Total Nuclear Annihilation

Service Manual

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1) Introduction

Total Nuclear Annihilation Pinball is a project that Scott Danesi started in November of 2015. The goal was to create a semi-simple, early 80's Bally influenced custom machine. This pinball machine would have upgraded electronics, displays, lights, and software with an 80's retro-futuristic feel. In 2016 the machine design got picked up by Spooky Pinball LLC. to be produced as an actual production machine. Production began in September of 2017.

To find out more about the build process and to find the latest code updates please visit

ScottDanesi.com

For technical service please reach out to

Service@SpookyPinball.com

For other Spooky Pinball games please visit

SpookyPinball.com

2) Game Assembly and Setup

Thank you for purchasing a game from the smallest, happiest, goofiest little pinball company on the planet! Your support means everything to our family and business.

Here's a few quick notes to help you get your new game set up.

Ideal playfield pitch is 6.5 degrees

2.1 Unboxing and parts inspection

Tools required for initial machine assembly

Utility knife or razor blade
Ratchet with ⅝" socket or ⅝" wrench
Small bubble level (side to side and incline)
Wire cutters

Parts List

1 Set of coin door keys
1 Tilt plump bob
1 Backbox (head) bolt
4 Pinball legs
4 Pinball leg levelers with nut
8 ⅝" Headed pinball leg bolts
4 Pinballs
1 Power cable (line cord) for your country's electrical system

#1 - Your coin door keys are located inside this leg box. All the pinballs, a power cord, legs, leg bolts, and head bolt & washer, are in the same package. Your backbox key is inside the coin door. Please take a minute to inspect to make sure you have all the parts and that they are not damaged.

#2 - If your game came in a box then there are a couple of ways to begin. If your game did not come in a box, then continue on to step #3. Begin by opening the flaps on the top of the box. Be mindful to make sure you remove the staples from the flaps so you don't get scratched or misplace any of them. DO NOT CUT THE PLASTIC STRAP JUST YET!

A) With some assistance, lay the machine flat on the floor one the side that is marked "Truck this side only." Grab the plastic strap and pull the game from the box. Once the game has been removed from the box (and with the assistance of a helper), stand the game back upright on its back.

OR

B) Using your utility knife, carefully cut down the sides of the box that are labeled "Truck this side only," making sure that your knife DOES NOT come in contact with the game cabinet itself. Once both sides are cut you will be able to access the pinball cabinet itself.

#3 - Start by threading the leg leveler nut onto each of the levelers. Once that is complete then you can thread the leg leveler into the bottom of each of the pinball legs. Let's begin with all of the levelers adjusted to their lowest positions (threaded all the way in).

2.2 Leg installation and backbox assembly

#4 - Using 2 of the ⅝” headed pinball legs bolts per leg, start with either of the front legs. Thread the leg bolts into the corresponding holes on the corners of the front of the cabinet. Using your ratchet or wrench, tighten adequately to make sure the leg is attached to the machine. With the assistance of a friend or helper slowly tip the game forward until the two from legs are resting on the floor. Now, as a team, pick up the rear of the cabinet and attach the back two legs in the same fashion as the front. You may want to find a stool or other sturdy support system to rest the game on while attempting this. Once the rear legs bolts are inserted and tightened you can set the game down on its legs.

#5 - Using your wire cutters, cut the plastic strap that runs the length of the game. CAREFUL, there is some tension on this strap and it may release with some force. Once the strap is free, now you can lift the backbox into position. Be mindful to make sure none of the wiring gets pinched while lifting the backbox. Use the clasp on the backbox and the cabinet to temporarily hold the backbox upright. This should not be used as a permanent fastener. Using the keys from the parts box, open the coin door and retrieve the backbox keys. With these keys, unlock the backbox lock and remove the backglass by gently lifting up on the “lift channel” and then swing the glass out and down from the channels it is supported in. Now, using the head bolt and washer provided, secure the backbox to the base cabinet. At this time check for any loose or disconnected connection in your backbox. When you are done, reinstall the backglass and engage the lock. Place the backbox key back on the hook in the coin door.

#6 - With the coin door open, grasp the lever located at the top right of the door frame and pull it to the left. This will release the mechanism that hold the “lockdown bar” in place. Set the lockdown bar aside in order to remove the playfield glass. Now close your coin door to keep it out of the way of the playfield glass. In order to remove the playfield glass, simply slide the glass down the front of the machine. This is tempered glass, so please take care not to hit the edges of it on anything as it may shatter. With the glass safely stored off to the side we are ready to level the machine.

2.3 Pitch and Level Adjustments

#7 - With your small bubble level you can level the side to side action of your game. Placing the level on the playfield itself will give you the most accurate results. First level the back of the game. With your friend or helper watching the level, crawl under the machine and rotate the leg leveler counter clockwise to make the leveler “longer.” Do this until your bubble is between the two lines on your level. Repeat this process for the bottom of the playfield. Once that is done, you can use your pitch level to adjust the pitch of the game. The steeper the pitch, the fast the game will play. We recommend a pitch of 6.5°. The pitch can be increased by raising the back of the game. This is accomplished by making the leg levelers on the back legs longer. Once proper pitch is established, recheck the level of the playfield.

2.4 Ball Installation

#8 - Now remove the pinballs from their package. Please take a minute to inspect them for any nicks or scratches. Also, this is a good time to wipe them off before installing them into the game. Once you are satisfied that they are acceptable, place them on the lower playfield and let them naturally fall into the trough. Please install all 4 balls that come with the game.

2.5 Tilt

#9 - The tilt plump bob is a metal cone, that when makes contact with the ring it is inside of, will issue a “Tilt Warning.” After repeated “tilts” the machine’s coils will shut down and the player will lose their current ball. To install the tilt plump bob (hereafter referred as simply tilt bob) open the coin door on the front of the game. Located on the inside left of the base cabinet you will find a long metal rod inside a metal closed hoop. Insert the narrow end of the tilt bob onto the metal rod and then tighten the nut on the side of the tilt bob. The farther up the metal rod you go, the less movement will be necessary to “tilt” the machine. After playing a couple of games you can adjust this to your liking.

2.6 Volume and Amp Adjustments

#10 - The volume for Total Nuclear Annihilation is controlled by the two black buttons mounted to the inside of the coin door. The amplifier has been set from the factory. PLEASE DO NOT adjust the amplifier directly.

2.7 Power up and First Impressions

NOTE: IMPORTANT! This game auto ranges from 50 to 60 hz! 110 / 220 switch is on back of 48v power supply. DO NOT ADD A CONVERTER / TRANSFORMER!

#11 - Using the line cord from your parts box, plug the female end into the receptacle on the back of the base cabinet and the male end into your wall socket. Turn the switch on (under bottom of cabinet, right front side). Please take this moment to check for proper function for the basics of the machine. If the machine does not seem to function properly see the troubleshooting guide at the end of this manual or contact Service@SpookyPinball.com

#12 - Your game is factory set to free-play... HAVE FUN! :-)

For more information, apron cards you can print, and links to even more technical info / parts... go to:
www.SpookyPinball.com/game-support
FOR TECHNICAL HELP, PLEASE EMAIL: Service@SpookyPinball.com
FOR SALES HELP, PLEASE EMAIL: KT@SpookyPinball.com
You will get a prompt reply.

Thanks from the Entire Spooky Pinball family!

SPOOKY PINBALL LLC
184 Ridge Ave.
Benton, WI 53803

3) Game Rules and Features

From: http://tiltforums.com/t/total-nuclear-annihilation-rulesheet/3209

Layout:

Upper Playfield area

- **Left Orbit** - Orbit entrance on left side of playfield. Feeds to top of playfield, CORE Rollovers, and right orbit.
- **Left Spinner** - Spinner directly inside Left Orbit Entrance
- **CORE Rollovers** - At top of orbit is four rollovers labeled C, O, R, E. The orbit has two controlled gates on either side of the rollovers. The rollovers feed to the Reactor playfield area
- **Reactor Core** - Playfield area at the top half of the game that is entered through the Rollovers and the ball exits at bottom of area near the scoop. The Reactor area has elements on all sides. The bottom is a mini flipper, with the exit directly to the right of it. The left edge above the flipper is a rubber ring, and the panel above it is a rubber ring with kicker (like a slingshot). The top is the CORE rollovers. To the right are three stationary targets labeled 1, 2, 3. Continuing around, the last side is a rubber ring with kicker.
- **Right Orbit** - Orbit entrance on right side of playfield. Feeds to top of playfield, CORE Rollovers, and Left orbit.

Lower Playfield

Lower playfield is your classic Italian flipper setup with 2 standard flippers, two triangle slingshots, and one inlane and one outlane per side.

Inlanes/Outlanes - Each lane is labeled labeled S, A, V, and E from left to right. Lit inserts can be moved with each flipper button. Used to qualify and collect ball saves.

RAD Targets - Three white stationary targets directly above the left inlane area. Each with a matching triangle insert, labeled R, A, D. Used to qualify mystery award and destroy reactors.

Destroy Targets - Red square stationary targets at left and right corners of the lower playfield area. Inserts say DESTROY. Used to destroy reactors.

Scoop - Main Scoop on Playfield. Can be shot from either flipper. Is the shot for Collect Mystery and Start Reactor. Watch out for how quick the scoop fires the ball back!

Grid - Three yellow stationary targets at top center of lower playfield. In front of the targets is a 3 x 3 grid of circular inserts. The inserts are lit by hitting the corresponding target above each column. Used to qualify a reactor and for reactor jackpots

Lock Targets and Lock Scoop - The set of 3 in-line drop targets. Behind the 3rd targets is a scoop.

Pop Bumper - Single pop bumper along the right side of the playfield, about halfway between the right orbit entrance and the right inlane

Rules

Total Nuclear Annihilation (TNA) is a perfect example of “Simple to learn, difficult to master”. The game play is deceptively simple, but is loaded with behaviors aimed to press the competitiveness of the game in a head-to-head scenario. Timing, pressure, and reaction are the recurring themes in TNA.

Skill Shot

Hands-Free Skillshot

At the start of a ball, one of the CORE rollovers will be lit. The lit letter can be moved with the flippers PRIOR to plunging the ball; once the shooter lane switch opens, the selected letter is locked in. Landing the plunged ball into the lit CORE rollover will score the ‘Hands-Free’ Skill Shot. If you move the selected lane with the flippers AFTER the ball is plunged, you will be downgraded to the regular skillshot.
Making a Hands-Free skill shot will complete the Reactor grid, and spot a full lane ball-save level. If the reactor is already running, the player will get a Reactor Jackpot.

Regular Skillshot
Using the flippers AFTER the plunge will move the lit rollover and change it's color to yellow. Doing so will disqualify the Hands-Free Shot, and making the lit rollover will score a regular Skill Shot.
Making a regular skill shot will spot a whole lane ball-save level.

Competitive Notes: The controlled gates will both be OPEN on a skill shot making it more difficult to drop into the rollovers. If you short plunge and the ball returns to the plunger, the game will QUICKLY plunge the ball and mock you. Using a short plunge to the right orbit and right flipper can be useful if you intend to hit the Lock lane.

End of Ball Bonus

End of ball bonus is reflected by the grid of inserts above the flippers. Bonus is increased by

- hitting grid targets
- hitting drop targets
- Bonus advance multiplied by playfield multiplier (?)

Different colors in the bonus insert grid simply indicate that you're over 10k. At 11k bonus, the 10k insert will light white and the 1k insert will light in a different color. At 20k, the 1s digits will light a new color (etc.).

Bonus Multiplier - Completing the CORE rollovers will increase the end-of-ball bonus multiplier. Multiplier will be reflected by the 2x, 3x,4x inserts below the grid.

Mystery Award

Mystery Award is qualified by completing the RAD Targets. Mystery is awarded by shooting the scoop. Mystery awards include:

- +1 Tilt Warning
- 10,000 Points
- 25,000 Points
- 150,000 Points
- Complete Keypad Grid
- Enable Ballsaver (default # of seconds)
- Enable Locks
- Increase Lane Save Level
- Enable Super Spinner (only if not already enabled)
- +1x Bonus Multiplier
- Max Out Bonus Multiplier (7x)

Special note: if you are out of tilt warnings, the mystery will always award +1 Tilt Warning.

