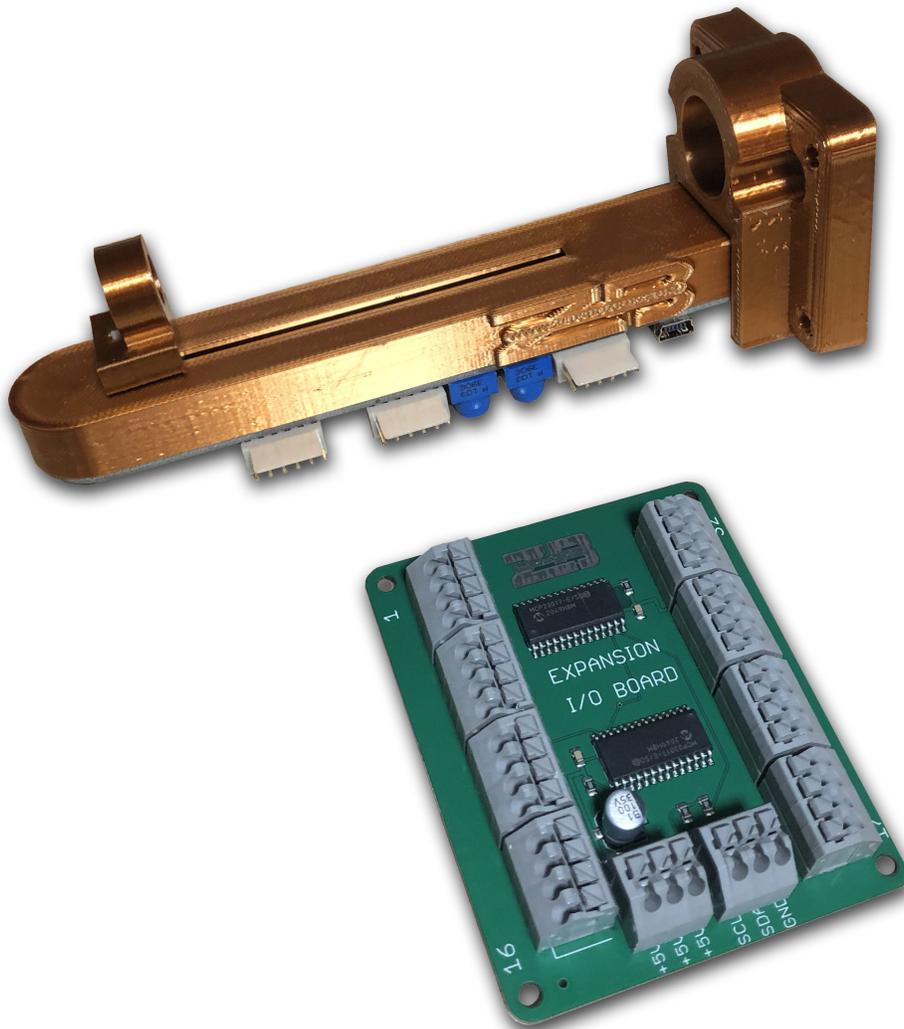




V5 Digital/Analog Plunger Installation





BEFORE YOU BEGIN

Working with electricity comes with huge risks that should never be taken lightly, safety should always come first.

To avoid personal injury, possible damage to equipment or danger of fire, all work on electronic equipment should be conducted following these safety procedures.

General Safety

Before working on any electronics, consider following these basic safety precautions to help reduce any hazards.

- Remove any electronic equipment you're testing or working on from the power source.
- Never assume the power circuit is off. Test and test again with a voltmeter to confirm.
- Remove fuses and replace them only after the power to the circuit is disconnected.
- Don't connect power to a circuit until you're done working on it and rechecked the work.
- Always ensure that all electronics equipment is properly grounded
- If it's damaged, replace it. For instance, replace cables instead of repairing with insulating tape.
- Always use the right electronics repair and maintenance tools.
- Always return covers after removing them to reduce the risk of electric shock.
- Make sure your circuit is not overloaded.
- Always have safety equipment like a fire extinguisher, a basic first aid kit and a mobile phone nearby.

Personal Safety

Here are some personal safety precautions to keep in mind:

- Always keep your work area dry.
- Always work in a well-ventilated area.
- Don't wear flapping or loose clothing when working.
- Don't work with metallic jewelry on your hands like watches, rings and bracelets.
- Always wear non-conductive shoes.
- Always remove power to a circuit before connecting alligator clips.
- Always wear safety goggles.
- Be careful when handling large capacitors as they can still hold high voltage even after you've disconnected the circuit from power.

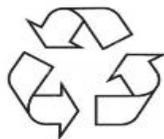
Static Damage Prevention

Static electricity can damage electronic devices and your system. To avoid damage, keep static-sensitive devices in their static-protective bags until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its antistatic bag, touch it to an unpainted metal part of the system unit for at least 2 seconds. (This action removes static electricity from the package and from your body).
- Remove the device from its package and install it directly into your system, without putting it down. If it is necessary to put the device down, place it onto its static-protective bag. (If your device is an adapter, place it component-side up.) Do not place the device onto the cover of the system or onto a metal table.
- Take additional care when you handle devices during cold weather. Indoor humidity tends to decrease in cold weather, causing an increase in static electricity.

Disposal



Observe the approved methods and ordinances of your locality with regard to proper disposal of used electronic appliances.

Ensure all parts are present :

1pc Plunger Assembly

1pc Plunger Slider Block

1pc I/O Expansion Board

1 pc USB A to mini-B Cable

3pcs 6pin Wire Harness Assembly

1pc plastic shim

3pcs #10 x 1/2" machine screw and star washer

1pc #10 flat washer

2pcs #6 x 1" panhead screw

Assemble screws and star washers

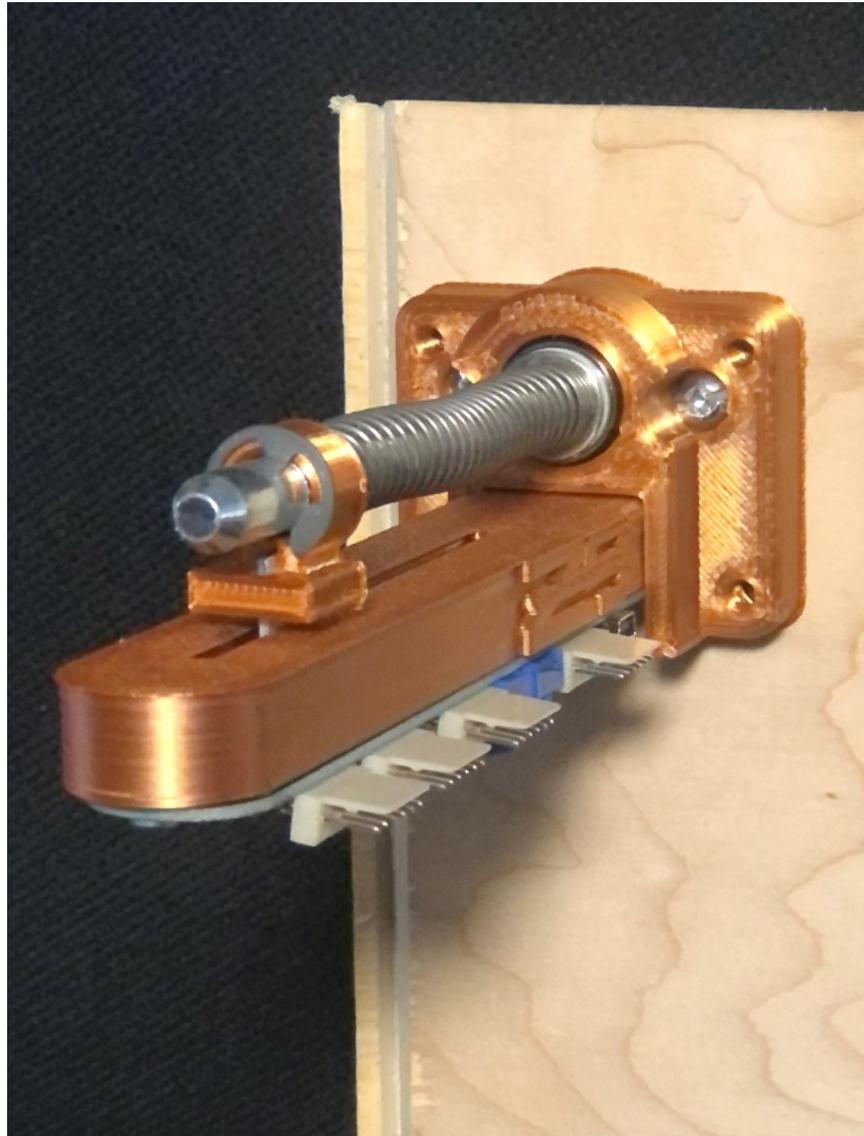


Mount ball shooter in opening



Use the large flat washer to hold the ball shooter in place securely.

Mount plunger using supplied machine screws and star washers (washers not really necessary).

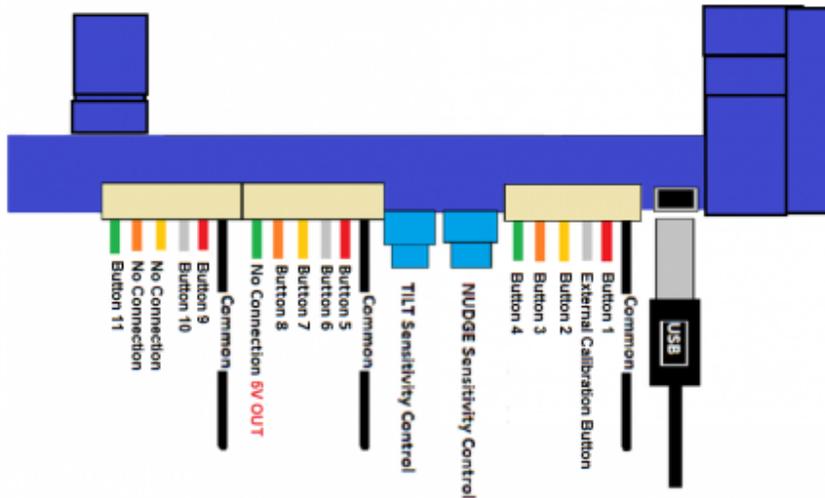


Make sure not to overtighten and damage the plunger housing plate. Screws should be tight enough to hold the ball shooter in place but not so tight as to split mounting plate. If the angle of the plunger is too high toward the front, put the supplied panhead wood screws into the bottom holes of the plunger and tighten to bring down the nose of the plunger. If the nose of the plunger is too low place the provided shim behind the bottom of the plunger to raise it up.

Note that slider block is mounted between the c-clip and shooter rod spring.



