

VIRTUATILT BASIC CONFIGURATION AND SETUP

Following some basic instructions to have your VirtuaTilt up and running quickly.

VirtuaTilt controller is powered by FRDM KL25Z board with Pinscape software already installed.

Please always refer to official Pinscape build guide available here:

<http://mjrnet.org/pinscape/BuildGuideV2/BuildGuide.php?sid=kl25zSoftwareSetup>

KL25Z Software Setup

VirtuaTilt comes with a KL25Z "microcontroller", which is basically a tiny computer. **Pinscape firmware is already installed (latest version - August 19, 2024)**. That serves as both the operating system and the application software. It controls all of the virtual pinball functions of the KL25Z, including the sensors, buttons, and feedback devices, and it handles communications with Windows.

In addition to the Pinscape firmware that runs on the KL25Z, there's a separate Pinscape program that runs on your Windows PC, called the **ConfigTool**. This provides an interactive interface for setting up the device, configuring it, and testing it. You don't need to leave the ConfigTool running all the time; it's only needed to set up and test the device. You can also run it again at any time to change options, update the firmware, or troubleshoot problems (it includes some testing features that can help debug the hardware setup).

The software installation process is all controlled from the PC. The Config Tool handles the KL25Z software setup, so the first step is to install the Config Tool on your PC. You can download it from official page:

<http://mjrnet.org/pinscape/swversions.php>

To install, download the ZIP file above, unblock it (**very important!**) and unpack it into a folder on your hard disk. Use any location that's convenient. Open the folder and double-click the "**PinscapeConfigTool.exe**" application.

VirtuaTilt default config

Following is the default VirtuaTilt config in Pinscape. We recommend to leave it as-is for testing buttons, potentiometer, feedback devices, etc. You can obviously change it afterwards, according to your personal preferences. We also recommend to save it, in case you need to revert back to original configuration:

Back up & Restore

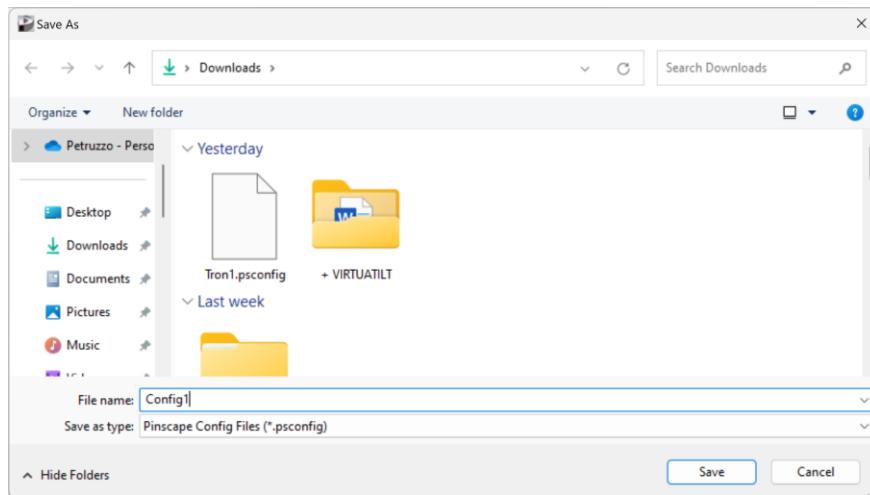
Pinscape Unit #1 | LedWiz Unit #1 | CPU ID 001A-004F9002-53274E45

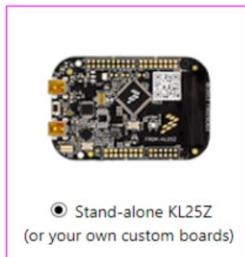


Saves the configuration settings from the KL25Z to a file on your PC. You can use this file as a data backup in case of hardware problems or data loss on the KL25Z. You can also use it to duplicate this device's settings on other devices, or share your setup with other people.



Restores the KL25Z to the settings saved in a backup file. You can use this to recover from data loss or hardware failures, or to restore working settings after making experimental or unwanted changes.



Settings**Configuration settings for KL25Z CPU ID 0049-004E9002-53274E45**Memory used: 9.5K bytes of 16K bytes (6,672 bytes free) [Explain](#)**System type.** Are you using this KL25Z on its own, or with a set of expansion boards? [Help](#) Stand-alone KL25Z
(or your own custom boards) Pinscape Expansion Boards Pinscape All-in-One**USB Identification.** This is how the KL25Z identifies itself to Windows through the USB port.LedWiz Unit 1 (USB Vendor ID FAFA, Product 00F0)

- If you have a **real** LedWiz unit in your system, choose **LedWiz Unit 8** for your first Pinscape unit, 9 for the second, etc.
- If you **don't** have any real LedWiz units, choose **LedWiz Unit 1** for the first unit, 2 for the second, etc.

[I want more details!](#)**Pinscape ID.** This is a **separate** ID from the LedWiz unit number. DOF R3 and the [DOF Config Tool](#) use this ID to identify the unit. Set this to 1 for your first unit, 2 for the second, and so on.You **don't** have to copy the LedWiz unit number here! This is completely unrelated to the LedWiz number. This setting **must always** be 1 for your first (or only) Pinscape unit, or DOF won't work.Pinscape Unit 1 **Reset on disconnect.** If the USB connection is broken, and can't be re-established within a time limit, the KL25Z can automatically reset itself as an attempt to fix whatever's wrong. Select EnabledTime before reboot (seconds): [Details](#)**TV ON switch.** If one or more of your monitors needs to be turned on manually every time you power up your cabinet, you can use this feature to switch them on automatically. See the [FAQ](#) for more information. Enabled**IR Remote Control.** The controller can send and/or receive IR remote control signals if you attach some additional components. This can be used with the [TV ON](#) feature to turn your cabinet on at power-up. Select the components required and how to connect them. If you don't have any IR components attached or wish to disable them, simply set the pin assignments here to "Not Connected".IR LED (transmitter) pin:

Requires a PWM-capable pin

IR receiver input pin:

Requires an interrupt-capable pin

Joystick input. The controller acts like a Windows USB Joystick in order to send the plunger position, accelerometer readings (for nudging), and button input.

Enable joystick input

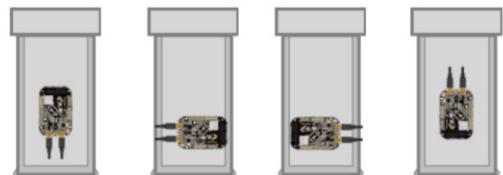
[Why would I want to disable this?](#)

Joystick axis format: X/Y/Z [What's this?](#)

Joystick report interval (milliseconds): 8.333 [Explain](#)

Accelerometer "stutter": 2 [Explain](#)

Accelerometer orientation. If you're using the accelerometer (for nudge sensing), the software needs to know how the KL25Z is oriented in the cabinet so it's level with the floor of the cabinet, with the chips and LEDs facing up.



Ports facing front Ports facing left Ports facing right Ports facing rear

Dynamic range. Select the range for accelerometer readings. Ranges above $\pm 2G$ have lower precision. [Details](#)

- $\pm 1G$ (original Pinscape setting, highest precision)
- $\pm 2G$ (same precision as $\pm 1G$ but with wider range)
- $\pm 4G$ (reduced precision, wider range)
- $\pm 8G$ (lowest precision, widest range)

Auto-centering. The controller automatically zeroes the accelerometer after it's been sitting still for a while. This compensates for any tilt in the mounting plate. [Joystick Viewer](#).

- Manually center only (no auto-centering)
- Auto-center with default time (5 seconds)
- Auto-center with custom time

Plunger sensor setup

Sensor type: Potentiometer

[Live Sensor View](#)

Potentiometer. This uses a slide potentiometer, which is a variable resistor with a control knob that moves linearly across the length of the device. Attach the pot's electrical resistance changes as the knob moves, proportionally to the position, so the controller can determine the plunger position by reading the voltage.

Pin assignments:

Wiper:

PTB0

Requires an ADC (analog in) pin

Plunger calibration button. If you wish, you can install a pushbutton in your cabinet to activate plunger calibration mode. This is optional, since you can do it in the software.

Button input: PTE29 Enabled

Indicator lamp output: PTE23 Enabled

ZB Launch Ball setup. You can set up your mechanical plunger to act as a "virtual" Launch Ball button for tables that use a button instead of a plunger.

