsibility for the rest of the industry. The company’s management offers steady annual growth and a solid business model. Just what a blue chip stock should do, and just the kind of approach the digital media companies need to adopt.*
Ingram Micro reports first quarter results
• net income increased 69%
• sales of $0.65 billion

Ingram Micro (Santa Ana, CA) reported financial results for the first quarter ended March 29, 1997. Net income for the period was $40.4 million, exceeding net income in the previous year’s quarter by 69%. In the quarters of both 1997 and 1996, Ingram Micro’s results include a non-cash compensation charge related to the vested portion of previously granted stock options converted to Ingram Micro stock options. These charges were $1.5 million and $4.1 million, net of tax, in the first quarter of 1997 and the first quarter of 1996, respectively. Excluding these charges, net income for first quarter of 1997 grew 50% to $41.8 million. The company posted record net sales in the first quarter of 1997 of $3.65 billion, growing 33% over the prior period’s $2.75 billion. (714.566.1000)

Across the board, distribution channels are experiencing healthier demand than they have in recent years. Much of the growth is driven by the shift in market emphasis to the enterprise, and purchases through VARs, System Integrators, and dealers. Meanwhile, retail channels go for price, and are the reserve of the big PC OEMs and their fat marketing dollars.

Intergraph announces first quarter results
• losses grow on lower revenues, but the systems division makes money
• Intergraph Computer Systems rumored to be set for spin-off

Intergraph Corporation (Huntsville, AL) reported operating results for the first quarter ended March 31, 1997. The company incurred a net loss of $24 million for the quarter on revenues totaling $253 million. This compares with a loss in the first quarter of 1996 of $6 million (including a gain of $9 million from the sale of stock invested) on revenues totaling $257 million. Orders for new systems totaled $159 million, a 10% increase over the first quarter 1996 level.

<table>
<thead>
<tr>
<th>1997</th>
<th>1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>$252,758,000</td>
</tr>
<tr>
<td>Loss from operations</td>
<td>(24,204,000)</td>
</tr>
<tr>
<td>Gain on sale of stock investment</td>
<td>--</td>
</tr>
<tr>
<td>Other non-operating income (expense)</td>
<td>(2,085,000)</td>
</tr>
<tr>
<td>Net loss</td>
<td>($26,289,000)</td>
</tr>
</tbody>
</table>

* Includes a gain of $9,373,000 from the sale of a stock investment

Intergraph’s statement of operations

In spite of a disappointing first quarter, the company anticipates more positive results as the year progresses. Intergraph’s computer hardware business continues to grow, and the company has been successful in becoming a force in several segments of the computer hardware industry. Also, three major software products are being released in the second quarter: SolidEdge 3.0, Imagineer Technical 2.0, and Geomedia 1.0. The company anticipates that these software products will produce incremental revenue for the balance of the year. The company also announced that it had completed the disposition of two non-core businesses that will no longer have a negative impact on future results. (205.730.2000)
Rumor has it that Intergraph may turn its Intergraph Computer Systems division into a stand-alone company. It actually makes money, and would probably rank as the largest Windows NT workstation vendor in the world.

The Learning Company revenues grow
- 12% growth in core publishing business to $81 million
- net loss of $106 million in the first quarter

The Learning Company (Cambridge, MA) announced its 1997 first quarter financial results. Revenues for the first quarter ended March 31, 1997, were $81,027,000 as compared to prior year first quarter revenues of $71,133,000 ($77,184,000 on a pro forma basis to reflect the acquisition of Minnesota Educational Computing Corporation [MECC]). In the first quarter of 1997, TLC’s revenues from its core publishing business grew by 12% over the prior year on a comparative, combined basis, including its acquired subsidiary MECC.

Excluding the amortization and acquisition related charges in the first quarter of 1997 of $124,721,000 and $90,512,000 in the prior year’s first quarter and provision for deferred income taxes, net income for the quarter ended March 31, 1997, would have been $13,603,000 as compared to $10,712,000 in the first quarter of the prior year. Including the amortization and acquisition related charges, TLC reported a net loss for the first quarter ended March 31, 1997, of $106,701,000. (617.494.1200)

The TLC loss reflects the high cost of their acquisition spree in recent years. TLC, formerly Softkey, has all the multimedia development it needs, and the channels. They now take on CUC in the channels. The outcome will determine what kind of legs the multimedia CD-ROM business is going to have into the next decade.

Micronics announces second quarter results
- net sales of $24.3 million, compared with previous results of $40.7 million
- net loss of $2.7 million

Micronics (Fremont, CA), owner and operator of Orchid, announced results for the second quarter ended March 31, 1997. Net sales for the quarter totaled $24.3 million, compared to net sales of $40.7 million in the quarter ended March 31, 1996. Net loss for the second quarter was $2.7 million, compared to a net loss of $916,000 for the comparable period in the prior year.

For the six months ended March 31, 1997, net sales were $60.5 million, compared to $100.9 million for the prior year period. Net loss for the six months ended March 31, 1997, was $2.5 million, compared to net income of $13,000 for the prior year period.

“Our second quarter performance was slower than expected due mainly to lower sales to OEM and government markets and product introduction delays related to supplier inability to provide component parts,” said Micronics President and CEO, Shanker Munshani. (510.651.2300)
Micrografx announces third quarter results
- revenue of $17.1 million, down from $18.4 million in last year’s quarter

Micrografx (Richardson, TX) reported financial results for the third quarter of its 1997 fiscal year. Net income for the three months ended March 31, 1997, was $0.1 million on revenues of $17.1 million. This compares to net income of $0.5 million on revenues of $18.4 million for the same period in 1996 as restated for the April 1996 acquisition of Visual Software. For comparative purposes, revenue would have been $0.7 million higher using last year’s currency rates.

For the nine months ended March 31, 1997, Micrografx reported revenues of $49.8 million and a net loss of $2.3 million (including a second quarter pre-tax restructuring charge of $2.0 million). This compares to revenues of $56.2 million and net income of $2.1 million for the same period in 1996. (214.234.1769, http://www.micrografx.com)

Number Nine reports Q1 financial results
- revenues of $13.96 million, down 56% from previous year’s quarter
- net loss of $2.4 million, down from loss of $570 thousand in last year’s quarter

Number Nine Visual Technology (Lexington, MA) announced revenues and operating results for its first quarter ended March 29, 1997. Revenues for the quarter were approximately $14.0 million, a decrease of 56% from $32.0 million in the first quarter of 1996. The company reported a net loss of approximately $2.4 million for the quarter.

<table>
<thead>
<tr>
<th></th>
<th>Three months ended</th>
<th></th>
<th>March 29, 1997</th>
<th>March 30, 1996</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td>$13,964</td>
<td>100.0%</td>
<td>$32,035</td>
</tr>
<tr>
<td></td>
<td>Cost of sales</td>
<td>11,550</td>
<td>82.7%</td>
<td>27,470</td>
</tr>
<tr>
<td></td>
<td>Gross profit</td>
<td>2,414</td>
<td>17.3%</td>
<td>4,565</td>
</tr>
<tr>
<td></td>
<td>Sales, general, and administrative</td>
<td>3,299</td>
<td>23.6%</td>
<td>4,367</td>
</tr>
<tr>
<td></td>
<td>Research and development</td>
<td>1,481</td>
<td>10.6%</td>
<td>984</td>
</tr>
<tr>
<td></td>
<td>Income (loss) from operations</td>
<td>(2,366)</td>
<td>(16.9%)</td>
<td>(768)</td>
</tr>
<tr>
<td></td>
<td>Other expense (income), net</td>
<td>(9)</td>
<td>(0.1%)</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Income (loss) before income taxes</td>
<td>(2,357)</td>
<td>(16.9%)</td>
<td>(866)</td>
</tr>
<tr>
<td></td>
<td>Provision (benefit) for income taxes</td>
<td>--</td>
<td>n/a</td>
<td>(296)</td>
</tr>
<tr>
<td></td>
<td>Net income (loss)</td>
<td>(2,357)</td>
<td>(16.9%)</td>
<td>(570)</td>
</tr>
</tbody>
</table>

(Number Nine’s condensed consolidated statement of operations)

During the first quarter of 1997, the company experienced lower OEM volume sales on its merchant-based products, lower unit volume and pricing on its Imagine 128 Series 2 compared to the fourth quarter of 1996, and pricing pressure across the remaining products, particularly those at end-of-life. This was partially offset by the introduction and volume sales of the company’s two newly introduced Imagine 128 8 Mbyte products, but not enough to increase gross margins to the same level as the fourth quarter of 1996. (617.674.0009, http://www.nine.com)
VRAM-based products represented 82% of Number Nine’s business in the 1st quarter, and 73% of the business was from Imagine-based products. OEM business comprised 63% of revenue, with Dell contributing 36% (of total revenue) and Micron contributing 13%. The bottom line from Number Nine was that the quarter was worse than they predicted, with tougher pricing and lower volumes. Their own price reductions during the quarter didn’t make a significant difference.

The only bright spot during Number Nine’s conference call with the financial community was that first silicon of the next generation (3D) Imagine chip has come back, and management says the company is on track for a launch of that product in Q3. In Q2 the company will be feeling the same pressures that yielded a difficult first quarter.

The company has cash, and is continuing to make investments in the future. There are more people in R&D than there were one year ago, and they are still building this group. Number Nine recognizes that in order to be a strong player with proprietary silicon they need multiple generations in the pipeline at once. Their serial product development schedule has been a problem.

