

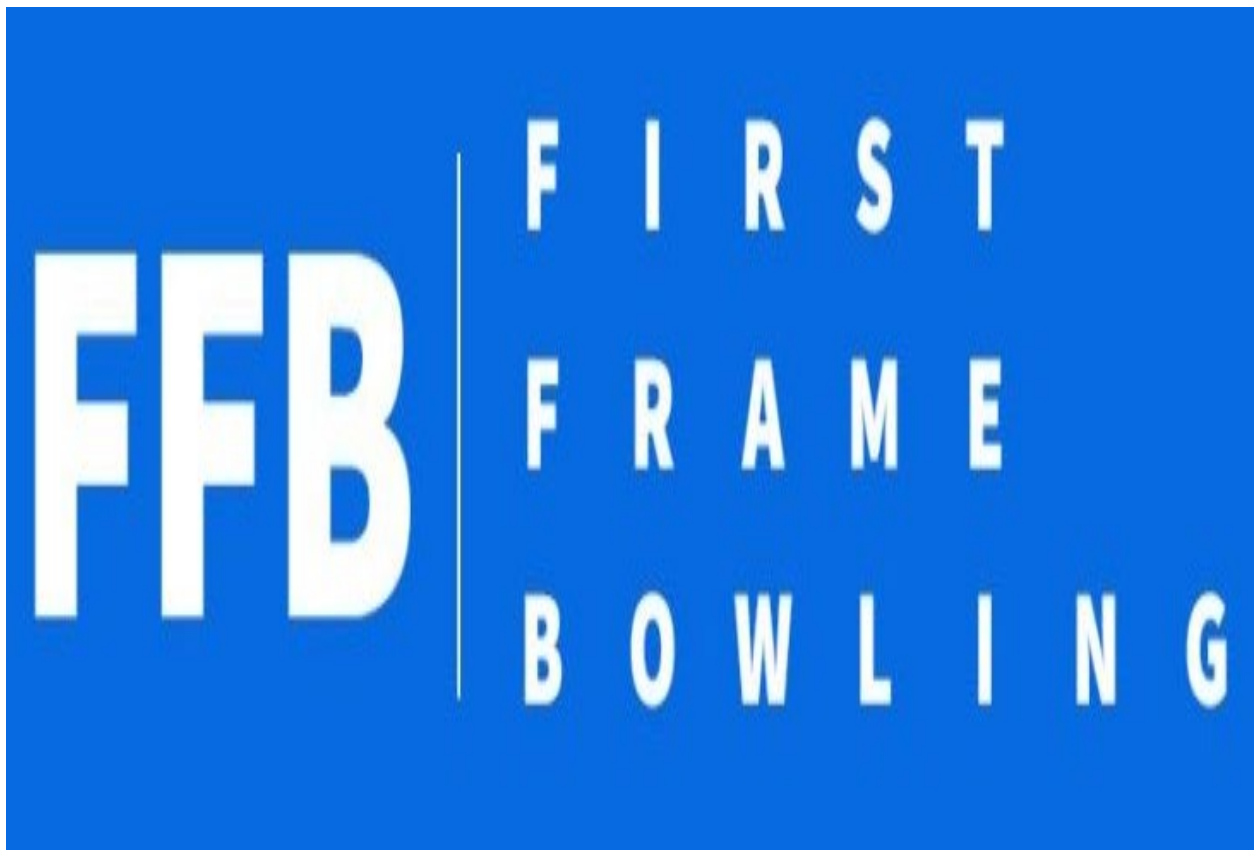
ARCADE TECH TRAINING

Instructor: Jeff Lemmons



Hosting center: Station 300 Gainesville
Dates: August 18th-21st, 2024

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Day 1

Welcome to the Arcade Tech Training here at STATION 300 GAINESVILLE. Thank you all for being here. On behalf of FIRST FRAME BOWLING, we hope you enjoy your time and gain valuable knowledge that will help you in your career and last a lifetime.

This class is intended to help all attendees better understand the arcade side of the amusements business. Game repair, game diagnosis, preventative maintenance, simple electrical, arcade floor elements, redemption, and game reports are a sample of the focus for this training.

This class will be divided between classroom instruction and hands on instruction on the game floor. We will use the knowledge gained in the classroom setting to apply it to the game floor when troubleshooting is needed.

In the back of this workbook are pages to make notes and to write down any questions you may have as we progress through the training. Please feel free to use these pages as we will have Q & A sections throughout the training.

Today we will do the instructor and attendee introductions, discuss the class objectives, go over the elements of an arcade floor, and walk the game floor to get a visual of the different elements of an arcade floor.



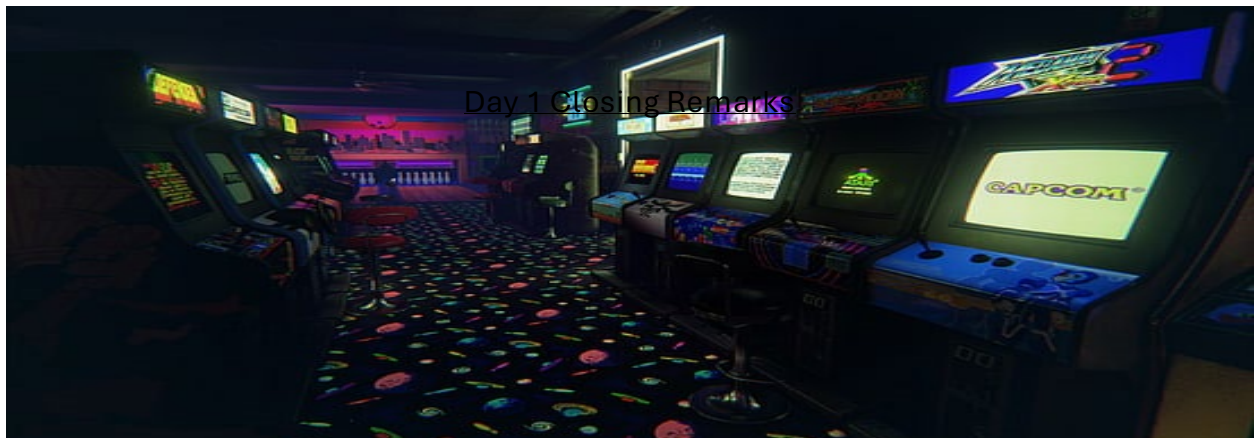
Class Objectives

- Understand the different elements of a game floor (swipers, pos, kiosk, etc.)
- Learn the different types of games (video, prize, claw, etc.)
- Discuss the different manufactures of equipment
- Understand the key components in a game
- Troubleshoot and repair issues on games
- Understand how to use a multimeter and apply it to diagnosing a game
- Understand how back-office reports can help with finding issues
- Discuss technical support and parts and redemption suppliers
- Discuss how a great preventative maintenance program can help minimize game downtime and prevent unnecessary issues from happening
- Understand how to splice wires
- Learn how to solder wires and use heat shrink
- Discuss the different connector types
- Understand how to use wiring diagrams when diagnosing a game
- Discuss common issues and tips and tricks when it comes to the game floor
- Discuss checklists and how they help with ensuring tasks are being completed daily, weekly, and monthly
- Discuss spare parts and how they can prevent games from being down for longer than necessary to maximize revenue
- Learn about calibration on games and why it is important to check calibration on games to ensure they are working as intended



