

GAMEROOM

Celebrating 20 Fun-Filled Years!
www.gameroommagazine.com

May 2008 \$5.95
Volume 20, Number 5



The Mod Squad

Making it better, brighter, badder

Game Room of the Month

Ross "doc" Ellis, Pinball Hunter



The

WAYBACK

Machine

 by David Ellis

The Sharper Image

I recently had the pleasure of interviewing former Atari electrical engineer and programmer Howard Delman. Howard's career spans more than 30 years, starting with his stint with the most historic video game manufacturer of them all.

In this, the first of multiple columns covering Howard's history and contributions to the industry, we look at his pivotal role in the development of Atari's vector graphics system in the late 70s.

The quest for better graphics. If there is one thing that has pervaded the entire history of video games, it's the constant effort to make games look better. All too often over the years, that visual pizzazz often comes at the expense of gameplay—the time it takes to develop the massive amount of high resolution art and intricate geometry and the engineering efforts required to drive it share the limelight, while the game design itself is little more than an afterthought.

This was not always the case, however. In fact, in the coin-op industry, the technology and hardware were often developed specifically to support the games. This included not only custom controls for games, but also the video display systems themselves.

Raster graphics were constantly improving. Whereas games like *Pong* had graphics that consisted exclusively of squares and rectangles, later games like *Tank*, *Sprint 2*, and *Jet Fighter* depicted recognizable (albeit, still crude) objects. One of the biggest developments in terms of improving video game graphics in the early days, however, was the vector monitor. In the late 70s, the display technology was nothing new—in fact, neither was the idea of using a vector monitor to display game graphics, as

evidenced by William Higgenbotham's 1958 video game predecessor, *Tennis for Two*. However, the introduction of vector graphic games to the video arcade was definitely something that players noticed. Some of the most popular games from the golden age of video arcades used this technology and, at a time when "high resolution" meant that the



ball in your ball and paddle game might not be quite so square, they were truly amazing to behold.

Not surprisingly, the coin-op manufacturer that had the most hit vector graphic games in the arcades was the one that had a lion's share of the hits of that era: Atari.

In 1976, Howard Delman was about to

graduate from the University of California, Santa Barbara with a master's degree in Scientific Instrumentation and he was at the point where he had to decide what to do next. Many of his classmates were planning careers in medical research or the university system, but that didn't sound very fun or creative to Delman. Then, out of the blue, an evening diversion nudged him in the direction of video game development.

"I was having a few beers with friends at the Cold Spring Tavern one night, and we were playing the video game *Tank*," Delman said. "Suddenly, I became very curious about the technology, and had an epiphany. 'Hey. I can do this,' I thought. I found the phone number for Atari and called them that week."

Delman was hired as an electrical engineer, and as such was responsible for creating the hardware for new coin-op games. Because he also had experience programming on microprocessors, his job also included some programming.

"At first, I was helping other engineers, learning the technology, and studying Atari's existing products," he said. "My first real assignment was for a driving game known internally as *City Driver*. I was both the hardware engineer and the programmer. My immediate supervisor, Lyle Rains, gave me the basic topology of the hardware. I fleshed it out, made it work, and implemented the game. It was released in 1977 as *Superbug*."

Although well-versed in both software and hardware development, Delman's number one passion was hardware, and that is what he primarily pursued, both at Atari and in his career after leaving the company.

"Software is just too intangible for me,"

he said. "I've always enjoyed building things I could touch and carry. As a kid, I built radios, an intrusion alarm, audio equipment, even an electromagnetic anti-gravity machine. My father was a TV repairman, so besides having him as a teacher, I had a vast repository of electronic components to work with. Despite countless burn scars from my soldering irons and shocks from voltages as high as 25,000 volts, I still relish the great feeling I get when something I've spent months assembling actually works!"

One of Delman's biggest hardware contributions at Atari (and something that worked very well indeed) was the development of Atari's vector graphics system. Atari wasn't the first company to hit the arcades with vector games. The earliest games by Vectorbeam/Cinematronics pre-dated the first Atari vector game by about a year. However, Delman says that the Vectorbeam system was quite different.

"The origins of Atari's vector system were in Grass Valley, so I don't know if they were influenced by the Vectorbeam design," Delman said. "I do recall dissecting one and concluding that it was a very different approach from ours."