Spinner

Spinner advances Reactor Bonus. The spinner will have its inserts lit and cycling when the Reactor is started, and will advance the Reactor's critical state. Super Spinner can also be started (Unknown impact and qualification)

Ball Save

There is a segment display below the flippers that will count down a ball save timer. Ball save is active at ball start. Ball save can also be collected and activated via the rollovers in the inlanes and outlanes. The ball passing over an unlit lane will light it red. Both flippers can be used to cycle the lit lanes. Lighting three S, A, V, E letters qualifies a ball save, and the 4th lane will start flashing. Having the ball trigger a lane with the flashing insert will activate the ball save timer.
Additional ball save levels can be stacked. Stacking is indicated by color in this order: Red, Orange, Yellow, Green, Blue, Purple. There is a bonus of 10K per un-used ball save at the end of the ball.

Reactors

The main feature and objective during the game is to destroy reactors. The game has 9 reactors as indicated by the 1-9 numbered inserts in the middle of the lower playfield. The game starts at Reactor 1, and destroying it, enables Reactor 2, and so on.
To destroy a reactor three phases must be completed
1 - Qualify the Reactor and Start it
2 - Advance the Reactor to Critical Status (100% on upper playfield numeric display)
3 - Destroy the reactor by hitting the randomly lit shots
Each Reactor has a starting bonus value, increasing with each reactor level. Each Reactor level is more difficult by increasing the amount the reactor must be advanced, and how many targets are needed to destroy the critical reactor.
Reactor State carries over ball to ball.

Qualifying the reactor
The keypad grid located at the center of the playfield is used to qualify the reactor. Hitting a target lites one of the inserts in the matching column to green. Filling the grid to all green qualifies the Reactor Start at the scoop. Shooting the scoop will start the reactor.

Overheat the reactor
Once a reactor is started, the Segment display in the upper playfield will count up to 99 as the player advances the Reactor's status. The Reactor is advanced by hitting the spinners and all switches/slingshots in the reactor area of the playfield (the upper playfield area). The kicker sides of the reactor advance the status quicker than the other sides. Advancing the reactor status will also advance the Reactor Value. Once the Reactor status surpasses 99, the Reactor is at critical and is ready to be destroyed. Max reactor value depends on the reactor level. Reactor 1 maxes at 40k, reactor 2 at (?), etc. The Reactor Value can be increased at any time before destroying it.

Destroy the Reactor
Once critical, one or more targets on the lower playfield will have their inserts lit white and flashing. To destroy reactor 1, only one target is lit, higher reactors require hitting more targets. The targets to hit will be hit will be randomly picked from the RAD, Destroy, and Pop Bumper. (the Pop Bumper can represent two targets). Hitting all the flashing targets will collect the current Reactor Bonus and reset the Grid for the next reactor.

Reactor Jackpot
Once a reactor has been started, the Grid resets and can be completed the same as qualifying the reactor. But instead of green, hits will fill the grid with red. Completing the grid will collect a Reactor Jackpot which awards a point value 25% of the current Reactor Value.

Multiball

Multiball is qualified by locking two balls and then releasing the balls by hitting the Lock Target after two balls are locked. Multiball is a 3 ball multiball. Progress towards qualifying, completing, and collecting reactors is possible during multiball.

Ball Lock
Ball locks are collected in the in-line Lock lane. Lock will be lit at the start of each ball and the lock arrows will be lit green. Two balls can be locked by shooting the in-line target lane, and the drop targets will reset to trap a ball behind the first two targets. Hitting the Lock target after two balls are locked will start multiball.
Lock Re-Light
After a multiball completes, the lock inserts will be red and must be re-qualified. Lock lane will reset so that the deepest drop-target is up. Hitting the 3rd drop target will drop the target, and the scoop must be shot to relight lock.
Competitive Note: Ball Lock stealing is possible and encouraged. Players get credit for whatever balls are already in the lock when they start their turn. Backhanding the lock lane is possible, but gets more dangerous the deeper the drop targets are down.

Jackpots
At the start of multiball, all three Lock Targets will be up. Jackpots are hitting the Lock Drop Targets. 1st Target = 1x Jackpot, 2nd Target = 2x Jackpot, 3rd Target = 3x Jackpot, scoop = Super Jackpot (5x Jackpot). The drop targets will cascade back on you every 5 seconds if you do not achieve the next jackpot. Example: You've made the 2x jackpot, but do not collect the 3x in time, the targets will reset so only the 1x jackpot is ready.
Competitive Notes:
It is possible to score a quick Super Jackpot when multiball starts by shooting the lock scoop before the targets reset.
The drop targets do not reset when multiball ends, potentially making it easier to relight locks if you are deep into jackpots when multiball ends.

Multiball Multiplier
During multiball, playfield values will be multiplied by the number of balls in play. The multiplier inserts will change color and reflect the playfield multiplier during multiball (2x or 3x).

Jackpot values
Formula:
[seed value] x [reactor scaler] x [multiball multiplier] x [jackpot multiplier]
Initial jackpot seed is 5000 (boosts?)
Reactor Scaler is multiplier that changes based on which reactor is active (values? Ex: second reactor is 1.5)
Multiball Multiplier = Number of balls in play
Jackpot Multiplier = 1x, 2x, 3x, or 5x
Competitive Notes: The reactor grid is very dangerous to shoot, so being able to qualify the grid with multiball chaos is very attractive. The playfield multiplier is also very attractive to have active before destroying a reactor as the reactor values are the biggest points in the game.

##Wizard Mode
Destroy all 9 reactors. Destroying all reactors completes the game and game will terminate. Similar to ‘beating’ a video/arcade game. If there are balls remaining, message on screen says, “Flippers and slings disabled” and when ball drains, player will be credited with Total Nuclear Annihilation Bonus again.

4) Menu System

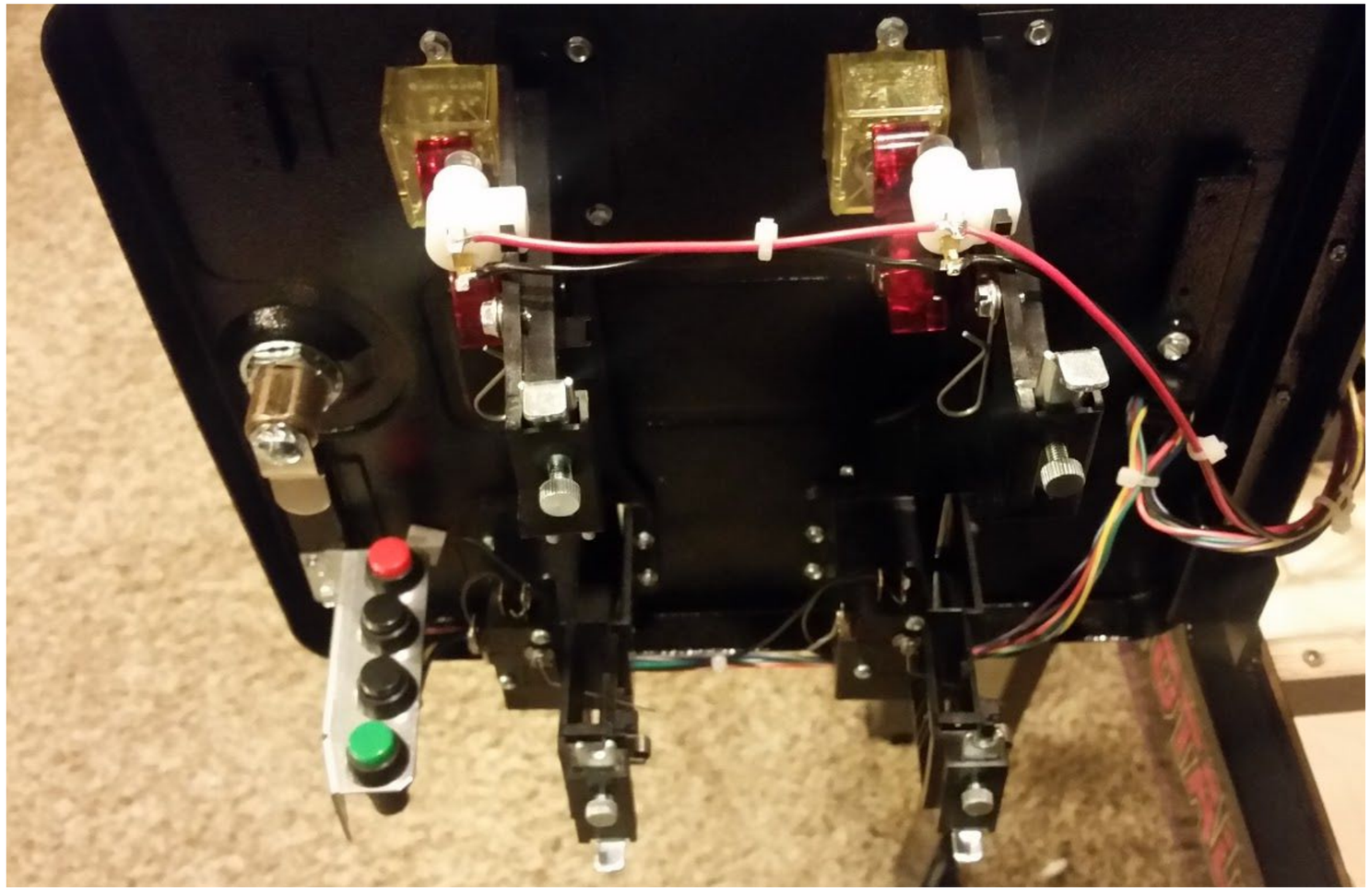
4.1 Basic Menu Functions

All settings to the game are done via the menu system.

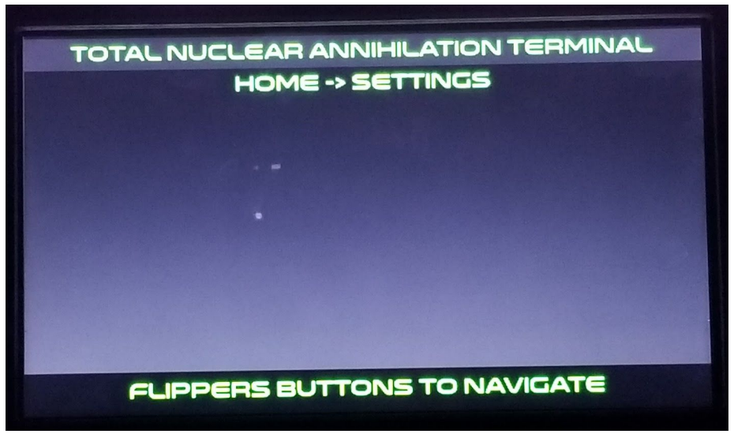
From left to right

Red - Back out one step
Black (left) - navigate to the left
Black (right) - navigate to the right
Green - “Go” into the menu further

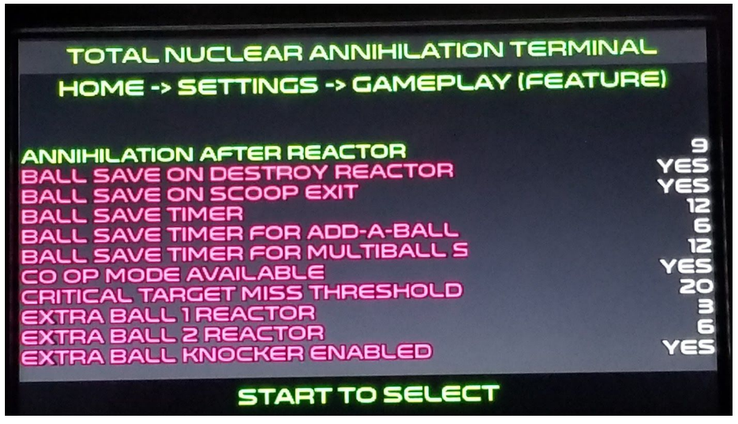
- Home
  - Settings
    - Gameplay (Features)
    - Machine (Coils)
    - Machine (Pricing)
    - Machine (Replay)
    - Machine (Standard)
  - Tests
    - Switch Test
    - Led Test (Single)
    - Led Test (All)
    - Coil Test
    - Drop Targets
    - Music
    - Shaker
    - Burn-In
  - Statistics
    - Audits
    - Coin Op Audits
    - Last Score Data
    - Reactor Audits
  - Utilities
    - Clear Credits
    - Reset Audits
    - Factory Settings
    - Set Date/Time
  - Software Info

