TOUCHSCREEN VIDEO GAME CONVERSION

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.

MIDWAY AMUSEMENT GAMES, LLC
3401 North California Avenue Chicago, Illinois 60618-5899 USA
http://www.midway.com
How to adjust the volume of your Touchmaster®:

1. Unlock and open cash door and hit SETUP button. (See Illust. A.)
2. Touch + or − to adjust volume level. When done, touch EXIT. (See Illust. B.)
3. Close and lock cash door. (See Illust. A.)

How to customize your Touchmaster® name:

1. Unlock and open cash door and hit SETUP button. (See Illust. A.)
2. Touch LOCATION SETUP on screen. (See Illust. B.)
3. Touch LOCATION NAME. (See Illust. C.)
5. Touch RETURN button in LOCATION SETUP screen. (See Illust. C.)
6. Touch EXIT in SYSTEM SETUP screen. (See Illust. B.)
7. Close and lock cash door. (See Illust. A.)
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 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 equipment.

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| ![Warning Icon] | WARNING: DO NOT SUBSTITUTE PARTS. Use of inferior parts or 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 Icon] | WARNING: DISCONNECT POWER. Always turn power off and unplug 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 Icon] | WARNING: GROUND MACHINE. Avoid electrical shock! Do not plug in the line cord until you have inspected and properly grounded the Video Game Machine. Only use a grounded, three-wire outlet. Do not use a “cheater” plug, or cut off the ground pin on the line cord. |
| ![Warning Icon] | 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 Icon] | CAUTION: INSPECT SALVAGED PARTS. Kit completion requires salvaging parts from an existing Video Game Machine. Salvaged parts must operate perfectly for the converted Machine to perform properly and safely. Before attempting conversion, repair circuit board malfunctions and cabinet damage. |
| ![Caution Icon] | CAUTION: PROPERLY ATTACH ALL CONNECTORS. Make sure connectors on CPU Board Assembly are properly connected. If the connectors do not slip on easily, do not force them. A reversed connector may damage your Machine and void warranty. All wiring harness connectors are keyed to fit specific header pins on the Board Assembly. |

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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 convolutions, discontinue use immediately and consult your physician.
PRODUCT SPECIFICATIONS

Video Game Machine Characteristics

**Player Variables**
- Choice of many 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

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.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Item</th>
<th>Quantity</th>
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</thead>
<tbody>
<tr>
<td>16-80021-101</td>
<td>Touchmaster Conversion Kit Manual (this publication)</td>
<td>1</td>
</tr>
<tr>
<td>04-12824</td>
<td>Touchmaster® CPU Board Assembly (processor and electronics)</td>
<td>1</td>
</tr>
<tr>
<td>04-12898</td>
<td>CPU metal plate</td>
<td>1</td>
</tr>
<tr>
<td>20-10478</td>
<td>Touchscreen control module (converts processing signal)</td>
<td>1</td>
</tr>
<tr>
<td>H-23505</td>
<td>Adapter Cable (mates 15-pin to 12-pin connector)</td>
<td>1</td>
</tr>
<tr>
<td>H-23379</td>
<td>Adapter Cable (mates 15-pin to 9-pin connector)</td>
<td>1</td>
</tr>
<tr>
<td>H-23608</td>
<td>Main Harness (connects CPU Board to speaker, video, etc.)</td>
<td>1</td>
</tr>
<tr>
<td>31-3628</td>
<td>Paper Marquee</td>
<td>1</td>
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<td>31-3499</td>
<td>Side Panel Decals</td>
<td>2</td>
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<tr>
<td>4008-01003-05</td>
<td>Screw 8-32 x 5/16 P-PH-S.</td>
<td>6</td>
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<tr>
<td>4108-01219-08</td>
<td>Screw #8 x ½ Pinhead-AB Special</td>
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</tr>
<tr>
<td>RM-42-01</td>
<td>Hook Fastener</td>
<td>2</td>
</tr>
<tr>
<td>RM-43-01</td>
<td>Loop Fastener</td>
<td>2</td>
</tr>
<tr>
<td>5556-13956-00</td>
<td>Ferrite Bead</td>
<td>4</td>
</tr>
<tr>
<td>4406-01128-00</td>
<td>6/32” KEPS nut (Affixes ground cable to bracket)</td>
<td>1</td>
</tr>
<tr>
<td>16-10089.1</td>
<td>Label-Epilepsy Warning (Affix beneath monitor bevel)</td>
<td>1</td>
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<tr>
<td>16-10650</td>
<td>Game Registration Card</td>
<td>1</td>
</tr>
<tr>
<td>03-8338-1</td>
<td>Spacer, PCB MTG ¼”</td>
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</table>

NOTICE: The conversion kit CPU Board Assembly is not interchangable 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.

