Kelley and Jamie's Pop Culture Arcade Explosion!

A Tale of Two Arcades
Jimmy Rosen Goes a-wanderin'
Twin Galaxies High Scores
A World-Record Tournament at the Pinball Hall of Fame!

GameRoom Reviews

Kohout Enterprises Williams System 3-7 CPU & Driver Board

Finally, a Solid Solution to buggy solid state Williams pinball (1977 to 1984)

$155, Kohout Enterprises
www.pinballpcb.com

Everything Old Is New Again

I suppose it was around 1997 when I purchased a dead Laser Cue pinball machine for $75. Nothing worked, no power to anything. Usually, these are welcomed problems since something as simple as a line fuse can get you up and running. A peek inside proved that all the boards were there and no major hacks that I could quickly see. And since the price was ridiculously low, how could I go wrong? Laser Cue uses System 7 (or Level 7 in some pinball circles) hardware. This told me that once I got power to the boards, I would have a much easier time diagnosing issues with the 7-segment LED on the CPU board, as opposed to the 2 blinking LED's on earlier versions of this board.

As part of my restoration routine, I checked the power cord for any obvious signs of damage & the main line fuse. Then I ran through all the fuses in the game checking values against the manual. Luckily, everything was fine except the power cord. It had one broken wire to the line filter, probably due to someone pulling on the cord. Once repaired, I powered up the game to find only the general illumination lamps on the playfield and the CPU locked up tight. A closer inspection of the interconnect between the CPU and driver board made the problem obvious. This connector was a mess. There was corrosion from a previous battery problem and some very

bad "repair" work near this connector. Even more, the "through-the-board" socket connectors on the driver board where badly speckled with green—the leftovers from batteries gone very bad. Whoever worked on this before had a *hot* soldering iron. They actually burned sections of the CPU board while trying to add solder to this area. It was a disaster.

So What's the Problem with these Original Boards?

In all Williams solid state machines prior to System 9, the CPU and driver boards are 2 separate circuit boards. They sandwiched these together with a long strip of pins on the CPU board and a "through the PCB" series of connectors on the driver board. These lines all interface PIA's (parallel interface adapters) on the driver board. What this basically means is this: the CPU board extends its job onto the driver board. It's

like they didn't have enough room on the CPU board so they took some real estate from the driver board. The reason this is a problem is due to what happens when there are connector problems. When the computer wants to pass information to a PIA on the driver board, it must see it out there. If there is a problem with this big sandwich connector and it can't see exactly what it expects, it locks up. Even these early computers can move information well over 1000 times per second. For my Laser Cue, this meant that the only way to ensure that this problem wouldn't re-occur with these existing boards would be to hardwire the boards together with dozens of short, hard-soldered wires to bypass the connector. My only other option then was to get another 15+ year old CPU board and hope for the best.

