

FOUND!

The First Microprocessor Pinball Machine

by Alexis Tzannes



Author/collector Alexis Tzannes is the proud owner of a unique piece of pinball history. It's the world's first solid state pinball machine, Bally's **Flicker**. All Photos: Courtesy of the author.

DISCOVERY

I was browsing through the local *Want Advertiser* last October when I spotted an old pinball machine for sale, a 1975 Bally 2-player called **Flicker**. The price was certainly fair (\$100), so I quickly got on my computer and checked the Internet Pinball Database for a picture of it, to see if I liked the design and artwork. I was thrilled to discover that the game had a movie theme as my wife is a big movie buff, so it would be a big hit with her. I had always been fascinated with pinball machines. During my teenage years in Europe, I often found myself in the corner of the arcade playing pinball while my friends were clustered around **Pac-Man**. Now I would finally have a pinball machine of my own!

Flicker didn't work, of course. It was in very bad shape, but I still loved it. I slowly figured out how to read the schematic and after adjusting a number of switches and replacing a few cooked coils, the game was up and running about two weeks later. I felt like a kid again. I couldn't wait to come home from work and play a few games.

I continued looking around the Internet for even more information about **Flicker**. Searching www.dejanews.com, I came across an old posting from November 1997 to rec.games.pinball (RGP) by someone named Ken Miller, stating:

*"I have a **Flicker** pinball with Laurel & Hardy on the front glass. The playfield is in perfect condition because it has never been played because someone tried to modify it to a digital machine. It seems it was just before transistors came out. The wheels have been removed from the upper cabinet and replaced by a P.C. board with a bunch of spaghetti wiring on it. How can I get this info into the right hands of someone who may need this machine?"*

Since my playfield was in very poor shape, I sent Ken an email asking if he would be willing to sell just the playfield. I knew it was a long shot, believing the email address would bounce or that

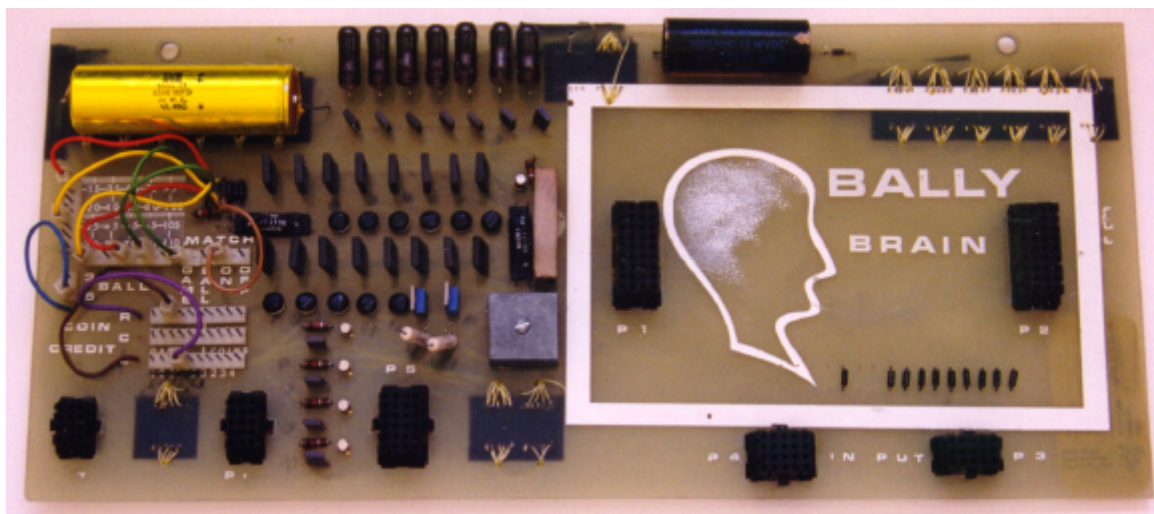
the game had been sold a long time ago. Amazingly, I received a reply saying he still had the machine and was willing to sell the playfield alone. We talked on the phone and he assured me the playfield was complete with all of the plastics, original wiring, and other parts intact.

Ken was right! It was in great shape cosmetically. The artwork and plastics were like new. When I looked underneath, though, the wiring was completely different than my machine. The bonus stepper unit and relays were missing altogether. The wiring was vinyl-covered, as opposed to the cloth-covered wires in my game. Also, the connectors were completely different. I was very disappointed. I expected to get a playfield that I could plug right into my existing machine, not a tedious project where I had to transfer all the wiring.