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

TOOLS REQUIRED FOR CONVERSION

Philips head screwdriver, flat head screwdriver, safety utility knife, nut driver or small socket wrench, squeegee or sponge.
TOUCHMASTER® CONVERSION KIT PACKAGING AND CONTENTS

- BUBBLE PACK (36 FT.)
- CPU BOARD AND MOUNTING PLATE (IN ANTI-STATIC BAG)
- MANUAL (IN ENVELOPE)
- INNER CARDBOARD
- HARDWARE AND FASTENERS
- OUTER CARTON
- CONTROLLER
- ARTWORK (DECALS, MARQUEE)
- MAIN HARNESS ASSEMBLY
- ADAPTER CABLES
INSTALLATION PROCEDURE

VERIFY ORIGINAL EQUIPMENT OPERATION

1. **INSPECT PARTS:** Unpack the conversion kit and verify that nothing was damaged in shipping.
2. **CHECK CABINET:** Inspect cabinet for damage. Repair before proceeding.
3. **VERIFY OPERATION:** Plug line cord into grounded outlet and switch on AC power. You should hear a single beep during startup. A working machine starts without system errors and enter Attract Mode.
4. Turn AC power off and unplug line cord from outlet.
5. **CLEAN:** Vacuum vent opening at bottom rear of machine to remove loose dust.
6. Insert key into coin lock and turn clockwise to unlock.
7. Locate the coin meter, CALIBRATE button, and SETUP button inside the coin door on the left.

![Control Button Location Diagram]

8. **METER:** Record the coin meter count.
9. Plug in line cord and turn AC power on. Leave it on for an hour (to detect problems related to heat).
10. **CURRENCY:** Insert coins and play games to verify operation. Record number of coins used.
11. Confirm that coin meter has advanced for each coin inserted.
12. **ORIGINAL MANUFACTURER’S CALIBRATION:** Press CALIBRATE button to perform original manufacturer’s adjustment. If Touchscreen does not calibrate correctly, repair or replace it.

![Calibration Screen Diagrams]

13. The first calibration dot appears in the upper right-hand corner of the screen. Touch center of circle with one finger. An audible tone verifies finger position.
14. The second calibration dot appears in lower left-hand corner of the screen. Touch its center with one finger. The software enters Test Screen mode accompanied by an audible tone.
15. Touchscreen and note that crosshair centers beneath your fingertip. Touch all four corners and entire bottom edge of Touchscreen. Touch **EXIT** on screen when done.
16. **TRACKING TEST:** Press SETUP button. Touch TEST SCREEN.

![TEST SCREEN](image)

17. A cross appears in test screen center. Touch center of the cross and observe that crosshair centers on cross. The crosshair follows your finger as you move it across the screen.

18. Touch EXIT on the screen.

If crosshair fails to center on your finger, note distance and direction of discrepancy. Return to calibration screen and place your finger on screen slightly away from, but in same general direction and distance, from dot to where the crosshair was off center.

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

Repeat previous step for second calibration dot. When crosshair centers on your finger, calibration is successful. You may need several attempts to accurately calibrate the screen to compensate for your Touchscreen's individuality and its mounting on CRT. Use CALIBRATE mode as needed to calibrate Touchscreen 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 fix these symptoms.
REMOVE ORIGINAL EQUIPMENT ELECTRONICS

BOTTOM DOOR REMOVED

1. Unplug line cord. Insert key into Bottom Door Lock and turn clockwise to unlock. Remove Door.

2. GROUND WIRE: Remove ground wire, if present.

3. TOUCHSCREEN: If Touchscreen Connector Cable (a rectangular connector shown below) 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 CPU Board Assembly. You may have either or both connectors.

You may have one or both connectors.

REMOVAL OF CONNECTOR(S)
4. **CONTROLLER:** If present, remove Touchscreen Controller from cabinet. Detach Touchscreen Connector Cable from Controller. Leave cable inside cabinet and retain mounting hardware.

5. **KEY REMOVAL:** Inspect Touchscreen Connector Cable sockets for polarizing key. Remove any keys with a sharp tool.

6. **CONTROL:** Disconnect 15-pin (or 9-pin, depending on model) coin and control connector.

7. **SPEAKER:** Disconnect 2-pin speaker connector.

8. **COIN LOCKOUT:** Disconnect coin lockout connector, if present.

9. **VIDEO:** Locate video connector attachment to monitor board. Record orientation of red wire, either toward front or toward rear of cabinet. Detach connector.

**ORIENTATION OF VIDEO CONNECTOR**
10. **POWER:** Loosen, but do not remove, top six screws on power supply terminal strip by turning one full turn with a screwdriver. Do not loosen bottom two (AC) screws.

11. Remove DC wires from +5, GND, -5, and +12 terminals. Leave AC wires connected. If you must disconnect a green and yellow striped AC connector to reach another connector, replace it.

12. Verify connections on your power supply. Illustration above is only a typical view.

13. **CPU BOARD ASSEMBLY:** Slide wooden electronics shelf out of front of cabinet. Pull gently, to avoid damaging remaining connections to power supply. Remove CPU Board Assembly with original wiring attached. Avoid snagging hanging cables or wires. Store CPU Board Assembly in an anti-static bag.