Enabled

Button inputs. You can use the KL25Z as a key encoder to connect pinball-style buttons on your cabinet to the PC. Set up the wiring connections and key pin or key assignment to change a setting.

[Test Buttons](#)

Shift button number: 0 [Help](#)

- Shift OR Key mode
- Shift AND Key mode

[Set standard joystick buttons](#) | [Set standard keyboard keys](#) | [View standard key assignments](#)

TLC5940 (external PWM controller chip) setup [What's this?](#)

Number of TLC5940 chips:

TLC59116 (external PWM controller chip) setup [What's this?](#)

Disabled - [Show Settings](#)

74HC595 (external digital out chip) setup [What's this?](#)

Number of 74HC595 chips:

Pinscape After Dark. You can set up a button or switch to activate **Night Mode**, which disables the feedback device outputs that you designate as noise-makers, and neighbors. [Details](#)

Button input number: 0 = no input button assigned

Button type: Momentary button On/off switch
(Toggles mode when pushed)

Indicator lamp output port: 0 = no indicator output

Feedback device outputs. Pinball software on the PC can control output devices connected to the KL25Z to create special effects during play, such as tactile feedback address the outputs. Use these port numbers when you set up your [DOF configuration](#). For each port, you can select the physical output pin that the port is wired to.

Test Outputs

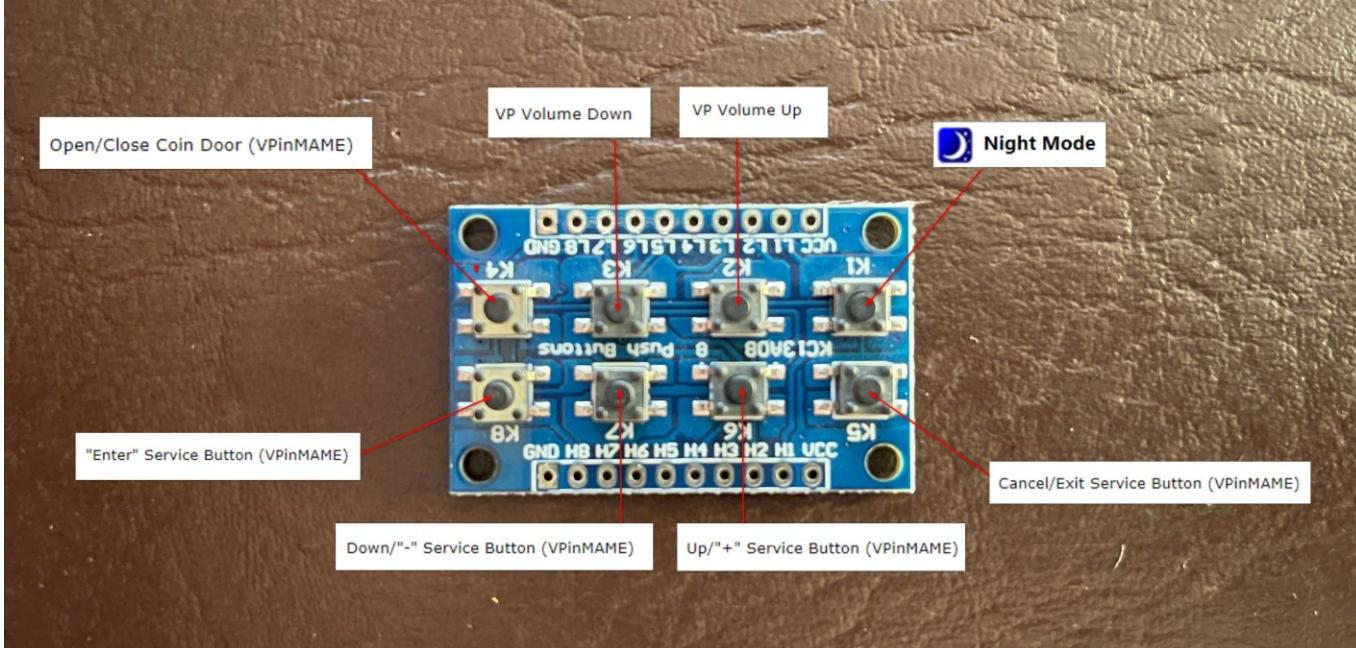
Port No.	Type	Location	Pin	Port	Options [?]	Description
+ X I	Digital	KL25Z	J1-2	PTA1		Bumper
+ X I	PWM	KL25Z	J1-4	PTA2		Shaker Motor
+ X I	Digital	KL25Z	J1-6	PTD4		Flipper Left
+ X I	Digital	KL25Z	J1-8	PTA12		Flipper Right
+ X I	PWM	KL25Z	J1-10	PTA4		
+ X I	PWM	KL25Z	J1-12	PTA5		
+ X I	PWM	KL25Z	J2-2	PTA13		
+ X I	PWM	KL25Z	J2-4	PTD5		
+ X I	PWM	KL25Z	J2-6	PTD0		
+ X I	PWM	KL25Z	J2-10	PTD3		
+ X I	Digital	KL25Z	J2-8	PTD2		
+ X I	Digital	KL25Z	J1-14	PTC8		
+ X I	Digital	KL25Z	J1-16	PTC9		
+ X I	Digital	KL25Z	J1-1	PTC7		
+ X I	Digital	KL25Z	J1-3	PTC0		
+ X I	Digital	KL25Z	J1-5	PTC3		
+ X I	Digital	KL25Z	J1-7	PTC4		
+ X I	Digital	KL25Z	J1-9	PTC5		
+ X I	Digital	KL25Z	J1-11	PTC6		
+ X I	Digital	KL25Z	J1-13	PTC10		
+ X I	Digital	KL25Z	J1-15	PTC11		
+ X I	Digital	KL25Z	J2-18	PTE0		

NOTE: Nightmode on VirtuaTilt is enabled for all feedback devices. You can choose to enable/disable for specific devices from above settings page.

Buttons Mapping

This is the default VirtuaTilt buttons mapping:

Default Control	Keyboard Config	Button Color
Left Flipper	 Shift (Left)	Left Flipper 
Left MagnaSave	 Ctrl (Left)	Left MagnaSave 
Right Flipper	 Shift (Right)	Right Flipper 
Right MagnaSave	 Ctrl (Right)	Right MagnaSave 
Start	 ! 1	Start Game 
Coin In	 % 5	Coin In 
Exit/Cancel	 Esc	Exit to menu 
Launch Ball	 Enter	Plunger/Launch Ball 
Extra Ball	 @ 2	Extra Ball (Buy-In) 
Fire!	To be assigned on Visual Pinball	