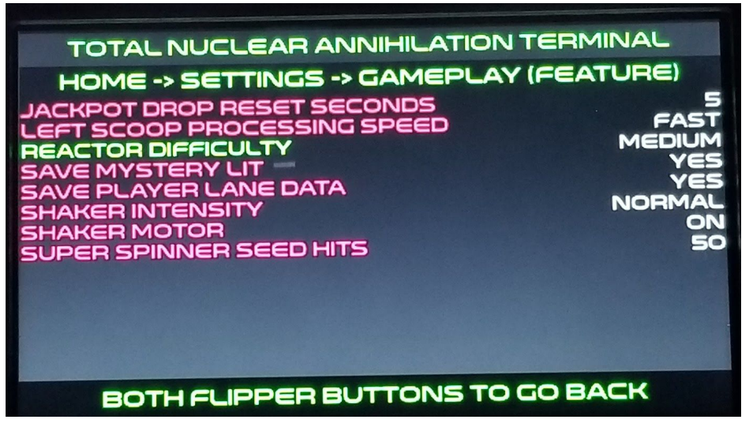


4.2 Settings



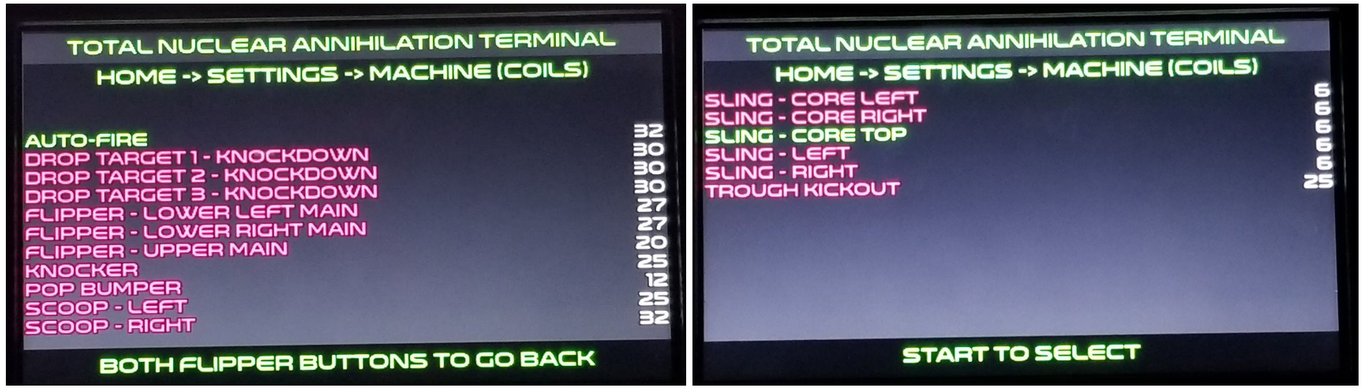
4.2.1 Gameplay Features





• Annihilation After Reactor This setting will determine after which reactor the end of the game "Total Nuclear Annihilation" happens. options: [1,2,3,4,5,6,7,8,9] default: 9	• Ball Save Timer For Add-a-Ball The number of seconds the ball save is active after an add-a-ball is achieved by hitting the first super jackpot. 0 will disable ball save. options: [0,90] increments: 1 default: 6	• Extra Ball 1 Reactor The first extra ball will be awarded after starting the reactor in this setting. 0 to disable. options: [0,1,2,3,4,5,6,7,8,9] default: 3	• Left Scoop Processing Speed This option lets you decide how quickly the left scoop ejects the ball after entry. options: ['Lame','Medium','Fast'] default: 'Fast'	• Shaker Intensity Just in case you want to back down the overall intensity of the shaker motor. options: ['Low','Normal'] default: 'Normal'
• Ball Save On Destroy Reactor This will award the player a ball save when a reactor gets destroyed. This is started as soon as the destroy lightshow starts. options: ['Yes','No'] default: 'Yes'	• Ball Save Timer For Multiball Start The number of seconds the ball save is active after multiball is started. 0 will disable ball save. options: [0,90] increments: 1 default: 12	• Extra Ball 2 Reactor The second extra ball will be awarded after starting the reactor in this setting. 0 to disable. options: [0,1,2,3,4,5,6,7,8,9] default: 6	• Reactor Difficulty This setting sets the overall difficulty of the reactors. The settings that are modified by this are number of spotted keypad lights, number of hits to bring a reactor critical, and number of shots needed to destroy each reactor. Brutal is not recommended. options: ['Easy','Medium','Hard','Brutal'] default: 'Medium'	• Shaker Motor This setting will determine if the shaker motor is used during game play. options: ['On','Off'] default: 'On'
• Ball Save On Scoop Exit If a ball gets thrown directly down the middle after a scoop exit, this setting will enable a quick ball save when set to Yes. Note: This feature does not function during multiball as it can be used as a tournament exploit. options: ['Yes','No'] default: 'Yes'	• Co-Op Mode Available Allows the operator to make available or disable co-op mode in the system. options: ['Yes','No'] default: 'Yes'	• Extra Ball Knocker Enabled This option lets you turn on and off the knocker when an extra ball is awarded. options: ['Yes','No'] default: 'Yes'	• Save Mystery Lit If the player lights mystery and does not collect it, it will carry over to the next ball. options: ['Yes','No'] default: 'Yes'	• Super Spinner Seed Hits The number of spins required to qualify Super Spinner. This is a seed value and will automatically increase each time super spinner is qualified. options: [20,400] increments: 10 default: 50
• Ball Save Timer The number of seconds the ball save is active for. 0 will disable ball save. options: [0,90] increments: 1 default: 12	• Critical Target Miss Threshold This setting will ensure that if a critical target is broken on the game, the game can continue. It does this by watching the unlit critical targets and if the other targets are hit X times without a lit one being hit, it will regenerate the location of the lit critical targets to ones that register. This can happen multiple times if needed. At this time, it does not throw an operator alert since this can be a false positive. options: [0,40] increments: 1 default: 20	• Jackpot Drop Reset Seconds During multiball the jackpot drop targets will cascade back up at X seconds. This setting allows control over the amount of seconds. Higher makes the jackpots easier to get through. options: [2,15] increments: '1' default: '5'	• Save Player Lane Data Lane save data will be carried over from ball to ball if this setting is set to Yes. options: ['Yes','No'] default: 'Yes'	

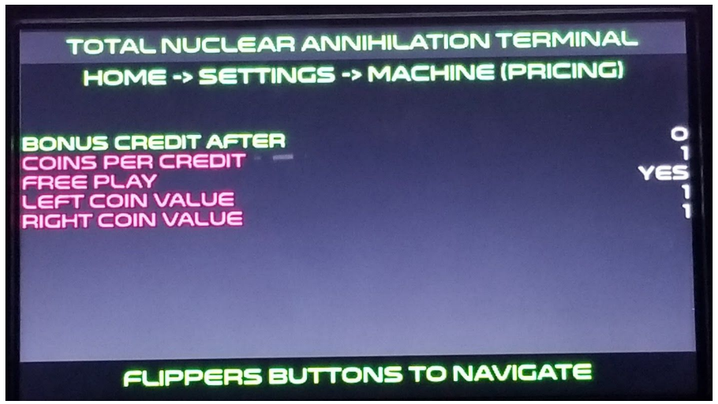
4.2.2 Machine (Coils)



The settings below control the amount of milliseconds that each coil is pulsed for. These can be adjusted up to increase coil power or adjusted down to reduce the power.

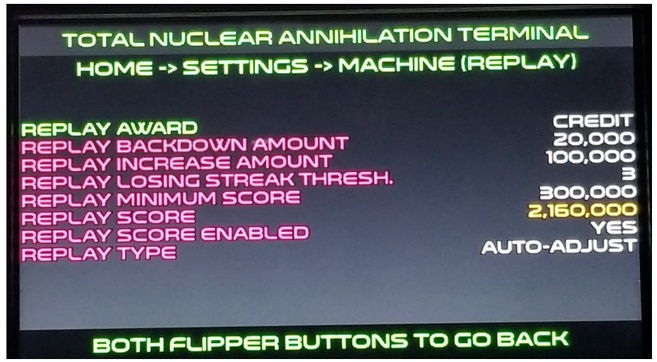
• Auto-Fire options: [24,63] increments: 1 default: 32	• Flipper - Lower Left Main options: [20,50] increments: 1 default: 29	• Pop Bumper options: [8,30] increments: 1 default: 15	• Sling - Core Right options: [5,20] increments: 1 default: 6	• Trough Kickout options: [15,40] increments: 1 default: 25
• Drop Target 1 - Knockdown options: [10,40] increments: 1 default: 30	• Flipper - Lower Right Main options: [20,50] increments: 1 default: 29	• Scoop - Left options: [15,40] increments: 1 default: 25	• Sling - Core Top options: [5,20] increments: 1 default: 6	
• Drop Target 2 - Knockdown options: [10,40] increments: 1 default: 30	• Flipper - Upper Main options: [10,30] increments: 1 default: 20	• Scoop - Right options: [15,40] increments: 1 default: 32	• Sling - Left options: [5,20] increments: 1 default: 6	
• Drop Target 3 - Knockdown options: [10,40] increments: 1 default: 30	• Knocker options: [10,50] increments: 1 default: 25	• Sling - Core Left options: [5,20] increments: 1 default: 6	• Sling - Right options: [5,20] increments: 1 default: 6	

4.2.3 Machine (Pricing)



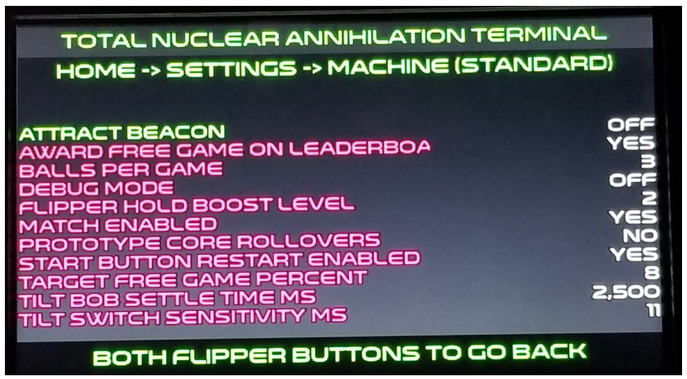
• Bonus Credit After This setting will give a free credit after the specified number of credits are put on the machine before starting a game. options: [0,10] increments: 1 default: 0	• Free Play If Free Play is set to Yes, players do not need to pay for games. This is recommended for home environments and locations where coin operation is not allowed or needed. Free Play can be set to No which will essentially force players to purchase credits by inserting coins into the coin slots of the pinball machine. This option will avoid the need to drill a hole in your cabinet and install a doorbell button on the outside that is wired to the coin switch on the coin door. Free Play was introduced to pinball machines in the 1980's and still used as a setting to this day. options: ['Yes','No'] default: 'Yes'	• Right Coin Value This sets the value of the right coin slot. For example, if you have this set up with a quarter mech, the value would be 1. If it was set to accept Sacagawea Dollar Coins, it would be set to 4. This can be set independently from the left coin slot which enables the ability to accept different coin values like Loonies and Toonies in Canada. options: [1,2,3,4,5,6,7,8] default: 1
• Coins Per Credit This is how many coins are needed to earn a credit. For instance if you have your game setup for $1 per play, you would need 4 coins per credit. See Left and Right Coin Value below for the value of each coin slot. options: [1,2,3,4,5,6,7,8] default: 1	• Left Coin Value This sets the value of the left coin slot. For example, if you have this set up with a quarter mech, the value would be 1. If it was set to accept Sacagawea Dollar Coins, it would be set to 4. This can be set independently from the right coin slot which enables the ability to accept different coin values like Loonies and Toonies in Canada. options: [1,2,3,4,5,6,7,8] default: 1	

