



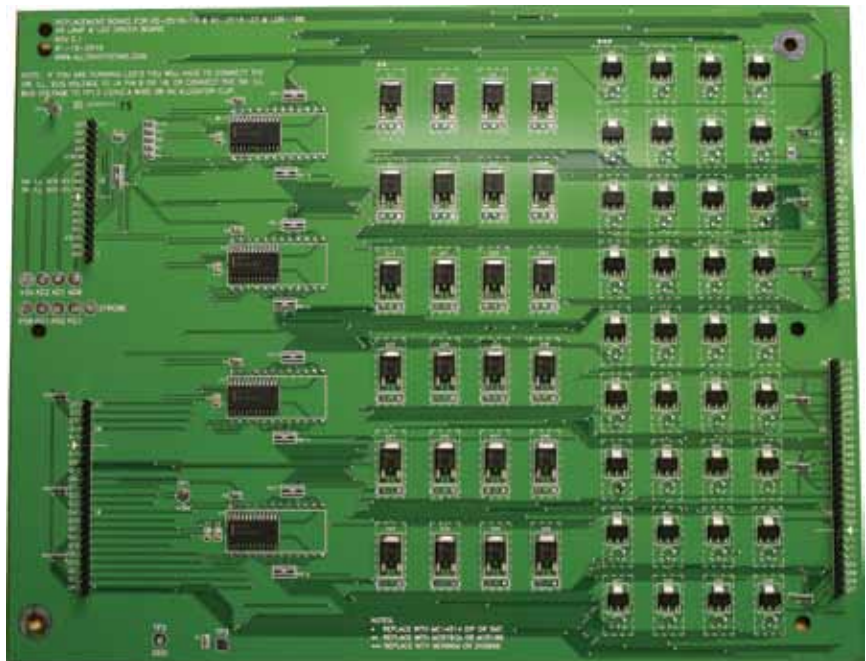
## LED Driving with Alltek (Ultimate LED/Lamp Driver Board Inspection)

As far as pinball product reviews go, I'm a bit old school. I'm stuck in the day when we looked for the best products and told everyone about what made them great. Today, many writers seek out the smallest of faults and exploit them in some hope that negativity, even in the context of product ignorance, will somehow earn them popularity with an emerging audience that feeds off of negative vibes. I find all of that fruitless, and it ultimately only tells people what not to buy. If a product sucks, I simply don't waste a monthly offering badgering it. But when a good one comes along, I'm ready to do an examination.

### Alltek Systems

Alltek Systems, the company that brought forth the most innovative replacement for early Bally and Stern pinball MPU boards, continues to develop quality replacement boards for the platform. In the September 2007 issue of *GameRoom*, I wrote about Alltek's Ultimate Driver Board, a replacement circuit board for problematic Bally / Stern Voltage Regulator Solenoid Driver (VR/SD) boards. Years before, I published my research on the best replacement Bally / Stern MPU's and easily found Alltek's Ultimate MPU board to be the winner. (2003, [popbumper.com](http://popbumper.com))

Today, we have the Alltek Ultimate LED/Lamp Driver for the early solid state Bally and Stern platform. At first, having such a replacement board on the market seems confusing. If you've been restoring these early Bally and Stern pinball machines, you know that there aren't too many things that commonly go wrong with them. In fact, my own warehouse raid experiences have found the most "cabbaged" ma-



chines still having this very board intact. The lamp driver board is a simple one containing a few decoder chips (4 x MC14514) and handfuls of SCR's (MCR 106) and transistors (2N5060). Parts are available at various electronics components stores at fair prices.

But as these machines age, there are certain component failures to come. I've said this more than once: if you find electronic troubleshooting and component replacement as pure joy, you may have no need for replacement boards at all, but if you are strapped for time and are all thumbs at the electronics workbench, you will be glad to see another replacement board in the pinball marketplace.

There are a few reasons why this board is important to make available in the current collector market. Firstly, you can't repair a board that isn't in your machine.

Sure, you can get cheaper used boards on eBay. But you might want to pay \$99 to have a fresh new board and an Alltek lifetime warranty. For some, it's all about peace of mind.