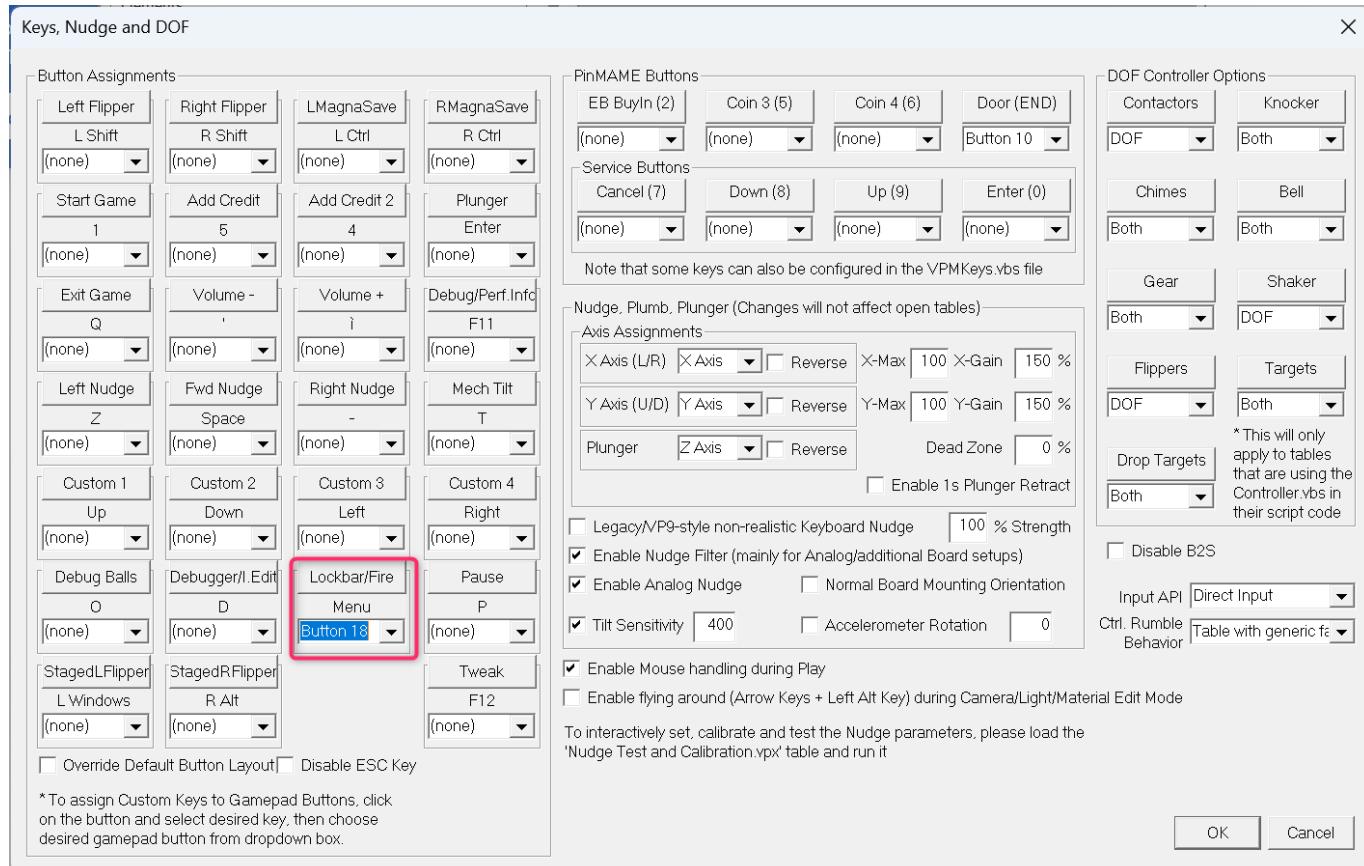
Fire Button assignment

To assign fire button, check corresponding button number in Pinscape config tool (button 18 in this case):

3	PTB2		OFF
4	PTB1		OFF
5	PTE30		OFF
6	PTE22		OFF
7	PTE5		OFF
8	PTE4		OFF
9	PTE3		OFF
10	PTE2		OFF
11	PTB11		OFF
12	PTB10		OFF
13	PTB9		OFF
14	PTB8		OFF
15	PTC12		OFF
16	PTC13		OFF
17	PTC16		OFF
18	PTC17		ON

Joystick button status:

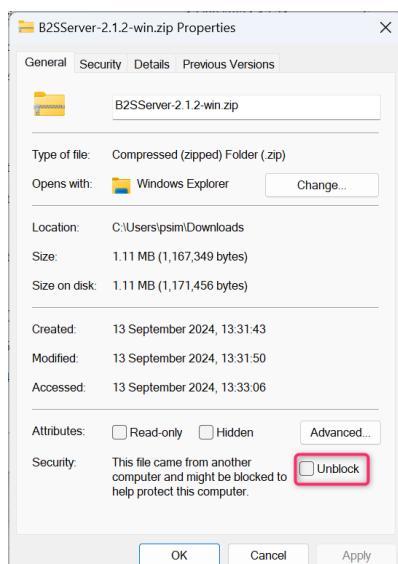
Assign same button number in Visual Pinball:



Installing DOF

You need B2S Server installed first. If you have already installed it, skip this B2S Server part.

For first-time users, download latest version from here: <https://github.com/vpinball/b2s-backglass/releases> and unblock it:

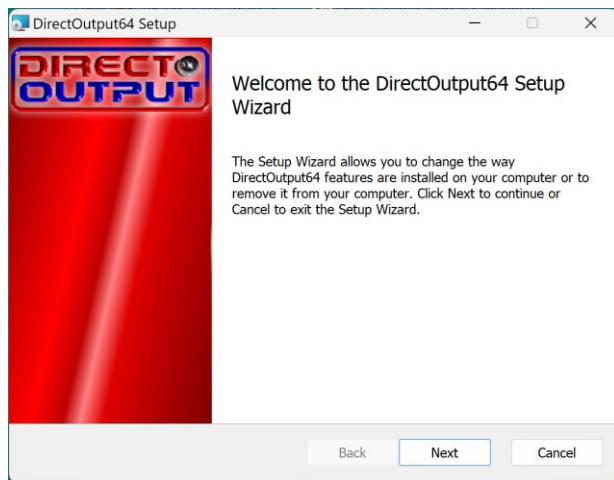


Unzip the B2SServer archive in VisualPinball folder (typically **C:\vPinball\VisualPinball\Tables**) and run the **B2SBackglassServerRegisterApp.exe** as Administrator (right-click). This registers the software as a COM object:

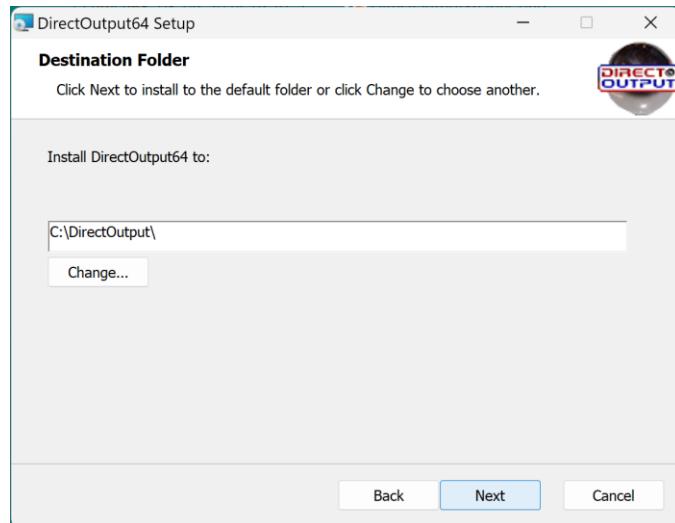


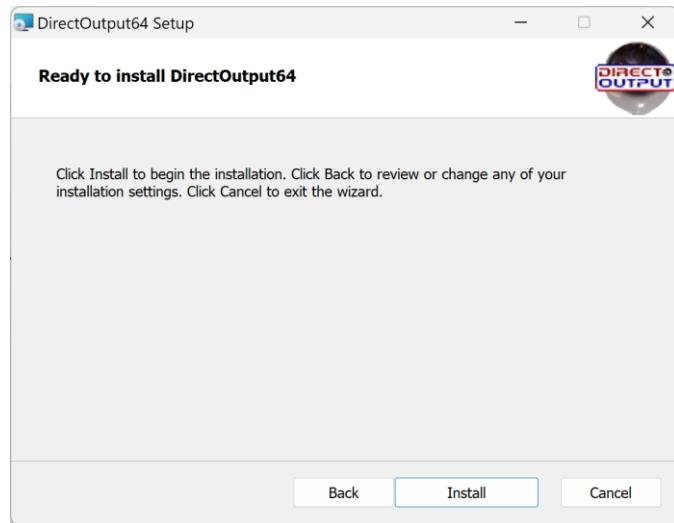
Latest version of DOF (**1 September 2024**) allows merging of X86 and X64 installs. **64bit versions only of both VPX and DOF are highly recommended.**

Install DOF using .msi files from official page: <http://mjrnet.org/pinscape/dll-updates.html> and launch it:

