

State Fair Pinball Documentation

The Mission Pinball Framework Team

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The Machine / Hardware

- 1 Playfield Description** **2**
- 2 Backbox Features** **4**
 - Modularity 4
- 3 Mechanical backbox toy** **5**
- 4 Electronics** **6**
 - Lights & LEDs 6
 - Ticket Counter 6
 - Gun Replacement 7
 - Driver Reassignment 7
- 5 Tickets** **8**
 - Wristband Mode 8
 - Ticket Bets 9
 - Ticket Champion 9
 - End of Ball Bonus 9
 - Ticket Buy-in 9
 - Game Over 9
- 6 Skill Shots** **10**
 - Regular Skill Shot 10
 - Video-based Skill Shot 10
 - Super Secret Skill Shot 10
- 7 Food** **11**
- 8 Carnival Games (Modes)** **13**
 - todo 13
- 9 Fair Attractions** **15**
 - Demolition Derby 15
 - The Petting Zoo 15
 - Pig Race 15

Tractor Pull	16
Pie Eating Contest	16
Monster Trucks	16
10 Multiballs	17
General multiball	17
11 End of Ball Bonus	18
Bonus Multipliers	18
12 Combos	20
13 Prize Booth	21
14 Rides	22
15 Wristband Mode	24
16 Zoltar	25
17 Video Modes	27
18 Wizard Mode	28
19 Download State Fair Pinball	29
20 Yet to figure out	30

This repository is for the *State Fair Pinball* (SFP) machine, a new machine currently being conceived by the people who are creating the [Mission Pinball Framework](#) (MPF).

The theme of the machine is a state fair. (Duh!) Think carnival games, demolition derbies, livestock judging, pie-eating contests, amusement rides, and deep-fried food.

State Fair Pinball is designed to be a “teaching machine”—ultimately a complete game that we can use for the MPF tutorial.

Our goal is to not use any licensed content and to make all the plans, assets, designs, etc. available for free. So if you want to build your own (or use the base plans for your own), then you’re free to.

Note: Everything here is just an early draft as our ideas come together. Lots will change, and we’d love your feedback too!

State Fair Pinball attempts to capture the experience of being at a state fair. All of the game modes are based on things you do at a fair, including riding attractions, playing carnival games, and eating food.

One of the central concepts of the game is “tickets” (which are tracked per player, separate from score). Just like a real fair, you need tickets to do things, which you earn through game play. Several game modes are carnival games, which cost tickets to play, but also where you can win tickets which you can then use to do more things. (So everything you do costs tickets, but some things earn you tickets as well.)

You get to the wizard mode by doing everything in at fair, so if you’re good and you can earn lots of tickets quickly then you can move through all the modes, but if you’re not as good you might have to play some of the carnival games a few times to earn enough tickets for the later things. (More on tickets [here](#).)

Since SFP is a teaching machine, we're going to try to add as much as we can into it. So some things might be over the top, but everything that's there is for the purpose of demonstrating how it could be done.

Playfield Description

While we'd love to completely design *State Fair Pinball* from scratch, we realize that we're "software people" and not "mechanical engineering" or "playfield layout" people.

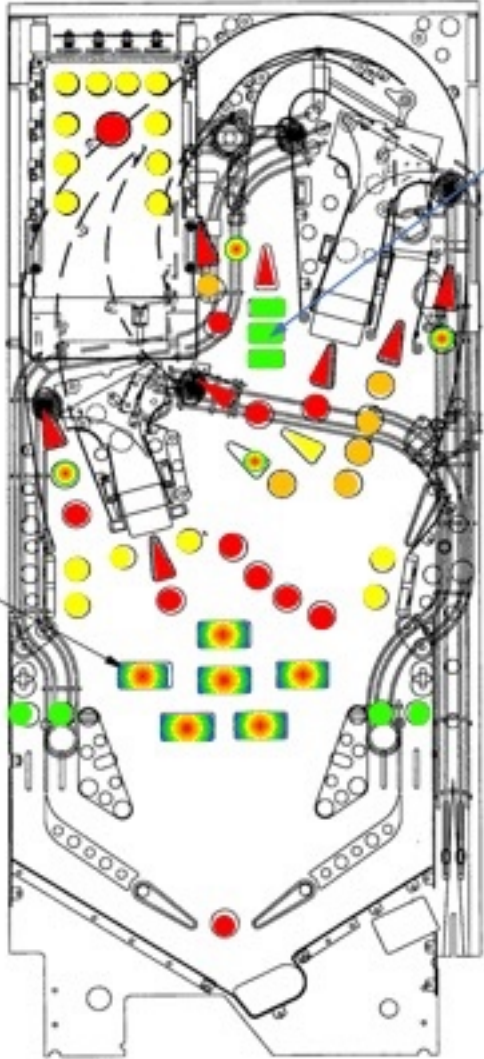
So the *State Fair Pinball* machine we're building is a retheme of Bally's 1994 *The Shadow* pinball machine.