Today, we see a growing market for pinball reproduction circuit boards. This is no doubt due to the number of people restoring pinball. As reported on
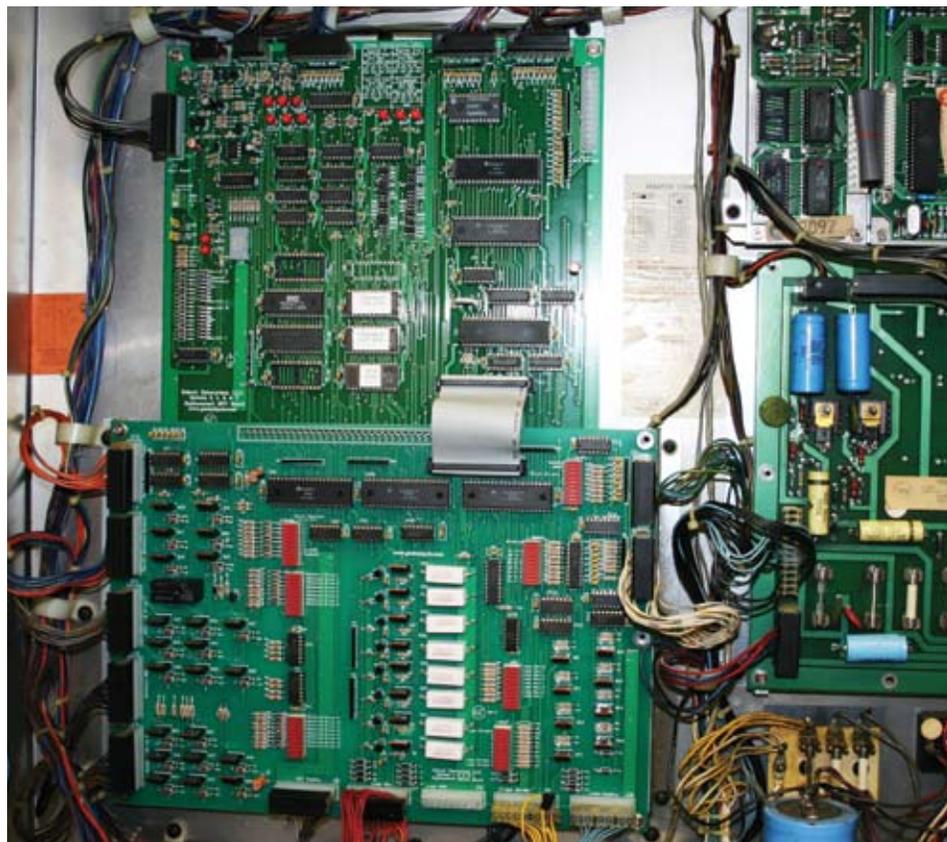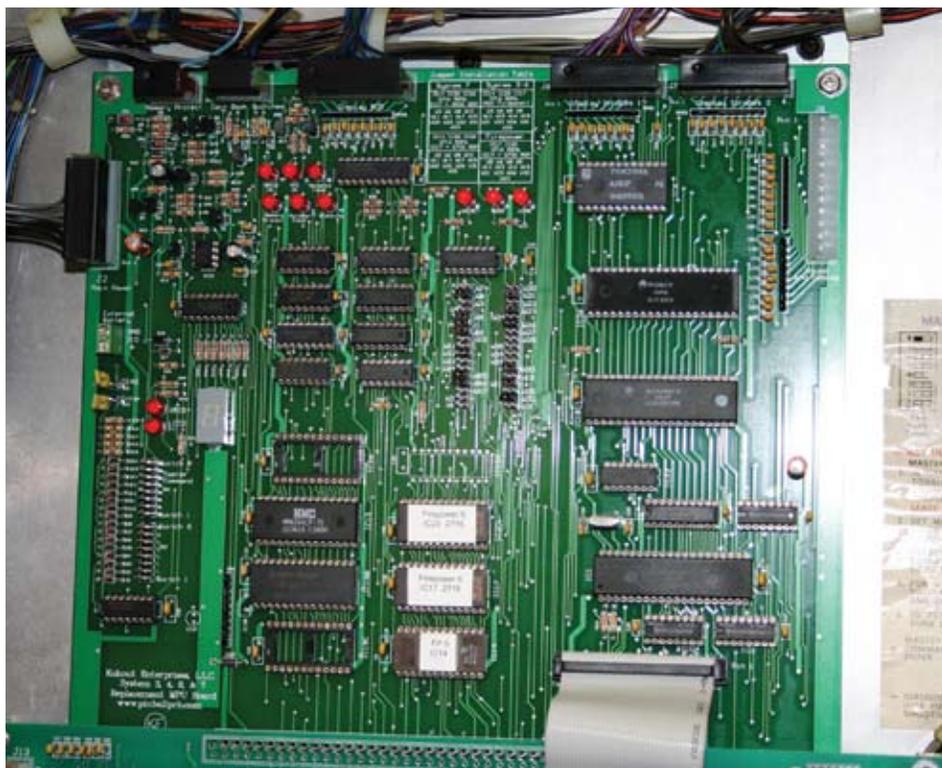
Kohout Replacement CPU Board

Popbumper.com, there are other reproduction systems for Bally and Gottlieb that have addressed these needs. But not until now has there been an early Williams replacement.