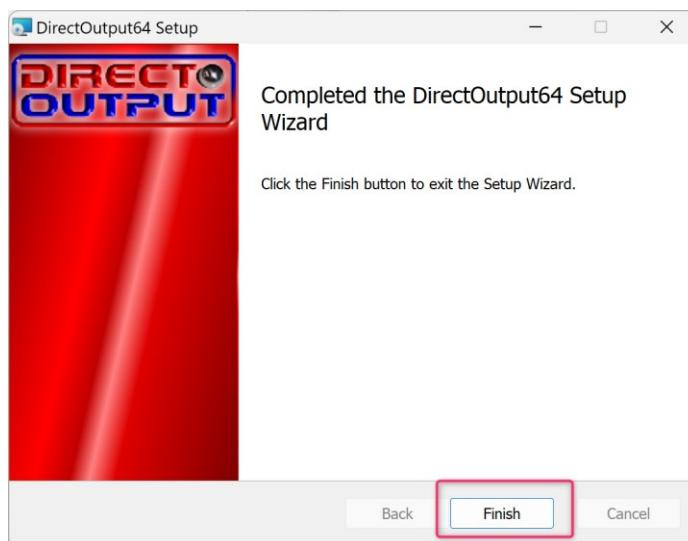
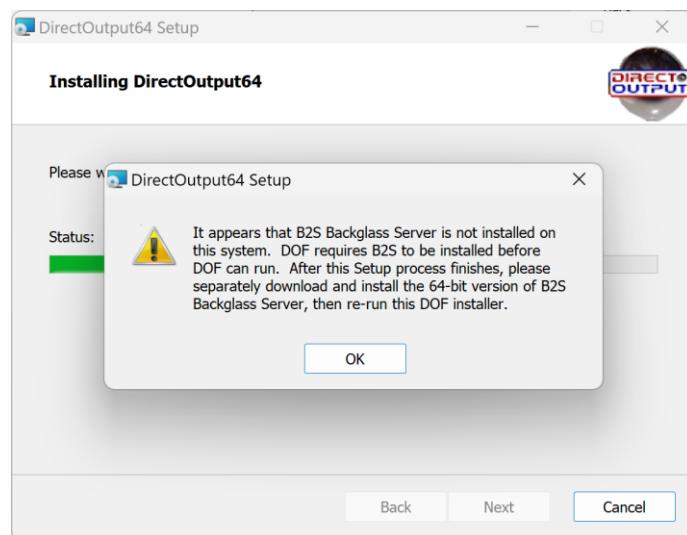


Leave installation folder as-is (**C:\DirectOutput**). Highly recommended:

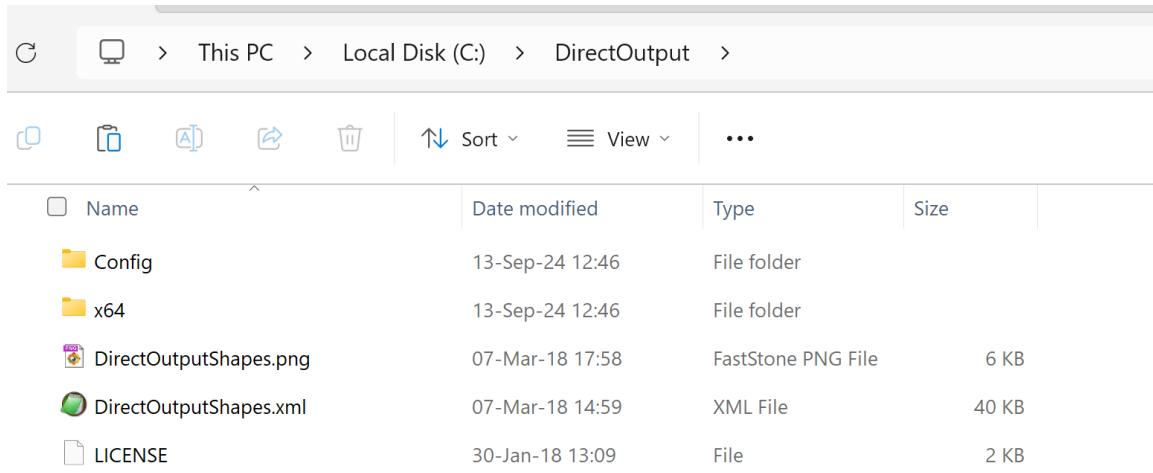




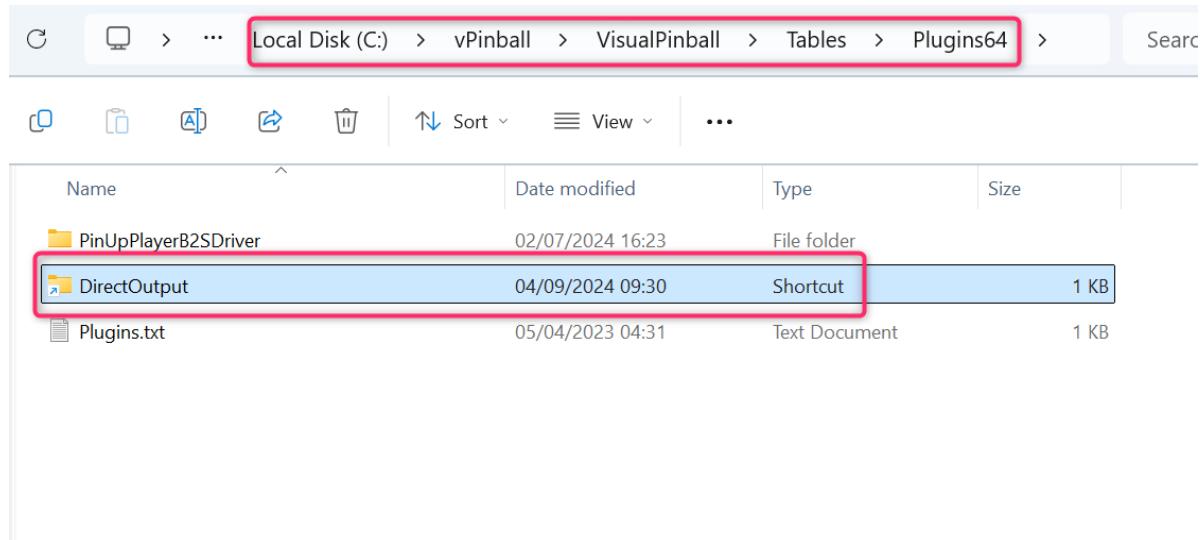
Do not care about following error (it appears if you don't have B2S Server installed) and click OK:



This is how the **\DirectOutput** folder will look like:



A shortcut to DirectOutput folder in **\Plugins64** folder of B2SServer installation should be present (created by DOF setup):



If not, manually create a shortcut to **DirectOutput** folder and put it in **Plugins64** folder of B2SServer installation.

As a reference, the official step-by-step guide for DOF configuration is available here: [Pinscape Build Guide \(mirnet.org\)](#).

Configuring DOF for VirtuaTilt

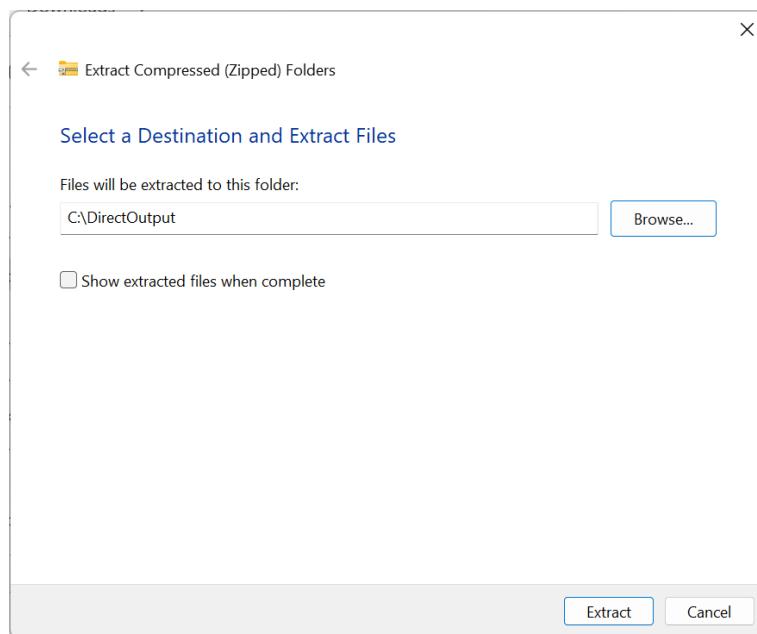
In order to configure DOF you need to setup a configuration file. You can create an account and login to the [DOF Config tool](#) page or [you can just download provided config files from our GitHub repository](#), unblock the file and copy/move the files into **C:\DirectOutput** directory (or wherever DOF is installed on your PC), overwriting existing files:

The screenshot shows a GitHub repository page for 'VirtuaTilt / DirectOutput'. A specific file, 'directoutputconfig_v4869.zip', is selected. The GitHub interface includes a search bar, navigation links like 'Code', 'Issues', and 'Pull requests', and a sidebar with files like 'main', 'Configurations', 'DirectOutput' (which contains 'directoutputconfig_v4868.zip' and 'directoutputconfig_v4869.zip'), 'readme.md', 'LICENSE', and 'README.md'. Below the file list is a 'Code' button, a blame history, and a note about GitHub Copilot.