Connect inputs from buttons as shown in diagram



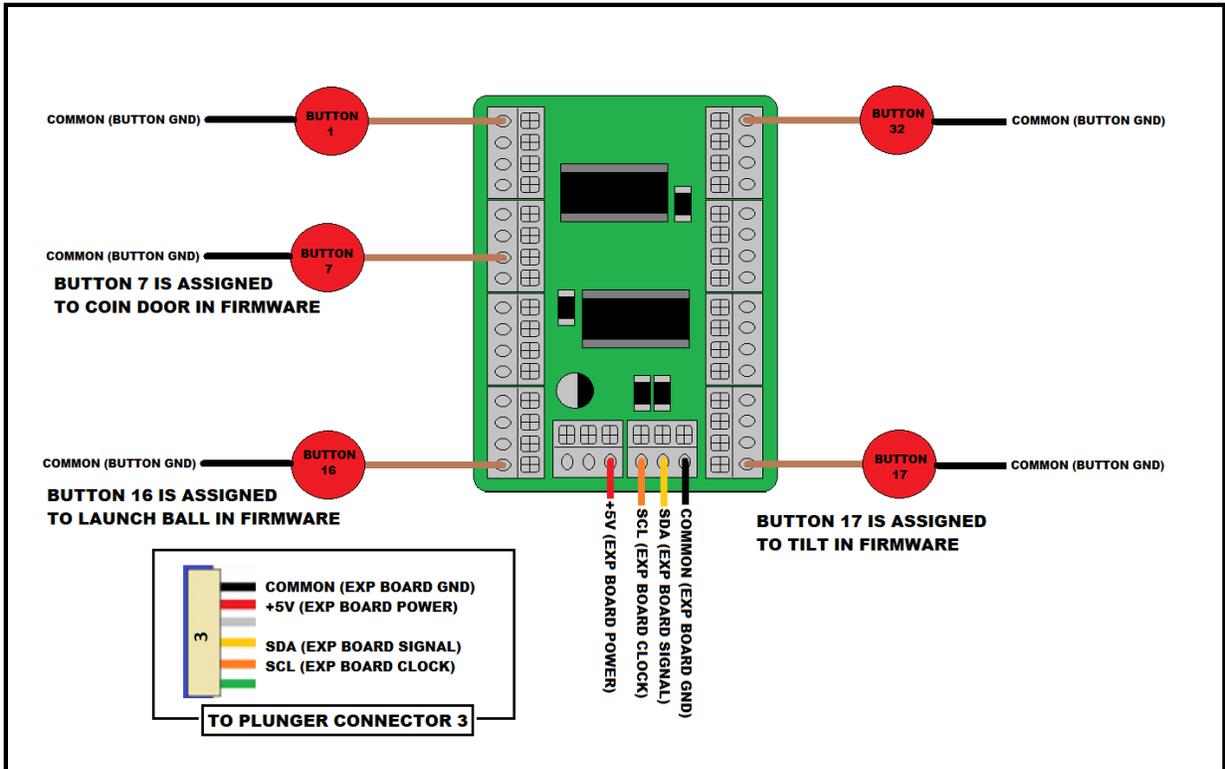
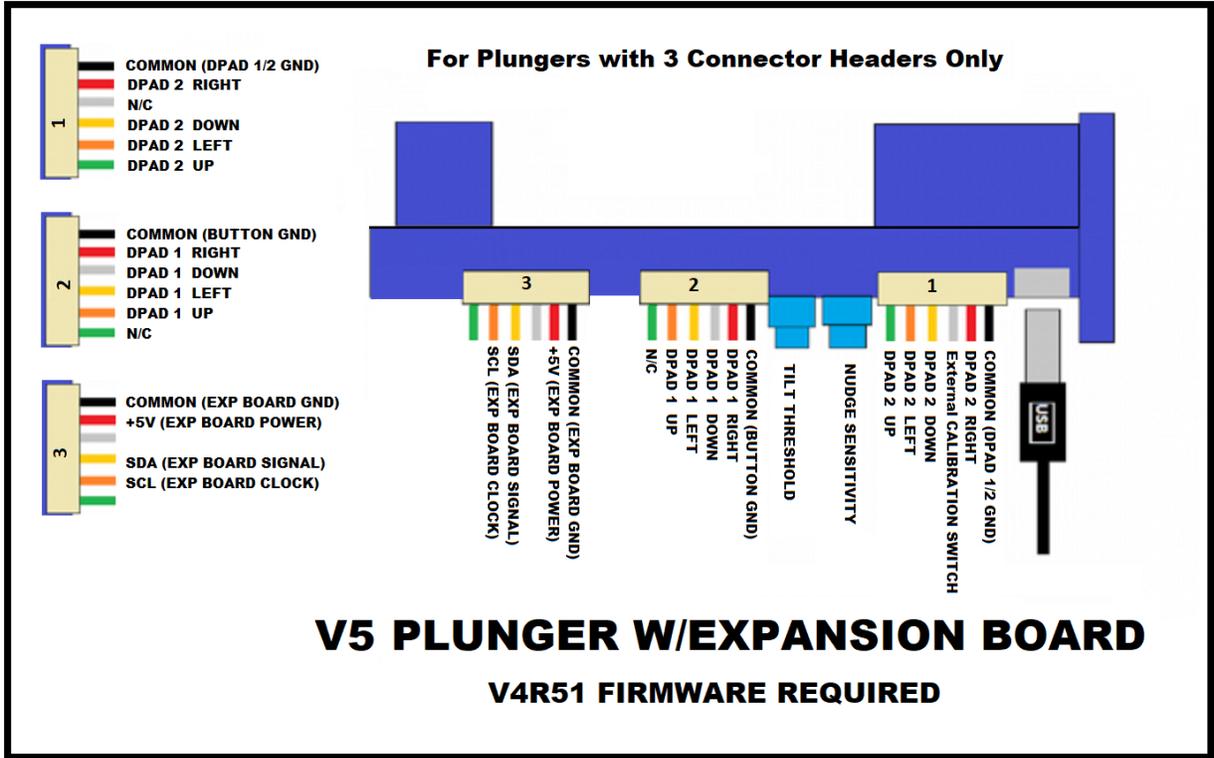
Factory Key Assignments

| | |
|------------------------|--------------|
| Button 1 - L Shift | L Flipper |
| Button 2 - L CTRL | L MSave |
| Button 3 - 1 | Start |
| Button 4 - q | Exit |
| Button 5 - 5 | Coin |
| Button 6 - R Shift | R Flipper |
| Button 7 - R Ctrl | R MSave |
| Button 8 - Enter | Launch Ball |
| Button 9 - GP Button 9 | Tilt |
| Button 10 - | GP Button 10 |
| Button 11 - | GP Button 11 |

BUTTON 9 (virtual button) is tilt threshold indicator light and output. Assign button 9 to tilt in game settings

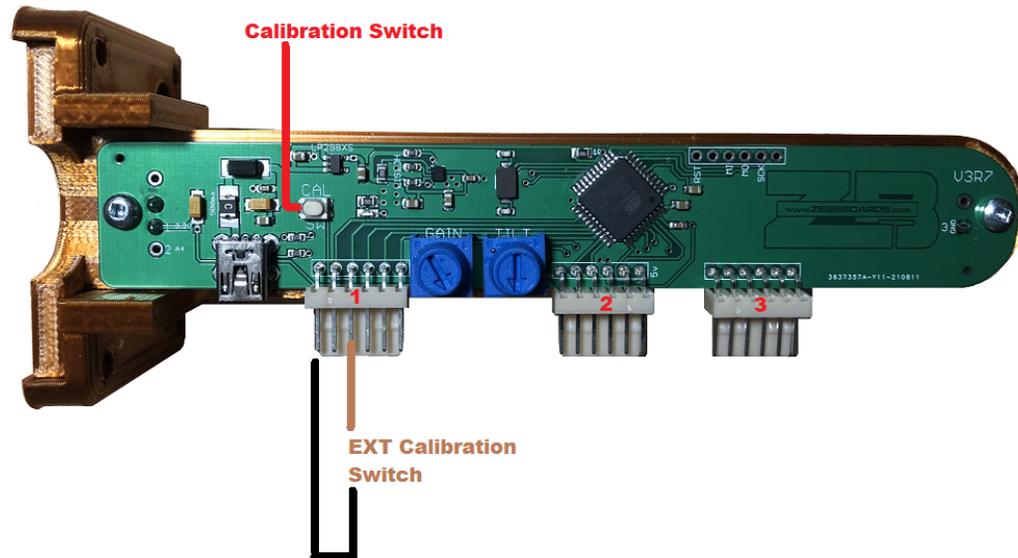
Reset input is provided as a convenience feature, grounding input will reset plunger (equivalent of unplugging USB cable)

V5R5.4 Gamepad Wiring - No Expander Board



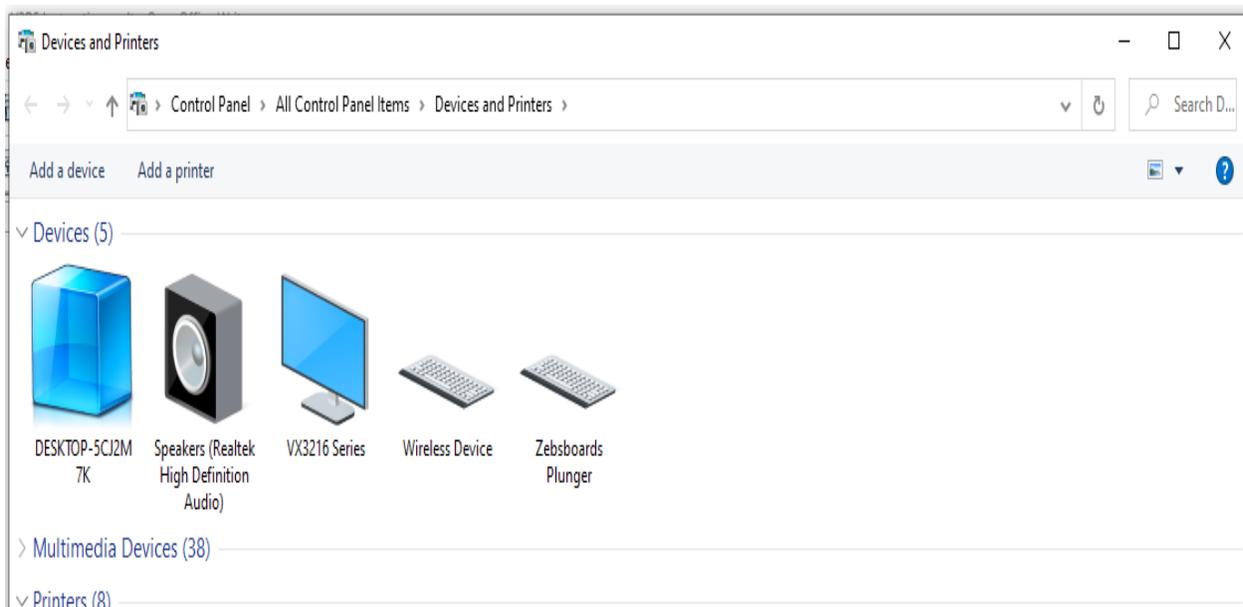
Calibration

Firmware posted after and plungers sold December 14, 2020 now comes with a simple hardware calibration routine built in. It is recommended to run the calibration routine.

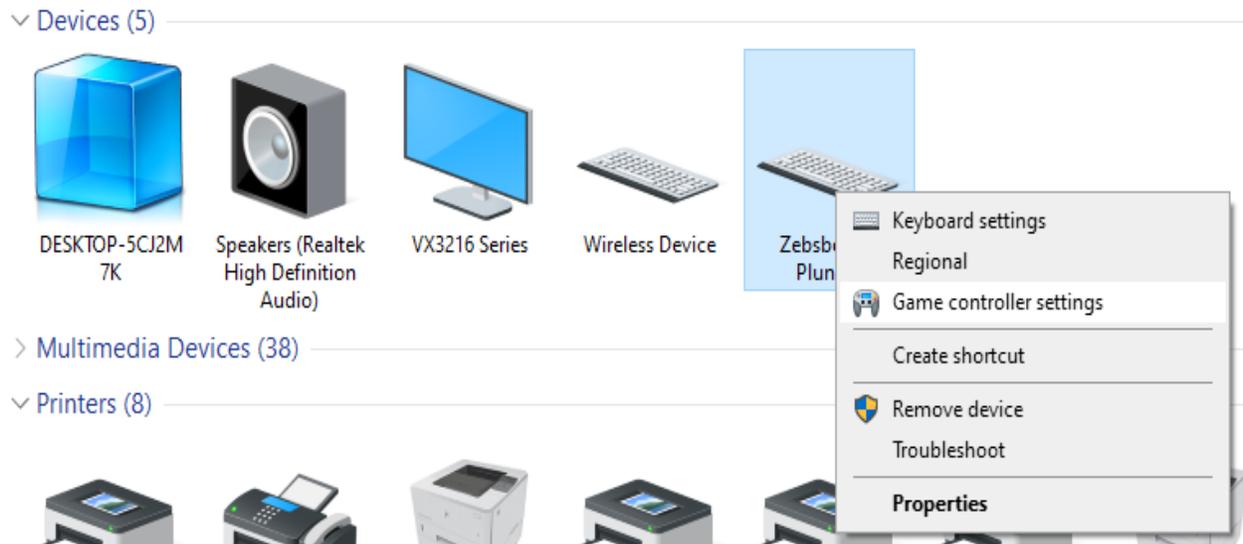


With the plunger mounted in your cabinet start your computer and switch to the Gamepad controller applet in windows

