Life at Sanders

In the late 1950s, I quit my job as a VP for engineering at Transitron, Inc, a Manchester, New Hampshire electronics design, development and manufacturing operation. With almost 20 years of electronics engineering experience under my belt at that time, I joined Sanders Associates Inc., in Nashua, New Hampshire. There I soon became the manager of the Equipment Design Division. Sanders was then a large R&D and production company. We worked almost exclusively on advanced defense-electronics programs such as airborne radar countermeasure and antisubmarine warfare electronics. For many years, Sanders was the largest employer in the State of New Hampshire. The corporation became a Lockheed company in the mid-1980s and later, it would be a Lockheed-Martin company. In 2001, Sanders Associates was absorbed by BAE as a subsidiary.

During the 1960s and 1970s I was officially the company's Chief Engineer for Equipment Design. There were as many as 500 engineers, technicians, and support personnel in my division at one time or another. I was a busy guy. We were involved in many CRT display programs that delivered what then passed for high resolution graphics. None of the work in my division, or in the rest of the company for that matter, involved development of broadcast television technology or other forms of raster-scan displays. The display systems we had bought or built were of the stroke-writing, also called vector, types. More on that later.

At the time there were roughly forty million TV sets in U.S. homes alone, to say nothing of many additional millions of TV sets in the rest of the world. They were literally begging to be used for something other than watching commercial television broadcasts!

Thoughts about playing games using an ordinary TV set began to percolate in my mind again, shades of my earlier desire to include some form of game into the TV set I designed at Loral in 1951. That idea had been nixed by my boss at the time, Sam Lackoff, Loral's chief engineer.

During a business trip for Sanders to New York City in 1966 I found myself waiting for another Sanders engineer at a bus terminal; he was going to join me for a meeting with a client. I took advantage of my free time and jotted down some notes on the subject of using ordinary home TV sets for the purpose of playing games. I have a distinct image in my mind of sitting on a cement step outside the bus terminal, enjoying a nice warm, sunny summer day, occasionally looking out at the passing traffic, waiting for my associate to show up and scribbling notes on a small pad. It was "Eureka" time...but of course I didn't know that then. The concept of playing games on an ordinary TV set had bubbled up once again from my subconscious and I got that exciting feeling of "being on to something," a feeling that is so familiar to me.

Figure 11 - Sanders Associates Canal Street Building in Nashua, NH.

Witnessed & understood R.M. Solomon 2 Sept 66

page 1 of 4 RH Baer 1 Sept 66

Background Material - Conceptual, TV Gaming Display

PLAINTIFF'S EXHIBIT 64-3

1 Intent

The purpose of the invention is to provide a large variety of low-cost data entry devices which can be used by an operator to communicate with a monochrome or color TV set of standard, commercial unmodified type. Entry into the TV set is to be gained either through direct connection to the video system (at 2nd detector) or by connection to the antenna terminals thus substituting the entry device (hereinafter called "Generator") for the broadcast TV signal, by modulating an RF oscillator operating on one of several standard TV channel frequencies, and tuning the TV set to that channel (Channel 4 for Let's Play).

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2. Some Classes of Games Considered

The following general classes of games are presently visualized

(A) Action games in which skill of operator (observation, manual-dexterity) play a part. Example: "Steering" a wheel to control random drift of color (hue) over the CRT face - timer determines which participant (hereinafter called player) can maintain a particular hue longest etc.

(B) Board Skill games - i.e. classes of games imitative of checkers, Chess, Pominoes,

(C) Artistic games in which the player manipulates controls to produce artistic designs, working against time (integral timer)

9-3

(D) Instructional games designed to teach basics of geometry, basic arithmetic (ex. adding blocks)

(E) Board Chance games - i.e. classes of games imitative

Figure 15 - Disclosure Document 2/5

Gregory, who was also a good cartoonist, to make up some professional looking transparencies for me so we wouldn't have to present the ratty-looking stuff which I had drawn. Stew obliged and here is what the Firefighters' overlay looked like:

