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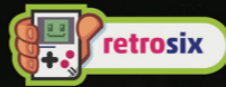
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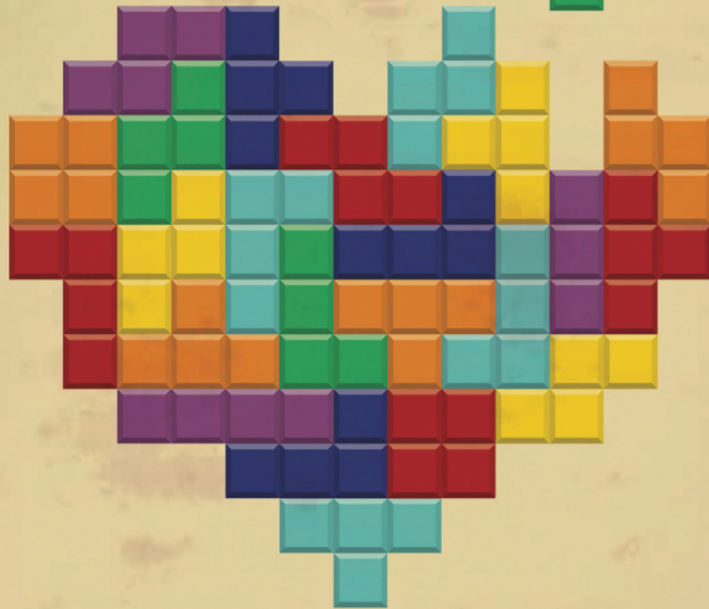
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By Ethan Johnson

**The Magnavox Odyssey, the world's first game console, wasn't actually successful upon its initial release. While it would reimagine itself with the Odyssey 100 and 200 dedicated consoles as well as the Odyssey 2, the original model only sold 350,000 units over three years without any sort of true competition for comparison. However, despite the lackluster reception, the Odyssey made Magnavox a great deal of money. How so? Through a great American past-time: Litigation.**

When Ralph Baer at Sander's Associates was creating the Odyssey, he kept very detailed documentation nearly down to the day of it's progress. This was important for having a legal claim to the technology they were working on, to show that it predated any other. The scope of their work was very specific as well. Baer made sure all of his patents related to games being played on a TV set - the video in video games - not any sort of screen (like in Spacewar!).

It's important to understand, though, that what they patented wasn't the very idea of a video game. Concepts like that cannot be patented, so they had to specify what their inventions truly covered. The main invention that Baer's team was able to claim was something specific to the Ping-Pong game on the Odyssey, the original idea of Bill Rusch. On October 18, 1967 Rusch first documented the idea for that game, and what the team had claims on was something much more specific to patent:

1. The invention displays objects on a television screen.
2. There are at least two objects, Object A (the paddle) and Object B (the ball).
3. When Object B hits Object A, Object B will go in a different direction than where it was first going.

At a basic level, this is Pong, Breakout, and the "ball and paddle genre". At a broader level, this could apply in many other ways.

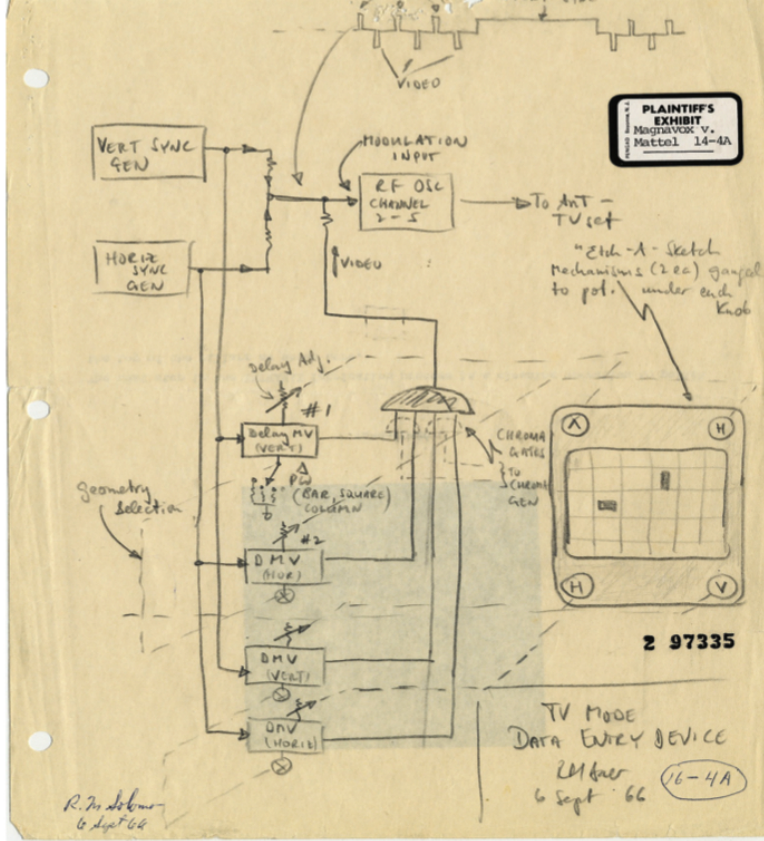
Basically, anything where an object hit another and then bounced, like - say - the trampolines in Mappy. But it did not specifically mean that all video games were covered under the patent scope. Space Invaders, for example, couldn't be said to have a 'bouncing' object. However, if a company did lay claim to a game with those characteristics, Magnavox could sue.

In 1973, pretty much immediately after Pong clones started to proliferate in the coin-op industry, Magnavox's legal counsel was contacting companies like Midway and Atari about this infringement. Though famously Nolan Bushnell got the idea for Pong from a viewing of the Magnavox Odyssey Ping-Pong game, that fact was largely immaterial next to the fact that all of these companies



**Ralph Baer Design Document for Odyssey from 1966 as used in legal case.**

PLAINTIFFS EXHIBIT  
Magnavox v. Mattel 14-4A



Assigned to see out the rest of the case was the Honorable Judge John F. Grady, who was the newly assigned Federal Judge for Northern Illinois. Grady was an accomplished law practitioner, but he was not very knowledgeable about modern technology. Much of the time prior to the court case was dedicated to familiarizing himself with terms like "video" and "transistor". His interpretation of the Ping-Pong patent would set the precedent for all of Magnavox's following litigation, based largely on his understanding of the digital circuitry involved.

The Magnavox Odyssey is really nothing like any other video game device at a functional level. There are no integrated circuits - though there are transistors and diodes - and no memory whatsoever. It's limited functionality was built into its DNA as a device intended for mass market consumption, but the design could never be scaled. Even the Odyssey 100 and 200 series immediately diverged from Baer's original design because it was so antiquated. This, however, did not matter to the Court.

Judge Grady's ruling, after years of deliberation and several weeks of testimony, decided not to take into account the specifics of the technology involved. What he viewed as important was that all these games used a video signal on a standard TV (unlike the prior mainframe games), they all had the collision with subsequent direction changing, and that Sander's Associates had been very specific about what its patents covered. Disregarding the specific manner of circuitry and technology involved, Judge Grady not only ruled in Magnavox's favor but distinguished Baer's basic patent on the Odyssey (the less material one about the hardware itself) the status of a 'pioneer patent', establishing it as the first video game in a legal sense.

Bolstered by this decisive victory, Magnavox would go on to sue or broker with any major company who did not pay their licensing fees. This would include Nintendo, Sega, Mattel, Bally (again), Taito, Capcom, Konami, and Activision. The latter case was actually the most devastating, proving not only that the Odyssey patents applied to all software developers but saddling the company with a debt of 20 million dollars in legal fees. The company would be saved by the current CEO, Bobby Kotick.

In retrospect, the consequences of the initial ruling in Chicago were very negative. The interpretation of the Court made it so that games as divergent as Pong, Mattel's Major League Baseball, and Activision's Ice Hockey were all infringing despite how they were based on existing sports and all diverged in their methods. Almost no other cases in video games would be won on such a broad judgment.

To put it in less complicated terms, let's look at something a bit more familiar. Contrary to the Internet rumor, the Nintendo Zapper does not work using a lightbulb when you pull the trigger. The Magnavox Rifle, however, will trigger because it's only looking for brightness. These are two different methods of achieving a similar effect, and yet Magnavox was able to claim their lightgun technology was stolen by Nintendo because of that broad application.

copying Pong had those characteristics described in the patent. Ball and paddle coinciding, the ball bounces.

In April 1974, the legal battle that would come to encompass much of the notable arcade video game industry at the time began in earnest. The combined case would pit Magnavox and Sander's Associates against Bally plus its distributing arm Empire Distributing, Williams Electronics and its parent company Seeburg, Chicago Coin, Allied Leisure and Universal Research Laboratories (the companies behind the Paddle Battle game), Atari, and later Sears upon the release of Home Pong. This war, waged largely in Chicago, would prove the veracity of the claims to which Baer's team asserted themselves.

To disprove that the "bounce" concept and execution was patentable, the lawyers on the defendants' side would pull out everything they could to rid the Odyssey of the bearing of "first". This would include Nolan Bushnell's attempts to place his conception of a video game before Baer (an ultimately misguided effort, due to the specificity of the patent) and the lawyers digging up every single precedent game that might be material evidence of this distinction. William Higinbotham's Tennis game, Spacewar!, and many more obscure games were brought forward to establish that the Odyssey had nothing unique to which the inventors could lay claim.


The case would eventually reach the court in 1976, but prior to that, Magnavox and Sander's were able to reduce the challenge to their claims. Atari, Bally (with Empire distributing), and Sears would work out an agreement with Magnavox agreeing to pay them royalties for dropping the suit. Allied Leisure had their case reassigned to Florida and Universal Research went bankrupt before proceedings were underway. Atari settled specifically due to their impending purchase by Warner Communications, an imposition which could have prevented them from getting the money they needed to finish the Atari VCS.