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INSTALL GAME ELECTRONICS

1. **ORIENT ELECTRONICS**: Place Touchmaster® CPU Board Assembly and metal tray on wooden electronics shelf in roughly same position as previous electronics so heat sink is at rear of cabinet.

2. Using screws in parts kit, attach metal tray onto wooden electronics shelf. Do not overtighten screws.

3. **ADJUST VOLUME**: Set master volume control to middle position. The potentiometer is near heat sink. Use a screwdriver to point arrow toward front of cabinet.

4. **INSTALL WIRING HARNESS**: Attach keyed connectors to CPU Board Assembly.

   **CAUTION: UNKEYED CONNECTOR** The black connector is unkeyed and can be accidentally reversed on CPU Board Assembly. When attaching connector, make sure tabs face inward toward center of board.
5. **TOUCHSCREEN:** Connect Touchscreen Connector Cable to bottom of new Touchscreen Controller.

6. **MOUNTING:** Orient new Controller in same position as previous Controller (if applicable) and mount in cabinet
   If there was no Touchscreen Controller before, install hook and loop fastener material from parts kit. LED should face front of cabinet.

7. **GROUND WIRE:** If there was an existing ground wire, attach it to threaded stud on metal plate. Use nut in parts kit for this.

8. **INSERT ELECTRONICS:** Slide wooden electronics shelf back into cabinet until clear of opening.

9. Guide main harness through rear of cabinet and to level of coin mechanisms.

10. **SPEAKER:** Attach the 2-pin speaker connector.

11. **COIN:** Attach the 15-pin coin mechanism cable connector. If your 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.

12. **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.

13. Attach Touchscreen Controller power wires at GND screw (green) and the +12V screw (orange)

14. **ATTACH:** Secure, but do not overtighten, top six screws on power supply terminal strip.

15. **CONTROLLER:** Attach Touchscreen Controller Connector Cable to socket on CPU Board Assembly. Do not overtighten connector screws.
16. **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.

17. **GROUND WIRE:** Reconnect any additional ground wires removed during disassembly.

**VERIFY NEW EQUIPMENT OPERATION**

1. **START UP:** Plug in line cord and turn on AC power. Observe CPU Board Assembly LED. They should illuminate. After Touchmaster® logo and game version appear on screen, close cabinet door.

2. **ADJUST MONITOR:** Correct size and position of on-screen video if needed using monitor controls.

3. **CALIBRATE:** Perform a Touchscreen calibration. This sets 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 Touchscreen is inverted (that is, touching screen in lower left corner causes reaction in upper right corner) you can correct it by following the procedure on page 14 of this chapter.

**DECALS AND MARQUEE**

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. One at a time, peel each oval decal off the backing paper.

3. Line up artwork with the top of each panel. Use care to avoid wrinkles. Moving outward from the center of the artwork, smooth down and squeeze out any air bubbles.
4. **LABEL:** Locate the epilepsy warning label. Peel off backing and apply to the base of the cabinet just underneath the monitor bezel.

5. **CURRENCY:** Insert coins and play games to verify operation. Record number of coins used.

6. Remove the cash door and confirm that coin meter has advanced for each coin inserted.

7. **OPTIMIZE:** Read operating instructions and adjust game characteristics.

8. **MARQUEE:** Remove screws holding marquee glass retainer. Remove glass retainer. Remove original paper marquee. Trim new marquee equally on each side, if necessary, to fit. Insert new marquee between two glass panes. Replace retainer and screws.
**INVERTING TOUCHSCREEN SIGNALS**

1. Turn off AC power and unplug line cord.
2. Unlock and remove Bottom Door and pull wooden electronics shelf out slightly.

3. Locate P2 connector on CPU Board Assembly and remove connector from socket.

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

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

6. Insulate blue, white-striped wire and secure it to harness.

7. Reattach connector P2 to CPU Board Assembly.

8. Replace wooden electronics shelf. Replace and lock Bottom Door.

9. Plug in line cord. Turn on AC power.

10. Recalibrate Touchscreen.
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NOTICE: You are responsible for enforcing all local, state, and federal regulations concerning this game.
GAME FEATURES

Touchmaster® offers many different games, each of which accommodates one or two players. Update software frequently to offer players new games and interesting updates to existing games.

You can adjust game characteristics to suit player proficiency. Modify graphics to alter game appearance. Increase or decrease game speed and length, etc. This flexibility increases game entertainment value for frequent players and lets you maximize revenues.

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.

**PRETIDIGITATION - 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.
**TOUCHMASTER® OPERATION**

**STARTING UP**

Each time AC power is turned on or power is restored, code executes from the boot ROM. These self-diagnostic tests automatically verify and report hardware and EPROM conditions. If any individual test fails an error message for that test displays for three seconds or until an 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 enters Attract Mode.

Game choice menus alternate with scenes and sounds from typical games until game play starts.

Insert currency, select a game, and choose variables (i.e., number of players). Play begins at once and progresses until time runs out or you exit the game. If no more play is required, Attract Mode begins.