"Re-theming" means that we take an existing machine and completely strip it down to the bare wood, and then replace all the art with original art. (Sort of like how Stern's *Shrek* is a retheme of *Family Guy*—same mechanical and physical layouts, but completely different games.)

Our goal is to make the retheme process as easy as possible, which means keeping the physical changes of the machine to a minimum. Luckily we can use *The Shadow* almost as is. We'll have to make some minor changes like replacing the Phurba ramp diverters with State Fair-themed ones, and swapping out the figurines, but everything else pretty much works as is. (The Battlefield is a perfect State Fair shooting gallery!)

We'll also keep the inserts as they are, including the colored inserts. However we'll replace the lamps under the clear inserts with RGB LEDs which will give us the option to change their colors. We'll also replace the rings with RGB LEDs and add more LEDs on the top site of the playfield since state fairs have lots of lights.

Here's a diagram of the playfield with the lights in the colors they are. The rainbow lights are RGB LEDs:



Backbox Features

We'd like to do something fun in the backbox versus just having a static translite full of lights. We don't know what we'll do exactly, but maybe something like a *Scared Stiff* style rotating wheel, or EM-style score reels to show the current player's ticket count.

We also want to add a red rotating light on the backbox (which lights and spins when the player wins one of the midway games), as well as an electric mechanical bell on the side of the backbox.

We'll keep the DMD / speaker panel the same size, but upgrade the speakers and replace the DMD with a 128x32 dot matrix RGB LED display.

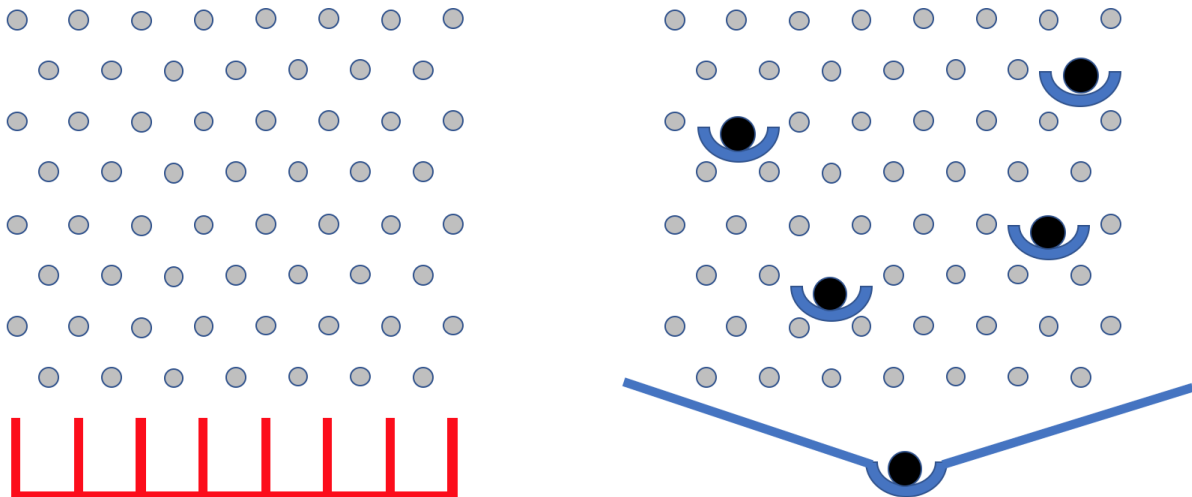
Modularity

Since *State Fair Pinball* is a teaching machine, we expect that people might want to build their own, but that they also might not want to include all of the physical components (some of which are complex and/or expensive). So we'll be sure that the bigger external things (mechanical backbox stuff, etc.) are optional, and we'll show people how to configure their operator menus to enable/disable things. (In other words, we'll treat these things like optional mods.)