Elements of an arcade floor

- Arcade games
- POS system (Embed, Intercard, etc.)
- Kiosks
- Tellers
- Bill breakers
- ATM's
- Card swiper system (Embed, Intercard, etc.)
- Access points
- Radios
- Server
- Wi-Fi
- Redemption
- Prizes
- Stock for claws
- Cards/coins for pushers
- Balls/puck/etc.
- Tickets (if applicable)
- Coins for coin mechs (if applicable)





Day 2

Welcome to day 2! Today we will focus our attention on a variety of topics that include:

- Any question or comments from Day 1
- Elements of an arcade floor
- Reports
- Payouts
- Redemption
- Games
- Kiosks
- Electrical basics
- Connectors
- Splicing
- Voltage testing
- Power supplies
- Game buttons
- Wiring diagrams
- Coin hoppers

Tonight, we will hold a Q & A session at (insert hotel name here) (insert address here) (insert time here). Dinner will be provided and allow for a relaxed environment to ask questions or have open discussions. This is optional, but if you are interested, we look forward to dinner and an evening of comradery.



Different ways to discover issues on the game floor

Out of service log- looking at the center's out of service log to see if there are any games currently out of service. (This is the easiest way to discover issues because the game is offline, and guests can't play the game.)

Game floor walks- walking the game floor to visibly look for issues or concerns. (By doing walks, you can look for visible errors on screens, a game is unplugged, turned off, screen off, and numerous other visible discoveries.)

Game testing- playing games on the floor to check for full operation. (Testing/playing games can help discover issues that may be overlooked by a visible inspection. Example: not crediting up, lights out, mis score, etc.)

Reports- running weekly reports can help discover issues that may have gone unnoticed or find obscure issues that could be commonly overlooked by the team (Examples: Looking at the bottom 10 games each week could help to show a game malfunctioning that guests know about and haven't let the staff know. Seeing a game consistently in the bottom could mean that it isn't dispensing cards/coins as it should)

Payouts- checking payout percentages on games can help to find issues that might not be noticeable by just looking or playing the game (Examples: A game that is overpaying prizes/tickets could be a faulty sensor or board. If you notice a lot of guests winning the same prize could mean the claw strength wasn't adjusted when a new prize was placed in it)

Guests- guests coming up to you to let someone know about an issue or concern (Example: A guest tells you about a game taking credits but not allowing them to play)

Teammates- teammates communicating about an issue or concern on the floor



Reports

Reports are often not thought about when it comes to the technician side of an arcade floor. Reports can help in determining if a game has an issue by looking at the payout percentage for each game. That could include overpaying, underpaying, hardware issues, swiper issues, and software problems.

Being proactive with checking reports can help with finding issues and help with preventing abnormal guest redemptions. This can help with inventory control and help maximize profits while ensuring guests are getting a fair value for their money spent to play.

Aside from finding technical problems with games, reports can be used to determine which games are underperforming. By checking to see what games aren't performing well, you can decide if you should relocate a game to a higher performing area of the game floor. When deciding if a move should happen, be cautious and check to see if there are other options to boost that area (poor lighting could be affecting guest appeal to visit that area).

Redemption reporting is another viable resource in determining underperforming items, theft, inventory control, and ordering practices, to name a few.

Checking reports can be very time consuming and can take time to understand. Utilize your resources if you need help while looking at them



Redemption

Redemption tends to be the first line of defense when it comes to arcade issues as most guests go to the redemption counter when they have an issue. Having your staff knowledgeable with basic repairs and the standard procedure on how to handle guest issues with games can help or hurt your center's image with those guests.

Having a "game issues" log behind the counter for teammates to write down any issues/complaints they receive during their shift can help the advanced techs know what the problems were and what games to investigate further for possible deeper issues. A simple template with the: date, time, game name, brief description, and reporting member's name, is a good baseline to start with.

Keeping track of what is selling and what's underperforming in redemption is vital to maximizing profitability. Don't be afraid to try new items!

Maintaining a monthly inventory of redemption products helps to discover theft rates (internal/external), establishing par levels, and maximizing profits, among many other factors.

Daily, weekly, and monthly checklists should be developed to assist with maintaining the game floor and redemption to the best it can be.



Redemption

Candy

Tootsie rolls
Theater boxes
Full size chocolate bars
Peg candy
Try random candy
Suckers

Claws

Big rubber ducks
Small inflatable balls
Generic plush
Themed plush
Candy/rubber ducks
Ice crystals in bottoms

Novelty

Seasonal high prize items
Venue themed items
Branded items
Area specific items
Retro items

High Prize

Gaming systems
Trendy items
Seasonal
Anime characters
Figurines
Retro gaming systems

Plush

Pokémon/Pokéballs
Pickle Rick
Sonic
Generic (smiley faces)
Pacman
Ella the Elephant

Lights/Lamps

Lava lamps
Light up signs
Night lights

Gag Items

Hand buzzers
Rubber chickens
Hand cuffs
Disappearing ink
Rubber band shooters
Cap guns

General Help

Fill it up
Maximize space
Think outside the box
Half off days
Double points day



Redemption Suppliers

- A&A Global (variety supplier)
www.aaglobal.com
- Redemption Plus (variety supplier)
www.redemptionplus.com
- BMI Merchandise (variety supplier)
www.bmimerchandise.com
- The Toy Factory (plush) *soft filled for cheaper freight*
shop.thetoyfactory.biz
- Amazon (high prize & trending products)
www.amazon.com
- Wal-Mart (seasonal plush & clearance items)
www.walmart.com
- Sam's (candy)
www.samsclub.com
- Costo (candy)
www.costco.com

This is a basic list of suppliers, there are other options available

Some suppliers offer free freight on orders over a certain amount, reach out to individual suppliers to discuss free freight order minimums



State Laws & Licenses

Each state has their own individual laws regarding arcades. It is recommended to inquire about these individual laws to protect your center from any possible fines for violating the state's individual laws.

Some states may require licenses for each individual game or playfields. As with the state laws, it is recommended to inquire about state licenses to protect your center from possible fines or seizures from the licensing agency. (Example: The South Carolina Department of Revenue requires games/playfields to have a license present and up to date, along with the center's name and address visible)

States may govern the price of an item allowed to be in a game, so be sure to know your individual state laws to protect your center.

Additionally, some cities may require individual licenses to be obtained and displayed properly on each game on your floor along with the state license.

It is best to learn about your individual state requirements to ensure you are following all laws and regulations to ensure no fines or seizures will happen



Games

There are different types of classifications for games based on the gameplay and style of the individual game. Video, claw, racing (video), prize, vr/motion, and coin pushers are a few examples of the classification types you will see on the game floor.