You may insert your own message to inform players of new games, upcoming events, etc. This message then appears as a screen in Attract Mode.

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

**PLAYER CONTROLS**

This game uses a 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.

**OPERATOR CONTROLS**

**CABINET SWITCHES**

External switches are located on top and at the bottom of the cabinet near the line cord.

- **Power Switch**
  The Power Switch at the top of the Machine turns the AC power on or off. It does not reset game variables.

- **Circuit Breaker**
  The Circuit Breaker protects the electronics from fault conditions. It does not reset game variables.

**CONTROL SWITCHES**

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

- **SETUP Pushbutton**
  The SETUP pushbutton takes you into the Menu System to set game characteristics. An on-screen EXIT button lets you return to Attract Mode.

- **CALIBRATE Pushbutton**
  The CALIBRATE pushbutton 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. 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.
MENU SYSTEM

SYSTEM OVERVIEW

Adjustments and diagnostics appear in a series of on-screen menus. The SYSTEM SETUP menu lets you enter information, make changes, or verify equipment operation. Subsequent screens 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.

Submenu screen items offer you choices within a category. Some items have no submenu 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 RETURN on each sub or detail menu and then select EXIT 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.

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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 submenus 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.

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**TYPICAL GAME ADJUSTMENTS SCREEN**

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

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**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 submenu.

CUSTOM
Takes you to a submenu where you can modify coin values

ACCEPT
Saves your changes to coin values

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

TYPICAL PRESET COINAGE SCREEN

PRESET COINAGE VALUES

TOKEN
AUSTRALIA
JAPAN
NEW

ZEALAND
BELGIUM
SPAIN
SWEDEN

BRAZIL
SWITZER

CANADA
LAND
FINLAND
UK

FRANCE
USA

GERMANY
INDIA
CUSTOM

CANCEL
NEXT

PRESET COINAGE USA

USA1  $0.25 = 1CR, $1.00 = 4CR
USA2  $0.25 = 1CR, $1.00 = 5CR
USA3  $0.50 = 1CR, $1.00 = 2CR
USA4  $0.50 = 1CR, $1.00 = 3CR
USA5  $0.25 = 1CR, $1 = 4CR, $5 = 24CR

CANCEL
CUSTOM
NEXT
RESTORE FACTORY SETTINGS
This changes all customized settings (i.e. game, coin) to their condition when the Touchmaster® was built. Accidentally doing this can cost you a lot of time resetting variables, so a warning screen lets you cancel.

RESET FACTORY SETTINGS

WARNING
THE FOLLOWING WILL OCCUR
RESET GAME ADJUSTMENTS
CLEAR ALL AUDITS
CLEAR ALL HIGH SCORES
RESET OPERATOR MESSAGE

CONTINUE?
YES NO

TYPICAL RESTORE FACTORY SETTINGS SCREEN

Touch YES to restore all factory settings. Touching NO returns to the GAME/COINAGE SETUP menu.

DISPLAY AUDITS
This submenu allows you to assess game popularity. 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 Goes to a submenu to view, clear, and reset high scores for individual games. You can also reset high scores through the HIGH SCORES submenu.
NEXT Advances to more GAME AUDIT screens. The screens repeat after the last is viewed.
RETURN Reverts to the main menu screen. The screen values remain without change.

TYPICAL GAME AUDIT SCREEN

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.

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 CLEAR to erase any existing message.

3. Select a background by touching BKGD. 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 TEXT 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 SHIFT to access punctuation and other symbols.

7. Touch 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 SPACE to insert empty space between characters.

10. When satisfied with your message, touch DONE to save it 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 SETUP 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 SETUP touch LOCATION SETUP on screen.

Press LOCATION NAME. 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 CLEAR 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 SHIFT to access punctuation and other symbols.
5. Use SPACE to insert an empty space between characters.
6. LEFT and RIGHT let you maneuver the flashing insertion cursor left and right in your location name.
7. DELETE erases the character above the flashing insertion cursor.
8. When finished, touch RETURN 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 SETUP. 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 SETUP inside the cabinet to enter the menu system. Touch LOCATION SETUP on the screen. Touch TOUCH KEY SETUP to access the TOUCH KEY menu.

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 ON to activate your PIN. When finished, touch RETURN. At the LOCATION SETUP menu, touch RETURN again to return to SYSTEM SETUP.
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 done with local adjustments, touch EXIT to return to Attract Mode.

5. Explain policies for to make changes (i.e., lower volume or erotic game access after a certain time of day). Describe when game scores might be reset. Demonstrate adjustments and explain features.

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 Touch Key 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 SETUP.
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.

**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 **CLEAR** to erase the existing serial number.
3. Touch the four characters or numerals to spell out your serial number.
4. Use **DELETE** to correct mistakes.
5. Use **SHIFT** to access punctuation and other symbols.
6. Use **SPACE** 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 SUBMENU 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.

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**
Lets you analyze red, green, blue, and white balance.