John Thompson, the President and CEO, said he feels good about necessary infrastructure which has been put in place, saying now they simply need the right products to sell. The company is not retreating from the merchant chip board business; rather, they are refocusing their efforts on providing a range of solutions (not limited to their proprietary I128 technology) for OEMs in the new AGP era.

**Oak Technology’s third quarter 1997 results**
- sales decrease 43%
- optimal storage continues to be strong for Oak

Oak Technology (Sunnyvale, CA) reported results for the third fiscal quarter ending March 31, 1997. The company reported net sales of $50.6 million, a decrease of 43% over third fiscal quarter 1996 net sales of $88.4 million. Net income of $9.5 million compares to net income of $22.2 million for the comparable period a year ago.

Margins for the current quarter were favorably affected by an adjustment to cost of sales associated with the sale of products, which had been fully reserved in a prior period. Excluding the impact on cost of sales of this adjustment, gross margin for the quarter would have been approximately 45%.
Three months ended
March 31, Percent March 31, Percent Change
Net sales $ 50,634 100.0% $ 88,359 100.0% (43%)
Cost of sales 22,829 45.1% 39,964 45.2% (43%)
Gross profit 27,805 54.9% 48,395 54.8% (43%)
Research and development 8,552 16.9% 8,323 9.4% 3%
General and administrative 5,720 11.3% 4,548 5.1% 26%
Income from operations 13,533 26.7% 35,524 40.2% (62%)
Interest and other income, net 1,143 2.3% 2,202 2.5% (48%)
Income before taxes 14,676 29.0% 37,726 42.7% (61%)
 Provision for taxes 5,136 10.1% 15,543 17.6% (67%)
Net income $ 9,540 18.8% $ 22,183 25.1% (57%)

(in thousands) (unaudited)

Oak’s consolidated statement of operations (table 1)

Nine months ended
March 31, Percent March 31, Percent Change
Net sales $ 117,171 100.0% $ 228,566 100.0% (49%)
Cost of sales 48,270 41.2% 104,022 45.5% (54%)
Gross profit 68,901 58.8% 124,544 54.5% (45%)
Research and development 24,506 20.9% 21,726 9.5% 13%
General and administrative 15,100 12.9% 13,410 5.9% 13%
Income from operations 29,295 25.0% 84,571 37.0% (65%)
Interest and other income, net 3,127 2.7% 6,641 2.9% (53%)
Income before taxes 32,422 27.7% 91,212 39.9% (64%)
 Provision for taxes 11,347 9.7% 37,579 16.4% (70%)
Net income $ 21,075 18.0% $ 53,633 23.5% (61%)

(in thousands) (unaudited)

Oak’s consolidated statement of operations (table 2)

“Optical Storage continues to be a strong and important business for Oak. During the quarter, we strengthened our leadership position in this market with the introduction of the OTI-912, the industry’s fastest CD-ROM controller,” stated David Tsang, President and CEO of Oak Technology. “In addition, our MPEG1 decoder business more than doubled over the December quarter and represents an important step in achieving our diversification goals,” Tsang added. (408.328.6899, http://www.oaktech.com)

Oak is turning a corner beyond the CD-ROM market. (See earlier comments on Oak Technology’s new strategies on page 550).

Pixar announces financial results for Q1’97
• income of $5.1 million

Pixar Animation Studios (Richmond, CA) announced financial results for the first quarter of 1997. Revenues for the first quarter were $7.9 million, compared with $8.3 million in the first quarter of
May 2, 1997

The Peddie Report

1996. Net income for the first quarter was $5.1 million, compared with $6.3 million in the first quarter of 1996.

The first quarter of 1996 included technology licensing fees of $6.5 million for a one-time patent license granted by Pixar to Silicon Graphics. As a result of Pixar’s announcement in March, 1997, that it will no longer produce interactive products and will redirect resources in its interactive division to film related projects, net income for the first quarter of 1997 included a loss of $77,000 from discontinued operations. (510.412.3620)

*Just in case you were wondering, their gross profit margins are over 80% in most cases.*

**Radius announces second quarter results**

- revenues of $10.1 million
- inventory write downs contribute $3.8 million to $5.4 million net loss

Radius (Sunnyvale, CA) announced financial results for the second quarter of its 1997 fiscal year ended March 30, 1997. For the quarter, Radius reported net revenues of $10.1 million and an operating loss of $0.7 million before certain one-time net charges of $3.8 million, relating primarily to inventory write downs, resulting in the reported loss of $4.5 million. The net loss after interest and taxes was $5.4 million. The consolidated results for the prior year’s quarter were net revenues of $30.6 million, an operating loss of $3.0 million and a net income of $13.9 million, which included other income of $17.2 million primarily related to product group divestitures.

For the six months ending March 30, 1997, the company reported net revenues of $22.2 million and an operating loss of $0.6 million before the one-time net charges of $3.8 million recorded in the second quarter, resulting in a reported loss for the first half of $4.4 million. The net loss after interest and taxes was $6.2 million. The consolidated results for the prior year’s first six months were net revenues of $63.2 million, an operating loss of $12.5 million and a net income of $4.1 million which included other income of $17.2 million primarily related to product group divestitures. (408.541.6100; http://www.radius.com)

<table>
<thead>
<tr>
<th></th>
<th>March 31, 1997</th>
<th>March 31, 1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net sales</td>
<td>$10,147</td>
<td>$30,575</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>8,409</td>
<td>25,098</td>
</tr>
<tr>
<td>Gross profit</td>
<td>1,738</td>
<td>5,477</td>
</tr>
<tr>
<td>Research and development</td>
<td>997</td>
<td>1,519</td>
</tr>
<tr>
<td>General and administrative</td>
<td>5,223</td>
<td>6,951</td>
</tr>
<tr>
<td>Income from operations</td>
<td>(4,482)</td>
<td>(2,993)</td>
</tr>
<tr>
<td>Interest and other income, net</td>
<td>(7)</td>
<td>18,132</td>
</tr>
<tr>
<td>Income before taxes</td>
<td>(5,246)</td>
<td>14,168</td>
</tr>
<tr>
<td>Provision for taxes</td>
<td>195</td>
<td>249</td>
</tr>
<tr>
<td>Net income</td>
<td>$(5,441)</td>
<td>$(13,919)</td>
</tr>
</tbody>
</table>

(Radius’ consolidated statement of operations (table 1))

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Page 575
Six months ended

<table>
<thead>
<tr>
<th></th>
<th>March 31, 1997</th>
<th>Percent</th>
<th>March 31, 1996</th>
<th>Percent</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net sales</td>
<td>$ 22,244</td>
<td>100.0%</td>
<td>$ 63,227</td>
<td>100.0%</td>
<td>(65%)</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>15,435</td>
<td>69.4%</td>
<td>53,705</td>
<td>84.9%</td>
<td>(71%)</td>
</tr>
<tr>
<td>Gross profit</td>
<td>6,809</td>
<td>30.6%</td>
<td>9,522</td>
<td>15.1%</td>
<td>(28%)</td>
</tr>
<tr>
<td>Research and development</td>
<td>1,901</td>
<td>8.5%</td>
<td>5,149</td>
<td>8.1%</td>
<td>(63%)</td>
</tr>
<tr>
<td>General and administrative</td>
<td>9,321</td>
<td>41.9%</td>
<td>16,912</td>
<td>26.7%</td>
<td>(45%)</td>
</tr>
<tr>
<td>Income from operations</td>
<td>(4,413)</td>
<td>(19.8%)</td>
<td>(12,539)</td>
<td>(19.8%)</td>
<td>65%</td>
</tr>
<tr>
<td>Interest and other income, net</td>
<td>(12)</td>
<td>(0.1%)</td>
<td>19,269</td>
<td>30.5%</td>
<td>(100%)</td>
</tr>
<tr>
<td>Income before taxes</td>
<td>(5,919)</td>
<td>(26.6%)</td>
<td>4,576</td>
<td>7.2%</td>
<td>(229%)</td>
</tr>
<tr>
<td>Provision for taxes</td>
<td>316</td>
<td>1.4%</td>
<td>440</td>
<td>0.7%</td>
<td>(28%)</td>
</tr>
<tr>
<td>Net income</td>
<td>$ (6,235)</td>
<td>(28.0%)</td>
<td>$ 4,136</td>
<td>6.5%</td>
<td>(251%)</td>
</tr>
</tbody>
</table>

(in thousands) (unaudited)

*Radius’ consolidated statement of operations (table 2)*

*On the plus side, Radius has only just started to stimulate interest in their 3D products for the Mac. On the down side, this is the Apple market we’re talking about. While Apple’s core users represent Radius’ best customers, they are a little wary of investing in high-end graphics just now. Lightscape and Electric Image represent the two best 3D opportunities on the Mac for Radius’ Glint accelerators. Interesting to note, one Apple user we talked to at CGDC said that he was being asked by his management to switch over to PCs, although he much preferred the Mac himself.*

*Larry Ellison has officially withdrawn from the race for Apple, and the company now has a couple of quarters in which to develop some forward motion. What will Radius do if the Phoenix doesn’t rise from the ashes? Hard to tell.*

*SDRC reports financial results*
- 50% increase in operating income before acquisition costs
- new license revenues up 22%

SDRC (Milford, OH) reported revenues totaling $80.9 million for the quarter ended March 31, 1997, a 24% increase over the same quarter last year. Excluding a non-recurring charge of $20.9 million related to the acquisition of Metaphase Technology, net income was $8.4 million, an increase of 33% compared to the same period last year. Operating income excluding acquisition costs increased 50% over last year to $10.9 million. Net income for the quarter ended March 31, 1996, was $6.4 million, compared to a reported net loss of $12.4 million for the quarter ended March 31, 1997.