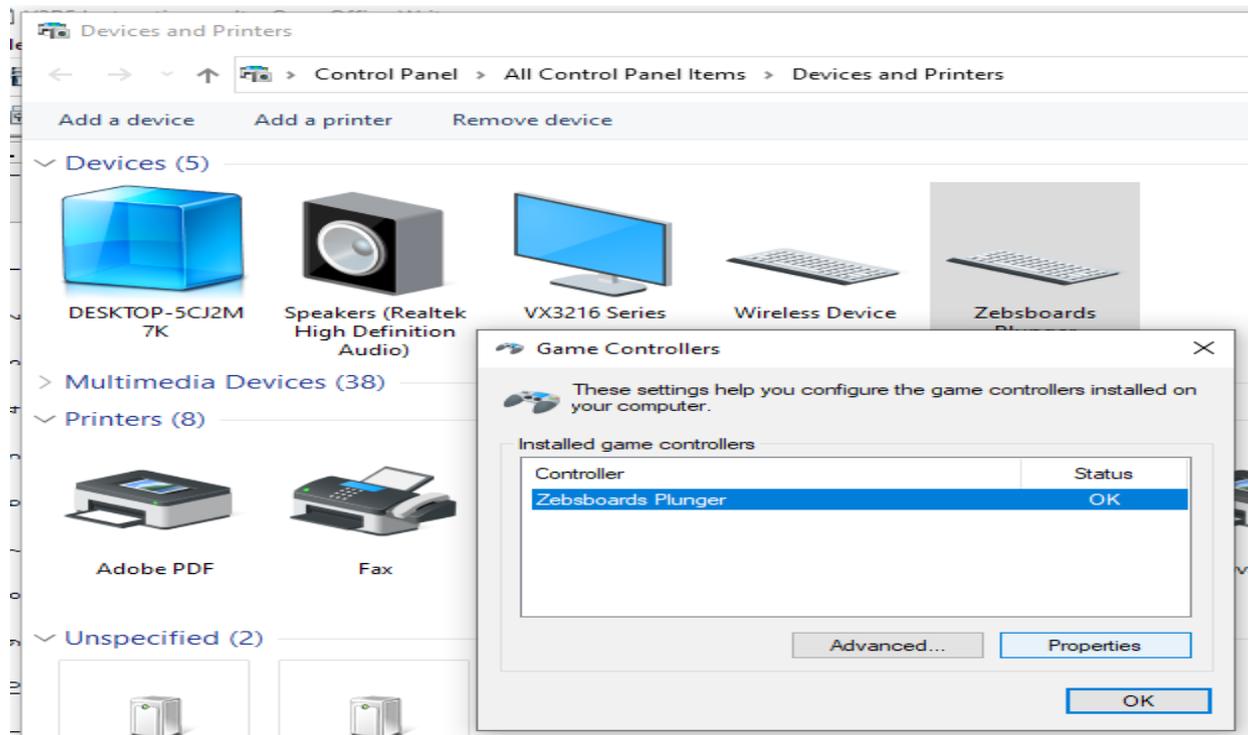
Open the deices and printers screen



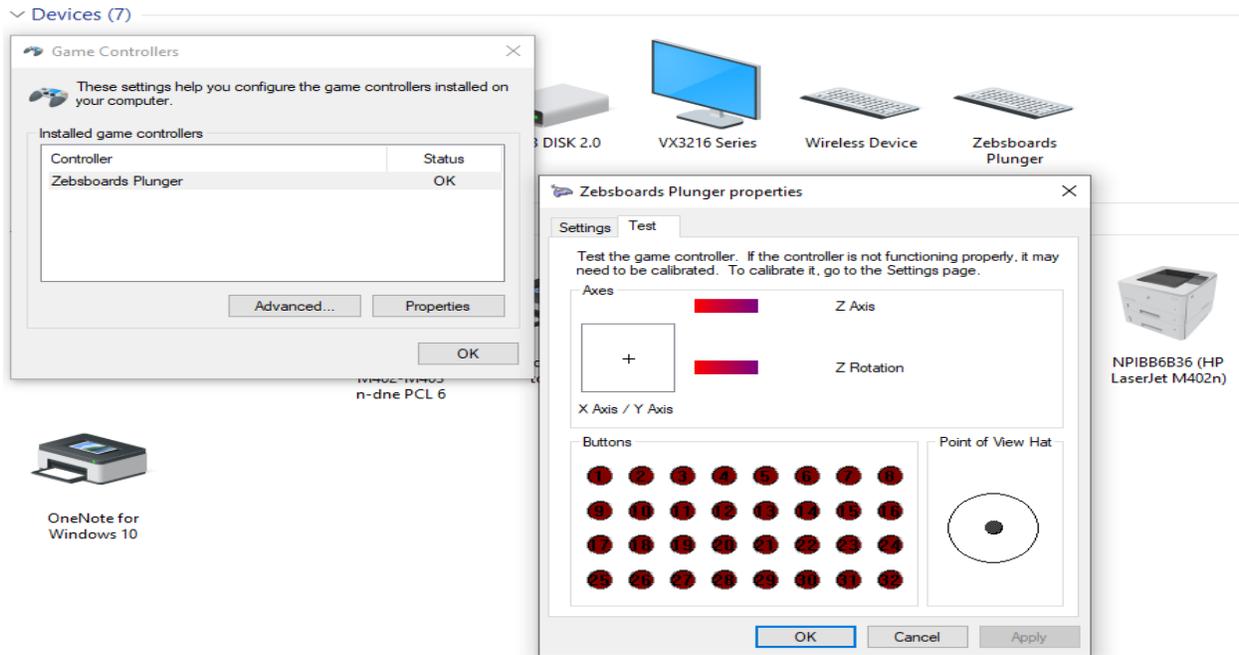
Right Click on the Zebsboards Plunger icon and select Game Controller Settings in the drop down menu that appears ...



Select Properties and click on 'OK' ...



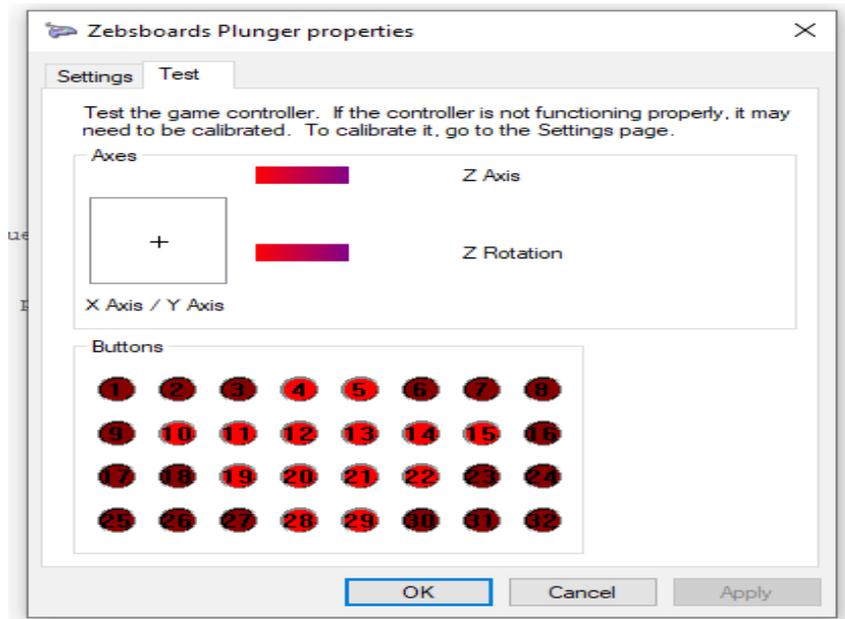
Which will bring you to the Test screen ...



With this screen open, **press and hold the CALIBRATION SWITCH for 2 seconds and then release it.**

The Button Display will display an DOWN ARROW in lighted buttons

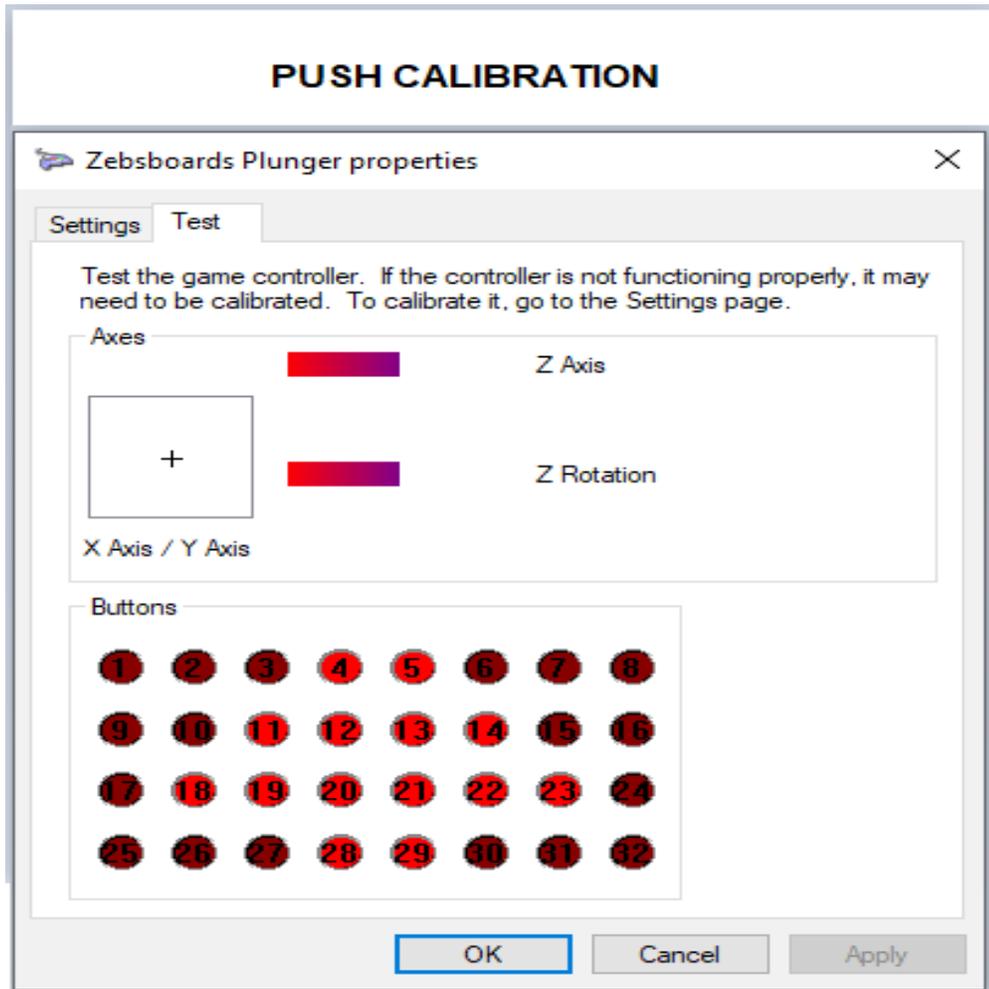
PULL CALIBRATION



Pull Back the plunger to the FULL LENGTH OF TRAVEL and release it.

If you have pushed the plunger in by accident the button lights will flash several times and then light back up as the DOWN ARROW and you can try again.

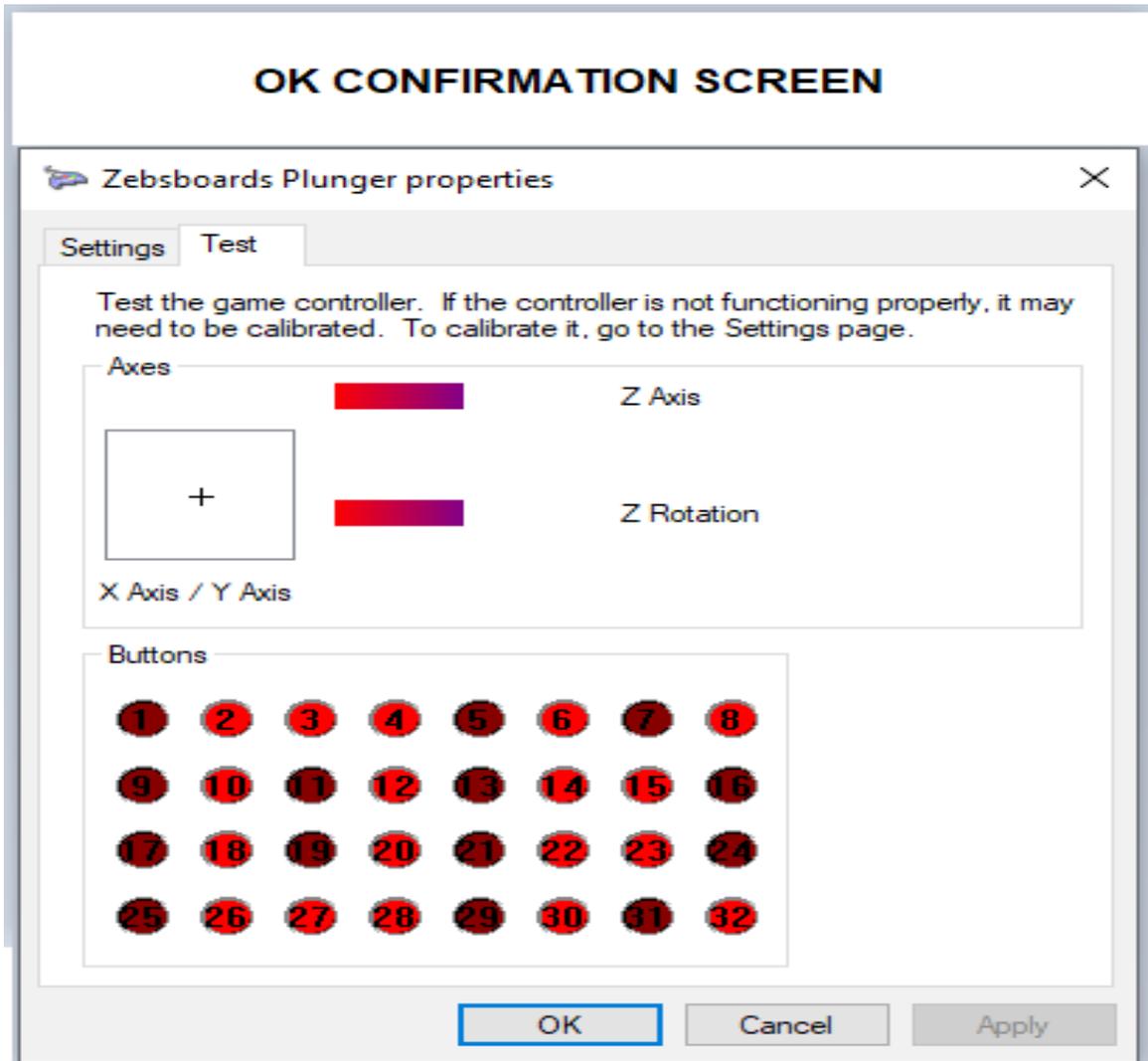
Upon successfully pulling and releasing the plunger the button display will change to an UP ARROW ...



Press the plunger FORWARD to the full extent of travel and release it.

If you have pulled the plunger in by accident the button lights will flash several times and then light back up as the UP ARROW and you can try again.

Upon successful completion of the routine the button lights will change to display OK.