**COLOR BARS**
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.

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

Each 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 + or - 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 Touchmaster® sounds. Short bursts of sound indicate single events such as 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 announce start or end of game, bonus rounds, or new high score. Phrases can last from one to five seconds. The final group consists of repetitive sounds like a jazz-drum riff or a ticking clock. These sounds distract players and attract others.

NOTICE: Volume adjustment in sound tests is same as one used for game play. Be sure to set volume back to a reasonable level when you conclude 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
Touchmaster® Conversion Kit
Switch tests allow you to manually check each switch. Touchscreen uses a digital controller to sense player input and 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 Submenu screen. Touch **RETURN** again to go to the Main Menu.

### TYPICAL SWITCH TEST MENU SCREEN

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

Each line item on screen represents an input signal from currency acceptors or pushbutton switches. The screen above is correct for a Touchmaster® with CALIBRATE pushbutton depressed and held. The Video Game Machine detects and displays status of each switch independently, allowing you to check switches for interaction or incorrect programming (as with electronic currency acceptors).

Touchmaster® audio circuits also generate a *clunk* noise as switches close to help you locate shorted or intermittent connections when you are not in position to view monitor screen.

To install a coin mechanism that accepts a type of coin different than previously used, turn off AC power and open Cash Door. Remove existing mechanism and install alternate unit. After mounting and connecting new mechanism, match Touchmaster® software to new currency values. Turn AC power on and verify Touchscreen operation. Recalibrate Touchscreen.

Check switch operation for Currency Acceptors as follows: press SETUP pushbutton to display Menu System. Choose **DIAGNOSTICS**, then choose **SWITCH TEST** to go to switch menu screen. A typical game SWITCH screen is illustrated; your Touchmaster® may have a different compliment of acceptors.

Press and hold CALIBRATE pushbutton. The Touchmaster® emits CLUNKing sounds and indicate switch is CLOSED on screen. Release button to stop the sound and revert to OPEN state. Repeat steps for other switches in VGM. When finished, choose **RETURN** and **EXIT** to quit.

**NOTICE:** Continuous *clunk* noises can indicate wiring defects, jammed switch, bad IC, etc.
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.

![CALIBRATE TOUCHSCREEN TOUCH WHITE DOT IN: UPPER RIGHT CORNER](image1)

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

![TYPICAL CALIBRATION SCREENS](image2)

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 recalibrate and test Touchmaster® after moving it.
Parts and 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.
### Field Replaceable Parts

<table>
<thead>
<tr>
<th>Designation</th>
<th>Part Number</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J12</td>
<td>---</td>
<td>Security Key</td>
<td>Custom Assembly</td>
</tr>
<tr>
<td>U8</td>
<td>---</td>
<td>Sound Program</td>
<td>EPROM Assembly</td>
</tr>
<tr>
<td>U36</td>
<td>---</td>
<td>Graphic ROM</td>
<td>EPROM Assembly</td>
</tr>
<tr>
<td>U37</td>
<td>---</td>
<td>Graphic ROM</td>
<td>EPROM Assembly</td>
</tr>
<tr>
<td>U38</td>
<td>---</td>
<td>Graphic ROM</td>
<td>EPROM Assembly</td>
</tr>
<tr>
<td>U40</td>
<td>---</td>
<td>Graphic ROM</td>
<td>EPROM Assembly</td>
</tr>
<tr>
<td>U41</td>
<td>---</td>
<td>Graphic ROM</td>
<td>EPROM Assembly</td>
</tr>
<tr>
<td>U51</td>
<td>---</td>
<td>Game ROM</td>
<td>EPROM Assembly</td>
</tr>
<tr>
<td>U52</td>
<td>---</td>
<td>Game ROM</td>
<td>EPROM Assembly</td>
</tr>
<tr>
<td>U62</td>
<td>---</td>
<td>Memory Backup</td>
<td>Nonvolatile SRAM with Battery</td>
</tr>
</tbody>
</table>

### 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.
MAINTENANCE

Touchmaster® 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 screen and cabinet 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 performance.

♦ Glass surfaces
  You may clean glass while power is on. Apply a mixture of isopropyl alcohol and warm water 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 screen. Use the Calibration Test steps to determine if recalibration is required.

SERVICING

We recommend you read the Safety Notices section thoroughly before beginning service.

Touchmaster® uses complex electronic components that are very sensitive to static electricity. Observe the following precautions prior to handling any of the electronics.

1. Ensure that AC power is off prior to servicing the electronics.
2. Discharge any static electricity build up in your body by touching the metal cabinet base. Do this before touching or handling electronic assemblies.
3. Store the electronic assemblies in an anti-static area. Use anti-static bags to store electronic assemblies. Reuse the bag to store removed boards during service.
4. Do not remove or connect any electronic assemblies when 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.