What Kohout Enterprises does here is exactly what the restoring market needs. They offer a single CPU board or single driver board (completely redrawn and re-designed), using modern manufacturing. All of this with a money back guarantee! James Kohout's direction for a repro was to offer the consumer either board or both. Each way addresses the customer's needs.

Suppose you have a CPU board that is overwhelmed with battery corrosion. You could try to repair it yourself, or send it to a professional like Lenny's Pinball World. Either way, you have a 20+ year old CPU board that has repair work and your out either a little money and a lot of your time OR in the case of paid repair, more money. Then there is always the case of a CPU board with so much acid damage that it's beyond repair. With a reproduction CPU, you buy it and plug it in. Of course, there's more to consider, like the condition of your driver board's interconnect female connector and any corrosion that fogged its way down there.

Maybe your CPU board is fine and your driver board has problems—perhaps the lamp matrix resistors burnt the board beyond repair. Or maybe an amateur hacked up the PIA's while trying to replace them. In this case, just order a driver board and you're done.

Finally, you have my case. I have absolutely no interest in dealing with this interconnect ever again. I've replaced several .156 pin strips on CPU boards, and those unique female "through-the-board" connectors on driver boards. But eventually, the problem of missing data will occur again and lock up the CPU. So buying Kohout's CPU and driver boards allow me to exercise a more permanent solution.

When using both Kohout CPU and Driver reproduction boards, an included IDE cable carries the precious logic communication with definite reliability. IDE is the type of wiring connection that most computers have used for years to carry constant data from hard drives to motherboards. They're easy enough to come by these days and have proven their reliability.

There are other cases where you could need both boards. Like when you score that big operator deal and find several

awesome pins without boards. Operators have a habit of robbing good boards from retired route machines to keep others running. The majority of bulk operator deals I've made have been on machines missing something major. Instead of running from these deals, you can knock off $300–350 on your normal offer on a running machine and absorb the cost of both CPU and driver boards. That's the way I like to deal on machines like this.

Putting these Boards to a Real-World Test

My test machine for these boards was a Williams *Firepower*. I thought this would be one of the best machines to test the Kohout dual board replacement since *Firepower* uses a unique array of jumpers. I dropped Kohout Enterprises an e-mail and after a friendly reply I mailed off a payment. The boards arrived professionally packed with *Firepower* ROMs installed and documentation.

Installation was a breeze. All connections for both CPU and driver board are right where you expect them to be without tension on any part of the harness. As I mounted the driver board over the CPU, I was impressed at how smooth the IDE connector fit and looked in the machine. Another thing that really makes life easy is the abundance of information silk-screened on the boards themselves. Unlike the original boards which have no information printed for components or connectors, Kohout's board is covered with identification and configuration notes. Since the board can run anything from the earliest System 3's up to the latter System 7 pins, there is a small array of jumpers that you can pull off and change the boards configuration. Originally, you had to heat up a soldering iron for this task.