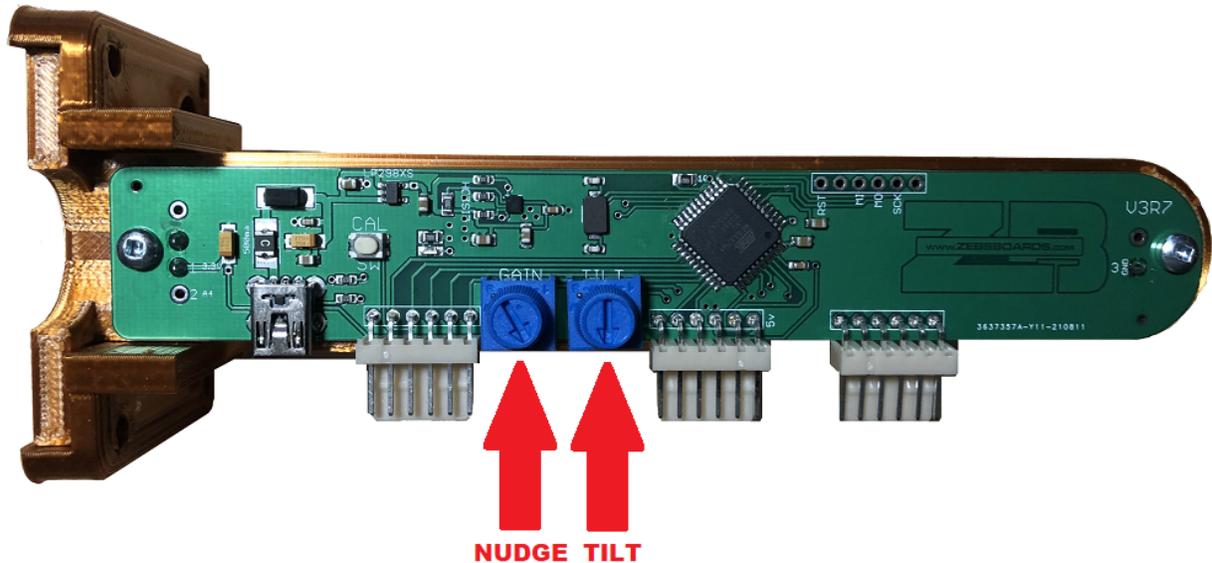
After a few seconds the button lights will go back out and the normal screen will be displayed.

At this point pull the plunger and release it to reset the plunger and make use of the new values. **Pull and release and press and release the plunger several times** to verify proper operation. If the operation is erratic the plunger was not pulled completely back or pressed completely in during the routine, Press the LEFT SHIFT and START BUTTONS and repeat the above procedure.

When you are satisfied with the plunger behaviour you can exit the screens.

The values measured by the calibration routine are stored in the non-volatile memory of the plunger and will not change when the plunger is disconnected or the computer is powered off.

Nudge and TILT adjustment



Nudge Adjustment

The gain on the nudge signal from the accelerometer can be adjusted from 0% - 100% by turning the indicated knob as seen in the picture above. Best practice for adjusting is to open a table in Visual Pinball and adjust the knob until the desired response is found. Turning the knob clockwise increases the sensitivity and counter clockwise decreases the sensitivity.

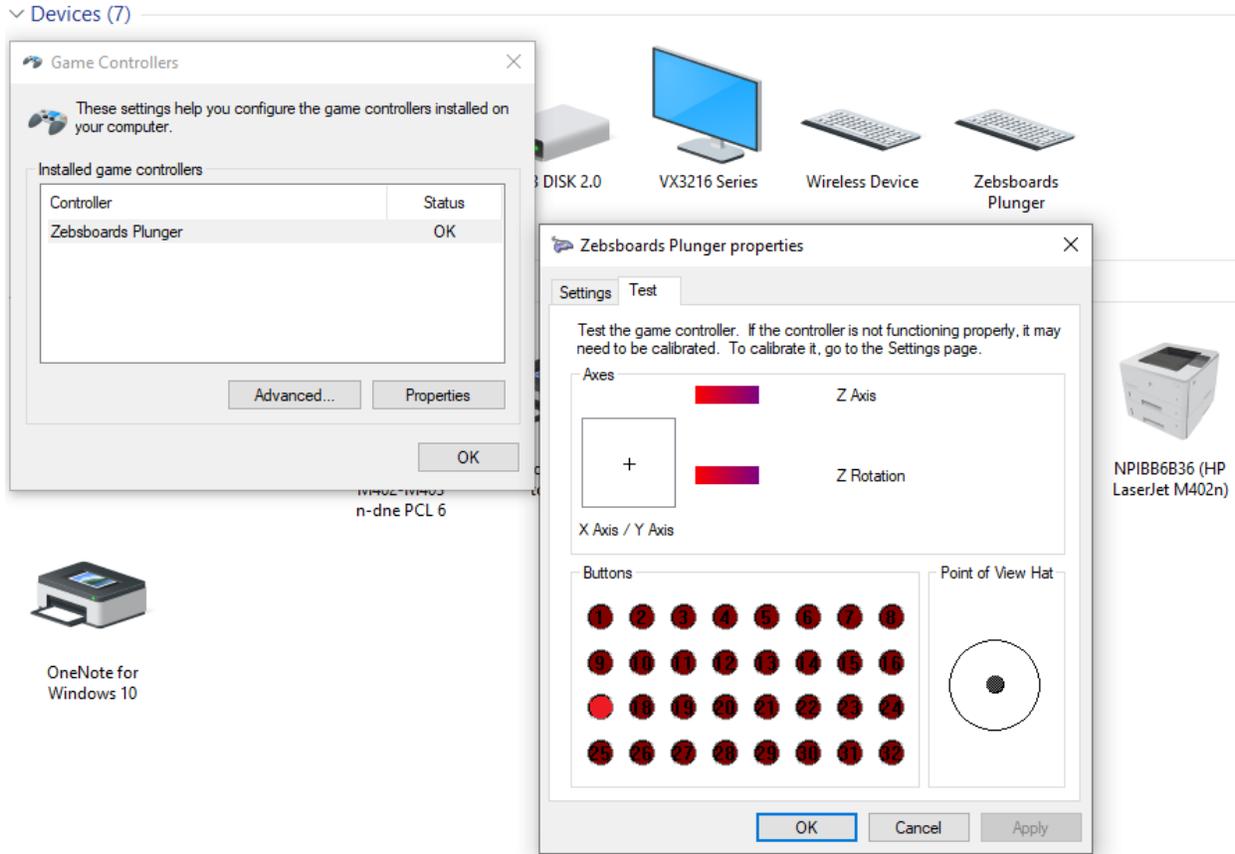
If the adjustment cannot be made to your satisfaction, open the preferences\keys tab of the settings in Visual Pinball and increase or decrease the gain settings as required. Repeat the above procedure.

Adjusting the nudge sensitivity with the knob can create an offset in the centering of the x and y axis of the plunger. If you notice a considerable pull in any direction after adjustment, simply unplug the USB cable from the plunger and reconnect it. This will force a reset of the plunger and will calculate a new center position for both axis.

It is recommended to set the nudge gains to the desired level before setting the TILT level as reversing the order will likely disrupt your TILT setting.

TILT Adjustment

After setting the nudge gain to the desired level, close Visual Pinball and open the gamepad controller applet as described in the calibration section.



To check the level of gain for tilting the machine, nudge the cabinet at a level that you feel is appropriate for tilting and adjust the TILT knob until Gamepad Button 17 flashes.

Set the button number to 17 in the VP keys and preferences Screen to use the tilt function.

The use of the letter 'T' for tilt in the firmware has been discontinued to eliminate the hang-up that could occur with windows due to a misadjusted tilt level.

Turning the knob clockwise increases the sensitivity and counter clockwise decreases the sensitivity.

The TILT routine has a limiting timer in it that will debounce the TILT command by prohibiting the T keypress from occurring more than once every 2 seconds. When adjusting the TILT level be sure to allow for the delay timer to complete before trying to tilt the machine again.

Disabling Onboard TILT Feature

The built in TILT feature can be disabled by using the serial control file ZBTED ZB Tilt Enable / Disable). See the Serial Control Section later in this manual for more details.

Launch Ball Button & Plunger as Launch Button

The Launch Ball Input is Gamepad 16 and is assigned there by default as the button assignment in the firmware is critical to the proper operation of the Plunger as Launch Button Function. If required, a separate Launch Button can be installed and wired to the Gamepad Button 16 input on the plunger and assigned to Gamepad 16 in the game software settings.

Switching between Analog and Digital Plunger modes (normal plunger operation or press to imitate button press) is controlled by sending a serial control signal through the usage of the included script and batch files. See the Serial Control Section later in this manual for more details.

Gamepad/Keyboard Mode Switching

The plunger can be switched between Gamepad only and Keyboard/Gamepad Hybrid modes by quickly pressing the Calibration button once.

The plunger can also be switched between Gamepad only and Keyboard/Gamepad Hybrid modes by pressing the Right Flipper and Start Buttons simultaneously.

The plunger can also be switched between modes by the use of the provided serial control files. See the Serial Control Section later in this manual for more details.

Plunger Factory Reset

The plunger can be easily be reset to factory defaults in the firmware by running the serial control batch file for ZBRST.bat (after 1st editing the com port in the file to match your hardware). A reset is also required after a firmware upgrade to force a hardware scan of the plunger to redefine or confirm input assignments for the plunger.

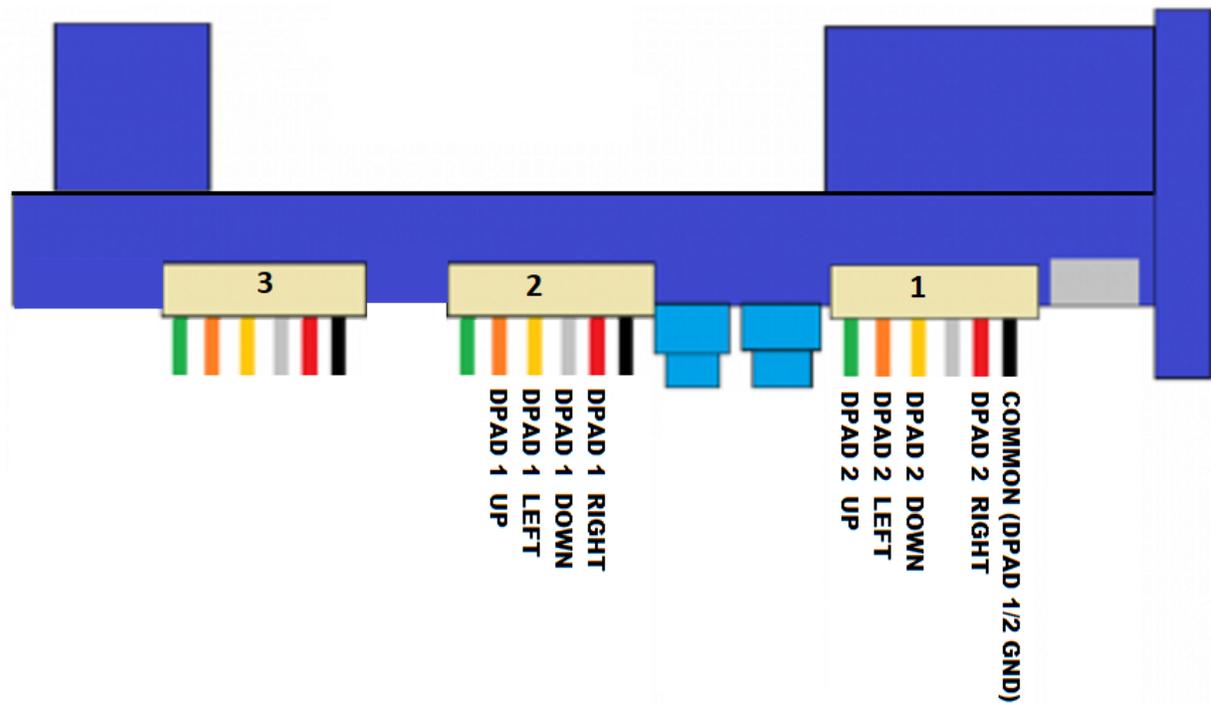
After running the batch file a manual reboot (unplugging and reconnecting) of the plunger is required to finish the firmware reset.