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

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>Speaker</th>
<th>Coin Meter</th>
<th>Control Switches</th>
<th>Touchscreen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor Bezel, chassis boards, and Gasket</td>
<td>Monitor</td>
<td>Cash Door Assembly</td>
<td>Power Switch or Circuit Breaker</td>
<td></td>
</tr>
</tbody>
</table>

♦ Touchscreen Controller
  Do not substitute original Touchscreen controller (if any) for the one in the kit. While they look similar, the new one has the latest software instruction set. Early devices may not calibrate correctly.

♦ CPU Board Assembly
  Switch off AC power and unplug line cord. Unlock and open rear door. Slide electronics shelf forward a bit. Disconnect Touchscreen Controller Connector Cable. Extract harness cables from board connectors. Disconnect ground wires as needed. Pull assembly out of cabinet and set in a safe place. Remove board mounting screws. Anti-static bags and protective containers from new parts must be used to store board if not reinstalled immediately.
Battery Memory Module
Switch off AC power, remove line cord, and remove rear door. 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 same or equivalent type recommended by the manufacturer. Dispose of used batteries according to instructions printed on module or its packaging.

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

Switch off AC power, remove line cord, and remove rear door. Carefully note position of each chip before using a chip extraction tool (not needed for security key). Use a rocking motion to avoid bending pins.

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

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.

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.

ORIENTATION OF FIELD REPLACEABLE ELECTRONIC COMPONENTS
WARNING: GROUND TOUCHMASTER®. 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

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

* 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

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>RANGE LIMITS</th>
<th>COLOR</th>
<th>FUNCTION</th>
<th>RANGE LIMITS</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Circuits</td>
<td>+4.90V to +5.10V</td>
<td>Red</td>
<td>Not Used</td>
<td>-4.75V to -5.25V</td>
<td>N/C</td>
</tr>
<tr>
<td>Audio Circuits</td>
<td>+11.5V to +12.5V</td>
<td>Orange</td>
<td>Ground Return</td>
<td>0V</td>
<td>Black</td>
</tr>
</tbody>
</table>

**NOTE:** Full Metal Chassis Power Supply has +5V adjustment. Open Frame voltages are all fixed.
ADAPTERS FROM CASH DOOR TO MAIN HARNESS

9-12 PIN WIRING ADAPTER CABLE H-23379

12-15 PIN WIRING ADAPTER CABLE H-23505
<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>LOCATION</th>
<th>FUNCTION</th>
<th>COLOR</th>
<th>STATE</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED 1</td>
<td>CPU BOARD ASSEMBLY</td>
<td>PROCESSOR ACTIVITY</td>
<td>RED</td>
<td>OFF</td>
<td>NO POWER (No DC power at the CPU)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td>LOCKED UP (Faulty CPU instructions)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BLINKING</td>
<td>NORMAL OPERATION</td>
</tr>
<tr>
<td>LED 2</td>
<td>CPU BOARD ASSEMBLY</td>
<td>RESET INDICATOR</td>
<td>GREEN</td>
<td>OFF</td>
<td>NO POWER (CPU not operating)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td>NORMAL OPERATION</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BLINKING</td>
<td>ERROR (Continuous reset at the CPU)</td>
</tr>
<tr>
<td>LED 3</td>
<td>CPU BOARD ASSEMBLY</td>
<td>INTERFACE CONDITION</td>
<td>RED</td>
<td>OFF</td>
<td>NORMAL (No touch signal from Controller)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td>LOCKED UP (Continuous busy at the interface)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BLINKING</td>
<td>TOUCH DETECTION</td>
</tr>
<tr>
<td>LED 4</td>
<td>TOUCHSCRN CONTROLLER</td>
<td>CONTROLLER CONDITION</td>
<td>GREEN</td>
<td>OFF</td>
<td>NO POWER (No DC power at the Controller)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td>NORMAL OPERATION</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BLINKING</td>
<td>ERROR (Internal Controller error. See note for details.)</td>
</tr>
</tbody>
</table>

NOTES FOR LED 4, Internal Controller error.

<table>
<thead>
<tr>
<th>Number of flashes every 10 seconds</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RAM fault</td>
</tr>
<tr>
<td>2</td>
<td>ROM fault</td>
</tr>
<tr>
<td>3</td>
<td>A/D fault</td>
</tr>
<tr>
<td>4</td>
<td>NOVRAM fault</td>
</tr>
<tr>
<td>5</td>
<td>Analog fault</td>
</tr>
</tbody>
</table>

LOCATIONS OF LED 1, 2, 3, and 4 IN CABINET
NOTICE: The conversion kit 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.

Touchmaster® uses complex electronic components that are sensitive to static electricity. The following precautions must be observed and followed prior to handling electronics.