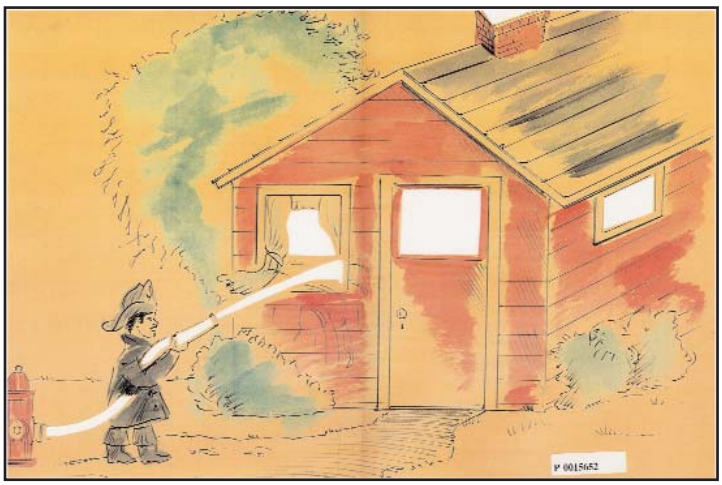

Figure 34 - Pumping Game Overlay

Note that the hose sections and windows are transparent. A rising - or dropping - level of blue would show through those openings and the entire screen would turn red and backlight the windows if we didn't beat the timer.

Royden Sanders, Harold Pope, and the entire Board of Directors showed up on June 15th, 1967 for our demonstration. We had moved our dog-and-pony show to a conference room. There was no way we could have squeezed that large a group into our small game lab. - The demonstration was well received, although there was more than one expression of doubt that we could make this into a business. Henry Argento was probably the most enthusiastic of the board members there. He really liked what he saw and remained a faithful booster for years afterwards. Sandy and Harold Pope conferred briefly and decided to let us continue with additional game development despite currently unanswered questions about where the work might lead commercially. Management's edict now became: "Build something we can sell or license."

August 1967 - TVG Unit # 3, Our First "Product" Is Ready!

Bill Harrison continued to work away at new improved circuit designs. In July we were essentially finished. We had a 5x5x6 inch stand-alone game box that played several simple chase games, board games using overlays and light gun games. We had thrown out anything that wasn't absolutely necessary to play chase and gun games. That included color, timers, and some of the other do-dads like the random number generator and the "pumping" circuitry.

We decided to reduce cost by "modularizing" the construction, using plug-in printed circuit cards for the various sub circuits such as the player spots, H&V sync circuits, and so on. The general idea was to simplify test and assembly in production. This became TVG Unit #3 (Figure 36). I told Bill to keep working on improvements to the circuitry and the light gun. That did not take him long. By mid-September he was finished and made up a list of materials for TVG Unit #3. Then he "priced" it based on the cost of typical U.S.-made components. We decided on a probable production run of ten thousand units and came up with a direct-material cost of fifteen dollars and seventy-five cents. Bill had designed the unit using three small, modular circuit boards. To keep down the cost of connecting these board to the "motherboard", I searched for and found some rudimentary edge board connectors available for just pennies. The modularization did reduce anticipated assembly and test time but there still was not enough perceived play value to justify the projected cost. That meant that my initial idea of a U.S. manufactured, twenty-five-dollar game at retail was probably a pipe dream. It was clear that we needed to do something different, something more exciting that would warrant a probable $50.00 retail price for a TV game. So it was back to the bench to cook up new and better games!

A historical note: This scheme of modularizing the circuitry was revived in Magnavox's Odyssey game system where it ran up the cost of the hardware needlessly. Anyway, mere incremental cost reductions were not getting us anywhere...we absolutely needed better games. No amount of gimmickry was going to fix our cost problem.

Talking about the cost problem: Later that year, in mid-October I told Bill Harrison to take a crack at pricing a design based of the use of 7400 series TTL Integrated

Figure 44 - The Brown Box, our TV Game Unit #7 with its hand controls and gun (1/69)

into a connector at the rear of the Brown Box, we could shoot at stationary or moving target spots.

- Golf Putting - a golf ball mounted on the end of a joystick which, when placed on the floor, was tapped with a putter to make the "ball" spot fly into the "hole" spot and disappear.
- Checker Games - with and without obstacles - that were played with transparent overlays.

Bill Harrison kept working on circuit improvements of the Brown Box over the next half year, although it was in good, demonstrable shape by the middle of January of 1968, The Brown Box was clearly a "real" game machine. Furthermore, it was engineered so that it could be reproduced without a problem...there were no hokey or unstable circuits that couldn't be reliably duplicated; it was a good pre-production design. That would become important later.

Some of the games required overlays to depict features of the playing field such as goals in soccer and hockey. The same applied to the many board games, most of them Bill Rusch's brain children, and target shooting seemed more interesting when the gun's aim was a poor Tweety Bird. Technically, Ping-Pong, hockey and soccer games were the same except that the latter two games were played without the central net line and our (arbitrary) game rules were different.

