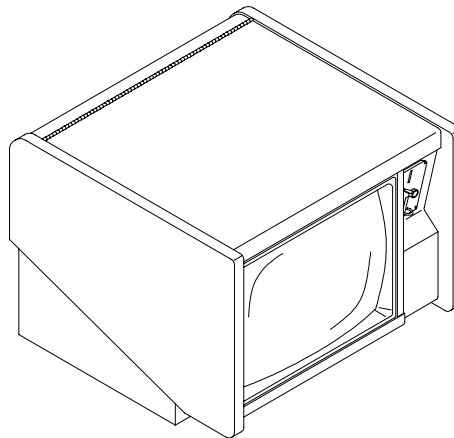
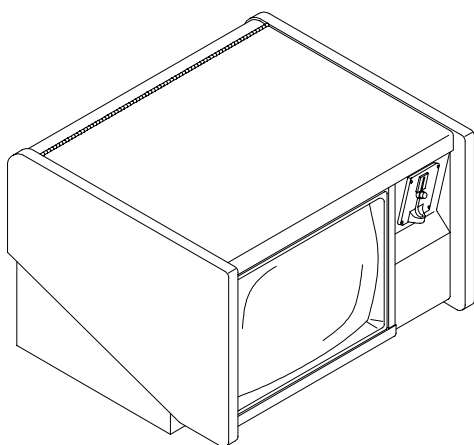




TOUCHSCREEN VIDEO GAME MACHINE CONVERSION

FOR USE ON THESE CABINETS



Manual Includes

- Installation • Operations • Adjustments • Parts Information • Wiring • Troubleshooting •

The manufacturer intends that this game is to be operated for amusement purposes only and not in contravention of any federal, state or local law or regulation of the United States or any foreign country governing gaming devices. All operators of this game are responsible for its operation in accordance with such laws and regulations. The manufacturer's factory settings for this game may require adjustment in order to comply with laws applicable in an operator's specific jurisdiction. It is the operator's responsibility to determine whether adjustments are necessary and, if they are, to make the appropriate adjustments prior to operating the amusement game.

How to adjust the volume of your Touchmaster® VGM:

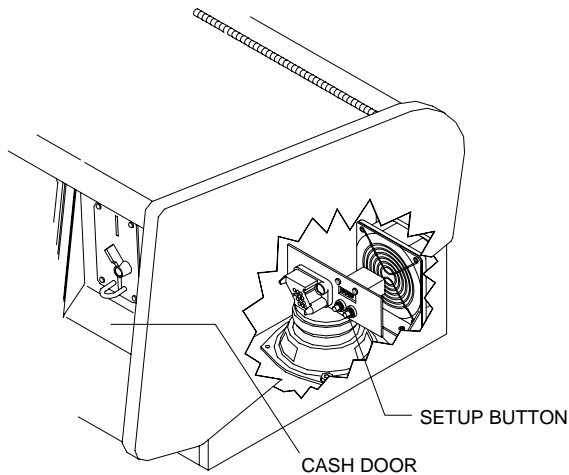


Illustration A. Setup Button Location

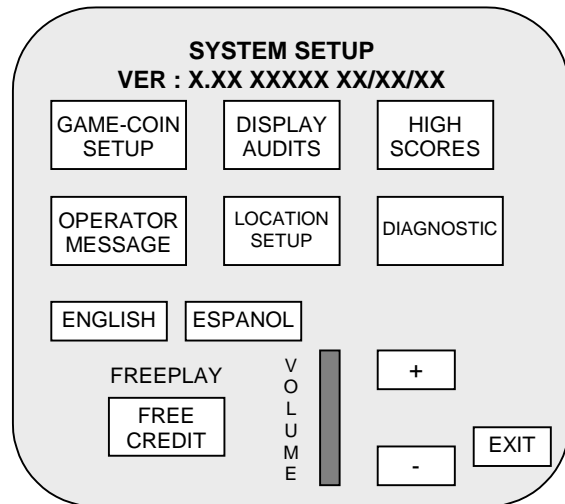


Illustration B. SYSTEM SETUP screen

1. Remove cash door and hit SETUP button. (See Illust. A.)
2. Touch + or – button to adjust volume level. When done, touch EXIT button. (See Illust. B.)
3. Replace cash door. (See Illust. A.)

How to customize your Touchmaster® VGM name:

1. Remove cash door and hit SETUP button. (See Illust. A.)
2. Touch LOCATION SETUP button on screen. (See Illust. B.)

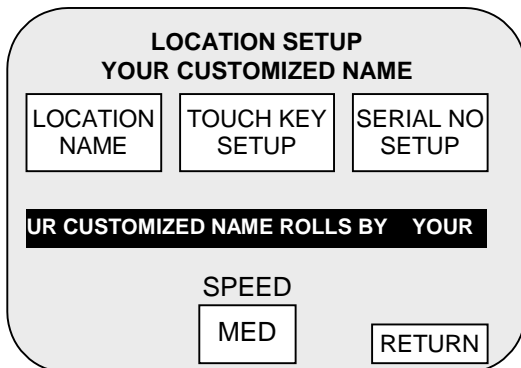


Illustration C. LOCATION SETUP screen

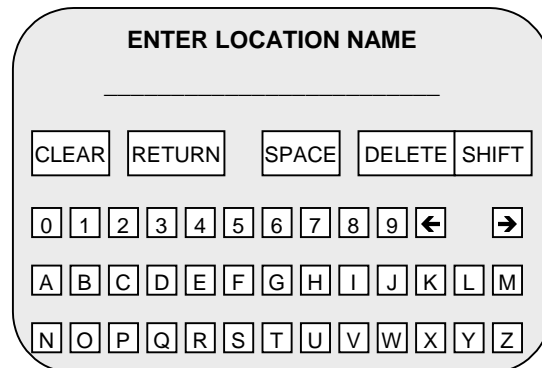


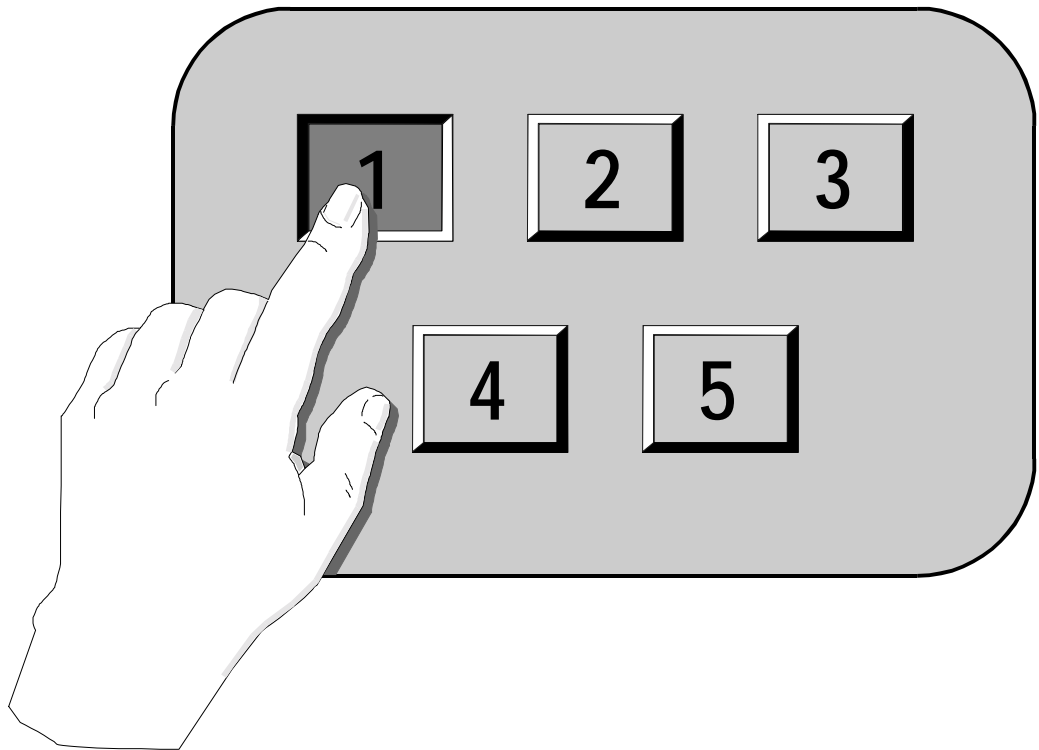
Illustration D. ENTER LOCATION NAME screen

3. Touch LOCATION NAME button. (See Illust. C.)
4. Touch characters of name. (See Illust. D.) Touch RETURN when done.
5. Touch RETURN button in LOCATION SETUP screen. (See Illust. C.)
6. Touch EXIT button in SYSTEM SETUP screen. (See Illust. B.)
7. Replace cash door. (See Illust. A.)

TOUCHMASTER[®]

CONVERSION

CHAPTER



SETUP



NOTICE: Information in this manual is subject to change without notice. Midway Amusement Games, LLC reserves the right to improve equipment function, design, or components as progress in engineering or manufacturing methods may warrant. Field installed upgrade kits may also change the operating sequence or functions.

SAFETY INSTRUCTIONS

The following instructions apply to operators and service personnel. Read these instructions before preparing your Video Game Machine (VGM) for play. Other safety instructions appear throughout this manual.







DEFINITIONS OF SAFETY TERMS

DANGER indicates an imminent hazard. Failing to avoid this hazard **WILL** cause death or serious injury.

WARNING indicates a potential hazard. Failing to avoid this hazard **COULD** cause death or serious injury.

CAUTION indicates a potential hazard. Failing to avoid this hazard **MAY** cause minor or moderate injury. CAUTION also alerts you about unsafe practices.

NOTICE indicates information of special importance. Observing notices may prevent you from damaging the VGM equipment.

	WARNING: DO NOT SUBSTITUTE PARTS. Use of inferior parts or VGM modifications could cause serious injury or equipment damage! Use only Midway authorized parts. For safety and reliability, do not substitute parts or modify Midway products. Substitute parts or modifications may void EMC directive or FCC type acceptance.
	WARNING: DISCONNECT POWER. Always turn AC power off and unplug the line cord before attempting service or adjustments. Installing or repairing board assemblies while the power is on can cause injury, damage components, and void the warranty. Be sure that you securely install ground wires.
	WARNING: GROUND VGM. Avoid electrical shock! Do not plug in a VGM until you have inspected and properly grounded it. Only plug this VGM into a grounded, three-wire outlet. Do not use a "cheater" plug, or cut off the ground pin on the line cord.
	WARNING: GROUND SELF. Wear a grounding strap during installation. Ground yourself frequently by touching the metal chain lug on the rear of the cabinet to discharge static electricity from your body.
	CAUTION: INSPECT SALVAGED PARTS. Kit completion requires salvaging parts from an existing VGM. Salvaged parts must operate perfectly for the converted VGM to perform properly and safely. Before attempting conversion, repair circuit board malfunctions and cabinet damage.
	CAUTION: PROPERLY ATTACH ALL CONNECTORS. Make sure connectors on the CPU Board Assembly are properly connected. If the connectors do not slip on easily, do not force them. A reversed connector may damage your VGM and void the warranty. All wiring harness connectors are keyed to fit specific header pins on the Board Assembly.

EPILEPSY WARNING

A very small portion of the population has a condition which may cause them to experience epileptic seizures or have momentary loss of consciousness when viewing certain kinds of flashing lights or patterns that are commonly present in our daily environment. These persons may experience seizures while watching some kinds of television pictures or playing certain video games. People who have not had any previous seizures may nonetheless have an undetected epileptic condition.

If you or anyone in your family has experienced symptoms linked to an epileptic condition (e.g. seizure or loss of awareness), immediately consult your physician before using any video games.

We recommend that parents observe their children while they play video games. If you or your child experience any of the following symptoms: dizziness, altered vision, eye or muscle twitching, involuntary movements, loss of awareness, disorientation, or convulsions, *discontinue use immediately* and consult your physician.

PRODUCT SPECIFICATIONS

VGM Characteristics

Player Variables

Choice of Several Different Games
1 or 2 players per game
High Score Recognition, Difficulty

Operator Variables

Coinage, Difficulty,
Graphics, Statistics
Audits, Time, Volume

Diagnostics

Automatic Power-Up Self-Test
Manual Multi-Level Menu System
Touchscreen Calibration

MAINTENANCE

This VGM uses the same surface for video display and player controls. Because players use their fingers, the entire screen and cabinet will quickly become covered with fingerprints. We recommend that you clean the VGM frequently to ensure maximum customer interest.



NOTICE: AVOID ABRASIVE CHEMICALS. Do not use products with ammonia, bleach, lemon, vinegar, trisodium phosphate (tsp), or any abrasive ingredients. These products can damage the surface of the touchscreen and degrade VGM performance.

◆ Glass surfaces

You may clean glass while power is on. Do not use ammonia or chlorine. Apply a mild glass cleaner to a clean cloth or sponge, then use this to wipe screen. *Do not apply the cleaner directly on the glass!* Liquids could drip down into the touchscreen circuits and cause erratic operation.

◆ Calibration

Calibrate the screen each time you clean the VGM. Use the Calibration Test steps to determine if recalibration is required (refer to Calibration in this section).



NOTICE: Neither Midway Amusement Games, LLC nor its affiliates sponsors, authorizes, condones, or is in any way associated with tournaments using any Touchmaster® games.

CONVERSION PROCEDURE

Pictorial presentation for experienced installers. Detailed instructions immediately follow.

Inspection

Unpack the materials from the carton and inspect for obvious signs of damage. Use the checklist to be sure the kit is complete. You must supply the remainder of the materials required for this conversion.

Part Number	Item	Quantity
[] A-23380-33	Touchmaster [®] CPU Board Assembly (processor and VGM electronics)	1
[] A-23381	Touchscreen control module (Converts processing signal)	1
[] RM-42-01	2" square of hook fastener (To fasten controller to cabinet)	1
[] RM-43-01	2" square of loop fastener (To fasten controller to cabinet)	1
[] H-23368	Wiring Harness (Connects CPU Board Assembly to speaker, video, etc.)	1
[] H-23379	Adapter Cable (Mates 15-pin to 9-pin connector, if used for cash door.)	1
[] 04-12821-1	Marquee Retainer with magnet fasteners.	1
[] 31-3443	Cabinet Decal-Left side (Covers existing VGM markings)	1
[] 31-3444	Cabinet Decal-Right side (Covers existing VGM markings)	1
[] 31-3445	Cabinet Decal-Front-wide (Covers wide VGM markings)	1
[] 31-3458	Cabinet Decal-Front-narrow (Covers narrow VGM markings)	1
[] 31-3627	Marquee artwork	1
[] 16-10089.1	Label-Epilepsy Warning (Affix to VGM front beneath monitor bevel)	1
[] 4406-01128-00	6/32" KEPS nut (Affixes ground cable to bracket)	1
[] 16-80020-101	Touchmaster Conversion Kit Manual (This publication)	1
[] 4008-01003-05	6/32" Machine Screw (Fastens CPU Board Assembly to metal plate)	6

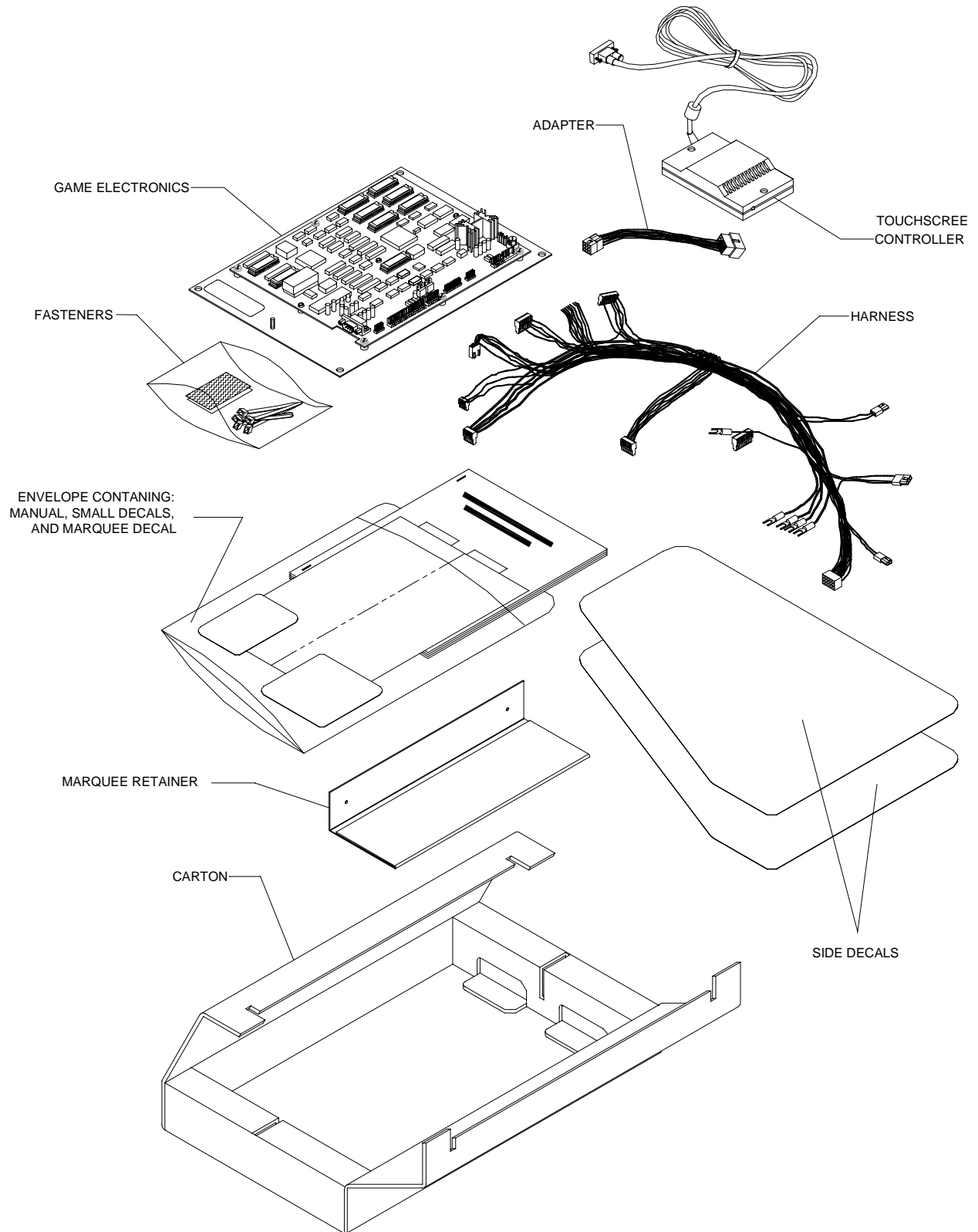


NOTICE The conversion kit CPU Board Assembly is not interchangeable with the standard Touchmaster[®] CPU Board Assembly. The assemblies look very similar, but have different part numbers. The incorrect assembly will cause sync and touchscreen calibration errors.

TOOLS REQUIRED FOR CONVERSION

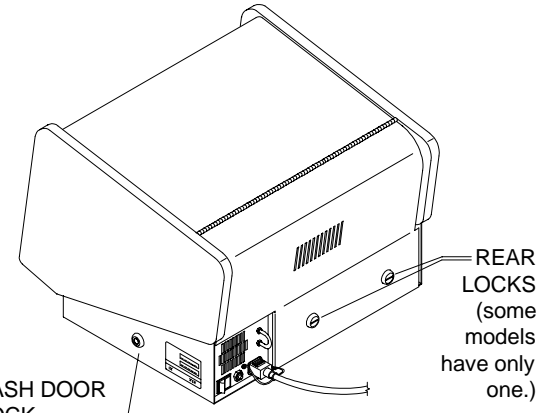
Philips head screwdriver, flat head screwdriver, safety utility knife, 5/16 nut driver or socket wrench.

TOUCHMASTER® CONVERSION KIT PACKAGING



Verify operation of original VGM.

1

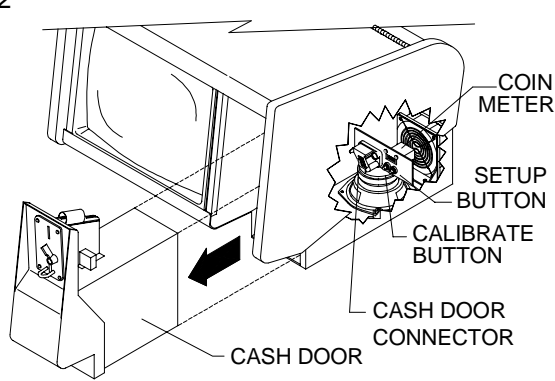


CASH DOOR LOCK

REAR LOCKS (some models have only one.)

Vacuum loose dust from fan area. Unplug line cord. Unlock cash door.

2



COIN METER

SETUP BUTTON

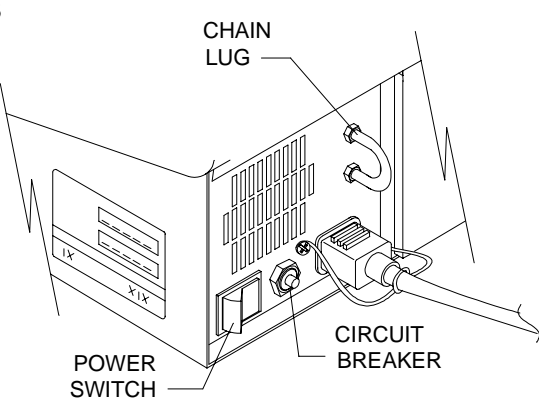
CALIBRATE BUTTON

CASH DOOR CONNECTOR

CASH DOOR

Remove cash door to reveal coin meter, SETUP, and CALIBRATE buttons. Note meter count. Reinstall cash door.

3



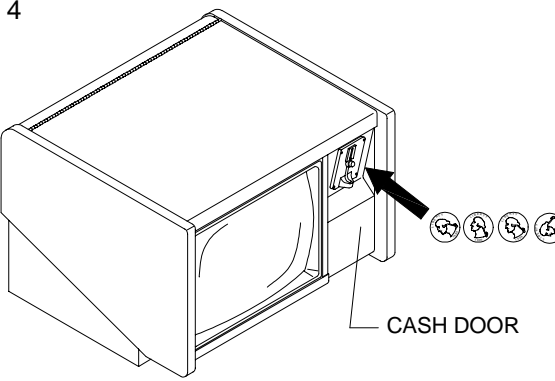
CHAIN LUG

POWER SWITCH

CIRCUIT BREAKER

Plug in line cord. Turn on AC power.

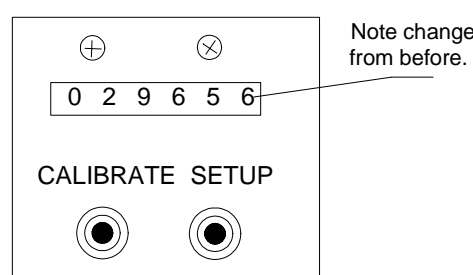
4



CASH DOOR

Insert coins to play games. Verify operation and record number of coins used. Remove cash door to confirm meter has advanced once for each coin.

5



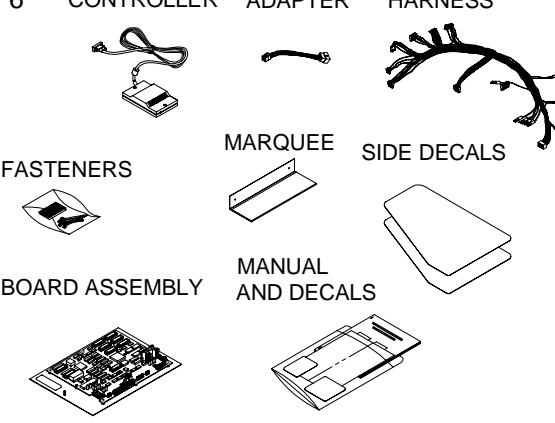
Note change from before.

0 2 9 6 5 6

CALIBRATE SETUP

Press CALIBRATE button and follow instructions on screen. Touch EXIT TEST on screen. Press SETUP button, then the TEST SCREEN button on screen. Line up crosshair with cross. Then hit EXIT TEST on screen.

6



CONTROLLER ADAPTER HARNESS

FASTENERS

BOARD ASSEMBLY

MARQUEE

MANUAL AND DECALS

SIDE DECALS

Turn off AC power and unplug line cord. Install cash door. Unpack parts. Inspect for damage.

Remove original VGM electronics.

1 TOUCHSCREEN CONNECTOR CABLE

TOUCHSCREEN CONTROLLER CABLE

You may have one or both of these connectors.

Open cabinet door. Disconnect touch screen connector and/or touch screen controller cable connector, depending on model.