Every second a game is down, is a potential loss of revenue. Game floor walks before shift, throughout the shift, & at the end of shift are important to staying ahead of guest issues or discovering issues that went undocumented. Some examples of staying ahead of issues are ice balls balanced, basketballs balanced, errors displayed on screens, claws full, and air hockey paddles in place are just a few basic checks to prevent complaints or refunds.

When it comes to repairing games, **DO NOT BE AFRAID TO UTILIZE YOUR RESOURCES!!** Most game manuals can be found online to download for free. Technical support is usually just a phone call or email away. Utilize these resources as they will be key to helping resolve issues.

Weekly game tests should be performed to ensure proper operation of each game. Checking for loose steering wheels, loose game buttons, loose swipers, swiper guards in place, lights out, cosmetic issues, sticker/decals peeling, coins/cards dispensing, sensors scoring correctly, and switches working are just a small example of items to check during weekly checks.

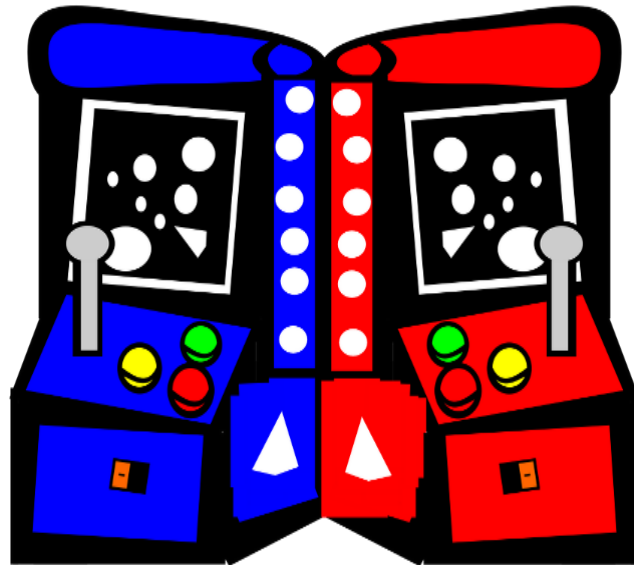
Build checklists and have team members sign off on tasks to ensure work/checks are being done. Randomly check behind them to verify

FFB

F I R S T
F R A M E
B O W L I N G

Anatomy of an arcade game

- Game button
- Computer
- Wiring
- Fuses
- Power supply
- Main board
- I/O board
- Ticket mechs
- Coin mechs
- Motors
- Sensors
- Handles
- Wheels
- Bearings
- Prize doors
- Lights
- Speakers
- Audio board
- Monitor
- Balls/pucks/coins



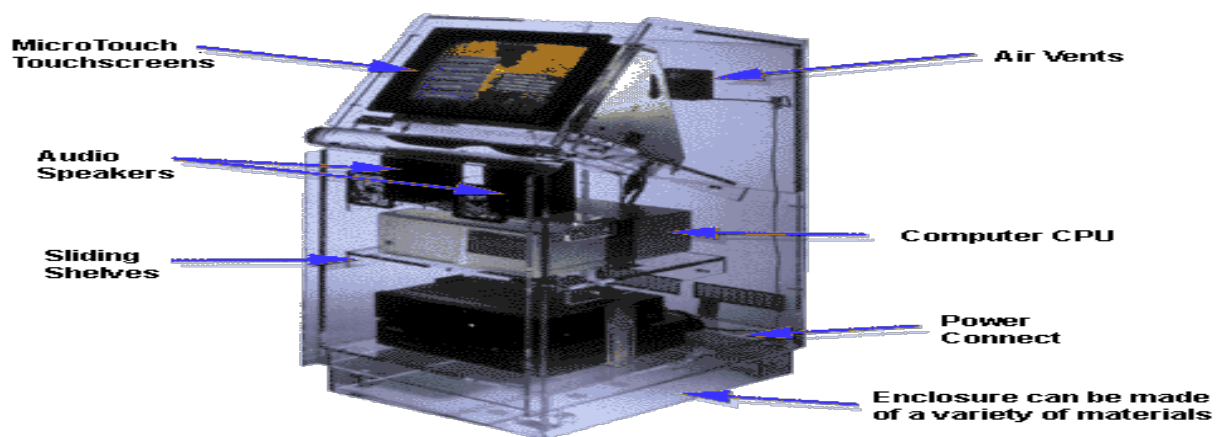
This is a broad overall list as each game will have similarities and differences depending on manufacturer, year produced, along with numerous other factors



Kiosks/Tellers

In this section we will discuss the different parts and common issues of a kiosk/teller. Below are a few topics we will dive into.

- Troubleshooting
- Cash acceptor issues
- Card dispenser issues
- Receipt printer issues
- “Rejection” card area
- Intercard “secret” menu
- Tech support to test/troubleshoot
- Credit card processors
- Mag reader issues & cleaning
- Com ports failing on the PC
- Dip switches on Intercard bill validator
- Bill holding box issues
- Disabling features while awaiting parts





Card set machines

In this section we will discuss the different parts and common issues of a card set machine. Below are a few topics we will dive into.

- Troubleshooting
- Coin acceptor issues
- Card acceptor issues
- Coin “color” relearn
- Adding new cards/coins/games
- Daily tasks
- Intercard “fishing” issues
- Adjusting the barcode scanner
- Swiper issues and cleaning
- Mag reader issues and cleaning

If you have local competition, keep in mind that guests may bring cards/coins from the competition and attempt to use them in your center. Typically, they will have a couple letters at the beginning of the barcode that alert you they are from that company. Example: Main Event has a “ME” at the beginning of the barcode. The card set machine will reject these cards as the barcode isn’t programmed into your machine



Electrical

When it comes to electrical, SAFETY is first and foremost! Always disconnect the power from any game before doing any electrical testing. If advanced testing is needed on a powered-on game, please have a qualified technician perform the testing to ensure personal safety and protection of components inside the game.

Please understand this is only the basics of electrical to apply to arcade repair and not an advanced electrical module that explains the in-depth principles of electricity.

The electrical section of this training module will be focused on the following:

- Understand what AC & DC voltage are and where they apply in games
- How to use a multimeter to test for different voltage types
- How to test for a broken wire or blown fuse using continuity
- How to identify different connector types
- How to splice wires using different connector types
- How to replace burnt/corroded/broken connectors
- How to solder wires and use heat shrink to protect the connection
- How to test power supplies for input and output voltage
- Wiring diagrams and how to use them to trace wires for testing
- How to test a microswitch
- Understand the makeup of a basic game button
- Understand the basic electrical components you will find in the field



Electrical

Again, this is only the basics to aid with testing/diagnosing individual components, repairing connections, and understanding the makeup of electrical circuits in an arcade game. Electricity principles can take countless days to understand every little thing about it. With this module, you should be able to efficiently troubleshoot electrical issues and find the faulty component or components by applying the basics discussed.

If your center has multiples of the same game, comparing readings or swapping components from one to the other can help in the diagnostic process

If swapping parts from one to the other, please be careful as you could damage a known good part due to another issue with the faulty game

Connectors

There are many different types of connectors being used daily in different industries, below are examples of commonly used ones. We will discuss a few of these as they relate to the Amusements side of this training.