The 24% increase in revenue over 1996 included a 22% increase in new license sales revenue, including a 72% increase in new Metaphase product license sales. Total revenue from product data management (PDM) sales and services grew 91%. (408.980.0100)

*MCAD companies continue to do well. Part of SDRC’s growth is related to their NT business, particularly in Europe. It seems SDRC’s American customers continue to be Unix/RISC.*
Trident Microsystems reports on first three quarters

- a 16% increase in sales to $143.21 million
- stock repurchase plan announced

Trident Microsystems (Mountain View, CA) announced record sales for the first three quarters of fiscal 1997 of $143,214,000, an increase of 16%, from $123,921,000 for the same period of the prior fiscal year. Net income was $13,422,000 for the first three quarters of fiscal 1997, compared to net income of $15,242,000 the same period of the prior fiscal year.

Sales for the third quarter of fiscal 1997 were $46,511,000, compared to $46,007,000 for the third quarter of the prior fiscal year, and sales of $51,865,000 for the prior quarter. Net income for the third quarter of fiscal 1997 was $4,532,000, compared to net income of $5,581,000 for the third quarter of the prior fiscal year; and $5,365,000 or $0.38 for the same period of the prior fiscal year.

“In the graphics industry, the first quarter of calendar 1997 signaled the start of a new product cycle with the transition to the new 3D products away from 2D desktop products. For Trident, the strengths of our portable product shipments to major OEMs, now our largest product family, and our Asia/Pacific channel significantly contributed to our results,” said Frank Lin, President and CEO.

Mr. Lin continued, “Our third quarter results were driven by improved gross margins of 38%. Gross margins improved as Trident delivered a richer product mix to both the portable and desktop markets, and as we continued to improve our manufacturing performance.”

For the third quarter of fiscal 1997, cash, cash equivalents and short-term investments decreased to $50.2 million, compared to $58.6 million from the prior quarter. This decrease principally reflects the company’s additional equity investment of $25.9 million in United Integrated Circuits Corporation (UICC), a foundry joint venture, offset in part by a foundry reimbursement of $14.4 million and by profitable operations. Accounts receivable increased by $5.0 million to $23.6 million due to higher sales in the month of March. Inventory decreased by $9.3 million to $10.3 million and is well positioned as the market transitions to emerging 3D products. Accounts payable decreased by $7.5 million to $13.2 million, primarily due to decrease in purchases from vendors.

<table>
<thead>
<tr>
<th></th>
<th>March 31, 1997</th>
<th>Percent</th>
<th>March 31, 1996</th>
<th>Percent</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net sales</td>
<td>$46,511</td>
<td>100.0%</td>
<td>$46,007</td>
<td>100.0%</td>
<td>1%</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>29,064</td>
<td>62.5%</td>
<td>28,730</td>
<td>62.4%</td>
<td>1%</td>
</tr>
<tr>
<td>Gross profit</td>
<td>17,447</td>
<td>37.5%</td>
<td>17,277</td>
<td>37.6%</td>
<td>1%</td>
</tr>
<tr>
<td>Research and development</td>
<td>5,706</td>
<td>12.3%</td>
<td>16,163</td>
<td>35.1%</td>
<td>(65%)</td>
</tr>
<tr>
<td>General and administrative</td>
<td>5,718</td>
<td>12.3%</td>
<td>4,245</td>
<td>9.2%</td>
<td>35%</td>
</tr>
<tr>
<td>Income from operations</td>
<td>6,306</td>
<td>13.6%</td>
<td>7,665</td>
<td>16.7%</td>
<td>(18%)</td>
</tr>
<tr>
<td>Interest and other income, net</td>
<td>360</td>
<td>0.8%</td>
<td>542</td>
<td>1.2%</td>
<td>(34%)</td>
</tr>
<tr>
<td>Income before taxes</td>
<td>6,666</td>
<td>14.3%</td>
<td>8,207</td>
<td>17.8%</td>
<td>(19%)</td>
</tr>
<tr>
<td>Provision for taxes</td>
<td>2,134</td>
<td>4.6%</td>
<td>2,626</td>
<td>5.7%</td>
<td>(19%)</td>
</tr>
<tr>
<td>Net income</td>
<td>$4,532</td>
<td>9.7%</td>
<td>$5,581</td>
<td>12.1%</td>
<td>(19%)</td>
</tr>
</tbody>
</table>
Trident’s consolidated statement of operations (table 1)

<table>
<thead>
<tr>
<th></th>
<th>Nine months ended</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>March 31,1997</td>
<td>Percent</td>
<td>March 31,1996</td>
<td>Percent</td>
</tr>
<tr>
<td>Net sales</td>
<td>$ 143,214</td>
<td>100.0%</td>
<td>$ 123,921</td>
<td>100.0%</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>92,090</td>
<td>64.3%</td>
<td>77,572</td>
<td>62.6%</td>
</tr>
<tr>
<td>Gross profit</td>
<td>51,124</td>
<td>35.7%</td>
<td>46,349</td>
<td>37.4%</td>
</tr>
<tr>
<td>Research and development</td>
<td>13,522</td>
<td>9.4%</td>
<td>5,423</td>
<td>4.4%</td>
</tr>
<tr>
<td>General and administrative</td>
<td>16,552</td>
<td>11.6%</td>
<td>12,028</td>
<td>9.7%</td>
</tr>
<tr>
<td>Income from operations</td>
<td>18,409</td>
<td>12.9%</td>
<td>20,799</td>
<td>16.8%</td>
</tr>
<tr>
<td>Interest and other income, net</td>
<td>1,332</td>
<td>0.9%</td>
<td>1,615</td>
<td>1.3%</td>
</tr>
<tr>
<td>Income before taxes</td>
<td>19,741</td>
<td>13.8%</td>
<td>22,414</td>
<td>18.1%</td>
</tr>
<tr>
<td>Provision for taxes</td>
<td>6,319</td>
<td>4.4%</td>
<td>7,172</td>
<td>5.8%</td>
</tr>
<tr>
<td>Net income</td>
<td>$ 13,422</td>
<td>9.4%</td>
<td>$ 15,242</td>
<td>12.3%</td>
</tr>
</tbody>
</table>

Trident’s consolidated statement of operations (table 2)

For Trident, the portable market now represents more than 40% of the company’s sales. This trend is expected to continue following the sampling of the Cyber9397 graphics accelerator. Trident also announced that the Cyber9388 will be available in the second half of 1997. This device offers 2 Mbytes of embedded DRAM, and is the first silicon from the agreement signed with Samsung in 1996.

Games have also become a strategically important area of new business as they drive the acceptance of the new 3D standards. Sega has agreed to bundle demos of three games with certain Trident products; a similar agreement was signed recently with Eidos. Trident announced significant design wins during the quarter with major board manufacturers such as Diamond, Number Nine and Jaton to implement full-blown, 133 MHz AGP on a number of their upcoming 3D cards.

Separately, Trident also announced today that their Board of Directors has approved a stock repurchase plan. The plan provides that $9 million be set aside to repurchase up to 600,000 shares over the next six months. (415.691.9211; http://www.trid.com)

Trident is bullish in terms of product and results right now. They’re also on the AGP bandwagon so they have something to crow about for the year-end. The most challenging aspect of the chip business is deciding on how to please the OEMs who are either looking for performance, or buying on price at the low end. S3 will feel the pinch unless they can come up with some compelling performance leadership, and Trident is well placed to knock on the door of S3’s customers, especially now that Cirrus is taking a walk in the wilderness. Of course, the issue here is not loss of volume, but exposure to profits in core graphics markets. You either have to have technology to get the big bucks, or you have to have a lean, mean, and aggressive organization.

We had an individual investor, a desperate soul, knocking on our door this week, one who had been advised to invest in a graphics chip company by her broker, and she was distraught at the fact that
her company of choice was not growing at 30% per year (we chuckled), and she thought Intel was going to eat their lunch (we said, “hmmm.”). She asked what she should do, and we said, “Madam,” because we are respectful and polite, “you’re not going to get rich on graphics companies’ stock right now.” She seemed surprised. We sighed, and said goodbye. Are we wrong? No, we don’t think so, but we don’t hold that the industry is in bad shape. We actually believe it is in good shape, and that execution, good management, and a strong hand on the technology rudder are going to help companies weather the storms of 1997. Trident, on the surface, seems to have most of those attributes right now.

**Truevision reports third quarter results**
- **sales increase 9%**
- **net loss for the quarter of $1.5 million**

Truevision (Santa Clara, CA) today announced financial results for its third fiscal quarter ended March 29, 1997. Net sales for the quarter were $11.9 million, an increase of 9% from $10.9 million in the prior quarter and a decrease of 37% from the net sales of $18.8 million for the same period last year. Net loss for the third quarter was $1.5 million.

Net sales to OEMs in the third fiscal quarter were $3.9 million, an increase from $2.3 million in the prior quarter, and down from $9.4 million for the same period last year. International net sales were $2.7 million, or 23% of total net sales for the quarter.