Mechanical backbox toy

It could be a *Scared Stiff* style mechanical wheel in the backbox. Don't exactly know what this is for yet. A prize wheel?

Or this could be another type of carnival game? Maybe this is something like Pachinko? There could be small balls and lots of pins, with several channels with different prizes. (The labels for the prize channels should be interchangeable so operators can change which prizes and odds are available.)



It's our intention to make this project as easy as possible for us, which means that we will *not* rewire the machine from scratch. Instead we'll replace the MPU board with a P-ROC or FAST WPC controller (MPF supports either with just a few lines of config file changes). We'll reuse the existing WPC driver board.

We will be able to remove the DMD board and sound board. We'll replace the DMD board with a [Smart Matrix RGB LED DMD](#). Sound will be driven by the host computer that runs MPF.

Removal of those two boards will free up space to install a small single-board computer to run MPF in the backbox. We'll probably run Linux since it's free and easy to use with MPF.

We'll reuse the original transformer and power supply, but will also install an additional 5v power supply to power our computer and LEDs since they will draw more current than is available in the built-in 5 volt line available in the 20+ year old machine.

Lights & LEDs

We will update the machine to LEDs, but use the "drop in replacement" style LEDs that are commonly available for pinball machines. That will allow us to reuse the existing lamp matrix without a lot of rewiring.

Some of the playfield inserts are transparent, so for those we'll replace the original lamps with modern RGB LEDs so we have full color control. We'll use either a FadeCandy (if we're using a P-ROC) or the built-in RGB LED controller of the FAST Pinball controller to drive the LEDs.

Ticket Counter

Since *tickets* is a central concept in the game, we want to add an LED segmented ticket counter somewhere. We don't know where we'll add it yet. Possibly in the right rear corner.

Gun Replacement

We'll replace the gun-shaped ball launch switch with a regular switch.

Driver Reassignment

We want to add some new drivers to *State Fair Pinball* that were not originally in *The Shadow*.

First is an powered up/down post which can hold balls in the right habitrail about 6 inches before it drops the ball into the right inlane. This will use used in various game modes (basketball, quick draw).

We also want to add the rotating red beacon on the top of the machine.

Third is the mechanical bell on the side of the backbox.

One option would be to add a driver board (either a PD-16 if we're using a P-ROC or an 0804 if we're using a FAST Pinball controller). Another option is to repurpose 3 flasher outputs to drive these devices and then to replace the original high-voltage flashers with LEDs.

Tickets

A central concept of *State Fair* is tickets.

Tickets are used to start many of the game modes (which are midway games and fair attractions that you need tickets to play). Some of the modes let you earn tickets, and some are things you need to spend tickets to do just to play. (Eventually you have to do everything to get to wizard mode.)

The number of tickets a player has at all times will be plainly visible and as obvious as their score. Ideas currently are that it's either (1) a large 7-segment numeric display in the right rear corner, or (2) an EM-style score reel display in the backbox. (Or both?) We'll also make it clear on the DMD when tickets are awarded.

The player starts with a certain number of tickets (operator configurable). Something like 4.

You get tickets for all the things you'd expect, like:

- Skill shot (4 tickets)
- Super skill shot (1 extra ticket for each target you hit, and 4 extra if you get them all down)
- Combo (1 ticket for a 2-way combo, then 1 more for each combo chain you add on).

Many of the modes will also award tickets depending on how you do in the mode.