2

COIN LOCKOUT

Disconnect: 9- or 15-pin coin mechanism cable, 2-pin DC fan connector (some models do not have one), 2-pin speaker connector, coin lockout connector (if applicable).

3 TYPICAL POWER SUPPLY

DC Volt.

Leave AC and FG wires attached.

SURGE PROTECTOR (not on all models)

Detach all DC wires that lead to CPU Board Assembly. Verify power supply connections.

4

FRONT OF UNIT

POSSIBLE VIDEO CONNECTOR ORIENTATIONS

OR

REAR OF UNIT

RED WIRE

Locate video connector on monitor board. Record orientation of red wire into this connector (toward front or toward rear) and detach connector.

5

CPU BOARD ASSEMBLY

Remove existing CPU Board Assembly with original wiring attached.

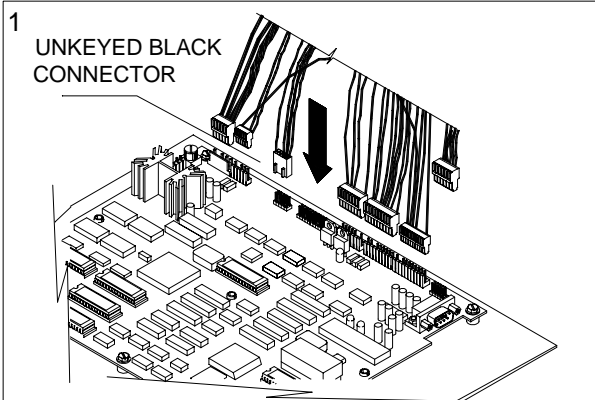
6

TOUCHSCREEN CONNECTOR CABLE

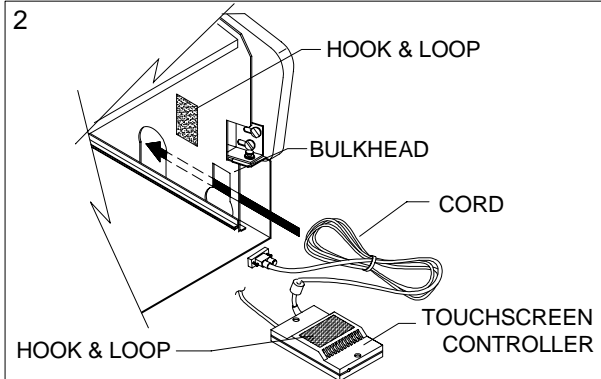
TOUCHSCREEN CONTROLLER

Disconnect and remove touchscreen controller. Remove any key plugs in connector cable sockets. Leave cable in unit. Retain mounting hardware (nuts or hook-and-loop fastener).

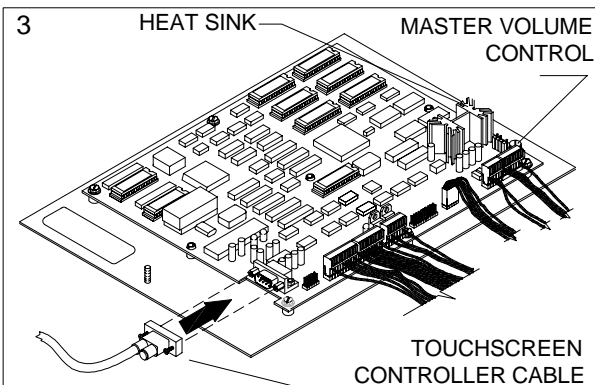
Install conversion VGM electronics.



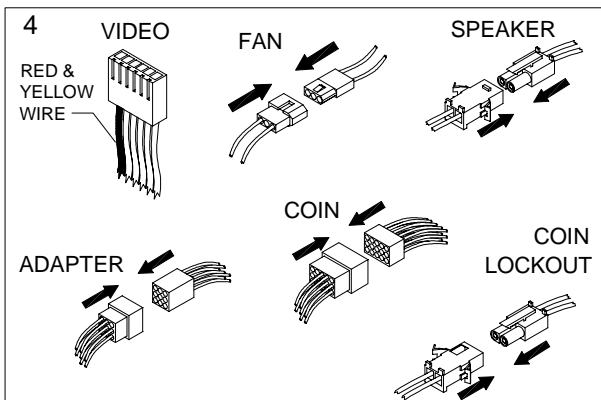
Snugly attach, but do not force wiring harness connectors into new board assembly. On the unkeyed black connector, tabs should face in toward the board assembly.



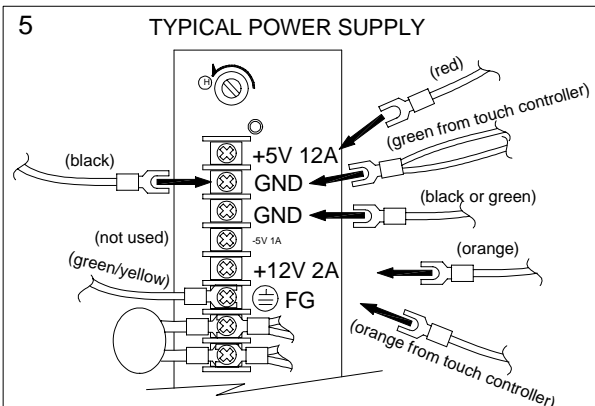
Attach touchscreen connector to controller. Mount controller on bolts or with hook and loop fastener so LED faces rear or right of VGM. Attach any ground lugs to mounting bolt. Stow excess cable between metal walls.



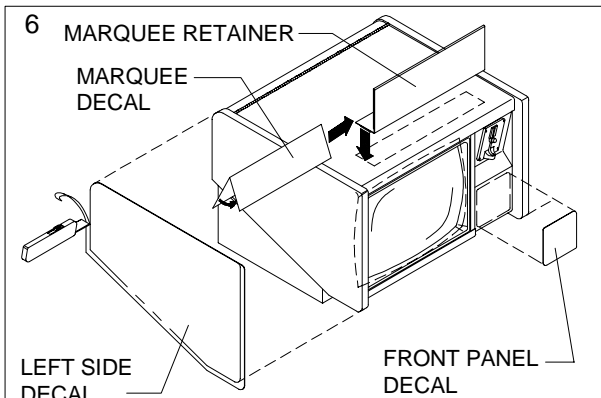
Orient board assembly with heat sink to front left of VGM. Point volume control to front of VGM. Slide CPU Board Assembly into cabinet. Attach touchscreen controller cable to board.



Attach 6-pin connector to video board. Orient red/yellow wire as red one was before. Attach: fan, speaker, coin, and coin lockout (if applicable) connectors. Use 9-pin adapter if needed.



Attach DC power wires to power supply. Attach touch controller wires to +12 and GND. Stow wiring and cables in front of security bar. Verify power supply connections.

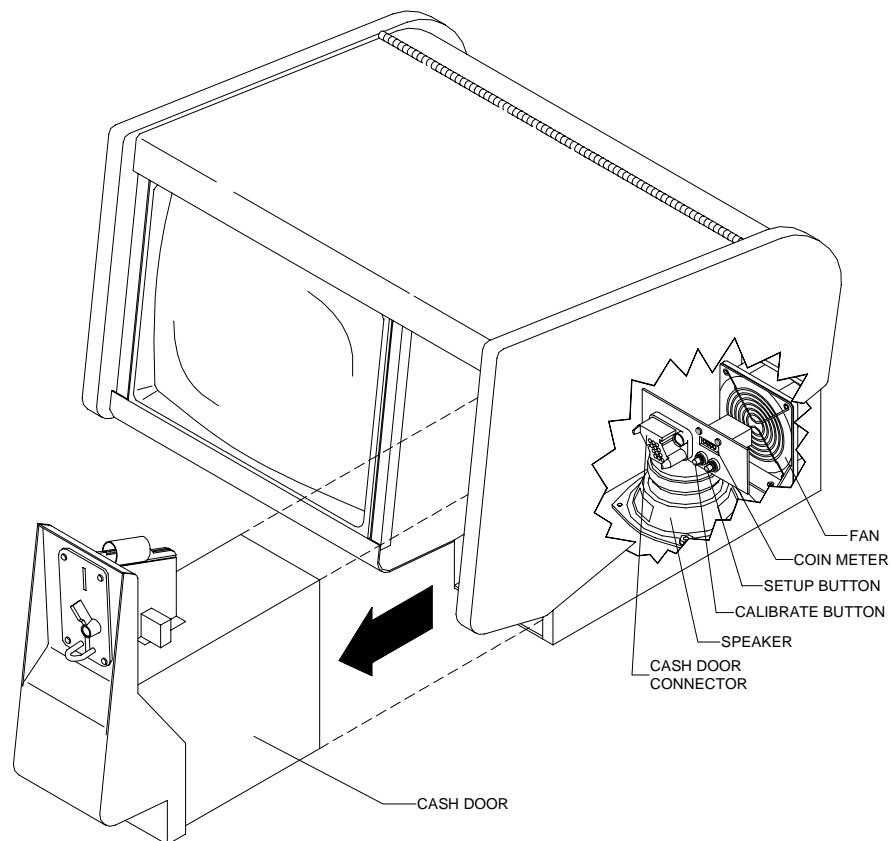


Plug in VGM and turn on power. Calibrate and test. Remove artwork. Align side decals with top of cabinet. Apply decals trim to fit. Cut keyhole. Apply correct sized front decal. Add marquee.

DETAILED INSTALLATION PROCEDURE

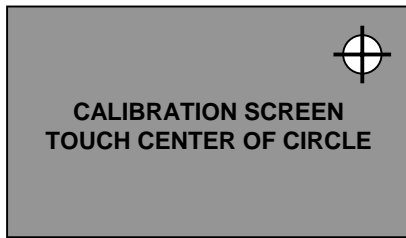
Verify Original Equipment Operation

1. **INSPECT PARTS** Unpack the conversion kit and verify that nothing was damaged in shipping.
2. **FLATTEN DECALS** Unfold the side panel decals. Stack large, heavy items like newspapers, books, or magazines on them until the weight flattens them sufficiently for use.
3. **CHECK CABINET** Inspect VGM cabinet for damage. Repair before proceeding.
4. **VERIFY OPERATION** Plug in VGM and switch on AC power. A single beep should be audible during startup. If the system starts without errors and enters the Attract mode it is considered functional.
5. Turn off power and unplug the VGM from the outlet.
6. **CLEAN** Vacuum the fan opening from outside the cabinet to remove loose dust.
7. Insert key into coin lock and turn clockwise to unlock. Pull the entire cash door out of VGM.
8. Locate the coin meter, CALIBRATE button, and SETUP button at rear of the coin vault.

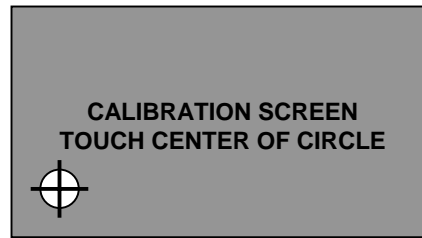


CUTAWAY OF CASH VAULT WITH CASH DOOR REMOVED

9. **METER** Record the existing coin meter count and replace cash door tight with connections in rear.
10. Plug in line cord and turn on AC power.
11. **CURRENCY** Insert coins and play games to verify operation. Record number of coins used.
12. Remove the cash door and confirm that coin meter has advanced for each coin inserted.
13. **ORIGINAL MANUFACTURER'S CALIBRATION** Press the CALIBRATE button to perform original manufacturer's adjustment. If the touchscreen does not calibrate correctly, repair or replace it.

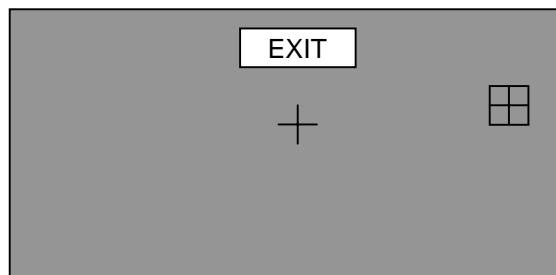


FIRST CALIBRATION SCREEN



SECOND CALIBRATION SCREEN

14. The first calibration dot appears in the upper right-hand corner of the screen. Touch the center of this circle with your finger. Finger position will be verified by an audible tone.
15. The second calibration dot appears in the lower left-hand corner of the screen. Touch the center of this circle with your finger. The VGM enters the Test Screen mode accompanied by an audible tone.
16. Touch the screen and note that the crosshair centers beneath your fingertip. Touch all four corners and the entire bottom edge of the touchscreen. Touch the EXIT TEST button on the screen when done.
17. **TRACKING TEST** Press the SETUP button. Touch the TEST SCREEN button on the screen.



TRACKING TEST SCREEN

18. A cross will appear in the center of the test screen. Touch the center of the cross and observe that the crosshair centers on the cross. The crosshair will follow your finger as you move it across the screen.
19. Touch the EXIT button on the screen.

If the crosshair was *not* centered on your finger, note the distance and direction it is off center. Return to the calibration screen and place your finger on the screen slightly away from, but in the same general direction and distance, from the dot to where the crosshair was off center.

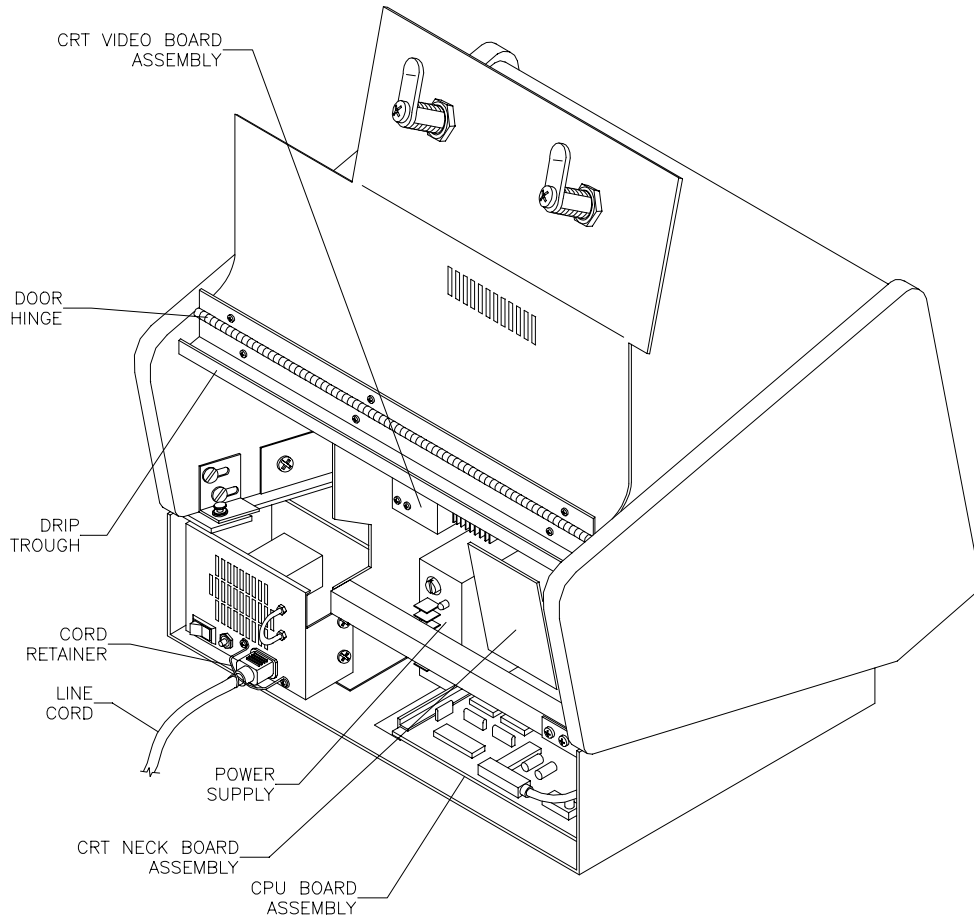
Example: If the crosshair appears slightly below where you touched the screen, place your finger just below the calibration dot. If the crosshair appears slightly above and to the right of where you touched the screen, place your finger just above and to the right of the calibration dot.

Repeat the previous step for the second calibration dot. When the crosshair is centered on your finger the screen is accurately calibrated. To accurately calibrate the screen, several attempts may be required to compensate for the individuality of the touchscreen and its mounting on the CRT. Use the CALIBRATE mode as needed to calibrate the screen as accurately as possible.





NOTICE If the existing touchscreen cannot be calibrated correctly, troubleshoot and repair or replace any defective components before proceeding. The kit electronics will not make these symptoms go away.

REMOVE ORIGINAL EQUIPMENT ELECTRONICS

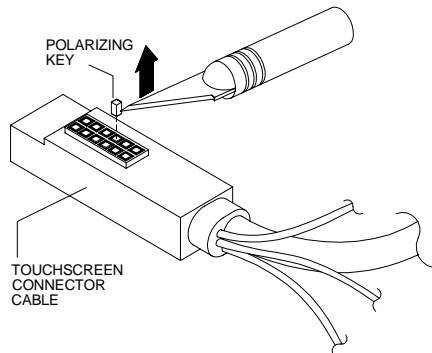


REAR OF CABINET WITH DOOR OPEN

1. Unplug VGM. Insert key or keys into rear lock or locks and turn clockwise to unlock. Open cabinet door.

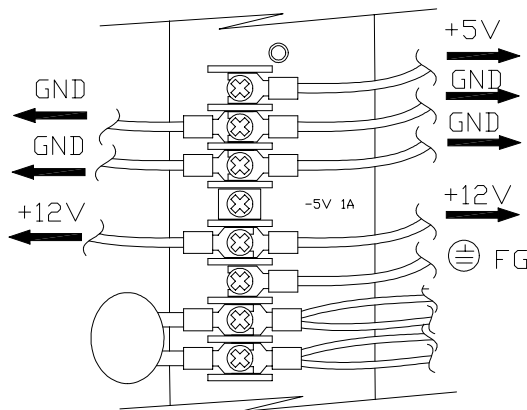
	<p>DANGER: HIGH VOLTAGE CRTs and their power supplies can retain energy for long periods of time after power has been turned off. This is especially true when a defective circuit prevents a normal discharge. Connect a very well insulated ground strap to the metal chassis. Slide the free end of the strap under the CRT anode cap until contact is made. Wait two minutes for charge recovery, then discharge the anode a second time.</p>
	<p>DANGER: RADIATION The high voltages used in the video monitor assembly can generate X-rays under fault conditions. Do not substitute high voltage components or modify the circuit without factory authorization. Follow the manufacturer's directions for measuring and adjusting the CRT anode voltage.</p>

2. **GROUND WIRE** Remove ground wire, if present.
3. Locate each of the original equipment manufacturer's cable and wire connections prior to disconnecting them from the VGM electronics.
4. **TOUCHSCREEN** If the touchscreen connector cable (a rectangular connector) is connected to the CPU Board Assembly at J5, disconnect it from the CPU Board Assembly. If a separate touchscreen controller connector cable is also present, disconnect it (a D-subminiature connector) from the CPU Board Assembly. You may have either or both connectors.
5. **CONTROLLER** Remove the touchscreen controller from the VGM. Detach touchscreen connector cable from the controller, if present. Leave the cable inside the cabinet and retain mounting hardware.



REMOVAL OF POLARIZING KEY

6. **KEY REMOVAL** Inspect the sockets of the touchscreen connector cable for polarizing key. Remove any keys with a sharp tool.
7. **CONTROL** Disconnect the 15-pin (or 9-pin, depending on your model) coin and control connector.
8. **FAN** Disconnect the 2-pin fan connector. Some models use an AC fan; no disconnection is needed.
9. **SPEAKER** Disconnect the 2-pin speaker connector.
10. **COIN LOCKOUT** If your VGM has a coin lockout connector, disconnect it.
11. **VIDEO** Locate the video connector where it attaches to the monitor board. Record the orientation of the red wire, either toward the front or toward the rear of the cabinet. Detach the connector.
12. **POWER** Loosen, but do not remove, the top six screws on the power supply terminal strip by turning one full turn with a screwdriver. Do not loosen the bottom two (AC) screws.
13. Remove the DC wires from +5, GND, -5, and +12 terminals. Leave the AC wires connected. If you must disconnect a green and yellow striped AC connector to reach another connector, replace it.



REMOVAL OF DC WIRES FROM TYPICAL POWER SUPPLY

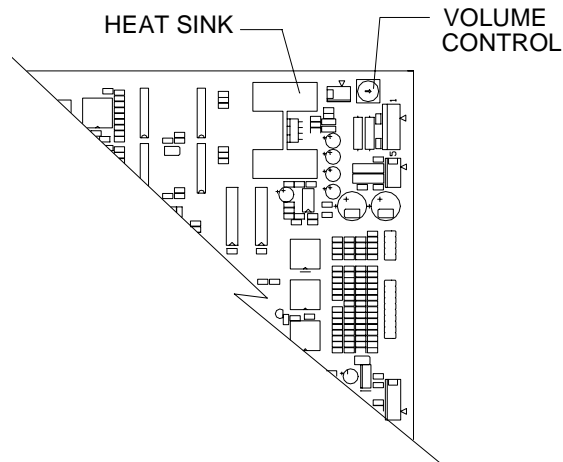
14. This is a typical view of the power supply connections. Verify the connections on your power supply.
15. **CPU BOARD ASSEMBLY** Slide the CPU board Assembly out of the cabinet with original wiring attached. Make sure not to snag any hanging cables or wires. Store the CPU Board Assembly in an anti-static bag.



WARNING: DO NOT SUBSTITUTE PARTS Using inferior parts or modifying a VGM could cause serious injury or equipment damage! Use only Midway authorized parts. For safety and reliability, do not substitute parts or modify Midway products. Substitute parts or modifications may void EMC directive or FCC type acceptance.

INSTALL GAME ELECTRONICS

1. **ORIENT ELECTRONICS** Place the Touchmaster® CPU Board Assembly behind the cabinet so the heat sink is near the video monitor. The heat sink should be toward the front left side of the cabinet, opposite cash door.
2. **ADJUST VOLUME** Set the master volume control to its middle position. The potentiometer is near the heat sink. Use a screwdriver to point the arrow toward the front of the cabinet.

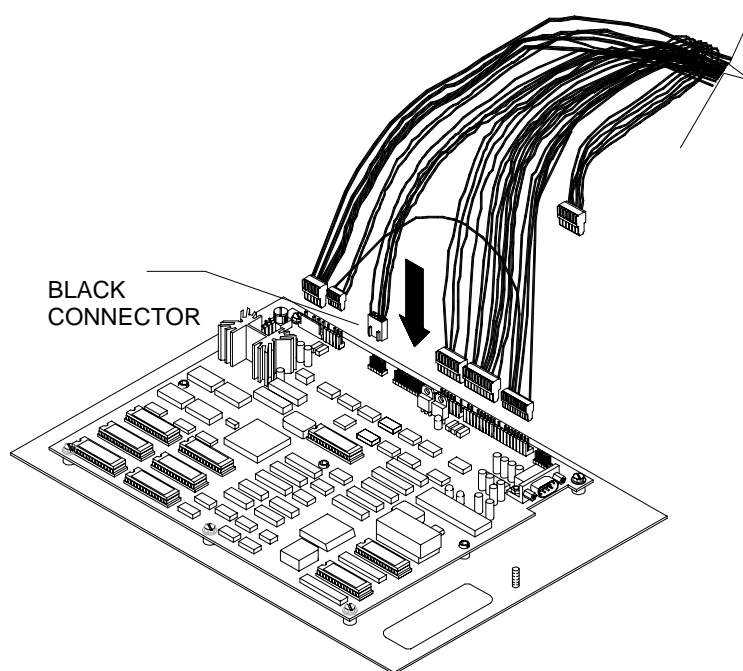


COMPONENTS ON CPU BOARD ASSEMBLY

3. **INSTALL WIRING HARNESS** Attach the keyed connectors to the CPU Board Assembly.