I called Ken and explained the situation, but he was surprised too! He was under the impression that the playfield had not been modified. He didn't know much about the history of the machine having bought it with a few others from an antique dealer years back. He said there were no other relays or big parts remaining in the cabinet; rather, only two transformers in the base, a chime unit and a circuit board in the upper cabinet.

At this point I started thinking that it might be better to get this game to work as a modified solid state game, although I knew nothing about solid state pinball machines. Ken agreed to send me the rest of the game. I figured that even if it never worked, I could always use the parts for my original **Flicker**.

The packages arrived the evening before Thanksgiving. The whole game was there except for the backglass. He didn't send the glass until later because he was trying to figure out how to package it properly. I put the game together, checked the fuses and turned it on. As Ken had noted, the general illumination did work, but nothing else. I noticed there were two 36-pin connectors on the motherboard that were not connected to anything. Was something missing? Also, there appeared to be no logic chips or microproces-



Above: Circuit board is missing its "Brain," the board that would plug into the pair of connectors inside the white border.

sor on the board, only about 50 transistors and the displays for the scoring, credits, ball in play and match features. The only piece of information was a sticker on the board which read: "Property Of Dave Nutting Associates," with an address in Illinois (Dave Nutting Associates designed and produced the first commercial video game, **Computer Space**, in 1971).

The next day I got on the Internet and put a long post on RGP in search of information, describing this strange machine and its components. I really didn't expect it to lead to much, but I had nothing to lose. Little did I realize ...

THE SAGA UNFOLDS

The first response came the next day from a collector in Minnesota named John Mohr, asking if I was interested in trading or selling the machine. We spoke on the phone and he explained he was a collector of solid state Bally games from this era and is especially interested in prototypes. Since I was interested in electromechanical (EM) games a trade sounded fine, but the only one he had available was a **Capt. Fantastic**. I probably would have accepted, but we had just given my brother a **Capt. Fantastic** for his birthday! He also offered me cash, but I still didn't have the backglass and couldn't settle on a price. Nonetheless, I was thrilled and amazed that a machine I picked up by mistake appeared to have some significant collector value!

Things got even more interesting that day when I received a reply from Allan Reizman, who was a Bally engineer at the time, stating:

"Nutting did some examples of solid state construction for Bally that led to the establishment of the engineering group I was eventually a part of. Unfortunately, it would be a very remote possibility any documen-

tation or parts for this game will turn up. Still, it has historical value for a collector out there. It would be a shame to scrap it before you ask around."

Was this **Flicker** one of the examples Allan spoke of? You can imagine my excitement when another email arrived, this time from Williams/Bally pinball designer Pat Lawlor (**The Addams Family**,

Roadshow) stating:

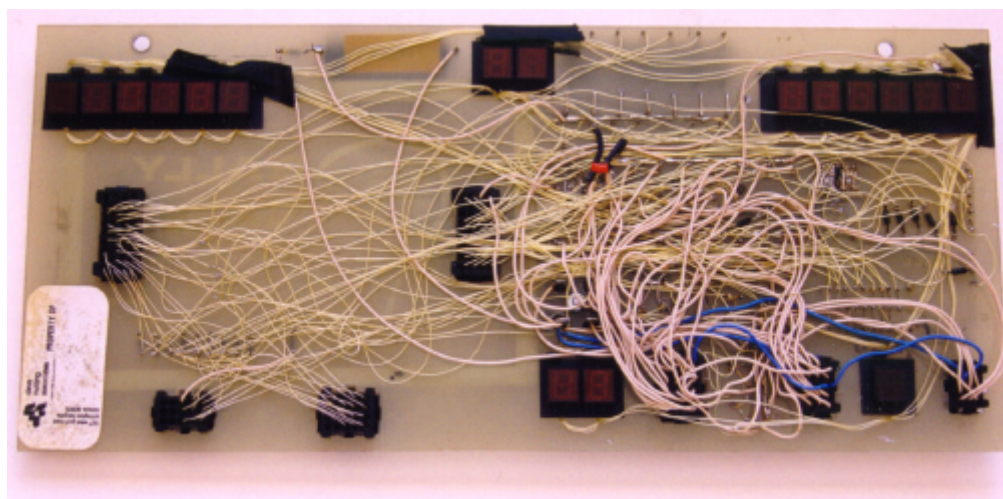
"You are in possession of a little piece of pinball history. The game was the legal turning point on whether or not Williams lived or died in the early 1980's. Dave Nutting had a patent on a "microprocessor based pinball machine." The game you are in possession of was (one) engineering sample of that early patent. Williams was sued by Bally (assignee of the patent) and had they lost, in all probability they would have gone out of business or been absorbed by Bally! Dave Nutting moved to Colorado after the video collapse of 1984. (Dave Nutting Assoc. was closed by Bally). How do I know this? Easy, I worked there from 1980-1984. My suggestion ... DO NOT PART OUT THE GAME! My question: where in Colorado did the game come from?"