<table>
<thead>
<tr>
<th></th>
<th>Three months ended</th>
<th></th>
<th>Percent</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>March 31, 1997</td>
<td>March 31, 1996</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net sales</td>
<td>$11,904</td>
<td>$18,825</td>
<td>100.0%</td>
<td>(37%)</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>7,678</td>
<td>11,424</td>
<td>64.5%</td>
<td>(33%)</td>
</tr>
<tr>
<td>Gross profit</td>
<td>4,226</td>
<td>7,401</td>
<td>35.5%</td>
<td>(43%)</td>
</tr>
<tr>
<td>Research and development</td>
<td>1,674</td>
<td>1,883</td>
<td>14.1%</td>
<td>(11%)</td>
</tr>
<tr>
<td>General and administrative</td>
<td>3,889</td>
<td>4,251</td>
<td>32.7%</td>
<td>(9%)</td>
</tr>
<tr>
<td>Income from operations</td>
<td>(1,337)</td>
<td>(1,267)</td>
<td>(11.2%)</td>
<td>(206%)</td>
</tr>
<tr>
<td>Interest and other income, net</td>
<td>(125)</td>
<td>(180)</td>
<td>(1.1%)</td>
<td>(31%)</td>
</tr>
<tr>
<td>Income before taxes</td>
<td>(1,462)</td>
<td>1,087</td>
<td>(12.3%)</td>
<td>(234%)</td>
</tr>
<tr>
<td>Provision for taxes</td>
<td>0</td>
<td>33</td>
<td>0.0%</td>
<td>(100%)</td>
</tr>
<tr>
<td>Net income</td>
<td>$(1,462)</td>
<td>$1,054</td>
<td>(12.3%)</td>
<td>(239%)</td>
</tr>
</tbody>
</table>

*Truevision’s consolidated statement of operations (table 1)*

*(in thousands) (unaudited)*
<table>
<thead>
<tr>
<th></th>
<th>Nine months ended</th>
<th></th>
<th>March 31, 1997</th>
<th>March 31, 1996</th>
<th>Percent</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net sales</td>
<td>$32,863</td>
<td>100.0%</td>
<td>$54,043</td>
<td>100.0%</td>
<td>(39%)</td>
<td></td>
</tr>
<tr>
<td>Cost of sales</td>
<td>21,800</td>
<td>66.3%</td>
<td>33,441</td>
<td>61.9%</td>
<td>(35%)</td>
<td></td>
</tr>
<tr>
<td>Gross profit</td>
<td>11,063</td>
<td>33.7%</td>
<td>20,602</td>
<td>38.1%</td>
<td>(46%)</td>
<td></td>
</tr>
<tr>
<td>Research and development</td>
<td>4,934</td>
<td>15.0%</td>
<td>5,394</td>
<td>10.0%</td>
<td>(9%)</td>
<td></td>
</tr>
<tr>
<td>General and administrative</td>
<td>11,503</td>
<td>35.0%</td>
<td>12,462</td>
<td>23.1%</td>
<td>(8%)</td>
<td></td>
</tr>
<tr>
<td>Income from operations</td>
<td>(5,374)</td>
<td>(16.4%)</td>
<td>2,746</td>
<td>5.1%</td>
<td>(296%)</td>
<td></td>
</tr>
<tr>
<td>Interest and other income, net</td>
<td>(629)</td>
<td>(1.9%)</td>
<td>(400)</td>
<td>(0.7%)</td>
<td>(57%)</td>
<td></td>
</tr>
<tr>
<td>Income before taxes</td>
<td>(6,003)</td>
<td>(18.3%)</td>
<td>2,346</td>
<td>4.3%</td>
<td>(356%)</td>
<td></td>
</tr>
<tr>
<td>Provision for taxes</td>
<td>0</td>
<td>0.0%</td>
<td>69</td>
<td>0.1%</td>
<td>(100%)</td>
<td></td>
</tr>
<tr>
<td>Net income</td>
<td>$(10,861)</td>
<td>(33.0%)</td>
<td>$2,277</td>
<td>4.2%</td>
<td>(577%)</td>
<td></td>
</tr>
</tbody>
</table>

*(in thousands) (unaudited)*

**Truevision’s consolidated statement of operations (table 2)**

“There have been several positive developments during the third quarter,” said Louis Doctor, President and CEO. “Truevision shipped its first DVCPRO TARGA 2000 RTX to Matsushita (Panasonic) under the terms of a recently signed OEM contract. At the recent National Association of Broadcasters Conference, we introduced the MADRAS Real-Time Studio transcoder and announced shipment of the TARGA 2000 SDX which supports serial digital interfaces. Additionally, we are undertaking a 35 city end user road show featuring TARGA hardware and including industry partners such as Adobe Systems, Avid Technology, D-Vision Systems, Intergraph Computer Systems, Kinetix, Microsoft and Panasonic.” (408.562.4200)

*NAB was a strong showing for the digital video market, but it may be some time before see the results reflected in sales. This is a very poor showing for Truevision, and we believe that digital video companies like them are going to have to rethink their strategic plans for the next couple of years. It’s time to define the digital video market on the desktop because seat-of-the-pants innovation and high-end niches are colliding haphazardly.*

**Tseng Labs’ first quarter 1997 results**
- revenues decrease 37%
- company must transition to 3D product line

Tseng Labs (Newton, PA) announced financial results for the first quarter ended March 31, 1997. First quarter 1997 revenues were $2,600,000, a decrease of 37% from $4,107,000 in the corresponding period in 1996 and a decrease of 14% from $3,020,000 in the immediately preceding fourth quarter of 1996. The decrease in revenues in both periods is due to lower unit shipments of the company’s graphic products and pricing pressures on ET6000-based solutions which resulted in lower selling prices for the company’s ET6000 graphics controller in both periods.
The company reported a loss of $1,752,000 for the three months ended March 31, 1997, compared to a loss of $1,417,000 in the corresponding period in 1996 and a loss of $11,054,000 in the immediately preceding fourth quarter of 1996. The fourth quarter loss included one-time charges related primarily to the company’s previously announced focus on 3D graphics. Lower unit shipments and pricing pressures on 2D graphics solutions are expected to produce operating losses for the next several quarters while the company completes development of its first 3D product.

Although revenues are down, the company is investing in research and development, and knows what they have to do (great 3D). However, the overall outlook for Tseng is not good with so much financial pressure on the company, and with the strong competition in the market they have to pull a rabbit out of the hat to get back into contention.

U.S. Robotics reports results for second quarter
• revenues up 52%
• earnings up 77%

U.S. Robotics (Skokie, IL) reported record revenues and earnings for its fiscal second quarter ended March 30, 1997. Revenues for the second quarter of fiscal 1997 were $690.2 million, an increase of 52% over the $454.5 million recorded for the second quarter of fiscal 1996. Net earnings for the current quarter were a record $91.5 million, an increase of 77% over the $51.6 million recorded for the prior year quarter. Net earnings for the second quarter of fiscal 1997 included a non-recurring tax benefit of $17.9 million associated with the company’s acquisition of Scorpio Communications, which closed in the September quarter. Excluding the non-recurring tax benefit, earnings for the quarter were $73.5 million, or $.77 per share.

Gross margins increased to 49.1% of net sales in the current quarter, compared to 41.9% of net sales for the corresponding period in 1996. This increase was due in part to strong margins on initial shipments of the company’s x2 native desktop modem products. The increase in gross
margins also reflected reductions in manufacturing costs and changes in the mix of products sold in each of the periods.

Operating expenses were $220.0 million or 31.9% of sales in the current quarter, compared to $110.4 million or 24.3% of sales in the corresponding period of 1996. The increase was reflected in each major category of expense, consistent with the company’s overall growth, with the majority related to selling and marketing expenses. Substantial expenses were incurred during the March 1997 quarter in connection with the introduction of the company’s x2 products and for selling and marketing programs designed to generate continuing growth in revenues and market share. Also, the company continued to make significant investments during the March 1997 quarter to expand its sales force worldwide.

Revenues for the second quarter of fiscal 1997 increased by $44.8 million or 7% over the $645.4 million reported for the first quarter ended December 29, 1996. Excluding the non-recurring tax benefit, earnings for the second quarter increased by 7% to $73.5 million from the $69.0 million posted for the December quarter. International revenues for the quarter were $229.8 million or 33% of total revenues, up from $193.5 million or 30% of total revenues for the December quarter. International revenues from sales of network systems products during the March quarter were approximately $53 million.

Gross margins increased to 49.1% of net sales in the March quarter from 42.8% of net sales in the December quarter. This increase was primarily due to strong margins on x2 products as well as changes in product mix. Revenues attributable to sales of network systems products increased as a percentage of total revenues during the quarter.

Revenues for the first six months of fiscal 1997 were $1,335.6 million, an increase of 63% over the $819.3 million for the corresponding period of the previous year. Excluding the non-recurring tax benefit, earnings for the first six months of fiscal 1997 were $142.6 million, compared to $93.3 million for the first six months of fiscal 1996. Including the non-recurring tax benefit, net earnings were $160.5 million or $1.67 per share for the first six months of fiscal 1997. (847.882.5010)

At CGDC you could tell who the well-heeled Valley executives were; they were the ones carrying the Palmtop Pilots, and both Messrs. Fischer and Peddie are proud users of the little device at JPA. That’s not the only reason Robotics’ financial results are on this page, either; this is the company to beat in the communications market, and if 3COM can pull off the merger with success, then beware modem makers everywhere.