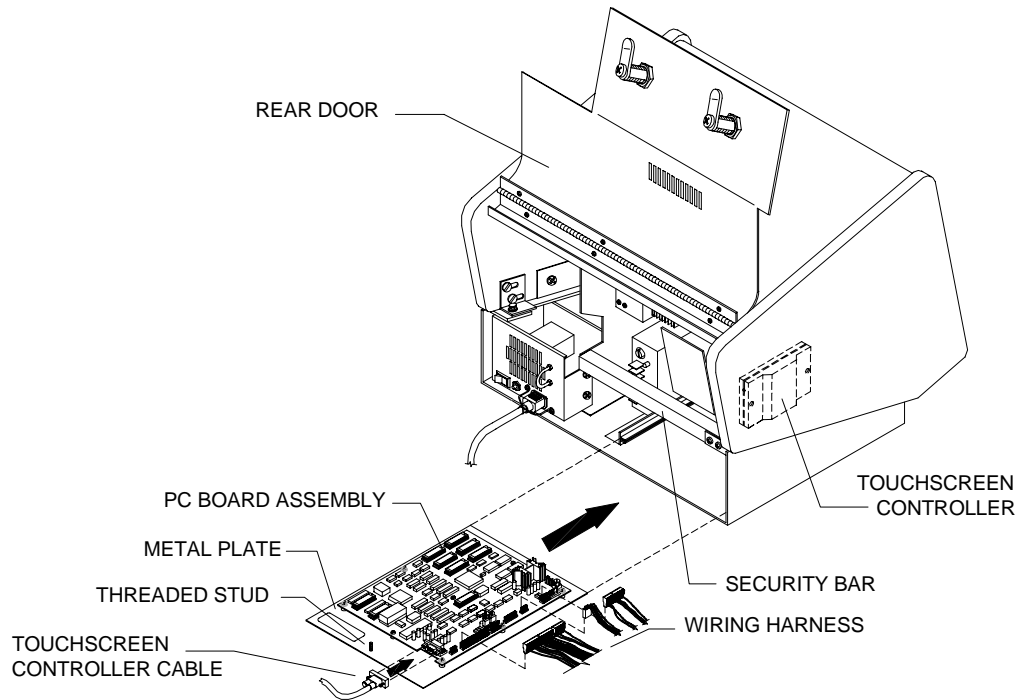


CAUTION: UNKEYED CONNECTOR The black connector on the harness is unkeyed and can accidentally be reversed on the CPU Board Assembly. Make sure that when you attach the connector, its tabs face inward toward the center of the board.



HARNESS INSTALLATION

4. **TOUCHSCREEN** Connect the touchscreen controller connector to the bottom of the new controller.
5. **MOUNTING** Orient the new controller in the same position as the previous controller so that the LED faces the rear of the cabinet. If the controller is mounted on the rear bracket, the LED should face to the right of the cabinet. If no controller existed before, install the hook and loop fastener material included with the kit. Be certain that the controller position will not interfere with other components or the closed cabinet door.
6. **GROUND WIRE** If there was an existing ground wire, attach it to the threaded stud on the metal plate. A nut is supplied with the kit hardware just for this purpose.



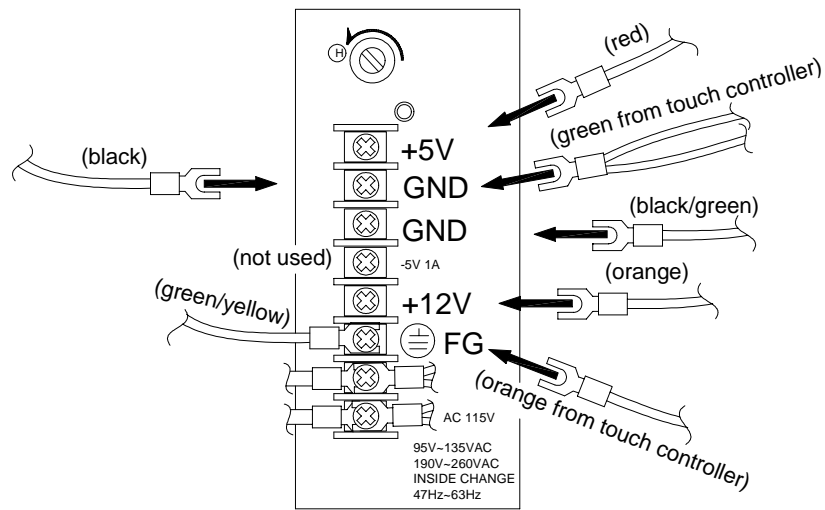
TYPICAL REAR CABINET VIEW

7. **INSERT VGM ELECTRONICS** The CPU board assembly is mounted on a metal plate. Slide the plate into the slots at the base of the VGM until it is clear of the cabinet door.



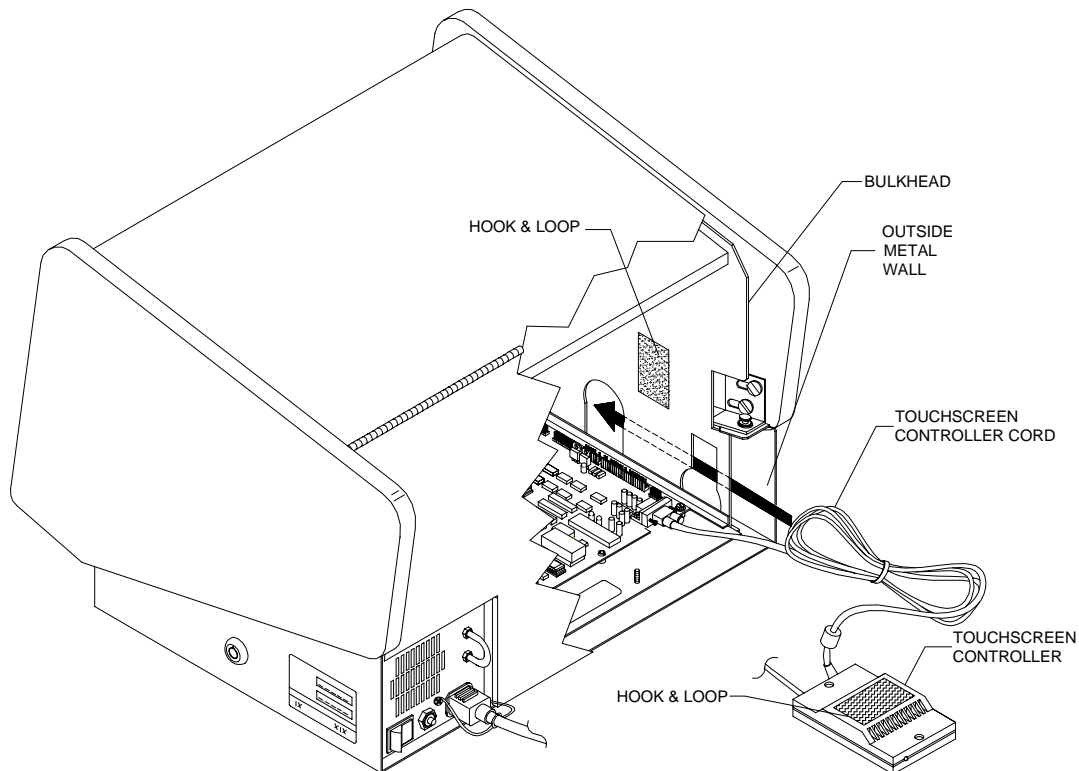
CAUTION: ROUTE CABLES IN FRONT OF THE CABINET SECURITY BAR. You will need to lock the cabinet door with the security bar later. Ensure you have clearance by keeping all cables beneath and in front of the security bar.

8. **FAN** Attach the 2-pin fan connector if you disconnected it previously.
9. **SPEAKER** Attach the 2-pin speaker connector.
10. **COIN** Attach the 15-pin coin mechanism cable connector. If your VGM's coin mechanism has a 9-pin connector, use the 9-to-15 pin connector to mate it with the 15-pin connector. Reconnect the coin lockout connector, if applicable.
11. **POWER** Install the harness to the power supply terminal strip at the following screws:
 - +5V (red wire)
 - GND (black wire)
 - GND (black wire and green wire with yellow stripe)
 - +12V (orange wire)
 - FG (green wire with yellow stripe) should already be connected.
 - The -5V terminal is not used. The AC wires remain connected from the original equipment.
12. Attach touchscreen controller power wires at the GND screw (green) and the +12V screw (orange)



TYPICAL POWER SUPPLY CONNECTIONS

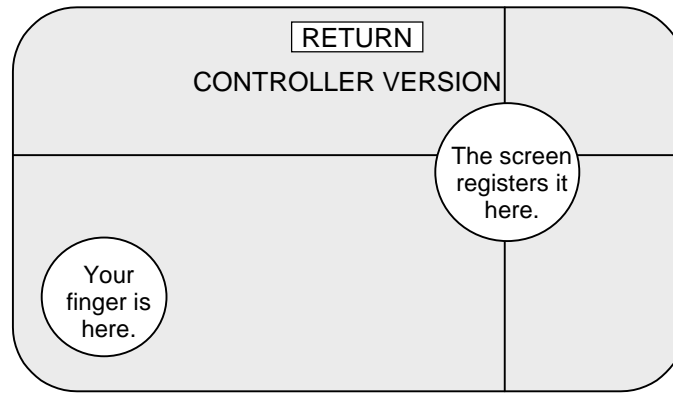
13. **ATTACH** Secure, but do not overtighten, the top six screws on the power supply terminal strip.
14. **CONTROLLER** Attach Touchscreen Controller Connector to the socket on the CPU Board Assembly. Do not overtighten connector screws.
15. **VIDEO** Attach video connector to monitor board. Orient yellow and red-striped wire in connector where existing red wire was previously oriented, as noted in electronics removal section of manual.
16. **GROUND WIRE** Reconnect any additional ground wires removed during disassembly.
17. **HARNESS ROUTING** Stow wiring in front of the security bar. Ensure that wires are clear of fan. Tie wrap extra Touchscreen Controller Cable and store in between the cabinet bulkhead and outside metal wall on the left. Failure to do so may cause difficulty calibrating touchscreen.



TYPICAL TOUCHSCREEN MOUNTING AND CABLE STOWAGE

VERIFY NEW EQUIPMENT OPERATION

1. **START UP** Plug in the VGM and turn on power. The CPU Board Assembly LEDs should illuminate. After the Touchmaster® logo and game version appear on screen, close the cabinet door.
2. **ADJUST MONITOR** Correct size and position of on-screen video if needed.
3. **CALIBRATE** Perform a touchscreen calibration. This sets the new values into the game memory.



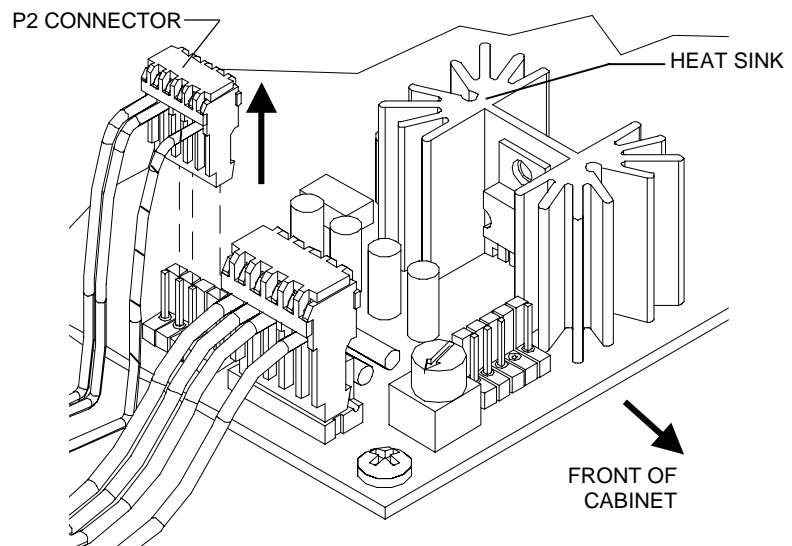
INCORRECT TOUCHSCREEN ORIENTATION

4. In the calibration test, a vertical and horizontal line should cross beneath your finger. If the touchscreen is inverted (that is, touching the screen in the lower left corner causes a reaction in the upper right corner) your original equipment was inverted. You can correct this by following the procedure on the next page. If you do not have an inversion problem, skip to the last page of this chapter.

INVERTING TOUCHSCREEN SIGNALS

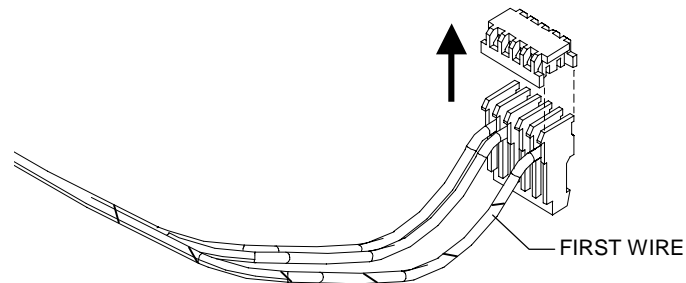
1. Turn off AC power and unplug the line cord.
2. Open the cabinet door.

3. Locate the P2 connector on the CPU Board Assembly (at the J6 designation) and remove the connector from the socket.



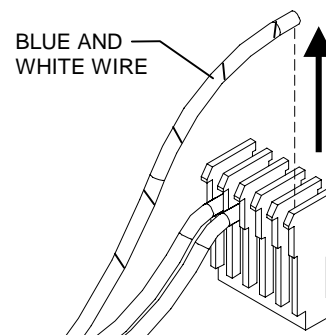
CONNECTOR P2 ON CPU BOARD ASSEMBLY

4. Using your fingers, pry off the plastic strain relief cap. Set the cap aside in a safe place.



REMOVAL OF CONNECTOR CAP

5. Remove the first wire (it will be blue with a white stripe). Replace the cap and close it tightly.

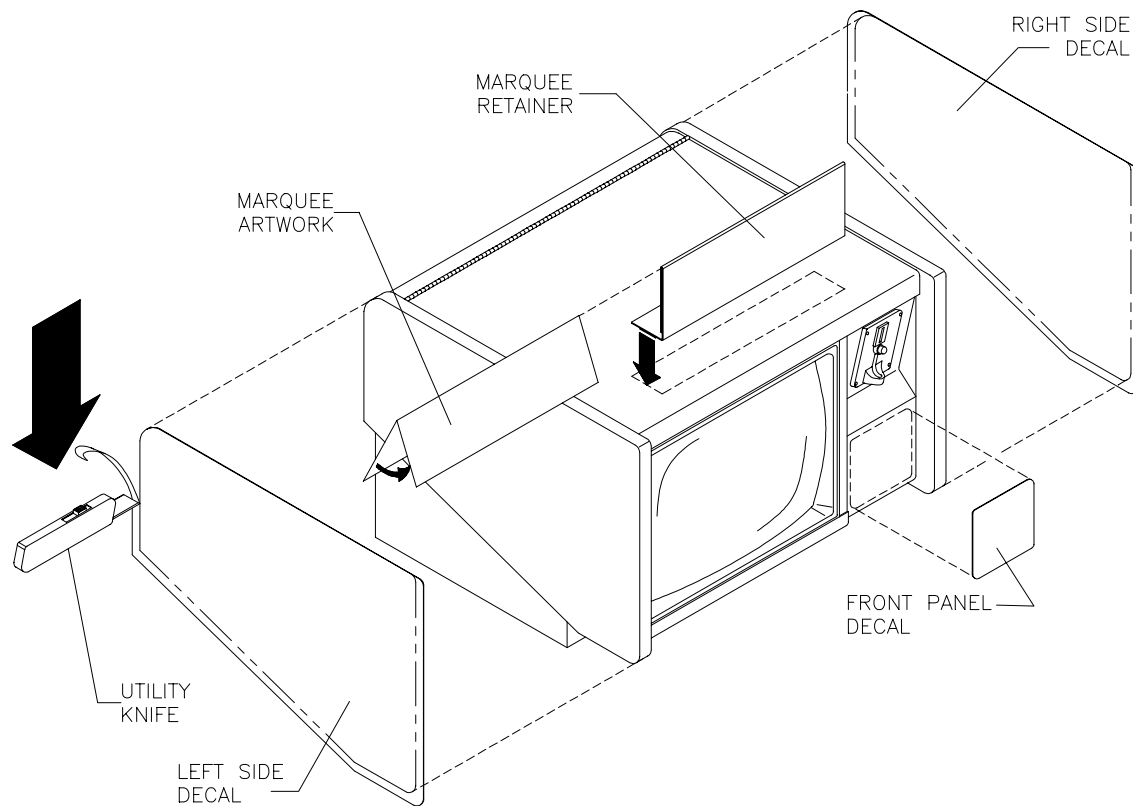


REMOVAL OF BLUE AND WHITE WIRE

6. Insulate the blue, white-striped wire and secure it to the harness.
7. Reattach connector P2 to the CPU Board Assembly at J6.
8. Replace the electronics into the cabinet.
9. Close the cabinet door. Plug in the line cord. Turn ON the AC power.
10. Recalibrate the VGM.

DECALS

1. Remove existing decals or artwork. Clean off all glue residue. Turn off AC power and unplug line cord.
2. Locate side panel cabinet artwork. The decals should be larger than the panels. One at a time, peel off the backing and line up the artwork with the top of the left and the right panels of the cabinet. Use care to avoid wrinkles. Moving outward from the center of the artwork, smooth down and squeeze out any air bubbles. Cut decals with a utility knife to fit the panels exactly. Decal can wrap slightly over edge onto trim area, if necessary.

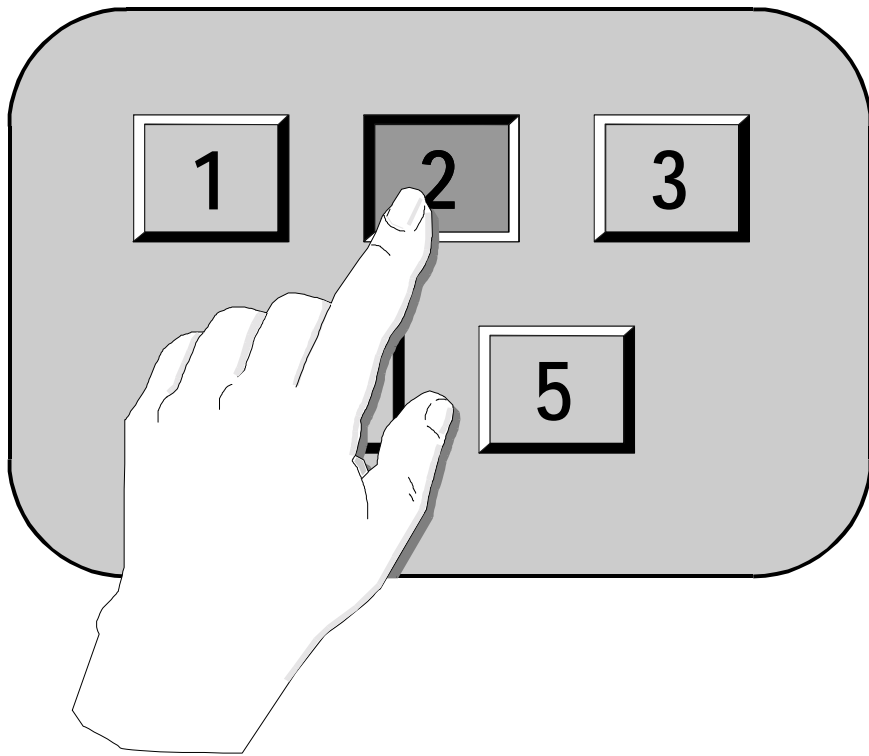


LOCATION OF DECALS



3. **KEYHOLE** If necessary cut a circle in the right side decal to accommodate key insertion.
4. Select the front panel decal whose size is appropriate to your cabinet model. Center this piece on front of cash door beneath currency acceptor and apply as in previous step.
5. **LABEL** Locate the epilepsy warning label. Peel off backing and apply to the base of the cabinet just underneath the monitor bezel.
6. **CURRENCY** Insert coins and play games to verify operation. Record number of coins used.
7. Remove the cash door and confirm that coin meter has advanced for each coin inserted.
8. **OPTIMIZE** Read the operating instructions and make adjustments to optimize the games.
9. **MARQUEE** Fold marquee artwork in half and insert it into the marquee retainer. Place the plastic retainer on top of the cabinet. The magnets at the base of the marquee hold it in place.

TOUCHMASTER® CONVERSION

CHAPTER



SYSTEM

	<p>NOTICE: Information in this manual is subject to change without notice. Midway Amusement Games, LLC reserves the right to make improvements in equipment function, design, or components as progress in engineering or manufacturing methods may warrant. Field installed upgrade kits may also change the operating sequence or functions.</p>
	<p>NOTICE: You are responsible for enforcing all local, state, and federal regulations concerning this game.</p>

GAME FEATURES

Touchmaster® has many different games. Each game can accommodate one or two players. Update the software frequently to offer players new games, as well as interesting updates to existing games.

You can adjust the characteristics of each game to suit the proficiency of the players. Graphics may be changed to alter the game appearance; the speed of the games may be increased or decreased, etc. This flexibility increases the entertainment value of these games for frequent players.

Some versions include different games. International games permit play in several widely spoken languages. Contact your authorized distributor to learn which games are available for your location.

Games are classified according to the type of player challenge. Here are some representative examples of games found in most Touchmaster® models.

DEXTERITY - Games that test the player's eye-hand coordination

Hot Hoops™

Touch the player to make him shoot at a moving basket. Surprise objects block shots at random.

PRESTIDIGITATION - Video versions of popular sleight-of hand tricks

Shell Shock™

Pick the correct item that covers the pea. The shuffle speeds up as your skills improve.

TRADITIONAL - Electronic versions of old favorites

Solitaire™

Use all the cards in the deck to build up the four suit stacks from ace to king.

MATHEMATICS - Test your ability to add different combinations of numbers

Triple Elevens™

Assemble three groups of numbers whose total is eleven. How fast can you calculate sums?

LANGUAGE - Display word recognition skills

Wordz™

Guess the phrase by picking letters to complete each word. Spelling counts, just like in school.

VIDEO GAME MACHINE (VGM) OPERATION

STARTING UP

Each time the game is first turned on or power is restored, it executes code from the boot ROM. These self-diagnostic tests automatically verify and report the condition of the hardware and game EPROMs. If any individual test fails an error message for that test is displayed for three seconds or until any on-screen button is touched. If a fatal error (i.e., a touchscreen controller fault) is detected, the message remains on the screen until the fault is resolved. In the event of other errors (key problems, low battery, etc.) a message is reported, but the program loads and permits game play.

Press the CALIBRATE button at any time to adjust or verify the touchscreen operation.

Press the SETUP button at any time to activate the menu system (audits, adjustments, etc.).

If you do not press either button, the system completes all tests, then load and run the game.

Once all power-up tests are complete, the game goes into Attract mode. Game choice menus alternate with scenes and sounds from typical games repeatedly until game play starts.

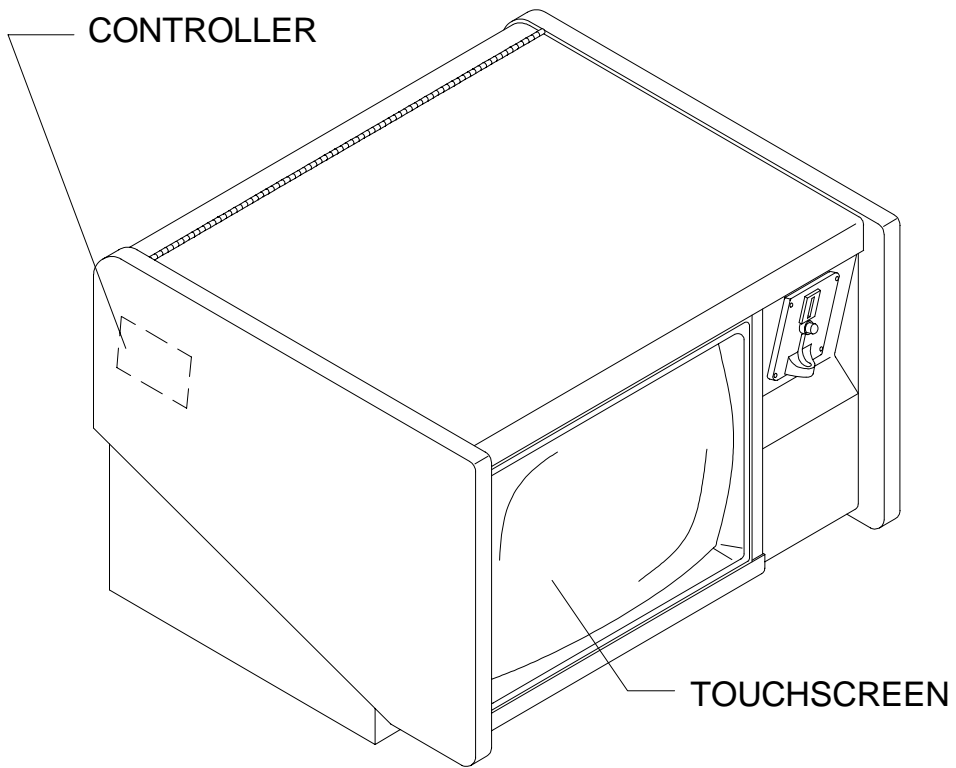
Insert currency to start the game. Select a game and choose game variables. Play begins immediately. The game progresses until time runs out or you exit from the selected game. If no more play is required, the game automatically returns to the Attract mode.

You may insert your own message to inform players of new games, upcoming events, etc. This message then appears as one of the features displayed in the Attract mode.