Once you power up the game, the boards become a Christmas tree of information. On the CPU are LED's that indicate everything power related, logic related, and diagnostic related. Moving down to the driver board reveals more of the same. Switch and lamp matrix information come alive by using LED's in dual inline strips.
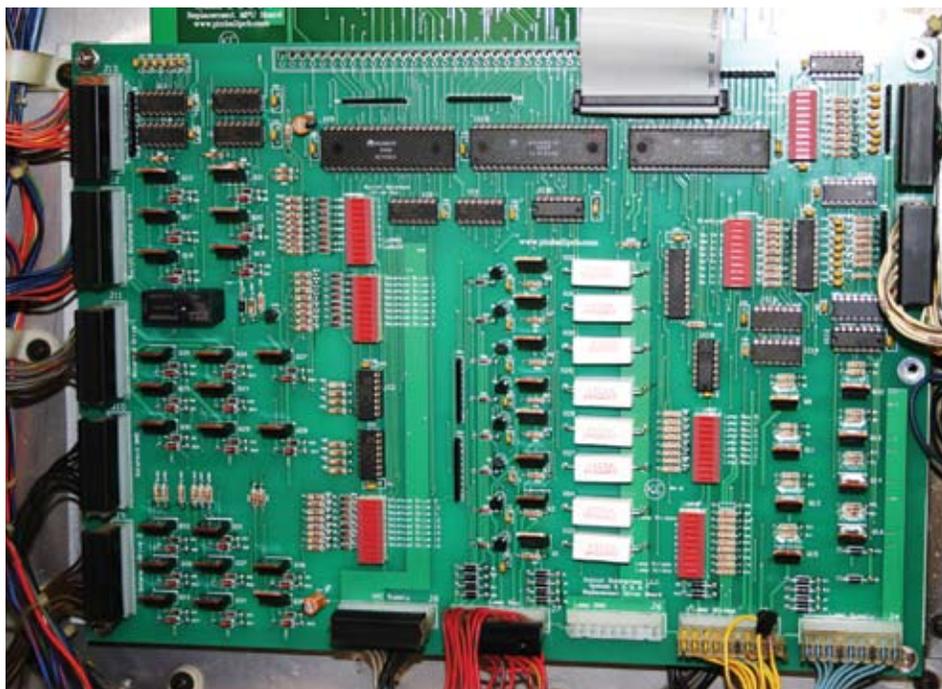
Kohout Replacement Driver Board

What's in a Manual?

The manual for both boards are nuts and bolts only. Since installation is straightforward and no software configuration is necessary, only the hardware details are spelled out. Every chip on the board is mentioned with a listing of compatible replacements should something fail. Basic operation and identification of the board's LEDs are explained. And a comprehensive schematic for both boards on 11 x 17 paper is included. So I had to ask James Kohout about the decision to go into more detail than anyone else has dared on replacement components in the manual. His response: "If someone pays the money for one of my boards and if there is ever an issue, I want the average person to be able to fix it." And therefore, all the IC's are in machined sockets.

Have I mentioned yet how sturdy these printed circuit boards are? Kohout's boards are all thick! Everything they make goes above the standard board thickness. I personally like this choice on the Williams machines for those using just a CPU or just a driver board. There's a lot of tension involved when separating the 2 sandwiched boards. This more rigid design makes me feel better about applying the grip necessary to get the boards out of the machine.

From the Mad Scientist

Since minds like mine are "oh so curious", I needed more of James Kohout's insight into his drive to take on the early Williams boardset. After having troubles of his own with this system, and reading of others problems, James decided to take on this system one piece at a time. He re-built the display driver board, then the sound board. The CPU and driver board were the next step. As for user information, the LED's for the clock, reset line, and blanking signal are leftovers from the prototype. It was inexpensive to add for the user, and po-

tentially important to troubleshooting both today and in the long term future. This same thought was carried over on the driver board with LEDs in DIPs. Almost everything you could want to know on that driver board is available in the form of an LED.

Other reproduction systems for Gottlieb and Bally pinball machines incorporate an all-in-one EPROM or PROM that handles all software for that particular system. But on Kohout's CPU board, original independent EPROM's are used.

When asked about why, Kohout explained that he is thinking about the long run (the really long run): *"If that (custom) ROM ever goes bad and you can not find the image, or the packed ROM for your specific game is not 100% correct, your board is essentially useless. The original Williams ROM cose is available all over the place and there is no real shortage of 2716 EPROMs. Additionally, if someone updates the ROM with added features, which is starting to become more popular, updating would not be possible."* And I respect his thoughtful decision to develop his board this way.

Replacement CPU and driver boards, when sold individually, include the .156 Molex pins on the CPU and through-the-board female sockets on the driver board. The original connector is not included when sold as a set unless the customer requests it.

Firepower!

PROS / CONS

PROS: (In no particular order)

» Rigid board design creates a stronger circuit board.

» The CPU & driver board are complete modern redesigns with obvious traces to their original grandfather boards.

» The manufacturing of the boards is above average, no concerns here at all.