Videonics reports results for first quarter
• revenues drop from $7.1 million to $4.5 million
• net loss of $2.4 million

Videonics (Campbell, CA) announced financial results for its first quarter ended March 31, 1997. Revenues for the first quarter were $4.5 million, compared to $7.1 million reported in the first quarter a year ago. The net loss for the first quarter was $2.4 million, compared to net income of $449,000 reported in the first quarter a year ago. Included in the loss for the quarter were non-recurring charges: to inventory reserves for components rendered obsolete by product
revisions; to warranty reserves for new product hardware updates; to revenue for cancellation of an OEM contract; and to bad debt reserves for specific accounts. These charges, which totaled $1.4 million, reduced revenue by $335,000, increased the cost of revenues by $733,000 and increased operating expenses by $338,000. Excluding these charges, the company’s loss would have been $1.4 million.

“As reported in our pre-release of March 28, 1997, we are disappointed with the lower sales rate this quarter and with the first quarterly loss that we have experienced since early 1993,” said Jim McNeill, VP and CFO of Videonics. “Sales were impacted by several factors. First, our retail dealers reported that after a slow year-end selling season, weak sales continued throughout the first quarter, thus lowering orders for our Videographer products. Second, our new software release for PowerScript did not occur until the end of February, which was too late to substantially affect sales for the quarter. Finally, Video ToolKit for Windows was released for shipment the last week of March, which minimized its contribution to the quarter. We believe that Videonics’ financial performance will continue to be under pressure until additional new products begin shipping later this year.” (408.866.8300)

**VSI Enterprises reports first quarter results**
- **revenues up 85%**
- **backlog up 43% over 1996**
- **strong increase in videoconferencing system sales**

VSI Enterprises (Norcross, GA) reported its financial results for the first quarter ended March 31, 1997. The company generated revenues of $5,506,416 for the first quarter that ended March 31, 1997, an increase of 85% over revenues of $2,968,558 for the first quarter of 1996. The net loss for the quarter ended March 31, 1997, was $1,243,240, compared to a net loss of $1,709,468 for the quarter ended March 31, 1996. The backlog of purchase orders as of March 31, 1997, was $3.3 million, an increase of $1.0 million, or 43%, over the backlog of $2.3 million on March 31, 1996.

VSI cited the following first quarter highlights: the establishment of a strategic alliance with BT for multinational distribution and co-development of products and support capabilities, and an increase of about 60% in videoconferencing system revenues.

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**Editorial and Other**

**Shifting the Bottleneck - Talisman**
- **3D acceleration challenges from a high-level application and UI developer’s perspective**

This article is the first in a series designed to *Accelerate the Development of Accelerated 3D Applications*. Here, we look at the “Accelerated 3D Applications” portion and discuss various application types and the challenges in making them run fast.

With the understanding that pushing polygons through an accelerator solves only a portion of the overall 3D graphics application acceleration problem, we look at Talisman and examine the contributions that reasonable implementations could make in overall application performance. Like
you, we don’t have hardware yet to do real testing, but we will soon, and you can look forward to seeing our results.

Challenges for “Accelerating the Development” are touched on in this article and are further explored in next month’s article. Subsequent articles and reports discuss issues related to writing and accelerating various types of graphics applications.

This series of articles is authored by Danielle Forsyth and Roy Hall, co-founders of Crisis in Perspective, a graphics research and development company based in Portland, OR.

3D Application Acceleration
There is no single accelerator or acceleration model that works for all graphics applications. There are simply too many types of applications that put too many different kinds of pressure on different points of the system to take a “one solution for all” approach. This series of articles takes a look at user needs from a very high level and examines acceleration technologies that may apply to solving some of their problems. Application acceleration is maximized when the hardware, driver API and application API are used effectively by the programmer to create a well targeted application. We won’t be covering all of that in one article!

Graphics companies have long dealt with the dilemma of optimizing for application performance or optimizing for polygon processing (and the associated meaningless benchmarks). We know that raw numbers matter little in application performance yet we use (and often optimize accelerators for) these simple benchmarks. They do provide an unsophisticated user with an easy to understand gauge of a hard to communicate problem. Fortunately, in some applications, these benchmarks actually translate directly into application performance. For most, however, they don’t. For 3D to move to the masses, we need to move on; to think, design and communicate in user terms. Users don’t ask to process millions of triangles. If we are to make a range of applications run well, we must look at graphics problems as system problems. As system resources grow and change we, in the graphics community, need to re-assess system loading based on real user needs and where necessary, look at alternative ways to solve performance, usability and image quality/realism problems.

First, our basic assumption; the only bottleneck that matters is the one between the user and the computer. If we don’t understand what the user is doing (and wants to do), applications won’t run quickly. If applications don’t have an acceptable (as perceived by the user) level of usability, realism and interactivity, they won’t be used. If applications and 3D content cannot be easily generated, they will be slow in coming. None of this is revolutionary. In fact, the workstation companies (who are forced to take a system wide approach to acceleration) have been designing entire systems for years. In the component based PC world, few companies truly have a system wide view. A system wide approach is essential but even the right hardware architecture doesn’t matter if care is not taken in structuring the application.

The User Experience
For simplicity, let’s separate users into three major groups; Data Viewers, of which there are two types, Indirect and Direct Manipulators, and Data Editors.
### Viewing – Indirect Manipulation

**Examples**
Games
VR

**Characteristics**
- Fixed (pre-created) database (user is directing)
- Usually, no cursor
- Single “window”
- Accuracy not nearly important as speed
- Interactivity (and consistent speed) critical

**Acceleration Needed**
- High throughput of shaded, textured, anti-aliased images with high temporal coherence to a single window.

### Viewing – Direct Manipulation

**Examples**
Interactive Media (technical illustration, scientific “presentation”, CD – reference material)

**Characteristics**
- Fixed database (user is examining/directing)
- Pointing device used
- Multiple views
- Accuracy important

**Acceleration Needed**
- High throughput of shaded, anti-aliased images with high temporal coherence. Textures, line drawing, and annotation may be part of the images.

### Editing

**Examples**
CAD, Modeling (for animation, art, science)

**Characteristics**
- Variable database
- Multiple views of the data
- Multiple input devices used (and device tracking is critical)
- Accuracy critical
- Interactivity important (but willing to tradeoff realism)

**Acceleration Needed**
- High throughput of drawn geometries with extreme temporal coherence (generally changing only a few things in an otherwise static environment).

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Although the chart is simple, it shows three distinct user types with three distinct interaction requirements. It will not help an architect building a complex 3D model to have speed without accuracy. It may not matter to a game user if a game character is photorealistic (there is a lot of research which says less realistic, more personality-filled animated characters are more appealing). The point is, there is not a single graphics application so there is not a single graphics acceleration solution. Luckily, there are numerous ways of accelerating applications.

**Accelerating Graphics Applications**

Before we look at specific acceleration approaches, let’s step back and take a look at the lowly triangle of performance benchmarks:

Once we’ve set up the material, lighting, and transformation, a simple triangle is sent to the graphics as 3 vertices – about 36 bytes of information. Polygon setup requires some vertex transformation, shading computations, and interpolant initialization (fixed overhead for any polygon). During scan conversion, we linear interpolate using a dozen-or-so computations per pixel. To load the pixel, we read the Z-buffer value combine it with the interpolated pixel values, and write the new Z-buffer value (4 to 16 bytes per pixel depending on Z-buffer depth, color resolution, and alpha). If a typical triangle covers 100 pixels, our original 36 bytes of data grows to perhaps several thousand computations and up to 1600 bytes communicated to the video memory.

Textures were the next great step in 3D graphics. They provide a tremendous increase in visual complexity with little growth in the volume of data. Our simple triangle is now sent to the graphics as 3 vertices and 3 texture vertices – about 72 bytes of information. If we
want to get a good rendering, we need to do bilinear interpolation of the texture as a minimum. This requires 16 bytes per pixel texture for texture lookup, and we increase the computation per pixel to several dozen to include bilinear texture interpolation and multiplying the interpolated color by the texture color. For the 100 pixel triangle, the original data grew to 72 bytes (2x), memory access grew to about 32 bytes per pixel (2x), and computations by a factor of perhaps 3 or 4. One big question is where the texture lives – if it is in system memory, we just put a tremendous load on the system bus. If it is on the graphics card, we added a requirement for more memory (and we still use the system bus to download the texture).

Consider an image that: is the size of the screen, say 1000 x 1000; has an average polygon depth of 4 per pixel\(^1\); and is refreshed at video rates, 30 frames per second. This requires processing 120 million pixels per second. At several dozen computations per pixel, we need maybe 5000 MIP graphic processing speeds. At 32 bytes/pixel the bus between the graphics processor and the video memory needs to carry about 3.2 gigabytes per second.

Now compound the problem by adding anti-aliasing as an image quality requirement. This is usually achieved by over-sampling. Something like 9 or 16 samples per pixel which are accumulated into the frame buffer. This is typically done by re-rendering the image 9 or 16 times with a partial pixel offset in the sampling grid. Now we need something on the order of 50000 MIP graphic processing and 30 gigabyte/second graphic memory access.

This is pretty daunting. Graphics processors keep getting faster – and they are expected to improve by several orders of magnitude. But the bottom line is that there is just too much data to process – not necessarily in terms of raw 3D graphics data (triangles), but in terms of what it takes to generate pixels. Doubling the visual complexity of a scene increases the data by roughly a factor of 8 (2x in each of 3 dimensions) – but affects the pixel processing requirements very little. Doubling the screen resolution increases the number of pixels to process by a factor of 4, which is far more significant. This all suggests we need to re-focus from pushing more polygons through the graphics, to being far smarter about selecting which polygons we push through the graphics.