I couldn't believe what I was reading! Could it really be that the pinball machine sitting in my basement was the world's first solid state prototype example? Could this machine have actually been an exhibit in an important patent-related court case?

GRAY MATTER

I immediately called Colorado information to try and find Dave Nutting's phone number. I was in luck as there was only one Dave

Below: Reverse of board reveals digital displays and tell-tale "Dave Nutting Associates" sticker.



Nutting in all of Colorado! I called and got his wife who said he was at the hardware store. She was very polite and asked if I could call back around lunch time. You bet I could!!

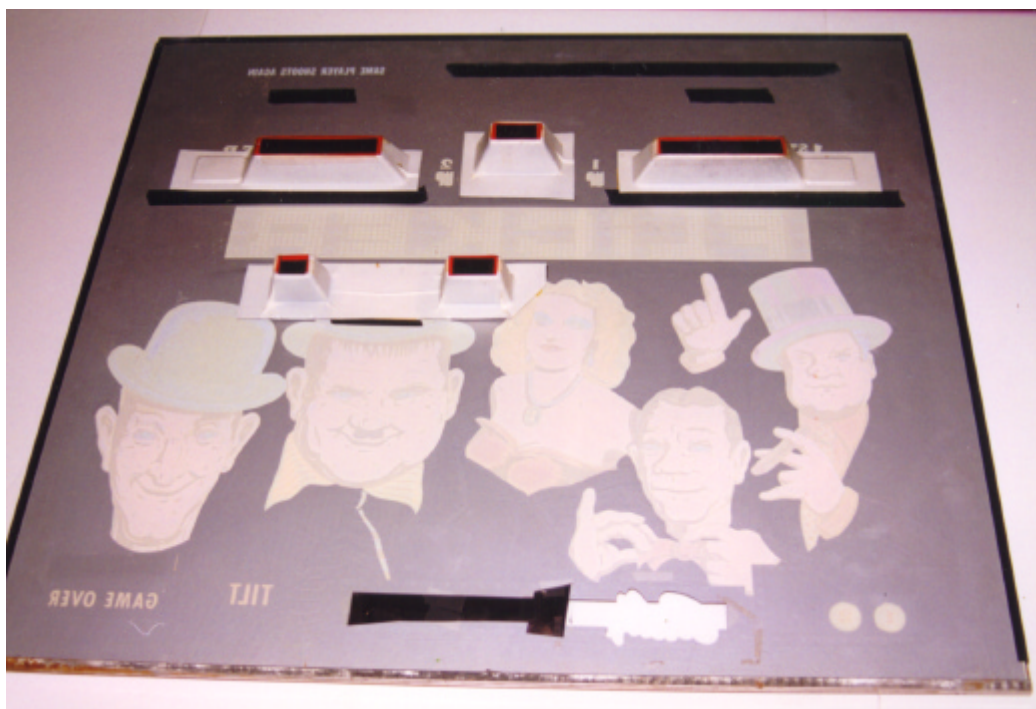
I phoned later and indeed he was there. I introduced myself and said, "Mr. Nutting, I have an old pinball machine with your name on it. It's a 1975 Bally **Flicker** with Laurel and Hardy on the backglass, and it has a board with a sticker that says Dave Nutting Associates on it. The game was modified to be a solid state game." After a long a pause he replied, "You have that machine!?" With that, my countless questions were about to be answered!

Dave Nutting Associates was his company and contracted by Bally in the early 70s to perform consulting work. Nutting hired a young engineer named Jeff Frederiksen to design a microprocessor-based pinball machine. To test the idea, Bally gave them two **Flicker** pinball machines in 1974. One of them was stripped of all wiring and redesigned as a microprocessor-based game. The other they kept as an original EM.