A modal window titled 'directoutputconfig_v4869.zip Properties' is open. It displays the following details:

- Name:** directoutputconfig_v4869.zip
- Type of file:** Compressed (zipped) Folder (zip)
- Opens with:** Windows Explorer (with a 'Change...' button)
- Location:** C:\Users\psim\Downloads
- Size:** 63.6 KB (65,224 bytes)
- Size on disk:** 64.0 KB (65,536 bytes)
- Created:** 13 September 2024, 16:01:33
- Modified:** 13 September 2024, 16:01:34
- Accessed:** 13 September 2024, 16:01:34
- Attributes:** Read-only Hidden Advanced...
- Security:** This file came from another computer and might be blocked to help protect this computer. Unblock

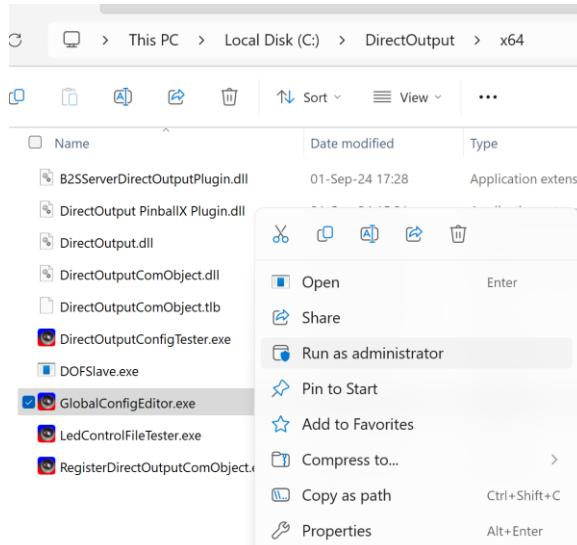
At the bottom of the dialog are 'OK', 'Cancel', and 'Apply' buttons.



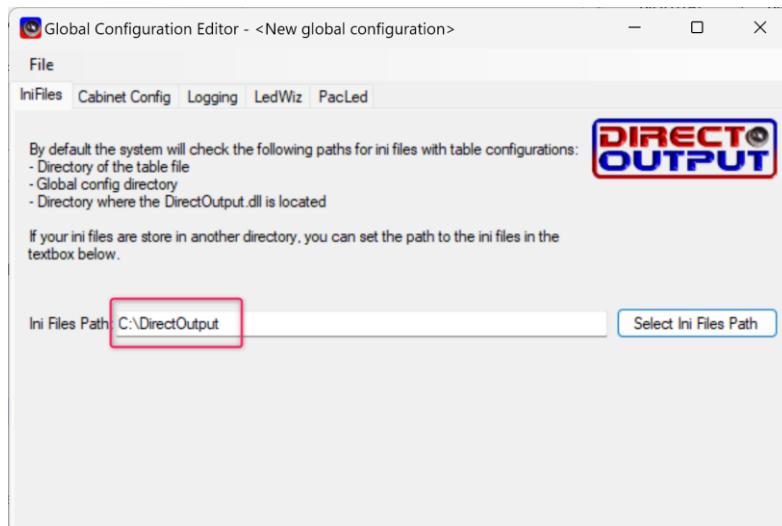
This is how the **DirectOutput** folder will look like:

Name	Date modified	Type	Size
Config	13-Sep-24 12:46	File folder	
x64	13-Sep-24 13:07	File folder	
directoutputconfig51.ini	04-Sep-24 07:08	INI File	139 KB
DirectOutputShapes.png	04-Sep-24 07:08	FastStone PNG File	4 KB
DirectOutputShapes.xml	04-Sep-24 07:08	XML File	57 KB
LICENSE	30-Jan-18 13:09	File	2 KB
tablemappings.xml	04-Sep-24 07:08	XML File	138 KB

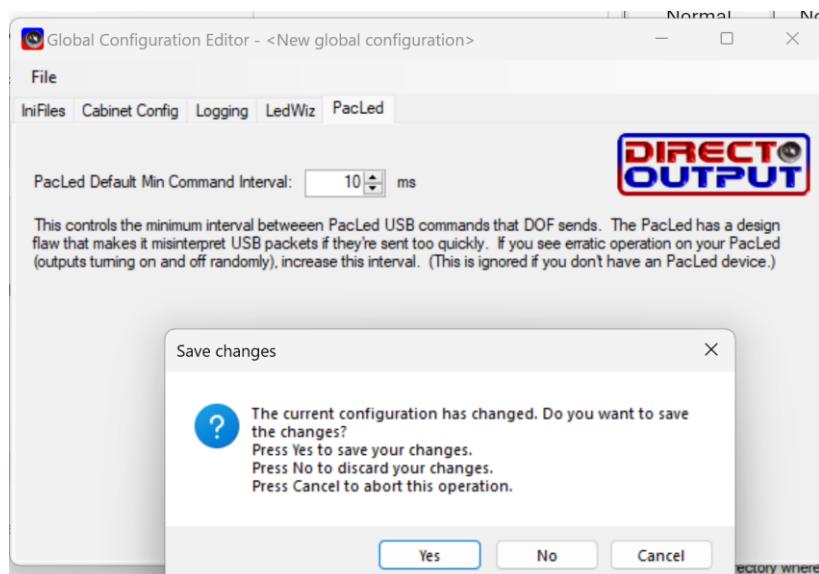
Now right-click **GlobalConfigEditor.exe** file in **/DirectOutput/X64** folder and launch it as Administrator:



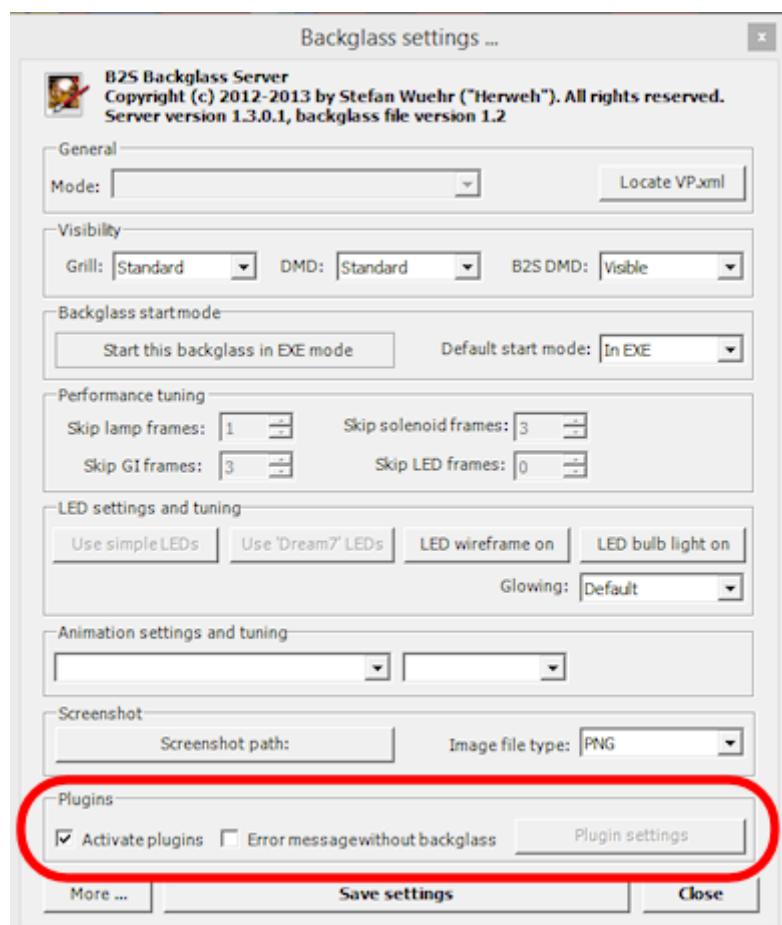
Configure .ini file path where you previously unzipped our config file (**C:\DirectOutput**):



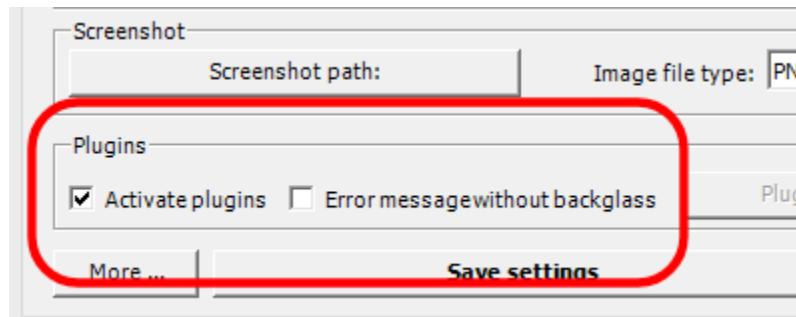
Close the window and press **Yes** to save all changes:



Start Visual Pinball and load a table that has a matching B2S backglass file installed; right-click the mouse anywhere in the backglass area to bring up the B2S options dialog:



Check the box **Activate plugins** and uncheck the box **Error message without backglass**.

