

# The Ultimate Solenoid Driver Board



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## Manual and Users Guide

Version A



## Getting Started

First let us say thanks again for purchasing The Ultimate Solenoid Driver Board (SDB). The following instructions should have your pinball machine setup and ready to play quickly. If at any time you are unsure of how to proceed or have a question, STOP. We offer e-mail support at [mpusupport@allteksystems.com](mailto:mpusupport@allteksystems.com) with an ever improving technical support page on our website at [www.allteksystems.com](http://www.allteksystems.com). The SDB includes a 5 year warranty. For more info on our warranty procedures or any of our other great products, please refer to our website.

## Before you plug in

It is important to do several things **before you plug in the Ultimate SDB**. First get a flashlight and inspect the connectors that are located in the top right corner in the head of the game. Visually inspect the connectors for broken wires, burnt housings, and burnt or broken pins. If you see any damage you will need to repair this before continuing. Pins, connectors and required crimper's are available from our distributors. Next use the two new plastic stubs to replace any missing or broken plastic mounting studs. Set the two mounting screws to the side for now.



Now let's talk about some safety issues. If you look at the SDB you will notice a section labeled High Voltage in the upper left corner. The games use a high voltage power supply

to power the displays. At no time should you put your hands in this area of the board when power is applied. Do not touch energized components, and also allow the capacitors to discharge for a minute before handling the board. Notice the potentiometer R5 which is the 190VDC adjustment pot, this has been pre-adjusted to +190vdc and requires no further adjustment. If in doubt please contact us. Remember stay clear of this area.

## ***Connecting Up***

Go ahead and mount the new SDB. At this time use the two mounting screws to secure the SDB to the mounting rails. Plug in the connectors. Make sure that you have the connectors plugged in correctly. Do not rely on the connectors having the proper key because over the years they may have been replaced without the key. They should only fit one direction but verify that you have not missed a pin. The connector wires will have a memory since they have been in the same positions for years. If it feels like your having to bend a connector in a direction that it doesn't want to go, stop and verify that you're plugging the connector in correctly. Connector P7 is used to program U4.

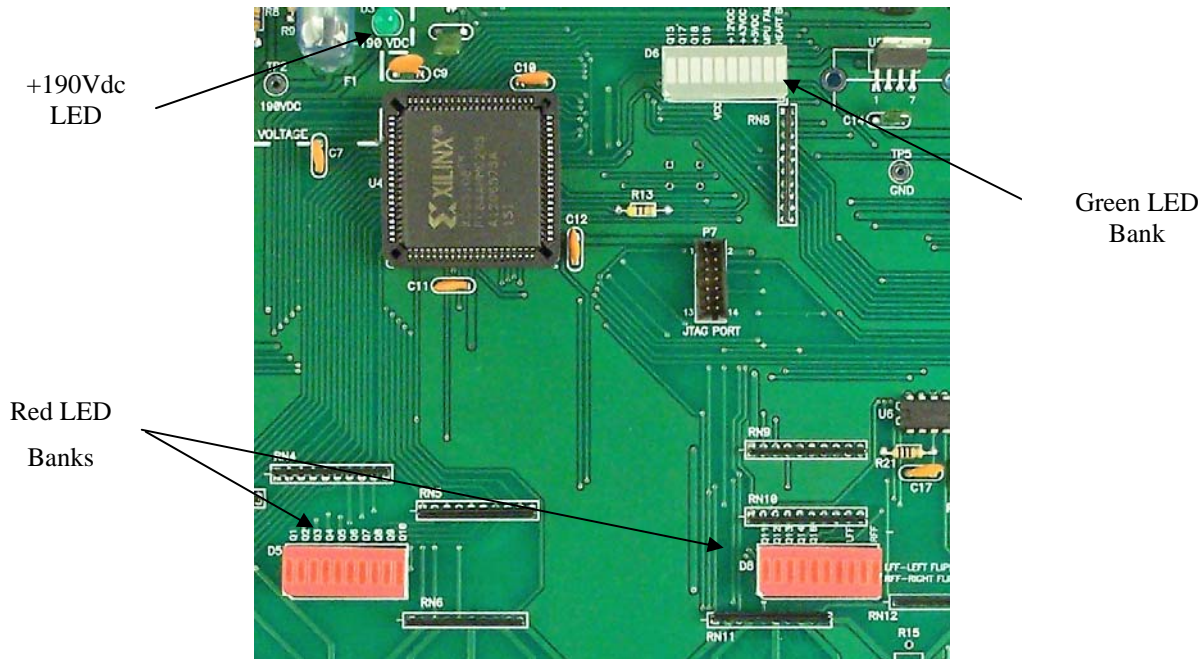
## ***Power Up***

With everything checked, set, and plugged in, its time for power up. Go ahead and turn on the machine. After turning on the machine you should notice several things on the SDB. You will first notice that the SDB goes through a self-test by flashing on any of the labeled LED's. Next make sure that the heartbeat LED is flashing. After that make sure that you notice the +12v, +43v, +5v, and +190v power LED's are lit. Lastly verify that the MPU Fault LED is not flashing. At any time you notice a problem refer to the troubleshooting section of this manual.