1. Turn off AC power and ensure the cord is unplugged prior to servicing.
2. Discharge any static electricity build up in your body by touching any unpainted metal on the cabinet, such as the chain lug. Do this before touching or handling the assemblies.
3. Handle electronic assemblies by their edges and store them in an anti-static area when not in active use. Use anti-static bags to store or transport the CPU Board Assembly.
4. Do not install, remove, or connect any electronic assemblies when 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 all ground and mounting screws are installed and tightened firmly.
## Touchmaster® Does Not Start

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Problem</th>
<th>Suggested Solution</th>
</tr>
</thead>
</table>
| • Machine appears non-functional.  
• No audio  
• No fan  
• No video display. | Lack of electricity | Check that power switch is set to **on** and line cord is plugged in. |
| • Machine appears non-functional  
• Fan operates | Poor AC connection | 1. Check air flow out of cabinet near fan. Air flow suggests DC power is available from power supply.  
2. Turn off AC power. Remove line cord cable clamp.  
3. Test line cord, power plug and IEC connector for breaks or damage.  
4. Verify continuity of each wire in cord.  
5. Fully seat IEC connector in cabinet receptacle.  
6. Replace cable clamp and all of its screws.  
7. Ensure wiring harness connectors are fully seated in corresponding AC Power connectors.  
8. Verify AC wire connections at power supply terminals. |
| Tripped circuit | 1. Examine circuit breaker.  
2. If the circuit has been broken, reset button protrudes from the circuit breaker.  
3. Press button in until it latches to restore power. |
| Faulty AC line filter | 1. Examine AC line filter. If faulty, replace with identical filter of proper voltage and current rating.  
2. Connect line cord and verify operation.  
3. Fully seat AC plug in the outlet. Verify that AC line voltage is present.  
4. Turn AC power on. Check DC wiring harness and connectors if breaker opens circuit again. |
| Poor DC connections | 1. Open bottom door while AC power is on.  
2. Inspect the CPU Board Assembly under low light level conditions.  
3. LEDs glow if voltage runs through processor circuits. (This does not mean that voltages or signals are as they should be, but it indicates CPU Board receives DC power from the Power Supply.)  
4. Turn AC power off.  
5. Unplug AC line cord.  
6. Inspect CPU Board Assembly.  
7. Ensure DC Power connector is attached and fully seated onto mating board connector.  
8. Check other harness connectors in same way. |
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Problem</th>
<th>Suggested Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot Be Played</td>
<td>Machine does not accept currency or tokens.</td>
<td>1. Unlock and remove cash door. Empty cash box. Inspect for counterfeit currency. Remove items from vault that block path from coin mechanism.</td>
</tr>
<tr>
<td></td>
<td>Machine does not start.</td>
<td>2. Check each coin mechanism or currency acceptor by hand to ensure proper mounting. Clear the currency path. Reinstall and latch mechanism.</td>
</tr>
<tr>
<td></td>
<td>Number of credits per coin or bill is incorrect.</td>
<td>1. Unlock and remove cash door. Inspect internal cash door wiring connections. Check cables for wiring continuity from CPU Board Assembly to coin mechanism or currency acceptor. Examine acceptor for programmable features. Some devices require operator adjustment for each specific type of currency recognized. Test both good and bad coins to see if mechanism accepts and rejects currency correctly.</td>
</tr>
<tr>
<td></td>
<td>Machine accepts currency or tokens.</td>
<td>2. Press SETUP button. From SYSTEM SETUP, go to DIAGNOSTICS and choose SWITCH TEST. Use these tests to confirm the operation of each switch.</td>
</tr>
<tr>
<td></td>
<td>Machine does not start.</td>
<td>3. Test both good and bad coins to see if mechanism accepts and rejects currency correctly. Press SETUP button. From SYSTEM SETUP, go to DIAGNOSTICS and choose SWITCH TEST. Use these tests to confirm the operation of each switch.</td>
</tr>
<tr>
<td></td>
<td>Machine does not accept currency or tokens.</td>
<td>1. Unlock and remove cash door. From vault, block from coin mechanism. Replace faulty switches (i.e. bent levers).</td>
</tr>
<tr>
<td></td>
<td>Machine does not start.</td>
<td>2. Ensure mechanism is attached and fully seated.</td>
</tr>
<tr>
<td></td>
<td>Machine accepts currency or tokens.</td>
<td>1. Unlock and remove cash door. Press SETUP button. From SYSTEM SETUP, go to DIAGNOSTICS and choose SWITCH TEST. Use these tests to confirm the operation of each switch.</td>
</tr>
<tr>
<td></td>
<td>Number of credits per coin or bill is incorrect.</td>
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</tr>
<tr>
<td></td>
<td>Machine does not start.</td>
<td>3. Ensure connector is attached and fully seated.</td>
</tr>
<tr>
<td></td>
<td>Machine accepts currency or tokens.</td>
<td>1. Unlock and remove cash door. From vault, block from coin mechanism. Replace faulty switches (i.e. bent levers).</td>
</tr>
<tr>
<td></td>
<td>Number of credits per coin or bill is incorrect.</td>
<td>2. Test both good and bad coins to see if mechanism accepts and rejects currency correctly. Press SETUP button. From SYSTEM SETUP, go to DIAGNOSTICS and choose SWITCH TEST. Use these tests to confirm the operation of each switch.</td>
</tr>
<tr>
<td></td>
<td>Machine does not start.</td>
<td>3. Ensure connector is attached and fully seated.</td>
</tr>
<tr>
<td></td>
<td>Machine accepts currency or tokens.</td>
<td>1. Unlock and remove cash door. Inspect internal cash door wiring connections. Check cables for wiring continuity from CPU Board Assembly to coin mechanism or currency acceptor. Examine acceptor for programmable features. Some devices require operator adjustment for each specific type of currency recognized. Test both good and bad coins to see if mechanism accepts and rejects currency correctly. Press SETUP button. From SYSTEM SETUP, go to DIAGNOSTICS and choose SWITCH TEST. Use these tests to confirm the operation of each switch.</td>
</tr>
<tr>
<td></td>
<td>Number of credits per coin or bill is incorrect.</td>
<td>2. Test both good and bad coins to see if mechanism accepts and rejects currency correctly. Press SETUP button. From SYSTEM SETUP, go to DIAGNOSTICS and choose SWITCH TEST. Use these tests to confirm the operation of each switch.</td>
</tr>
<tr>
<td></td>
<td>Machine does not start.</td>
<td>3. Replace faulty switches (i.e. bent levers).</td>
</tr>
</tbody>
</table>
## Touchscreen Malfunctions

