

Rob Craig's

Tales of the Silverball



Lighting It Up With LEDs

My first experience with LEDs for pinball displays was at Expo 2003. I walked around their display table and was a bit struck at first with the bright alternative to high voltage glass tubes, and then with the implication of what this would mean for our pinball collecting future.

I, for one, like the original displays when they work correctly. I suppose it has been a part of me since the late 70's when making all those pinball memories of my childhood. But these displays looked very much like their elder counterparts. So I struck up a conversation with the PinLED guy, and ended up leaving with a full set of displays for my 1986 Williams *Pinbot*.

PinLED

My machine was suffering from the same types of things all of our high voltage display suffer from (or eventually will). Three of the five displays had bubbly segments over 80% or more. Some portions were worse than others, but I knew that I had to replace the glass display soon. What this entails for *Pinbot* is handling fragile expensive glass that has as many as 34 angel-hair sized metal leads, feeding them into a cleaned-up display PCB, and soldering each one while keeping the new display in the correct position throughout the process. When soldering is completed, you bend the display at the leads back against the PCB and figure out a way to adhere the glass to the PCB. This really isn't too much work for a moderately confident electronics hobbyist. In fact, I'm the weird kind of person that actually likes to do it if I have time. But time is something I seem to have less and less of, especially when *Pinbot* needed 3 displays replaced. With the new LED displays, I had another option. But it would require

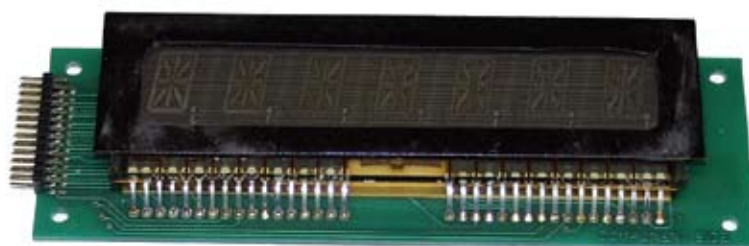
me to replace *all* of the displays, not one at a time. So I tried the pinball LED replacement boards and wrote the review up on December, 2003 and published it on popbunker.com. It's hard to believe that it was nearly 4½ years ago!

I thought then, as I do today, that PinLED had a great product. It does, however, have a few design "flaws" that I need to address. This is not to say that the PinLED system is bad. In fact, my *Pinbot* displays look exactly the same as they did 4½ years ago. They're bright and consistent throughout each segment. But there were a couple of minor issues that I im-

mediately found in the PinLED design.

First was the choice of using a white LED background. With the machine off, the displays were quite noticeable. As you get used to stock black displays, the white really grabs your attention. With the machine on, the white background wasn't very noticeable. But something else was. The flood of GI lighting fell on the top of the displays, taking attention a bit off of the displays and into the backbox lighting.

Finally was the brightness. These things are very visible, amazingly bright. While I wasn't particularly bothered, another pinball hob-



Top: Original display. Middle: PinScore display. Bottom: PinLED display

byist mentioned that the LED display was so bright that it took away from the general illumination in the backbox.

These might be considered as picky items as the display board did exactly what it was supposed to do – remove the need for high voltage, provide bright LED displays, and provide a longer life than traditional displays.

PinScore

The reason I have gone into this much detail on my PinLED experience is to bring out what I consider a next generation of the concept, the PinScore LED display system. The PinScore product includes a number of improvements that really takes the idea of LED displays to the next level.

A few weeks ago I was talking to Marc Mandeltort (of Marco Specialties) when the topic of conversation turned to the PinScore product. I had seen the array of solid state games that the ever growing PinScore product line was supporting, and it had grabbed my interest. He told me that I would have to see for myself and in short time, I had a set of displays for my Data East *Laser War* (which is conveniently parked next to the PinLED Pinbot machine). Within a few days, the product arrived on my doorstep.

It's sometimes hard to hold back excitement over a new toy. I had a couple of projects to complete first, but was dying to dig in and see the difference new displays would make in my *Laser War*. Just like my Pinbot before its conversion, *Laser War* was suffering from a couple of fried displays. But unlike in 2003, the cost of replacement glass is much higher and finding them is becoming a more difficult task. Calculating the current cost for new replacement glass displays for *Laser War* goes something like this:

- 2 – 7 Digit Alphanumeric Display Glasses (\$80 – 90 total)
- 2 – 7 digit numerical displays (\$70-80 total)
- Single credit/match 4 digit display glass (\$35-40).

So, if I was to replace every display in the system with original high voltage glass displays, I would be out \$185 to \$210, and probably two evenings sitting on a stool in front of my workbench. Another option would have been to replace just the two worst looking displays for around \$75 to \$85, spend one night at the workbench, and calling it done. But here's the interesting part



The PinLED Displays, Installed and working



An inside-the-backbox look at the PinLED displays



An example of the GI "light bleed" on the top of the PinLED displays

about both LED systems for Pinbot & Laser War (PinScore and PinLED): neither requires high voltage from the power supplies, both include a new driver board, and both have a 5-year warranty.

So, what you end up with is a lighter load on the aging power supply (albeit an increase on the +5V supply), and a little insurance policy on all of your displays. I don't think I've ever bought a high voltage display (DMD included) that carried a warranty. Anyway, it's a decision that you have to make. With Pinbot or Laser War, I could spend \$200 for a PinScore display system, or \$230 for a PinLED system, and save a lot of time wielding a soldering iron.