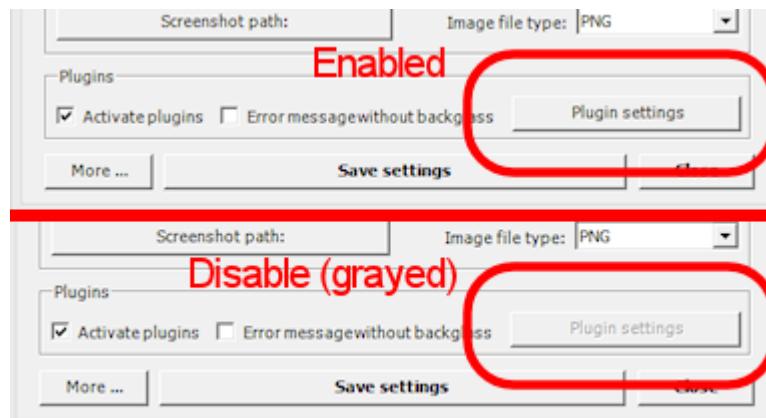


Make sure that **Activate plugins** is checked and **Error message without backglass** is un-checked

- Click Save Settings
- Exit the table (press "Q" and then "Q" again) and close VP

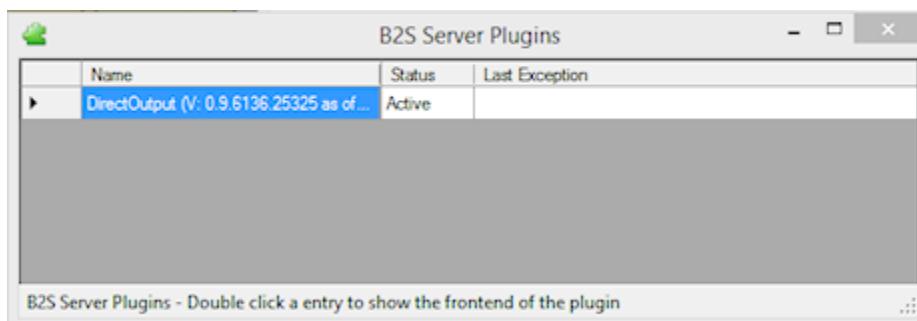
Now start VisualPinball and load a table that has a B2S backglass. You can use the same table you used during the setup procedure in the step where we updated the B2S backglass settings.

As before, when the backglass appears, right-click the mouse anywhere in the backglass display area to bring up the options dialog. Look to see if the **Plugins** button at the bottom is **enabled**:



If the button is disabled, DOF isn't getting loaded. Go to the official [troubleshooting](#) section for things to try.

If the button is enabled, click it. This will bring up a separate dialog that shows the status of each plugin.



Look for a **DirectOutput** entry in the list. If you don't see any such entry, it means the same thing as a disabled Plugin Status button, namely that DOF isn't being loaded. Go to the official [troubleshooting](#) section for help.

Finally, check the **Status** and **Last Exception** columns for the Direct Output entry.

If the Status is Disabled, or there's a message in the Last Exception box, see the official [troubleshooting](#) section for help.

If the Status is **Active** and the Last Exception column is empty, congratulations! Your DOF setup work was successful! DOF is loading and starting correctly.

Changing DOF Configuration

Select your device

Create an account and login to the [DOF Config tool](#) page.

Once you have an account setup, go to **My Account** and select the number of devices for your setup.

- Select **1 for Number of Pinscape Devices** and then **Save Settings**

The screenshot shows the 'DOF Config Tool' interface with the 'Account Settings' tab selected. The 'Number of Pinscape Devices' dropdown is set to '1'. The 'Save Settings' button at the bottom left is highlighted with a red box.

Creating a config file

When creating a config file for your setup, its simply a matter of selecting the outputs for each device in your cabinet. VirtuaTilt is already configured this way:

- **Port1** – Solenoid – Combo for bumpers and slingshots
- **Port2** – Shaker Motor
- **Port3** – Left Flipper Solenoid
- **Port4** – Right Flipper Solenoid

Current Version: 4855

Device: Pinscape 1 - directoutputconfigin51

Port	Combo1	Port	Port	Port	Port	Port	Port
1	34	67	100	101	102	103	104
Port	Shaker	35	68	104	105	106	107
3	36	69	107	108	109	110	111
Port	Flipper Right	37	70	112	113	114	115
Port	Flipper Left	38	71	116	117	118	119
Port	39	72	120	121	122	123	124
Port	40	73	125	126	127	128	129
Port	41	74	130	131	132	133	134
Port	42	75	135	136	137	138	139
Port	43	76	139	140	141	142	143
Port	44	77	144	145	146	147	148
Port	45	78	149	150	151	152	153
Port	46	79	154	155	156	157	158
Port	47	80	159	160	161	162	163
Port	48	81	164	165	166	167	168
Port	49	82	169	170	171	172	173
Port	50	83	174	175	176	177	178
Port	51	84	179	180	181	182	183
Port	52	85	184	185	186	187	188
Port	53	86	189	190	191	192	193
Port	54	87	195	196	197	198	199
Port	55	88	199	200	201	202	203
Port	56	89	204	205	206	207	208
Port	57	90	209	210	211	212	213

Save Config Generate Config Clear Fields

Shaker Motor
Min Intensity: 48 ✓ Max Intensity: 48 ✓

Fan
Min Intensity: 1 ✓ Max Intensity: 48 ✓

Toy Durations in ms
Chime: 60 ✓ Knock: 60 ✓ Bell: 60 ✓

Custom Brightness
Strobe 48 ✓ PF Strobe MX FF ✓ Flasher FF ✓ Ledstrip Flasher FF ✓

Contactor variables
Set Intensity and Duration to 0 if you don't want feedback to these events

Targets Drop Targets
Duration: 60 ✓ Intensity: 48 ✓ Duration: 60 ✓ Intensity: 48 ✓

Ledstrip variables Revert Default Check here for explanation of the positioning parameters

Strobe MX Left AH 30 ✓ AL 0 ✓ AT 0 ✓ AW 9 ✓ Color: White ✓ SHP Circle3 ✓
 Strobe MX Right AH 30 ✓ AL 91 ✓ AT 0 ✓ AW 9 ✓ Color: White ✓ SHP Circle3 ✓
 Flasher MX Left AH 100 ✓ AL 0 ✓ AT 0 ✓ AW 19 ✓ SHP Circle3 ✓
 Flasher MX Right AH 100 ✓ AL 20 ✓ AT 0 ✓ AW 19 ✓ SHP Circle3 ✓
 Flasher MX Center AH 100 ✓ AL 40 ✓ AT 0 ✓ AW 19 ✓ SHP Circle3 ✓
 Flasher MX Right AH 100 ✓ AL 60 ✓ AT 0 ✓ AW 19 ✓ SHP Circle3 ✓
 Flasher MX Left AH 100 ✓ AL 80 ✓ AT 0 ✓ AW 19 ✓ SHP Circle3 ✓

The **Combo1** config is assigned to slingshot and bumpers:

Combo ID	Option	Toy Category	Toy 1	Toy 2	Toy 3	Toy 4
Combo1	Delete	Mono	Slingshot Left	Slingshot Right	B Bumper Left	B Bumper Right
New	Add	Mono				

You can change it according to your personal preferences. To do this, simply navigate to the "**Combine Toys**" section in the config tool and enter your new combos.