Nutting recalled being in a mall one day and spotting a digital clock in a store window. He had been searching for an alternative to EM scoring reels, something that would give the prototype a new look. LEDs were not yet available in a large enough format. He wanted something about an inch high so they'd be easily visible to the player. He bought the clock, took it back to the lab and "reverse engineered" it to work as a scoring display! This led to the six-segment scoring displays used on the prototype.

After ironing out all of the details and getting the prototype to work, they set up a meeting in September 1974 to demonstrate the game to the "Bally brass." Bally CEO Bill O'Donnell and other vice presidents arrived at Dave Nutting Associates in a limousine where inside they found two games set up side by side on a concrete floor. Nutting played the EM game while Jeff played the prototype, noting how they were identical except that the prototype was quieter and the displays were different. They opened the cabi-

Below: Dave Nutting modified the backglass by scraping away unneeded portions to accommodate the solid state features.



nets to reveal the EM game packed with relays, coils, and switches while the prototype was virtually empty. Their jaws dropped to the floor. Nobody could believe that the small board could replace all those relays. One of them even circled the machines and looked in the nearby closet for the computer that was controlling everything! Perhaps he expected to find The Wizard of Oz?

In the months that followed the Bally engineering staff evaluated the **Flicker** design and proceeded to develop their own microprocessor-based system. Since Bally did not immediately use their design, Nutting said his company entered into an agreement with a small company called Mirco in mid-1975. Under the terms of the arrangement, the Phoenix, Arizona-based Mirco was to build pinball machines based on the **Flicker** prototype. Although the relationship was terminated shortly thereafter, Mirco's **Spirit of '76**, which is known as the first commercial solid state pinball, was based partly on the **Flicker** prototype. **Spirit of '76** had a very small production run before the company withdrew from the pinball business.

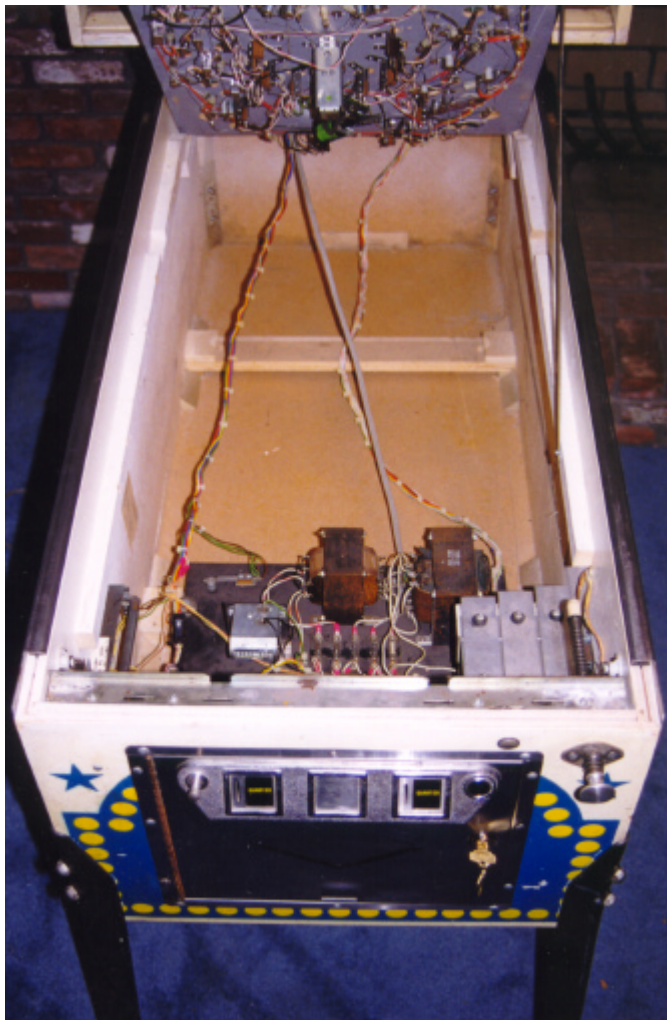
Nutting remembered that in early 1976 he signed an agreement with Midway (a subsidiary of Bally) to produce smaller home pinball versions of games like **Fireball**, **Capt. Fantastic** and others. Their operating systems were based on the **Flicker** prototype. Over 12,000 such games were sold.

Eventually, Bally purchased Dave Nutting Associates including the rights to the patents. In fact, Bally's first commercial microprocessor-based game, (**Freedom**, released in December 1976) was also based on **Flicker**!