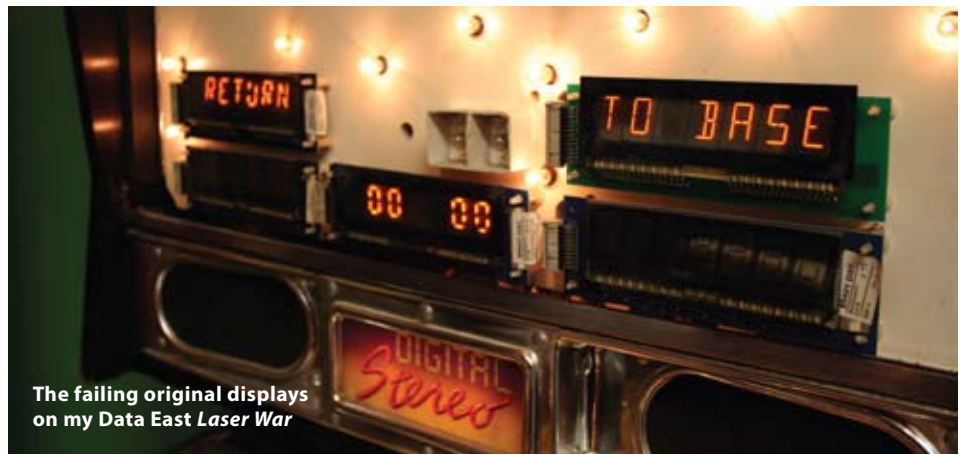
The PinScore PS-10877-P display kit is compatible with Data East's *Laser War*, WMS *Pinbot*, WMS *High Speed*, WMS *Grand Lizard*, and WMS *Road Kings*. In the box is four Alphanumeric LED displays, one credit/match display, black foam surrounds for all of the displays, one PinScore driver board, and two ribbon cables.

The installation of the new PinScore system is really much the same as the PinLED system. For Pinbot and Laser War, you remove all old displays and the display driver board, pop in the new displays to the original mounts, make sure you're not mixing OEM with LED parts, plug everything up, checking your wiring twice, then power up.

Yes, it's really that fast. The results are immediate and rewarding. And I was quite satisfied in both cases that I freed up at least one or two good original glass displays already mounted on PCB's to be used in other games in the future.

There is one difference in cabling. I mentioned that PinScore displays include two ribbon cables. These are for the original numerical displays that use two less pins on their connectors. Since PinScore and PinLED use four alphanumeric displays, they both require the two additional pins. PinScore deals with this by adding the two new ribbon cables, whereas PinLED hands out all new ribbon cables for each display. I didn't have any problems with the old ribbon cables running to the top two alphanumerics and the credit/match display. But, you could have intermittent problems with these old cables. So with PinScore, there are additional ribbon cables sold separately if you want to replace them all.

With everything up and running with the 4 year old PinLED set in Pinbot and the new PinScore set in Laser War, did PinScore address any of my original picky issues? Indeed they did. Remember that bleeding general



The failing original displays on my Data East Laser War



The replacement PinScore displays, installed and working



The foam light blockers do a great job of preventing GI "light bleed"

illumination lighting that sort of poured into the display area? PinScore's black foam surrounds does a great job of blocking the light. Each one fit snugly without the need for tape or glue. I was worried that one might fall off as I installed the backglass, but no need – they stayed in place. Then there was the white LED background color with the PinLED set—not on the PinScore displays. They're flat black and do a better job of getting closer to the original display look in my

opinion. But now for the big one, brightness. When the PinScore set first powered up, they were very bright – matching the glow of the PinLED set. But the PinScore set has a brightness adjustment on the driver board that really allows you a wide range of control over how intense the displays are. You might consider it a master volume control over light. I couldn't help but play with it for a while, trying to tweak it to look as close to original glass displays as possible.

Before I hand out a recommendation, I should add that I brought the PinScore displays and driver board to work with me. I'm lucky enough to be employed at a local university in the Information Systems and Applied Technology department. What this means is, I'm surrounded by over 100 combined years of electronics experience in the faculty there. I spilled out the package to one of the experience electronic gurus for a fabrication inspection and introduction to the concept of LED's over high voltage displays in pinball. After looking intently at each piece in the package, he considered the PinScore PCBs to be as good or better than anything you can expect from a board manufacturing facility today.

There are great benefits in owning an LED display system. And overall, I have to say that the PinScore set I tested gets my nod for a great, more versatile product. There are other reasons besides the brightness control, foam surrounds, and flat black base on the LED surface. PinScore PCB's are assembled in the US, and this set is currently \$30 cheaper than the PinLED product, or \$40 more if you include the PinLED dress-up kit (required to tone down the LED intensity and help block out the GI lighting). Both include a fantastic 5 year warranty.

Everyone has to weigh out the cost of getting their machine back to tip top shape. Sometimes we skip cosmetic things like new legs, coin doors, or backglasses. But displays are a vital part of the pinball experience. Without them, you have no idea what your



score is, or perhaps what to do next in the case of alphanumeric or dot matrix displays. With Pinbot and Laser War, you really can't rotate your worst display to player 4 like you can with older pre-alphanumeric machines. There are other replacement motives too, like having a dead display driver board, or losing high-voltage at the power supply.

I see the best scenario like this: you're a collector, have several machines using the same types of displays, and can use a new LED display system to free up some original displays for other machines that need it. If

this is your situation, buying a LED display kit is an easy decision to make.

I'll be back next month to finish up the Space Station "Let's Shop" article. Come back then with some fresh cleaning cloths and Novus! **GR**

Learn more about LEDs

<http://en.wikipedia.org/wiki/Led>

PinScore web site: www.pinscore.com

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www.marcospecialties.com

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