To shut the game off, turn the power switch to the OFF position at any time.

PLAYER CONTROLS

This game uses an on-screen touch sensor on the CRT face to control all player moves and choices. Players touch the screen for a moment in an active area to enter information. Touching inactive areas of the screen produces no response. The touch sensor responds to only one active input at a time.



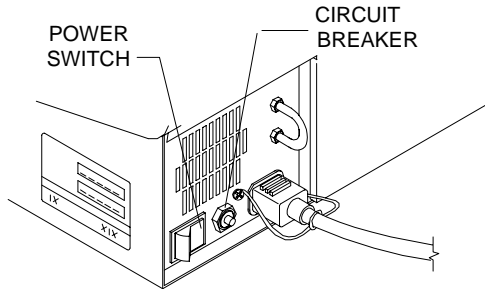
TYPICAL LOCATION OF TOUCHSCREEN COMPONENTS

OPERATOR CONTROLS

CABINET SWITCHES

The external switches are located on the rear of the game near the line cord.

- ◆ **Power Switch**
The **Power Switch** turns the game on or off. It does not reset the game variables.
- ◆ **Circuit Breaker**
The **Circuit Breaker** protects the game from fault conditions. It does not reset the game variables.

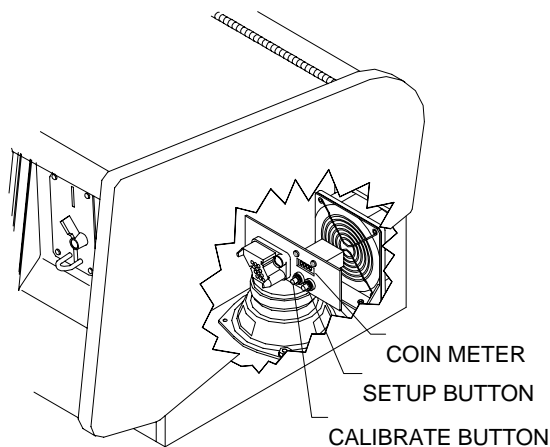


TYPICAL CABINET SWITCH LOCATIONS

CONTROL SWITCHES

The internal switches are located behind the cash door. They are attached to a mounting bracket.

- ◆ **SETUP BUTTON**
The **SETUP** button takes you into the menu system to set game characteristics. An on-screen EXIT button lets you to leave the menu system and return to Attract mode.
- ◆ **CALIBRATE button**
The **CALIBRATE** button takes you to a Touchscreen adjustment screen and verification routine. After verification, normal game operation returns automatically.
- ◆ **Master Volume Control**
The **Master Volume Control** (on the CPU Board Assembly) sets the maximum sound level for the game. Adjust the game volume at the initial System Setup screen after pressing the SETUP button.
- ◆ **Monitor Remote Adjustments** (inside cabinet in the rear)
The **Monitor Remote Adjustment Board** sets the video display for optimum viewing.



TYPICAL CONTROL SWITCH LOCATIONS

MENU SYSTEM

SYSTEM OVERVIEW

Game variables and diagnostics are presented in a series of on-screen menus. The SYSTEM SETUP menu allows you to enter information, make changes, or verify equipment operation. Each sub menu screen displays one specific group of choices. The detail menu presents data or runs the required test. You must be at the detail menu level to detect errors, make changes, or activate tests. Both the operator controls and the player controls are used to move through the menus and start or stop particular routines.

Each menu is different, but the general location of objects is consistent.

The area at the top center of each screen displays the current menu title.

The center of the screen is used for data (menu items, video signals, statistics, reports, etc.).

The bottom of the screen is reserved for control functions (increase, decrease, next, return, etc.).

ORGANIZATION

You must activate the menu system manually and deactivate it manually to return to Attract mode.

SYSTEM SETUP menu choices fall into three categories: audits, options and tests.

Audits provide you with information about earnings and the performance of each game.

Option items permit you to change the game and customize or return to factory defaults.

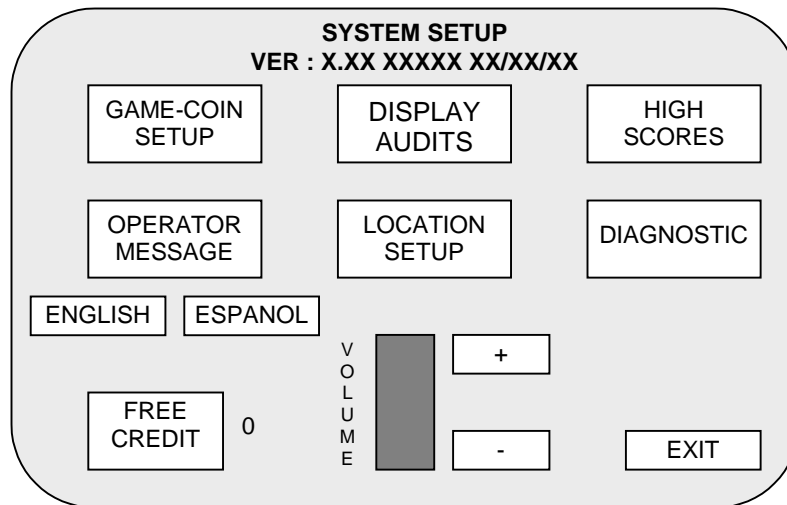
Tests are used to verify proper operation of the equipment.

Sub menu screen items offer you choices within a category. Some items have no sub menu while others may have several. You can return to the previous menu or go on to the next menu.

Detail menu screen items contain specific information. You interact with the system to get results or to make changes. There is always a way to go back to the previous menus from a detail menu.


Touch the screen to select or highlight an item on any menu screen. Only one item can be highlighted at a time. To restore the game to normal play, touch the RETURN box on each sub or detail menu and then select the EXIT box at the Main Menu to restore game play.

Press and release the SETUP button inside the cabinet to enter the menu system. A Main menu, similar to the one below, appears. After completing any task, you must return to this screen to restore game play

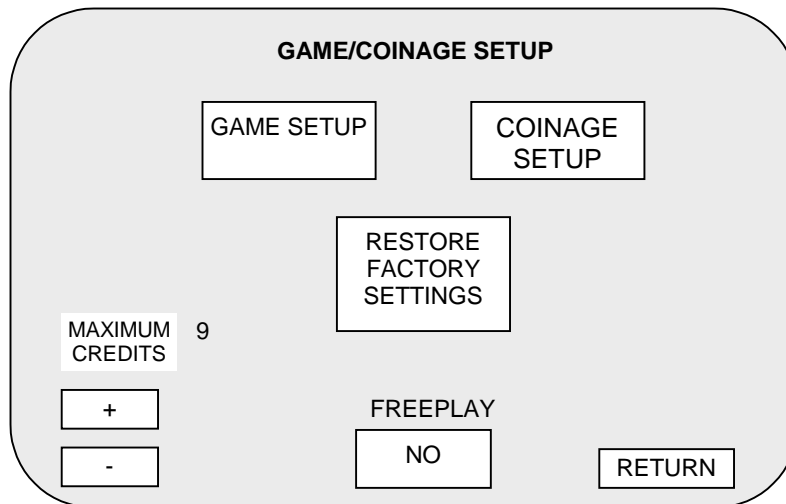


TYPICAL SYSTEM SETUP SCREEN

GAME/COINAGE SETUP

	NOTICE: Applicable law may dictate changes in the Touchmaster® game compliment, and may also regulate the appearance, bonus awards, language, or other variables on a game-by-game basis. The example here shows how operators might use these utilities to customize the Touchmaster®
---	---

This menu allows you to change variables, such as game difficulty and appearance, and adjust the cost of one play. You can also reset game variables to their factory default settings.



TYPICAL GAME/COINAGE SETUP SCREEN

MAXIMUM CREDITS

Touch the + button to increase the number of maximum credits. Touch the – button to reduce the number of maximum credits.

FREEPLAY

Set FREEPLAY to YES to allow unlimited free games. Set FREEPLAY to NO to return to coin-activated games.

Touch RETURN to return to the SYSTEM SETUP menu.

GAME ADJUSTMENTS

These sub menus let you change variables for each of the Touchmaster® games. At the GAME/COINAGE SETUP menu, touch the GAME SETUP button to view the GAME ADJUSTMENTS menu.

- RESET** Returns variables to factory default values. This resets **all** your custom game settings.
- +** Raises the value of the selected variable until the maximum value is reached.
- Lowers the value of the selected variable until the minimum value is reached.
- NEXT** Saves the current on-screen values and advances to additional Game Setup screens.

GAME ADJUSTMENTS			
GAME	CREDIT	TIME	GRAPHIC
HOT HOOPS	1	MED	--
SHELL SHOCK	1	MED	--
TARGET 21	1	MED	CARD
ROYAL QUEST	1	MED	CARD
SOLITAIRE	1	MED	CARD
MOVIE TRIVIA	1	MED	--
WORDZ	1	MED	--
PAIRS	1	MED	CARD
TRIPLE ELEVENS	1	MED	CARD
PYRAMID 13	1	MED	CARD

TYPICAL GAME ADJUSTMENTS SCREEN

When you touch the NEXT button, you are taken through several screens with individual game adjustments. The final sub menu in this permits you to make some more general adjustments, such as whether to award free games, enable erotic games, etc.

GAME ADJUSTMENTS	
ROYAL QUEST – WILD CARDS	YES
ROYAL QUEST – DECK	EASY
ROYAL QUEST – HI-LO BONUS	YES
WORD GAMES - MAX. CHANCES	6
ENABLE EROTIC GAMES	YES
AWARD FREE GAMES	YES
HIGHEST SCORE FREE GAME	YES
SHOW TRIVIA ANSWER	YES

AUTO RESET HIGH SCORES
 AFTER PLAYS

TYPICAL FINAL GAME ADJUSTMENTS SCREEN

COINAGE SETUP

This submenu lets you set individual revenue characteristics.

- CANCEL** Reverts to the previous menu without saving your changes.
- NEXT** Advances to the next sub menu.
- CUSTOM** Takes you to a sub menu where you can modify coin values
- ACCEPT** Saves your changes to coin values

PRESET COINAGE VALUES

TOKEN	JAPAN
AUSTRALIA	NEW
ZEALAND	
BELGIUM	SPAIN
BRAZIL	SWEDEN
CANADA	
	SWITZER
LAND	
FINLAND	UK
FRANCE	USA
GERMANY	CUSTOM
INDIA	

CANCEL

NEXT

TYPICAL GAME COINAGE SCREEN

To access your currency from the PRESET COINAGE VALUES screen, touch your country to highlight it, then touch the NEXT button.

PRESET COINAGE USA

USA1	\$.25 = 1CR, \$1.00 = 4CR
USA2	\$.25 = 1CR, \$1.00 = 5CR
USA3	\$.50 = 1CR, \$1.00 = 2CR
USA4	\$.50 = 1CR, \$1.00 = 3CR
USA5	\$.25=1CR, \$1=4CR, \$5=24CR

CANCEL

CUSTOM

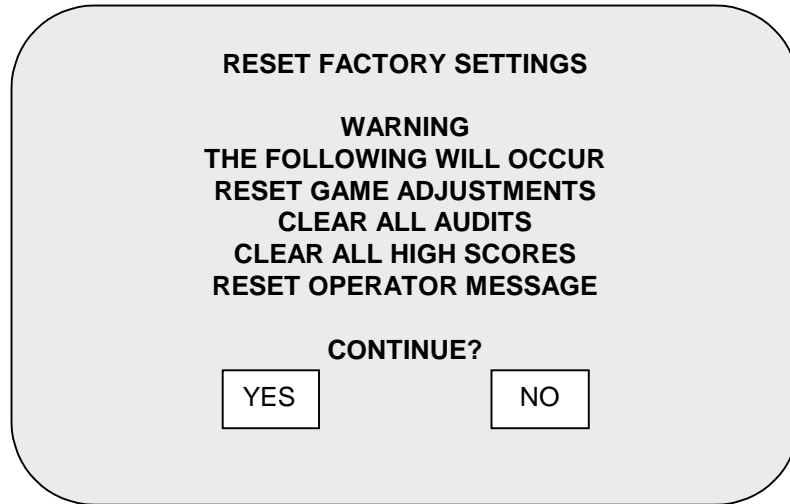
NEXT

TYPICAL PRESET COINAGE SCREEN

RESTORE FACTORY SETTINGS

This button permits you to globally change all customized settings (game, coin, name, etc.) simultaneously to the condition they were in when the VGM was manufactured..

Since accidentally performing this operation can require you to spend much time resetting variables, a warning screen lets you cancel this operation. The screen reads:



TYPICAL RESTORE FACTORY SETTINGS SCREEN

If you touch YES, all factory settings are restored. Touching NO will return to the GAME/COINAGE SETUP menu.

DISPLAY AUDITS

This submenu allows you to assess how well the games are played. The screen displays earnings and other aspects of the game that reveal player skill levels. Statistics may be reset to zero after viewing.

CLEAR ALL Sets every audit quantity to zero. Record the information before using this command.

GAME DETAILS Takes you to a sub menu where you can view, clear, and reset high scores for individual games. You can also reset high scores through the HIGH SCORES sub menu. Details on the following page.

NEXT Advances to additional GAME AUDIT screens. The screens repeat after the last is viewed.

RETURN Reverts to the main menu screen. The screen values remain without change.

GAME AUDITS	
AUDIT	TOTAL
1 PLAYER	39
2 PLAYER	0
TOTAL BUYINS	0
TOTAL GAMES PLAYED	39
FREE GAMES WON	0
FREE GAMES HI SCORE	9
FREE GAME BUYINS	2
AVG. GAME TIME	1:35 MIN.

CLEAR ALL GAME DETAILS NEXT RETURN

TYPICAL GAME AUDIT SCREEN

Data in the Display Audits portion of the Menu System is presented in the following categories:

- ◆ Game Play: 1-Player games, 2-player games, Free game awards; Buyins; Average game times.
- ◆ Earnings: Coin and Credit statistics for each Currency Acceptor installed in the game.
- ◆ Game Comparison: Popularity and average length of game play for individual games.
- ◆ Game Specifics: Detailed account of characteristics applying only to one game.

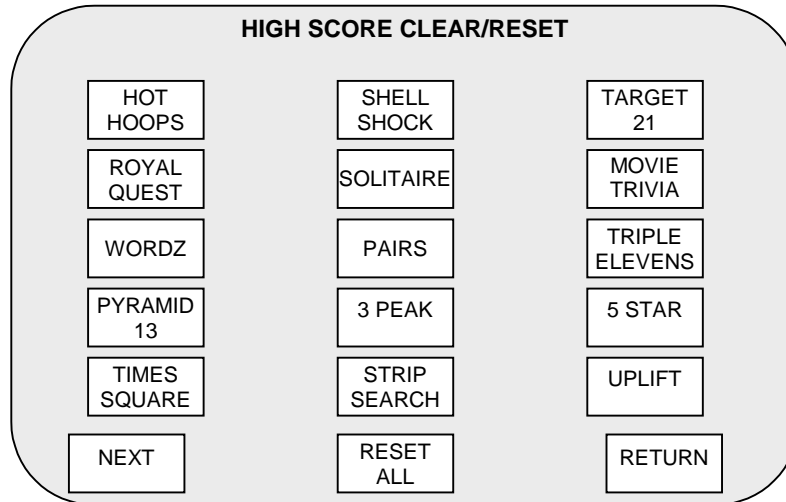
HIGH SCORES

The HIGH SCORES submenu lets you view the top game scores and the player identifications. Players who earn a high score may create an identifier of up to eight characters. The player can also skip this opportunity and remain anonymous. In this case, the high score will be posted without any identifier.

NEXT Saves the current on-screen values and advances to additional HIGH SCORE screens.

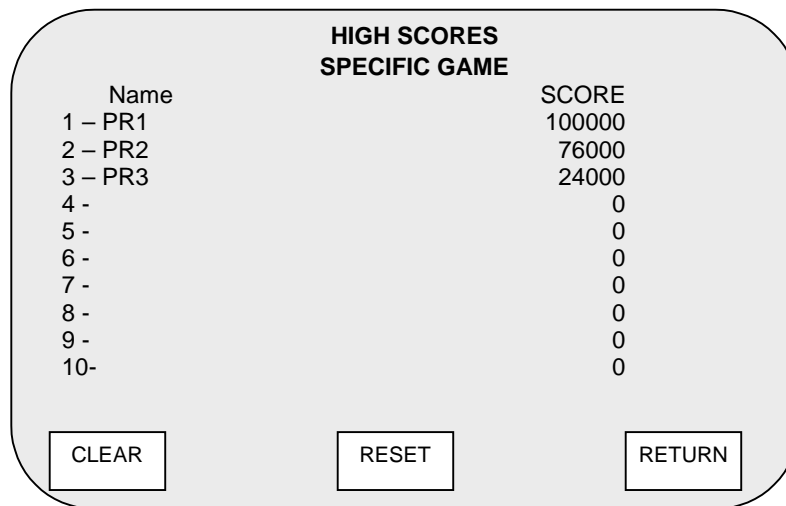
RESET ALL Returns variables to factory default values. This erases **all** high scores and identifiers.

RETURN Saves the current on-screen values and reverts to the main menu screen.



TYPICAL HIGH SCORE CLEAR/RESET SCREEN

Scores are ranked in numerical order, with the highest of the top ten scores listed first. When a high score is bettered, the lowest score on the list is dropped to make room for the new one. Each game has a high score screen, which you access by touching the button with the game's name.



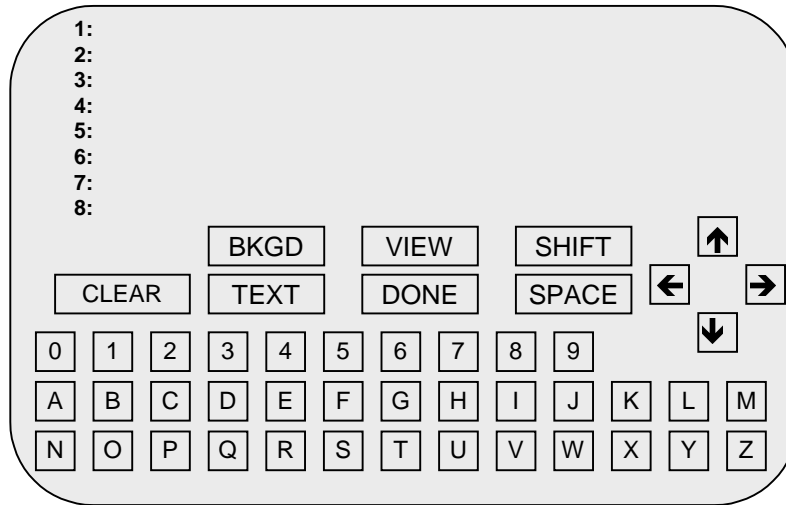
TYPICAL GAME HIGH SCORE SCREEN

In the screen above, CLEAR erases all the scores, RESET restores the factory values of the top ten scores, and RETURN brings you back to the HIGH SCORE CLEAR/RESET menu.

OPERATOR MESSAGE

The game can display an on-screen message to draw attention, announce contests, welcome players, etc.

CLEAR	Deletes all characters from the screen simultaneously. Use it to erase old messages.
BKGD	Changes the color of the background area behind the message. Provides contrast.
TEXT	Changes the color of the message. Each message line can be another color if you like.
VIEW	Displays how your finished message will appear before it is saved in game memory.
DONE	Saves the message and background, then reverts to the main menu screen.
SHIFT	Changes the letter entry boxes to standard symbols. Use for math, punctuation, etc.
SPACE	Enters a space between characters. Used to separate words and sentences.
ARROWS	These boxes control the up, down, left and right position of the cursor on the screen.



TYPICAL GAME MESSAGE SCREEN

You can write a message of up to eight lines with 32 characters each. All the characters in each line can be a different color than the other lines. You may also vary the color of the background area behind the message. The Touchmaster® automatically centers each line of the message when it is displayed.

1. To create a new message, first reach the OPERATOR MESSAGE menu from the SYSTEM SETUP menu.
2. Touch the CLEAR button to erase any existing message.
3. Select a background by touching the BKGD button until the texture you like is visible at the top of the screen. At any time, you can touch VIEW to preview how your final message will look in Attract mode.
4. Select the color of the first line by touching the TEXT button until the line shows your preferred color.
5. Touch the sequence of letters and numbers to spell out the first line of your message.
6. Touch the SHIFT button to access punctuation and other symbols.
7. Touch ↓ button to begin entering the next line. Repeat for each line.
8. Use ↑, ←, and → to place the cursor where you need to correct errors.
9. Use the SPACE button to insert empty space between characters.
10. When you are satisfied with your message, touch the DONE button to save your message and return to the previous screen.

LOCATION SETUP

This submenu contains three more submenus that permit you to customize your Touchmaster®: LOCATION NAME, TOUCH KEY SETUP, and SERIAL NO. SETUP. You can also adjust the speed by which your customized location name scrolls in Attract mode.

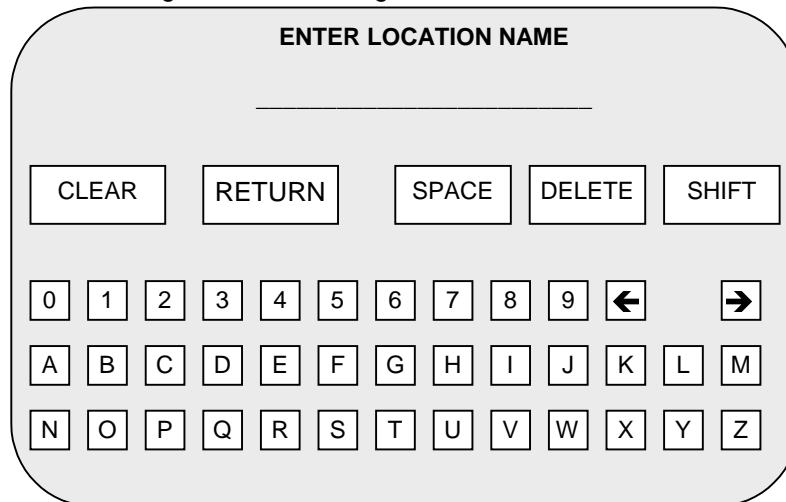
LOCATION NAME

To modify the location name displayed during Attract mode, enter the SYSTEM SETUP screen either by pressing the SETUP button in the coin vault or using your touch key PIN to access the LOCAL ADJUSTMENTS screen (explained on next page). You can enter up to 24 characters.

If you used the SETUP button, touch the LOCATION SETUP button on screen.

Press the LOCATION NAME button. Several buttons on this screen control text entry:

CLEAR	Deletes all characters in the location name at once. Use this to erase old information.
RETURN	Returns you to the Location Setup screen and saves your location and ID number.
SPACE	Enters a space between characters. Use this to separate words and sentences.
DELETE	Deletes the character above the flashing cursor and moves the remaining text to the left.
SHIFT	Changes the letter entry boxes to standard symbols. Use for math, punctuation, etc.
ARROWS	Move the flashing cursor left and right.



TYPICAL GAME LOCATION SCREEN

The location and machine identification are convenience features and have no effect on game play. The Touchmaster® automatically recalls this information if the game audit tables are printed out.

1. To enter your location name, access the ENTER LOCATION NAME screen.
2. Touch the CLEAR button to erase the existing location name.
3. Touch the character keys on screen to enter the numbers and letters that spell your location name.
4. Use the SHIFT key to access punctuation and other symbols.
5. Use the SPACE key to insert an empty space between characters.
6. The ← and → buttons let you maneuver the flashing insertion cursor left and right in your location name.
7. The DELETE key erases the character above the flashing insertion cursor.
8. When finished, touch the RETURN button to save the name and go back to the previous screen.

TOUCH KEY LOCATION ADJUSTMENT SYSTEM

The Touch Key™ setup feature lets you make some “local adjustments” to games without removing the cash door to access the SETUP button. A Personal Identification Number (PIN) gives access, allowing you or other designated employees to vary loudness, insert new messages, reset scores, etc., without having keys for the cabinet. The PIN can be altered regularly to prevent unauthorized changes to games.

TOUCH KEY PROGRAMMING These steps explain how to activate the TOUCH KEY™ system.

Press the SETUP button inside the cabinet to enter the menu system. Touch the LOCATION SETUP button on the screen. Touch the TOUCH KEY SETUP button to access the TOUCH KEY menu..