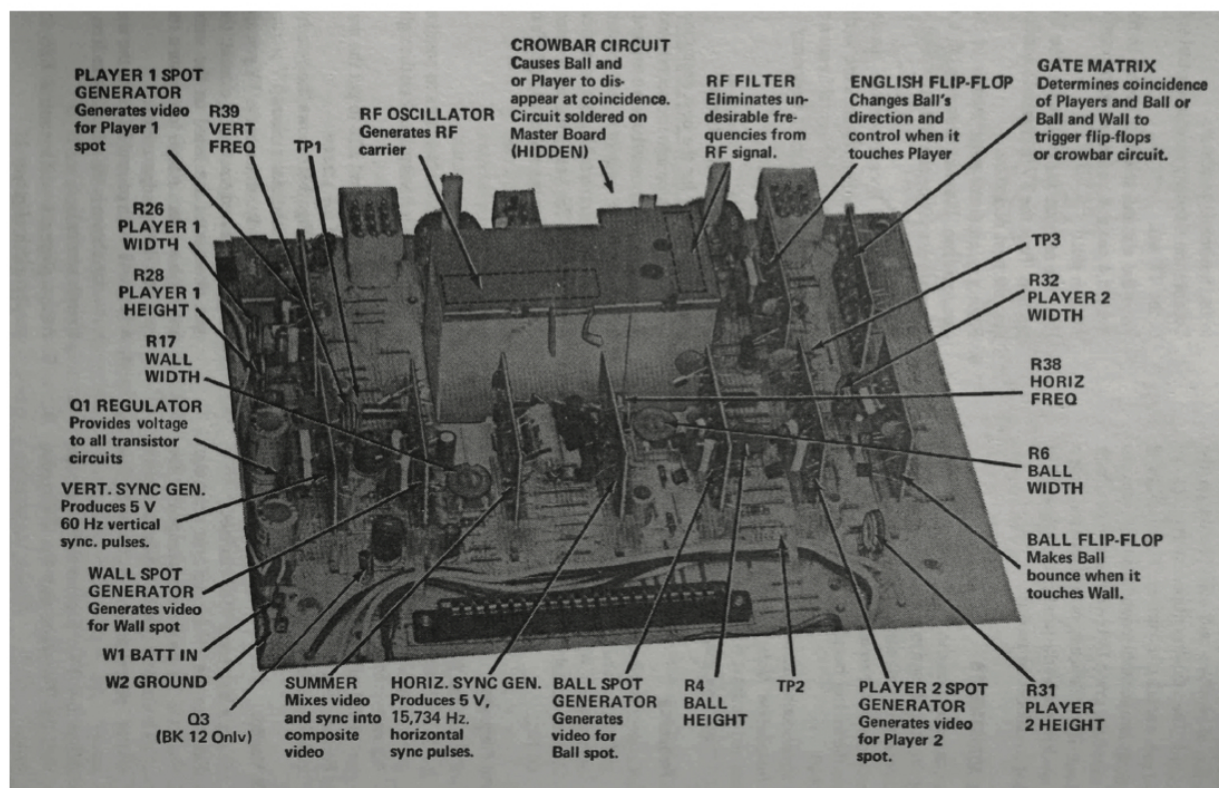
It's unknown, exactly, how much money Sander's and Magnavox gained through litigation, not counting the standard licensing fees they also elicited. Atari had to pay \$1.5 million - though that was a special case - and Konami paid \$495,000 for games released within a two year span. They continued suing NES developers like Data East and Tecmo well after the expiration of their patents in 1989, even giving a kick in the teeth to a failing Acclaim in the 2000s, but the relevance of the patents and decisions on technologies by other judges made it so the 1977 court decision was largely limited to the video game field.

In these ways, Magnavox had a definite impact even if they never attempted to remain a player beyond the crash and the Odyssey's technology had hardly any direct influence on the development of the industry. Patents would largely go by the wayside in terms of video game litigation, and copyright over ideas - like the Blizzard v. Valve over Dota - became the way video game companies would battle it out in court. Perhaps in one important way, Magnavox did presage the attitude of companies in the new American corporate age: Namely, that they were going to sue sue sue.



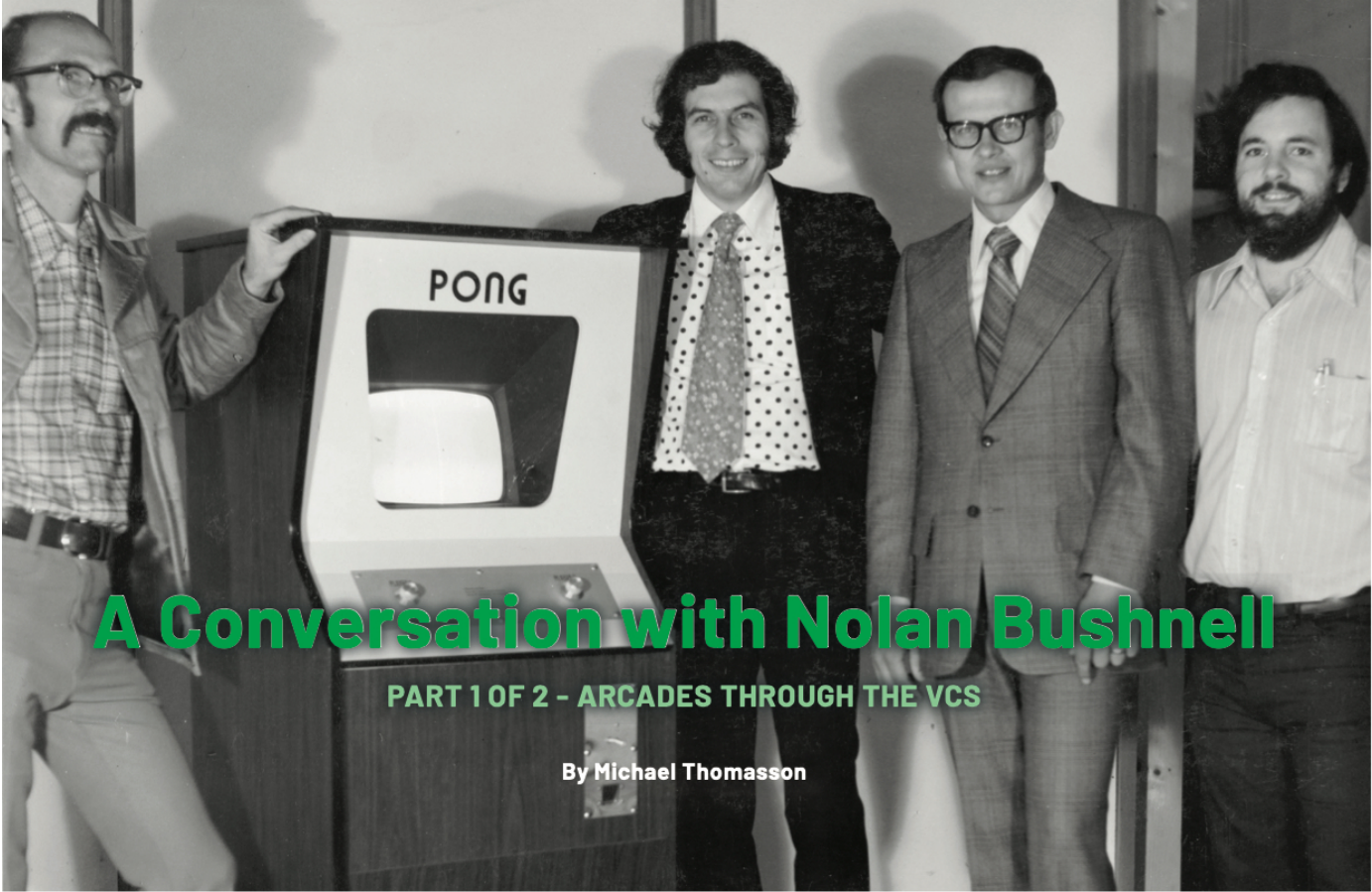
Above: Attendees at Midwest Gaming Classic playing on Odyssey  
Below: Technical Inside View of the Odyssey

\*\*A special thanks to Alex Smith and Keith Smith for helping with interpretation of these legal records. Thanks to the Chicago National Archives staff for hosting me during my research. \*\* 



**Ethan Johnson** - Ethan hold a BA in Game Design from Columbia College Chicago, class of 2017. His primary interests in research and writing are of the formative period of video games in the 1970s covering mainframes, arcades, and home consoles. He has spent a great amount of effort in tracking down obscure sources in libraries as well as importing Japanese books to translate. More and more my interest has expanded into an international focus with connections in many Japan and European regions. Currently he writes research guides for the Video Game History Foundation and has collaborated on the Sega Arcade Revolutiohn and the CRPG Book Project and runs "The History of How We Play" game research blog.





# A Conversation with Nolan Bushnell

## PART 1 OF 2 - ARCADES THROUGH THE VCS

By Michael Thomasson

**S**ometimes that amazing crossing of paths happens and you just get so excited that you have to jump on it. That opportunity came for our publisher, Ryan Burger at CES this past year when he ran into Tyler Bushnell who is working to make his place in the gaming industry just like his Dad, Nolan Bushnell did 40+ years ago (Check out PolyCade.Com for more information on what Tyler is doing). What follows is the first part of a 2 part interview done by Old School Gamer with Nolan Bushnell with thanks to Tyler Bushnell.

**OSG:** Our readers would like to hear some early stories from Syzygy to Atari. Perhaps a nugget or two that hasn't been rehashed again and again in the history books. Your time in school, working at the Lagoon Amusement Park, that kind of stuff. What was your inspiration?

**NOLAN:** I feel like I was probably the only guy who was both an engineer and a carnie. My amusement park experience was in early college from 1963 to 1968. I went from actually working on the midway to being a department manager for three years.

I've always considered my management time as my MBA. It was "hard knocks", because I was managing 150 kids: hiring, training, firing. I managed merchandise percentages, labor costs, the whole thing. I was essentially running a \$3.5 million business, or \$12 million run rate, because it was \$3.5 million over a summer, a four-month summer!

Inside, I had a couple of kids who reported to me. They gave me the understanding of the economics behind the coin operated games business. That knowledge was really instrumental in being able to create the first coin-op video game, because I knew the math. I knew what it had to become.

**OSG:** You understood what the operators were pushing. At that time, they were mostly dealing with pinball and jukeboxes. Money wise, giving half of the proceeds to the venue, keeping half of it - the whole shuffle.

**NOLAN:** The whole nine yards.

**OSG:** Okay. So how did that transition from seeing Steve Russel's Spacewar and inquiring, "Hey, this could be something more than just what geeky engineers do"? If I could simplify it...?"

**NOLAN:** Only if I could drop the cost. When I was playing Spacewar it was on a \$500,000 computer! Clearly the math on that didn't work. I knew there had to be a different way. Following graduation, I worked at Ampex and honed my digital skills - my understanding of how to create digital circuitry, digital timers, and others. All of a sudden it all fell together, giving me the skillset that I needed to build Atari's first game, Computer Space.

**OSG:** And that's where you started to bring other people into the mix such as Ted Dabney?

**NOLAN:** Correct. Ted Dabney was my office mate at Ampex. He ran the display area within Ampex. I was on the digital recording side, where the structure was created. For example, I created the digital signal generator and Ted interfaced it with the monitor. That was how we patched the job.

**OSG:** Okay. So, Computer Space eventually makes it to market. It's not a runaway success, but kicks-off the coin-op industry.

**NOLAN:** Right. It's funny. I think that Computer Space was considered a commercial failure by many, but for me it was a runaway success. I mean, I was happy, I did about \$2.5 million in sales.

**OSG:** That's not half bad. Especially in 1970s dollars.

**NOLAN:** Exactly. It's not as big as what came next, but it still was big. It also produced investment royalties that helped fund the startup that led to Atari.

**OSG:** That is because Computer Space was released through another company. You and Dabney were just the development house,



Computer Space - Image Courtesy of Arcade-Museum.Com

correct?

**NOLAN:** Correct. We licensed Computer Space to Nutting Associates, but we got a royalty. Remember, this was really during the infancy of venture capital, so I hadn't even heard of venture capital. The only way to build a company at the time was by internally generated cash flow. Ted and I each put in \$250. That's all the startup capital we had. Everything else we had to earn, so managing cash flow was just as important as the technology. It was the hard part.

**OSG:** You saw Ralph Baer's handiwork, but already had similar ideas stirring in your head at that point. Give me a little bit more information in that neighborhood.

**NOLAN:** Well. We'd been in the video game business for about two years and all of the sudden we heard, "Gee, you've got some competition with a big company, Magnavox." So, I had to go up and see what was going on. I looked at it and I thought, "Boy, this is really a piece of crap."