Spade female



Spade male



Fork



Ring



Butt



Bullet



Lever



Quick



Solder Sleeve



Splicing

Splicing is bonding two or more wires together to create a connection between them. This can be done in multiple ways. We will discuss a few of those ways and practice creating those connections during this section.

Butt



Solder Sleeve



Prepare the wires



Insert into the connector



Crimp

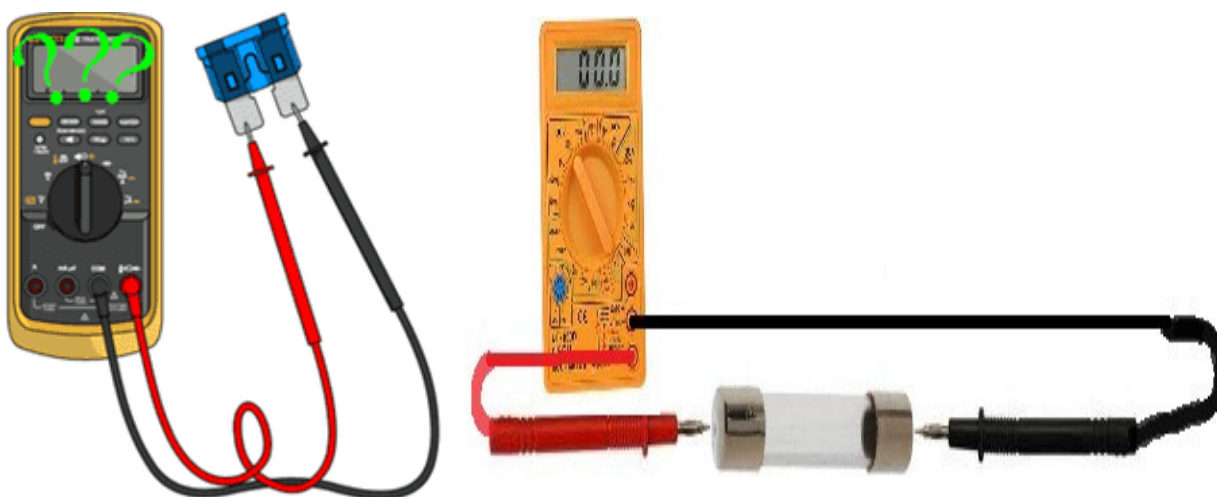
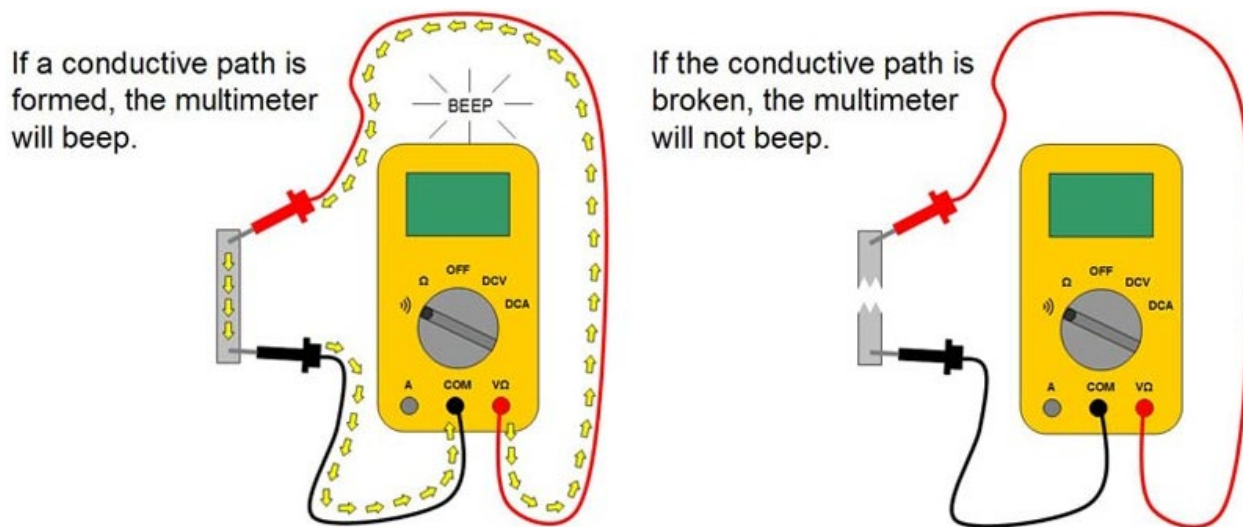


Use a hot air gun



Continuity

Continuity is a completely connected circuit for current to be able to flow. Continuity checks can be performed to test for a blown fuse, broken wire, or even a faulty switch.





Voltage testing

Testing for voltage may seem basic to some but it is often overlooked as the main source of an issue. Keeping it simple and starting from the source is the best plan of action when it comes to diagnosing a game that appears to have no power to the entire game or multiple areas of the game. As we progress in this class, you should be able to identify checking AC voltage versus DC voltage.

When testing for voltage, it is important to practice safety around any live equipment. If you are second guessing yourself or don't feel comfortable testing live equipment, please seek a trained professional to help with testing live electrical equipment.



V	Volts
A	Amperes
mA	milliamps
Ω	Ohms
~	AC
—	DC
➔	Diode test
🔊	Continuity test
Hz	Hertz
— —	Capacitance

MULTIMETER SYMBOLS



Power Supplies

Power supplies provide electric power to a load. They come in different shapes and voltage types. Typically, they convert AC voltage to DC voltage. In this section we will be examining switching power supplies and testing the input and output voltages on a few examples.