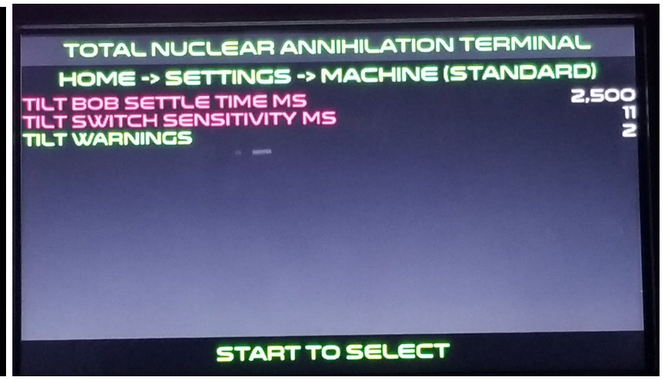
4.2.4 Machine (Replay)



• Replay Award The replay logic has the ability to award an extra ball or a free game. Selectable here. options: ['Credit','Extra Ball'] default: 'Credit'	• Replay Increase Amount This is the amount that the replay score will increase by when a replay is hit. options: [10000,500000] increments: 10000 default: 100000	• Replay Minimum Score An auto-adjusting replay value will never go below the value set in this setting. options: [100000,5000000] increments: 10000 default: 300000	• Replay Score Enabled This gives the operator the ability to disable replay completely. options: ['Yes','No'] default: 'Yes'
• Replay Backdown Amount This is the value that the replay score will drop down if the replay is not hit after the amount of times specified in the Replay Losing Streak Threshold setting. For example if the Losing Threshold was set to 3, after 3 games the replay target score will drop down by this backdown amount. options: [20000,200000] increments: 20000 default: 20000	• Replay Losing Streak Thresh. This is the number of times if a replay is not hit that the replay score is adjusted down using the Backdown Amount above. options: [0,30] increments: 1 default: 3	• Replay Score This is the current replay score of the machine. This can be set manually or set by the playing habits of the players using the auto-adjust setting. options: [500000,10000000] increments: 20000 default: 800000	• Replay Type If set to fixed, this will keep the replay value static as specified in the Replay Score above. If set to auto-adjust, the replay value is adjusted up and down using the settings above to adapt to player skill levels. options: ['Fixed','Auto-Adjust'] default: 'Auto-Adjust'

4.2.5 Machine (Standard)



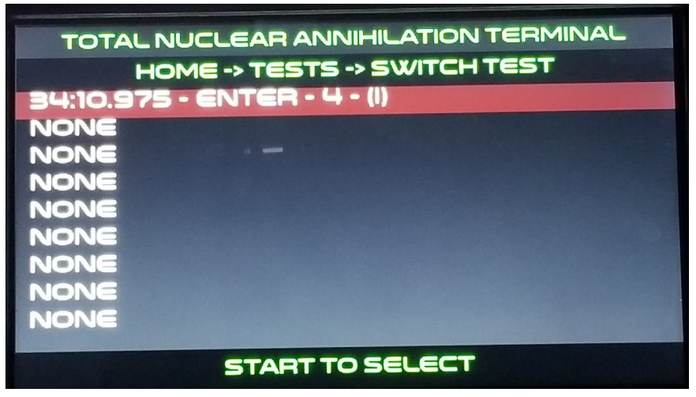


• Attract Beacon If set to On, the beacon light will turn on briefly every 120 seconds when the machine is sitting idle in attract mode. This is an old school technique for getting potential players attention in an arcade setting. options: ['On','Off'] default: 'Off'	• Debug Mode Debug mode, will display debug info directly on the LCD of the game. This is useful if there are intermittent issues with switches or other game logic. options: ['On','Off'] default: 'Off'	• Prototype Core Rollovers Don't turn this to Yes, or your core slings will not score and you will not be able to progress through the game. This is a setting for the Whitewood version of this game only. options: ['Yes','No'] default: 'No'	• Tilt Warnings Number of times you hear a public domain missile siren before you Tilt. options: [0,10] increments: 1 default: 2
• Award Free Game On Leaderboard This will award a free credit for achieving a leaderboard score. options: [Yes,No] default: Yes	• Flipper Hold Boost Level If a pinball is ejecting very quickly out of the left scoop, there is a potential to slightly knock the hold of the coil down a bit when the ball hits a flipper in the upright position. If that is an issue, this level can be increased to stop that from happening. options: [0,1,2,3] increments: 1 default: 2	• Start Button Restart Enabled Holding the start button for 2 seconds on Ball 2 or greater of a game will exit the current game back to attract mode if this setting is set to Yes. You will lose your credits... options: ['Yes','No'] default: 'Yes'	• Tilt Bob Settle Time ms The number of milliseconds that the game allows the tilt bob to settle before issuing another warning. options: [1000,10000] increments: 500 default: 1500
• Balls Per Game Number of balls per game. Anything over 3 is cheating. options: [1,10] increments: 1 default: 3	• Match Enabled Some people do not want to give out free games randomly, so this is for them. options: ['Yes','No'] default: 'Yes'	• Target Free Game Percent This setting will tell the machine what your target free game percent should be and it will adjust the match awards to be as close to this percentage as possible. This also takes in account free credits due to replay and high scores. options: [0,50] increments: 1 default: 8	• Tilt Switch Sensitivity ms The number of milliseconds that the tilt plumb bob must be in contact with the tilt ring to trigger a tilt warning event. options: [0,30] increments: 1 default: 10

4.3 Tests

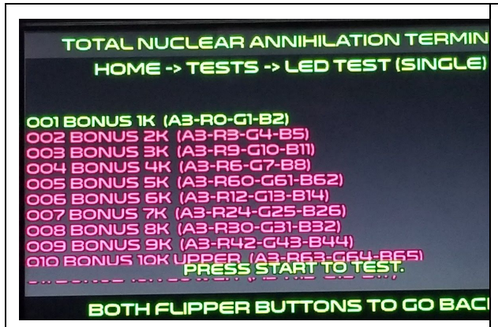
4.3.1 Switch Test

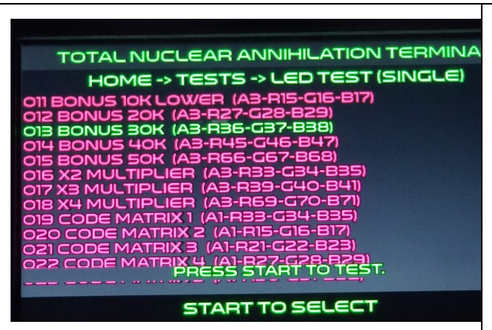
The switch test will show switch activity on the game. Each switch event will be accompanied by a sound and an indicator at the end of the switch name. The indicator (A) stands for the switch becoming active and the indicator (I) shows when the switch becomes inactive.

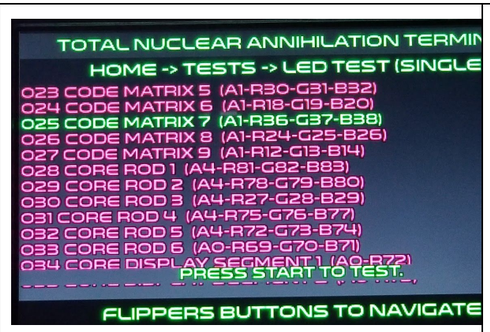


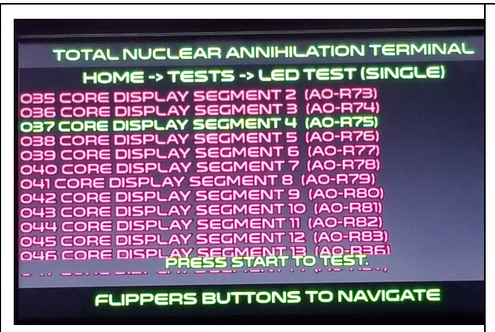
4.3.2 LED Test (single)

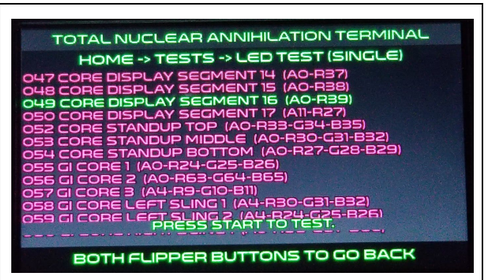
The single LED test will cycle through each LED in the system and display its associated name and LED number. This test is useful for identifying any miss-mapped LEDs in case they were plugged back into the wrong LED harness position.