LOCATION SETUP
YOUR CUSTOMIZED NAME

LOCATION NAME TOUCH KEY SETUP SERIAL NO. SETUP

UR CUSTOMIZED NAME ROLLS BY YOUR CUSTOMIZE
SPEED

MED RETURN

In the TOUCH KEY menu, select a four-digit PIN by sequentially pressing any four keys. You can choose any of the six keys more than once. Determine what adjustments to allow access to (high score, message and name, volume, erotic access). Touch the ON button to activate your PIN. When finished, touch the RETURN button. At the LOCATION SETUP menu, touch RETURN again to return to SYSTEM SETUP

TOUCH KEY™
KEYLESS ENTRY SETUP
ENTER 4 DIGIT PIN

1 6

2 5

3 4

ALLOW HIGH SCORE ACCESS YES

ALLOW MESSAGE & NAME ACCESS YES

ALLOW VOLUME ACCESS YES

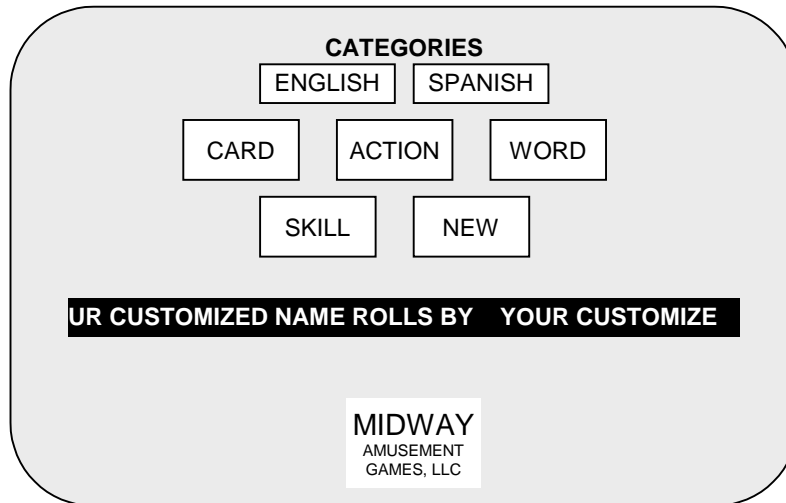
EROTIC ACCESS

OFF ON YES RETURN

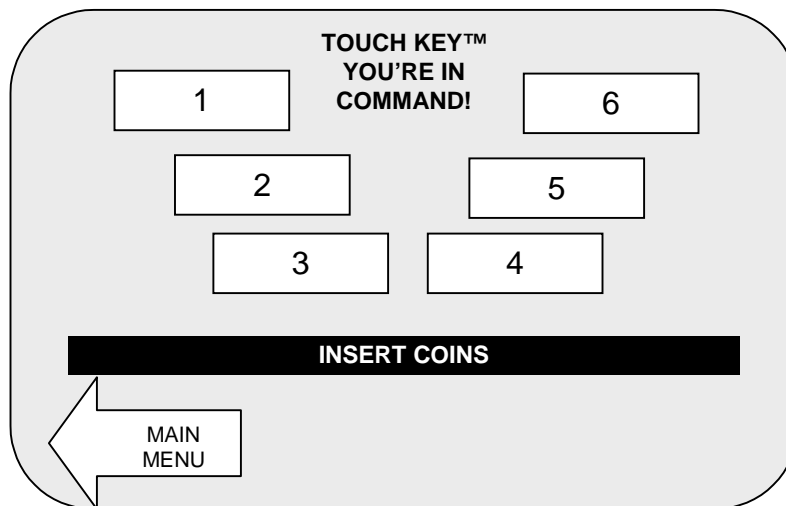
TOUCH KEY USE:

You can turn over local adjustments to designated employees using this procedure:

1. While in Attract mode, touch the Midway Amusement Games, LLC logo at the bottom of the screen.



2. Touch the four numbered keys to enter the PIN. Each key highlights as you touch it. The correct PIN reveals the LOCAL ADJUSTMENTS menu. The wrong PIN begins a series of high score screens.



3. In the LOCAL ADJUSTMENTS menu, you can change the custom message, clear or reset high scores, change your custom location name, adjust the volume, change the language of the game's text, turn the erotic games on or off, or perform a touchscreen calibration.
4. When finished making local adjustments, touch the EXIT button to return to Attract mode.
5. Explain the policies governing when changes should be made (i.e., lowered volume levels or erotic game access after a certain time of day, messages advertising tournaments, etc.). Describe situations when game scores might be reset. Demonstrate location adjustments and explain each feature.
6. Have chosen individuals memorize the PIN. Explain how often it will change and whom to contact if it fails to work. Show that the code functions only if the key system is enabled, but the game continues to operate and play normally. Have them enter codes to verify their understanding of the system.
7. Demonstrate the touchscreen operation. Describe incorrect tracking and what happens if the screen is out of calibration. Show how to calibrate the touchscreen, and how to test the calibration tracking.
8. If you forget the PIN, you can reset it as long as you have access to the SETUP button.

SERIAL NO. SETUP

You can enter a four-digit alpha-numeric serial number. If you have multiple VGMs that can print reports, serial numbers can identify each unit. SERIAL NO. SETUP cannot be accessed through Touch Key. The only time you will see your serial number is when you return to this screen or create a printout.

CLEAR	Deletes all characters in the location name at once. Use this to erase old information.
RETURN	Returns you to the Location Setup screen and saves your location and ID number.
SPACE	Enters a space between characters. Use this to separate words and sentences.
DELETE	Deletes the character above the flashing cursor and moves the remaining text to the left.
SHIFT	Changes the letter entry boxes to standard symbols. Use for math, punctuation, etc.

The image shows a typical SERIAL NO. SETUP SCREEN interface. At the top, it says "ENTER MACHINE NUMBER :". Below this, there are five buttons: CLEAR, RETURN, SPACE, DELETE, and SHIFT. Underneath these buttons is a grid of 33 buttons arranged in three rows. The first row contains digits 0 through 9, followed by a left arrow, and a right arrow. The second row contains letters A through M. The third row contains letters N through Z.

TYPICAL SERIAL NO. SETUP SCREEN

Enter a unique machine number for each unit at a location. Keep a master list of machines for future reference.

1. To enter your serial number, access the SERIAL NO. SETUP SCREEN through the LOCATION SETUP submenu.
2. Touch the CLEAR button to erase the existing serial number.
3. Touch the four characters or numerals to spell out your serial number.
4. Use the DELETE button to correct mistakes.
5. Use the SHIFT button to access punctuation and other symbols.
6. Use the SPACE button to insert empty space between characters.
7. Touch RETURN to save your number and return to the LOCATION SETUP screen.

DIAGNOSTIC

Use the Diagnostic routines to check display performance, to verify sounds and music, to test switches, and to calibrate and verify the Touchscreen.

VIDEO TEST Choose this test group to examine the CRT linearity, uniformity, or color characteristics.

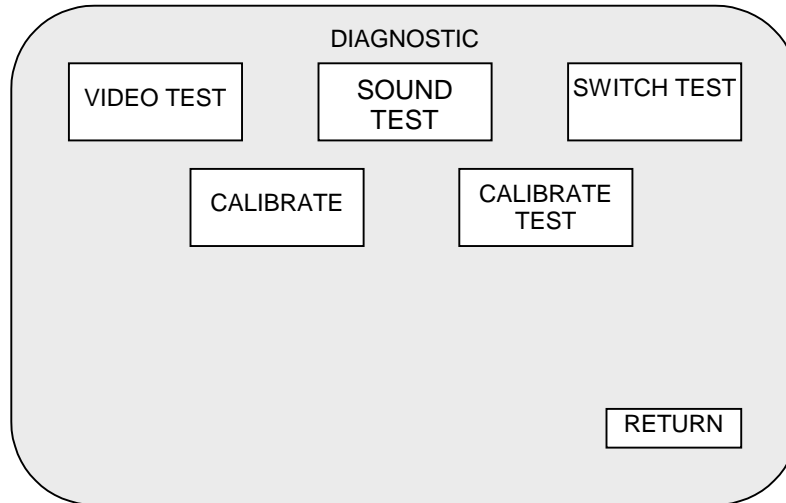
SOUND TEST Check the audio components with game sounds and music. Have you heard them all?

SWITCH TEST Manually test of currency acceptors, cabinet SETUP and CALIBRATE switches.

CALIBRATE Set the Touchscreen Controller coordinates to correspond to fixed screen locations.

CALIB. TEST Verify Touchscreen sensitivity and linearity for the entire active touchscreen area.

RETURN Revert to the main menu screen. You can then return to Attract mode.



TYPICAL DIAGNOSTICS SUB MENU SCREEN

These routines provide you with a means of keeping the Touchmaster® in top operating condition. Perform these tests on a regular basis. Players may lose interest if they have to compensate for screen maladjustments, in addition to remembering the rules of the game. All of these tests are brief, and may be done in any order.

When you make adjustments to the Touchmaster® calibration settings, the values are stored in memory. The game is very stable and retains its accuracy if not moved from the spot where it was last calibrated. However, the internal electronics cannot compensate for changes in nearby magnetic and electrical fields that may occur when the game is relocated to another position.

Verify the calibration each time the Touchmaster® is moved, in addition to the regular maintenance checks, for best game performance.

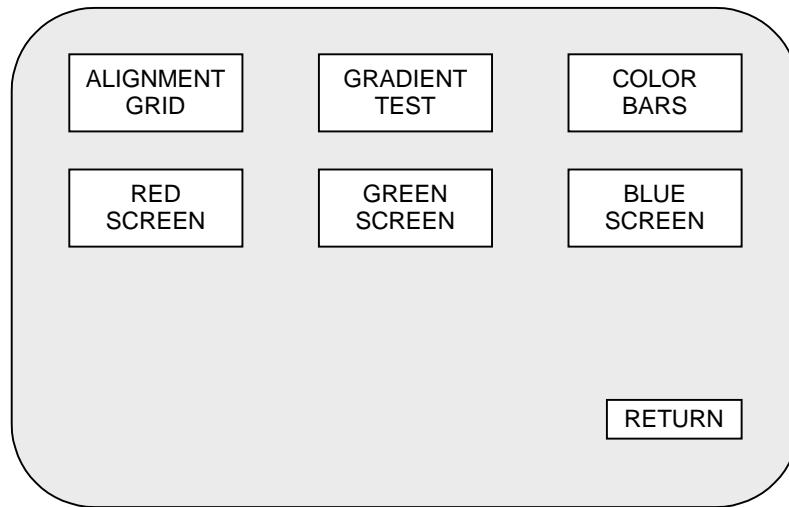
.**Some games do not have a SET CLOCK box. The clock provides accurate time and date information which is required to set the length of tournaments and communicate network data. Once set, the clock runs until the battery dies or some major fault occurs. Periodically examine the time and date on the system setup screen for correct values, and use the SET CLOCK utility to make changes when needed.

You can run the Calibrate routine without going through the Menu System by pressing the CALIBRATE button in the coin vault. However, this omits the Touchscreen Controller tracking test. The CALIBRATE button was included to encourage a quick check of the touchscreen functions each time the cash door is emptied.

VIDEO TEST

Video tests provide patterns which verify monitor performance or making adjustments. You can modify some monitor characteristics using the monitor controls remote board.

ALIGNMENT GRID	Lets you check or adjust monitor convergence, linearity, and dynamic focus.
GRADIENT TEST	Permits you to optimize CRT screen image for brightness and contrast.
COLOR BARS	Lets you analyze red, green, blue, and white balance.
RED SCREEN	Solid red screen for purity tests. Red should be the only color showing.
GREEN SCREEN	Solid green screen for purity tests. Green should be the only color showing.
BLUE SCREEN	Solid blue screen for purity tests. Blue should be the only color showing.



TYPICAL VIDEO TEST MENU SCREEN

It is vital that the information on the video display for the Touchmaster® is accurate, since the CRT screen is also the control panel for this game. Use these test patterns often to ensure precise game images. Game players tend to be more critical when they are close to the monitor, and the Touchscreen Controller requires intimate screen contact. This is especially true of small screen versions, since some of the sensor areas are the same size as the contact area of the player's fingers.

The ALIGNMENT GRID fills the screen with a series of lines and dots. The lines and dots should be all one color, with no fringes or parallel images. The lines must be straight and the dots very nearly round. Two color bars should be visible at the center of each screen edge. These bars verify scan size.

The GRADIENT TEST covers the screen with shades of colors to verify red, green, blue, and white level dynamic adjustments. Each color bar should appear sharp, clear, and distinct from the others. This test indicates a need for adjustment if some of the bars appear to be missing or blend together at the edges.

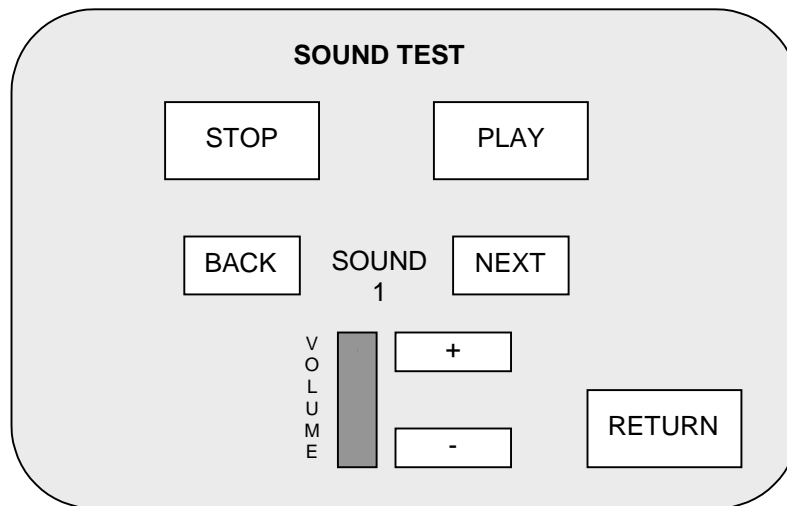
The COLOR BARS screen displays each of the standard colors and shades produced by the game's video circuits. The vertical bars must be uniform from top to bottom. The horizontal bars should show small changes in intensity or shade from side to side. A sudden transition in any bar indicates a fault.

RED, GREEN, and BLUE SCREENS fill the screen entirely with the chosen color at normal intensity. Each screen should be absolutely uniform from top to bottom and side to side. No retrace lines or noise should be visible. These tests verify that the black level, degaussing, and blanking circuits are correct.

SOUND TEST

Sound test allows you to ensure that audio components are connected and operating properly.

- STOP** Ends the selected sound. You can halt repetitive sound tracks with this button.
- PLAY** Starts the selected sound. You can start another sound while one is still playing.
- BACK** Selects the previous sound choice. Each single touch decrements the counter by one.
- NEXT** Selects the next sound choice. Each single touch increments the counter by one.
- +** Raises the volume of the sound in steps until the maximum value is reached.
- Lowers the volume of the sound in steps until the minimum value is reached.
- RETURN** Reverts to the previous screen. Touching RETURN again takes you to the SYSTEM SETUP menu. Touching EXIT at this point takes you back to Attract mode.





TYPICAL SOUND TEST MENU SCREEN

Each Game sound is stored in a discrete memory location. All sounds are available to test the audio reproduction capabilities of the sound circuits. Vary the volume as you sample these sounds to determine if loose wire connections, faulty memory, digital-to-analog conversion problems, a defective speaker, etc. could be causing distorted or missing sound effects. Select a repetitive sound track and a high volume level if you suspect errors caused by heat or time-related problems.

The sounds may be examined in any order. Touch the + or - buttons to change the volume as necessary. Touch RETURN to end these tests and go back to DIAGNOSTICS, then RETURN and EXIT to go back to Attract mode.

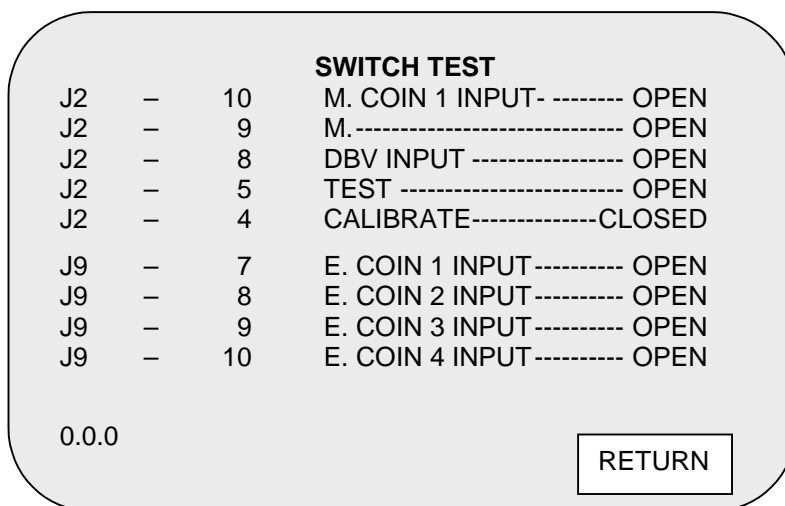
There are three types of sounds used in the Touchmaster® games. Short bursts of sound indicate single events such as a touch selection or an incorrect answer to a question. A dog barking, a cowbell, and the "boing" are examples of these sounds. Medium-length phrases are used to announce the start or end of a game, bonus rounds, or a new high score. These phrases can last from one to five seconds. The final group of sounds are repetitive sounds like a jazz-drum riff or the ticking of a clock. These sounds are used to distract the player and to attract others to the game.

	NOTICE: The volume adjustment in the sound tests is the same as the one used for the game play. Be sure to set the volume back to a reasonable level when you have concluded the tests.
	NOTICE: There is a master volume control on the CPU Board Assembly. Change this potentiometer only if there is not enough range in the on-screen volume adjustment. Refer to audio Troubleshooting.

SWITCH TEST

Switch tests allow you to manually check each switch used in the game. Because the Touchscreen uses a digital controller to sense player input, it has a separate test (refer to Calibrate steps).

- OPEN** Indicates a circuit with no continuity. This is a Normally Open switch condition.
- CLOSED** Indicates a circuit with continuity. This is a Normally Closed switch condition.
- RETURN** Reverts to the Sub Menu screen. Touch RETURN again to go to the Main Menu.



TYPICAL SWITCH TEST MENU SCREEN

The Touchmaster® game electronics expect all switches to be Normally Open except when activated.


Each line item on the screen represents an input signal from the currency acceptors or the push button switches. The screen above is correct for a Touchmaster® with the Calibration button depressed and held. The game detects and displays the status of each switch independently, permitting switches to be checked for interaction or incorrect programming (electronic currency acceptors).

In addition to the on-screen OPEN or CLOSED indication, the Touchmaster® audio circuits generate a *clunk* noise each time a switch is closed. Use this to locate shorted or intermittent connections when you are working from the back or sides of the cabinet and cannot see the monitor screen.

Example: Suppose a different coin mechanism must be installed to accept another type of coin than was previously used. Turn off the game power and open the Cash Door. Remove the existing mechanism and replace it with the alternate unit. After the new mechanism has been mounted and connected to the game electronics, the game must be matched to the new currency values. Power up the game and verify the Touchscreen operation (minor calibration may be required after any type of product service).

Check switch operation for the game Currency Acceptors in the following manner: Press the SETUP pushbutton to display the Menu System. Choose DIAGNOSTICS to get to the Sub Menu, then choose SWITCH TEST to go to the switch menu screen (a typical game SWITCH screen is illustrated; your Touchmaster® may have a different compliment of Acceptors).

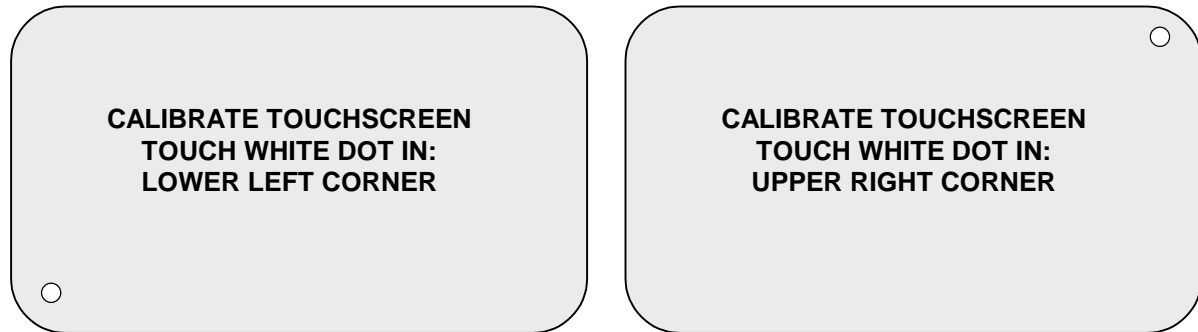
Press and hold the CAL. push button. The Touchmaster® emits CLUNKing sounds and indicate this switch is CLOSED on the screen. Release the button to stop the sound and revert to an OPEN state. Repeat these steps for other switches in the game. When finished, choose RETURN and EXIT to quit.

	<p>NOTICE: Continuous <i>clunk</i> noises can indicate wiring defects, jammed switch, bad IC, etc.</p>
---	---

CALIBRATE

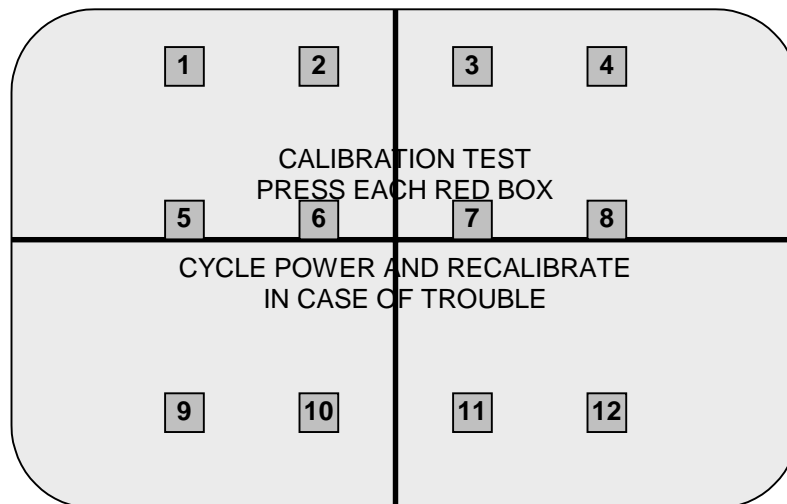
This procedure lets you correct the accuracy of the Touchscreen controller.

- Dot for controller calibration. This sets the ability to correctly recognize a player's touch.



TYPICAL CALIBRATION SCREENS

- Box for controller verification. This verifies the Touchscreen accuracy in critical areas.



TYPICAL CALIBRATION TEST SCREEN

The Touchscreen Controller in the Touchmaster[®] senses the position of your finger based on its capacitance. The Touchscreen uses a very weak uniform electrical field. Touching the screen disturbs the field. The controller tracks the disturbance and translates it into a location. The game electronics interpret the location information into commands. The process occurs in a fraction of a second, allowing the game to respond rapidly.

When the Touchmaster[®] is moved from one location to another, the amount of capacitance changes. This causes the controller to shift its tracking coordinates and may generate errors in some screen areas. The Calibration routine allows the controller to adjust its tracking to match the touch point.

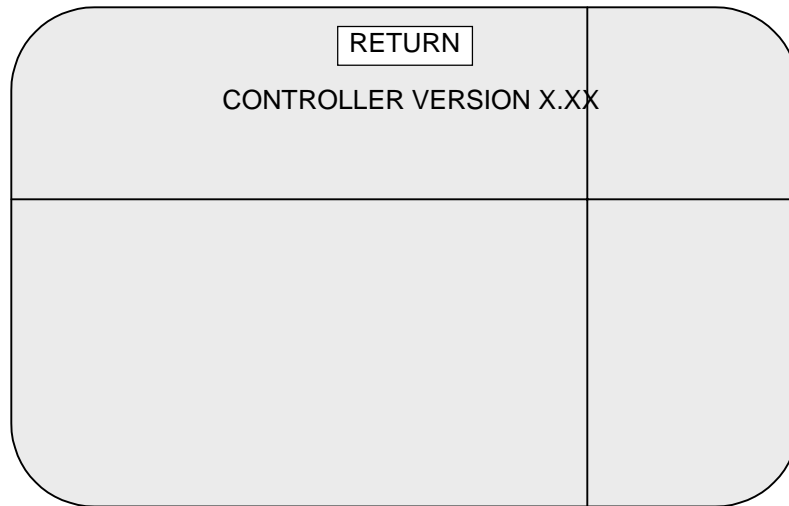
Calibration screens require you to touch one specific location as indicated by a single dot. Touch the dot and hold this position until coarse tracking adjustments are completed (*about two seconds*). The Touchmaster[®] automatically advances to the next screen and emit a short burst of sound. Repeat this procedure for each screen with a single dot. The Calibration Test screen (see next page) tracks finger position over the entire screen, allowing the entire playing surface to be checked for accurate calibration.