**OSG:** Well, despite being primitive, the Odyssey had evolved from an idea on paper to reality over a period of six years. It was a major accomplishment.

**NOLAN:** So, I looked around the room and people were kind of having fun with it. By happenstance, that was the day that Allan Alcorn showed up for his first day at work. I had talked him into coming aboard a couple weeks before, but it was actually his first day. I drove back down and he asks, "Okay. What do you want me to do?"

I described a ping-pong game and I thought, "This is a real simple game, this will be a good learning project," thinking it was just going to be a throwaway. A couple weeks later he got the first part of it going and it was kind of fun. We made little tweaks on it and it got to the point where we were staying late after work playing the damn thing.

We didn't have a factory yet, so I was still thinking that we were simply a studio. We were just going to do design work and continue to make our money through royalties. I had landed a contract from Bally to develop their next coin-op game.



Prototype of Pong - Image Courtesy of Arcade-Museum.Com

It was to be a driving game, and of course a driving game was a lot more complex and more difficult to design.

I thought, "Hey, maybe the ping-pong game is fun enough. Maybe they'll take this game instead." So, I got on an airplane and returned to Chicago with a prototype under my arm. We'd done a second prototype at the time and Al and Ted put it in a bar while I was back there. That's when the famous story of the cash box spilling over happened.

**OSG:** So, after meeting with Bally, you weren't contractually obligated to give them the ping-pong game anymore and were able to pursue the project on your own.

**NOLAN:** Yeah. I figured out that we had just enough cash to build twelve of them. We sold all twelve and then we built another thirty-six. Those turned around and funded another hundred. The building materials were about \$300, and we were selling them for \$900. We had a nice margin. That's how we bootstrapped ourselves up.

**OSG:** How long did it take for the purchaser of the coin-op to recoup their initial \$900 investment?

**NOLAN:** About two months. That was the magic of it. It was earning so much money - about \$200 to \$300 a week. It didn't rocket science to recognize that it was a pretty damn good investment.

**OSG:** Atari's games were a lot like traditional Chess: simple to play, but tough to master. The classic games still stand the test of time. Following Pong and a series of driving games, what did you envision for Atari?

**NOLAN:** Like the old saying, "only the paranoid survive." We were competing with companies that had big factories and a lot of money that we didn't have. We were operating an assembly line within an old roller-skating rink at the time just to get the square footage cheap. We didn't know how to control inventory. I mean, we were making it up as we went along. Everybody else had been in business long enough that they had all those systems and procedures in place. But we had one skill that they didn't have - we could design and invent stuff. So, innovation was our only way to maintain our growth. As a result, we just started designing games as quickly as we could to fill the demand while building diversity.

That turned out to be the right strategy because with each game we learned a little bit more; our factories got a little more efficient, our systems got a little more polished, and we made a little more money. Pretty soon we became just as efficient as the other guys. We ended up making as much money as the competition, and we were cleaning their clock just because of innovation.

**OSG:** *Following Pong's release, how long did it take for the copycats to hit the market? I know that the Texas Instruments "Pong-in-a-chip" solution certainly made it easier for less reputable operators.*

**NOLAN:** Concerning Pong in the coin-op market, we were about six months ahead. There were at least twenty different knock-offs for the home market.

**OSG:** *I know, I have more than my fair share of the home versions. The knock-offs came very quickly. Obviously, popular companies like Coleco got in the game. Nintendo even had its fingers in helping with some stuff. It seems that any group within the electronics industry entered the fray.*

**NOLAN:** In time, we were probably doing four to five different games each year, and with each game release we had fewer and fewer knock-offs. That was pretty encouraging, actually.


**OSG:** *The story of Sears releasing Pong for the home is pretty well known, but what led to the VCS and giving up the company?*

**NOLAN:** With the 2600, we were planning to actually take Atari public,

but the stock market sort of did a lurch. The market wasn't good for a public offering at the time - we had to pull it. We knew we needed a lot more cash in order to build a different factory and to set up production facilities. We really had to fund a lot of inventory... all of which required cash that we didn't have.

**OSG:** *So that's why the call went out effectively for another company to acquire, or significantly invest in, Atari?*

**NOLAN:** We initially went out to get another company to make a strategic investment. We didn't think of selling the whole company. But then Warner Communications came along and said, "Rather than an investment we'll put all the money in that's necessary and give you guys a great big birthday present. Plus, you can cash out a little bit." That actually sounded appealing. The cash flow stress was a roller coaster and really wearing on me... and it could have continued for several years. I was mentally and physically exhausted and needed the vacation.

This interview continues in the next issue of Old School Gamer Magazine with the the Chuck-E-Cheese Story. Thank you to Mr. Bushnell for the time he spent with us on this article. Stay tuned for How Nolan Bushnell revolutionized the way people eat pizza and have fun doing it! 



**Michael Thomasson** is one of the most widely respected videogame historians in the field today. He teaches multiple college level videogame courses, and has contributed to dozens of gaming texts and television shows including MTV's Video MODS and the highly-rated book Downright Bizarre Games. He has written business plans, managed a multiple game-related retail stores, and consults for multiple video game and computer museums. Michael has helped publish 100s of games on Atari, Sega and other console platforms. In 2014, The Guinness Book of World Records declared that Thomasson had "The Largest Videogame Collection" in the world. Visit [www.GoodDealGames.com](http://www.GoodDealGames.com).

# Space Wars

By Kevin Butler

**S**pace Wars was the first vector-driven arcade game. Its success would enable Atari to create their own vector generator creating games such as Asteroids and Battlezone. Space Wars also enabled a fledgling company called Cinematronics (established in 1975) to finally be a part of the major arcade craze that hit, although Space Invaders wouldn't come around for another year. Space Wars has its roots 15 years prior in a computer game called Spacewar!. Steve Russell was asked to demonstrate the capabilities of the PDP-1 in 1962 at MIT. He decided that since the space-race was on, a spaceship simulator/trainer would be the logical next step. With the help of others, they got a working version of said trainer done in 1962. Improvements followed and the finished product was distributed to other college campuses. In the late 1960's, Larry Rosenthal, a student at MIT, saw this game and decided that he could create a system that would specifically run this game and even offer the possibility of it being a commercial success. After being turned down by several of the big name arcade machine manufacturers, he happened upon Cinematronics, which desperately needed a good game to keep its doors open. Larry provided said game in the form of Spacewar!. In the next few pages you will get to hear from both the creator of Spacewar! and the creator of Space Wars. If you want to see a simulation of the original game on a simulated PDP-1, and also the pre-compiled code (all public domain), head to this site: <https://www.masswerk.at/spacewar/>

## STEVE RUSSELL

My first interview was with Steve Russell, the original creator of Spacewar! It was an honor to hear about the beginnings and what went into one of the first games.

**OSG:** *When did you first get interested in computers and electronics?*

**STEVE** Russell (SR): When I was in grade and middle school, I had a Lionel Train set. It was here I learned how to put electronics together and learned about circuits. I continued to expand upon this knowledge in high school. In 1949, at the age of 12, I was

visiting an uncle in the Boston/Cambridge area. It was here that I saw a Harvard Mark I computer (an electro-mechanical system). It used a big ship's propeller shaft running the width of the room for timing and power. It used paper tape and cards for program input while it used a typewriter to print out results and tables. This was designed by Professor Aiken. After seeing this, I took a basic electricity course and got into ham radio. I also learned about circuits by disassembling and reassembling WWII radio receivers.

**OSG:** *After you graduated high school, what did you do to pursue your interest in electronics and computing?*

**SR:** From 1954-1958, I decided to get a degree in Mathematics from Dartmouth. During my junior year, I took a summer job working with John McCarthy at MIT in electrical engineering. I did work on an IBM 704 that was just installed and we were using the latest compiler which happened to be FORTRAN. I did "number crunching" and learned about using punched cards for programming. In my senior year, I started programming for an LGP-30 which was a small computer with a magnetic drum and a typewriter.

In the fall of 1958, I started working at the MIT Artificial Intelligence Project for professors Marvin Minsky and John McCarthy. Professor McCarthy figured out that something was needed that was close to FORTRAN, but suitable for manipulating symbols as found in mathematical expressions. He, therefore, created primitives to implement list processing on the IBM 704. This meta-notation was designed for humans to make it easier to code. Professor McCarthy wrote a simple expression for an expression evaluator in this new language, which he called LISP, and I translated this expression evaluator into 704 assembler language.

**OSG:** *With all this work at MIT, did you ever get your degree?*

**SR:** No, I never got my degree, but I had an excellent education for all the work I was doing at MIT and much of the future work I would do.

**OSG:** *How did you build on the work you already did?*

**SR:** I implemented LISP to do mathematical calculations





of 2nd year calculus among other things. After I got it mostly working, Jim Slagle (who was a grad student) started using the LISP language for symbolic mathematical integration. Jim found an unexpected bad feature. I rewrote the LISP interpreter with an improvement to the LISP language to fix this in the spring of 1959.

**OSG:** So when did you first get involved with creating Spacewar!?

**SR:** In 1961, I was continuing to work with LISP and other computer projects. DEC donated a PDP-1 to MIT. At the time, I was a member of the Tech Model Railroad Club. The PDP-1 was right down the hall from my office. At that time, Professor Minsky stated that the PDP-1 had two unique things over the IBM and LGP: A typewriter with an interface that responds to keystrokes and it also had a simple graphical display. In the fall of 1961, I suggested that someone should write a program to demonstrate the display and interactive capabilities of the PDP-1. Since the space race was in full swing at the time, I suggested doing a spaceship trainer. Everyone thought it was a good idea so I was "volunteered" to program it. My big problem was that I wasn't good at the numerical analysis (sine and cosine). Alan Kotok acquired the math routines and said "Now what's your excuse?". I was shamed into writing some code. The original game had two ships that fired torpedoes at each other. These torpedoes would blow up ships, torpedoes, or yourself. The controls were simple left, right, thrust (fire rocket engine), and fire a torpedo. I had a central sun and random stars.

**OSG:** So this first version, did it work well?

**SR:** It did, but it was definitely missing things. Many people helped to improve the game. Peter Sampson programmed the constellations based on real star positions. Dan Edwards, who also worked on the AI project, figured out how to speed up the display with a "just in time" compiler. One of the issues was the fact that the gravity from the central star had no effect on the torpedoes because there wasn't enough time

to compute it and keep the game running at a reasonable speed.

The program worked as a two-person game. The goal to create something for training and fun was achieved. Hyperspace was added later and the final version was finished in spring of 1962. Software, in general, could not be copyrighted or patented at the time.

**OSG:** After you finished this project, what did you do next?

**SR:** During the fall of 1962, I went to Stanford with Professor McCarthy to do a variety of computer projects. Stanford had just introduced Computer Science as a new degree. In addition to maintaining LISP, we started work on making a PDP-1 into a multi-user computer. This PDP-1 had a custom display, drum, and modified hardware to run a 12 station system. Initially, the system was almost fast enough for characters to be displayed but they were unreadable initially. This setup was used for computer science and instruction. I and several others created a primitive flight simulator on this PDP-1 system. It only included landing lights and street lights. The system was reasonably accurate, but it was very poor in details and boring to play.