Factory Default Keycodes

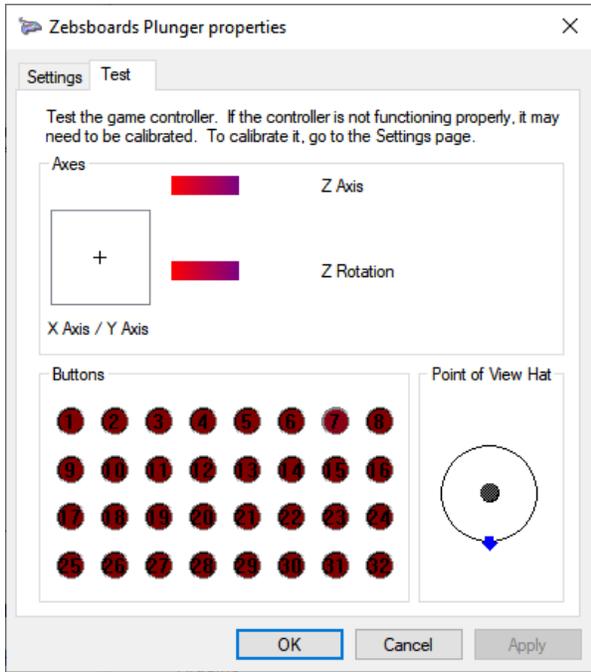
| | | |
|--------|------------------------|-----------|
| LShift | Left Flipper | Button 1 |
| LCTRL | Left MSave | Button 2 |
| 1 | Start | Button 3 |
| q | Exit | Button 4 |
| 2 | Extra Buy-in | Button 5 |
| 5 | Coin | Button 6 |
| END | Coin Door Open/Close | Button 7 |
| = | Volume DOWN | Button 8 |
| - | Volume UP | Button 9 |
| 8 | SMenu Down | Button 10 |
| 9 | SMenu UP | Button 11 |
| 0 | SMenu Enter | Button 12 |
| 7 | SMenu Cancel | Button 13 |
| RShift | Right Flipper | Button 14 |
| RCTRL | Right MSave | Button 15 |
| Enter | Launch/Fire | Button 16 |
| | Tilt Button Assignment | Button 17 |

Dpad/Joystick Connection

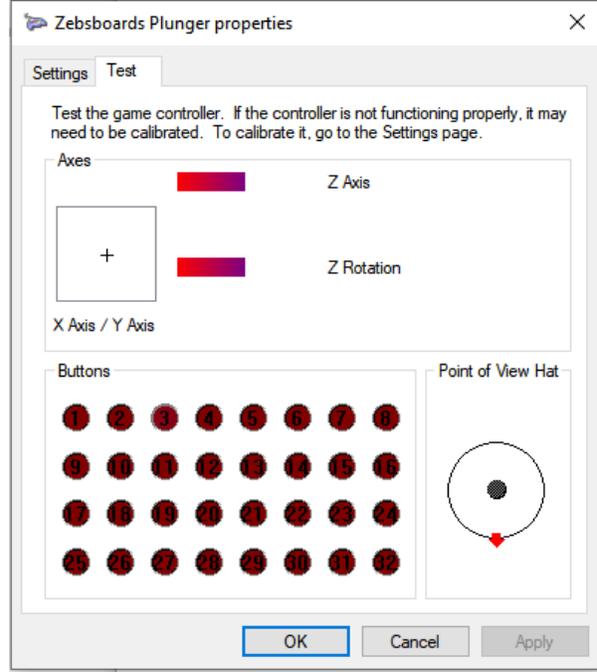
The firmware allows for the connection of 2 joysticks for use through the Point of View Hat Switch inputs. These inputs rely on the use of the harnesses provided and run through direct input (- or common) switching. The inputs for the Dpads are as follows:



Dpad events show up in the control panel app on the Hat Switch Ring as shown below.



DPAD 1



DPAD 2

SERIAL CONTROL

Batch File Definitions:

ZBGP.bat - Gamepad Mode Enable - sends a serial character (G) to the plunger and puts it into Gamepad Button Mode

ZBKB.bat - Keyboard Mode Enable - sends a serial character (K) to the plunger and puts it into Keyboard/Gamepad Button Mode - Gamepad buttons will be sent as well as keystrokes

ZBLA.bat - Analog Plunger Enable - sends a serial character (A) to the plunger and puts it into Analog Plunger Mode

ZBLD.bat - Digital Ball Launch Mode - sends a serial character (D) to the plunger and puts it into Digital Plunger/Ball Launch Mode - Pressing on plunger sends an Enter key/Gamepad button press

ZBRST.bat - Reset plunger to factory default - sends a serial character (R) to the plunger and reloads the factory settings (keystrokes, button assignments, etc). Requires reboot of plunger after running.

ZBTED.bat - Tilt Enable/Disable - sends a serial character (T) to the plunger Enabling or Disabling the onboard TILT function - sending command Enables or Disables depending on current state

ZB**.vbs - Runs the ZB**.bat file in a script shell (hidden) - for use in adding commands to vb scripts where a pop-up window is not desired

Typical Usage

Switching between keyboard and gamepad modes is usefull for systems using Visual Pinball and PinballFX2/3. Due to the reliance on VPINMAME, Visual Pinball responds best to keyboard controllers as VPINMAME and some tables have keystrokes coded directly. In the case of PINBALLFX2/3 or The Pinball Arcade, a full gamepad is prefereable as it makes setting up xbox360ce (the controller interface software) as easy as can be. Being able to switch modes completely removes the need for TSR software such as XPADDER or JOY2KEY.

Control Batch Files / VBS Scripts

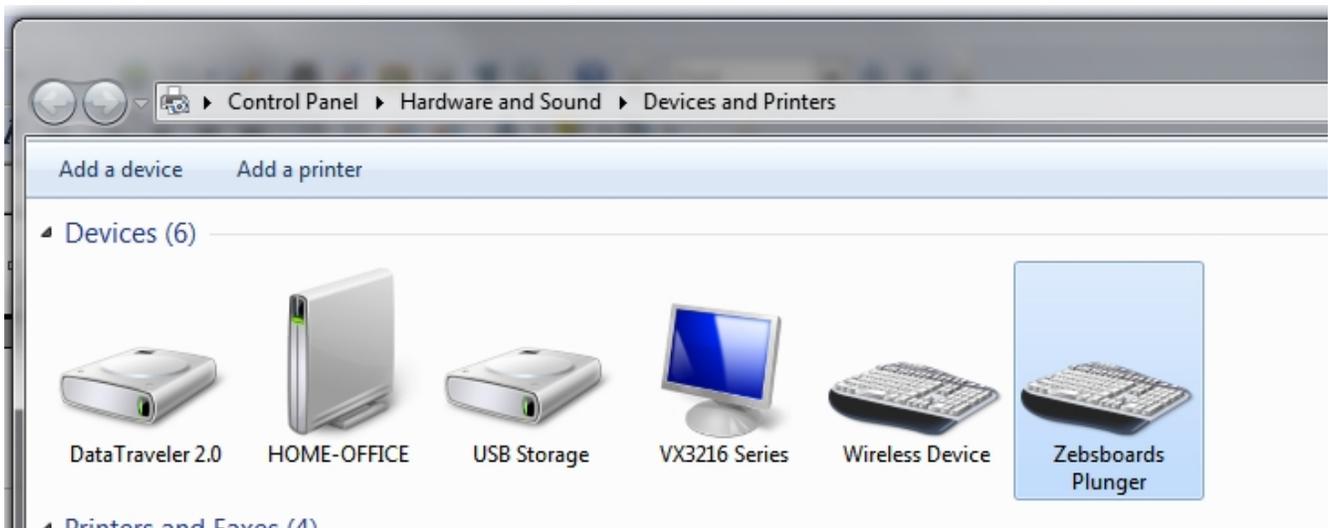
The easiest method of sending the commands to the plunger are by the following batch files or vbs scripts (the vbs scripts are used to run the batch files in hidden command boxes).

In order to use the files, the serial port assigned to the plunger needs to be entered in the batch files.

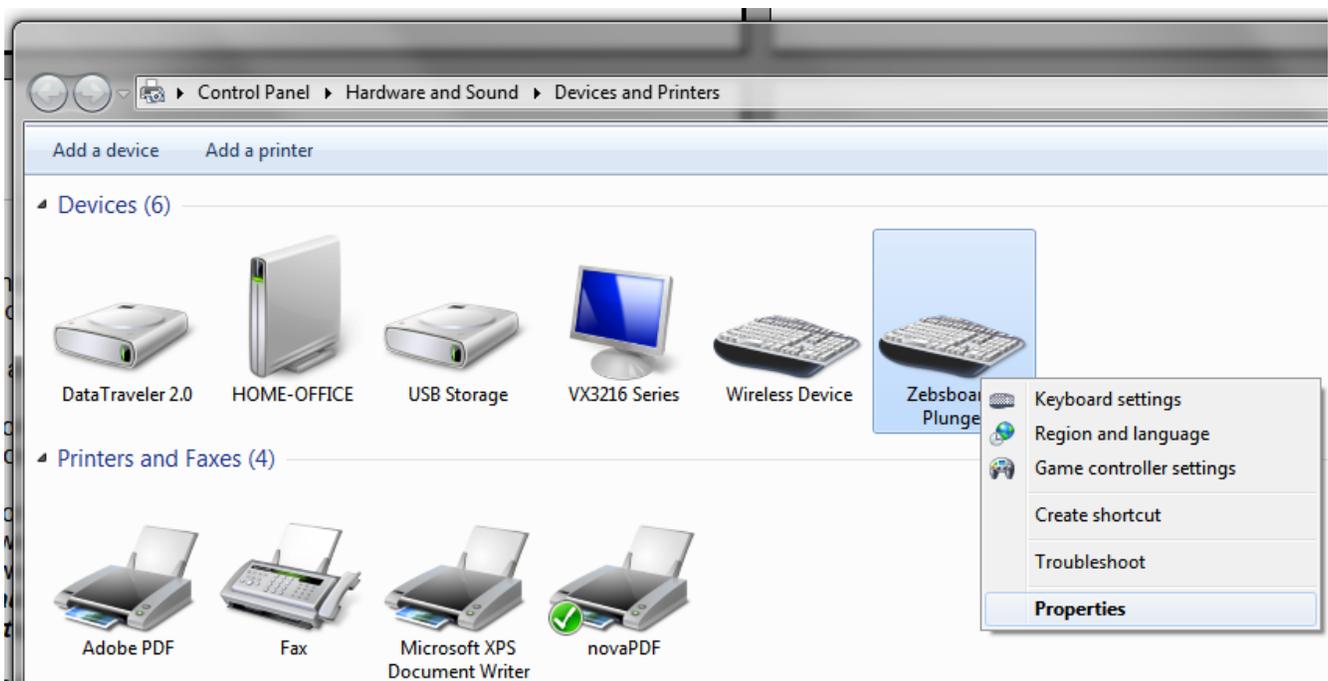
Finding The Plunger ComPort

To find the comport assigned to the plunger do the following:

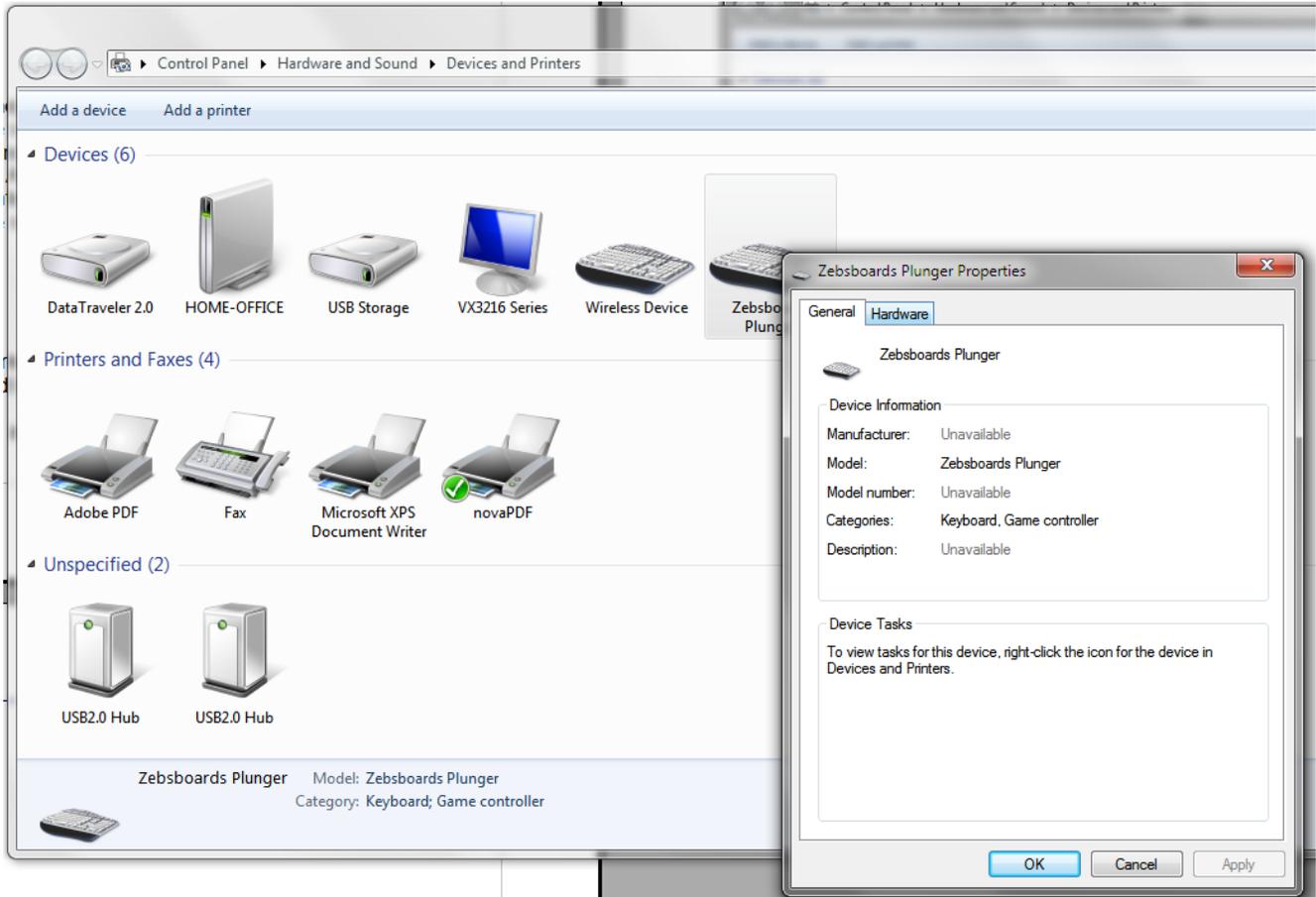
Open Devices and Printers screen and locate the zeksboards plunger