Wristband Mode

One of the prizes in the game will be a "wristband" which gets you unlimited access to the attractions without needing tickets for a certain amount of time. (Something like 30secs of non-mode game play.) So to start the super mode which costs 100 tickets, either earn that many tickets or start it while you have the wristband.

Ticket Bets

Some modes will allow you to wager your tickets. (There's a horse race mode, for example.) Others will let you bet on skill. e.g. "If you can hit this shot in one flip, you win 50 tickets, but if you miss, you lose 20 tickets. Yes or No?"

Ticket Champion

The number of tickets will go up and down throughout the course of the game as the player wins and spends them. But the game will track how many total tickets the player has earned over the course of the game, and a "TICKET CHAMP" high score category will be tracked.

End of Ball Bonus

The total number of tickets a player has earned will be one of the things that End of Ball Bonus is calculated on.

Ticket Buy-in

There will be an operator setting that enables a special "Buy-in" button on the cabinet that lets you buy more tickets during a game. (Something like 10 tickets for 25 cents)

Game Over

When the game ends, you should be given the opportunity to "buy" something on your way out with your tickets. An extra ball, or play a light & sound show, or the ability to fire the knocker, flash the light, or ring the bell, the ability to impress your friends with fake initial entry, leave them for the next player to "find" somewhere, etc.

State Fair Pinball does not have a mechanical spring plunger, so the skill shot options will need to be based on shots hit.

Regular Skill Shot

Similar to *Ghostbusters*, the player can use the left and right flippers to “call their shot” for the skill shot. We should make it so that all shots have to be completed before they’re reset so a player doesn’t keep hitting the same shot over and over.

Video-based Skill Shot

Similar to *Champion Pub*, we can have an option where the player holds down the launch button and then releases when the prize they want is selected. It would be annoying to have this running at the same time as the regular skill shot, so maybe this is used only to launch additional balls in certain modes.

Super Secret Skill Shot

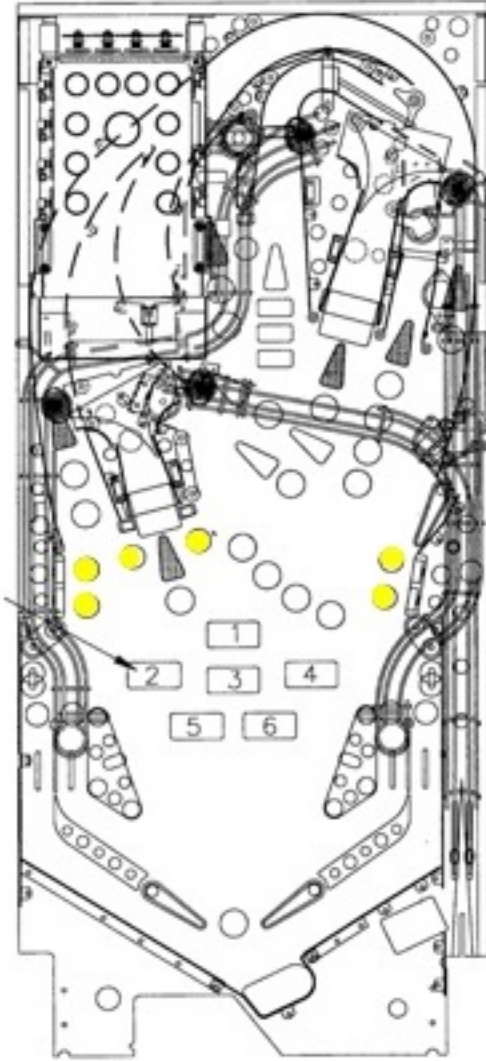
We could add some kind of advanced skill shot where the player’s skill shot prize is doubled (or something) if they immediately hit a combo after hitting the skill shot.

CHAPTER 7

Food

State Fairs are about eating so much food that you hate yourself. So we'll capture that in *State Fair Pinball*. :)

SFP has 6 standup targets with yellow lights, as show here:



We will label each of them for a different type of fair food:

- Corndog
- Deep fried Twinkie
- Giant pickle
- Beer
- Cotton Candy
- Funnel Cake

Each hit will be the player consuming one of those food items. We can have fun with them, like a bonus to loosen your belt after 20, a drunk mode if you get 6 beers in 2 mins, sugar high if you eat 10 twinkies, cotton candies, and/or funnel cakes in one ball, etc.