Over the years, we have used a number of techniques to expand the image generation speed and visual complexity while trying to minimize the complexity of 3D scene description. These techniques have included:

1. Dedicated graphics hardware/video RAM – shifting the processing load from system resources.
2. Textures – adding visual complexity with minimal growth in scene data.
3. Data simplification, compression and alternative rendering techniques – reducing the data bandwidth between the system and the graphics, but now affecting the number of pixels we need to process.
4. Algorithmic approaches – analyzing and reducing what is drawn/rendered

The first three offload system processing requirements, or reduce the bandwidth between the system and the graphics. Only algorithmic approaches can reduce the data and number of pixels to be

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\(^1\) This is a reasonable guess for imagery that is full screen – as in a game or multimedia application.
processed. A trivial example of algorithmic treatment is the use of XOR line drawing during object editing/positioning with scene re-draw when the operation is complete. No amount of acceleration speed can provide a similar performance while re-rendering the entire scene.

The first three approaches provide incremental improvement to application performance. Algorithmic solutions are the only way to significantly enhance application performance.

**Talisman**

A Talisman is supposed to be a protective charm (Microsoft says “magical powers”, Random House says “an object supposed to possess occult powers and worn as an amulet or charm”). In the case of Microsoft’s rendering architecture, is it? Well, no. First of all, it is not a single entity. Second, as yet, it is not physical. Finally, there is very little that is mystical, unique or even consistent about it. Talisman is, however, significant. It is not significant for its gross numbers but for its combination of approaches to accelerating real 3D applications. Talisman’s greatest contribution will be in applications with lots of motion and limited spatial accuracy. Talisman combines a number of mechanisms that help to make graphics applications available – interactively and inexpensively. Even if you don’t want to work with Microsoft, you should examine the pieces and their contributions to accelerating different types of applications.

**What is Talisman?**

Talisman is the integration of ideas and technologies that have been floating around for a while. This integration addresses some of the limitations of current rendering and acceleration technology.

The main components integrated in Talisman are:

1. On chip memory – video memory (for chunk buffers only) and graphics accelerator on the same chip.
2. Compressed textures/images – texture and image data can be handled in compressed form.
3. Scene re-use – similar in concept to display lists, but caching the rendered information rather than the raw polygon descriptions (render only the stuff that changes).
4. Selective resolution – the idea that everything doesn’t need to be rendered at full screen resolution.
5. 2D image effects in lieu of intense over-sampling – the idea that anti-aliasing, motion blur, depth-of-field and other effects can be simulated using fast 2D image operations rather than slow over-sampling techniques.

The first point is kind of a no-brainer. Instead of putting wires between the graphics processor and the memory, put them both on the same chip so they can talk fast. One obvious implication is that this accelerates current graphics as well as Talisman.

The second point uses existing image compression technology to reduce the bandwidth of what moves between the system processor/memory and the graphics, and reduces the graphics card memory requirements. Again, this applies to existing graphics as well as Talisman.

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2 Talisman allows the developers to tradeoff speed and accuracy. Performance specifications are impossible.
The last three are the most interesting. They are a new slant on the idea of a display list – but instead of caching the geometry of an object, the rendered geometry of the object is cached and re-used whenever possible. If we think of numerous viewing and editing applications, there are many instances where the frame-to-frame changes are not significant (high temporal coherence). If we look at the image in terms of objects, they may have changed positions a little, scaled up or down but the rendered objects change even less than the image as a whole. If we have cached the rendered objects as sprites (images that are transparent where there is no object data) we can overlay the images of parts that have not changed, and render only what has changed.

Talisman is an algorithmic solution to reducing the bandwidth requirements and computation requirements with some suggestions about the hardware that would best accelerate it. This is a substantially different approach than taking the same graphics pipeline we’ve been using for 15 years and trying to make hardware which makes it go faster. Instead, it is reducing the amount of data that needs to be processed and pixels that need to be rendered.

Talisman takes this a step further, and says even though a part has changed, the change might be small. In this case it may be acceptable to warp the cached image for the object instead of re-rendering it. The big win is that an anti-aliased object saved as a sprite can be warped and overlaid into the image with a small fraction of the computation and data bandwidth requirements of re-rendering\(^3\). Some effects, like depth-of-field and motion blur can be obtained by rendering at a lower pixel resolution and stretching the image (which will result in blur). A side observation is that if objects are moving very quickly, they may only require low resolution, non-anti-aliased rendering even if they are rendered every frame.

**What about Pushing Polygons?**

Using Talisman, you are only pushing polygons whenever you render a sprite. The less you can re-use sprites, the more important fast polygon pushing is. Talisman does not relax the pressure on fast polygon pushing. Talisman acknowledges that fast polygon pushing is not the ultimate acceleration strategy.

At what point does pushing polygons faster not help? When you can’t get the data to/from the accelerator or video memory fast enough. Getting the data to the graphics is going to be a big problem because the board people always need to go through the system bus, and they don’t have any control over the apps. Display list support in the driver API is one way to make the application tell the accelerator more about the structure of the data and reduce the bandwidth problem, but it doesn’t reduce the number of pixels that need to be processed.

**Who could use Talisman?**

Application developers and users who want rendered images (as opposed to wireframe) where quality/realism and speed are of prime importance, and the action is continuous (a sequence of frames of roughly the same data so there is high temporal coherence) will benefit most. Developers who can sacrifice some spatial accuracy - since image layer warping approximations affect the spatial accuracy of the final image (things aren’t necessarily exactly where passing the polygons

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\(^3\) Our quick estimate is that you might need something around 20 bytes/pixel using some simple image warp transformations. A data reduction by about 50X with a similar reduction of processing requirements could be achieved with rendered data re-use.
through the locating and camera projection transformations say they should be) should also enjoy
significant benefit.

Developers of applications which require spatial accuracy and applications which have large frame
to frame (low temporal coherence) changes will benefit least. Also, applications with line or
polygon drawing (as opposed to rendering) will not gain a great deal.

Hardware changes like bringing the graphics accelerator and memory onto the same chip, and
adding support for compressed textures, will benefit any 3D application. The big win, in terms of
better appearance and faster frames, is the scene re-use. For this to work in an application, the
scene must be broken up into objects whose layering is unambiguous (i.e. non-intersecting and
covex objects). Big gains will be achieved when much of the scene is static in terms of object data
(camera movement and object movement are OK as long as the data is static).

Viewing applications are going to be the easiest to fit into the Talisman architecture. They will also
benefit most in performance.

Why is Microsoft doing this?
Microsoft has taken a lot of heat for mucking with the hardware business. In fact, Talisman has
both software and hardware components and Microsoft has done a pretty good job of laying out the
hardware elements. The software elements need a lot of attention.

The technology Microsoft has assembled into Talisman is well published and understood. Anyone
could have packaged it, but no one else did. The graphics hardware acceleration business is filled
with companies that are unable to take a system-wide approach and do not have the research dollars
to invest in radically new technology. Microsoft is investing heavily in 3D (check out building #9
where they house Blinn, Cohen, Glassner, Kajiya, and a host of other graphics heavy-weight
gurus). They are accelerating the adoption of 3D technology that we all believed would be
mainstream by now. They are stepping on a few toes to do it (most notably, Silicon Graphics) but
they are offering it back to the industry (for a $10,000 license fee).

There is a catch here. Microsoft owns the API that talks to this hardware, and that makes a lot of
people uncomfortable. If Talisman were put forward by Intel, Microsoft would still own the API.
If Talisman were done by SGI, maybe the situation would be different. The API that Microsoft
owns is the driver API, extensions to DirectX. There are no reasonable higher level application
APIs yet and there is certainly no reason to believe that Microsoft needs to corner the market in this
area.

Whether you like working with Microsoft or not, you should view the Talisman technology as free
research. Cherry pick the pieces that apply to your market. There are really only two things that
Talisman asks from hardware. Critical for data editing applications would be putting the processor
and memory on the same chip. Critical for data viewing applications is adding enough memory on
the chip that you can save sprites (and add the capability of processing them (compositing and
image transform - both of which are trivial compared with the other 3D stuff).
Fill in the holes. With the cancellation of Escalante, Microsoft is even more anxious to work with hardware and software companies to quickly turn out accelerated 3D applications.

**How do application developers take advantage of Talisman?**

Software developers have long ignored hardware acceleration. We hoped that it would be automatic and painless (which was not our experience when we first used 3D accelerators). In fact, by using established driver APIs (OpenGL and Direct3D) when writing applications, it has almost become that way. But the gains that our users see from acceleration are not significant enough. And the tools and interfaces that are available for us are low level and cumbersome.

Talisman enhances the DirectDraw/Direct3D interface to include sprite management and rendering integrated with traditional 3D graphics. It is actually a bit more interesting than that. Talisman manages a bunch of DirectDraw surfaces (that’s what you render your objects into to make sprites), and knows about image warping and compositing (overlaying). When a DirectDraw surface is a window, you are drawing to the window (exactly what you do now with Direct3D). So 3D rendering becomes just a service used by Talisman in creating sprites – you could also get them from bitmaps or video or anything else that creates/captures images.

Using Talisman in an application

The Talisman DirectX extensions contain the basic tools for maintaining the sprite cache and doing the sprite compositing. Direct3D provides the rendering. The Application provides the data.