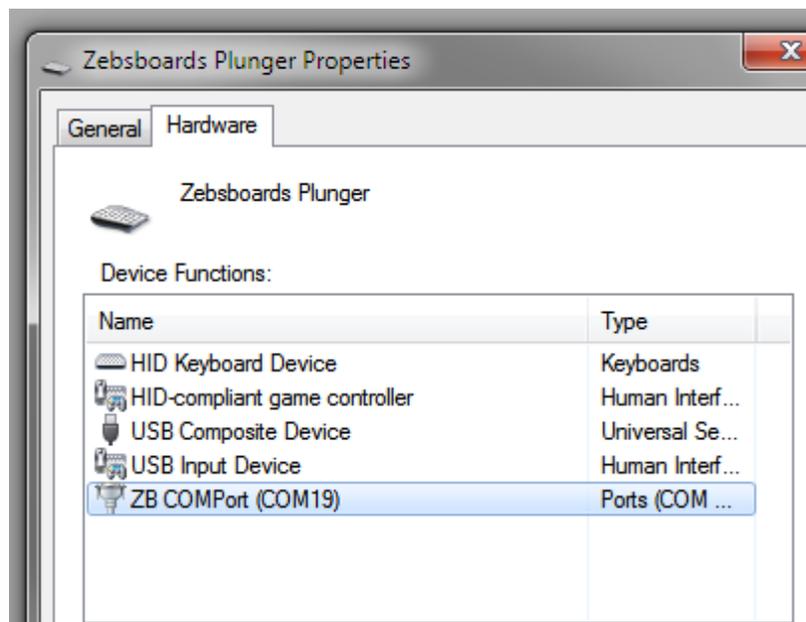
Right Click on the zeksboards plunger and select properties



Select the Hardware tab



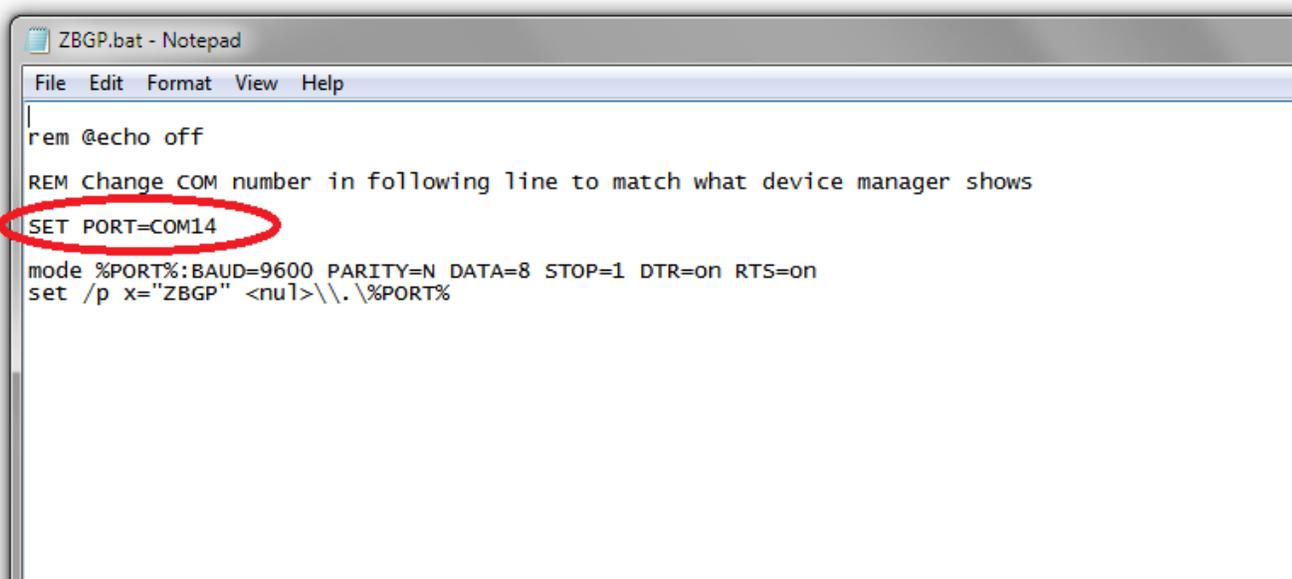
Make note of the comport in the listing



Modifying the Batch Files

The Serial Control Files can be downloaded in the firmware package linked on the front page at www.zesboards.com

Extract the files and open ZBGP.bat in notepad (right click and choose edit, don't double click to open).



```
ZBGP.bat - Notepad
File Edit Format View Help
|
rem @echo off
REM Change COM number in following line to match what device manager shows
SET PORT=COM14
mode %PORT%:BAUD=9600 PARITY=N DATA=8 STOP=1 DTR=on RTS=on
set /p x="ZBGP" <nul>\\.\%PORT%
```

Change COM number to match comport number found in device manager.

Save file and repeat for each of the following .bat files. Nothing needs to be done with .vbs files.

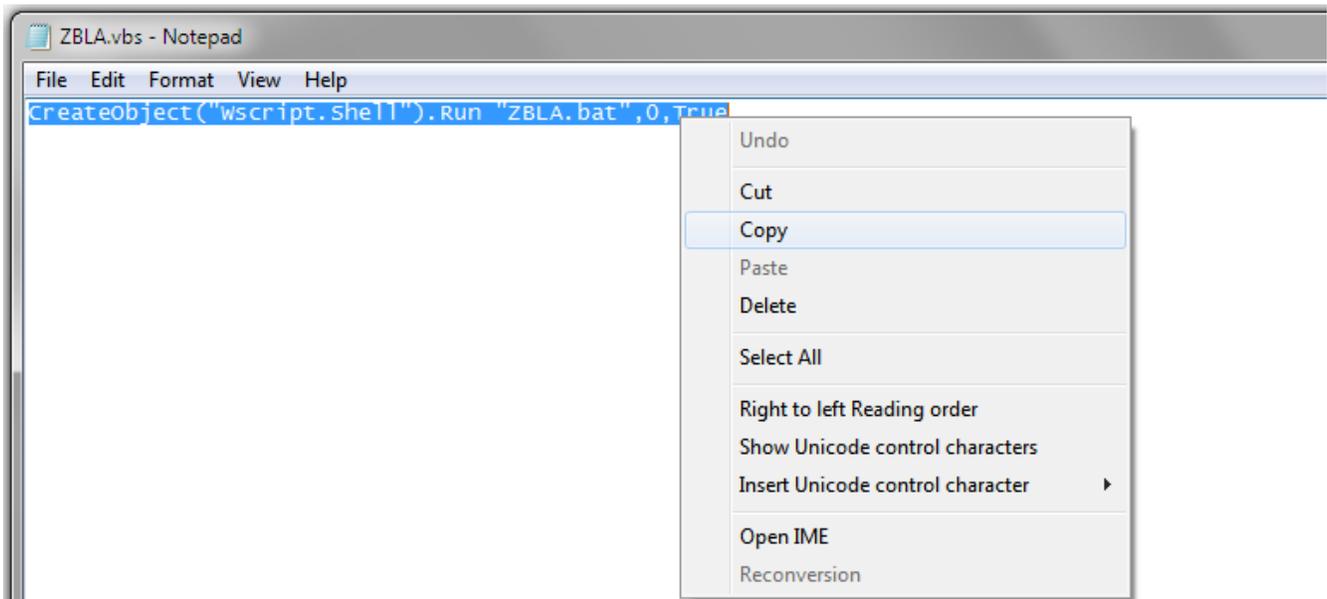
Using DIGITAL/ANALOG Switching Files

In Visual Pinball the easiest way to use the files (ZBLA / ZBLD) is to add the vbs command for the bat file directly into the script.

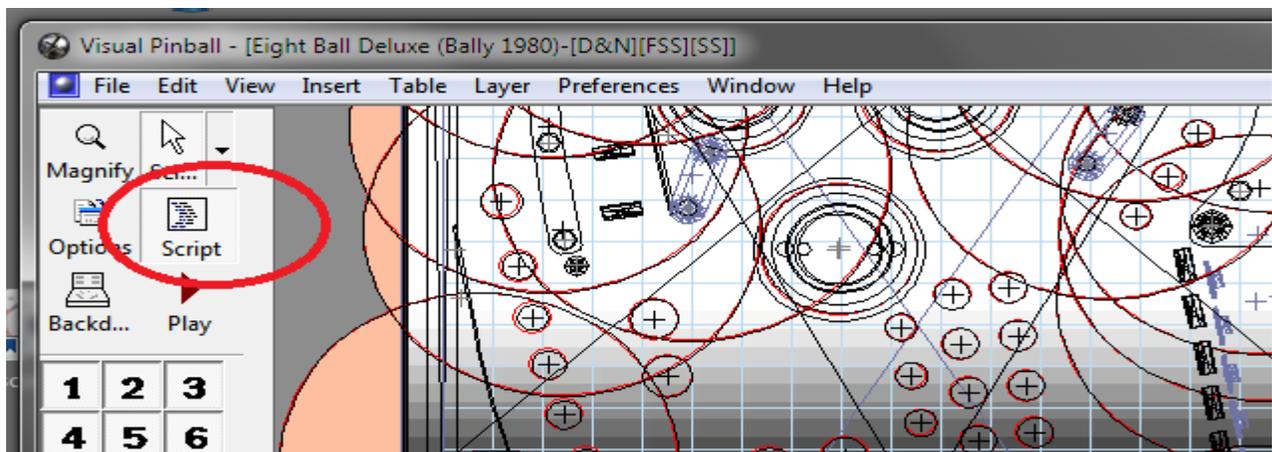
Start by copying ZBLA.bat and ZBLD.bat to the ..\VisualPinball\Tables directory of your vp installation.

Start the visualpinball editor and open/load a table that uses a mechanical plunger (ie: Eight Ball Deluxe).

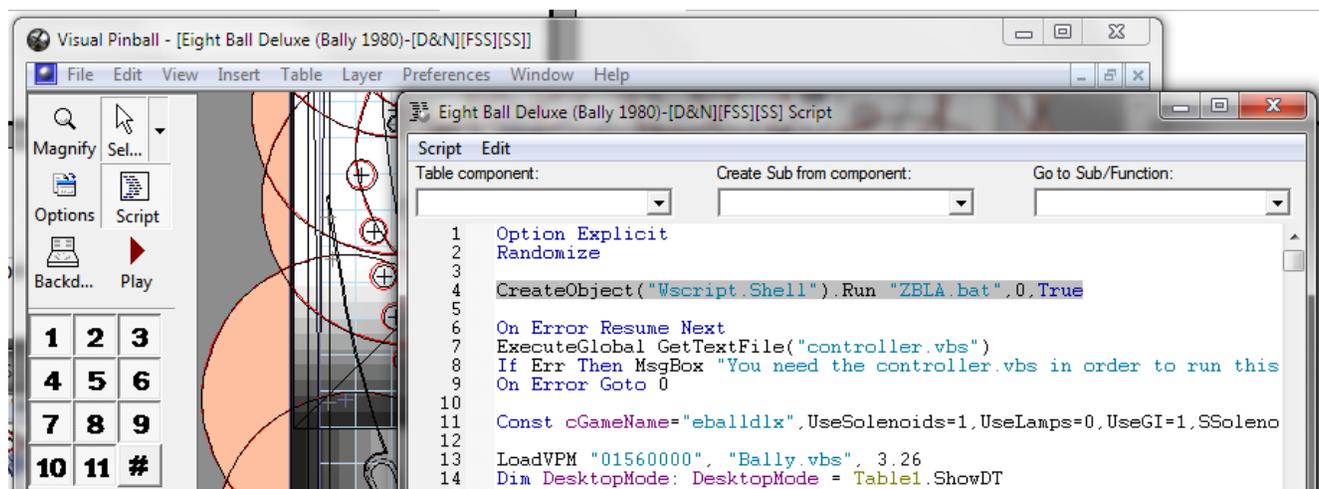
Open the ZBLA.vbs script file that unzipped with the ZBLA.bat file in notepad, highlight the line of text and copy it (right click and select copy).



Return to the VP Editor and click on the Script Button to the left of the table layout as shown below.