From 1969 to 1970, I also worked on the PDP-10 for the Computer Center Corporation in Seattle, Washington. This start-up sold computer time via dial-up terminals. Among other things, I did customer support and training. The system, though, was not reliable and crashed a lot. We also tried to keep ahead at the Lakeside School in Seattle with a teletype attached to the computer. Students, such as Bill Gates and Paul Allen would come to the company after hours to test and crash the system.

**OSG:** It sounds like you did quite a bit after doing Spacewar! Did you continue your work with timesharing on computers?

**SR:** No, from 1970-79 I worked for DEC and did work for Chase Manhattan Bank. I also helped with a couple of game startups and even worked with some experimental physics. In the 80's, I

Space Wars- Image Courtesy of  
Arcade-Museum.Com

DE

even assisted Digital Pictures in creating Night Trap. Since then, I've been retired and I assist monthly at the Computer History Museum by showing everybody Spacewar! on the working PDP-1 that they have there.

**OSG:** *It sounds like you have done quite a bit to advance computer science to where it is right now. I did forget to ask, what did you think of Larry Rosenthal's version of Spacewar!?*

**SR:** I didn't have a chance to play it until long after it came out. I haven't spent much time with it but some of the options make a game that is fun to play. Like most of the later generations of Spacewar! designs, it has many more options, some of which are too fast paced for my taste and abilities. I admire several things about it including:

It does more with less electronics and expense than other versions I have seen. This is no big surprise since the hardware was designed later and electronics had gotten faster and less expensive.

+ The vector display is clever and works well.

+ The whole design turned out to support other popular games, in addition to Asteroids, which is very Spacewar!-like.

+ The prototype fits in a carry-on suitcase.

**OSG:** *I want to thank you for your time and answering my questions.*

## LARRY ROSENTHAL

My second interview was with Larry Rosenthal, which was also an honor. He is the creator of Space Wars. He took Steve Russell's idea and created a dedicated computer that could actually play the game and it was small enough to put into an arcade box. Here is his very interesting story on how he pulled this off.

**OSG:** *When did you first get involved with computers and electronics?*

**LARRY Rosenthal (LR):** At the age of 4, I was plugging lamps into extension cords. Around the same time, my father bought me a No. 6 dry cell, a knife switch, a 3 volt light bulb and a door buzzer. I remember building a circuit on a wooden board using the parts my father bought me and taking it into my kindergarten class for show and tell. My teacher was afraid someone was going to get electrocuted. When I was 11 years old, I received my first ham radio license. I earned several more advanced radio licenses, but eventually let them expire. Forty-five years later, I wandered into a ham radio booth at a local Maker Faire and walked out with my license reinstated.

**OSG:** *When did you work on your first computer?*

**LR:** My first computer programming experience was in 1967 when I was a junior in high school. Myself, a dozen other students, and a school advisor were allowed to use the IBM 360/30 at Sandoz Pharmaceutical one evening a week. That's where I learned to program in FORTRAN on a mainframe computer with 32K of RAM and about 1/1000 the computing power of the phone in your pocket today.

**OSG:** *What did you do after you graduated high school?*

**LR:** I went to MIT and majored in Electrical Engineering. While visiting MIT as a high school senior, a friend, who was showing me around took me to one of the computer labs to show me several of his favorite games running on a DEC PDP-1. The one game I remember playing was Space War. Steve Russell, who was not a student at MIT, was the main programmer of Space War. I had always wanted to meet Steve, and several years ago at California Extreme, I finally met him. Steve told my wife that I was a lot smarter than he was because I figured out how to make money off the game. After graduating in 1972, I moved to the other coast to go to the University of California at Berkeley where I earned my MSEE in 1973. It was at Berkeley where I took a class where we built a computer around the Intel 8008 microprocessor. When I set out to build my Space War game, the skills that I learned in that microprocessor class came in very handy.

**OSG:** *How did you get involved with Space War after you graduated? You saw it on the PDP-1 at MIT, but what convinced you it could go commercial?*

**LR:** While on winter break at Berkeley I went back to MIT to visit friends. In the student center at MIT, I saw a Computer Space arcade machine. Computer Space was a very crude space battle game. My immediate reaction was, "what is a crude thing like this doing here where the original Space War game was developed". After getting my MSEE from UC Berkeley, I decided that I had had enough school and decided that I was going to build a "real" Space War game for home use.

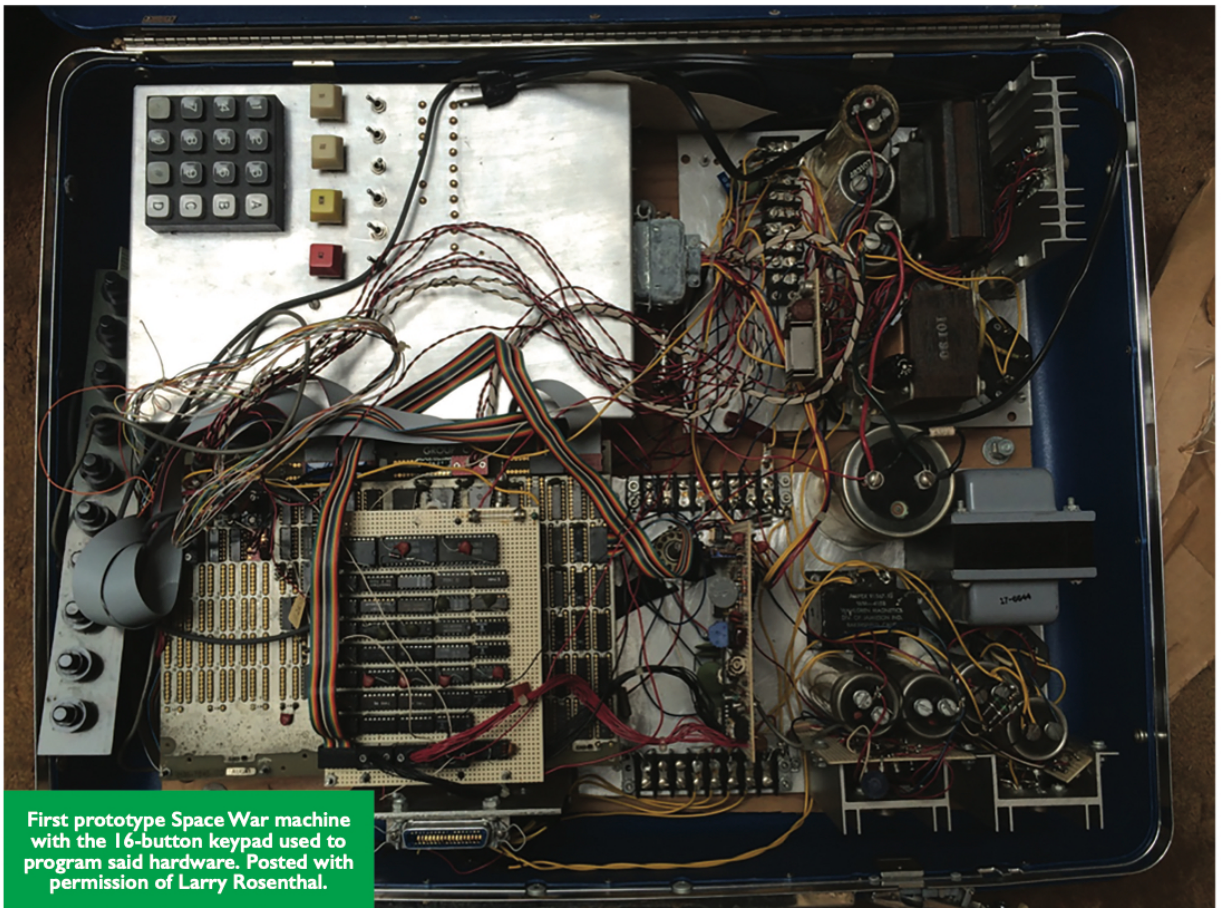
**OSG:** *So how did you go about creating your version?*

**LR:** I remember telling my parents what I was going to do and they immediately said that I needed to get a real job. Luckily I didn't listen to them. Within days of beginning work on the home version of Space War, I realized that the technology didn't exist to make it happen. I then decided to make an arcade version using standard raster technology. Again, after about a week I realized I could not get the resolution I needed to display the ships using standard television monitors. It was at that point that I began working on the vector display system that eventually made it into the arcades, and was ultimately copied by other game manufacturers.

To build the vector display system, I basically gutted a standard television set and drove the deflection coils directly. By varying the intensity of the electron beam and controlling the current through the horizontal and vertical deflection coils, I was able to draw vectors (lines) on the CRT display of arbitrary lengths in arbitrary directions. I looked at a number of different vector drawing systems. They were either too expensive to implement or too slow. Ultimately, I combined ideas from several different systems and developed a system that could be built inexpensively and had the speed that I needed.

**OSG:** *Since you figured out the vectors portion, that means you needed some method to control those vectors.*

**LR:** Yes, needed a computer to drive the vector generator. Actually, I built the computer before developing the vector



First prototype Space War machine with the 16-button keypad used to program said hardware. Posted with permission of Larry Rosenthal.

generator. I need the computer to test out the various vector generating systems. The fastest processor available at the time was the Intel 8080 which was way too slow to control a "full blown" version of Space War. I built a computer from scratch using approximately 125 SSI (small scale integration) and MSI (medium scale integration) TTL (transistor transistor logic) chips. To program the computer, I built a control panel with a 16-button keyboard that allowed me to enter in hexadecimal characters (0 - 9 and A - F). The control panel had switches and a hexadecimal displays that allowed me to do such things as examine memory, single step, insert break-points, and read and write the program to and from magnetic tape. I modified a Sony cassette player to handle the digital information. During development, I burnt a number of lines into the CRT. If the vector stopped moving or moved too slowly, the electron beam would literally burn the phosphors off the inside of the CRT. After a little more than two years of development, I had a working game and I packed the electronics into a suitcase to carry around to various game distributors. They were not impressed. I then built a second generation prototype and put it into a game arcade in Berkeley in December, 1976. The program had to be loaded from tape and a motorcycle battery was added to provide backup power in case the machine was unplugged. Immediately after getting the machine running in the arcade, I hopped a plane to

Boston to visit my girlfriend. When I returned a week later, the coin box had over \$400 in it. I then knew that I had a hit.

**NOTE:** To understand machine code and assembly, one must understand the concept behind these two types of languages. Mr. Rosenthal created his own computer to run Space Wars. In order to communicate with said computer, it has to have an instruction set that can tell the computer what to do. Each type of CPU has its own instruction sets. For instance, the 6502 (used to run most early Atari games and Apple computers) has a 56 instruction set. The Z80 (Zilog used to run many other arcade games has a 158 instruction set) while the Motorloa 68000 (used to run the original Macs and Atari ST line of computers) has a 56 instruction set. Mr. Rosenthal's system had about 40 instructions to control both the computer and the vector generator. In order to code these instructions, he used the 16-button keypad attached to his prototype. He programmed directly in machine language, which is the language a computer can use directly to execute code. For instance, the following code (using the 6502 instruction set which I am familiar with, starting at location \$1000) has no real meaning unless you know the instruction hex codes and how many bytes they may require:

1000- A9 02 69 05 8D A0 0F 60.