The drunk mode can use novelty flippers (maybe selected at random).. inverted, reversed, possibly even delayed (though we should give the player their ball back if we're too mean). Maybe even a "drunk champion" for the player who spends the most time drunk.

We can also incorporate the amount of food consumed into the bonus.

Carnival Games (Modes)

One of the main objectives of *State Fair* is to play midway games to win tickets. Playing games themselves require tickets. The selected game is flashing, and you light “Start Game” with a ramp shot, then hit the “Start Game” hole.

State Fair has a physical bell and a revolving red light on the top of the backbox. Both of these will go off when you “win” a game.

todo

- Sack Race (Video Mode), Alternate flippers, two consecutive of the same flipper and you fall over

Basketball (Midway Game)

This is the game where the player has a certain amount of time to make as many baskets as they can. This is a multiball mode. The trough and plunger auto launch can deliver balls to a habitrail which goes down the right side of the machine and has a post which can hold the balls.

When the mode starts, the trough will deliver all the balls to that post to stage them for the player. Balls will be released one at a time (every few secs) to the right flipper.

Any balls drained are put back into play (to the right flipper), and this mode has a multiball ball save timer so the player has a set time of unlimited balls to make as many baskets as they can.

Another option for this mode is that *only* the lower right flipper is enabled, which means all the player does is shoot for baskets. So this means that balls will drain a lot, which is fine, because they will continue to be delivered to the right flipper. (This is nice because it shows off a flipper novelty mode. This could also be an operator-configurable option which will show off that functionality as well.)

We can use both ramps for this mode, with the diverters oriented (and locked) so the balls are always returned to the right habitrail to be redelivered to the player. The easy (left) ramp can be one ticket per shot, and the rear right ramp can be 2.

Tickets are awarded for each basket made as well as a bonus for hitting a certain number.

This mode uses the display to show remaining time (in seconds), and when it's less than 10 seconds, it shows the time in tenths of seconds (like basketball shot clocks). We can add sound effects of a ball bouncing off the rim for missed shots.

Color Match (Midway Game)

The two ramps each have player-controlled diverters, and we'll add an RGB LED to each direction, so we have four RGB LEDs.

Then in this mode, the four major ramp shots are all lit with a different color randomly: red, green, yellow, blue.

Each shot made cycles that shot's color to the next on one the list. The goal is to try to get all the ramps to be the same color. The "catch" of course is that if the player is getting close and they accidentally hit a shot that was already the color they wanted, that shot will cycle to the next color and they will have to try to get all the shots that color or hit that shot three more times to cycle it to the color they want.

If we really want to be mean, we can make the standups just outside the ramp cycle the colors. Or maybe the slings?

Once you they the shots how they want them, the player can hit another shot to collect (lock in) the combo. Tickets will be awarded depending on how many shots you have that are the same color.

Something like:

- 2 shots match (2 tickets)
- 3 shots match (4 tickets)
- 4 shots match (8 tickets)

Quick Draw (Midway Game)

Similar to *Cactus Canyon*, a post holds the ball in the return lane just above the right flipper. It counts down "3, 2, 1, Draw!" and then one shot is randomly lit and the ball is released. Player win lots of tickets if you make it, no tickets if you don't. One shot.

Shooting Gallery

Uses the mini playfield. 1 ticket for each target hit, and they go out as you hit them. A bonus if they're all out.

Strong Man Mallet Pole (Midway Game)

Hit a shot over and over, with each shot adding to the lights, and a slow decay if shots aren't made fast enough. We can add a hardware toy with LEDs which shows the progress.

Or can we install an accelerometer behind the ball lock wall and detect how hard that shot is hit?

Fair Attractions

State Fair has lots of attractions that need to be played to get to wizard mode. All of the attractions take tickets to start, and most of them you can win tickets.

Demolition Derby

Clearly a multiball mode. Score by hitting standups. Increase your multiplier by hitting ramps (to increase speed). Mode ends when only one ball is remaining.