Verification screens require you to touch several locations as indicated by several boxes. Touch each box and hold this position until fine tracking adjustments are completed (*about one second*). The Touchmaster[®] displays one vertical and one horizontal line on the screen. The lines should intersect over the box when you remove your finger. Repeat this procedure for each box on the screen.

CALIBRATE TEST

This test verifies touch tracking for the entire active screen area and lets you detect any calibration errors.

- +** Intersecting lines indicate screen location coordinates from the Touchscreen Controller.
- RETURN** Returns you to the previous screen.




TYPICAL CALIBRATION TEST SCREEN

Check the accuracy of the Touchscreen Controller can be checked without going through a new calibration procedure. This test quickly detects any non-linear or unresponsive areas of the Touchscreen.

The Controller Version number indicates the model of controller used in this unit. Because of space limitations, the Touchscreen Controller is mounted where these numbers may be difficult to view easily. If customer assistance is required, the service person may request this number during problem solving.

The first time the Touchscreen Controller is calibrated, the tracking data is stored in a section of the Touchmaster® memory. Each time the screen is touched this information is recalled. This data must be changed if the game has been serviced or relocated. The test does not change the data stored in memory. The only way to replace the existing data with new information is to go through each of the calibration steps. Use Calibrate Test on a regular basis to determine if a new calibration is necessary.

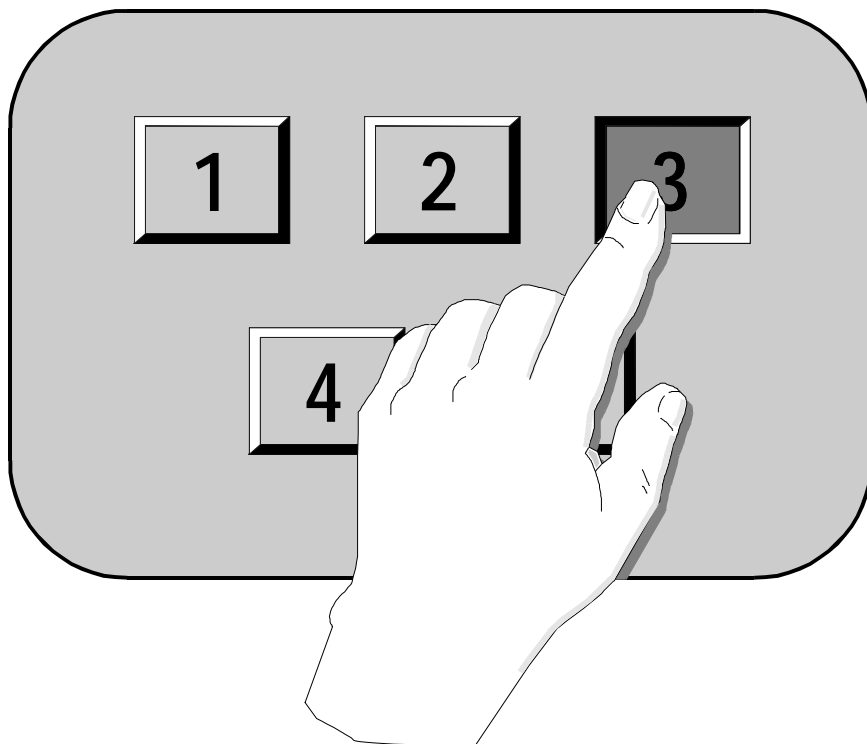
1. Touch CALIBRATE TEST to view the test screen. The lines should intersect at the screen's center.
2. Touch any location on the screen. The lines intersect at the point of contact.
3. For each additional touch point, the lines must intersect under your fingertip. Drag your finger across the screen, as well as lift it from the screen and place it down again.
4. Check several locations, especially along the outer perimeter of the screen. If **either** or both lines are visible beside your finger after the lines stop moving, recalibrate the touchscreen.
5. Touch RETURN to end the test and go back to the DIAGNOSTICS screen. If you encountered errors in the test, choose CALIBRATE and complete each step.
6. When the CALIBRATE TEST results are satisfactory, select RETURN to go to the main menu and EXIT to return to Attract mode.

	NOTICE: Always re-calibrate and test the VGM after moving your Touchmaster®.
---	---

TOUCHMASTER[®]

CONVERSION

CHAPTER

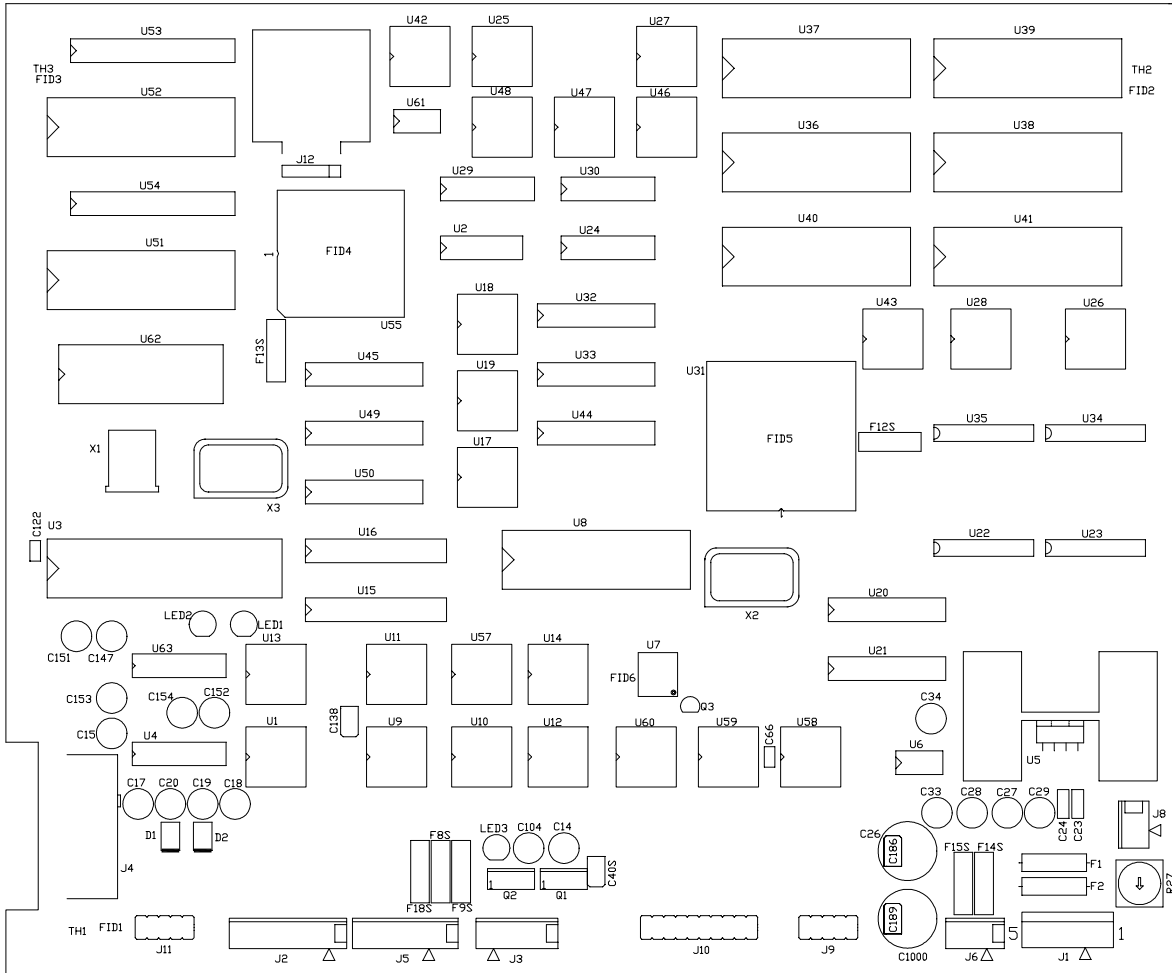


Service



WARNING: DO NOT SUBSTITUTE PARTS. Use of non-Midway Amusement Games LLC Parts or circuit modifications may cause serious injury or equipment damage! Use only Midway authorized parts.
For safety and reliability, do not substitute parts or modify Midway products. Substitute parts or modifications may void EMC directive or FCC type acceptance.

A-23380-33 CPU BOARD ASSEMBLY



Field Replaceable Parts

Designation	Part Number	Function	Description
J12	---	Security Key	Custom Assembly
U8	---	Sound Program	EPROM Assembly
U36	---	Game Program	EPROM Assembly
U37	---	Game Program	EPROM Assembly
U38	---	Game Program	EPROM Assembly
U39	---	Game Program	EPROM Assembly
U40	---	Game Program	EPROM Assembly
U41	---	Game Program	EPROM Assembly
U51	---	CPU Instructions	EPROM Assembly
U52	---	CPU Instructions	EPROM Assembly
U62	---	Memory Backup	Nonvolatile SRAM with Battery

- NOTES:**
1. Version specific. Contact your distributor for the latest part numbers of these components.
 2. Some versions of software do not require that all sockets be filled.
 3. The battery is permanently attached to the memory IC and cannot be replaced separately.

SERVICING

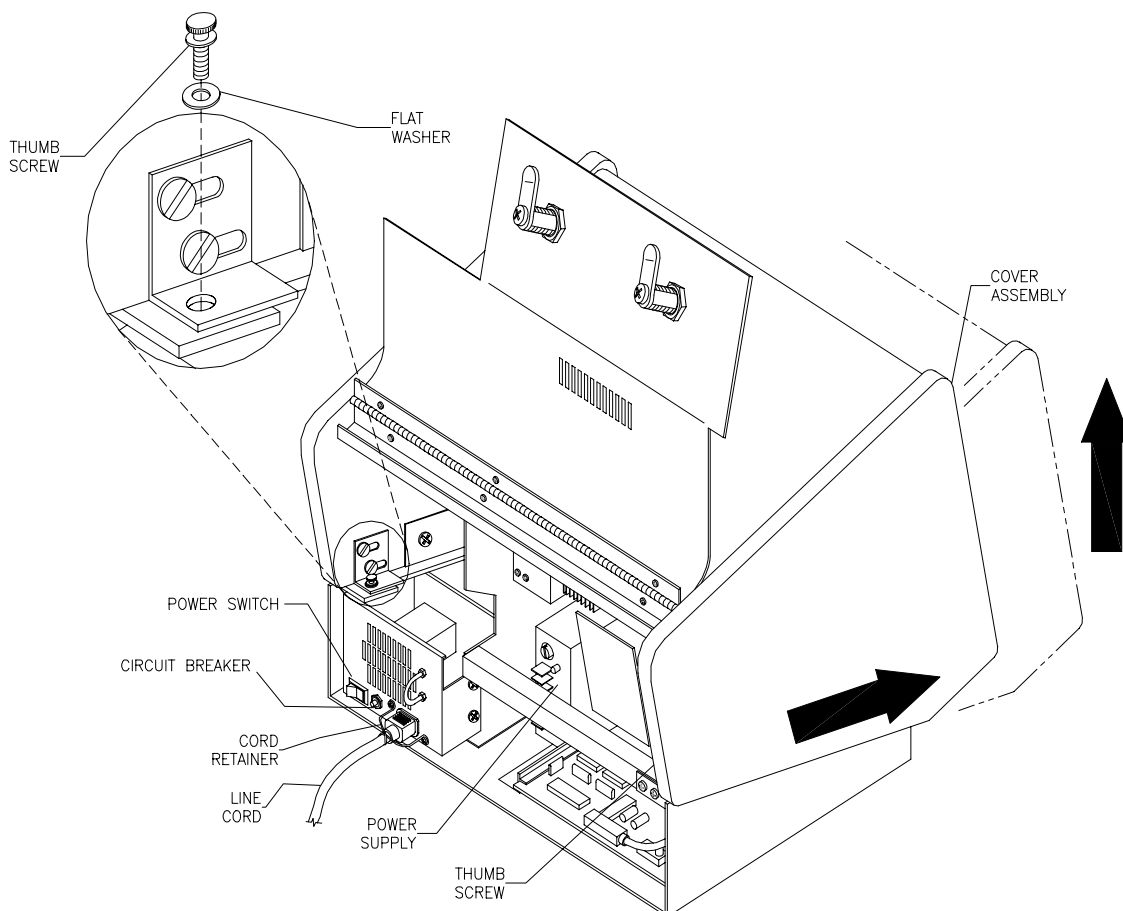
We recommend that you read the SAFETY NOTICES section thoroughly before beginning service.

This VGM uses complex electronic components that can be very SENSITIVE to static electricity. The following precautions must be observed and followed prior to handling any of the electronics.

- 1. Ensure that the AC power to the VGM is turned OFF prior to servicing the electronics.***
- 2. Discharge any static electricity build up in your body by touching the VGM cabinet metal base. This must be done BEFORE touching or handling the electronic assemblies.***
- 3. Store the electronic assemblies in an anti-static area. Anti-static bags are to be used to store VGM electronic assemblies. Reuse the bag to store removed boards during service.***
- 4. DO NOT remove or connect any electronic assemblies when the cabinet power is ON. Doing so will damage the electronic assemblies and void the warranty.***
- 5. Always replace ground wires, shields, safety covers, etc. when maintenance or service is completed. Ensure that all ground and mounting screws are installed and tightened firmly.***

◆ Cabinet (Top Cover)

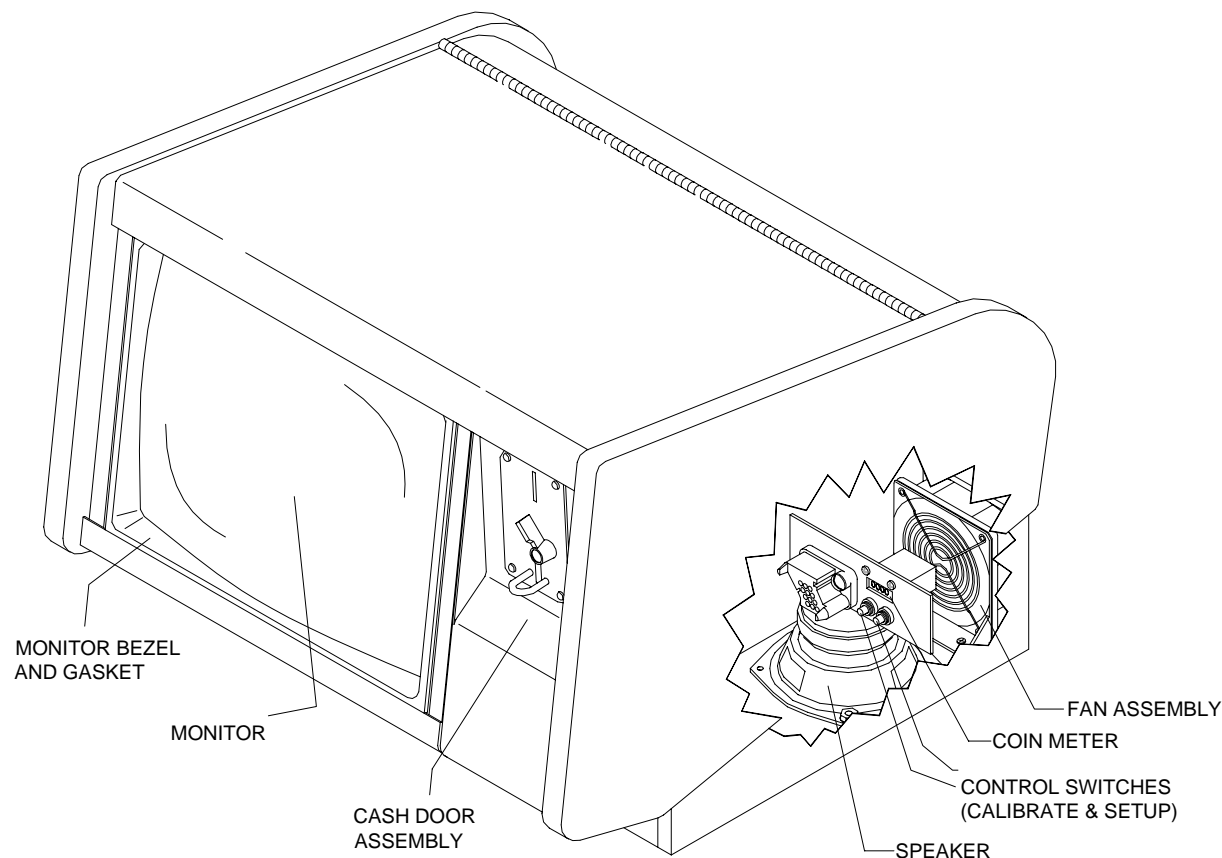
Switch off power to the VGM and unplug from AC power. Insert key or keys into rear door locks. Turn each key clockwise to unlock. Lift the access door up from the cabinet. Reach inside the rear of the cabinet to loosen and remove the thumbscrews and washers used to hold the cover in place. Store screws and washers in a safe place. Slide the cover forward approximately 1/2 inch (12 mm) until it stops. Lift up both side panels and remove the cover from the base. Set the cover in a safe place.



OPENING THE CABINET FOR SERVICE

Refer to the original equipment manufacturer's manual for information relating to the removal and installation of approved parts for the following components.

Power Supply	Speaker	Coin Meter	Control Switches	Rotating Base
Monitor Bezel and Gasket	Monitor	Cash Door Assembly	Fan Assembly	Power Switch or Circuit Breaker



LOCATION OF ORIGINAL COMPONENTS

◆ Signage Kit (Optional)

The original VGM sign was attached with screws to the top cover of the cabinet. If this sign is broken or missing and an exact replacement is not available, use the optional Touchmaster[®] signage kit.

Grasp the top edge of the sign holder and pull it forward and down to free the magnet strips from the top cover, then lift the sign up and off of the cabinet. The sign slides out at the bottom of the holder.

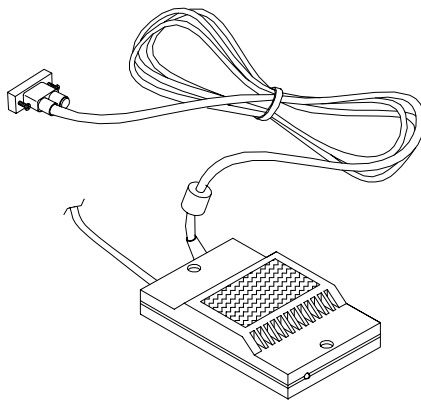
NOTE: Sliding may scratch the paint. Separate the magnet strips before lifting up on the sign to avoid damage to the surface of the top cover. Clean magnets before reinstallation.

◆ Monitor Chassis Boards

Refer to the original equipment manufacturer's manual for information about the removal and installation of approved parts for this unit. Several different types of monitors were used in various production runs of this device. Be certain to specify the manufacturer of your VGM's monitor.

◆ Touchscreen Controller

Do not attempt to substitute the original Touchscreen controller for the one included in the kit. Although they look similar, the new one has the latest software instruction set. Early devices may not calibrate correctly or provide the highest degree of accuracy.



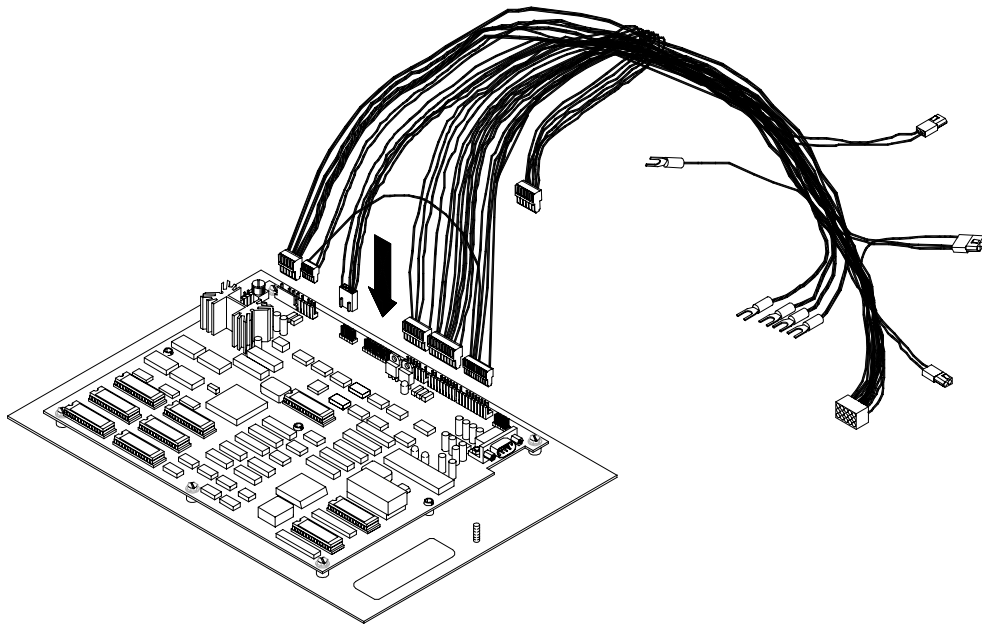
TOUCHSCREEN CONTROLLER

◆ **Touchscreen**

Contact your authorized distributor for information regarding replacement touchscreens.

◆ **CPU Board Assembly**

Switch off power to the VGM and unplug from AC power. Unlock and open the rear cover. Slide the rear edge of the CPU Board Assembly out enough to disconnect the Touchscreen Controller cable. Extract harness cables from the board connectors. Disconnect ground wires as needed. Pull the assembly out of the cabinet and set in a safe place. Remove the board mounting screws. Anti-static bags and protective containers from new parts must be used to store the board if not reinstalled immediately.



CPU BOARD ASSEMBLY WITH WIRING HARNESS

◆ **Battery Memory Module**

Switch off power to the VGM and unplug from AC power. Remove the top cover. Carefully note module orientation, as some versions do not have a notch or keying mark. Remove the module using a chip extraction tool.

To reinstall the module, align the module over its socket and press firmly to seat pins. **Do not force.**



NOTE: The battery is permanently attached to a memory circuit and cannot be replaced separately. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to instructions printed on the module or its packaging.

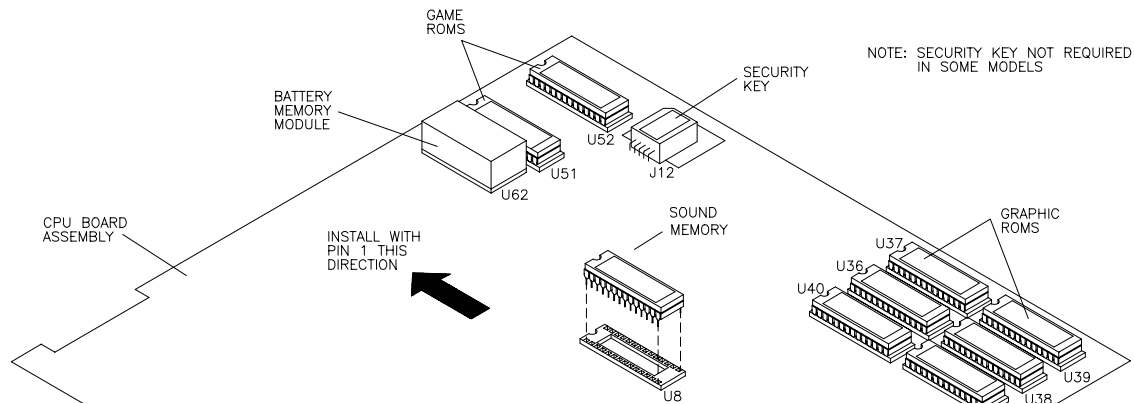
◆ **Memory and Security Key**

The ROM (Read Only Memory) circuits contain the computer operating instructions. *Memory devices are especially sensitive to static charges. Use grounding precautions when handling these parts.*

Switch off power to the VGM and unplug from AC power. Unlock and remove the top cover. Carefully note position of each chip, then pull using a chip extraction tool (not needed for security key). Use a rocking motion to avoid bending pins.

To reinstall memory circuits, orient a device over its socket and press firmly to seat pins.