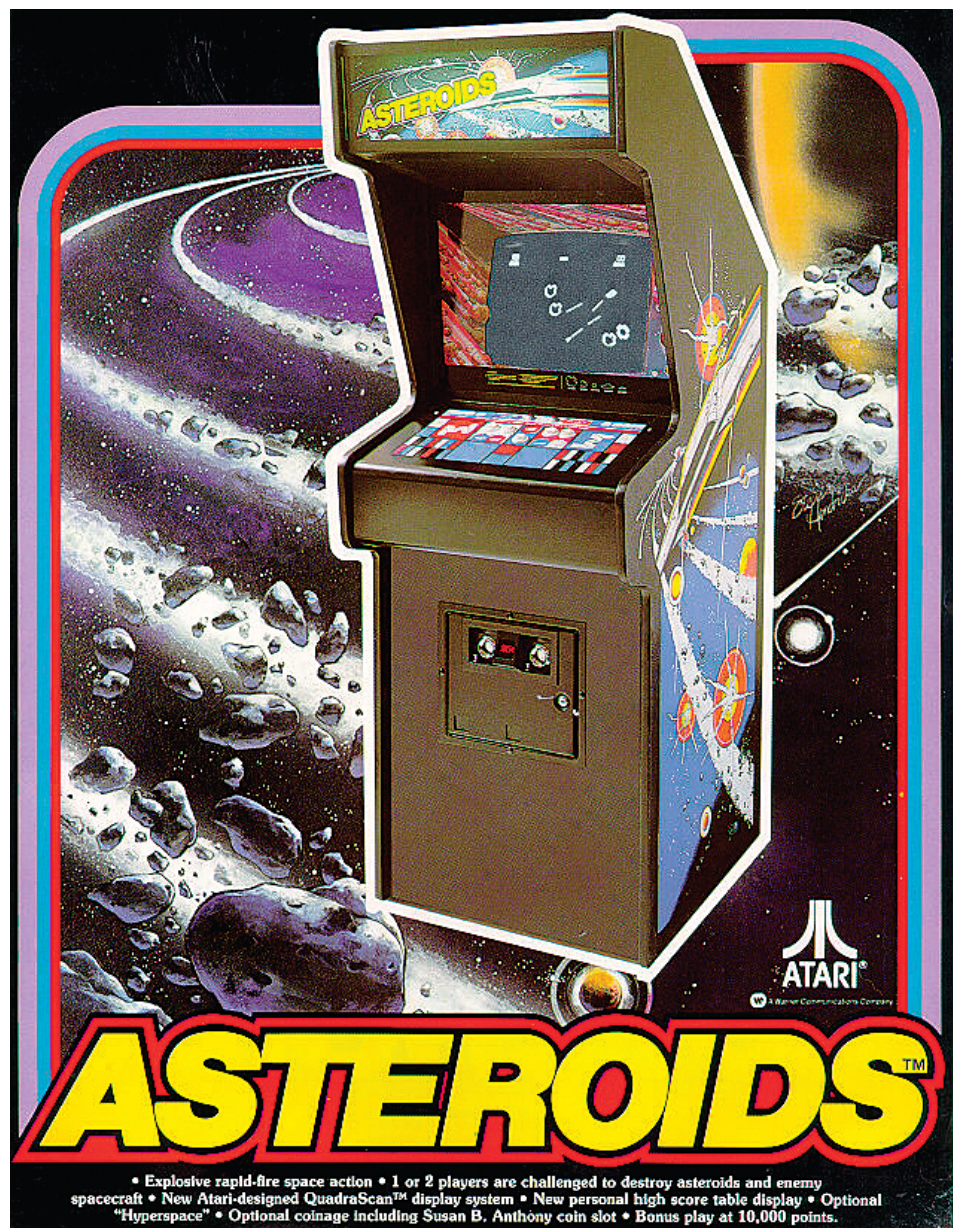
The development of vector games at Atari involved three distinct steps: the creation of the generic vector generator, the creation of the monitor to display it, and the development of the games that utilized the system.

"The original architecture for Atari's vector generator came out of the Grass Valley group," Delman recalled. "They built a prototype of a system that could display vectors on an appropriate monitor. It wasn't ready for production, but it did clearly demonstrate the viability of their ideas. I was given the job of cleaning it up, working out the bugs, adding all of the features necessary for using it in an arcade game, and making it producible.

"At the same time, Rick Moncrief was working on the display. (I don't know if he started from scratch, or was provided a preliminary design from Grass Valley.) Rick and I worked together, since our respective elements had to work together in the finished product.

"Of course, a finished product needed to include a game, so I was made project leader for Atari's first vector graphic game. Rich Moore was assigned the task of writing the software. Over the next year (1978), Rick, Rich, and I developed the three aspects mentioned above, and the final product was *Lunar Lander*."

As the team worked on getting the vector hardware and *Lunar Lander* ready for prime



time in the arcades, other developers at Atari became interested in using the new hardware for other games, including a game that would go on to be one of Atari's greatest arcade hits.