NOTE: Shaker Motor Intensity is already set at Maximum (48). You can change it according to your personal preferences:

Save Config Generate Config

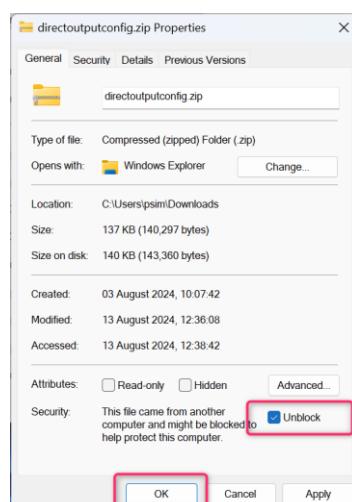
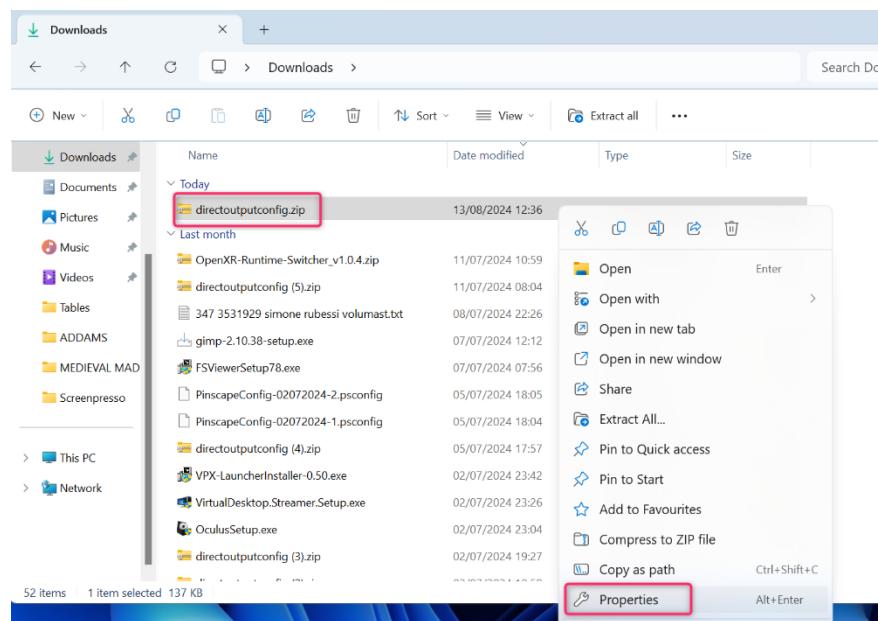
Shaker Motor
Min Intensity: 48 ✓ Max Intensity: 48 ✓

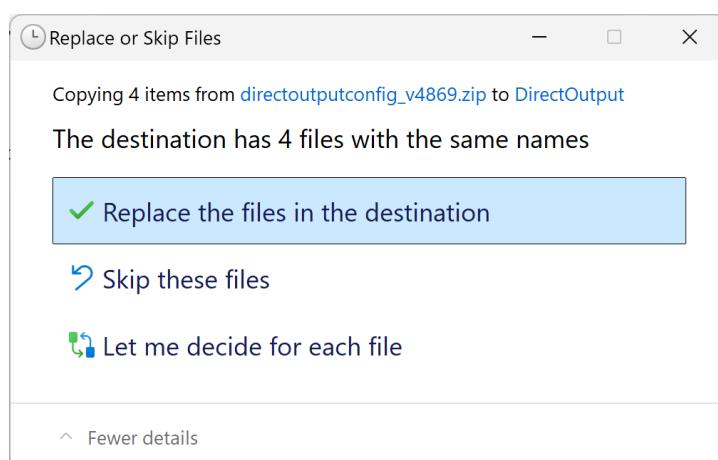
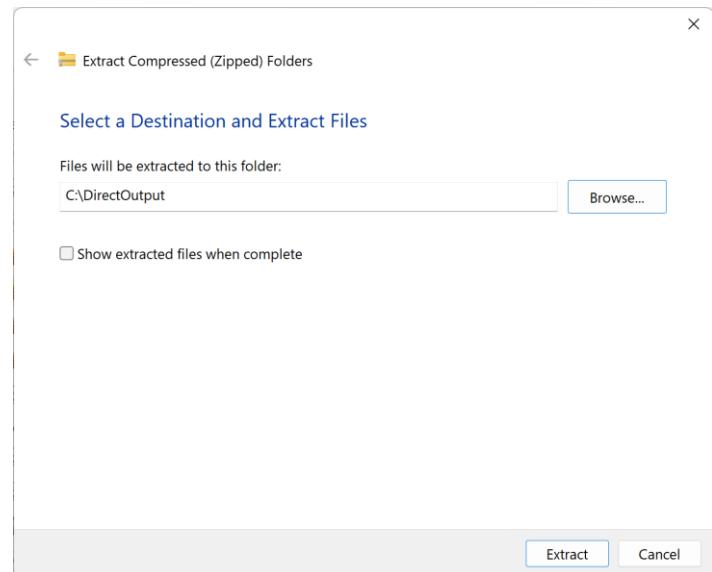
Setting your config in DOF

Once you have everything set in the config tool, click the **Save Config** button, then **Generate Config** button:



This will download a copy of the configuration files onto your PC. All you need to do now is to extract the zipfile into your **C:\DirectOutput** directory (or wherever DOF is installed on your PC) and overwrite all files:

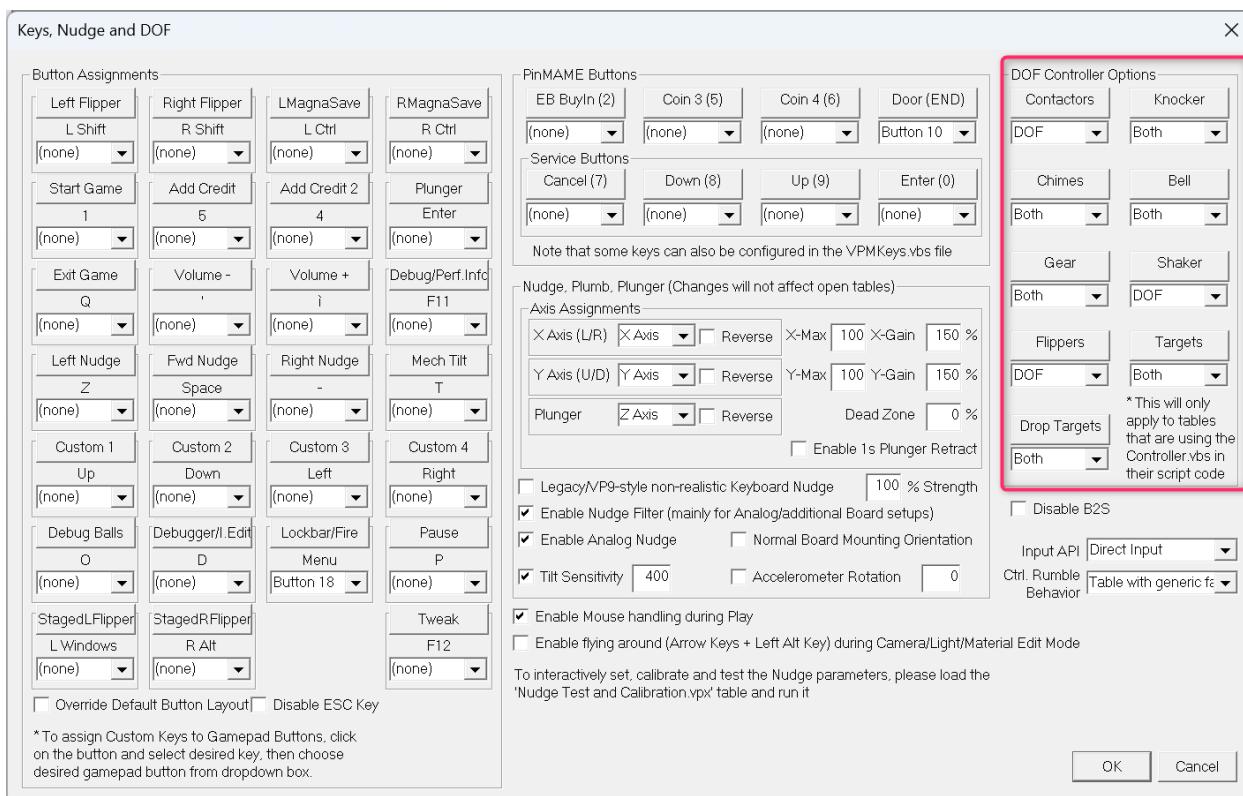
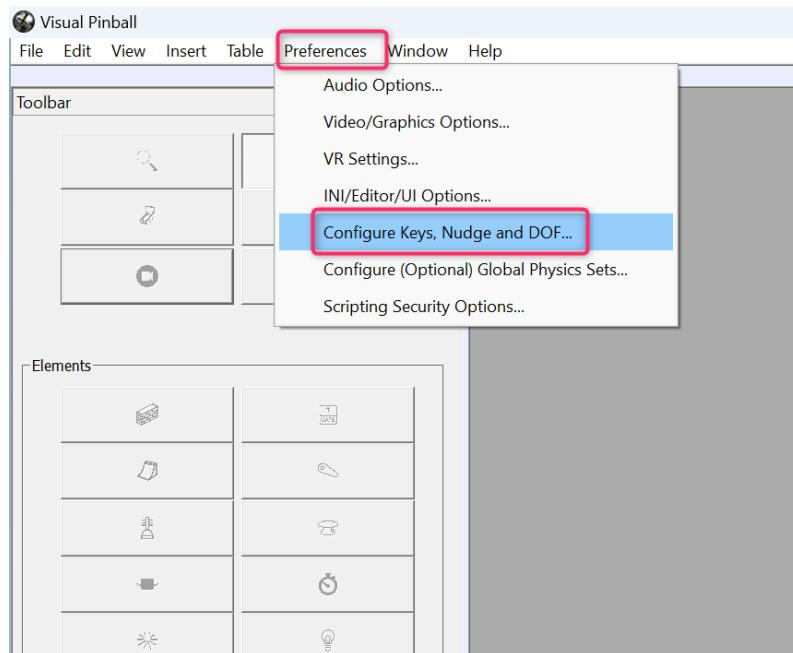