**Disassembled it will read like this  
(WITH the mnemonics of the instructions):**

<b>1000- A9 02</b>	<b>LDA #\$02</b>
<b>1002- 69 05</b>	<b>ADC #\$05</b>
<b>1004- 8D A0 0F</b>	<b>STA \$0FA0</b>
<b>1007- 60 RTS</b>	

*This code basically adds two numbers together and puts the result into a memory location. As you can see, it can be a real chore to code like this but it also creates the fastest executing code. Now imagine creating about 4000 or so lines of code in machine language.)*

**OSG:** *What other things did you add to the game?*

**LR:** My computer was fast, but to keep the cost down, it had its limitations. For example, it did not have a multiply or divide instruction. Multiplication and division routines would have to be implemented in software and be relatively slow. I added gravity by utilizing tables of logs and exponents that I loaded into memory and used Newton's Law of Gravity to implement the gravitational sun in the game. Since multiplication is simply adding logs and division is subtracting logs and then exponentiating the result, I was able to perform the multiplication and division needed to compute the gravity quickly using log and exponent table lookups. If you can remember what a slide rule is, it performs multiplication and division by adding and subtracting logs.

**OSG:** *Who did you demonstrate this prototype to and what was their level of interest?*

**LR:** In the first half of 1977, I was in talks with Midway about the system. We talked back and forth from about February to June but unfortunately they weren't willing to pay me an acceptable royalty. In September of 1977, I approached Cinematronics and they were very interested. It seems that they were in need of a unique video game to keep the company alive. I happened to be in the right place at the right time.

**OSG:** *Since your system was basically discrete logic chips and electronic components, how did you work with Cinematronics to get this game into production?*

**LR:** After Cinematronics saw the demo for the game, they were really interested in it. They immediately negotiated a licensing deal with me so that they could get into production as quickly as possible with Space Wars. Going from a prototype system to a production product took about six months and a lot of long days. Being young and not knowing any better, I ultimately started my own company, Vectorbeam.

**OSG:** *Now, you have already licensed Space Wars to Cinematronics, what was the purpose of starting up Vectorbeam?*

**LR:** I wanted to have my own company. After coming up with some mediocre games, I found myself heavily in debt, and in 1979, I began searching for someone to buy Vectorbeam. I talked to Steve Jobs about acquiring my technology, but it never got past an initial phone conversation. Steve kept asking me, "how cheap can it be built, how cheap can it be built?" In the end,

Cinematronics offered to buy Vectorbeam and take over the debt as long as I included the vector generating patents in the deal.


**OSG:** *After you got out of the arcade business, what did you do next?*

**LR:** I developed a new game system controlled by the Motorola 68000 microprocessor. I used a C language compiler running on IBM PC's to develop the games for the new system. PC's at that time were relatively slow and in 1982, I purchased a VAX 750 mini-computer running Berkeley UNIX to speed up development. From 1986 - 1994, I worked on writing my own C compiler that would produce faster more efficient code than other commercially available compilers. I figured that if I built a compiler with the features and performance that I wanted, I would have a product that people would want to buy.

**OSG:** *It looks like you stuck with computers after you sold your first arcade game and its technology?*

**LR:** I still found my first passion was developing electronic products that I thought I could sell. After the C compiler venture I developed a simple device for finding your misplaced keys. I discovered that no consumer product is simple. I had a prototype key finder working in less than a week. However, things such as the design for the plastic case for the key finder cost \$75,000 and the tooling took almost a year. The company can be found at keyringer.com and I have been working with it for almost the past 20 years improving on it and keeping it going. The key finder business is not making me rich, but it's making too much for me to walk away from it.

Mr. Rosenthal and I also spent some time discussing other aspects of both electronics and computers, as well his keyringer business.

I would like to thank both Steve Russell and Larry Rosenthal for taking the time to share their incredible story and experience with us. We also truly appreciate them sharing their schematics, drawings and photos with our readers so they can get a true sense of the complexity of what they were doing with the limited technology available at the time. It's truly awe inspiring. It has been a pleasure and an honor. 

**Kevin Butler** - He has played video and arcade games since the early 1970's until he joined the Navy in 1983. While in the navy, he continued his hobby of programming (Worked for Majicsoft in the mid-1990's which specialized in Atari ST games) and playing video games. After retiring from the Navy in 2004, Kevin started to write FAQ's for GameFAQ's specializing in doing retro-arcade games. These FAQ's have also been a part of the MAME project with regards to gameplay and history. He currently lives in Neosho, MO with his wife and son, who is also a video game hobbyist.



# Colossal Cave Adventure 1976

By Ken Horowitz

**A**s gamers, we fondly remember certain titles that defined specific periods in our lives. Some of us grew up with one console or computer that became synonymous with our childhood or adolescence. That kind of impact is remarkable and likely beyond the scope of what the developers of those games ever had in mind. It's a testament to what an integral part of our popular culture gaming has become.

There are specific games, however, that go beyond a personal transformation. Some affect the industry as a whole, forever changing the way games are made and forging a path that becomes a well-trodden highway. They introduce elements that other games adopt and expand, and their impact is still felt decades after their debut.

Colossal Cave Adventure (CCA) is perhaps one of the most recognizable video games fitting this description. Will Crowther's 1976 original was based on a combination of his hobby of cave exploration in Kentucky and his enjoyment of Dungeons & Dragons. Crowther came up with a text-driven fantasy adventure that captured the attention of Stanford's entire Artificial Intelligence Laboratory. A graduate student there named Don Woods greatly expanded on Crowther's game the following year, resulting in a groundbreaking text adventure that enamored players and created an entire new genre of gaming. Upon its debut, the simple text adventure bogged down the Stanford AI Lab time-sharing system so badly that Woods had his vacation interrupted by a call from a very annoyed lab administrator. It had become a phenomenon, appealing to people beyond Stanford's campus. In an interview for this article, Woods explained the game's attraction: "I think Adventure showed people that computers were not limited to abstract simulations (e.g. Hunt the Wumpus) and simple rote procedures like managing the cards in Solitaire."

Adventure titles to this day owe CCA a massive debt. Indeed, CCA would continue to inspire developers and bedazzle gamers



for years to come. Many later adventure classics have their origins in the first piece of interactive fiction and have gone on to become influential titles themselves. For instance, Scott Adams' Adventureland, which was released in 1978, was heavily influenced by Crowther and Woods' work. At the time, he was a programmer at Stromberg Carlson and involved with their first Digital Central Office. A colleague had installed CCA on the Digital Equipment Corporation (DEC) mainframe he was using, and Adams soon found himself playing the game before work in the morning and after quitting time. The experience prompted him to create his own adventure title, using all his creativity to squeeze his concept into the 16K memory of his TRS-80 micro-computer. Adventureland was born, and it led to an entire series of more than a dozen games. "I have literally gotten thousands of emails over the years from folks who said my adventure games were extremely influential in their lives," he said in an interview with the author. "Many started careers in computers because of my classic games. A good number of them then went to start numerous companies that are extremely well known today. I am talking many major companies that have literally influenced

millions. If it hadn't been for CCA, I would never have written those games which touched all of those people. I fully believe that CCA is truly the cornerstone of the entire computer gaming industry as we know it."

Perhaps the best-known computer game to take its cue from CCA was 1977's Zork. Created by Tim Anderson, Marc Blank, Bruce Daniels, and Dave Lebling; a quartet of MIT alumni who were part of the esteemed institution's Dynamic Modeling Group, the result of the ever-present programming urge to improve existing code. Lebling recalled their impression of CCA in a 2010 interview: "We all agreed Adventure was wonderful; When it hit the MIT Lab for Computer Science, no work was done for two weeks, but we thought it could be improved." The college crowd loved the game and wanted more, but there was nothing else like it, so in the spring of 1977 Anderson and his friends set about creating the next great adventure game. MIT had no qualms about their work, so long as it was after hours. The group used the time to expand upon the amount of text commands that could be implemented. "Necessity was the mother of invention," explained Blanc. "We wanted to put adjectives and preposi-

tions into the parser, which is the part of the game through which the player communicates with the game's environment." Zork blossomed into a franchise that sold a quarter million copies by 1984 and solidified interactive fiction as a computer gaming staple.

The shockwave CCA sent throughout the computer industry was felt in Sunnydale, California as well. There, 26-year-old Atari Designer Warren Robinett was finishing up his first game for the VCS console, Slot Racers. He was looking for his next project, and one day, his housemate Julius Smith invited him to the Stanford lab, where Smith worked as a graduate student. He wanted to show Robinett an amazing new game he was playing. Robinett was fascinated by CCA's design - the room layouts, the obstacles, and the ability to collect items and use them. He soaked it all in and looked for a way to bring the wonderful experience he had playing it to the VCS. Robinett's supervisor told him that it would be impossible, but he labored

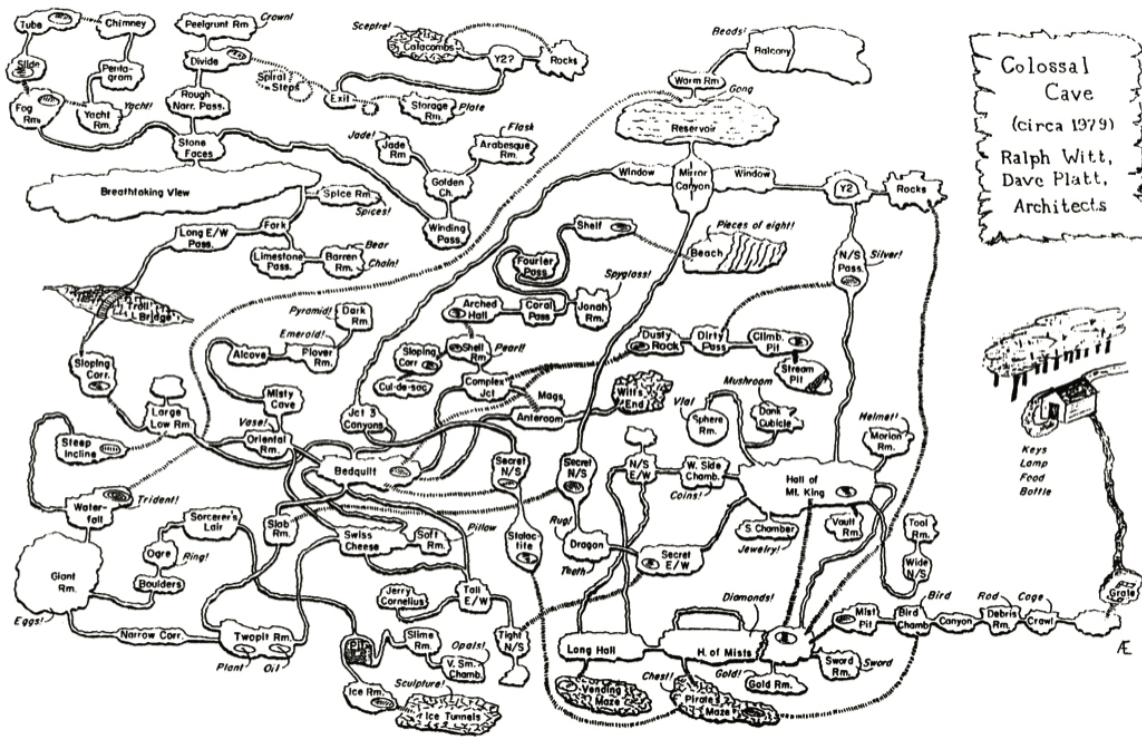
in secret and made it happen. The game was released in 1979 and sold over a million copies, "a combination of passion and stubbornness," according to Robinett.