This leaves two of the above functional boxes unhandled – data caching and sprite managing. Once a scene has been described, the sprite manager needs to sort all of the objects so it knows which objects to draw into sprites and what order to composite the sprites. Each time a frame is drawn, the sprite manager needs to:

- Query the object cache to find out what/how things have changed.
- Use Talisman functions to analyze what error the change introduces to each cached sprite.
- Use the error metrics to determine whether a sprite must be re-rendered, or whether it can be used with a warp function. Any sprite that must be re-rendered must be directed to do so.
- Direct the order of compositing the sprites and provide the warping transformations for each sprite (Talisman functions compute the warping transformations).
This all sounds a bit nasty. We have hopes that the Talisman SDK will do a good job in filling in these functional boxes.

In summary, take small steps:

1. Isolate the graphics. Wrap the low-level graphics with a higher level API that can be mapped into rendering technologies as they become available
2. Think in terms of graphic objects. Algorithmic approaches capitalize on the structure of the data by sorting objects and making decisions about their relationships. Unfortunately, Talisman is very low-level. It is a toolkit, and you need to make the decisions about how the tools are used. Objects will need to sort themselves into layers and make error decisions about when they can be re-used and when they need to be re-rendered.
3. If you want to do it all yourself, start by mapping your API into Direct3D then worry about incorporating the Talisman DirectX extensions. Otherwise, get on the list for the Talisman SKD and see how much of the data cache and sprite manager is filled in there.

**The Talisman DirectX Extensions and Talisman SDK**

Talisman does not necessarily force a new programming paradigm. It uses and augments existing tools. They are, however, Microsoft tools. The big change Talisman introduces is some additional functions at the DirectDraw/Direct3D API level to provide sprite management, wrapping, and overlaying in the context of a rather traditional 3D graphics API. There is also a library of utility functions at this level to help evaluate error metrics and warping transformations so the application can decide when and how to re-use the sprites.

The ideas are good, but the DirectX interface is a low-level bit-pusher’s interface. It lets you do anything you can imagine but gives you help only at the lowest level. It is a lot of work to figure out how to bend an application and write the stuff that maps into Talisman. And, unfortunately, if you are not careful, your application will be locked into the Talisman technology.

If you are relying on someone else to do the mapping between an application API and DirectX, then we believe that non-intersecting, convex display listed objects will be the key to passing the tough decisions to the software between the application API and the graphics driver. The Talisman SDK may prove to be the mapping for many applications, but since we haven’t seen it yet we can’t fill in the details.

**When will APIs become smart and easy?**

This is the real question in graphics. It hasn’t been easy yet, and algorithmic acceleration approaches put more responsibility on the application developer. What is frightening from an acceleration perspective is that the performance of the accelerator depends on the application developer’s use of it.

Even if you anticipate a major overhaul in hardware architectures, today’s APIs are based on a particular hardware architecture. They have always been very hardware centric.

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4 It is important to point out that any application interface the supports display list objects (like OpenGL) is a candidate for handling the mapping to Talisman between the application API and the graphics driver.
In any application we have worked on, the first order of business has always been to put a high level wrapper API around the low-level graphics subsystems. These wrappers are usually application specific, and often proprietary – but the point is, the application and the low-level graphics are isolated from each other. Smart APIs are not too distant a step from this methodology. They will happen in small steps.

We believe the key will be thinking of graphics data not as points, lines, and polygons; but as objects and layers that reveal the structure of the data. This will allow smart APIs to analyze the structure and make the decisions necessary to use the tools being provided.

**Summary**

Talisman adds some trivial 2D compositing and a bit more memory for sprites. Talisman can, with some application re-structuring, provide developers with a mechanism to determine which trade-offs they are willing to make to achieve which levels of speed and realism. Even without re-structuring for major application performance gain, Direct3D applications will benefit if Talisman hardware is available.

Support will be provided for acceleration in the Direct3D API and it will only work well if the application developer already understands how to build 3D applications. This, we believe, has to change. For 3D applications to become readily available, application developers who are application experts (not technology experts) need to be able to quickly build interactive 3D applications for their users. Hopefully, this will be addressed in the Talisman SDK and high level application class libraries.

The real world is of infinite complexity, and application developers and users will add complexity until the speed of the application makes further complexity unreasonable. While we may think a processor that is twice as fast, or a graphics accelerator which improves graphics performance by a factor of three or four will solve these problems, history has shown that authors (developers and users) will increase the complexity of their data until they are running at a similar interactive speed. The demand is somewhat insatiable. To keep pace, we must use algorithmic methods of reducing data complexity and adaptively determining the amount of complexity reduction required. Brute force is not the answer.

The Talisman SDK will be available to developers (under NDA) who send a request to tmantech@microsoft.com.

**Computer Game Developer’s Conference**

**Content takes the spotlight at this year’s CGDC**

- Console and arcade games get plenty of attention, supporting hardware, and Intel spec

This year, content was king, and while not much new hardware was on view after recent unveilings at Intel’s Visual Computing Day and last month’s WinHEC, there were an exciting number of good looking new and upcoming titles.
Rendition, showing the Verite V1000, and ATI, featuring the 3D Rage Pro, demonstrated OpenGL drivers. Rendition was particularly excited about the performance they are seeing with their first cut MCD. Closed door briefings on Rendition’s next generation technology were held, but details won’t be publicly available until at least the middle of June. One current Rendition customer has big plans for OpenGL on the company’s next generation hardware. Cirrus Logic also demonstrated an OpenGL MCD on the Laguna3D-A (AGP/PCI version) chip.

Matrox demonstrated several new titles on the Mystique. Most notably, Formula 1 is one of the first Direct3D titles that requires hardware acceleration (4 Mbyte boards, or greater), and it won’t run with software-only rendering. Terracide is the title by Simis which Microsoft likes to recommend for a D3D benchmark. This game takes advantage of a new stippled alpha feature of the company’s next generation chip. Moto Racer is a great looking Direct3D game due to be released this month, and Tomb Raider is now ported to the Matrox platform.

Nvidia looked like it had come a long way in the two weeks since WinHEC. The game which turned our heads at the show was an upcoming Direct3D title from Psygnosis called G-Police. The helicopter urban battlezone sim was running at high resolutions up to 960 x 720 on the Riva 128 and featured striking camera angles and inspiring flame and explosion effects. Nvidia is also working on a rendered model of an elaborate sculpted interior scene which was already impressive despite its unfinished state.

3Dfx’s technology was pervasive at the conference. At their booth they showed demos of Prey (3Drealms/GT Interactive), Sub Culture (Criterion/Virgin), Moto Racer (Delphine/BMG Interactive), Formula 1 and WipeOut XL (Psygnosis), MDK (Shiny), Outlaws (Lucas Arts), Mace (Atari/Williams), Time Warriors and POD (Ubi Soft), San Francisco Rush (Atari/Williams) in an arcade system. Terracide (Simis/Eidos) was demonstrated in a window on a Voodoo Rush board; GLQuake running on a Voodoo board side-by-side with an expensive OGL workstation was a popular demo at several booths, including SGI’s own. The company even demonstrated Voodoo Graphics in a PowerPC 604-based Macintosh running MacQuake by Lion Software. The company says they have Glide and Apple’s 3D Rave running, as well as OpenGL functional on the Mac.

NEC showed the PCX2 chip running at impressively high resolutions and announced the upcoming availability of several new PowerVR ready titles: Flight Unlimited (Looking Glass Technologies), CyberGladiators (Sierra Online), Resident Evil and Flying Nightmares 2 (Simis/Eidos Interactive) are the latest titles to join the program. According to NEC, these games will appear for the PowerVR platform during the summer.

Quantum3D, the recently spun-out marketing and distribution arm for 3Dfx’s Obsidian boards, (see PCGR, April 22, p. 522) had products all over the exhibition, most notably in the new ArcadePC from HanaHo. The ArcadePC is the fulfillment of the vision Microsoft articulated eloquently during the past year about the theater distribution model for PC entertainment software (see PCGR, January 27, p. 110). The ArcadePC from HanaHo (Bellevue, WA) showcased at CGDC consists of a wider than usual cabinet housing a 200 MHz Pentium with MMX running Windows 95, a 33-inch 640 x 480 monitor from Wells-Gardner being driven by a Quantum3D Obsidian board, JBL speakers built into the cabinet, and various DirectInput-compatible game controllers. Built with standard components, these coin-op cabinets are much less expensive to deploy than proprietary...
arcade systems, and being standards-based they can be re-deployed with a variety of compatible titles. Intel issued a press release announcing its hardware specification for coin-operated video games. It’s the same as HanaHo was building except that it features a Pentium II processor. Find the spec at http://www.intel.com.drg.

Games developers and hardware manufacturers square off at CDGC
• developers challenged to make better use of 3D hardware
• ISVs demand better 3D hardware products

Hardware manufacturers and game developers faced off in a panel led by Jon Peddie at this year’s Game Developers Conference. At issue were a number of points raised by Peddie. From the game developers point of view, Peddie says that the hardware manufacturers have been long on hype and short on products which would really improve the delivery of 3D to users. Instead, he said, game developers are caught in a set-up — customers have been enticed to buy 3D boards and games which failed to meet their expectations, and game developers are left holding the bag. Additionally, the failure of chip manufacturers to support 3D features such as setup, texture mapping, MIP mapping or interpolation in any consistent way forces game developers to gamble on particular implementations. On the side of the hardware manufacturers, Peddie took game developers to task for not making full use of the capabilities that do exist in the hardware. Specifically, Peddie said, even new games on the show floor, such as the very hot, G-Police, don’t make use of a commonly available feature like Z-buffering.

