

JP's VPX7 Physics

(jpsalas 2022)

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

All my tables released after 2020 include these settings.

The Settings

To make these settings easier to add to the objects just load in "JP's physics materials rev3.02 for VPX.7.mat" and apply those materials to all the objects that are in contact with the ball. Put those objects in Collections so the sound routines will play the hit sounds (see the vbs script).

	Metals	Plastic	Wood	(made mostly with wall objects)
Elasticity	0,2	0,15	0,25	very low compared to rubbers
El. Falloff	0,25	0,25	0,25	
Friction	0,15	0,15	0,15	also very low values
Rubbers	Elasticity	Elasticity Falloff (made also mostly with wall objects)		
(posts)	0,95	0,5	normal sized rubber. Thick plastic or metal pegs with a round rubber	
(pins)	0,85	0,55	thinner rubber. These are metal pegs with just a thinner round rubber	
(pegs)	0,9	0,5	thin rubber. I call “pegs” those metal pegs with a thin rubber sleeve.	
(long bands)	0,95	1,7	+ - very long rubbers so they can absorb high speed balls	
(short bands)	0,95	0,75	+ - a little less bouncing than 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 use 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 , 78

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

Size: 24, 14, 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	3600	strong,
Elasticity	0,85	thin rubber, but can be changed to thick 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	0,07	
Coil Ramp up	0	
EOS Torque	0,75	(it is adjusted in the script's flipper subs from 0,2 to 0,75) EOS
Torque Angle	10	

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

These settings will give nice all-round flippers but with some limitations. You will be able to make most of the flipper tricks, but you won't be able to do the ball tap passes, due to the very low Coil Ramp up value. I could enable tap passes but then the flippers may feel sluggish on its way up.

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

Playfield settings

Gravity constant	0,980665
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 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 will change EOSTorque value when the keyup or keydown is pressed to reduce the rebound when the flipper is up, as this value will be high, and at the same time to enable some flipper tricks like cradle separations and also drop catches when the flipper is on its way down.

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.