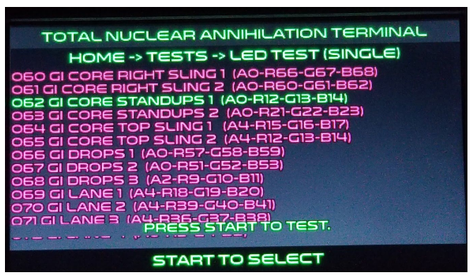


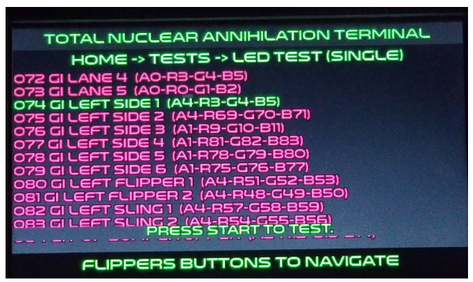


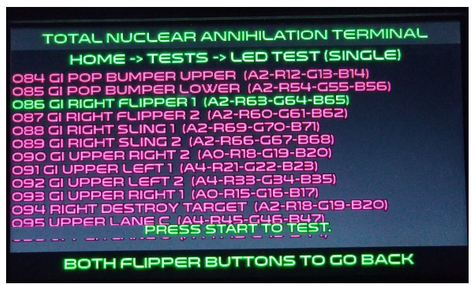


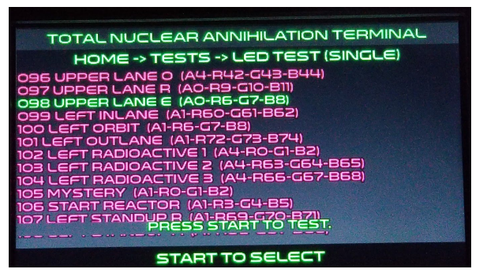


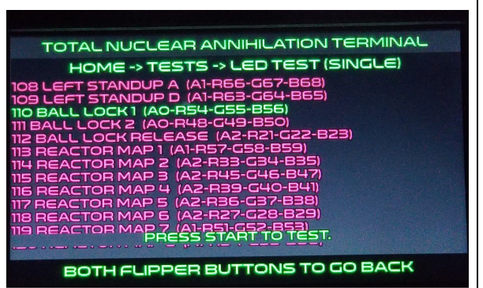


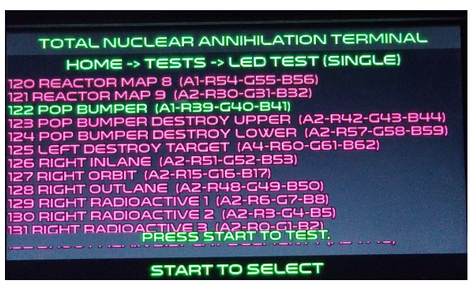


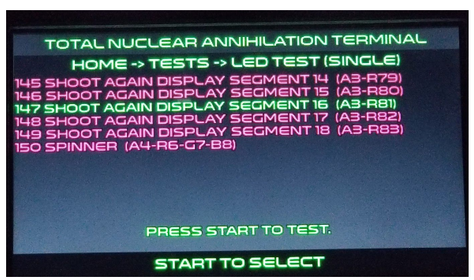






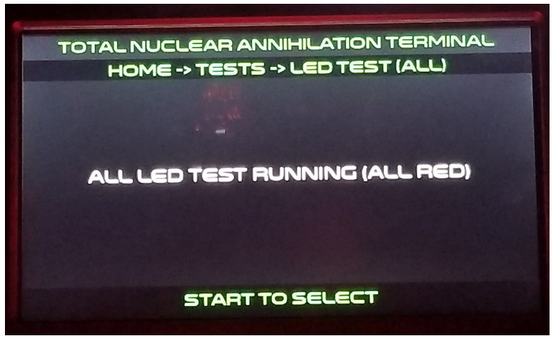


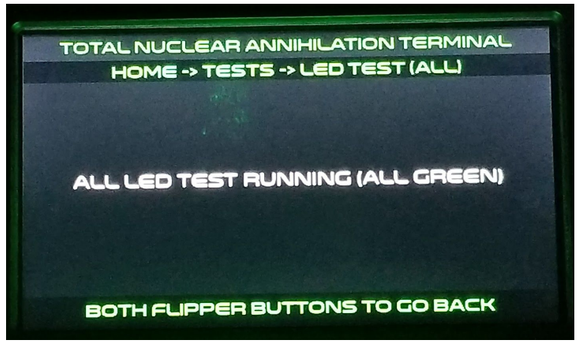


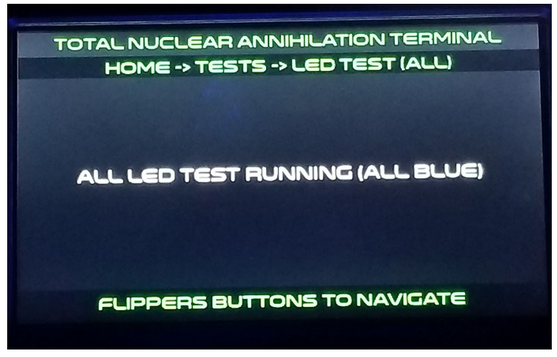


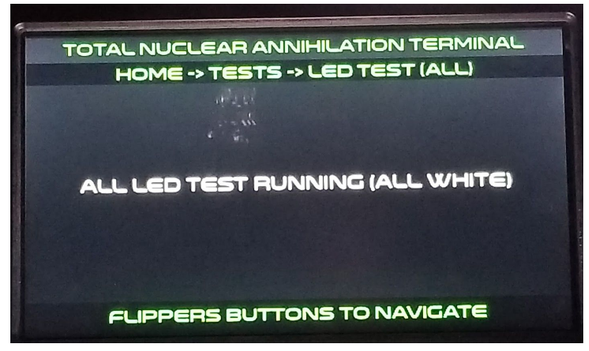
4.3.3 LED Test (All)

This LED test will cycle all LEDs in a Red-Green-Blue-Whitish pattern. This test is useful to see if any LEDs are out or any channels on your LEDs are out.



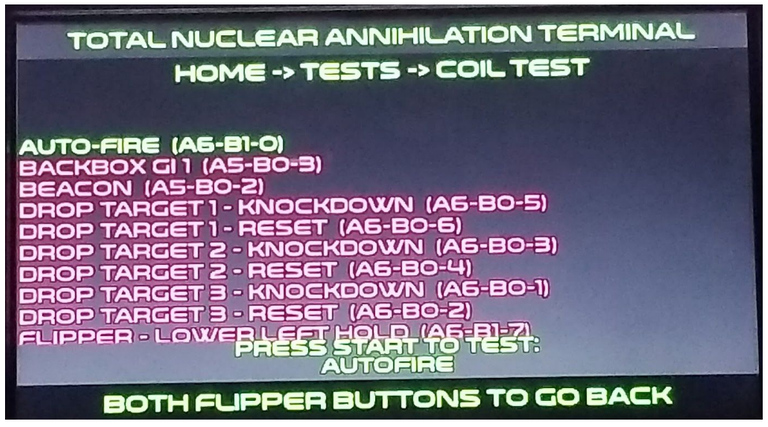


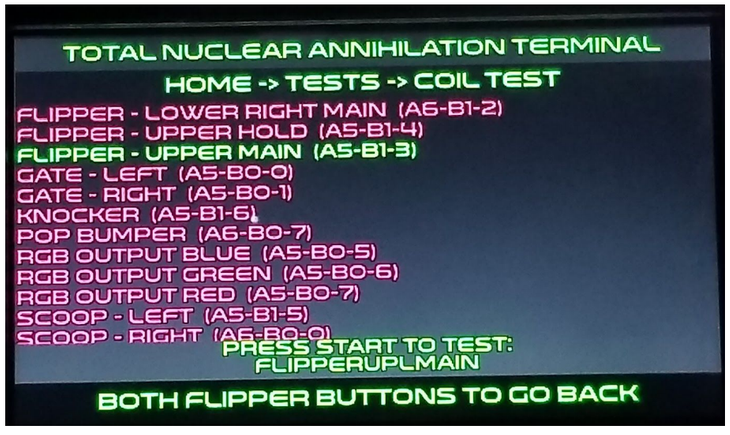




4.3.4 Coil Test

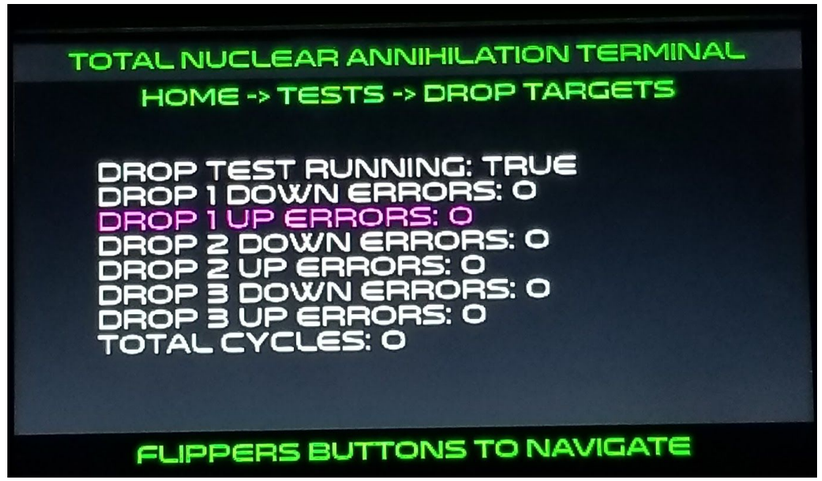
This is a pretty standard coil test mode used to check the functionality of the game coils. The coil pulses can be started and stopped by pressing the start button or the enter button on the coin door. A coil will continue to pulse until the test is existed or the start/enter button is pressed stopping the cycle.





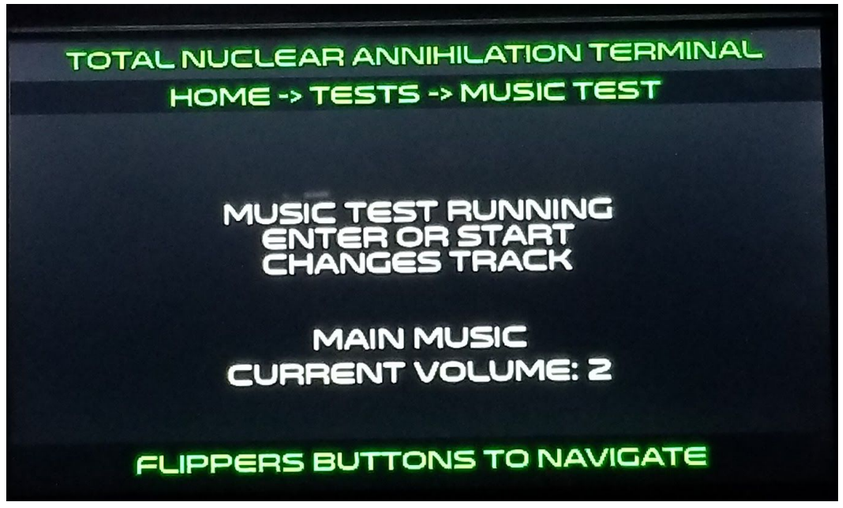
4.3.5 Drop Target Test

The drop target test will cycle through the up and down functions of the drop targets. The display will show if there are any errors with the targets and how many cycles have been run. We run the test for 50 cycles prior to shipping to make sure there are no errors.



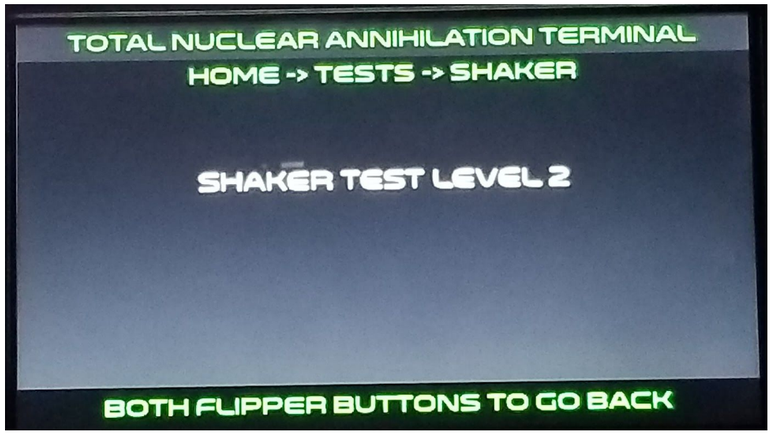
4.3.6 Music Test

The music test will play game music and is useful for testing and tuning the audio system. The music can be changed by pressing the start button or the enter button on the coin door. The volume can also be adjusted during this mode by using the volume up and volume down buttons on the coin door.



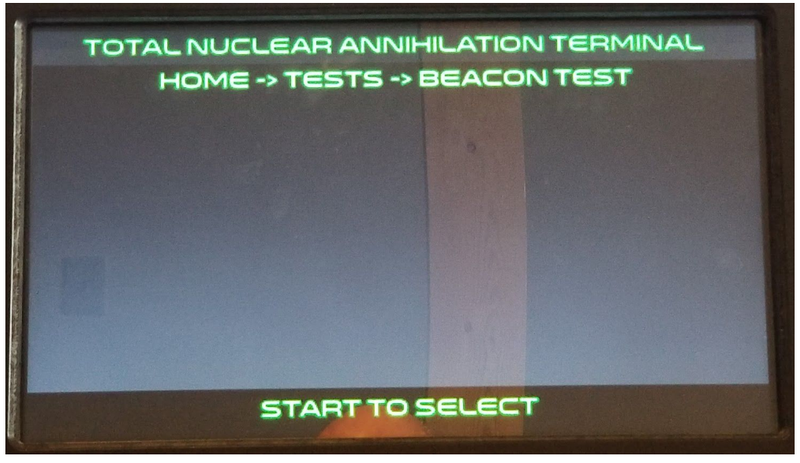
4.3.7 Shaker Test

The shaker test will cycle through a few different shaker intensities. This is just used to test proper functionality of the shaker outside of the coil test. This works better.



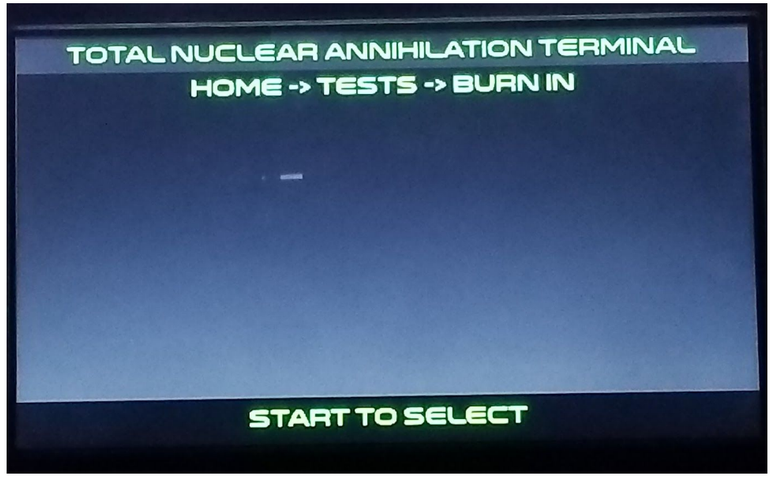
4.3.8 Beacon Test

The beacon test it here for you to test the functionality of the beacon motor.



4.3.9 Burn In

The burn in is used by the Spooky Pinball LLC. Factory to make sure the entire game is physically functioning properly. It will cycle through all the coils, play music, play animations, turn on the backglass LEDs, turn on the beacon topper, and make all the LEDs on the playfield whitish.