Peddie really didn’t have to throw any more hand grenades than this to get the ball rolling in the standing-room-only session. The one group not represented was the OEM manufacturers and almost in relief, the board and chip guys blamed the OEMs for going for the lowest common denominator in the products they used. A tentative stab was even made at blaming consumers for buying low cost products, but clearly almost everyone in the audience was uncomfortable going down that road, and even the game developers admitted the available games afforded little enticement for spending extra money for 3D accelerators.

Larry Ockene, a Microsoft Development Manager involved with the Talisman project, said the hardware products available now “look worse than television—and television sucks. At the very least,” he said, “game boards should have anti-aliasing, refresh rates up to 60Hz, and trilinear interpolation.” Peddie did say he saw change coming in that game developers finally have better resources at their command. The chips have improved dramatically in the last six months and some game developers have made the most of all available resources, including OpenGL.

One valuable observation to come out of the discussion was general agreement that it was almost impossible to write a game that was economical, ran well on the installed base, and made the best use of the new hardware technology. It was agreed the disparity between the low end and the high end had grown so great that a decision had to be made whether to write to the high end or go for the lowest common denominator. Since many developers in the room had clearly decided to go with the high end, after all that’s where their products will have staying power, Rich Choi, a game developer at Microsoft predicted really great games for next Christmas. However, his role at Microsoft is to create really great games that take advantage of Microsoft’s technology, especially D3D, and inspire the rest of the game developer community. Although he challenged the game
developer community to take him on and push the technology themselves, game developers in the audience jeered, “you can afford to experiment.”

Great games built on great hardware by the end of the year? In exasperation, Ken Nicholson of Winnov, said, “I don’t get this. We’ve all said, the chips suck, the boards suck, the APIs suck, but Santa Claus is going to bring us great games for Christmas?”

Nicholson’s exasperation was nothing compared to the game developer’s, however. They felt not only were they being asked to gamble on technology that had not proven itself in the market, but they were even being asked to write to hardware specs, like Talisman, that had yet to result in a product. At the bottom of their concerns was a really basic issue: “Why should we have to deal with this stuff in the first place? Why can’t we have decent products to write to and decent APIs to use so that we don’t even have to think about it?”

And that is where Microsoft stepped in. Ockene of Microsoft explained that Talisman and D3D would solve all their problems. But when demanded the developers? “Yeah, when?” demanded the chip manufacturers? “Soon.” answered Ockene, an extremely pleasant and sympathetic guy. Nevertheless, at that moment, something left the room. All the contentiousness, all the anger and, unfortunately, all the spirit. It was clear it was to be business as usual, and it wasn’t just Microsoft that was at fault. The game developers realized that the chip manufacturers, the board manufacturers, the OEMs, Microsoft and Intel, each have their own agendas. It was unspoken, but it was there: you game developers will play along because you really have no choice. You’ll work with what they’re given.

In the meantime? Game developers continue to take risks just like everyone else, but they’ll be the ones with less to wager and more to lose.

**Spotlight Award winners**

Instead of black tie, they came in T-shirts and blue jeans — maybe leather if they really felt like dressing up — but the game developers who attended and voted in the Spotlight Awards competition for the best computer games of 1997 are no less influential in their industry than are the members of the Academy of Motion Picture Arts and Sciences who vote for the Oscars. And, they’re no less capricious. Nominations were made this year by a committee whose members are Alex Dunne, editor of *Game Developer Magazine*; Johnny Wilson, editor-in-chief of *Computer Gaming World*; Neil West, editor-in-chief of *Next Generation*; Trent Ward, editor-in-chief of *Video GameSpot*; Donna Coco, senior associate editor of *Computer Graphics World*; Noah Falstein, Board Chairman of the Computer Game Developers Association; Judy Salpeter, editor of *Technology & Learning*; Greg Reeves, columnist for *Replay Magazine*; and Mark Miller, co-chair of IA-SIG of the MIDI Manufacturers Association. The awards were voted on by members and attendees to the Computer Game Developers Conference held last week in Santa Clara, CA.

The Computer Game Developers Association, founded in 1994, has a membership of 1,800 and they’re a very independent bunch. The association is open to all computer game developers from all platforms, but the majority of the members are PC game developers. For that reason, Nintendo has never had any presence to speak of at the show. So it came as a surprise to many members that Nintendo’s *Super Mario 64* won four awards, more than any other product nominated. One game
developer was heard to say at the end of the show, “I can’t believe that ‘effing’ little dwarf won so many awards.” Yes, Super Mario 64 is the game industry’s English Patient, but on the face of it, four awards doesn’t seem out of line. There is also the fact that Super Mario 64 makes excellent use of its host hardware and is a fine, fast moving little game. More notable perhaps is the fact that there really wasn’t a sweep by any product — even Quake didn’t win as many awards as expected. The optimist will assume that the breadth of winners indicates that there are more games with more variety. (Computer Games Developers Association – 415.948.2432, fax 415.948.2744; http://www.cgda.org/; KoAnne)

### The Awards

- **Best Pre-rendered Art**: Zork Nemesis
- **Best Animation**: Tomb Raider
- **Best Adaptation of Linear Media**: I Have No Mouth and I Must Scream
- **Best Script, Story or Interactive Writing**: You Don’t Know Jack XL
- **Best Use of Video**: Wing Commander IV
- **Sound Effects**: Quake
- **Best Use of Innovative Technology**: Super Mario 64 for the N 64
- **Best Console Game**: Super Mario 64
- **Best Simulation Game**: Mechwarrior II: Mercenaries
- **Best Music or Soundtrack**: Quake
- **Best Strategy/War Game**: C&C Red Alert
- **Best PC/Mac Game**: Civilization II
- **Best Arcade Game**: Virtua Fighter 3
- **Best Educational Game**: Freddi Fish II
- **Best Action Game**: Duke Nukem 3D
- **Best Sports Game**: NHL Hockey ‘97
- **Best Adventure Game/RPG**: Elder Scrolls: Daggerfall
- **Best New Technology**: N64 from Nintendo
- **Best Trivia or Puzzle Game**: You Don’t Know Jack XL
- **Online/Internet Game**: Quake
- **Best Game of 1996**: Super Mario 64

### Wide range of I/O devices shown at CGDC

- Polhemus demos Ultratrak Pro Motion Capture Server
- new 3D glasses from H3D and NuVision
- Logitec demos networked force feedback

Polhemus (Hercules, CA) demonstrated their Ultratrak Pro System with a puppet show. At the heart of their system is the Motion Capture Server which contains 4 to 16 motion capture boards (each of which provides two data channels), a VGA controller and external sync output and a communications card in a rack-mount system. Polhemus uses high-speed Etherlink for communications to the host computer. Each Ultratrak Pro can handle up to 32 receivers (two on each board) which interact with a Long Ranger transmitter — a triad of electromagnetic coils enclosed in an 18-inch acrylic sphere that emits the magnetic fields, providing the system’s reference frame for receiver measurements. The sphere provides a suitably space-age look to the entire system. (802.655.3159, http://www.polhemus.com)

At Logitech’s booth (Fremont, CA), gamers were playing with the CyberMan 2, the company’s new game controller, which features six degrees of freedom (6DOF) — X, Y and Z axes; pitch, yaw and
roll — for realistic navigation through virtual worlds. With its advanced, easily programmable interface, CyberMan 2 offers players the experience of being “inside” the game, compared with the joystick metaphor. The product will be available in Q3, estimated U.S. street price is $99.

Logitech also used the show to announce that all their future gaming products will incorporate Immersion Corporation’s advanced I-Force 2.0 force feedback technology, which is now fully supported by the Microsoft DirectX 5.0 API. In addition to the technology’s more sophisticated approach to force feedback, Logitech says Immersion’s advantage is Microsoft’s support, insuring that Logitech’s products will be compatible with all the games that take advantage of DirectX — that’s most of them. (http://www.logitech.com)

On the show floor there was some talk of Virtual I/O’s woes up in Seattle. The company has lost its key personnel and it looks like yet another promising VR company has lost its way. And as usual, when interesting headmount devices bite the dust, more simple technologies start making sense again. (However, there are those of us who were looking forward to watching TV in the privacy of our own heads.)

H3D Entertainment (Cupertino, CA) and Rendition (Mountain View, CA) teamed up to demonstrated H3D’s elegant design for 3D glasses. The incredibly lightweight shutter glasses feature an untethered design that relies on a tiny transmitter which sits on the computer. Power is supplied by two standard CR2032 coin-cell batteries, which can keep game players immersed for up to 190 hours. The glasses also feature a battery saving on/off mechanism that turns on when the glasses are put on and shuts down when they’re taken off. The glasses and transmitter systems will have a street price of around $100 (additional glasses will be available for $29.95) and will ship Q3’97, says the company. (408.777.1450)

On the other side of the show floor, NuVision (Beaverton, OR) was showcasing the WinSpex/3D development kit for Windows 95. The 3-D Spex glasses are also shutter glasses which rely on a cable design. The glasses also fall into the $100 price range, but their design is slightly less elegant. Most gamers will probably prefer the freedom of H3D’s design and the 3-D Spex molded plastic design seemed less comfortable. But there have to be games before consumers will even worry about making choices. NuVision’s WinSpex/3D development kit enables a PC game to display full-screen field sequential images. According to NuVision, 3D games using D3D and their development kit will be compatible with any 3D shutter glasses. (Contact Chris Delambo, Marketing Manager of NuVision Technologies, 503.617.2271, http://www.nuvision3d.com)