Still, there's a big second reason that might make this board really worth the cost—the Ultimate LED/Lamp Driver board solves the "flickering" LED problem. What's that, you ask? It's the *BIG* issue that has plagued pinheads when they try to convert their incandescent #555 and #47 computer controlled lamps to low-current, low-heat LED's.

As feature lamps turn ON, the voltage noise floor that would normally *not* affect incandescent bulbs is picked up by these more sensitive LED's. The result can be just a soft hint of LED visibility, up to a full-on flicker that confuses the player. In previous LED experiments, I've found that most games have LED flickering that renders the game a

complete mess. Flickering bonus lamps lead you to believe that you have more bonus than you really do, extra ball inserts might appear to be on when you haven't earned the extra ball, and inserts that indicate a particular mode might appear to be on when they aren't supposed to be.

It's hard to blame the engineers of the 1970's and 80's for this. How many of them ever thought we would be using LED's in place of lamps? In the case of these early solid state Bally / Stern machines, not all exhibit the same issues with computer controlled LEDs (in place of incandescent lamps). I have yet to find a clear explanation for why some are far worse than others.

I was contacted a few months ago with an invitation to test drive the new Ultimate LED/Lamp Driver board from Alltek. Gladly accepting, I loaded up a Bally Medusa and a Bally Flash Gordon with about 30 LED's each, particularly in the lower half of the playfield.

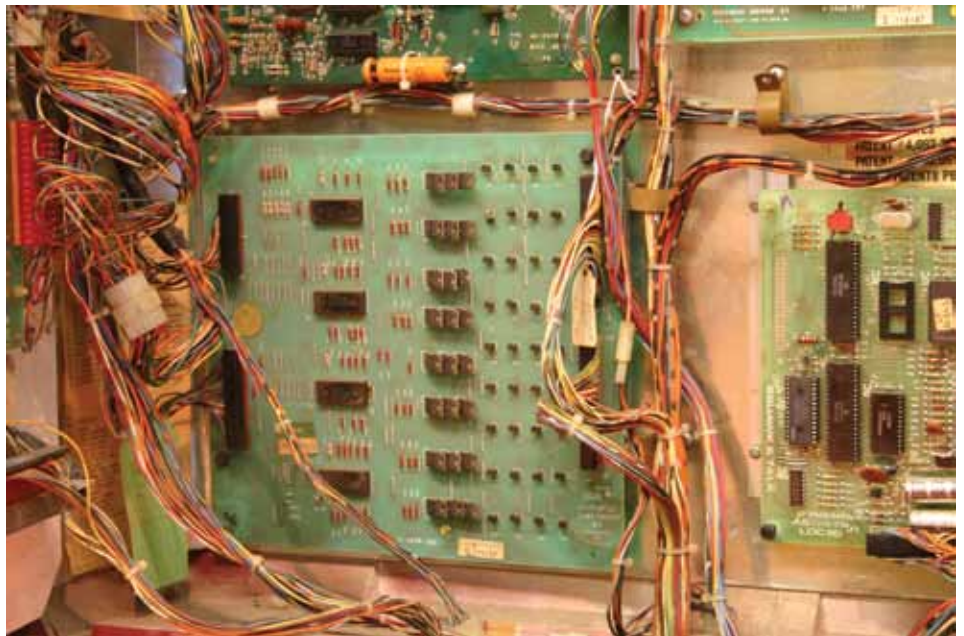
It's important to note that there are two distinctly different lamp circuits in a pinball machine. I was not testing general illumination—the “always on” lamps typically found underneath playfield plastics. The G.I. circuit runs off of 7V AC, uses a different style LED, and is not attached to the computer controlled lamp circuit. I was swapping lamps for LEDs where lane inserts, extra balls, bonus counters, bonus multipliers, and other nearby areas.