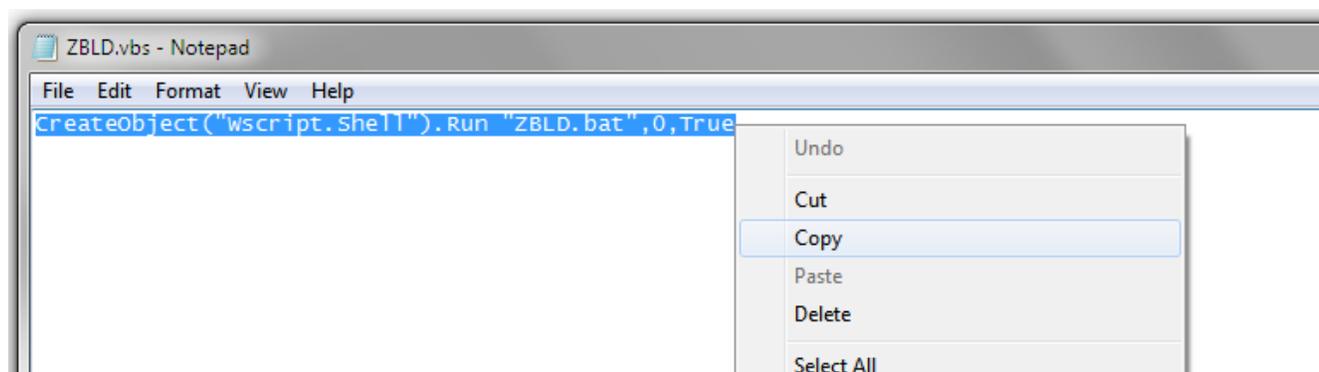


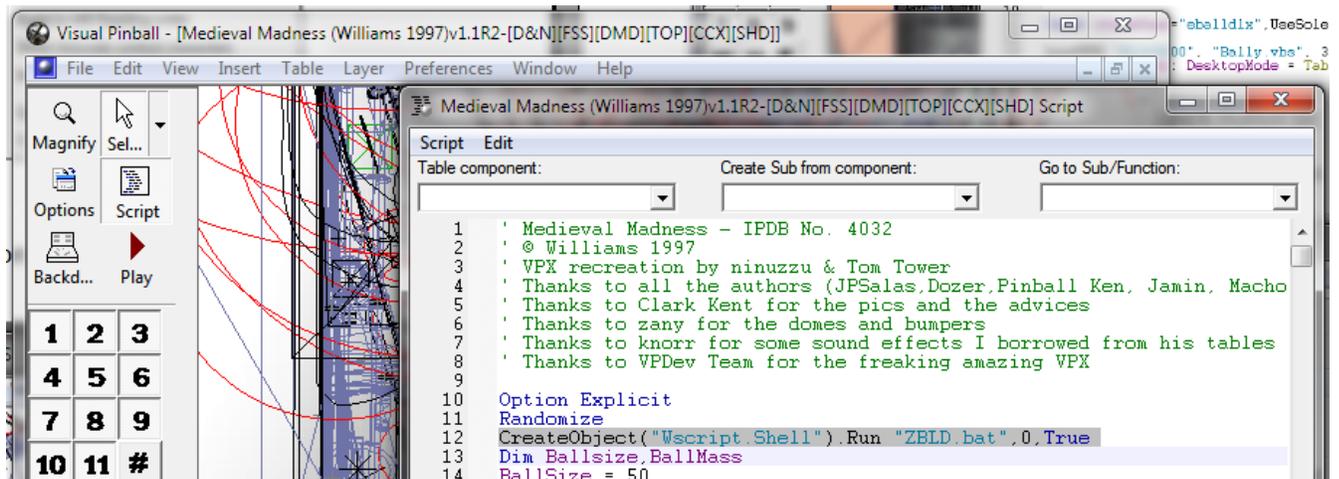
Paste the line of text copied from the ZBLA.vbs script into the table script as shown in Line 4 below.



Save the table and load a table that uses a Launch Button (ie: Medieval Madness)

Repeat the above procedure using ZBLD.vbs as shown below





Now run the Launch Button Table that you edited (Medieval Madness in the example).

You will find that the pushing on the plunger will launch the ball as if it were a launch button.

Now run the Analog Plunger table that you edited (Eight Ball Deluxe in the example).

You will find that the plunger operates as you would expect, pulling back and releasing and responding on screen to the plunger rod movement.

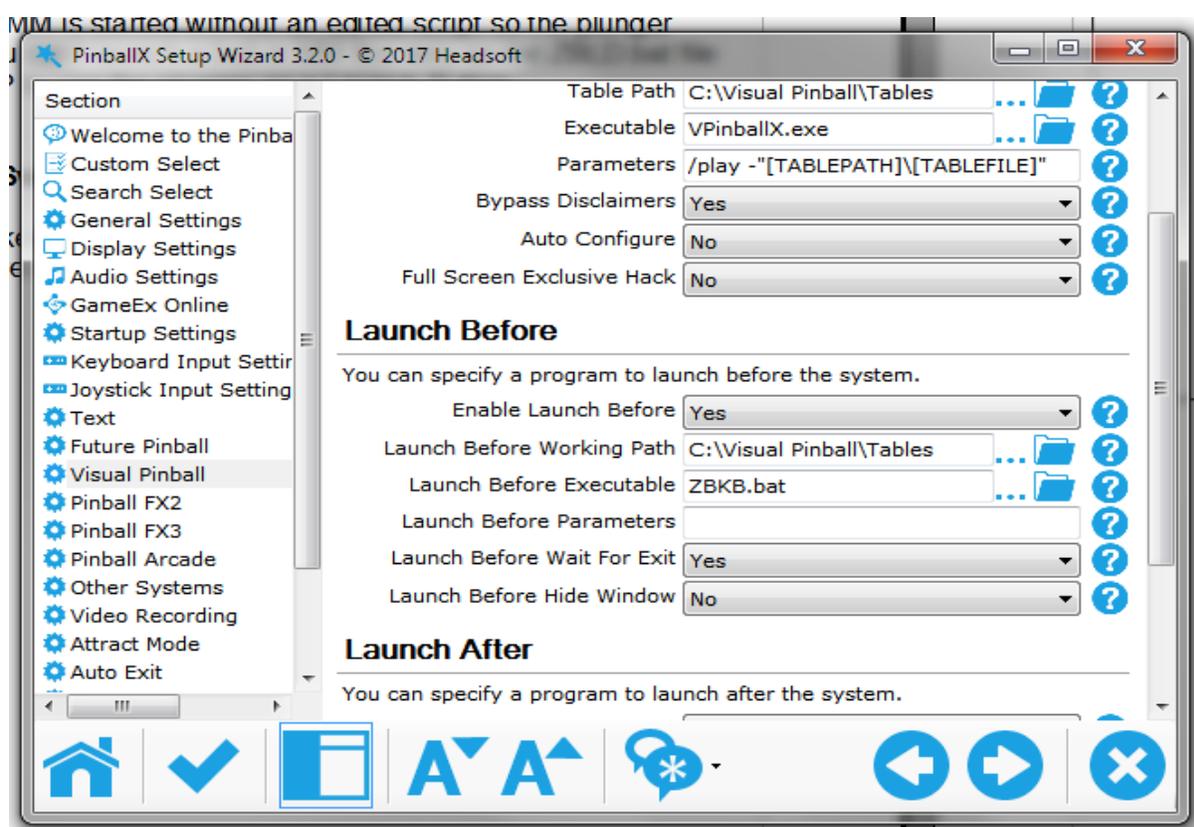
The main issue to remember is that if you are using the script edit method of switching the ball launch mode you will have to edit the script of every table you install with the proper command line. Failing to do so may leave you in the wrong mode when loading different tables if the mode line is missing

ie: EBD has the ZBLA.bat command and switches to Analog upon start. Upon exit the plunger is still in Analog mode but MM is started without an edited script so the plunger remains as an analog plunger. You can't launch a ball in MM this way so the ZBLD.bat file would have to be run outside of VP to use the plunger as a Launch Button.

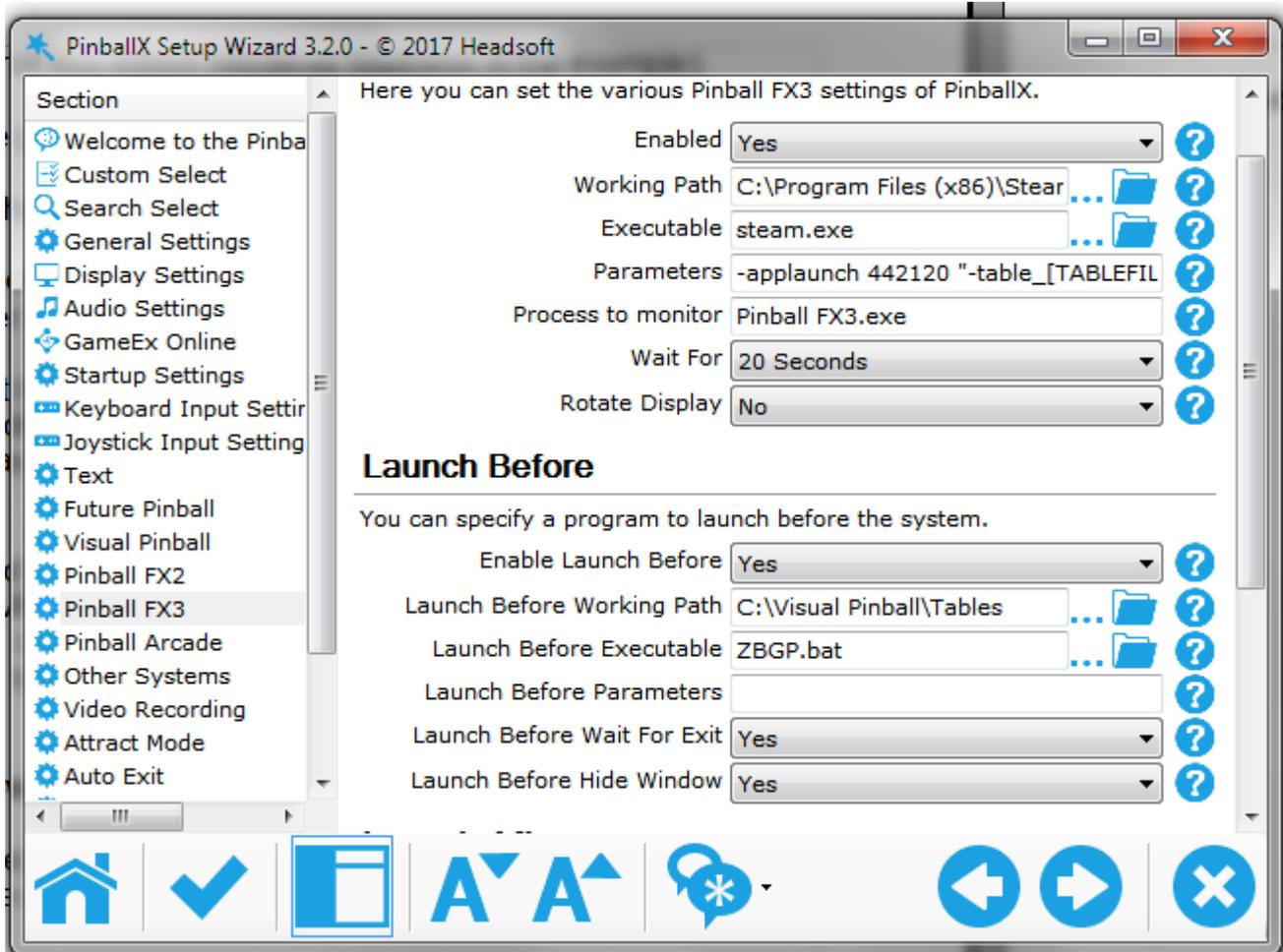
Using GAMEPAD / KEYBOARD Switching Files

Switching between gamepad and keyboard modes can be accomplished by running the appropriate bat file in the run before and/or run after sections of the PinballX settings.

Keyboard Mode



Gamepad Mode



Modifying and Using Serial Control Codes

PLUNGER KEYCODES

| KEYPRESS | HEX CODE | KEYPRESS | HEX CODE | KEYPRESS | HEXCODE |
|----------------|----------|----------|----------|----------|---------|
| LEFT_CTRL | 0x80 | 0 | 0X30 | a | 0X61 |
| LEFT_SHIFT | 0x81 | 1 | 0X31 | b | 0X62 |
| LEFT_ALT | 0x82 | 2 | 0X32 | c | 0X63 |
| LEFT_GUI | 0x83 | 3 | 0X33 | d | 0X64 |
| RIGHT_CTRL | 0x84 | 4 | 0X34 | e | 0X65 |
| RIGHT_SHIFT | 0x85 | 5 | 0X35 | f | 0X66 |
| RIGHT_ALT | 0x86 | 6 | 0X36 | g | 0X67 |
| RIGHT_GUI | 0x87 | 7 | 0X37 | h | 0X68 |
| UP_ARROW | 0xDA | 8 | 0X38 | i | 0X69 |
| DOWN_ARROW | 0xD9 | 9 | 0X39 | j | 0X6A |
| LEFT_ARROW | 0xD8 | A | 0X41 | k | 0X6B |
| RIGHT_ARROW | 0xD7 | B | 0X42 | l | 0X6C |
| BACKSPACE | 0xB2 | C | 0X43 | m | 0X6D |
| TAB | 0xB3 | D | 0X44 | n | 0X6E |
| RETURN (ENTER) | 0xB0 | E | 0X45 | o | 0X6F |
| ESC | 0xB1 | F | 0X46 | p | 0X70 |
| INSERT | 0XD1 | G | 0X47 | q | 0X71 |
| DELETE | 0XD4 | H | 0X48 | r | 0X72 |
| PAGE_UP | 0XD3 | I | 0X49 | s | 0X73 |
| PAGE_DOWN | 0XD6 | J | 0X4A | t | 0X74 |
| HOME | 0XD2 | K | 0X4B | u | 0X75 |
| END | 0XD5 | L | 0X4C | v | 0X76 |
| CAPS_LOCK | 0XC1 | M | 0X4D | w | 0X77 |
| F1 | 0XC2 | N | 0X4E | x | 0X78 |
| F2 | 0XC3 | O | 0X4F | y | 0X79 |
| F3 | 0XC4 | P | 0X50 | z | 0X7A |
| F4 | 0XC5 | Q | 0X51 | < | 0X3C |
| F5 | 0XC6 | R | 0X52 | > | 0X3E |
| F6 | 0XC7 | S | 0X53 | ? | 0X3F |
| F7 | 0XC8 | T | 0X54 | : | 0X3A |
| F8 | 0XC9 | U | 0X55 | " | 0X22 |
| F9 | 0XCA | V | 0X56 | [| 0X5B |
| F10 | 0XCB | W | 0X57 |] | 0X5D |
| F11 | 0XCC | X | 0X58 | EQUALS | 0X3D |
| F12 | 0XCD | Y | 0X59 | MINUS | 0X2D |
| SPACE | 0X20 | Z | 0X5A | PLUS | 0X2B |
| | | | | \ | 0X5C |