Herb Campman came up to the lab again to play the new game unit. Our overlays were a little on the primitive side but we now clearly had a nice collection of valid games. "Seems to me, we're finally getting there!" Herb observed when he played games with our

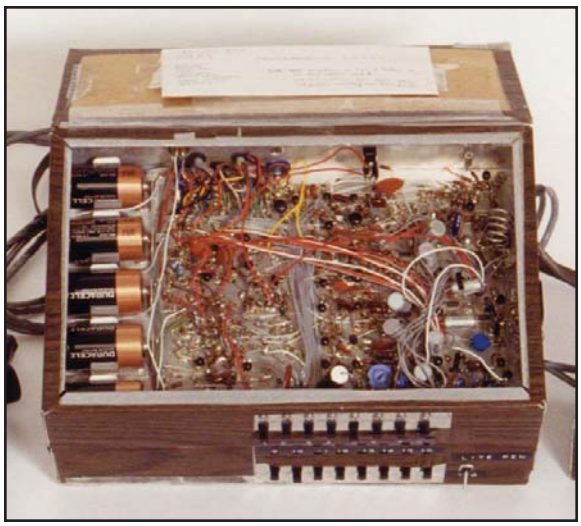

Figure 45 - Brown Box interior

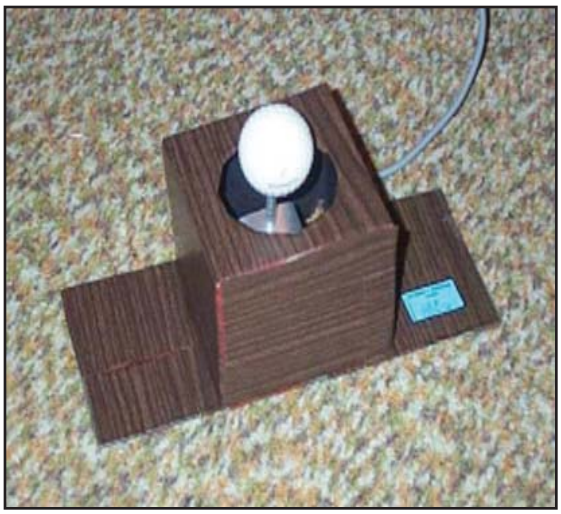

Figure 46 - Golf putting joystick

The Coleco Story

We need to step back to 1973.

Back then I had written a letter to Marvin Glass & Associates (MGA) in Chicago. I had inquired whether they were interested in help with the design of hand-held electronic games, which were then in their infancy. Mattel had started the business with a small, hand-held football game. The Glass partners promptly sent Geoffrey Breslow, one of their Associates, to New Hampshire. He spent half a day in my lab giving me the once-over and went home.

I promptly received an invitation to visit MGA in Chicago. A week later I presented myself to the rest of the associates. Anson Isaacson was the senior partner at the time. Marvin Glass himself had died a year or two earlier. Two hours into the interview with Anson Isaacson, Howard Morrison, Burt Meyer, Geoffrey Breslow and the rest of the partners, I had a handshake agreement. I became their "outside electronics capability."

That association lasted for the better part of a decade. It resulted in such well-known products as Milton Bradley's *Simon*, Ideal's *Maniac*, Lakeside's *Computer Perfection*, Coleco's *Amazatron*, and several other single-chip microprocessor-based hand-held games. For me, it opened up the doors to senior management at all of the major toy companies. During my frequent visits to MGA, I often shared lunch in their executive dining room with some of the partners and the president or VP of this or that toy company. That is how and where I first met Arnold Greenberg, Coleco's president.

Sanders tolerated my arrangement with Marvin Glass because I managed to carry it on in a non-interfering manner, meaning I did the work for MGA mostly at night and during weekends. Furthermore, there was a certain synergism between my work on interactive video-based systems at Sanders and several of the projects in which I was involved at MGA. Most importantly, licensing income to Sanders via Magnavox was beginning to make substantial contributions to Sanders bottom line. Nobody at Sanders wanted to disturb that process and I was a key to it. As money arrived at Sanders in ever larger amounts, I virtually needed no other mantle of legitimacy.

For all practical purposes I held down two jobs and received two paychecks every month. Herb Campman, our Director of R&D at Sanders, was kind enough to protect my derrière legally by signing off on an official Sanders document that sprinkled holy water over the new arrangement. Every quarter, Lou Etlinger, our Director of Patents, and I sat through financial and program status reports projected on the big screen in the auditorium at Sanders' HQ in South Nashua. Our videogame license income frequently beat that of the Electronic Countermeasure Division, the biggest division in the company. My name was all but up on the headquarters tower in neon lights.