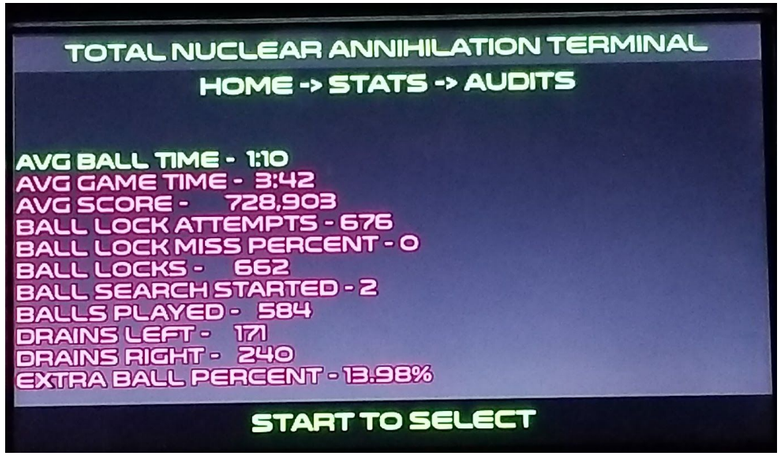
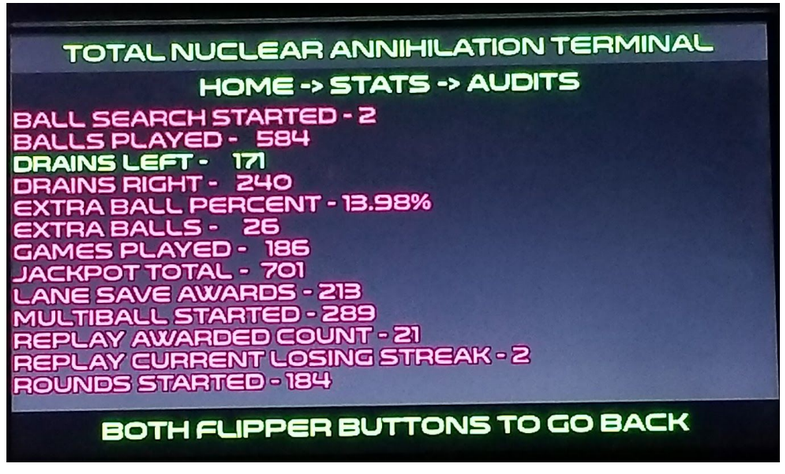


4.4 Statistics

The statistics pages are set up to give you important data about your machine. From audits to last score, there is a lot of information available to those that want it.

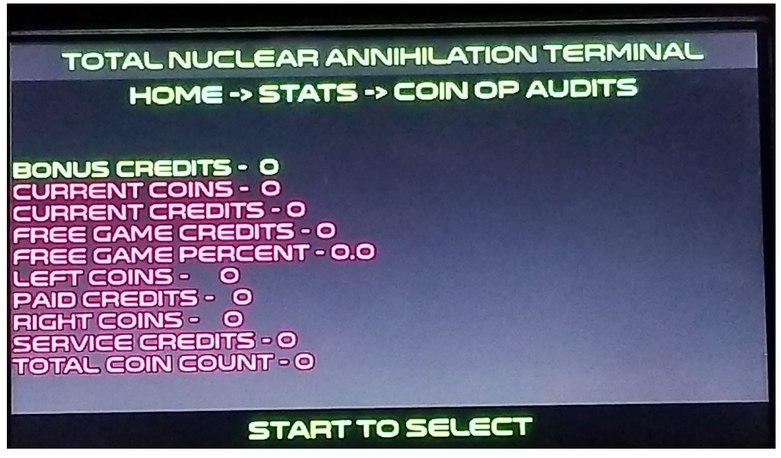
4.4.1 Audits

The audit screen will give you data on many features of the game. Average ball time to how many drains down each side.

<table>
<tr>
<td> 
</td>
<td> 
</td>
</tr>
</table>

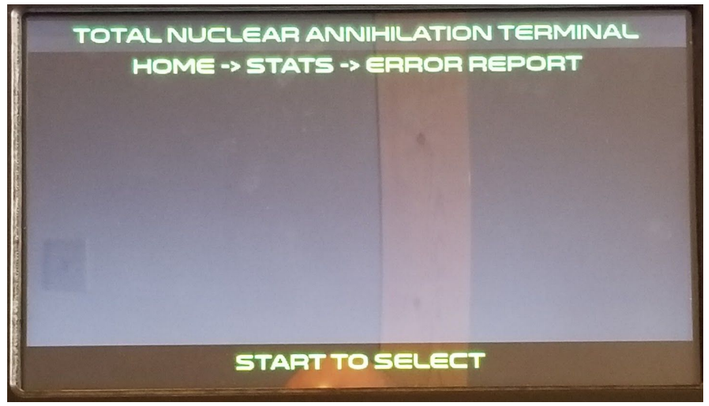
4.4.2 Coin Op Audits

The coin op audits screens show information for the operators of the game. This is mainly designed for the coin door use and shows coin count (for each coin slot), service credits, current credits, etc.



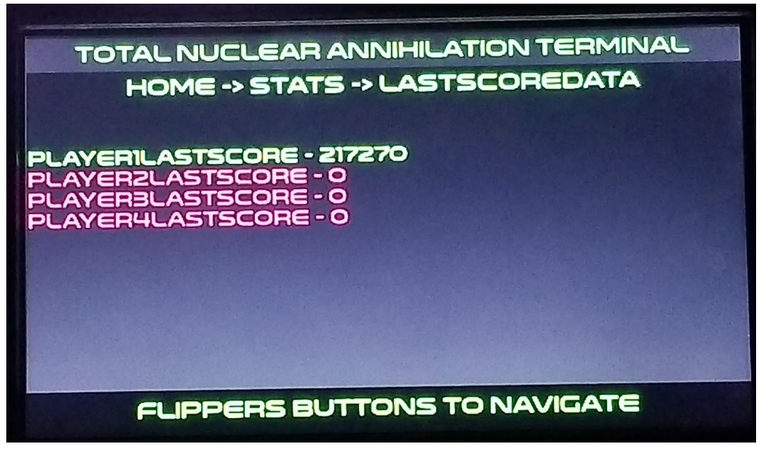
4.4.3 Error Report

If you find a “credit dot” on your machine, this is the screen that will explain what is going on.



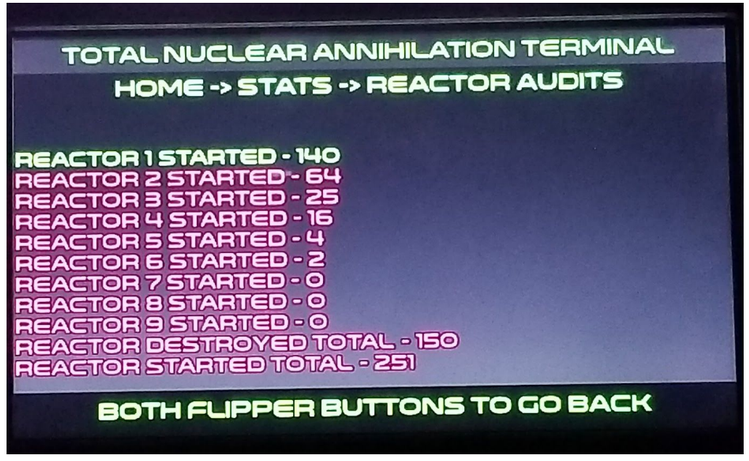
4.4.4 Last Score Data

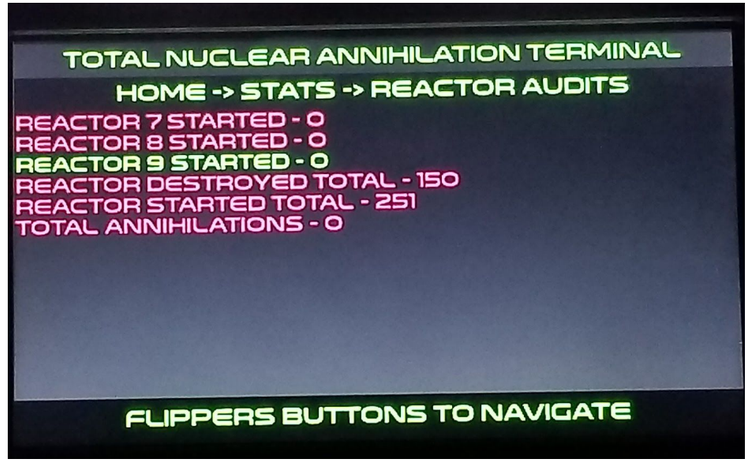
The last score data (lastscoredata) screen will show you the previous games scores for all 4 players. This is useful for tournaments and casual play alike.



4.4.5 Reactor Audits

Reactor audits shows the stats for all of the reactors since the last time the machine was reset.



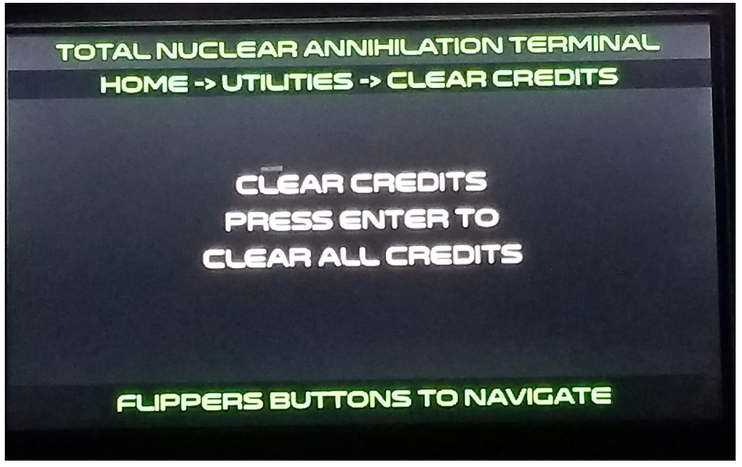


4.5 Utilities

This section is for the utility functions of the game. Clear Credits, Reset Audits, Factory Settings and Set Date/Time.

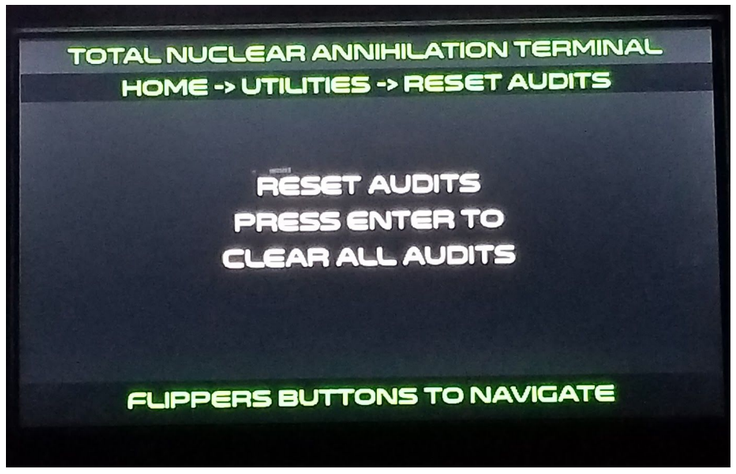
4.5.1 Clear Credits

If your game is set to coin play, then this is the menu that you would use to clear any remaining credits on the machine.



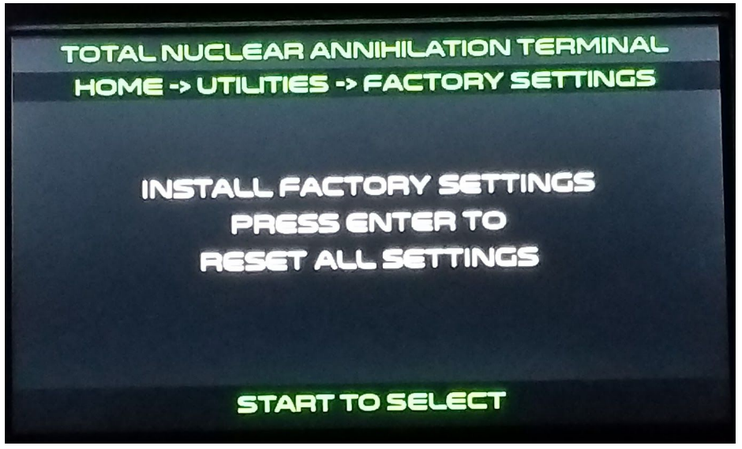
4.5.2 Reset Audits

If you are in need of clearing your credits (taking your game to a show, having a party, etc) in order to get a more accurate reading for an event, this is where that will be done.