DEFAULT FACTORY VALUES:

V3/V4 Plungers (4x pin harnesses, 18 Inputs)

| | | | |
|-------------------|---------------|-------------------------|-------------------------|
| Gamepad Button 1 | HEX 81 | LEFT_SHIFT | L FLIPPER |
| Gamepad Button 2 | HEX 80 | LEFT_CTRL | L MSAVE |
| Gamepad Button 3 | HEX 31 | 1 | START |
| Gamepad Button 4 | E | (DEFAULT 'q') | EXIT |
| Gamepad Button 5 | HEX 32 | 2 | EXTRA BALL BUY IN |
| Gamepad Button 6 | HEX 35 | 5 | COIN |
| Gamepad Button 7 | C | (DEFAULT 'END') | COIN DOOR |
| Gamepad Button 8 | HEX 3D | EQUALS | VOL DOWN |
| Gamepad Button 9 | HEX 2D | MINUS | VOL UP |
| Gamepad Button 10 | HEX 38 | 8 | SERVICE MENU DOWN |
| Gamepad Button 11 | HEX 39 | 9 | SERVICE MENU UP |
| Gamepad Button 12 | HEX 30 | 0 | SERVICE MENU ENTER |
| Gamepad Button 13 | HEX 37 | 7 | SERVICE MENU EXIT |
| Gamepad Button 14 | HEX 85 | RIGHT_SHIFT | R FLIPPER |
| Gamepad Button 15 | HEX 84 | RIGHT_CTRL | R MSAVE |
| Gamepad Button 16 | B | (DEFAULT 'ENTER') | LAUNCH BALL |
| Gamepad Button 17 | A | (DEFAULT GAMEPAD 17) | TILT |
| Gamepad Button 18 | HEX 0 | | |
| through to | | NO KEYBOARD ASSIGNMENTS | USED AS GAMEPAD BUTTONS |
| Gamepad Button 32 | HEX 0 | | |

Launch Ball Key HEX **B0** Coin Door Key HEX **D5** Exit Key HEX **71** TILT Button **17**

V5 Plungers (3x pin harnesses, 11 Inputs)

| | | | |
|-------------------|---------------|-------------------------|-------------------------|
| Gamepad Button 1 | HEX 81 | LEFT_SHIFT | L FLIPPER |
| Gamepad Button 2 | HEX 80 | LEFT_CTRL | L MSAVE |
| Gamepad Button 3 | HEX 31 | 1 | START |
| Gamepad Button 4 | E | (DEFAULT 'q') | EXIT |
| Gamepad Button 5 | HEX 35 | 5 | COIN |
| Gamepad Button 6 | HEX 85 | RIGHT_SHIFT | R FLIPPER |
| Gamepad Button 7 | HEX 84 | RIGHT_CTRL | R MSAVE |
| Gamepad Button 8 | B | (DEFAULT 'ENTER') | LAUNCH BALL |
| Gamepad Button 9 | A | (DEFAULT GAMEPAD 17) | TILT |
| Gamepad Button 10 | | NO KEYBOARD ASSIGNMENT | USED AS GAMEPAD BUTTON |
| Gamepad Button 11 | | NO KEYBOARD ASSIGNMENTS | USED AS GAMEPAD BUTTONS |

Launch Ball Key HEX **B0** Coin Door Key HEX **D5** Exit Key HEX **71** TILT Button **9**

SERIAL CONTROL COMMANDS:

Commands are used to control the operation of the plunger and consist of single character data. Commands are sent to the plunger by simple batch files and must be encapsulated in quotations in the command line. ***Changes in mode effected by commands take place immediately and other than TILT and RESET are not saved in memory.***

Example:

```
mode %PORT%:BAUD=115200 PARITY=N DATA=8 STOP=1 DTR=on RTS=on
```

```
set /p x="G" <nul>|. |.%PORT%
```

G – sets the plunger in Gamepad mode (buttons treated as gamepad button input)

K – sets the plunger in Keyboard/Gamepad mode (buttons treated as keyboard presses)

A – sets the plunger in Analog Plunger ball launch mode

D – sets the plunger into Digital Button ball launch mode

T – sets the onboard TILT ENABLE/DISABLE state. Sending a T to the plunger switches the onboard tilt routine to either ON or OFF depending on the current state. If onboard TILT is enabled, sending a T will disable. Sending another T will enable it again. The state change is saved in memory.

R – resets the plunger to the factory default values for keyboard codes and position indicators. *Requires plunger to be rebooted (usb unplugged and replugged in) after sending R command. Plunger calibration is NOT affected by using the reset command.*

SERIAL TRANSMISSION INITIALIZERS:

Initializers are used to notify the plunger of incoming serial data to be processed. Commands sent to the plunger must be prefaced with an initializer in order for the plunger to know how to deal with the data that follows.

Example:

```
mode %PORT%:BAUD=115200 PARITY=N DATA=8 STOP=1 DTR=on RTS=on
```

```
set /p x="CD5" <nul>|. |.%PORT%
```

In the example above the C is the initializer letting the plunger know that the D5 (shortened hex code of 0xD5 which is the END key) immediately following it is the keystroke identifier to be saved into the plunger's memory.

The initializers available for use are:

C – informs the plunger to save the next byte that follow as the keystroke that the COIN DOOR switch should use when in keyboard mode. By default the plunger ships with this being set to the END key. `set /p x="CD5" <nul>\\.\%PORT%`

E – informs the plunger to save the next byte that follow as the keystroke that the EXIT button should use when in keyboard mode. By default the plunger ships with this being set to the ‘q’ key. `set /p x="E71" <nul>\\.\%PORT%`

L – informs the plunger to save the next byte that follow as the keystroke that the LAUNCH BALL button should use when in keyboard mode. By default the plunger ships with this being set to the ‘ENTER’ key. `set /p x="LBO" <nul>\\.\%PORT%`

I – informs the plunger to save the next string of bytes that follow as the complete keypress layout and values that buttons should use when in keyboard mode. By default the plunger ships with this being set to the arrangement of values shown above in the Default Factory Values table.

An example of the usage of the I initializer appears as follows:

```
mode %PORT%:BAUD=115200 PARITY=N DATA=8 STOP=1 DTR=on RTS=on
```

```
set /p x="I81,80,31,E,32,35,C,3D,2D,38,39,30,37,85,84,B,A" <nul>\\.\%PORT%
```

In this example the 1st hex value following the I initializer (81) fills the position in the array for Gamepad Button 1 and if you reference it to the Plunger Keycodes table on page one of this manual you will see that (0x81) is the hex code for the Left_Shift key. The ‘0x’ in the hex key from the table is dropped and only the remaining 2 characters (81) are required in the string.

Other than the value immediately following the initializer (the 81 following the I), the remaining hex values and position indicator letters MUST be separated by a comma. The (80) in the second position fills the position for Gamepad Button 2 and is the hex value for the LEFT_CTRL key and so on through the array until you get to the letter (A) which fills the position for Gamepad Button 17.

V3/V4 Plungers without the I/O expansion board have 18 available physical Gamepad Button positions that can be assigned, V5 Plungers have 11 available physical Gamepad Button positions and plungers with the expansion board can assign up to and including 32 positions. Only the positions that are assigned to keystrokes and/or position indicators (A,B,C,E) need to be filled with a value, positions not filled with key values will be filled with null (0) values by the plunger firmware and assigned as Gamepad Buttons. Using the example above, this would mean that Gamepad button 18 will be automatically assigned as a Gamepad Button since there are only 17 out of 18 available positions filled in the array (plunger without expansion board).

POSITION INDICATORS:

```
mode %PORT%:BAUD=115200 PARITY=N DATA=8 STOP=1 DTR=on RTS=on
```

```
set /p x="I81,80,31,E,32,35,C,3D,2D,38,39,30,37,85,84,B,A" <nul>\\.\%PORT%
```

In this example we see the position indicators E, C, B, A. Each of these indicates to the plunger which Gamepad button with special function is being used for which purpose. Since the Launch Ball button and Tilt button are used in several routines in the firmware the plunger needs a specific value that is used to indicate which Gamepad Button is being used for them. Similarly, since the Coin Door switch is coded as a single click on, single click off and requires it's own button code for that purpose the plunger needs to know which Gamepad button is being used for the Coin Door. The Exit key indicator is provided as an easy way to change the specific value for the EXIT button from the factory default to whichever is most convenient. An example of this would be switching the exit key to 'q' while using Visual Pinball and then switching it to ESC for use in Future Pinball.

The indicators are as follows:

A – TILT button - factory placed in the Button 17 position , moving to another position in the array changes button assignment from 17 to the button assignment of the new position in the array.

```
Example: set /p x="I81,80,31,E,32,A,35,C,3D,2D,38,39,30,37,85,84,B" <nul>\\.\%PORT%
```

In the above array the TILT BUTTON is now Gamepad Button 6 and LAUNCH BALL is Gamepad Button 17

B – LAUNCH BALL BUTTON – factory placed in the Button 16 position, moving to another position in the array changes button assignment from 16 to the button assignment of the new position in the array.

```
Example: set /p x="I81,80,31,E,32,B,35,C,3D,2D,38,39,30,37,85,84,A" <nul>\\.\%PORT%
```

In the above array the LAUNCH BALL BUTTON is now Gamepad Button 6

C – COIN DOOR BUTTON – factory placed in the Button 7 position, moving to another position in the array changes button assignment from 7 to the button assignment of the new position in the array.

```
Example: set /p x="I81,80,31,E,32,C,35,3D,2D,38,39,30,37,85,84,B,A" <nul>\\.\%PORT%
```

In the above array the COIN DOOR BUTTON is now Gamepad Button 6

E – EXIT BUTTON – factory placed in the Button 4 position, moving to another position in the array changes button assignment from 4 to the button assignment of the new position in the array.

Example: `set /p x="I81,80,31,32,C,E,35,3D,2D,38,39,30,37,85,84,B,A" <nul>\\.\%PORT%`

In the above array the EXIT BUTTON is now Gamepad Button 6

Changes made to the key value array and sent to the plunger take effect immediately and are written to the plunger memory.

BATCH FILES:

Batch files should follow the format illustrated below and be saved with the .bat extension.

The following 5 lines of the batch file would be saved as 'ZBGP.bat'

```
@echo off
```

```
REM Change COM port in following line to match what windows device manager shows for the plunger
```

```
SET PORT=COM24
```

```
mode %PORT%:BAUD=115200 PARITY=N DATA=8 STOP=1 DTR=on RTS=on
```

```
set /p x="G" <nul>\\.\%PORT%
```

The com port number for the plunger can be found by right clicking on the plunger in the view devices screen of the windows control panel and clicking on the Hardware tab.

VBS FILES:

VBS (Visual Basic Script) files can be helpful in running commands from the table script or used to run batch files in hidden windows. The hidden window script consists of one line as below and needs to be saved with the .vbs file extension. As well, the vbs script should be in the same directory on the hard drive as the batch file it calls and named similarly. The vbs file for the above batch file would then be saved as 'ZBGP.vbs'

```
CreateObject("Wscript.Shell").Run "ZBGP.bat",0,True
```

Links to further Information

Identifying Your Plunger Firmware

<https://www.zesboards.com/forum/ext/dmzx/fileupload/files/d9eab665cbb79d11f0846a2f21d2d90e.pdf>

A Simple Utility to Locate the Bootloader COMPort of your plunger

<https://www.zesboards.com/forum/ext/dmzx/fileupload/files/55b9c46b8ce7b56e63ea381bfa889cab.zip>

Visit Zesboards Forums for further information and firmware updates

<https://www.zesboards.com>

TROUBLESHOOTING

Plunger has erratic behaviour on ball launch / doesn't return to 0 position

Make sure that the lower housing is pushed back fully against the Upper Housing mounting plate and not loose or slipping

Run calibration utility described earlier in this manual

Plunger doesn't calibrate properly in Windows calibration

Calibration in Windows is not needed and can give unwanted results, do not use Windows calibration tool. If you have used it, return to the calibration screen, click on "RESET TO DEFAULT", click ok, exit the screen and reboot computer

Run the calibration utility described earlier in this manual

Plunger launches early before end of stroke

Plunger is not aligned properly. The plunger is designed to be mounted in 3/4" cabinet material, if the cabinet material is less than 3/4" shim out the Upper housing mounting plate by the difference

Make sure that the lower housing is pushed back fully against the Upper Housing mounting plate and not loose or slipping.

Run the calibration utility described earlier in this manual

Plunger causes computer to hang on boot

Tilt and / or Nudge settings too high. Turn down Tilt and Gain settings (blue knobs under plunger) and re-adjust software gain in nudging axis (x/y). Re-adjust Tilt sensitivity after setting nudge in software.

Possible issue with Plunger not resetting. Make sure that USB charging while computer is off is disabled in your BIOS (see mainboard manufacturer's manual for instructions)

Plunger won't switch on serial commands

Incorrect comport settings / driver not installed.

Open devices and printers and verify successful driver installation for plunger.

Open batch files in notepad and verify correct comport in file.

Verify that there are no comport conflicts with software assigned ports (Freezy's dmd script, Serial addressable led comport, etc)

Plunger button inputs don't work after firmware upgrade

Hardware scan bit not reset in plunger.

Modify comport setting in RST.bat file and run. Unplug USB cable and reconnect to force hardware scan.

Plunger Opening Template