The Petting Zoo

Animal escape!

All balls in the machine are released, and you have to lock them all.

This mode can contain the homage to the cow.

There are five balls in the machine and five places that balls can go. So all five balls are released (and re-released if they drain) and the player has to lock all five. When the mode ends, points are awarded based on how many you locked.

When the mode ends, the balls will be released, so it will be like multiball again, but we need a reason for why they're released.

Pig Race

Bet on which pig will win. Race begins, pig numbers are randomly assigned to shots, you have to hit the shot you end up with to advance your pig.

Tractor Pull

This mode focuses on combos, with each combo propelling the player's tractor ahead. But be careful, because each non-lit shot they hit (standups, etc.) causes damage. (First slipping, then ultimately a broken drive train.)

This mode is not timed but ends when the player either wins or hits too many (5?) off shots. So it rewards accuracy rather than speed.

Pie Eating Contest

How many times and how fast you can hit one shot. But too fast or you'll choke!

Monster Trucks

CHAPTER 10

Multiballs

State Farm Pinball will have several multiballs. We will include several different styles:

- Traditional
- Add-a-ball
- Timed unlimited
- Stacked

Modes in the game which include multiball:

- Petting zoo escape
- Basketball

General multiball

Typical three shots to lock three balls. Then jackpots / super jackpots while you play. Can be stacked with other modes. After the first time through, two shot to light/lock.

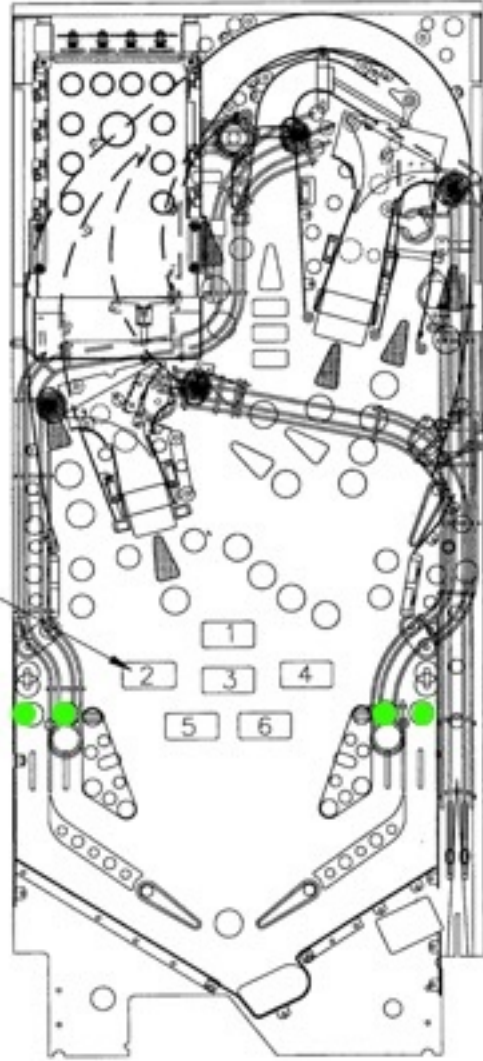
CHAPTER 11

End of Ball Bonus

- Total number of tickets earned (not current)
- Highest scores on each carnival game (so if you play a game again and get a better score, it uses that one)
- Total rides ridden (or total attractions / games started)
- Bonus multiplier
- Amount of food consumed

Bonus Multipliers

The bonus multiplier is advanced by completing the “FAIR” lanes. They all start off at the beginning of a ball and can be rotated with the flippers.



Bonus multipliers can also be awarded by Zoltar or purchased with tickets at the prize booth.

CHAPTER 12

Combos

We want to track combos (and a combo champ), awarded when a player hits a lit shot (lit with the red arrows) within a shot time after hitting a shot that returns the balls to the flippers. Points can be awarded for chaining these together, 3X, 4X, 5X, etc.

The Shadow used a left orbit to upper right flipper combo, with additional combos when the right flipper to inner left orbit is hit over and over. This is fun and something we should add to SFP.