Regulated



AC Adapter



Linear



DC Power

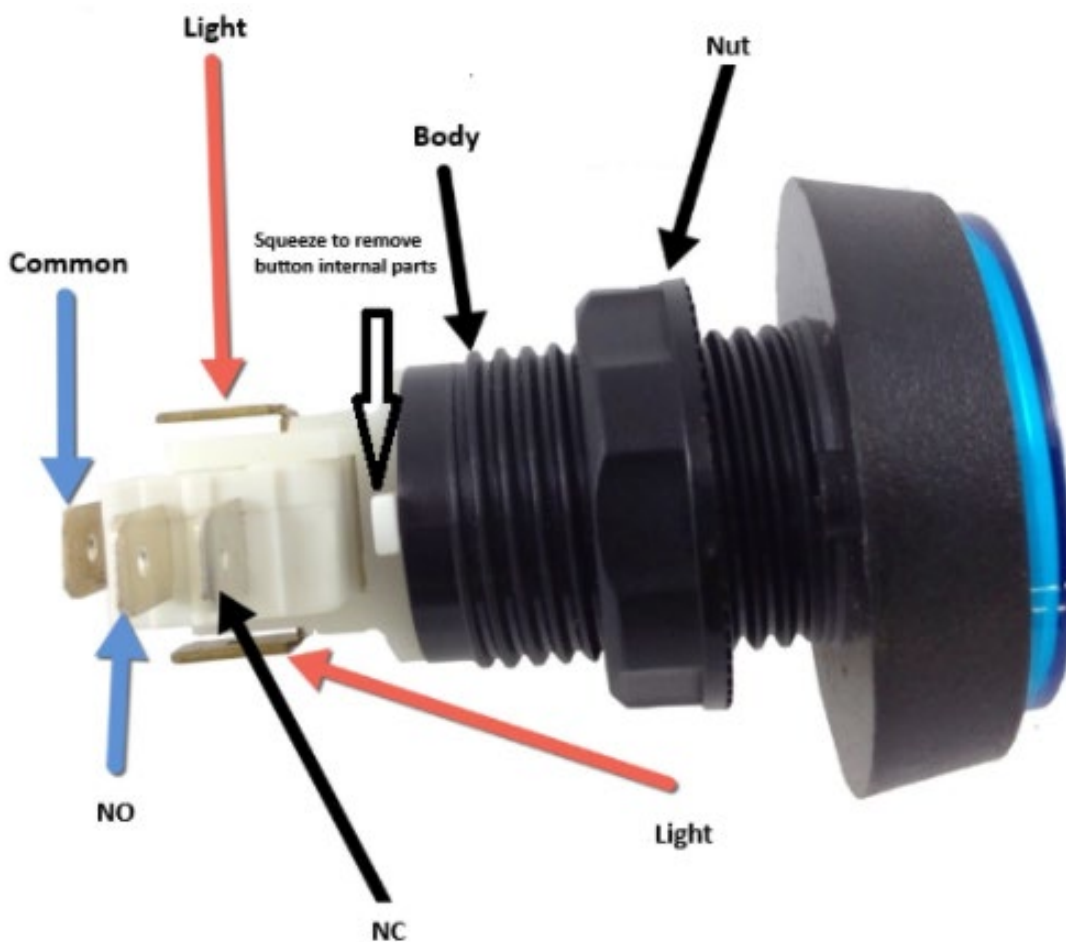


Switching



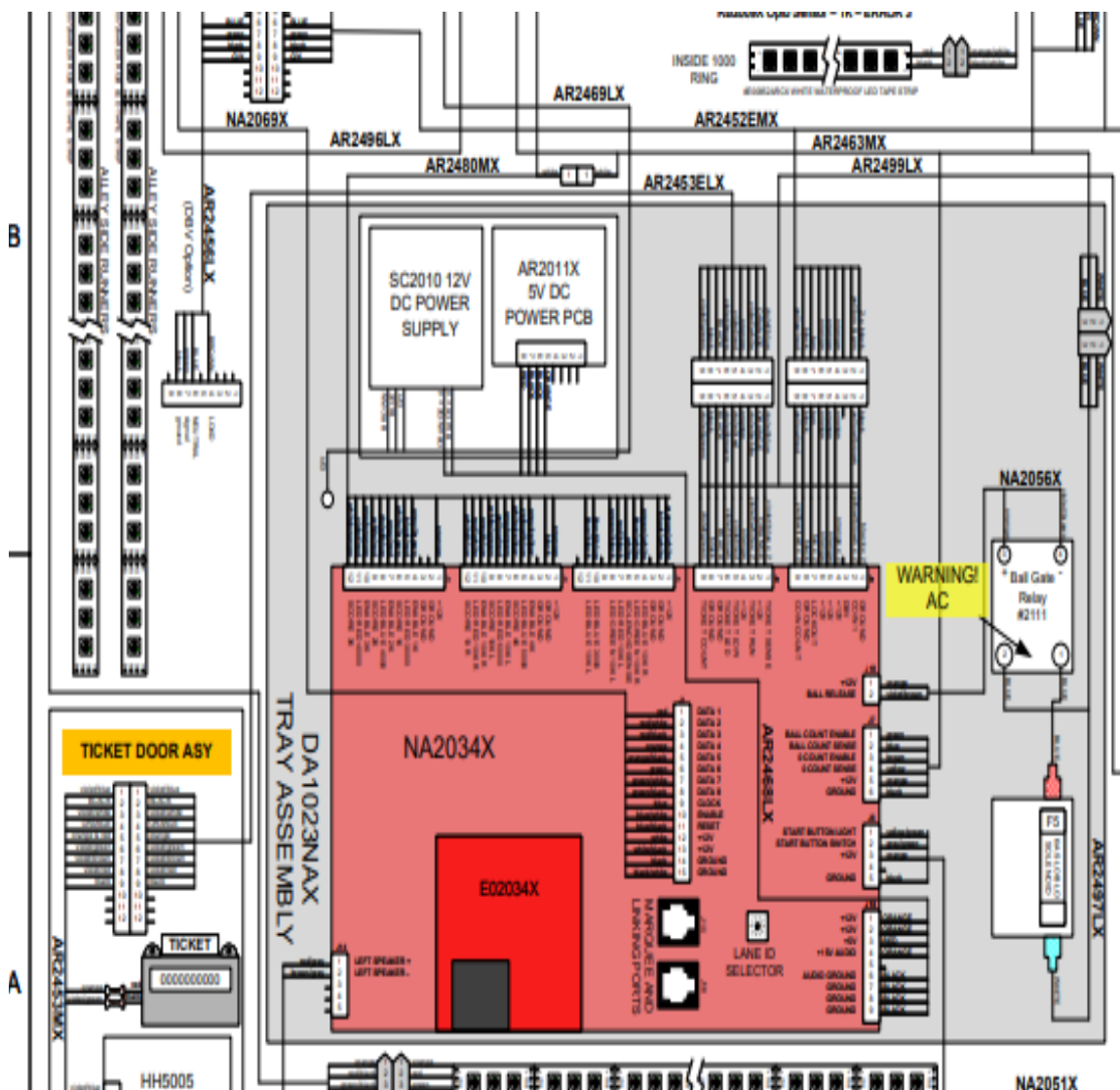
Game Buttons

While game buttons may come off as a simple issue to some, there are plenty of places in the amusements industry that have games down due to a simple game button repair. Having a few of the common style game buttons in your inventory is recommended as it is a lost cost item that could cause a revenue loss. Parts between the different buttons are often interchangeable and allow for a simple quick fix until the OEM button can be ordered and installed.