Nutting verified Pat Lawlor's comments about the machine being involved in a court case. In May 1975, Dave Nutting and Jeff Frederiksen filed a patent to protect this new use of technology. Since Bally bought Dave Nutting Associates, the patent was ultimately issued to Bally in June 1978. By that time, however, Bally was already producing microprocessor-based pinball machines of different design. They, as we all know now, were an instant success. EM games were immediately a thing of the past. Williams, Gottlieb, and the newly-formed Stern Electronics were now fol-

lowers, they not getting solid state games into the market place until the fall and winter of 1977. Instead of designing their own microprocessor system, Gottlieb and Williams decided to copy the Nutting-Frederiksen design. This led to Bally suing Gottlieb and Williams for patent infringement in 1980. Damages were estimated at over \$20 million.

Nutting testified in the court case, with the **Flicker** prototype machine as a courtroom exhibit. He remembered the judge's surprise ruling who stated that the invention was obvious, therefore the patent was invalid. He said Bally never appealed because their Bally legal staff was distracted by licensing problems related to opening a casino in Atlantic City, so the case died.



Above: The solid state **Flicker** prototype stunned Bally executives ... where were all the relays, solenoids, and motors!?

Now, what about the unusual backglass? Was it designed specifically for the prototype or modified for the different displays? Nutting said quite simply, “No, I just took a razor blade and scraped the artwork off the areas where I needed holes (for the Ball-in-Play, Credit and Match) digits.”

And the aforementioned Jeff Frederiksen? Nutting knew exactly where I could find him!

MORE BRAINS!

In speaking with Jeff Frederiksen, it was apparent that he knew much more about the specific electronic design of the machine. Even though it was 25-years-ago, he was still able to describe the number and types of transistors on the board. He revealed he’d designed the electronics using a time division multiplexing scheme. He said that I was missing the “Bally Brain,” which is a small board with the microprocessor on it that clips into the two available connectors on the other board. It was based on the first Intel microprocessor, the 4-bit 4004 and that he saw the **Flicker** prototype for the last time in the courtroom when he testified. He indicated he might have a Brain “lying around the basement or somewhere.” When asked if he thought we could get the game to work again he replied, “The game works, you’re simply missing the Brain.”

About 15 minutes after we hung up, his wife, Robin, called me back. She was very excited the machine still existed. Her voice was full of nostalgia as she spoke about those years. She described the “hole in the wall,” the run down rat infested lab they had rented to design the game. She described being ambushed by Bally lawyers who, prior to the court case, came into their house and took everything they could find related to the patent, including pictures and schematics. She said she still had some documentation about the machine, and believed she had seen a Brain somewhere, too. Our long conversation left me feeling a bit uneasy since it was obvious that the pinball machine in my basement was an important part of her family history.

The next morning Robin called me back. She had been up all night looking for information about **Flicker**. She wasn’t able to locate the Brain, but found several documents that included hand drawings of the circuit schematics!

A few days later the backglass arrived. As Nutting had recollected, there were rectangular holes carefully cut into the artwork to accommodate the additional displays. He also scratched off the “Ball in Play” lettering and covered the blank area with a Bally logo sticker, which had since been removed. On the back of the glass there were black shadowboxes around the digits to mask light. Also, the “100,000” and “Match” digits (which are not used) are covered on the rear of the glass with black tape. On the top left of the backglass, handwritten in black marker, it reads: HIGH SCORE JEFF 583,150 SINGLES, JEFF 429,310 COMPETITION SCOTT.

I emailed a picture of the backglass to Frederiksen. He recognized the handwriting and remembered it being on the glass during the court cases. He said “it brought back sweet memories.” The high scores were from the mid-70s. Paul Scott Smith was the technician who wired the game and spent several hours playing it in the testing stage. Amazingly, Jeff’s high score from 25-years-ago still stands.

TRACING THE LEADS

Over the next several months I traversed a long trail attempting to collect as much information as possible. I talked to anyone who might know something about it, from pinball historians to lawyers who represented Bally and Gottlieb in the court case, to people who worked at Bally at the time. Pinball historian Russ Jensen informed me that Dave Nutting talked at Pinball Expo ‘96 about the development of this prototype. According to Russ’s notes from the Nutting seminar, someone in the audience asked which game Bally had given them to design the prototype, but he couldn’t remember the name at the time. I contacted Nutting again regarding this and he said that immediately afterwards he walked onto the Expo floor and saw a **Flicker** and it “all came back to him.”