CHAPTER 13

Prize Booth

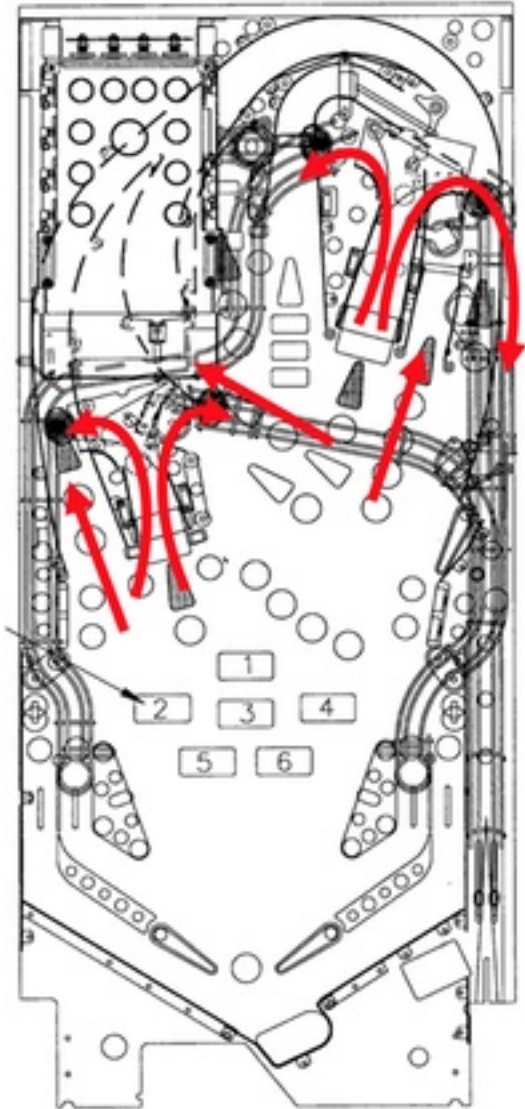
One of the shots will be for the ticket redemption stand where you can use tickets to buy prizes and power ups. For example:

- Extra 10 seconds of ball save (4 tickets)
- One extra tilt warning (5 tickets)
- Additional X bonus multiplier (10 tickets)
- Hold Bonus (15 tickets)
- Extra ball (100 tickets)
- etc.

CHAPTER 14

Rides

State Fair Pinball will have several rides. These aren't really incorporated in the game play (in that you don't need to start modes for them or spend tickets), rather, the 7 main flow shots map to the following seven rides:



From left-to-right:

Haunted House Comet Cyclone Fun House Hurricane Mousin' around Zingy Bingy

CHAPTER 15

Wristband Mode

CHAPTER 16

Zoltar

<http://www.thingiverse.com/thing:822643>



Award a random free prize, which could include:

- Extra ball
- Tickets
- Ball Save
- Wristband
- Points
- One extra tilt warning
- Additional X bonus multiplier
- Hold Bonus

Also some things are bad:

- No hold flippers
- Weak flippers
- No lights

It would be cool if we could load actual cards into the machine that would be dispensed when you

CHAPTER 17

Video Modes

Sack Race / Three-legged race

CHAPTER 18

Wizard Mode

Don't know what this will be yet, but I like the idea that when it's done, the fair is over and all the lights are off and you have to wait until next year to come back. (And when you do, everything is more expensive in terms of the number of tickets things cost.)

CHAPTER 19

Download State Fair Pinball

State Fair Pinball is hosted on GitHub. You can browse it online [here](#).

Download the [latest zip](#) which is the MPF machine folder (as well as these docs).

Note that at this point, *State Fair Pinball* doesn't exist. The MPF config is literally an empty folder.

CHAPTER 20

Yet to figure out

There are several other concepts which can be incorporated that we haven't figure out yet, including:

- Ribbons & judging
- Day and night modes
- Power outage mode. Could have a cool light show effect of colored lights blowing up with bright white flashes.
- Mode stacking
- Modes you can play again and again
- Modes you have to play multiple times
- Modes you only do once and then complete