JP's VPX7 Physics Rev2
(jpsalas 2023)

(This is a short introduction to my physics settings for authors who want to try them.)

Why new physics settings?

For several years I have been using the default VPX physics, which are explained in the file PhysicValues.txt, and they are quite good. But there were always a few things that I always felt they could be better. Many other authors have made their own changes and all them are quite good (like ClarkKent, nFozzy and Rothbauer). But I wanted to use what VPX has to offer, and simply adjust some parameters to make the tables play a little closer to a real pinball with a few simple settings. I always felt the default physics made the ball feel more like a football (a soccer ball) or even a billiard ball, more than a pinball steel ball. The same for the flippers which were missing some functionality, and the shooting angles were not optimal.

Here it is what I wanted to accomplish:

- Stop the ball making strange stops and changes in speed or direction.
- Increase side to side action.
- Do some flipper tricks like live catches, cradle separation and backhand shots.
- Consistent flipper shooting angles.
- Reduce ball rebound on top of a flipper when it is up.
- Better ball bounce on objects, mostly rubbers, both at higher and lower speeds.
- Easy way to control the ball speed.
- The settings should not hogg the CPU.

To do all these I wanted a set of values that should be the same on all the tables, older and newer, and they should be easy to add to a table. Rubbers should be rubbers on all the tables, they should not change elasticity or friction values, and the same applies to metals, plastics and wood. Flippers should work just as good on older tables than in new tables.

You will find several files in the download zip:

- JP's VPX7 Rev2 Physics.pdf   *this document which explains all the settings*
- JP's VPX7 Rev2 Elasticity Test.vpx   *a simple test of the new elasticity settings*
- JP's VPX7 Rev2 Table Physics.vpp *table and flipper settings that you can import*
- JP's VPX7 Rev2 Physics Materials.mat   *the physic materials for easily change the object properties. I recommend using collections.*
- JP's VPX7 Rev2 script addons.vbs   *flippers script.*

The Objects settings

To make these settings easier to add to the objects just load inn "JP's VPX7 Rev2 Physics Materials.mat" and apply those materials to all the objects that are in contact with the ball. In the editor just press F4 and use the import button.

	Metals	Plastic	Wood	(made mostly with wall objets)
Elasticity	0,3	0,2	0,25	*very low compared to rubbers*
El. FallOff	0,2	0,2	0,2	
Friction	0,15	0,15	0,15	*also very low values*

Rubbers	**Elasticity**	**Elasticity FallOff**	*(made also mostly with wall objets)*
(posts)	0,95	0,6	*normal sized rubber. Thick plastic or metal pegs with a round thick rubber*
(pins)	0,9	0,6	*thinner rubber. These are metal pegs with just a thinner round rubber*
(pegs)	0,85	0,6	*thin rubber. I call "pegs" those metal pegs with a thin rubber sleeve around.*
(long bands)	0,95	1,7	*+ - very long rubbers so they can absorb high speed balls*
(medium bands)	0,95	1,2	*+ - medium sized rubbers*
(short bands)	0,95	0,75	*+ - a little less bouncing that on posts*

Rubber bands with different lengths should have FallOff values between 0,75 and 1,7 depending on the length of the rubber, this FallOff value will make the rubber to absorb more or less ball energy.

Friction   0,25

Rubber Objects Hit height   27

Rubber Objects Height   30   *pins are a little higher, at 32, but the hit height should still be 27 for better VPX collision and physics.*

I prefer to user the rubber objects just for looks, and use walls around to ensure a nice collision hit, and to separate hit sounds and the physics. Good rubber behavior is essential for nice physics.

Scatter Angle   5 +   *on everything. Bumpers can usually be 10 or higher*.

Flippers

Flipper size 2”

Rubber: 5,9, 17,6 , 23,5

Size: 22,6 14,1 , 81,3

Flipper size 3” (Williams/Stern/Gottlieb – mostly modern flippers)

Rubber: 5,9, 17,6 , 23,5

Size: 20,6 11,7 114,7

Flipper size 3” (Bally/Gottlieb - older thicker flippers)

Rubber: 4,1, 17,6 , 23,5

Size: 22,6, 13,6, 114,7

Angle: between 50-53 degrees, f ex.

Start angle: 118 to 122, depending on the table. This angle should be aligned with the in-lane plastic, so the ball should not jump or change its speed.

End angle: 68 to 72. 68 will give you better strait up angle shots and backhand shots. It will make it easier to trap the ball.

End angle of 70 is average.

End angle of 72 will make it harder to catch the ball, but it will make it easier for the ball to pass from one flipper to the other. Backhands shots will be harder to do.

Flipper settings (all flippers: 2.5”and 3”, new and old)

Mass	1	
Strength	4600	very strong,
Elasticity	0,8 +	thin rubber, but can be changed to thicker rubber (0.95)
Elasticity Falloff	0,5 +	from 0,5 to 1,7, 1.7 gives hard rubbers, this is easy flippers.
Friction	0,25	normal rubber friction
Return Strength	0,04	
Coil Ramp up	1	these values are changed dynamically in the script.
EOS Torque	1	
Torque Angle	0	

Adjust the Elasticity FallOff to make the flippers more or less bouncy.

These settings will give nice all-round flippers but with some limitations. To help these limitations, JLouLouLou has enhanced my flippers settings in the script with a whole new routine to handle the EOS and enable all kind of flipper tricks, like live catches, cradle separation, and much more. So, take a look at JP's VPX7 Rev2 script addons vbs file to see the changes.

The flippers are very strong to get nice shooting angles, use Const **maxvel** to limit ball speed in then rolling sounds sub.

Other objects

Ramps   same as metal/plastic, although I have added a special ramp and ramp top materials. The ramp material has very low friction so it will help the ball come up the ramps.

Bumpers strength   15++
Slingshots strength 20++
Plunger strength   90++

Playfield settings

Gravity constant   0,9810001
Playfield friction   0,025
Playfield Elasticity   0,2
Contact Scatter Angle 5
Min & Max Slope   4 +- (EM)   5+ (early SS)   6 +- (newer SS)

Script changes

Take a look at the file "JP's VPX7 Rev2 script addons.vbs" to cut & paste the code to your tables.

The changes in the script are minimal. Just 2 main changes:

- the flipper section with the EOS changes
- the rolling sound routine which includes the ball speed control.

Flippers:

The script by JLouLouLou will change EOSTorque value in real time, so the flipper will be able to do all kind of tricks. Just test them on the table Attack from Mars v4_physics_test.vpx.

Ball speed control:

Added to the ball rolling routine. Change then **maxvel** constant according to table, for ex. 25-30 for EM, 30-40 early SS or 40-50 for modern tables with high ramps. It all depends of the speed you want to give to the table and how high ramps are on the table.