The fact that so many video game pioneers were able to enjoy Crowther and Wood's classic is both fortuitous and unfortunate. Without their exposure to the game on the mainframes where it was widely distributed, it's possible that none of the legendary titles they created would have ever seen the light of day. The pure technical environment in which they played and enjoyed CCA gave them an untainted view of a colleague's work and pushed them to build and expand its design. The downside was that since the game was distributed freely, those later ideas were created without any legal responsibility to Crowther and Woods. Thus, the pioneering work of these two men came without the financial bounty it would command today.

Woods, for his part, recognizes the standards CCA set for adventure games, such as inventory limits: "Well, my

friends always blame me when any game - computer or otherwise - sets a limit on how much stuff they can carry. I actually point the finger at Crowther for that particular limit, by the way." Leivity aside, Woods appreciates the love the game has received over the years, and he is quite aware of how influential it has been. "I think a lot of computer games," he admits, "both today and in between, involve simulating some sort of 'world' and letting players imagine they are traveling in and interacting with that world, and that whole mindset is something I think traces back to Colossal Cave Adventure."

Overall, not a bad way to be remembered. Most legendary games are remembered fondly. Few actually spawn an entire genre and influence several future classics.



Colossal Cave  
(circa 1979)  
Ralph Witt,  
Dave Platt,  
Architects

**Ken Horowitz** - Dr. Kenneth Horowitz is an English professor who has taught research and writing for 20 years. He is the author of "Playing at the Next Level: A History of American Sega Games" and "The Sega Arcade Revolution: A History in 62 games," both by McFarland & Co. His work has also been featured in numerous video game publications like GamesTM and Hardcore Gamer Magazine. Ken has also published academic articles in professional publications such as Language Magazine and the Hispanic Educational Technology Services Journal.

# Exploring The Classic Text Adventures of Scott Adams

By Bill Lange

**U**ntil the late 1970s, electronic gaming consisted of playing one of the hundreds of ping-pong console variants on your home television, an LED-based electronic handheld game, or possibly playing a text-based computer game ... if you were lucky enough to have had access to a mainframe and/or minicomputer at work or school.

The nascent microcomputer industry began to slowly take off in the late 1970s with the availability of the first appliance computers for the mass market, notably with the release of the "1977 Trinity", which included the Commodore PET, the Apple II, and the Tandy/Radio Shack TRS-80. Prior to the release of these "take them out of the box and plug them in" appliance computers, most microcomputers were sold in kit form and had to be hand assembled, which usually required an electronics background and mad soldering skills.

Even with the release of these early appliance computers, quality commercially-released software was still hard to come by. Many new computing hobbyists learned to program by typing in text-based game programs from BASIC source code listings printed in various computer magazines and books. Mike Mayfield's 1971 Star Trek space conquest game and Gregory Yob's 1973 map exploration game Hunt the Wumpus, first published in the People's Computer Company newsletter, were two popular games that found their way from the mainframe and minicomputer world of businesses and universities to the memory-constrained microcomputer world.

At around the same time, Gary Gygax and Dave Arneson's genre-creating fantasy-based tabletop role-playing game Dungeons & Dragons (D&D) was growing in popularity and spreading, particularly across college campuses. Themes and elements from D&D, and its competitors, soon found their way into mainframe and minicomputer based computer games, usually with the computer acting as the Dungeon Master,

or game referee, rolling the dice and crunching the numbers.

One such game, Colossal Cave Adventure, began life in 1975. Originally developed by Will Crowther as a cave exploration game, it was later significantly expanded by Don Woods with fantasy role-playing game elements. This game was huge, both in popularity and in size (for the time). The game consisted of 3000 lines of FORTRAN code and 1800 lines of data. It had 140 map locations, 293 vocabulary words, and 53 objects. While this game would go on to become one of the most influential titles in gaming history, it was simply too large to fit into the tiny RAM space and small mass storage devices (cassette tapes and floppy diskettes) of the day's microcomputers.

By 1979, the TRS-80 was the best selling line of the appliance microcomputers and had the largest available catalog of compatible software, including games, in the market. This was certainly helped by the then ubiquitous Radio Shack stores and

**THE ADVENTURES**

**#0 SPECIAL SAMPLER** — If you've never experienced the thrill of a Scott Adams Adventure, then this is a good place to start! All of the elements of a full-length Adventure are contained in this special cut-down version of our Adventure #1. Hours of enjoyment guaranteed — and at a special price too!

**#1 ADVENTURELAND** — Wander through an enchanted realm and try to recover the 13 lost treasures. There are wild animals and magical beings to reckon with, as well as many other perils and mysteries. Can you rescue the Blue Ox from the quicksand? You'll never know until you try ADVENTURE #1! This is the Adams Classic which started the Whole Ball of Wax! Try it, you won't be sorry. Difficulty Level: Moderate

**#2 PIRATE ADVENTURE** — The lost treasures of Long John Silver lie hidden somewhere — will you be able to recover them? Only by exploring this strange island will you be able to uncover the clues necessary to lead you to your elusive goal! Difficulty Level: Easy

**#3 MISSION IMPOSSIBLE ADVENTURE** — In this exciting Adventure, time is of the essence as you race the clock to complete your mission in time — or else the world's first automated nuclear reactor is doomed! So, tread lightly and don't forget your bomb detector! If you survive this challenging mission, consider yourself a true Adventurer! Difficulty Level: Hard

**#4 VOODOO CASTLE** — The Count has fallen victim to a fiendish curse placed on him by his enemies. There he lies, with you his only possible hope. Will you pull off a rescue, or is he down for the Count for good? Difficulty Level: Moderate

**#5 THE COUNT** — It begins when you awake in a large brass bed in a castle somewhere in Transylvania. Who are you, what are you doing here and WHY did the postman deliver a bottle of blood? Who can say ... but somewhere a centuries-old evil lies in dark wait ... Difficulty Level: Moderate

**#6 STRANGE ODYSSEY** — At the galaxy's rim, there are rewards aplenty to be harvested from a long-dead alien civilization, including fabulous treasures and advanced technologies far beyond human ken! Will you be able to recover them and return home? Prepare yourself for the incredible! Difficulty Level: Moderate

**#7 MYSTERY FUN HOUSE** — This Adventure puts you into a mystery fun house and challenges you to find your way through and back out of it. Sure to baffle you for quite a while, the MYSTERY FUN HOUSE is patiently waiting for you to enter. So, step right up and get your tickets here! Difficulty Level: Moderate

**#8 PYRAMID OF DOOM** — This is an Adventure that will transport you into a maddening dangerous land of crumbling ruins and trackless desert wastes — into the very PYRAMID OF DOOM! Jewels, gold — it's all here for the plundering — if you have the expertise to pull it recovery off! Difficulty Level: Moderate

**#9 GHOST TOWN** — You must explore a once-thriving mining town in search of the 13 hidden treasures. With everything from rattlesnakes to runaway horses, it sure ain't going to be easy! And — they don't call them ghost towns for nothing, partner! Includes a special bonus scoring system tool! Difficulty Level: Hard

**#10 SAVAGE ISLAND PART I** — A small island in a remote ocean holds an awesome secret — will you be able to discover it? This is the beginning of a two-part Adventure, the second half concluding as SAVAGE ISLAND PART II, ADVENTURE #11. NOTE: This one's a toughie — for experienced Adventurers only! Difficulty Level: Hard

**#11 SAVAGE ISLAND PART II** — The suspense begun with Adventure #10 now comes to an explosive conclusion with SAVAGE ISLAND PART II! This Adventure requires you to have successfully finished #10 wherein you were given the password to begin this final half. The plot thickens as you wind your way through glowing corridors in search of the elusive clue that will enable you to solve the riddle of the island. NOTE: For experienced Adventurers only! Difficulty Level: Hard

**#12 GOLDEN VOYAGE** — The king lies near death in the royal palace. You have only three days to bring back the elixir needed to rejuvenate him. Journey through the lands of magic fountains, sacred temples, stormy seas and gold, gold, GOLD! Can you find the elixir in time? This one is for experienced Adventurers only! Difficulty Level: Hard

catalogs, and its legions of technology-astute fans.

One of the earliest TRS-80 computers sold ended up in the hands of Scott Adams, a systems programmer at Stromberg Carlson. Adams was introduced to a version of the massive 300K byte FORTAN-based Colossal Cave Adventure game running on Digital Equipment Corporation PDP-10 minicomputer at work. He was hooked. He wanted to create his own text adventures on his TRS-80. But how could he fit such a huge game in a 16K micro-computer? As a System Programmer, Adams had experience writing compilers and operating systems. He came up with the brilliant idea to create an "adventure compiler" and an "adventure interpreter". This solution allowed him to create many adventure games and compress the data to fit into the small memory footprint of the TRS-80.

After months of work, his first game, Adventureland, was released and the Scott Adams' Adventure Series was born. At first, the text-adventure games were written in TRS-80 BASIC, but Adams quickly switched over to assembly language for speed and playability. Ads begin to appear in hobbyist magazines such as BYTE and SoftSide. As orders came in, Adams would hand-copy the cassettes for customers. Later, The Software Exchange of Milford, New Hampshire, and Creative Computing Software began to publish the Scott Adams' Adventure Series games as well.

The games became so popular in the commercial entertainment software starved world of the late 1970s that the business quickly outgrew Adams' home. He then created his own development and publishing company, Adventure International (AI). It became one of the first companies to primarily develop, package, and sell commercial computer games for the microcomputer market.

The original twelve text adventures in the series, released by AI between 1978 and 1981, included: Adventureland, Pirate Adventure, Mission Impossible (or Secret Mission), Voodoo Castle, The Count, Strange Odyssey, Mystery Fun House, Pyramid of Doom, Ghost Town, Savage Island - Part I, Savage Island - Part II, and Golden Voyage. These games were available for many of the various microcomputer platforms of the day, such as the Atari 8-bit, the Apple II, the TRS-80, the Commodore PET, the Commodore VIC-20, the Commodore 64, the TI-99/4A, the PC, the Spectrum, the Exidy Sorcerer, and the NEC home computer in Japan.

These text adventures consisted of some three dozen or so map locations, and used a two-word sentence parser, such as "GO EAST", "GET MATCHES", and "DROP TORCH". They were also among the first commercially available computer game programs written entirely in assembly language. Later, the original twelve text adventures were updated and enhanced with high resolution color graphics and the series was re-released by AI as the Scott Adams' Graphic Adventure series.

In the July 1980 issue of SoftSide magazine, Adams published two programs, Adventure Builder and Adventure Interpreter. Adventure Builder created a data cassette tape of the original TRS-80 BASIC language version of Adventureland. Adventure Interpreter would read the cassette tape and allow you to play the game for the cost of the magazine and a few hours of typing. It also allowed you to learn the secrets of how the BASIC version of Adventureland worked. Again, in the December 1980 issue of BYTE magazine, Adams published code to create and interpret the TRS-80 BASIC language version of Pirate Adventure.

In a 1981 catalog (Vol. 2, Issue 5), AI listed the Scott Adams' Adventure Writing System (SAAWS) as an "Available Soon" product. SAAWS was an enhanced version of the "adventure compiler" and "adventure interpreter" that was used for creating the Scott Adams' Adventure Series. It doesn't appear that this system was ever actually released commercially and it doesn't seem to appear in later AI catalogs. SAAWS currently seems to be lost to the annals of history ... just waiting to be found.