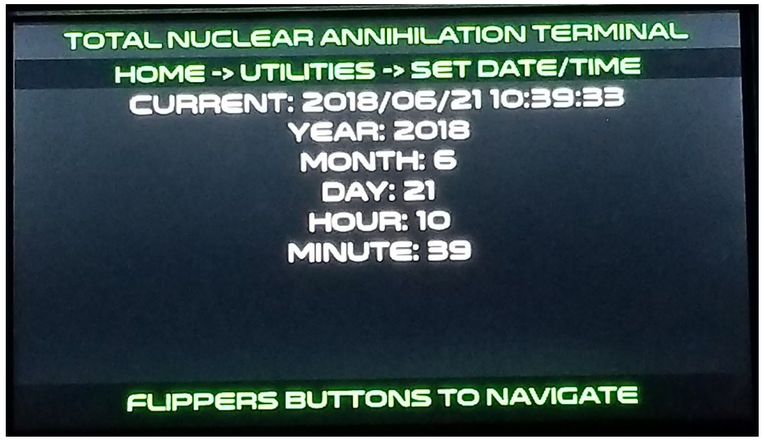
4.5.3 Factory Reset

A factory reset can be useful if you have changed a lot of settings and would like to start fresh, or if you just purchased a used game and would like to get back to the way the game shipped.



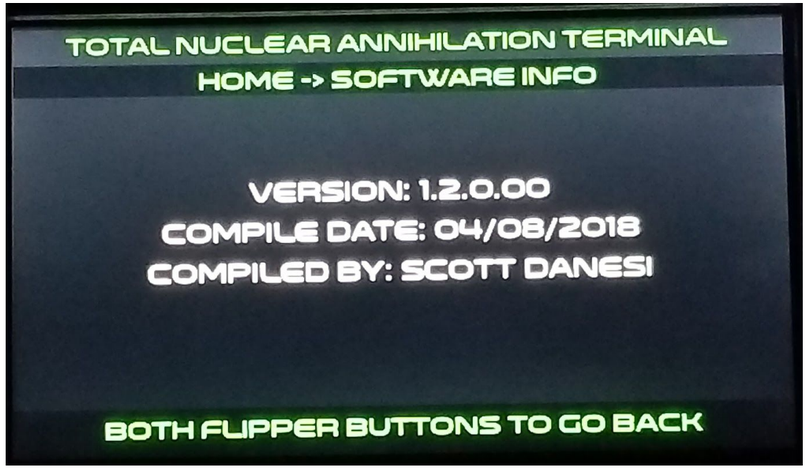
4.5.4 Set Date/Time

Your pinball machine has an internal clock. This is used for event logs, errors, etc. You can set the accurate date and time in this submenu.



4.6 Software Info

This is the screen used to give you an up to date display of what version software you are running. Always check to make sure you are running the latest version in order to have the most up to date system.



5) Game Parts

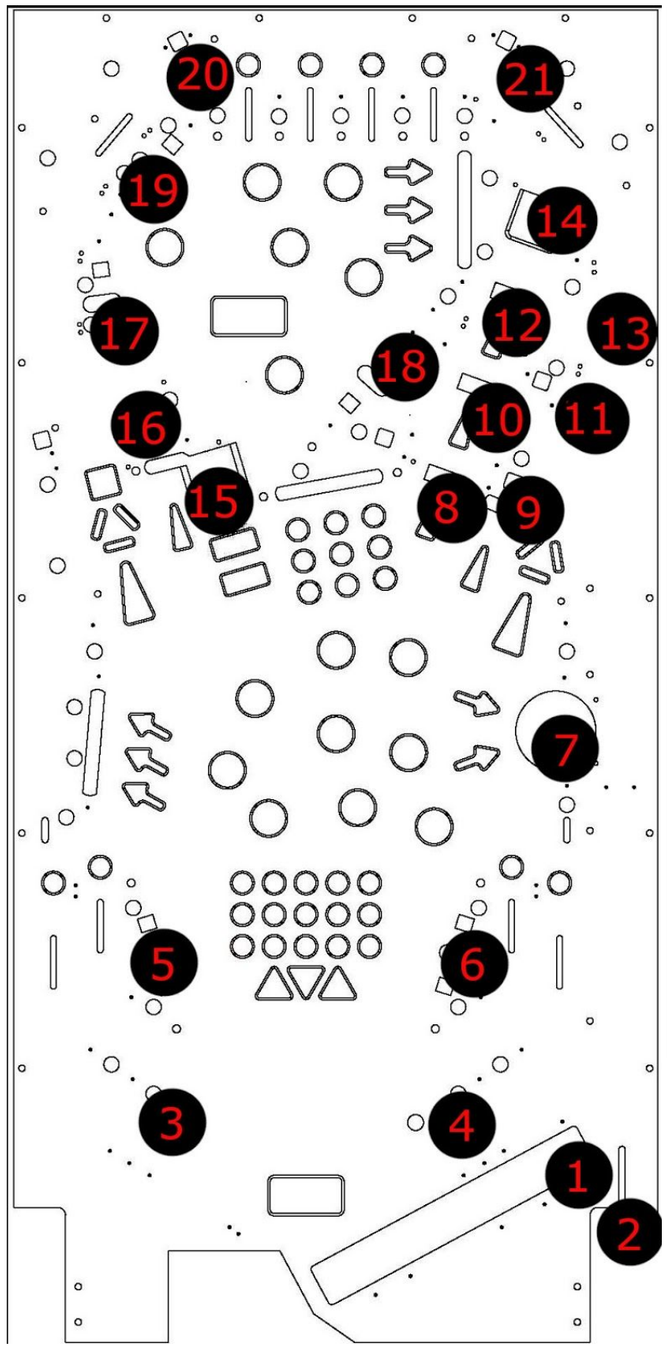
work in progress

6. Troubleshooting

- **Drop targets are constantly cycling on power up**
    - This is the machine telling you that it thinks there are balls stuck behind the drop targets. If there are not balls there, the opto switches are not registering properly. Check your opto power and check to ensure these opto switches are working correctly in the service mode switch test. This is most likely a serial cable (gray shielded cable) came unplugged to the switch boards.
- **Multiball is not being awarded when balls are dropped from the locks**
    - This is most likely caused by a drop target down switch not registering properly. Check all connections to these switches and be sure that they are working properly in switch test. This is most likely the first drop target down position that needs to be looked at.