"Lyle Rains, Ed Logg, and Steve Callfee had been working for some time on a traditional raster game called *Planet Grab*," said Delman. "As *Lunar Lander* took shape in the lab, they asked about using the hardware for their game, which would eventually be released under the name *Asteroids*."

As one of the developers of the vector hardware, Delman was inevitably involved in the production of *Asteroids* as well due to his intimate knowledge of the system.

"I modified a *Lunar Lander* circuit board in order to incorporate new features needed for *Asteroids*," he said. "I also developed a collection of circuits to provide *Asteroids*' distinctive sounds. In fact, I still have that original Lunar Lander board, modified to en-

able the development of *Asteroids*, as well as my original hand-built sound board. I should probably donate them to a game museum.

"In time, *Asteroids* got its own circuit board and it entered production a few months after *Lunar Lander*."

"Of course, by this time, every designer wanted to create a vector game, and I could no longer support them all," Delman said. "Other engineers took over and altered what I had created to suit their needs."

Despite the fact that other engineers were modifying the vector graphics system that Delman originally built, Delman himself was still involved in making some fairly substantial changes.

"The original vector generator hardware that was used in *Lunar Lander* and *Asteroids* was almost completely digital," he said. "It became clear to me that a vector generator was one place where analog circuitry could



outperform digital in cost and efficiency. I re-designed a portion of the hardware to replace digital components with analog circuitry, and the analog vector generator was born. Although the player in the arcade wouldn't know the difference, the change shrunk the size of the circuit board and lowered its cost."

Because Atari did not have the facilities to build monitors, they commissioned Electrohome to do the manufacturing. The monitor designed by Delman and his team became the Electrohome G-05. This is the monitor used in the first five Atari vector games (*Lunar Lander*, *Asteroids*, *Red Baron*, *Battlezone*, and *Asteroids Deluxe*). The G-05 was also used in Bally's *Omega Race*. Because Atari designed the monitor, Bally had to pay Atari a royalty for using the G-05.

In 1981, after the release of their first five vector games, Atari moved on from black-and-white vector games to color games, the first of which was the ever-popular *Tempest*. Although Delman was not involved in the design of the color vector system, he was aware of the design efforts that added color to the vector generator. He says the move from black-and-white to color would have been fairly straightforward.

"Certainly, from the perspective of the hardware that drives the monitor, it was not all that difficult," he said. "The real techno-

logical advance was the color monitor."

Although the black-and-white vector monitors were quite reliable, the color vector monitors used by Atari and other companies were notoriously problematic. Games that were popular with players, like *Tempest*, were sources of frustration for arcade owners because the monitors were often down for repair.

Atari produced a total of thirteen vector games, the last of which was *Empire Strikes Back*, a conversion kit for *Star Wars*, in 1985. By this time, the video game crash of the mid-80s was taking its toll on arcades and manufacturers alike. And, even so, technology had marched on, making vector games a thing of the past.

"By the mid-80s, the industry was in a downturn," Delman said. "Vector monitors had reliability problems, and raster graphics had improved dramatically, making vector graphics seem primitive. I suspect all of the above contributed [to the end of the vector game era]."

When it comes to personal preference regarding which vector game he considers the best of the bunch, Delman's preferences are quite clear.

"That's a no-brainer... *Asteroids*," he said. "How can I not love a game that has brought me fame and fortune? Other vector games

that I particularly have enjoyed playing over the years are *Lunar Lander*, *Tempest*, *Battlezone*, and the original *Space War*."

Vector graphics were truly a thing of beauty to behold back in the day. The graphics are simple by today's standards, but I remember being awestruck by the crisp lines and detail of the objects compared to the raster games of the time. Vector games played an important role in video game design, primarily through the introduction of the first-person perspective. Processing power being what it was in the early 80s, three dimensional games were nearly impossible to produce on a raster monitor. There was one notable exception, however.

"As a historical note—It is interesting to reflect on the game *Night Driver*, which came out in 1976," Delman said. "It was possibly the first 3D first-person game. Quite impressive for its time!"

Even so, three-dimensional polygonal graphics simply couldn't be dealt with on a raster monitor, whereas it was fairly easy to push polygons on a vector system. Through games like *Battlezone* and *Red Baron* gave players a glimpse of things to come—navigable, 3D worlds that were the distant ancestors of those found in modern games.

Although their era in the arcades was short (and their era in the home—the short-lived *Vectrex*—was even shorter), vector games will always remain a favorite of collectors and video game history buffs alike.

For more info on Atari's vector games, check out www.gamearchive.com/Video_Games/Manufacturers/Atari/vector.

In next month's Wayback Machine, Howard Delman talks about some of his early game projects, and gives us an insider's look at life at Atari during the company's heyday.

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