The defense electronics business was still coming out of a deep recession. Sanders quarterly statements would have looked a lot less cheerful if it had not been for the substantial contributions our videogame licensing and litigating activities added to the bottom line. I've often been asked how Sanders expressed their appreciation of my part in this happy state of affairs.

In the first place, I began to have total freedom of action starting in the mid 1970s, while I was still working within a big company with all of its resources. How do you put a price on that? Secondly, bonuses came along with most of the major influxes of cash from licensing. Thirdly, starting in 1976 and ending in 1985, Sanders awarded me a string of stock options that added up to better than a quarter of a million dollars. Since most of that money wound up being invested and has at least doubled over the intervening years, you might say that my direct return on videogame activities was a half million dollars.

The value of those options was enhanced quite a bit by what happened in 1986. Loral, my old alma mater, made an unfriendly takeover attempt on Sanders Associates. Our stock was trading in the mid-thirty dollar range at the time. Loral's offer pushed the price up

An Encounter With The Nintendo NES

The Gameboy Camera wouldn't be the first Nintendo product that I suspected infringed on my patents. In the mid-eighties, the home videogame industry tanked, absolutely and totally. There wasn't a dealer in the U.S. who would consider taking on a new line of videogames. The market had been saturated by shoddy look-alike games. Atari cartridges were being dumped in land-fills. It was that bad.

Nintendo of Japan had developed a new game system which they called the Famicom. It did well in Japan but the idea of introducing it into the U.S. did not look like a winner. Nintendo's game system made its first appearance at the Las Vegas CES in January 1986. In *The Ultimate History of Videogames* by Steve Kent (Prima, 2000), Howard Lincoln, the chairman of Nintendo of America is quoted as saying: "*We didn't even know if we really wanted to get into the home videogame business in the United States. We got a mixed reception at the show. The reaction, as I recall, was that anybody who would get into the videogame business was nuts. They liked the hardware, though, and the games*."

As Steve Kent described it, once Howard Lincoln and Minoru Arikawa, president of Nintendo of America, returned to their Seattle office after the show, the decision was made to sell their system as something other than a videogame. Kent told it this way: The solution came in the form of a light pistol and a little robot; a little robot that got its instructions via visible code flashes on the screen of the TV set. Sound familiar?

I encountered my first Nintendo Entertainment System (NES) sometime in late 1985. Lou Etlinger had sent me two NES units which he had received from Magnavox (by this time a brand name of North American Philips), with the usual request: "Could you please look this stuff over and see what makes it tick". English translation: "What parts of this system appear to infringe our patents...and thank you for your free advice".

I remember unpacking the components and setting them up in my lab at Sanders like it was yesterday. Playing the *Duck Hunt* gun game was an absolute blast in my humble opinion. Then there was that robot, ROB. It worked perfectly, even if it was a little incongruous. My first reaction was: "Why did they bother with this thing...it's cute but it's just a gimmick". My second reaction was a little different: "Hey, the gun game infringes several of my earliest patents; and sending digital code to the robot via flashes on the screen steps squarely on the toes of more of my patents."

After this epiphany I went to work and traced the p.c. wiring of the mother board in sufficient detail to get a good idea of what made the NES tick. I drew a rough sketch identifying the components on the board (Figure 148). Using a storage oscilloscope, I recorded the digital flash sequences that told ROB to raise or lower his arm, turn left or right, open or close hands. I drew a matrix of that code and added it along with the layout sketch to a memo (Figure 150) which I addressed to Lou Etlinger.

P.S. Historical non-sequitur: This memo was typed by me on a Coleco Adam.

I followed up the memo with a visit to Lou in his office. Basically, my question was: "What are you going to do about this?" Lou said that he would first ask Dick Seligman, his assistant (and the man who wrote all of our early videogame patents), to go over the details and make an assessment of the situation. Dick did just that in his usual, thorough way after I had given him a demo. Some of the scribbled comments in the memo's margin reflected my thoughts after getting feedback from him. In particular, he didn't think that my '805 Digital Video Modem patent would apply because there was only one digital light flash on the screen per bit during the transmission of the ROB code. My Digital Video Modem technique covered transmitting a whole byte (8 bits) per screen. However, other digitally coded data transmission via flashes from the TV screen were covered by some of my patents.

At that point the ball was in Lou Etlinger and Tom Briody's court. Did they want to lay this on Nintendo, given the fact that there were currently licensing negotiations going on between NAP and Nintendo? Potentially, there was also an "inequitable conduct" lawsuit waiting in the wings that could be scheduled by the Court at any time. As far as I know, the subject of