Adventureland may have been one of the first games with in-game advertising, as it included an in-game billboard advertisement for the next game in the series, Pirate Adventure.

In possibly another first of its kind, in 1981, AI created a "Collector's Edition" by packaging together the original twelve texted adventure in a Limited Gold Edition Scott Adams Adventure Series boxed set consisting of twelve cassette tapes or three diskettes, a numbered certificate of authenticity, and an autographed photo. The boxed set cost \$100.00 (in 1981 dollars) and was available for the Apple II, the TRS-80 and the Atari 8-bit computers.

In addition to the tough and varied puzzles, the thing I remember most about the Scott Adams' Adventure Series, and AI's products in general, were the amazingly drawn artwork for their ads, catalogs, and print matter. While not part of the Scott Adams' Adventure Series, AI's Stone of Sisyphus with artwork by Raymond Bayless comes to mind.

Like many companies in the wild west of the video game console and home computer markets of the mid 1980s, AI went bankrupt and closed down. For the most part, Adams left the gaming industry behind, moving on to develop business software.

Recently, Adams returned to the gaming industry, creating a new company called Clopas which is creating, what he calls, Conversational AdventureTM games. In addition to a new adventure game, Escape The Glomer, based on Brian Jacques' Redwall series of children's fantasy novels, his company is developing Adventureland XL, a reinterpretation of his original Adventureland for the Amazon Alexa and other modern platforms. See [www.clopas.net](http://www.clopas.net) for more information.

If you are interested in trying out any of the Scott Adams' Adventure Series games, and you certainly should be, open your

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**Scott Adams' Graphic Adventure Series ad from Creative Computing Magazine**

favorite web browser and navigate to <https://archive.org>. You can search for any of the titles listed above (as well as many, many other programs) and try them out using simple, in-browser emulation. Don't forget some scrap paper, a pencil, and a good eraser for mapping out the game's locations and for taking copious notes.

If you are interested in learning more about text adventures and interactive fiction in general, I highly recommend Jason Scott's 2010 film, *GET LAMP: The Text Adventure Documentary* available on <https://www.youtube.com>, and Nick Montfort's 2003 book, *Twisty Little Passages: An Approach to Interactive Fiction*.

## AN INTERVIEW WITH SCOTT ADAMS

**OSG:** *How did you first get started in creating and publishing computer games?*

**SA:** I had an entrepreneurial spirit since I was young. One time I converted our family garage into a slot car rental playground, for example. I have always enjoyed games and had written a number of computer games on mainframes and also on kit computers. Once the first appliance computers (i.e. prebuilt and ready to use) hit the market, the rest just happened!

**OSG:** *In 1980, you published the BASIC source code for Adventureland in SoftSide magazine and the source code for Pirate Adventure in the December 1980 issue of BYTE magazine. What was the impetus behind publishing the BASIC source code for a product that you were still selling, albeit, in a much faster and cleaned up machine language version?*

**SA:** BYTE magazine approached me to do the article. I had spoken on it at an industry event in New York, I think it was, and the games were starting to make some serious inroads in the marketplace. They suggested the format of the article and I was willing to do it.

**OSG:** *In a recent interview (available on <https://www.youtube.com>) with Kevin Savetz, Steve Meretzky mentioned that, due to the rampant piracy at the time, Infocom often sold more hint books than they did of their actual interactive fiction games such as Zork. Did you see similar trends with Adventure International products?*

**SA:** Yes. I actually sold the original hint sheets for the game and then later a hint book when we had enough titles. As far as I know we were the first to do this. I did notice that the hint books were selling more copies than the games!

**OSG:** *Speaking of Infocom, did you see them as a prime competitor?*

**SA:** Yes along with Sierra Online that was run by Roberta and Ken Williams. Infocom went for larger scale games while we tended to concentrate more on the smaller footprint machines. Sierra was more about point and click style games. It was fun to see what everyone was creating then. Lots of new things constantly coming out

**OSG:** *Why did you leave the computer gaming field in the mid 1980s?*

**SA:** There was a major crash in the industry then. Lots of

hardware producers let the field. We had made a mistake and licensed the Marvel games to Commodore computer and they really dropped the ball in regards to packaging and promoting. They ended up paying a very large sum to both us and Marvel for their screw ups. In any case we did not have deep pockets or investors and so weren't able to ride out the down turn.

**OSG:** *You recently made a donation of your early works to The Strong - National Museum of Play (<https://www.museumofplay.org/>) in Rochester, New York. Can you give us some highlights of the donated materials?*


**SA:** Many original packages from Adventure International, along with magazines. Also included in the collection was some of the very first original game packaging. It was a baby bottle bag, business card and a cassette tape. I also included the very first computer game I ever wrote. It was in high school and written on an IBM mainframe in APL/360. It was a game of tic tac toe you played against the computer. I taught myself to program and it consumed my interest. The high school had a remote terminal consisting of an IBM selectric typewriter with an APL ball head. There was an acoustic modem for dialing up the mainframe. None of the teachers had any clue on how to use it or how to program. I bought myself the APL/360 operators manual and just winged it.

**OSG:** *Any chance we will see a Limited 40th Anniversary Platinum Edition boxed set release of the original Scott Adams Adventure Series?*

**SA:** LOL! Now that is an interesting idea. Sadly though, all masters, etc. for the classic 8-bit games are long gone, along with my software tools I used in creating them.

**OSG:** *You've been very active in the gaming industry over the last few years. You created a new company, Clopas. You've been attending and speaking at development and gaming conventions. You've released a new game, Escape The Glomer. You've even written an introduction in a new textbook on game development, Introduction to Unity 3D with C# - The Exodus Adventure (2nd Edition) by Philip Conrod and Kris Murray. What else are you currently working on?*

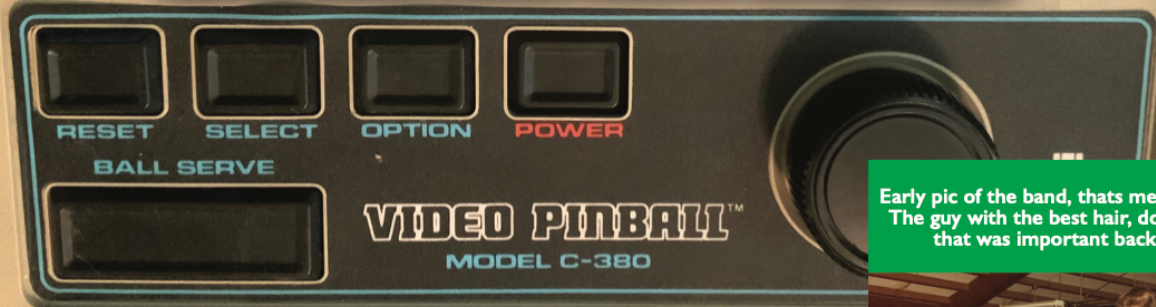
**SA:** I and my team are currently working on a 40th anniversary salute to Adventureland, the game I wrote that started it all. It is called Adventureland XL and will be available for modern platforms. We are also doing some small fun projects for another company that I can't really discuss at this time.

**OSG:** *Scott, I can't thank you enough for taking time out of your busy schedule to answer a few questions for me. I really enjoyed your games in my youth and I'm looking forward to your future endeavours.* 

**Bill Lange** - Bill is a software engineer. He designs and develops cloud based software solutions. He resides in NJ with his wife Lucy and their dog Yoda. In his spare time, he likes to tinker with game programming, 8-bit computers, and the classic arcade machines of his youth.

# That 70's Show, or The Pinball Wizard Breaks Out!

FROM THE WRITER FORMERLY KNOWN AS THE JADED GAMER



By Bill Donohue

**E**ditor's note: In order to capture the entire zeitgeist of the decade in question, I had to attempt a simulation of my mindset at that time. As a result, I've had several "beverages," I've driven the neighborhood crazy by playing every hard rock '70's song I can remember through my 50-watt Marshall stack (to be honest, I could have plugged in the 100-watt Marshall stack, but I have developed something akin to mercy in my old age), I inserted the first four Foghat albums into my stereo on infinite repeat, and... I PLUGGED THE VIDEO PINBALL MACHINE IN TO THE 60-INCH TV!!! Why? Wait for it...

The 70's was a very special time for me: I'd survived the '60s with only one bad trip, I graduated college in '73, and by '75 I'd secured the mandatory blue collar, 9 to 5 job; all of which meant I was ready to become a Rock and Roll star just as soon as I could.

To that end, I found myself a band of like-minded fellows and we proceeded to make ourselves the best band Chico had ever seen. We called ourselves "SIGH" and we practiced seven days a week, four hours a day. As much as we all wanted it, it became evident very quickly that we needed something that would help get us through those rare times when the Muse wasn't working. That something was VIDEO PINBALL!

I'd been given an Atari Video Pinball machine for Christmas by my Dad back in 1977 (this is the same Dad who gave me the Vic-20 computer and several Scott Adams adventure games, but that's another weird story), and since I didn't watch TV back then, the Video Pinball game was always hooked up and ready to rumble... and rumble it did...

The console that I'd been given had three games residing in its silicon memory:

Pinball, Basketball, and Breakout. While Pinball always got the competitive juices flowing, it was Breakout that became the schwerkpunkt of Rock God status. Basketball? Hey, Rock stars don't play basketball!

In Breakout, the object is to clear the screen of a 3 layers of multicolored bricks by hitting them with a Pinball. If you did it right, you focused on one side or the other, where a breakthrough would result in the ball bouncing between the top of the screen and the

layer of bricks, racking up a huge number of points and ultimate Rock Star status. What am I talking about?

Lowest score in Breakout? The beer run was your job, and, by the way, so was the cost of the inspirational fluid. Highest Breakout score of the current song-writing period? You got to name the new song. This idea may have been a mistake. One of our biggest songs was titled "Shoe Lace." Personally, I blame the bong...

But wait... there's more...

If you had the highest Breakout score before a show, you got to ride shotgun in the band van. It doesn't seem like much, but there were no seats in the back of the van; just cold stamped metal and about 20 huge speaker boxes, drum cases, guitar cases, and the ubiquitous cases of beer. If you survived the Bumpy Back Road Boogaloo back there, a Nantucket Sleigh Ride held no fears for you.

You know, that Foghat was a damn good band...

Time takes its toll on all things without mercy, and SIGH and Breakout are no exceptions to that rule. We did become Chico's favorite band for a while, but we eventually broke up. Breakout kind of faded away after that, but something else magic happened, years later...

Cut to the 1990's. My band was called The Rockin' Chair! (and still is!) and we were all Super Bomberman 2 addicts. We started every rehearsal with a fiver or two and ended each rehearsal the same way. We wrote songs about the game; (He Ain't Got) No Boot and Hypnotized still kick ass to this day. And on top of that, Hudson Soft invited us to play their Super Bomberman 3 release party! And if you think you got what it takes, we will gladly hand you your ass anytime. Yeah, we're not just a good band, but we bomb with the best of 'em!

But I still have the most Breakout points... so I'm a Rock Star... Let's Boogie!!! **KG**

Early pic of the band, that's me on the left. The guy with the best hair, don't laugh... that was important back then.



**Bill Donohue** - He ruled over The Cleansing and The Rinsing with an iron fist. Yes, he's back. He's the man formerly known as The Jaded Gamer... Bill Donohue!