The late Dick Bueschel also interviewed Nutting that day, gathering information for his pinball book series, *Encyclopedia of Pinball*. I also talked to Jim Patla, longtime Bally designer who created **Flicker**. He said that after Nutting did the prototype, the internal design group at Bally designed solid state prototypes using the game **Boomerang** (a 4-player version of **Flicker**; different artwork, same playfield layout).

I was unsuccessful at determining how the game ended up in the hands of Ken Miller in Colorado. The antique dealer who sold him the game had no specific recollection and wasn’t willing to search through his records to figure out who sold it to him.

I also attempted to locate pictures and information about the

game that was part of the court case. After calling the District Court of Illinois, I learned that the court case documents were still in existence ... in the National Archives and Records Administration Building in Chicago!

OFF TO THE WINDY CITY

The final pieces of the puzzle were about to be placed. I decided to make the trip from Boston to Chicago and view the files and use the opportunity to meet Jeff and Robin Frederiksen, who still live near Chicago. My **Flicker** affair was coming full circle.

Jeff, Robin, and myself spent three hours reading through three boxes of court documents searching for more information. We found several related things, including hand-drawn schematics of the circuitry and a list of the different chips used on the Brain. The most interesting piece of information was a document stating, "... two **Flicker** electromechanical pinball machines Serial Nos. 1060 and 1074 were shipped to Dave Nutting Associates on August 20, 1974." The serial number on my prototype is 1074! *(To clarify any misconceptions, most reference material show **Flicker**'s release as January 1975. However, it's common practice for manufacturers to build sample games for test site and distributor purposes months before full production proceeds. In **Flicker**'s case, the final production run was a meager 1585 units. - TF)*

"I WISH I HAD A BRAIN."

This past January I received an email from Jeff Frederiksen. Had he found the missing Brain? Not quite, but his wife was still digging through their personal archives! He wrote, "Robin found a listing of the original MCS-4 assembly language code that was used for the **Flicker** game. It's complete and well documented. We will fax you a copy of it."

The 15-page fax contained about 500 lines of assembly code. It's a late version of the code, dated September 20, 1974. I called to thank Robin and she said she had searched through about 30 boxes of old stuff and finally found something! The important thing about her finding this code is that we now know exactly how the game was programmed. Frederiksen had mentioned that after getting the prototype to work and play identically to its EM counterpart, they proceeded to add some extra features, to demonstrate the additional capabilities of microprocessors over relay logic. This code includes the routines for these extra features. For example, the EM version has four targets labeled A, B, C, D. When a player hits all four (in any order) a double bonus is awarded. In the prototype game, Jeff designed it so that if the player hits the four targets in alphabetical order, extra bonus points are awarded.

THE FUTURE'S PAST

Using the original code, the schematics and all other information about the Brain that's been collected, I'm now working with Jeff Frederiksen and Bill Ewing, a colleague of mine, in recreating the Bally

Brain. I patiently traced all the wiring on the playfield, backbox, and motherboard and created a programming specification sheet from my EM **Flicker**. The resulting time division multiplex matrix is identical to the one included in the patent filed by Nutting and Frederiksen 25-years-ago. Using this matrix and the original code, we are building a new Brain that will operate exactly like the original.

We've also attempted to cosmetically reproduce the original Brain as closely as possible. We're using a perforated board with wire-wrap sockets and yellow 26-gauge wire, as Jeff said they did at the time. We also recreated the aluminum dust cover in the same shape as the original, with "Bally Brain" written across the top in black letters. Through the course of this work, the original prototype machine has not been modified in any way. Thus, we should still be able to make the game operate with the original Brain, if it is ever found. Once we get the game working again, the first order of business will be breaking Jeff Frederiksen's 25-year-old high score! So stick around, the final chapter of this **Flicker** saga is yet to be written! ★

I would like to thank Dave Nutting and Jeff & Robin Frederiksen for all of their help and cooperation throughout the past several months. In addition, I must thank everyone who contributed information to this story. Most notably Pat Lawlor (for his help in location Dave Nutting), as well as Russ Jensen and Dick Bueschel (via Gordon "Gordo" Hasse) for their accounts of Nutting's Pinball Expo '96 seminar. If anyone has any information about this prototype machine or the whereabouts of the original Brain, please contact the author either by email: alexis@tzannes.net -or- phone: (781) 863-8218.

Below: Alexis Tzannes (left) meets the brain behind The Brain, Jeff Frederiksen.