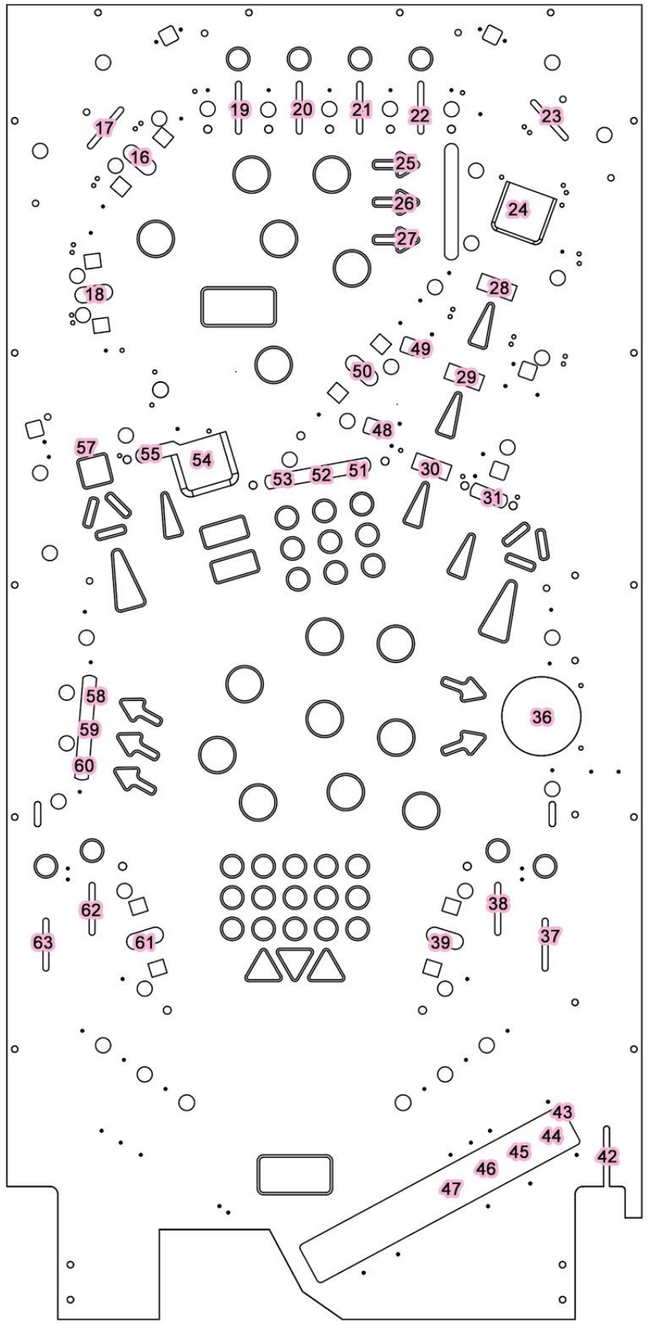
7) Layouts

7.1 Coil Layout



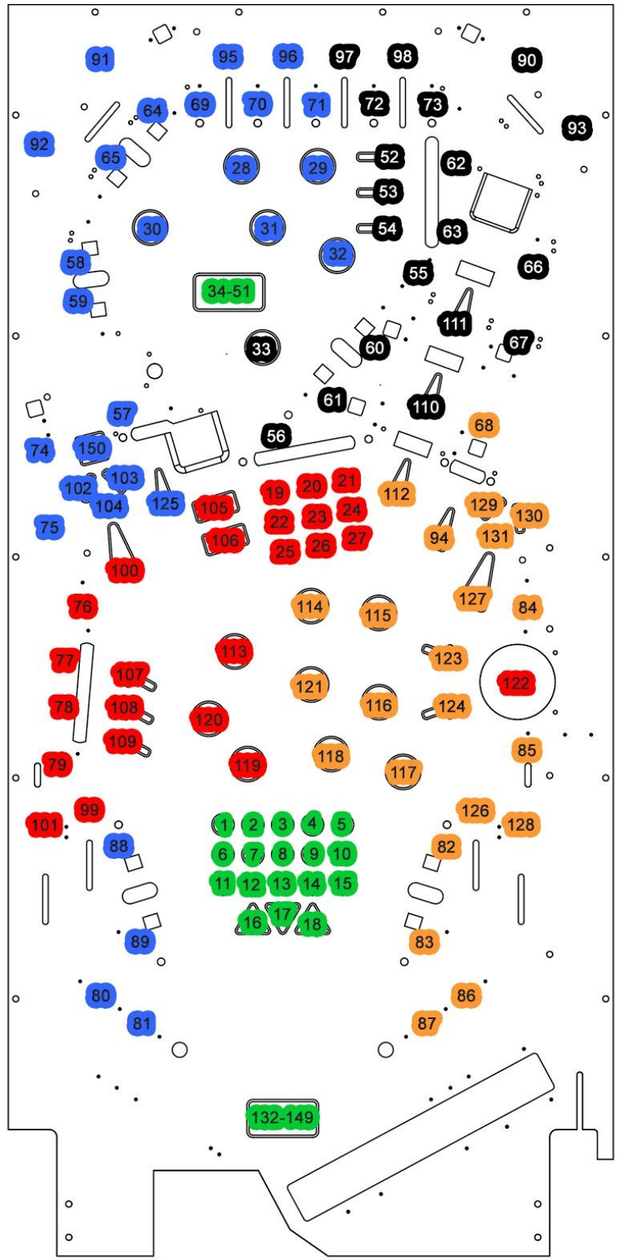
Coil	Description	Coil Type	Power	Control	Transistor	Coil	Description	Coil Type	Power	Control	Transistor
	TOP BOARD LEFT SIDE						TOP BOARD RIGHT SIDE				
7	Pop bumper	23-800	Purple	Grey/White	Q8	1	Trough kickout	26-1200	Orange	Orange/Black	Q10
8	Drop target 1 up	26-1200	Purple	Grey/Orange	Q7	2	Auto launch	23-800	Orange	Orange/Grey	Q9
9	Drop target 1 down	26-600	Purple	Purple/Blue	Q6	3	Lower left flipper (power)	Fl-11629	Orange	Orange/Blue	Q16
10	Drop target 2 up	26-1200	Purple	Purple/White	Q5	3a	Lower left Flipper (hold)	FL-11629	Orange	Orange/White	Q15
11	Drop target 2 down	26-600	Purple	Purple/Grey	Q4	4	Lower right flipper (power)	Fl-11629	Orange	Orange/Green	Q12
12	Drop target 3 up	26-1200	Purple	Purple/Green	Q3	4a	Lower right flipper (hold)	FL-11629	Orange	Orange/Purple	Q11
13	Drop target 3 down	26-600	Purple	Purple/Red	Q2	5	Lower left sling	23-800	Orange	Yellow/Blue	Q14
14	Right scoop	23-800	Purple	Purple/Black	Q1	6	Lower right sling	23-800	Orange	Yellow/Green	Q13
	BOTTOM BOARD LEFT SIDE					15	Left scoop	23-800	Blue	Blue/Black	Q14
20	Left orbit gate	26-600	Yellow	Pink/Green	Q2	16	Upper left flipper (power)	Fl-11629	Blue	Blue/Green	Q13
21	Right orbit gate	26-600	Yellow	Pink/Purple	Q1	16a	Upper left flipper (hold)	FL-11629	Blue	Blue/Pink	Q12
22	Kocker					17	Core sling left	23-800	Blue	Blue/White	Q11
23	Shaker					18	Core sling right	23-800	Blue	Blue/Grey	Q9
24	Beacon					19	Core sling upper	23-800	Blue	Blue/Purple	Q10
25	Backbox GI										

7.2 Switch Layout



Switch	Playfield Location	Wire Color	Board	Switch	Location	Wire Color	Board	Switch	Location	Wire Color	Board
0	Coin Switch Left	grey/white	0/J2-2	25	“1” Stand Up	white	1/J6-3	51	Grid Stand Up (Right)	purple/white	3/J2-5
3	Coin Switch Right	purple/white	0/J2-5	26	“2” Stand Up	brown	1/J6-4	52	Grid Stand Up (Middle)	blue/white	3/J2-6
4	Test Button Green	blue/white	0/J2-6	27	“3” Stand Up	purple/white	1/J6-5	53	Grid Stand Up (Left)	green/white	3/J2-7
5	Test Button Black (right)	green/white	0/J2-7	28	Lock 1 Drop Target	blue/white	1/J6-6	54	Left Scoop	yellow/white	3/J2-8
6	Test Button Black (left)	yellow/white	0/J2-8	29	Lock 2 Drop Target	green/white	1/J6-7	55	“Destroy” Stand Up (left)	orange/white	3/J2-9
7	Test Button Red	orange/white	0/J2-9	30	Release Drop Target	yellow/white	1/J6-8	57	Spinner	white	3/J6-3
10	Right Flipper Button	pink	0/J6-3	31	“Destroy” Stand Up	orange/white	1/J6-9	58	“R”ad Stand Up	brown	3/J6-4
12	Left Flipper Button	blue	0/J6-6	36	Pop Bumper	blue/white	2/J2-6	59	r”A”d Stand Up	purple/white	3/J6-5
13	Tilt	green	0/J6-7	37	Right Outlane	green/white	2/J2-7	60	ra”D” Stand Up	blue/white	3/J6-6
14	Upper Left Flipper Button	yellow	0/J6-8	38	Right Inlane	yellow/white	2/J2-8	61	Left Lower Slingshot	green/white	3/J6-7
15	Start Button	orange	0/J6-9	39	Right Lower Slingshot	orange/white	2/J2-9	62	Left Inlane	yellow/white	3/J6-8
16	Core Slingshot (Upper Left)	grey/white	1/J2-2	42	Shooter Lane	brown	2/J6-4	63	Left Outlane	orange/white	3/J6-9
17	Left Orbit	white	1/J2-3	43	Ball Jam Opto	purple/white	2/J6-5				
18	Core Slingshot (Left)	brown	1/J2-4	44	Ball Trough 1	blue/white	2/J6-6	**Board 0 Inside cabinet by left flipper button**			
19	“C”ore Upper Lane	purple/white	1/J2-5	45	Bal Trough 2	green/white	2/J6-7	**Board 1 Mounted by drop targets**			
20	c”O”re Upper Lane	blue/white	1/J2-6	46	Ball Trough 3	yellow/white	2/J6-8	**Board 2 Mounted closest to ball trough**			
21	co”R”e Upper Lane	green/white	1/J2-7	47	Ball Trough 4	orange/white	2/J6-9	**Board 3 Mount by board 2**			
22	cor”E” Upper Lane	yellow/white	1/J2-8	48	Lock 2 Opto	grey/white	3/J2-2				
23	Right Orbit	orange/white	1/J2-9	49	Lock 1 Opto	white	3/J2-3				
24	Right Scoop	grey/white	1/J6-2	50	Core Slingshot (Right)	brown	3/J2-4				

7.3 RBG Layout (Lighting)



LED	Location	PD-LED	LED	Location	PD-LED	LED	Location	PD-LED	LED	Location	PD-LED	LED	Location	PD-LED
33	Core Rod 6	PD-LED 0	19	Code Matrix 1	PD-LED 1	68	GI Drops 3	PD-LED 2	1	Bonus 1k	PD-LED 3	28	Core Rod 1	PD-LED 4
52	1 Stand Up	PD-LED 0	20	Code Matrix 2	PD-LED 1	82	GI Left Sling 1	PD-LED 2	2	Bonus 2k	PD-LED 3	29	Core Rod 2	PD-LED 4
53	2 Stand Up	PD-LED 0	21	Code Matrix 3	PD-LED 1	83	GI Left Sling 2	PD-LED 2	3	Bonus 3k	PD-LED 3	30	Core Rod 3	PD-LED 4
54	3 Stand Up	PD-LED 0	22	Code Matrix 4	PD-LED 1	84	GI Pop Bumper Upper	PD-LED 2	4	Bonus 4k	PD-LED 3	31	Core Rod 4	PD-LED 4
55	GI Core 1	PD-LED 0	23	Code Matrix 5	PD-LED 1	85	GI Pop Bumper Lower	PD-LED 2	5	Bonus 5k	PD-LED 3	32	Core Rod 5	PD-LED 4
56	GI Core 2	PD-LED 0	24	Code Matrix 6	PD-LED 1	86	GI Right Flipper 1	PD-LED 2	6	Bonus 6k	PD-LED 3	57	GI Core 3	PD-LED 4
60	Core Right Sling 1	PD-LED 0	25	Code Matrix 7	PD-LED 1	87	GI Right Flipper 2	PD-LED 2	7	Bonus 7k	PD-LED 3	58	GI Core Left Sling 1	PD-LED 4
61	Core Right Sling 2	PD-LED 0	26	Code Matrix 8	PD-LED 1	94	Right Destroy Target	PD-LED 2	8	Bonus 8k	PD-LED 3	59	GI Core Left Sling 2	PD-LED 4
62	Core Stand Up 1	PD-LED 0	27	Code Matrix 9	PD-LED 1	112	Ball Lock Release	PD-LED 2	9	Bonus 9k	PD-LED 3	64	GI Core Top Sling 1	PD-LED 4
63	Core Stand Up 2	PD-LED 0	76	GI Left Side 3	PD-LED 1	114	Reactor Map 2	PD-LED 2	10	Bonus 10k Upper	PD-LED 3	65	GI Core Top Sling 2	PD-LED 4
66	GI Drops 1	PD-LED 0	77	GI Left Side 4	PD-LED 1	115	Reactor Map 3	PD-LED 2	11	Bonus 10k Lower	PD-LED 3	69	GI Lane 1	PD-LED 4
67	GI Drops 2	PD-LED 0	78	GI Left Side 5	PD-LED 1	116	Reactor Map 4	PD-LED 2	12	Bonus 20k	PD-LED 3	70	GI Lane 2	PD-LED 4
72	GI Lane 4	PD-LED 0	79	GI Left Side 6	PD-LED 1	117	Reactor Map 5	PD-LED 2	13	Bonus 30k	PD-LED 3	71	GI Lane 3	PD-LED 4
73	GI Lane 5	PD-LED 0	99	Left Inlane	PD-LED 1	118	Reactor Map 6	PD-LED 2	14	Bonus 40k	PD-LED 3	74	GI Left Side 1	PD-LED 4
90	GI Upper Right 1	PD-LED 0	100	Left Orbit	PD-LED 1	121	Reactor Map 9	PD-LED 2	15	Bonus 50k	PD-LED 3	75	GI Left Side 2	PD-LED 4
93	GI Upper Right 2	PD-LED 0	101	Left Outlane	PD-LED 1	123	Pop Bumper Destroy Upper	PD-LED 2	16	X2 Multiplier	PD-LED 3	80	GI Left Flipper 1	PD-LED 4
97	Upper Lane “R”	PD-LED 0	105	Mystery	PD-LED 1	124	Pop Bumper Destroy Lower	PD-LED 2	17	X3 Multiplier	PD-LED 3	81	GI Left Flipper 2	PD-LED 4
98	Upper Lane “E”	PD-LED 0	106	Start Reactor	PD-LED 1	126	Right Inlane	PD-LED 2	18	X4 Multiplier	PD-LED 3	88	GI Right Sling 1	PD-LED 4
110	Ball Lock 2	PD-LED 0	107	Left Stand Up R	PD-LED 1	127	Right Orbit	PD-LED 2	34-51	Core Display	PD-LED 3	89	GI Right Sling 2	PD-LED 4
111	Ball Lock 1	PD-LED 0	108	Left Stand Up A	PD-LED 1	128	Right Outlane	PD-LED 2	132-149	Shoot Again Display	PD-LED 3	91	GI Upper Left 1	PD-LED 4
			109	Left Stand Up D	PD-LED 1	129	Right Radioactive 1	PD-LED 2				92	GI Upper Left 2	PD-LED 4
			113	Reactor Map 1	PD-LED 1	130	Right Radioactive 2	PD-LED 2				95	Upper Lane C	PD-LED 4
			119	Reactor Map 7	PD-LED 1	131	Right Radioactive 3	PD-LED 2				96	Upper Lane O	PD-LED 4
			120	Reactor Map 8	PD-LED 1							102	Left Radioactive 1	PD-LED 4
			122	Pop Bumper	PD-LED 1							103	Left Radioactive 2	PD-LED 4
												104	Left Radioactive 3	PD-LED 4
												125	Left Destroy Target	PD-LED 4
												150	Spinner	PD-LED 4

7.4 Rubber Ring Size and Layout

- 10x - 3/8" Bumper Post Rings
- 2x - 2-1/2" Rubber Rings
  This is for the lower slings. 2” or 2-1/4” can be used to further minimize the risk of balls getting stuck behind these slingshot rubbers.
- 3x - 2" Rubber Rings
- 1x - 1-1/4" Rubber Ring
- 5x - 1" Rubber Rings
- 3x - 1-1/16" Thin (Stern Compatible) Rubber Post Sleeves
- 1x - 5/16" Bumper Post Ring
- 2x - 3/8" OD Mini Post Rubbers
- 2x - Flipper Rubber - Standard Size – Purple
- 1x - Flipper Rubber - 1" Mini Size – Red

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This manual was made in collaboration with Spooky Pinball and Danesi Design, LLC.