Wiring Diagrams

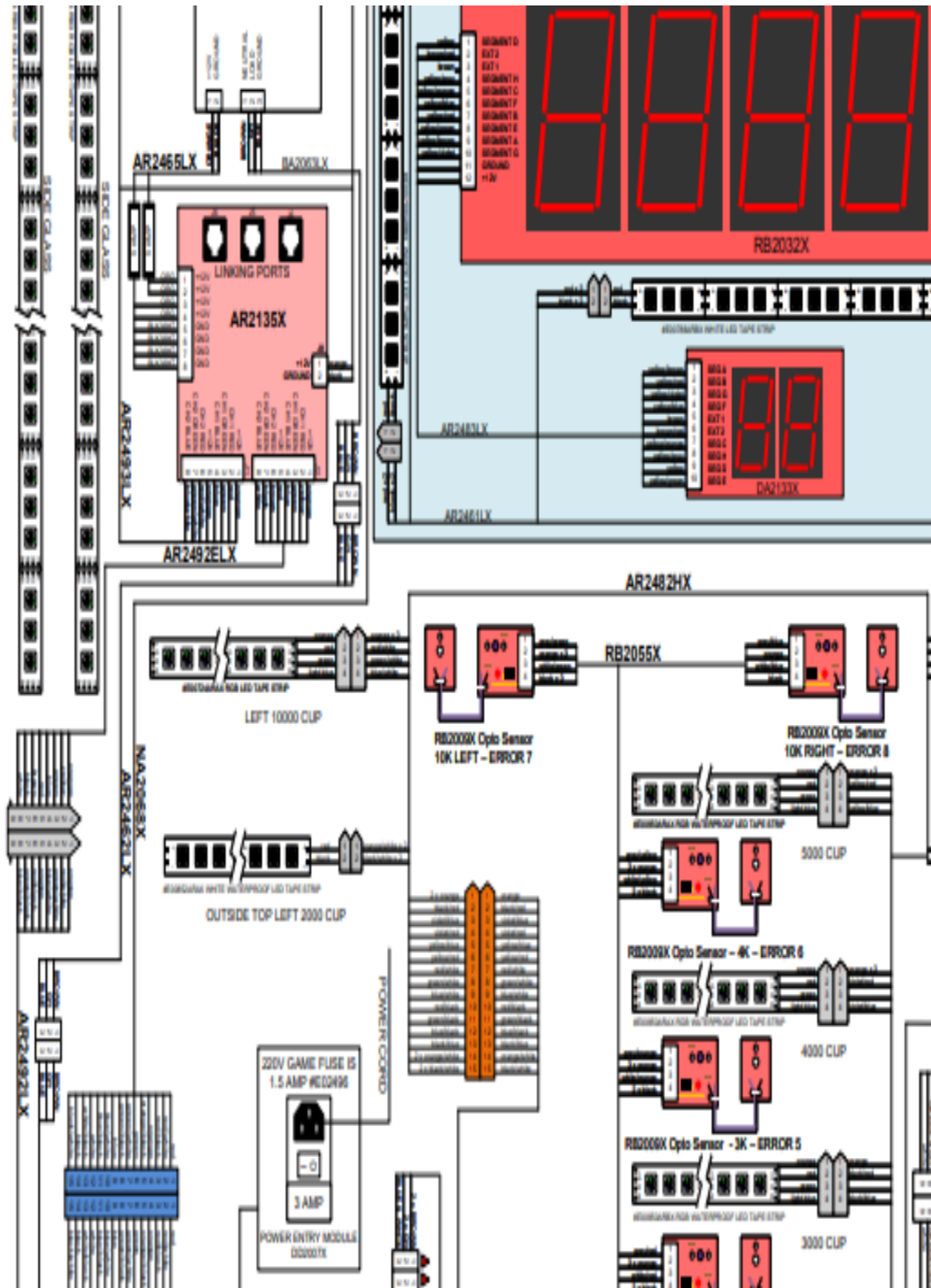
Wiring diagrams may be the toughest part to explain as they can be intimidating to some and seems to be the area a lot of people ask for help understanding. We will be going over the basics and how diagrams correspond with areas of a game.



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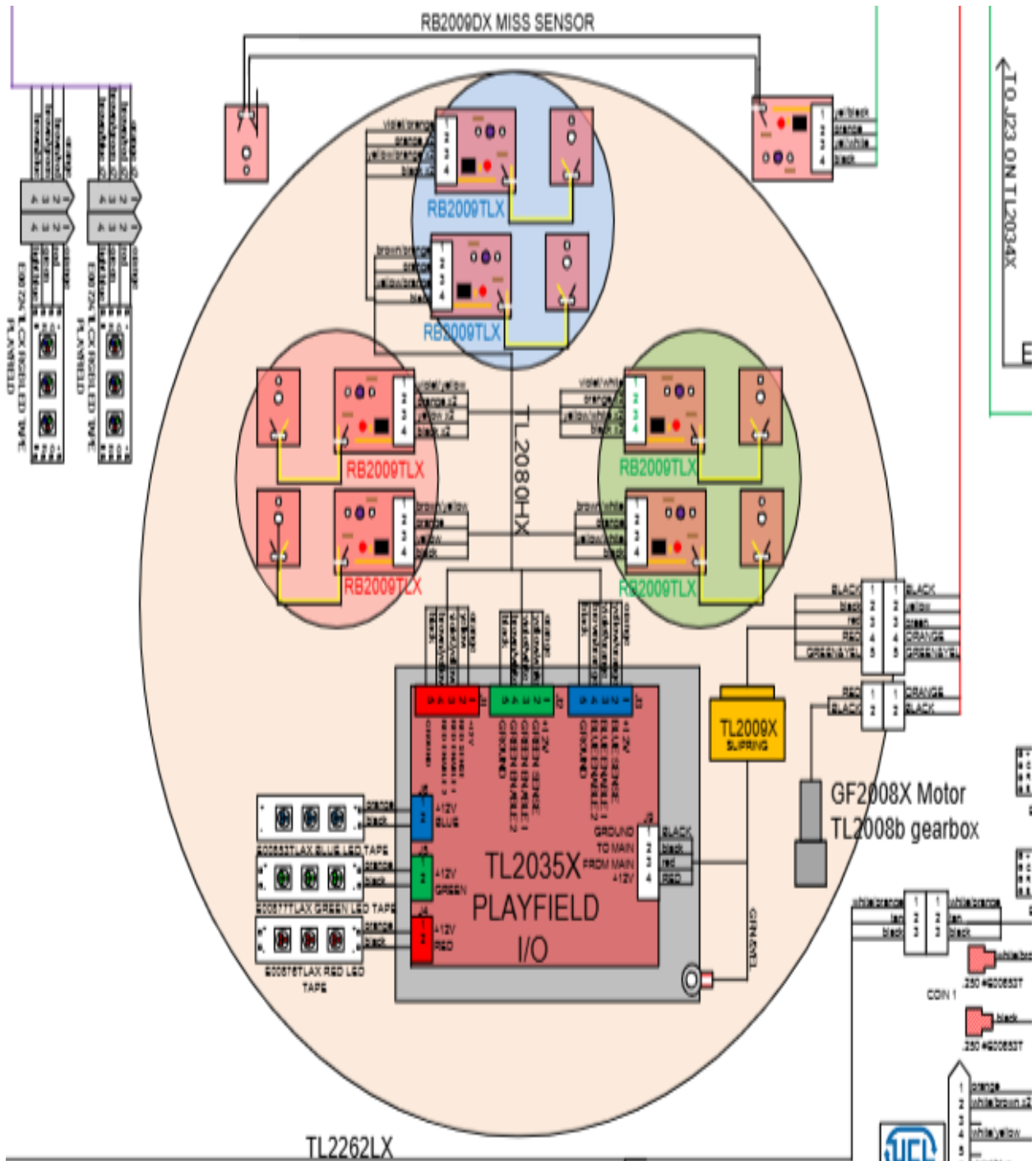
Wiring Diagrams