» Original ROM support.

» Easily jumpered with silkscreened information throughout the board.

» Plenty of diagnostics are reported in the form of LEDs.

» Included schematics in the manual.

» The re-engineered CPU to driver board connection is my favorite!

» The manual has in-depth information on compatible IC's to replace defective ones if and when they occur.

» Machined sockets on every IC.

» And finally, CPU and driver board covers all System 4 through 7 Williams pinball machines (and some shuffle alleys).

» Money back guarantee, 1 year conditional warranty.

CONS: I am reaching out here on these Cons as there are no apparent ones. The manual does not have in-depth coverage of installation. The warranty is 1 year. These are weak cons, I know. But I have to put something here...right?

Stats

Kohout Enterprises Williams System 3-7 CPU & Driver Board

» Manufacturer: Kohout Enterprises

» Price: $155 each

» Warranty: 30 days Money Back, No Questions asked, 1 year overall

» Documentation: Booklet including schematics

» Games Supported: All in Series

» LED Indicators: Yes, for everything you could ever want!

» Freeplay Option? Using game's original settings, Yes

» RAM Backup Method: Ferro-RAM, no Batteries

» ROM's on board? No, uses original game

EPROMs

» IC Sockets: Yes, All are Machined

» PCB Size: Same as originals

Scores

» Price: 10 - I expected $200 per board

» Documentation: 8.5 - Only lacks the bouncing ball installation routine to make it idiot proof.

» Ease of Install: 10 - Better than originals

» Overall Design: 10 - Superb, couldn't have asked for more!

» Supported Games: 10 - Only tested in Firepower, but since it uses original game EPROM's, should be 100%.

» Warranty: 9.5 - 30 Money back + 1 year!

» Final Score: 96

» Distribution: Direct from manufacturer only.

» Contact Information: Kohout Enterprises, 9818 Cross Creek Ct. Dallas, TX 75243 USA

» Web Site: www.pinballpcb.com

» E-mail: info@pinballpcb.com or jkohout@pinballpcb.com

Final Statement

I knew he could do it! I've dropped hints to James, and some of the other guys to build a replacement for this particular system. Now I'm sure James had other reasons than making me happy, but I'm tickled to near-death over this one. Yes, I know that there are plenty of good boards out there for these games. But I've found myself desiring to spend more time doing cosmetic work or playing pinball and less time on the bench working on pinball boards infested with these interconnect issues or battery acid damage. If you're like me, or if you don't want to attempt crazy soldering stuff, then consider Kohout's boards. You can't beat the price and no one offers this kind of money back guarantee that I know of.

If you liked this review or have an idea for another one, please drop me a line. If you didn't like this review, let me know and why. tilt@popbumper.com

— Rob Craig - Owner, Popbumper.com

Classic Arcades Pinball Coasters

$6, Classic Arcades
www.classic-arcades.com

Pinball Coasters?

I know what you're thinking: a review of a coaster? Bear with me, because these are a great find for any pinball fanatic.

I first ran across these coasters at Classic Arcades' booth at the Akron Pinball and Gameroom Festival. Using the plastic speaker punchouts from pinball machines, Jeff McAfee has created a cool way to use put those promotional pinball plastics to productive use.

These are precision CNC-created parts. As Classic Arcades Owner Jeff McAfee describes the process:

"First we start with a 3/4" black 4' x 8' sheet of lexan. We have three separate CNC programs to make the coaster: The first program cuts out all of the circles. We then place the circle in a custom made jig and then run the second program which cuts out the inside of the coaster. We now change bits and run the last sequence of the 2nd program which is the finishing bit program. This program runs the finishing bit around the outside diameter of the circles and cleans them up. The last program creates the rounded edge around the coaster. A special tool is used in the CNC machine. The program runs around the outside edge of the coaster and the tool creates a perfectly rounded edge."

These can be purchased directly from Classic Arcades Inc. (570) 819-1570. I can't think of a better home for my coffee cup. — *Kevin Steele*

Classic Arcades' Twilight Zone Coaster