Now let's point out some features. Refer to the silk screened legend on the SDB for an explanation of the LED functions summarized here. D6 is a bank of green LED's and D5, D8 consist of a bank of red LED's. The green LED's representing Q15, Q17-Q19 are considered continuous coils. These are coils that can remain on all the time, 100% duty cycle. A good example of this would be the coin lockout coil. So when a continuous coil is on, the green LED will remain on. The voltage status indicators are also green, as well as the MPU fault and heartbeat indicators. There is also one additional

green LED, D3, not part of the green LED bank indicating the presence of 190VDC for the displays.

The Red LED's Q1-Q14 and Q16 represent the momentary coils. These are the coils that only work for a split second like pop bumpers and sling shots. When one of these coils is activated you will notice the associated LED will flash for a split second. These coils should never be on for more than a fraction of a second or else they will burn out.



## Troubleshooting Section

***I turn on the game and nothing happens. None of the LED's on the SDB come on.***

This is most likely a power related problem. Verify all connectors are connected properly. Inspect the games power rectifier board and verify its putting out the correct voltages.

***I turn on the game and nothing happens. I do have game GI lights but no displays, no feature lamps.***

Verify you have 12VDC and 5VDC on the SDB. If not check the rectifier board and verify it is supplying the SDB with ~12-15VDC. There are status LED's for the +5VDC and +12VDC on the SDB. This problem is usually related to burnt/corroded connector pins or a corroded/faulty MPU. If the 12VDC and 5VDC is good, verify the MPU is booting.

***I turn on the game, the feature lamps are flashing in attract mode but one or more displays are not working.***

Check the SDB and verify the +190VDC LED is lit, if lit you have one or more bad displays. If the LED is not lit, power off the game and give the HV time to discharge. Check the fuse on the rectifier board for 240VDC. If it's blown replace and power back up. If it blows immediately check the diodes on the rectifier board for shorts. If the fuse on the rectifier board is good check fuse F1 under the plastic cover on the SDB. If it is blown, you have a shorted display. Disconnect all displays, replace fuse. Power on and verify the 190VDC LED is now lit. If so power off, now connect one display at a time and power on. When you get to the bad display the fuse will blow again.

***I turn on the game and one or more solenoids immediately fire.***

This should never happen with the built in short circuit protection, but if it does, immediately turn off the machine to prevent the coil from burning up. Contact us for repair/replacement.

***The Heartbeat LED is not flashing.***

If you have 5VDC and the heartbeat LED is not flashing, the board is defective. Contact us for repair/replacement.

***The MPU Fault LED is flashing.***

This indicates the SDB detected a faulty signal from the MPU board and it shut down the SDB to protect the game coils from burning up. This is most likely due to a faulty MPU board and/or corroded/defective connector J4 on the MPU. In rare cases a faulty sound board can cause this also, if the problem goes away when the sound board is disconnected, suspect the sound board.

***All of the solenoids are not working.***

Most games do not use all the solenoid circuits, Use the games self test to verify the coils work for your particular game, and the solenoid number matches the actual solenoid being energized. If the solenoid number does not match, check the J4 connectors on the MPU and SDB. A faulty MPU board can also cause this fault.

***The solenoid number in self test does not match the coil according to my game manual.***

First check the MPU-J4 connector and the SDB-J4 connector for corrosion and/or broken pins and wires. If the wiring looks good, try another MPU. In rare cases a defective sound board can cause this also by loading the data lines. If the problem goes away when the sound board is disconnected, it is most likely at fault.

***Only the free game and flipper solenoids are working.***

Check the fuse under the playfield. Most likely it is blown. Only replace with a 1amp slow blow. Also take this time to inspect all of your coils to see if anything needs to be replaced.

***One or more solenoids are not working but some do.***

First verify there is a coil installed and its wiring is good. Measure the voltage on coil to ground, it should be ~45VDC. If not, check the under playfield fuse and replace if necessary, do not over fuse. If there is still no +45VDC on the coil check game wiring, there is most likely a wire that has come loose from an upstream solenoid which feeds the power. The +45VDC normally is daisy chained from coil to coil, so if an upstream coils power wire comes loose, all downstream coils now will not work. Verify the proper LED is flashing for the coil; you may need the game manual for this. ***If you decide to use the old trick of shorting the tab of the transistor to energize the coil be very careful, as doing this bypasses the built in short circuit protection.***

***Two or more solenoids fire at the same time.***

This problem is normally found in games with an expander relay. Most likely someone has replaced a coil and not put the required extra diode on the coil that isolates the two buses. Refer to your game schematic and verify all solenoids that are on the expander have the extra diode and are wired correctly.

***One or several of the solenoid LED's are continuously flashing.***

The SDB has detected a short circuit condition on the corresponding solenoid circuit. Check the associated solenoid to see if it's burnt or shorted. Check the game wiring.

***One or both of the flippers is not working.***

Verify the fuses are not blown on the SDB. If the LFF or RFF (left or right flipper fault) LED lights when you push the flipper buttons, the fuse is blown. If you find a blown fuse, it's possible the flipper coil is shorted or the End of stroke switch is not wired correctly. If the fuse blows while the flipper is in the holding position, you most likely have the EOS switch mis-wired or mis-adjusted. The 2amp slow blow fuse was selected as a compromise to protect the SDB. In games which have extra flippers it may be necessary to increase the fuse size to 3amp slow blow. Contact us if your flipper fuses are blowing on multiple flipper games.

**Additional info sites:**

[http://www.allteksystems.com/Supplemental\\_Pinball\\_Info.html](http://www.allteksystems.com/Supplemental_Pinball_Info.html)