FFB

FIRST FRAMING BOWLING

Wiring Diagrams





Day 2 Closing Remarks

- Don't forget about the dinner tonight at (insert place, address, & time here)
- If you have any questions you may want to ask and not feel any pressure, please feel free to attend dinner & ask them
- LEARN YOUR GAMES! Knowing your games is invaluable as the possibilities to speed up the troubleshooting phase is endless by knowing how your game is intended to operate at full capacity
- Don't overthink when it comes to diagnosing a game, to often we don't keep it simple and miss the simple issues
- Any questions or comments?
- Remember to practice safety when performing tests on live equipment
- When splicing, don't forget the pull test
- If you have an amusements manager, speak to them about payouts and reporting to ensure games are working properly from that standpoint as those errors may go unnoticed if someone isn't checking these areas



Day 3

Welcome to day 3! Today we will be focused heavily on the game floor. We will be troubleshooting issues, removing/installing parts, testing voltage, and discussing checklists among other items. Remember to use your resources when troubleshooting games. Game manuals, technical support, and team members are examples of resources available to utilize.



Common Issues

Common issues vary from center to center based off many factors. Game types, age of games, preventative maintenance, and amount of gameplay are a few factors. Some examples are.

- Monster drop balls wear out & need replacing to prevent “ghost” balls
- Sensors vibrate loose (Ice Ball FX is a good example)
- Quik Drop sensor become dirty & cause errors
- Orange pegs on Fishbowl Frenzy break (balls get stuck in playfield & blower area)
- Pusher rods break on coin pusher motor assemblies
- Motors fail (pusher motors, carousel motor on Quik Drop, etc.)
- Silk screen on Hyper Pitch breaks
- Swipers are damaged due to ice/skee balls (swiper protectors are available)
- Wires break at Down the Clown motors
- Gate bolts work loose on Hot Shot
- Qube has gun issues (new style gun available)
- V.R. headset cable failure & headset issues
- Microswitch failure in numerous games
- Wires break on Eclaw grabber cable
- Claw solenoid failure on numerous claw machines
- Monitors fail (use a computer monitor to test for bad monitor)
- Game buttons break (microswitches, plastic tabs, spring)
- Camera & board fail on Big Buck Hunter
- Photo booth printers should be sent off for maintenance
- Ice Man filters need to be cleaned regularly to prevent overflowing

The logo for FFB (First Firm Framing) is displayed in large, bold, white letters on a blue background.The words "FIRMS T FRAMING" are displayed in a grid of white letters on a blue background. The letters are arranged in three rows: "F I R S T" in the top row, "F R A M E" in the middle row, and "B O W L I N G" in the bottom row.

Tips & Tricks

- Keep it simple! Don't overthink!
- Create an opening & closing checklist
- Game zone "how to" guide for new hires
- Make a "janitor's cart" for deep cleaning games
- When installing parts, write the date installed on it
- Show the team the "small" tasks to alleviate the workload
- Label arcade breakers with "drop and rec #" location chart
- Try "game of the week or month" for underperforming games
- Not every employee/manager is the same. Each place is different
- Check your payouts to make sure you aren't over/under paying out
- Check your contract with POS supplier as some offer free online training monthly
- Make a label with the "warranty end date" on new games and place inside cabinet somewhere
- Keep a log on games for parts installed on them to keep track of common issues, random failures, etc.
- If unsure about a faulty part and you have a duplicate game, swap the parts and see if the problem follows
- Make sure to communicate with the appropriate person to ensure stock/parts/supplies don't hit zero
- Create par levels for certain normally stocked items (Example; when you get down to 3 boxes of Willy Wonka cards, you place an order for more)



Checklists

Just as in every area of the venue, checklists should be developed and followed with the amusements side of the business. Checklists will vary from location to location based on the number of games, type of games, and countless other factors. Keep your checklists simple and doable. Creating complex and rigorous checklists can increase the workload of a team member to the point they aren't able to complete the tasks.

If checklists are in place already, look at them to see if anything should be added or taken away. Walk the floor and see if the tasks are being performed properly. Training may need to take place to help the team understand why this or that is being done or even how to properly execute a given task.

Daily, weekly, monthly, and annual checklists are a good baseline to start with and develop to ensure the game floor always remains at 100 % as possible from games up and operational to general game floor cleanliness.

A game deep cleaning checklist should be developed as well to ensure all games are being deep cleaned and checked at least once throughout each month depending on the total number of games on your floor. An average of 3-5 games throughout the day should be an attainable task and allows for ample time to ensure the games are properly maintained.

If you have other amusement attractions such as laser tag, mini golf, karting, bumper cars or any other attraction, it would be best to create a separate deep cleaning list for those attractions but don't forget to incorporate them into your daily, weekly, monthly lists with these attractions if the same team members are working those areas as well.

The following are just examples to use as a guide or starting point



Checklist Example

Daily

- Check out of service log
- Walk the game floor
- Redemption walkthrough
- Balance balls/bean bags/etc. in all games that require this
- Check for trash/spills/drink rings/etc. around the floor, on tables, & on games
- Empty card set machine (some centers may not have this)
- Check card/paper levels in all tellers
- Restock cranes/ticket rolls/pushers/etc.
- Restock & organize redemption area
- Deep clean assigned games on deep cleaning checklist
- Clean glass on all games

Weekly

- Place redemption order
- Game button check
- Empty silver coin catch trays/areas on coin pushers
- Check operation of every game
- Check lights on every game
- Steering wheel check
- Wipe down all table bases
- Calibrate all shooter games
- Deep clean trash cans (coordinate with the rest of the venue to do all at once)

Monthly

- Inventory
- Cosmetic game check (trim, stickers, plastic, etc.)
- Check all tables & chairs for issues (document or repair)
- Check for gum on the floor (document or remove)
- Wear & tear check (handles, mallets, basketball nets, etc.)
- Speaker & volume check (to low, to loud, speaker blown?)
- Clean filters on water games

FFB

**F I R S T
F R A M E
B O W L I N G**

Troubleshooting

Is it plugged in?

Is it turned on?

Have you turned it off and back on?