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# SPACE INVADERS

THE STORY OF HOW TOMOHIRO NISHIKADO  
REVIVED THE EARLY COIN-OP INDUSTRY  
AND INADVERTENTLY HELPED SAVE  
ATARI'S HOME VCS CONSOLE

MICHAEL THOMASSON'S

JUST 4 QIX

By Michael Thomasson



**In the late 70s, PONG clones were running amok and the market was so saturated that the coin-op industry was in a real slump. The release of Space Invaders shook things up, turned the industry around, and made video games a staple of entertainment from that point forward.**

In Space Panic, a very vulnerable astTo fully understand the origins of Space Invaders, some of Tomohiro Nishikado's previous projects should be examined. His first mechanical game was Sky Fighter II, a carnival-like shooting game that used a model airplane, mirrors, and a bit of technical trickery to conjure the illusion of a plane hovering about atop a scrolling cloud backdrop. It was an impressive feat for 1971 that, at its heart, was a shooting game, as was Western Gun, another popular title he created in 1975. During the period in-between, Atari released Pong and kicked off the early video game era as video games slowly replaced traditional mechanical-driven fare. Pong influenced Nishikado to make his first video game, Soccer, and eventually Western Gun, which Midway altered and improved upon by introducing a microchip when they brought the game to America as Gun Fight. After seeing how integrated circuitry could leapfrog old-tech, in 1975 Nishikado re-created the Sky Fighter II combat flight simulator mechanical game as a video game using microchips, and renamed it Interceptor.

As a more seasoned video game designer, Nishikado started on his next project. The working title for the game was originally Space Monster, pulling "monster" from a chart-topping song at the time by Japanese female pop music duo Pink Lady. Since the cabinet artwork was designed during this period of development, it featured colossal human-like monsters that are absent from the actual game. Management stepped in and professed that "monster" was out, and that "invaders" were in!

Believe it or not, Space Invaders wasn't originally going to feature space aliens. One report alleges that it was based on one of Nishikado's nightmares involving space aliens that attacked young school children eagerly awaiting Santa's arrival one Christmas Eve.

That rumor has never been verified (or denied) by Nishikado, but we do know that he enjoyed Atari's block-busting ball and paddle game Breakout, and pondered a scenario where the blocks evaded player gunfire instead of the ricocheting ball and fired back at the player. The blocks were to be replaced by more fighter planes, but the tech at the time was unable to depict believable aircraft movement. Wild west cowboys and military soldiers were next in line to march across the screen, until Taito's management expressed moral concerns and once again stepped in demanding that no human life could be executed on-screen.

Changes needed to be made, and with homo-sapiens out, Nishikado looked at the popularity of anime Space Battleship Yamato (StarBlazers) and George Lucas' live action film Star Wars and deemed the cosmos to be the setting for his new game. The initial invading space alien was inspired by the tentacled space aliens in H. G. Wells' novel War of the Worlds. The additional enemy characters were modeled after marine life which is so prevalent in Japanese island culture: the squid and crab. Prior games simply moved static graphic sprites about the video screen. Nishikado alternated the sprites to give movement to the enemies' appendages and as a result the game was the first to feature fully-animated characters.

Since Space Invaders is so deeply woven into pop-culture, there is no need to go in-depth concerning gameplay details. Most people breathing know that the objective is to pile up as many points as possible in order to defeat wave after wave of advancing aliens. Players must fire a horizontally moving cannon before the aliens descend upon the surface while dodging alien fire by hiding behind one of the three destructible defense bunkers. For a big bonus, don't forget to blast the occasional mystery ship that rockets across the upper stratum of the playfield.

Good game design is essential in designing a solid game. However, technical barriers and dumb luck can sometimes do the trick just as nicely. One of the more memorable elements of Space Invaders is the rhythmic thumping sound that is made as the alien invaders advance. As enemy ranks are diminished, the pace of the



alien's encroachment gains momentum and the game becomes more chaotic. Mimicking how a human heartbeat pounds harder when stressed, the thumping sound speeds up, making for a very dynamic experience. However, the gradual increase in speed as the invaders are destroyed was the result of a maxed-out central processing unit. As the enemy count is reduced, there is less work for the CPU to compute, and the game program runs more quickly. Fortunately, when Nishikado discovered the bug, he recognized its value and left it intact!

Designing arcade hardware during the infancy of the industry was quite challenging. Nishikado compiled what he learned from his previous projects and merged them with the latest tech to fabricate a microcomputer from scratch... a process which he found to be the most difficult of tasks. He originally wanted to release a full color game, but the numbers just didn't add up. The CP/M (Control Program/Monitor) was simply too slow for the task. However, the technology had improved when the game was published for home consoles a few years later and color graphics were introduced.

Space Invaders is often credited with being the first game that displayed "high scores," but in reality, it was Midway's 1976 title *Sea Wolf* that retained and displayed top scores first for competing players to aim to beat. It should be noted that Taito's *Speed Race* (also created by Tomohiro Nishikado) allowed extra driving time when a pre-determined high score was reached, and that game series pre-dated *Sea Wolf* by two years, being released in 1974.


Upping the high score became a worldwide phenomenon. Obsessed players learned to exploit the program, discovering that the UFO was triggered by how many shots the player fired. Players learned to exploit programming bugs, such as the "safe spot" directly below a bottom row invader. Nishikado recalls, "One day I saw a really good player putting up some high scores around 150k. When I looked closely at what he was doing, I saw that the very bottom row of invaders' shots seemed to pass right through his ship. It's because I programmed it so that their shots would come out just a little bit in front of the invaders." With the world mesmerized by the coin-op hit, it wasn't long before its reach expanded.

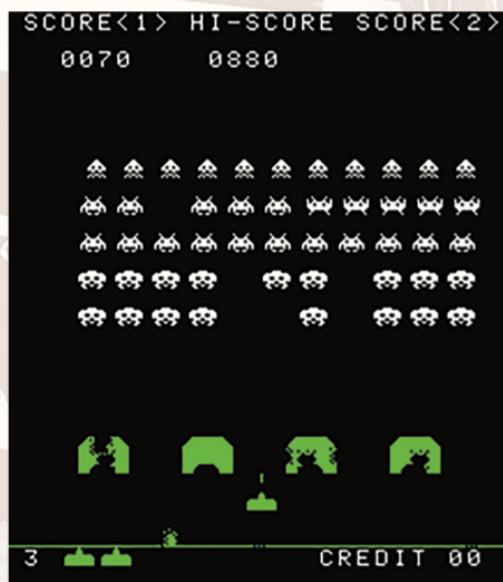
The first version of *Space Invaders* to invade a home video game system was for the Bally Professional Videocade, also known as the Bally Astrocade, in 1979. This unlicensed version was promptly renamed *Astro Battle* when Atari officially licensed the game to be released on the Atari VCS in 1980. *Space Invaders* was the first arcade title to be ported to a home console. While Bally's version was a solid entry, it paled in comparison to Atari's version, which included 112 variations of the game that added moving shields, zigzagging laser bombs, size and speed variations, as well as invisible enemies to hunt; greatly extending its value. Many people bought an Atari system predominately to play the game in their living rooms. The king of the arcade quickly became Atari's savior as the warehouses previously full of unsold Atari VCS consoles thinned out and units were rationed to department stores to meet the increased demand. *Space Invaders* became the first video game to sell over a million copies, garnering it recognition as the premiere "killer app." Ultimately, that number more than doubled and propelled Atari to the forefront of the home video game industry. *Space Invaders* has been ported to just about every platform to debut since, and will likely reappear indefinitely.

*Space Invaders* was labeled as the "highest-grossing entertainment product" during its hey-day, and few coin-op video games have rivaled its success. Over 360,000 coin-ops were sold the first year alone. *Space Invaders* surpassed one billion dollars

in sales by July of 1981. During the initial four years in the arcades, *Space Invaders* grossed 3.8 billion dollars, profiting \$450 million. The combined sales on all *Space Invaders* projects surpassed \$13 billion in 2016, making it the highest-grossing video game of all time!

Of course, a legacy consists of more than just sales numbers. In this world of seven and a half billion people, there are few that are not familiar with Nishikado's most famous creation. Many of the video game industry's greatest professionals cite *Space Invaders* as their introduction to the field, including Shigeru Miyamoto, the father of *Donkey Kong*, *Mario*, and *Zelda*; and John Carmack and John Romero, the creators of *Doom*.

In fact, *Space Invaders* touched this article's author in a profound way. On a hot summer day of '78, my siblings and I hopped on our banana-seated Schwinn bicycles and pedaled three miles to our local Dairy Queen with change jingling in our pockets to purchase a juicy Mr. Misty crushed-ice slushee. We walked in the door dripping in sweat, and to our surprise, there was a crowd gathered around a strange husky box decorated with some mighty scary monsters painted on the side. The cabinet held a monitor, and when I witnessed a teen rapidly mashing the buttons on a control panel, it dawned on me that this wasn't a television broadcast, but an interactive game... and the rest is history! 

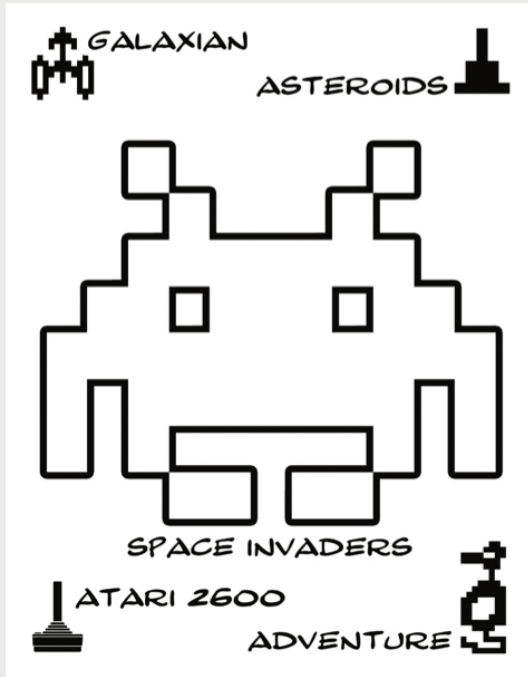


**Michael Thomasson** is one of the most widely respected videogame historians in the field today. He teaches multiple college level videogame courses, and has contributed to dozens of gaming texts and television shows including MTV's *Video MODS* and the highly-rated book *Downright Bizarre Games*. He has written business plans, managed a multiple game-related retail stores, and consults for multiple video game and computer museums. Michael has helped publish 100s of games on Atari, Sega and other console platforms. In 2014, *The Guinness Book of World Records* declared that Thomasson had "The Largest Videogame Collection" in the world. Visit [www.GoodDealGames.com](http://www.GoodDealGames.com).

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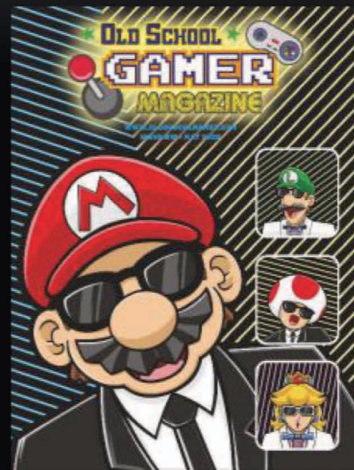
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