When complete, I ran through the following processes:

1. Run lamp test on the original lamp driver board
2. Resolve any issues with LEDs/ bulbs that aren't working (sockets, bad bulbs, etc)
3. Note any lamp issues that couldn't be resolved quickly (possible SCR issue)
4. Play a game, noting any LED flickering issues on original lamp driver board
5. Install the new Ultimate LED/Lamp Driver board and enter lamp test
6. Note any resolved issues (indicating bad SCR's on original boards)
7. Start a game and play, looking for flicker issues, note results

### Inspecting the Ultimate LED/Lamp Driver Board

Alltek's new board is a solidly constructed printed circuit board (PCB). Like the other boards they make, there are plenty of notes silkscreened on the PCB. But unlike the



others, this board looks more similar to the original board that inspired it.

While you might see a lot of surface mount components, a closer look will indicate that holes have been drilled for larger sized components to replace defective surface mount items should they fail. The parts used (decoder, SCR, etc) are the same ones in the original board, only newer and much smaller.

Each component is labeled with its original component ID (u2, u3, etc.). If you decided to not take advantage of Alltek's lifetime warranty, you could easily repair this board with the same components you might have on hand for 25+ year old original lamp driver boards.

There are some differences from the original beyond the smaller components that make way for proper LED pull-up voltage to prevent the flickering issues. To accomplish this, you must also connect a jumper wire from the Alltek lamp driver board to any switched lamp (non-G.I.) voltage source. A length of wire is included to reach one of the switched lamps in the backglass insert panel.

Typically, you will want to reach for one of the player (1 thru 4) lamps, or perhaps the TILT or shoot again lamps. While the documentation suggests that twisting this wire onto the stapled wire trail is sufficient, you might instead want to solder it in place. The jumper is an optional step and unnecessary if you are not using LEDs. Otherwise, the board is the same size as the original and installs just as easily.

### The Medusa Test

With Bally Medusa, there was just a hint of LED flickering while using the original lamp driver board on these 30 freshly install LEDs. It seems that my first test subject was one of those cases where stray voltage was at least toned down enough to not cause annoying LED flickering. After installing the Ultimate LED/Lamp Driver board, there were no traces at all. However, there was an interesting side effect. While using the new board in lamp test (all lamps blink off and on via a relay), the overall brightness of my remaining incandescent lamps were brighter. Additionally, Medusa has a Solenoid Expander Board under the playfield. Its relay gives more of a "buzz" and less of the proper "click" under the original board but was providing a strong "click" under the new Alltek board. While this could indicate a faulty 6V power source (bridge on the rectifier board perhaps), it is noteworthy that the Ultimate Driver Board resolved this 6V power flow problem. It also cleared up 2 lamps that were permanently



ON, indicating that my original board probably has 2 SCR's that have shorted closed.

### The Flash Gordon Test

My second candidate for the new board was a Bally Flash Gordon. Using the same process mentioned above, the result was quite different than with Medusa.

With the original lamp driver board installed, I had an obvious LED flicker in lamp test mode. During game play, flicker was definitely an issue with the bonus displays. Sometimes the extra ball insert was dimly lit, other times it was constantly on depending upon the number of bonus lamps I had lit. Obtaining a 2X bonus multiplier started a strobing effect with the 3X, 4X and 5X inserts.

I swapped out the original board with the Ultimate Driver Board and attached the jumper from the circuit board to the voltage side of the player 1 lamp located in the backbox insert. With the Alltek board, I no longer had a trace of LED flickering.

### The Final Word

In summary, the new Alltek Ultimate LED/Lamp Driver board is a fantastic reproduction for the early Bally / Stern solid state platform. While the original lamp driver boards have easy to replace and available components, the issues from aging boards continue to be problematic. Connector pins and old silicon-based components tend to fail at this age. But a bigger reason to consider this new board is that it resolves the LED flickering problem we face with stray voltage floating around the lamp circuit. You can't beat the lifetime warranty that comes



with Alltek products. If you love your early Bally / Stern game and want to use LED's, give them a test drive on the original lamp driver board. If you have flickering issues that drive you nuts, drop the \$99 on this board and consider your problems solved. Now, if the board could just fix those troublesome lamp sockets! **GR**

Find this board and the other Alltek Ultimate boards at [www.allteksystems.com](http://www.allteksystems.com)