This PC > Local Disk (C:) > DirectOutput >				
	Name	Date modified	Type	Size
<input type="checkbox"/>	Config	13-Sep-24 12:46	File folder	
<input type="checkbox"/>	x64	13-Sep-24 13:07	File folder	
<input checked="" type="checkbox"/>	1.xml	13-Sep-24 13:21	XML File	1 KB
<input checked="" type="checkbox"/>	directoutputconfig51.ini	04-Sep-24 07:08	INI File	139 KB
<input checked="" type="checkbox"/>	DirectOutputShapes.png	04-Sep-24 07:08	FastStone PNG File	4 KB
<input checked="" type="checkbox"/>	DirectOutputShapes.xml	04-Sep-24 07:08	XML File	57 KB
<input checked="" type="checkbox"/>	LICENSE	30-Jan-18 13:09	File	2 KB
<input checked="" type="checkbox"/>	tablemappings.xml	04-Sep-24 07:08	XML File	138 KB

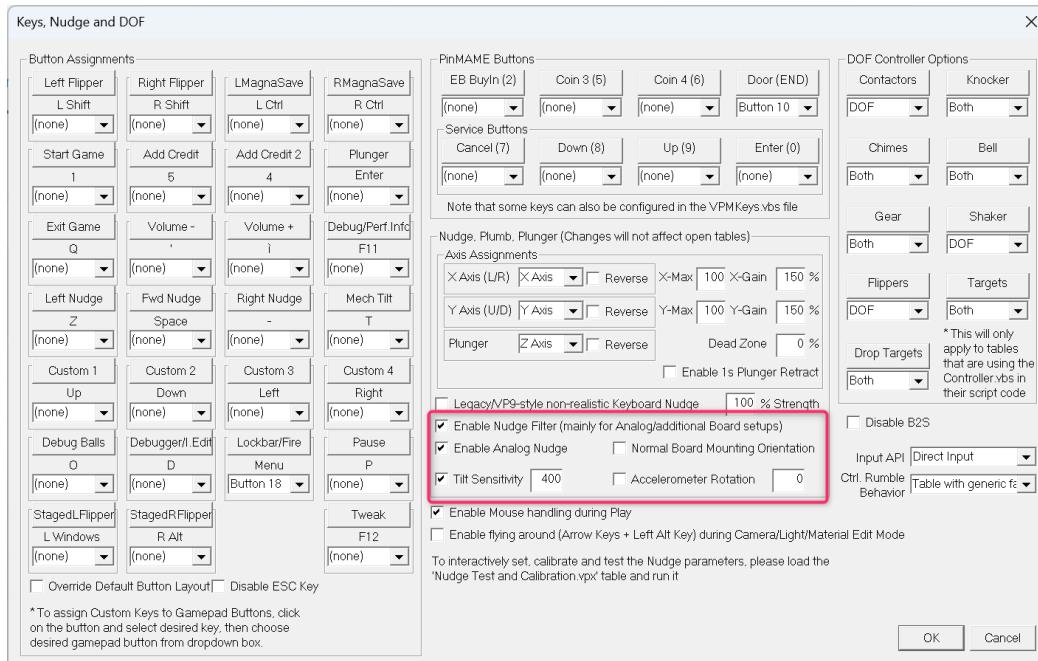
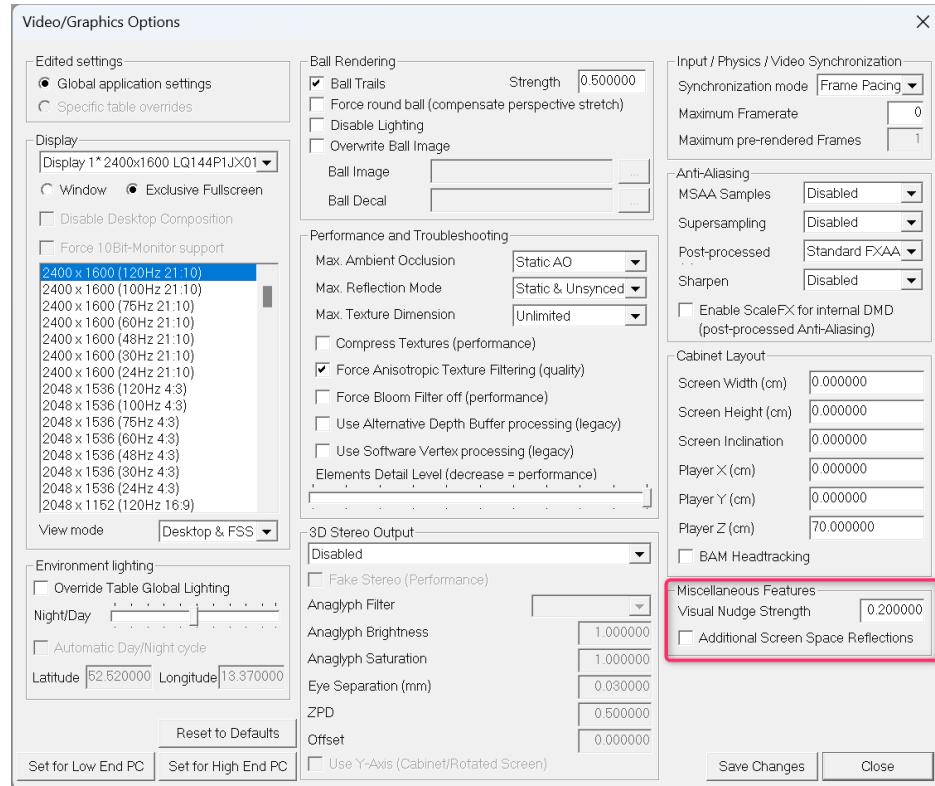
Visual Pinball configuration

Replicate the following configuration in Visual Pinball settings:



Nudge/Tilt configuration in Visual Pinball

We recommend starting with following values and modify them afterwards:



Your VirtuaTilt should now be able to play Visual Pinball and have feedback on all supported tables!