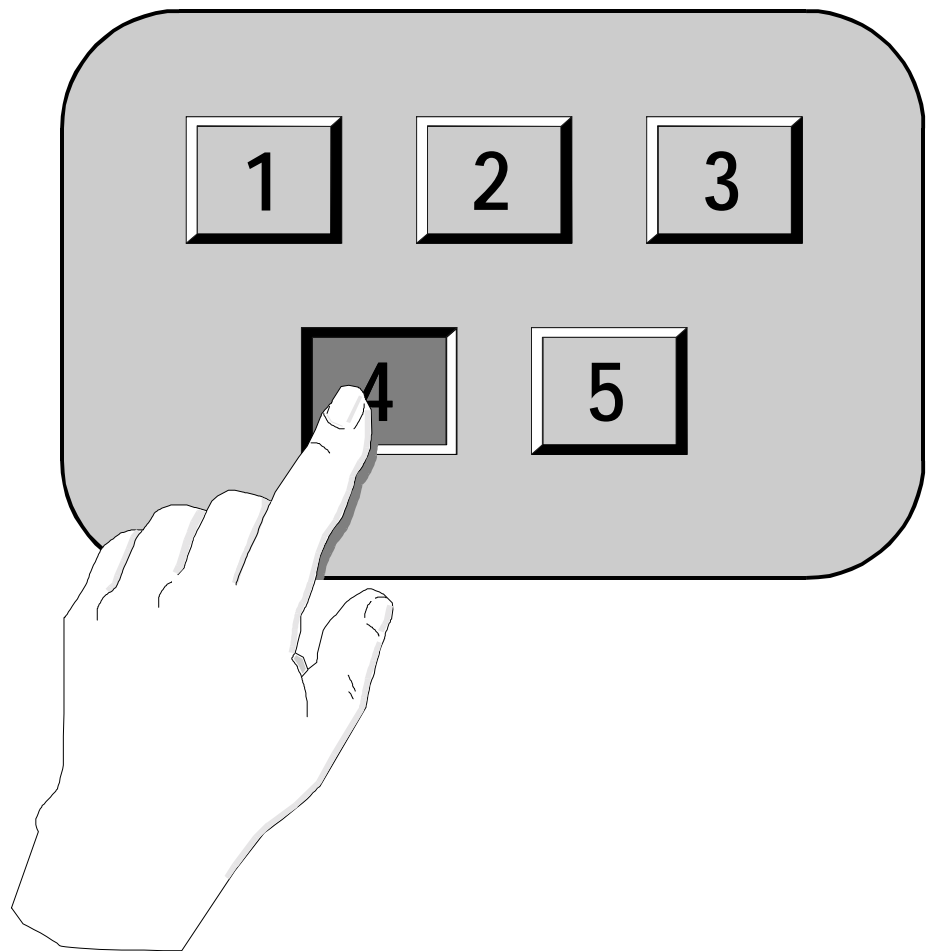
	<p>WARNING: DO NOT FORCE PARTS. If a component does not fit easily into its socket, inspect the component and socket to ensure they are keyed properly and reorient the component. Do not force components to fit, as you will damage them or the socket.</p>
	<p>CAUTION: GROUND SELF BEFORE TOUCHING ELECTRONICS. Discharge any static electricity build up in your body by touching the metal chain lug. This must be done BEFORE touching or handling any of the electronic assemblies.</p>



ORIENTATION OF FIELD REPLACEABLE ELECTRONIC COMPONENTS

TOUCHMASTER[®] CONVERSION

CHAPTER



Wiring



WARNING: GROUND Video Game Machine (VGM). Failure to reconnect all ground wires or replace metal shields and covers with each mounting screw installed and securely tightened may result in radio frequency interference.

CPU BOARD ASSEMBLY CONNECTOR CHART

FUNCTION	NO.	PIN	COLOR	FUNCTION	NO.	PIN	COLOR
Digital Ground	J1	1	Black	Screen Invert Ground	J6	1	Blue-White
Key	J1	2	N/C	Key	J6	2	N/C
+5VDC	J1	3	Red	+5VDC	J6	3	N/C
+12VDC	J1	4	Orange	+12VDC	J6	4	Orange
Analog Ground	J1	5	Black	Analog Ground	J6	5	Black
Digital Ground	J2	1	Black	Not Used	J7	--	N/C
Key	J2	2	N/C	Amplifier Volume In	J8	1	N/C
Screen Invert	J2	3	Blue-White	Preamp Volume Out	J8	2	N/C
Calibrate	J2	4	White-Blue	Key	J8	3	N/C
Setup	J2	5	White-Green	Audio Volume Ground	J8	4	N/C
Not Used	J2	6	N/C	Digital Ground	J9	1	Black
Not Used	J2	7	N/C	+12VDC	J9	2	N/C
Bill Detect	J2	8	N/C	Not Used	J9	3	N/C
Mech Coin 2	J2	9	N/C	Not Used	J9	4	N/C
Mech Coin 1	J2	10	White-Black	Not Used	J9	5	N/C
Meter	J3	1	White-Violet	Digital Ground	J9	6	N/C
Not Used	J3	2	N/C	Elec Coin 1	J9	7	Black-Brown
Coin Lock Out	J3	3	Blue-Grey***	Elec Coin 2	J9	8	Black-Red
Digital Ground	J3	4	Black	Elec Coin 3	J9	9	Black-Orange
Not Used	J3	5	N/C	Elec Coin 4	J9	10	Black-Yellow
Key	J3	6	N/C	Not Used	J10	--	N/C
Digital Ground	J3	7	Black	Not Used	J11	--	N/C
Not Used	J4	1	Cable	Security	J12	1	N/C**
Touchscreen RXD	J4	2	Cable	Security	J12	2	N/C**
Touchscreen TXD	J4	3	Cable	Security	J12	3	N/C**
Not Used	J4	4	Cable	Security	J12	4	N/C**
Digital Ground	J4	5	Cable	Security	J12	5	N/C**
Not Used	J4	6	Cable				
Not Used	J4	7	Cable				
Not Used	J4	8	Cable				
Not Used	J4	9	Cable				
Speaker +	J5	1	Red-Grey				
Speaker -	J5	2	Brown-Grey				
Key	J5	3	N/C				
Video Ground	J5	4	Yellow-Black				
Video-Blue	J5	5	Yellow-Blue				
Video-Green	J5	6	Yellow-Green				
Video-Red	J5	7	Yellow-Red				
Horizontal Sync	J5	8	Yellow-Violet				
Vertical Sync	J5	9	Yellow-Grey				

* Modem connections are also used for the external printer port. An optional printer port kit is available.

** Security key circuit is required to permit operation of some software versions.

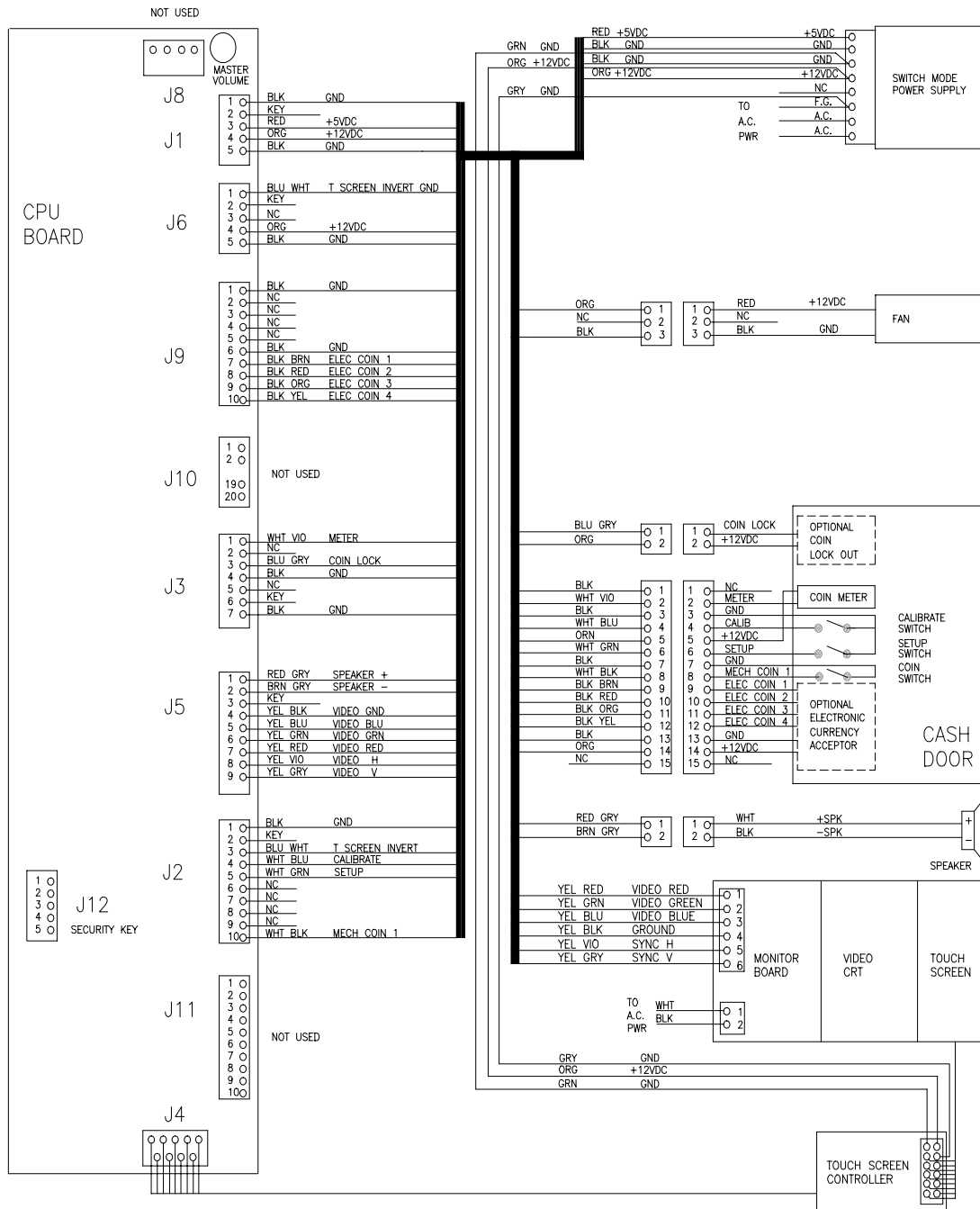
*** Coin lock out function is required in some locations. This connector is included in the wiring harness.

D.C. Power Source Voltage Limits

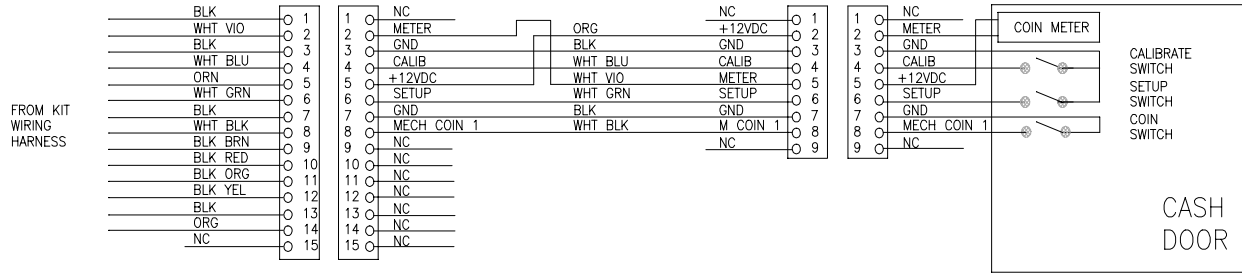
FUNCTION	RANGE LIMITS	COLOR	FUNCTION	RANGE LIMITS	COLOR
Digital Circuits	+4.90V to +5.10V	Red	Not Used	-4.75V to -5.25V	N/C
Audio Circuits	+11.5V to +12.5V	Orange	Ground Return	0V	Black

NOTE: Full Metal Chassis Power Supply has +5V adjustment. Open Frame voltages are all fixed.

TYPICAL CABINET WIRING (for models with 15-pin connectors)



WIRING ADAPTER CABLE (for models with 9-pin connectors)

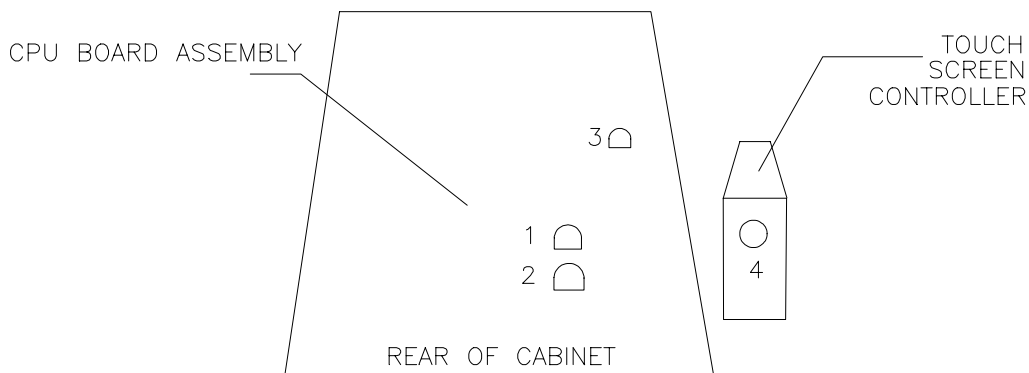


LED INDICATOR STATUS CHART

DESIGNATION	LOCATION	FUNCTION	COLOR	STATE	MEANING
LED 1	CPU BOARD ASSEMBLY	PROCESSOR ACTIVITY	RED	OFF	NO POWER (No DC power at the CPU)
				ON	LOCKED UP (Faulty CPU instructions)
				BLINKING	NORMAL OPERATION
LED 2	CPU BOARD ASSEMBLY	RESET INDICATOR	GREEN	OFF	NO POWER (CPU not operating)
				ON	NORMAL OPERATION
				BLINKING	ERROR (Continuous reset at the CPU)
LED 3	CPU BOARD ASSEMBLY	INTERFACE CONDITION	RED	OFF	NORMAL (No touch signal from Controller)
				ON	LOCKED UP (Continuous busy at the interface)
				BLINKING	TOUCH DETECTION
LED 4	TOUCHSCREEN CONTROLLER	CONTROLLER CONDITION	GREEN	OFF	NO POWER (No DC power at the Controller)
				ON	NORMAL OPERATION
				BLINKING	ERROR (Internal Controller error. See note for details.)

NOTES FOR LED 4, Internal Controller error.

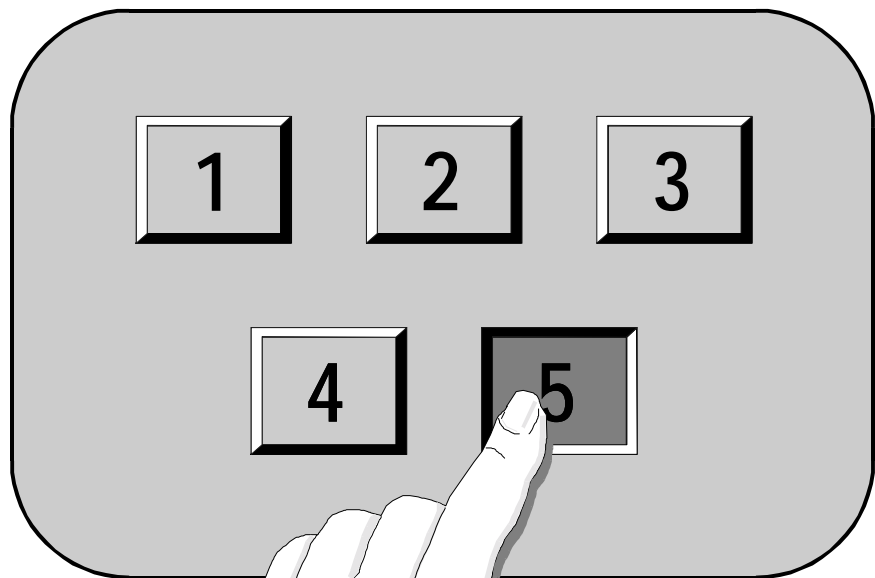
Number of flashes every 10 seconds	Reason
1	RAM fault
2	ROM fault
3	A/D fault
4	NOVRAM fault
5	Analog fault



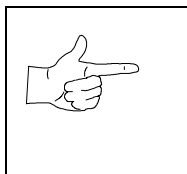
LOCATIONS OF LED 1, 2, 3, and 4 IN CABINET

TOUCHMASTER® CONVERSION

CHAPTER



Troubleshooting



NOTICE : The conversion kit interchangeable with the Board Assembly. The different part numbers. The touchscreen calibration errors.

CPU Board Assembly is not standard Touchmaster® CPU assemblies look very similar but have incorrect assembly will cause sync and

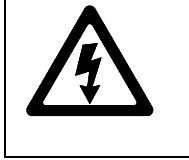
This Video Game Machine (VGM) uses complex electronic components that are **sensitive** to static electricity. The following precautions must be observed and followed prior to handling VGM electronics.

1. Turn off AC power to the VGM and ensure the cord is unplugged prior to servicing the VGM.
2. Discharge any static electricity build up in your body by touching any unpainted metal on the VGM, such as the chain lug. This is to be done **before** touching or handling the assemblies.
3. Handle the electronic assemblies by their edges and store them in an anti-static area when not in active use. Anti-static bags are to be used to store or transport the CPU Board Assembly.
4. **Do not** install, remove, or connect any electronic assemblies when the cabinet AC power is ON. Doing so will damage the electronic assemblies and void the warranty.
5. Always replace ground wires, shields, safety covers, etc. when maintenance or service is completed. Ensure that all ground and mounting screws are installed and tightened firmly.

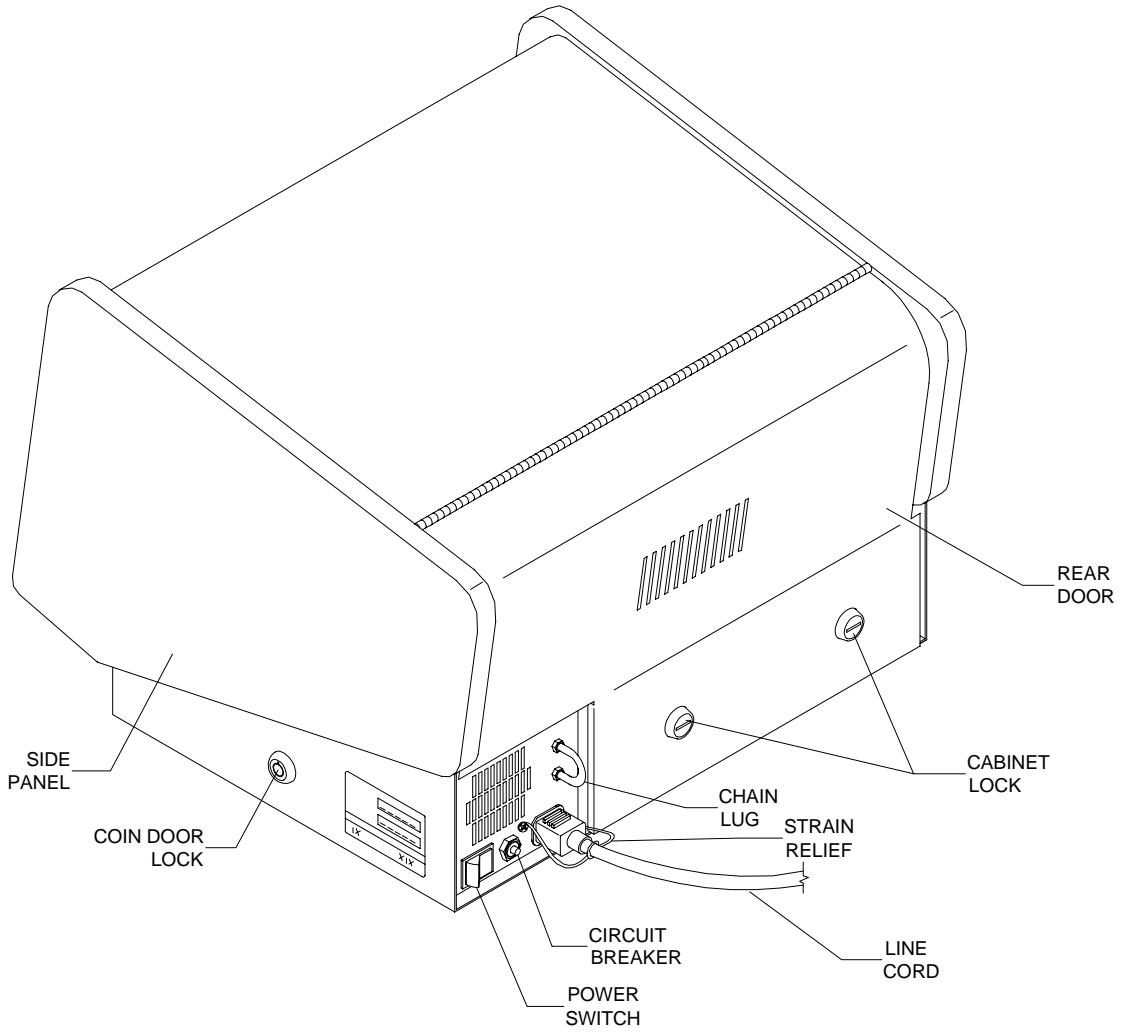
VGM Does Not Start

Symptom	Problem	Suggested Solution
<ul style="list-style-type: none"> VGM appears non-functional. No audio No fan No video display. 	Lack of electricity	Check that the Power Switch is set to ON and VGM is plugged in.
<ul style="list-style-type: none"> VGM appears non-functional Fan works. 	Poor AC connection	<ol style="list-style-type: none"> Check the air flow out of the cabinet by the fan. (This does not mean that voltages or signals are as they should be, but it does indicate that there is DC power available from the Power Supply.) Turn off power. Remove line cord cable clamp. Test line cord, power plug and I.E.C. connector for breaks or damage. Verify the continuity of each wire in cord. Fully seat I.E.C. connector into the mating cabinet receptacle. Replace cable clamp and all of its screws. Ensure that cabinet wiring harness connectors are fully seated in the corresponding AC Power Wiring Harness connectors. Verify the AC wire connections at the Power Supply terminals.
	Tripped circuit	<ol style="list-style-type: none"> Examine the AC Circuit Breaker on the cabinet. If the circuit has been broken, the reset button will be protruding from the Circuit Breaker. Press the button in until it latches to restore power.
	Faulty AC line filter	<ol style="list-style-type: none"> Examine the AC line filter on the cabinet. If the filter is faulty, replace it with an identical filter of the proper voltage and current rating. Connect the line cord and verify operation. Fully seat the AC plug in the outlet. Verify that AC line voltage is present. Turn VGM power ON. Check the DC wiring harness and connectors if the breaker opens the circuit again.
<ul style="list-style-type: none"> VGM appears non-functional Fan operates. 	Poor DC connections	<ol style="list-style-type: none"> Unlock and open the cabinet rear cover while AC power is on. Inspect the CPU Board Assembly under low light level conditions. You should see a glow from the LEDs if there is voltage in the processor circuits. (This does not mean that voltages or signals are as they should be, but it does indicate that the CPU Board is

- | | | |
|--|--|--|
| | | <p>receiving some DC power from the Power Supply.)</p> <ol style="list-style-type: none"> 4. Turn OFF VGM power. 5. Unplug the AC line cord. 6. Inspect the CPU Board Assembly. 7. Ensure that the DC Power connector is attached and fully seated onto the mating board connector. 8. Check the other wiring harness connectors in the same way. |
|--|--|--|



WARNING: DISCONNECT POWER. Do not remove or install any connector when power is turned on. Doing so will damage the CPU board assembly and void the warranty.