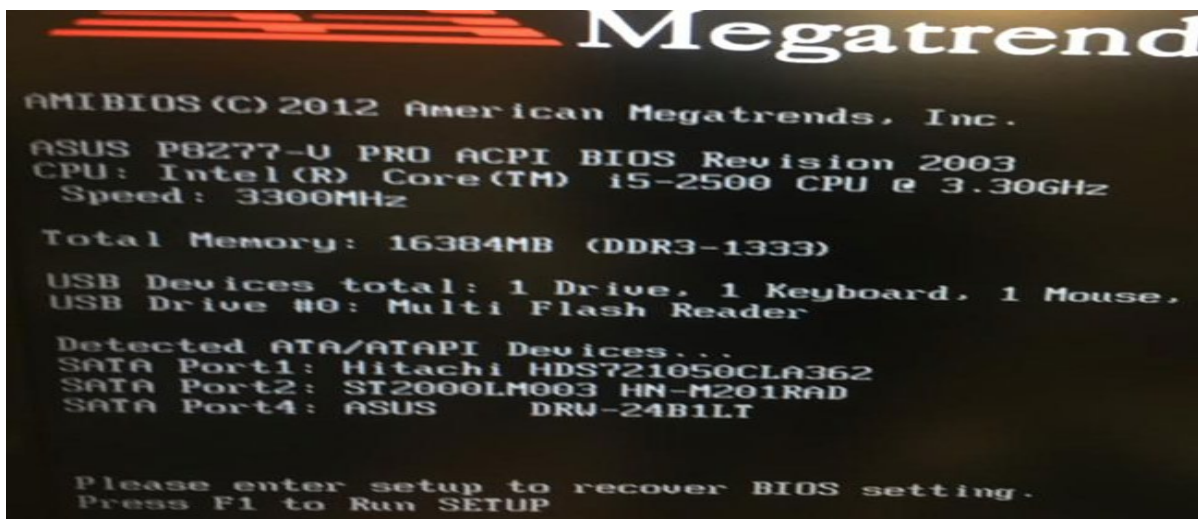
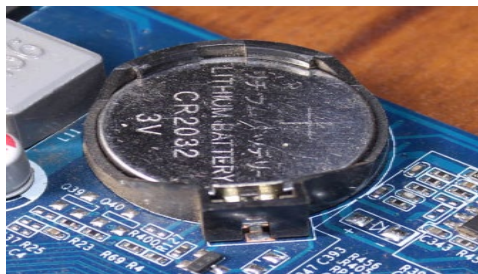


These are simple questions, but you would be surprised how often it's that simple to fix many game issues



CMOS Battery and BIOS

CMOS batteries must be replaced every so often and then the BIOS setting may need to be adjusted to correct the boot order and the auto power on feature.



F10 to enter

File-> set date and time

Storage ->boot order-> UEFI and legacy->CD drive 1st, Hard drive 2nd

Advanced->power on options->after power loss->on

G4 Bios -Press F10 to enter

Advanced->boot options->after power loss -> power on



Swipers

Swipers vary from manufacturer to manufacturer and typically the company the games are purchased from handle installing the swipers on the games during the installation process. You can reach out to your specific POS provider for assistance to help with swiper related issues.

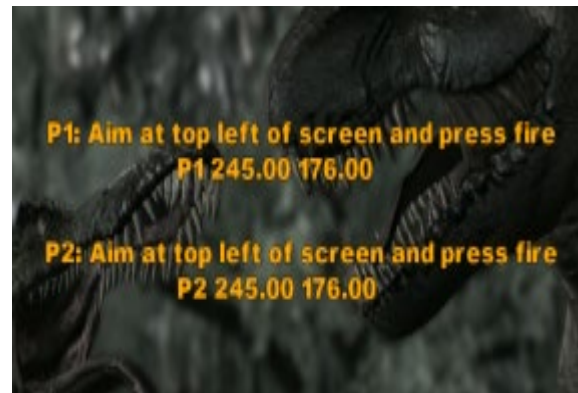
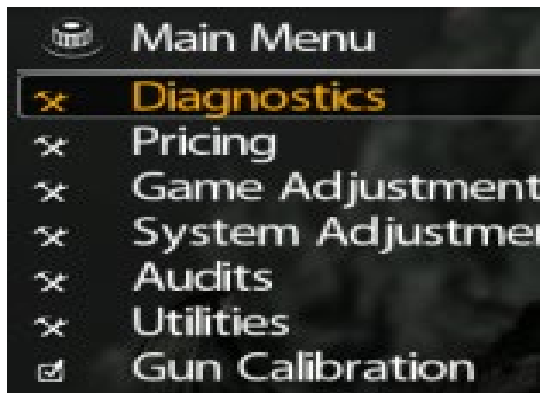




Calibration

Calibrating games are important for guest experience, payouts, and refunds to name a few reasons why. Most of us think of shooter games like Big Buck Hunter, The Walking Dead, Tomb Raider, or Jurassic Park when it comes to calibration.

Games such as Wheel of Fortune, King Kong, Cruisin' Blast, Dizzy Chicken, and V.R. Rabbits require calibration as well. These are just a few examples of other games that need calibrating. Refer to each games manual to follow the proper steps in calibrating any game that requires it.





Spare Parts

Spare parts can help prevent revenue loss, game downtime, and help in the aid of diagnosing an issue. The following are examples of spare parts that some centers may choose to have on hand to help maintain their floor to be at 100% as possible.

- Boxer padding & punching bag
- Game buttons (various sizes)
- Game button light
- Game lights that commonly fail
- Photo booth paper
- Pusher coins & cards
- Hockey pucks &
- Basketball nets
- Coin hopper
- Steering wheel belts
- Coin pusher rods
- Joysticks
- Power supplies (5 volt & 12 volt)
- Game cards
- Teller paper
- Ping pong balls
- Monster Drop & Monster Drop Extreme orange belts
- 5k potentiometer
- Big Buck camera & board
- Variety of microswitches
- VR headset cables/headset/padding/ straps
- Assortment of fuses
- Computer monitor with a DVI/HDMI/VGA/USB port to test for faulty monitors



Repairs

Learn your games! Know what is supposed to move, light up, open, release, etc. before, during, and after “playing” the game. How can you repair your game if you don’t know that something isn’t working? Examples: Do you know if the marquee on Bop It is designed to flash in attract mode? Did you know on Down the Clown, the carnival cannonball stuntman moves left to right during gameplay? Do you know what the “attract” music is for NBA Hoops?

Learn how to calibrate all games that need calibrating.

Don’t just rely on what someone said was happening with a game. Test it yourself. You may discover problems that weren’t relayed by testing it yourself.



Day 3 Closing Remarks



Preventive Maintenance

Preventive maintenance tends to get overlooked in centers, but not doing it can cause bigger problems or cost centers more in the long run. There are many factors that cause this to be overlooked but we will focus on what preventative maintenance is and how to perform these practices safely.

P.M. Practices



Post Training Questionnaire

Training takeaways?

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-

Recommendations/thoughts overall?

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-
-

On a scale of 1-5 (with 5 being the highest), how would you rate the training you received?

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Glossary

Alternating current-

Amperage-

Battery-

Capacitor-

Card set-

Circuit-

Circuit breaker-

Closed circuit-

Connector-

Continuity-

Credit-

Current-

Dead short-

Direct current-

Fuse-

Ground-

Hertz-

Input-

Junction-

Kiosk-



Glossary

Light emitting diode-

Load-

Neutral wire-

Normally closed-

Normally open-

I/O Board-

Multimeter-

Ohms-

Output-

Parallel circuit-

Polarity-

Power-

Power supply-

Relay-

Resistance-

Resistor-

Schematic-

Series circuit-

Short circuit-

Solder-



Glossary

Soldering-

Soldering iron-

Splicing-

Swiper-

Switch-

Teller-

Transformer-

Voltage-

Watt-

Wire-

Wire gauge-

Wiring Diagram-



Vendor Log



Example Lists



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Notes

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Questions

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Questions

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