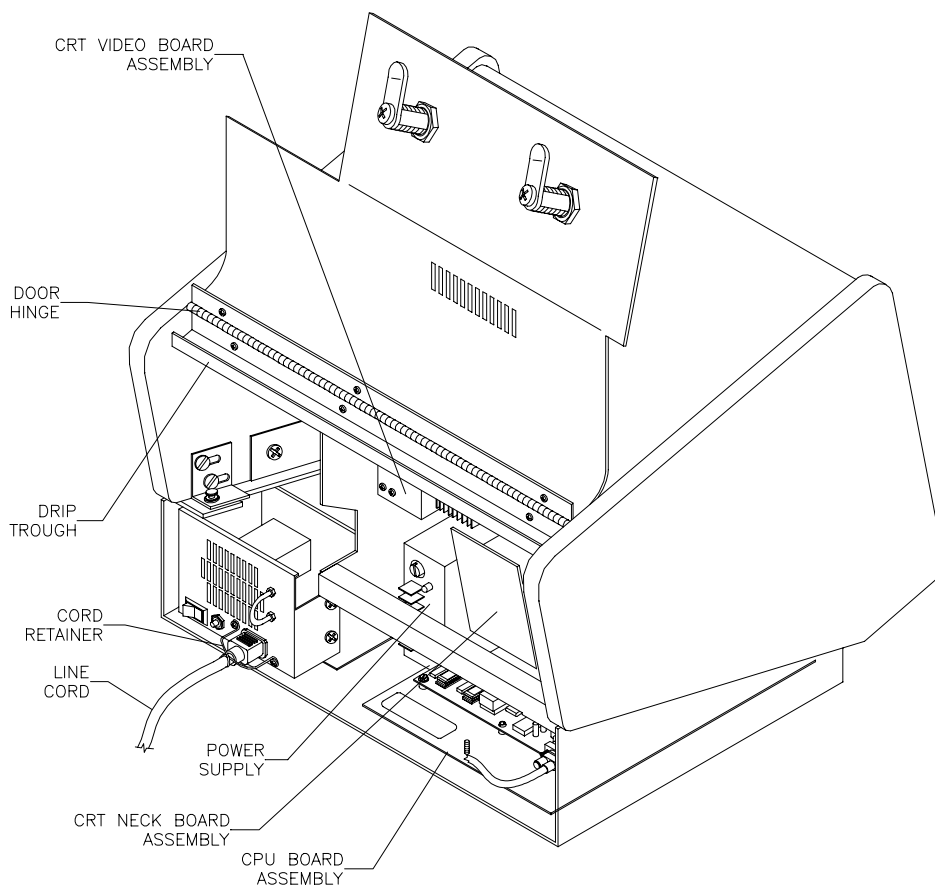
REAR VIEW OF CABINET

	Faulty video fuse	<ol style="list-style-type: none"> 1. Examine AC line fuse on Video Monitor Board. 2. If fuse is faulty, replace with identical fuse of proper voltage and current rating. 3. Connect line cord and verify operation.
	Poor voltage	<p>Plug in VGM and turn ON power.</p> <p>Using the 20 Volt DC range on a digital voltmeter, measure DC voltages at the CPU Power connector pins.</p> <p>Refer to the Typical Cabinet Wiring Diagram for specific wiring information and voltage limits.</p> <p>Adjust the +5V source if it is variable.</p> <p>Using the 2 Volt AC range on a digital voltmeter, measure the same DC voltages as above. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise.</p>
		<p>Verify that the VGM runs and completes the power-up self-test sequence without any errors.</p> <p>Note errors and/or failures found during these tests.</p>
		<p>Remove cash door.</p> <p>Enter Menu System by pressing the SETUP button inside the coin vault. From SYSTEM SETUP menu, choose the VIDEO TESTS (refer to Section One for additional details). Use these tests to check the operation of screens used in the VGM.</p>

VGM Can Not Be Played

Symptom	Problem	Suggested Solution
<ul style="list-style-type: none"> • VGM will not accept currency or tokens. • VGM does not start. • Audio functional. • Video functional. 	Cash door blockage	Unlock and remove cash door. Empty the cash box. Inspect for counterfeit currency. Check vault and remove items that block the path from the coin mechanism.
		Check each coin mechanism or currency acceptor by hand to ensure proper mounting. Remove the mechanism or acceptor and clear the currency path. Reinstall the mechanism and latch it.
	Unlevel cash door	<ol style="list-style-type: none"> 1. Verify that the mechanism is level when the cabinet is in its normal position. 2. Ensure that the connector is attached and fully seated. 3. Repair or replace a bent or damaged mechanism.
	Poor connection	Ensure that cables and wiring are connected to the currency acceptor or coin mechanism. An electronic currency acceptor may require some programming to recognize currency.
<ul style="list-style-type: none"> • VGM accepts currency or tokens. • VGM does not start. • Audio functional. • Video functional. 	Poor switch	<ol style="list-style-type: none"> 1. Unlock and remove cash door. 2. Check each mechanism by hand to ensure proper mounting. 3. Verify that each release latch is closed and locked. 4. Test both good and bad coins to see if the mechanism or acceptor accepts and rejects the currency correctly. 5. Enter the VGM Menu System by pressing the SETUP button. 6. From the SYSTEM SETUP menu, go to DIAGNOSTICS and choose SWITCH TEST. Use these tests to confirm the operation of each switch used in the VGM.
	Poor connection	<ol style="list-style-type: none"> 1. Inspect internal cash door wiring connections. 2. Check connectors and cables for wiring continuity from CPU Board Assembly connector to coin mechanism or currency acceptor. 3. Examine the acceptor for programmable features. Some devices require operator adjustment for each specific type of currency recognized. 4. Refer to the manufacturer's literature for assistance in setting the acceptor features to the required values. 5. Turn OFF VGM power. 6. Ensure that no parts or wires are caught in hinges or switch contacts. 7. Check for continuity in each of the suspect switch connections (Common to Normally Open or

		<p>Common to Normally Closed).</p> <ol style="list-style-type: none"> Replace faulty switches (bent levers, broken actuators, etc.). Verify that each mechanism is operating properly by placing it in a known functional unit.
<ul style="list-style-type: none"> VGM accepts currency or tokens. Number of credits per coin or bill is incorrect. 	Faulty switch	<ol style="list-style-type: none"> Unlock and remove the cash door. Enter the VGM Menu System by pressing the SETUP button. From the SYSTEM SETUP menu, go to DIAGNOSTICS and choose SWITCH TEST. Use tests to confirm operation of each switch used in the VGM. Set the pulse width adjustment to long pulses if the bills do not register when inserted into the acceptor. Verify that each acceptor is operating properly by placing it in a known functional unit.

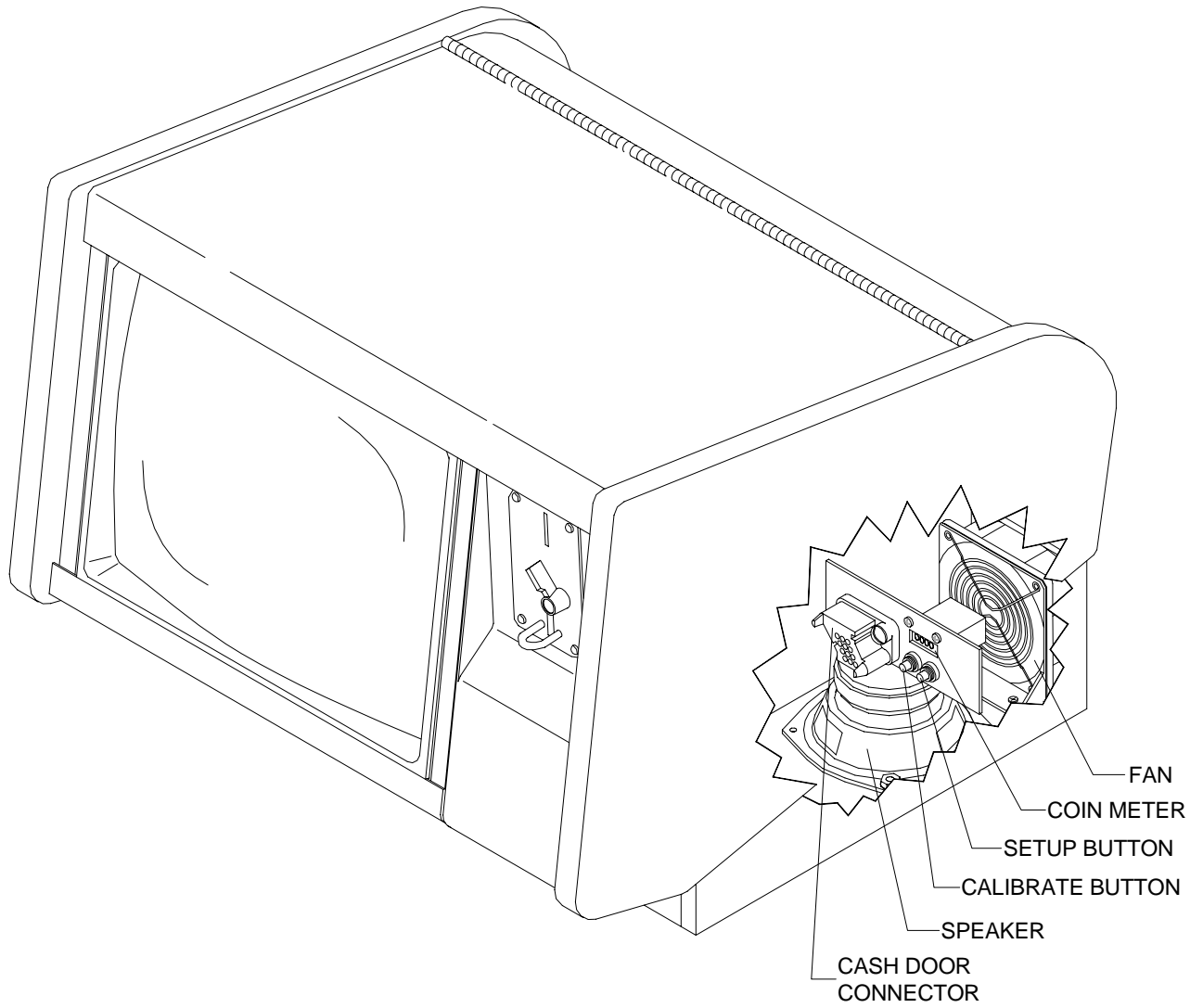


REAR VIEW OF CABINET WITH DOOR OPEN

Touchscreen Malfunctions

Symptom	Problem	Suggested Solution
<ul style="list-style-type: none"> Touchscreen is not accurate for two or more players. 	Dirty screen	Clean the entire cabinet frequently, especially the video screen glass and the touchscreen area. It is not necessary to switch off power to the VGM to clean the unit. Apply an isopropyl alcohol or warm water to a clean cloth or sponge, then use this to wipe the surface. Do not apply the cleaner directly on the unit. Liquids can drip into circuits and cause erratic VGM operation.
	Overzealous touching	Warn players to use only one finger at a time. Simultaneous touches confuse the touch controller.
	Poor player grounding	Some players may find that touchscreen response improves when they touch the surface of the metal cabinet with one hand as they operate the touchscreen with the other hand.
<ul style="list-style-type: none"> Touchscreen chooses incorrect items or does not respond when certain areas are touched. 	Poor calibration	Unlock and remove cash door. Enter Menu System by pressing the SETUP switch inside the coin vault. From the SYSTEM SETUP menu, go to DIAGNOSTICS and choose the CALIBRATE TEST (refer to Operation for additional details). Use these tests to confirm that the touchscreen is detecting and properly tracking finger position in all areas of the screen.
		From the DIAGNOSTIC menu, choose CALIBRATE to adjust the touchscreen accuracy. Follow the on screen instructions to optimize the touchscreen for sensitivity and linearity.
	Dirty screen	<ol style="list-style-type: none"> Turn OFF the VGM. Unlock and open the rear door. Remove the top cover and bezel (refer to Servicing instructions). Clean the touchscreen, especially areas normally hidden by the bezel.
	Faulty controller	Ensure that the Touchscreen Controller is operating properly by placing it in a known functional unit.
<ul style="list-style-type: none"> Touchscreen reacts in opposite corner from where touched 	Improper signal	<ol style="list-style-type: none"> Turn OFF the VGM and remove AC line cord. Open rear door. Verify that pin 3 of connector P6 is electrically grounded. Temporarily disconnect the blue/white wire at pin 3 of connector P6. Tape or insulate end of blue/white wire and secure to wiring harness. Plug in and turn ON the VGM. Recalibrate touchscreen.
<ul style="list-style-type: none"> Player touch controls are intermittent or completely non-functional. 	Poor connection	<ol style="list-style-type: none"> Unlock and remove the cash door. Enter the VGM Menu System by pressing the SETUP button.

<ul style="list-style-type: none"> VGM starts normally. 		<ol style="list-style-type: none"> From the SYSTEM SETUP menu, go to DIAGNOSTICS and choose the SWITCH TEST. Use these tests to confirm the operation of each switch used in the VGM.
	Poor calibration	From the DIAGNOSTIC menu, choose CALIBRATE (refer to Operation for additional details). Follow the on-screen instructions to optimize the Touchscreen for sensitivity and linearity.
	Poor power	<ol style="list-style-type: none"> Unlock and remove the top cover. Observe the CPU Board Assembly as you touch the screen. If the CPU senses your touch, you will see a glow from a red LED. A glow will be seen from a green LED on the end of the Touchscreen Controller if there is voltage in the Touchscreen circuits. Refer to LED Indicator Status Chart. Turn OFF VGM power. Inspect the Controller and, if necessary, lift the device up just enough to expose the Touchscreen connector. Check that the cable is fully seated in the connector. Ensure that the Touchscreen Controller is operating properly by placing in a known functional unit.
	Wrong board assembly	Verify that any replacement CPU Board Assembly is for use in the conversion kit. The CPU Board Assembly for standard production Touchmaster® units will cause calibration errors in this kit.
<ul style="list-style-type: none"> "Touch Controller Not Found" error message 	Poor connection	<ol style="list-style-type: none"> Turn OFF the VGM power. Unlock the snap latch plunger handles and lift up the rear edge of the CPU Board Assembly. Release the cable ties and lift the controller up just enough to expose the Touchscreen connector. Check that the cable is fully seated in the connector. Ensure that the Touchscreen Controller is operating properly by placing in a known good unit.



CUTAWAY OF COMPONENTS BEHIND CASH DOOR

Audio Malfunctions

Symptom	Problem	Suggested Solution
<ul style="list-style-type: none"> • Audio is non-functional. • Video is functional • VGM appears to operate normally. 	Volume set to zero in software.	<ol style="list-style-type: none"> 1. Unlock and remove the cash door. 2. Open the rear cover. 3. Enter the VGM Menu System by pressing the SETUP button. 4. From the SYSTEM SETUP menu, go to DIAGNOSTICS and choose SOUND TEST. 5. Verify that volume has not been set at zero. 6. Change the level to maximum to make the VGM audible.
	Volume set to zero on CPU Board Assembly	<ol style="list-style-type: none"> 1. Select an endlessly repeating sound track. 2. With the screen audio level at maximum, turn the master volume control on the CPU Board Assembly full up. Do not come into contact with the high voltage leads. 3. Now reduce the master volume until the sound is as loud as possible without distortion. 4. Use the screen adjustments to set a comfortable playing level.
		While in the SOUND TEST menu, select PLAY and use the NEXT box to advance through all the game sounds. Use sounds to confirm operation of the audio amplifier and speaker. Note if any game sounds are unintelligible, voice messages, strange noises, missing.
	Poor connection	<ol style="list-style-type: none"> 1. Turn OFF VGM power. 2. Verify correct cabinet wiring for this VGM. 3. Ensure that the speaker is properly connected to the audio output wires from the Audio connector. 4. Verify speaker continuity. 5. Refer to Typical Cabinet Wiring Diagram for specific wiring information.
	Poor power continuity	<ol style="list-style-type: none"> 1. Turn ON VGM power. 2. Using the 20 Volt DC range on a digital voltmeter, measure DC voltages present at the Power connector pins. 3. Verify the +5V, -5V and +12V sources. 4. Refer to the Typical Cabinet Wiring Diagram for specific wiring information and voltage limits. 5. Using the 2 Volt AC range on a digital voltmeter, measure the same DC voltages as above. 6. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise. 7. Verify proper operation of CPU Board Assembly by placing it in a known functional unit.

<ul style="list-style-type: none"> • Audio is distorted or muffled. • A constant low hum may be present. • Sounds may be missing. 		<ol style="list-style-type: none"> 1. Unlock and remove the cash door. 2. Enter the VGM Menu System by pressing the SETUP button. 3. From the SYSTEM SETUP menu, go to DIAGNOSTICS and choose SOUND TESTS. These tests will verify some of the functions of the audio circuits in this VGM.
	Bad speaker	<ol style="list-style-type: none"> 1. Turn OFF the VGM. 2. Unlock and remove the cabinet cover. 3. Locate the speaker. 4. Ensure that it is FULL RANGE (100 to 10,000 Hz response) and rated for at least 15 WATTS continuous power.
	Poor connection	<ol style="list-style-type: none"> 1. Inspect the speaker and its wires. 2. Ensure that no loose parts or wires are caught in speaker cone, terminals, mounting screws, or stuck to the magnet.
	Bad board assembly	<ol style="list-style-type: none"> 1. Verify that the sound ROM is correct for this VGM. There is only one sound ROM in this VGM set. The ROM circuit is labeled with the assembly number and the software version. 2. Check that the cabinet wiring is correct for this VGM. 3. Ensure that all cabinet ground wires are connected. 4. Refer to the Typical Cabinet Wiring Diagram for specific wiring information.
	Poor voltage	<ol style="list-style-type: none"> 1. Using the 2 Volt AC range on a digital voltmeter, measure voltages at the speaker terminals. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise. 2. Verify that the speaker is operating properly by placing in a known functional unit.

Video Malfunctions

Symptom	Problem	Suggested Solution
<ul style="list-style-type: none"> • Monitor appears non-functional. • Audio is functional. • Controls operate normally. 	Lack of electricity	<ol style="list-style-type: none"> 1. Unlock and remove cabinet cover. 2. Verify that AC Power is connected to the Video Monitor. 3. Inspect the neck of the CRT under low light level conditions. 4. You will see a glow near the CRT base if voltage is in the filament circuits. (This does not mean that other voltages or signals are as they should be, but it indicates that some monitor circuits are receiving power.)
	Poor connection	<ol style="list-style-type: none"> 1. Turn OFF VGM power. 2. Verify that the Video Signal and the Remote Adjustment Board connectors are fully seated on the Video Monitor Board Assembly. 3. Ensure that the video connector was installed onto the board with the pins in the same orientation as the original connector. 4. Check the other monitor connectors in the same way. Important: Do not operate a monitor without a Remote Adjustment Board.
	Faulty fuse	Examine the AC line fuse on the Video Monitor Board Assembly. If the fuse is faulty, replace it with an identical fuse of the proper voltage and current rating.
	Loose parts	Ensure that no loose parts or wires are caught or pinched by chassis or the mounting brackets. Reposition the thick, red CRT high voltage wire away from other components under the CPU shelf.
	Incorrect adjustments	<ol style="list-style-type: none"> 1. Check that the brightness (intensity) and contrast have not been set to their minimum levels. 2. Verify that the Video Monitor is operating correctly by placing it in a known functional unit.
<ul style="list-style-type: none"> • The power-up self-test is functional. • Game does not appear. • Audio is not functional. 	Error message	<ol style="list-style-type: none"> 1. Note and record any error messages that occur during self-test. 2. Turn OFF VGM power. 3. Restore power after one minute. 4. Note and record any new messages that appear on the screen. 5. Unlock and remove the cash door. 6. Enter the VGM Menu System by pressing the SETUP button. 7. From the SYSTEM SETUP menu, go to DIAGNOSTICS and choose VIDEO TEST. These tests will verify some functions of the video circuits.
	Wrong board assembly	<ol style="list-style-type: none"> 1. Turn OFF VGM power.

<ul style="list-style-type: none"> • Monitor does not lock onto signal and provide a stable picture. • Colors are missing, etc. 		<ol style="list-style-type: none"> 2. Verify that the CPU Board Assembly is correct for this VGM. Each CPU Board is marked with the manufacturer name, assembly number and the hardware version.
	Wrong ROM	<ol style="list-style-type: none"> 1. Verify that the ROM instruction set is correct for this VGM. There is more than one ROM in a VGM set. Each ROM circuit is labeled with the assembly number and the software version. 2. Turn ON VGM power. 3. Using the 20 Volt DC range on a digital voltmeter, measure DC voltages at Power connector pins. 4. Refer to Typical Cabinet Wiring Diagram for specific wiring information and voltage limits. 5. Adjust the +5V source if it is variable. 6. Using the 2 Volt AC range on a digital voltmeter, measure the same DC voltages as above. Any reading indicates that the supply voltages are unstable and may contain ripple or noise. 7. Compare CPU Board Light Emitting Diode states with the LED Indicator Status Chart.
	Poor connection	Check connectors and cables for wiring continuity from the CPU Board Assembly to the Video Monitor.
	Wrong board assembly	<ol style="list-style-type: none"> 1. Ensure that the CPU Board Assembly is correct for this VGM. Monitors for some VGMS require different sync polarity than Midway production units. Units with incorrect polarity or unusual sync connections will result in what appears to be horizontal tearing or complete loss of sync. 2. Verify that the Video Monitor is operating correctly by placing it in a known functional unit
<ul style="list-style-type: none"> • VGM operates normally. • Video wavers or rolls, has dark bars, uneven colors, etc. 	Poor connection	<ol style="list-style-type: none"> 1. Check connectors and cables for wiring continuity from the CPU Board to the Video Monitor. 2. Ensure that all the cabinet ground wires are connected, especially at the Video Monitor Chassis.
	Interference	<ol style="list-style-type: none"> 1. Move the cabinet away from machines, appliances, other VGMS, etc. Some equipment normally emits very strong electrical or magnetic fields. 2. Verify that the Video Monitor is operating correctly by placing it in a known functional unit.

Miscellaneous Malfunctions

Symptom	Problem	Suggested Solution
<ul style="list-style-type: none"> VGM operates normally. Cabinet gets very warm after several hours of use. 	Poor air flow	<ol style="list-style-type: none"> Check bottom and rear of cabinet for blocked air flow. Move VGM away from sources of heat. Turn OFF VGM power. Apply a high power vacuum cleaner to fan vent holes to remove dust.
	Poor cooling system	Unlock and open the rear door. Ensure that all fans are connected and operating at full speed.
<ul style="list-style-type: none"> Touchscreen requires excessive recalibration to maintain VGM accuracy. 	Touchscreen abuse	<ol style="list-style-type: none"> Clean the entire cabinet frequently, especially the video screen glass and the touchscreen area. It is not necessary to switch off power to the VGM to clean the unit. Apply an isopropyl alcohol or warm water to a clean cloth or sponge and use it to wipe the surface. Do not apply cleaner directly on the unit. Liquids could drip into circuits and cause erratic VGM operation. Warn players to use only one finger at a time. Multiple, simultaneous touches confuse the controller.
	Infrequent calibration	Repeat the Calibrate and Calibrate Test sequence each time the VGM is relocated.
<ul style="list-style-type: none"> Error messages appear on the screen. VGM is not functional. Audio is not functional. 	Defined by message	<ol style="list-style-type: none"> Check the assembly (RAM, ROM, battery, touchscreen, etc.) identified in the error message. If errors seem to occur at random, try to determine what conditions occur with the appearance of the message (i.e., time of day, when other equipment is turned off or on, when room temperature is elevated, when certain players are at the VGM, periods of low or high humidity, etc.). Call your authorized distributor for help with unresolved screen messages.
<ul style="list-style-type: none"> “Security Key Error” message 	Security failure	<ol style="list-style-type: none"> Check to see if security key is missing or incorrectly installed on CPU Board Assembly. Confirm that security key version matches software version.

WARNINGS & NOTICES

WARNING

- Use of non-Midway parts or circuit modifications may cause serious injury or equipment damage!
- Federal copyright, trademark and patent laws protect this game. Unauthorized modifications may be illegal under Federal law. The modification ban also applies to Midway Amusement Games, LLC and game logos, designs, publications and assemblies. Moreover, facsimiles of Midway equipment (or any feature thereof) may be illegal under federal law, regardless of whether or not such facsimiles are manufactured with Midway components.

WARNING

Prevent shock hazard and assure proper game operation. Plug this game into a properly grounded outlet. Do not use a cheater plug to defeat the power cord's grounding pin. Do not cut off the ground pin.

CAUTION

A very small portion of the population has a condition which may cause epileptic seizures or momentary loss of consciousness when viewing certain kinds of flashing lights or patterns that are present in our daily environment. These persons may experience seizures while watching some kinds of television pictures or playing certain video games. People who have not had any previous seizures may nonetheless have an undetected epileptic condition.

If you or anyone in your family has experienced symptoms linked to an epileptic condition (e.g. seizures or loss of awareness), immediately consult your physician before using any video games.

We recommend that parents observe their children while they play video games. If you or your child experience the following symptoms: dizziness, altered vision, eye or muscle twitching, involuntary movements, loss of awareness, disorientation, or convulsions, DISCONTINUE USE IMMEDIATELY and consult your physician.

CAUTION

Installation of this kit does not guarantee compliance with FCC or EMC requirements. You are solely responsible, and Midway has no responsibility for FCC and EMC compliance of installed kits. Don't install any compliance label on the product until the testing agency acknowledges compliance.

NOTICE

Information in this manual is subject to change without notice. Midway reserves the right to make improvements in equipment function, design, or components as progress in engineering or manufacturing methods warrants.

COPYRIGHT & TRADEMARK NOTICE

You may not reproduce any part of this publication by mechanical, photographic, or electronic means. You may not produce phonograph recordings of this document. You may not transmit this publication or otherwise copy it for public or private use, without permission from the publisher.

For Service: Call your Authorized MIDWAY AMUSEMENT GAMES, LLC Distributor.

©1996-2000 Midway Amusement Games, LLC, MIDWAY, and TOUCHMASTER are registered trademarks of MIDWAY AMUSEMENT GAMES, LLC All rights reserved. Refer to the individual Software Upgrade Kit Installation Instructions for game and logo trademarks.

**MIDWAY AMUSEMENT GAMES, LLC
3401 N. CALIFORNIA AVE.
CHICAGO, ILLINOIS 60618-5899
<http://www.midway.com>**