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Problem</th>
<th>Suggested Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Touchscreen is inaccurate for two or more players.</td>
<td>Dirty screen</td>
<td>Clean cabinet frequently, especially the video screen glass and the Touchscreen area. It is not necessary to switch off AC power to clean the unit. Apply isopropyl alcohol and warm water to a clean cloth or sponge, then use this to wipe the surface. <em>Do not apply the cleaner directly on the unit.</em> Liquids can drip into circuits and cause erratic operation.</td>
</tr>
<tr>
<td></td>
<td>Overzealous touching</td>
<td>Warn players to use only one finger at a time. Simultaneous touches confuse the touch controller.</td>
</tr>
<tr>
<td>Poor player grounding</td>
<td>Some players may find response improves when they touch the metal cabinet surface with one hand while operating Touchscreen with other hand.</td>
<td></td>
</tr>
<tr>
<td>• Touchscreen chooses incorrect items or does not respond when certain areas are touched.</td>
<td>Poor calibration</td>
<td>Unlock and remove cash door. Press SETUP switch. From SYSTEM SETUP menu, go to [DIAGNOSTICS] and choose [CALIBRATE TEST]. Use tests to confirm that Touchscreen detects and properly tracks finger position in all areas of the screen. From DIAGNOSTIC menu, choose [CALIBRATE] to adjust Touchscreen accuracy. Follow instructions to optimize Touchscreen for sensitivity and linearity.</td>
</tr>
<tr>
<td></td>
<td>Dirty screen</td>
<td>1. Turn off AC power. Unlock and open rear door. 2. Remove the top cover and bezel (refer to Servicing instructions). 3. Clean the Touchscreen, especially areas normally hidden by the bezel.</td>
</tr>
<tr>
<td>Faulty controller</td>
<td>Ensure that Touchscreen Controller operates properly by placing in a known functional unit.</td>
<td></td>
</tr>
<tr>
<td>• Touchscreen reacts in opposite corner from where touched</td>
<td>Improper signal</td>
<td>1. Turn off AC power and remove line cord. 2. Open Bottom Door. 3. Verify that pin 3 of connector P6 is electrically grounded. 4. Temporarily disconnect the blue/white wire at pin 3 of connector P6. 5. Tape or insulate end of blue/white wire and secure to wiring harness. 6. Plug in line cord and turn on AC power. 7. Recalibrate Touchscreen.</td>
</tr>
<tr>
<td>• Player touch controls are intermittent or completely non-functional.</td>
<td>Poor connection</td>
<td>1. Unlock and remove cash door. 2. Enter Menu System by pressing SETUP button. 3. From SYSTEM SETUP menu, go to [DIAGNOSTICS] and choose [SWITCH TEST]. Use tests to confirm the operation of each switch.</td>
</tr>
<tr>
<td>• Machine starts normally.</td>
<td>Poor calibration</td>
<td>From the DIAGNOSTIC menu, choose [CALIBRATE]. Follow on-screen instructions to optimize Touchscreen.</td>
</tr>
<tr>
<td>Poor power</td>
<td>1. Unlock and remove the top cover.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Observe CPU Board Assembly as you touch the screen.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. If the CPU senses your touch, you will see a glow from a red LED.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. You will see a glow from a green LED on the end of Touchscreen Controller if there is voltage in Touchscreen circuits.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Refer to LED Indicator Status Chart.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Turn off AC power.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Inspect Controller and, if necessary, lift device up just enough to expose the Touchscreen connector.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. Check that cable is fully seated in connector.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Ensure that Touchscreen Controller operates properly by placing in a known functional unit.</td>
<td></td>
</tr>
</tbody>
</table>

| Wrong board assembly | Verify that any replacement CPU Board Assembly is for use in conversion kit. CPU Board Assembly for standard production TouchMaster® units causes calibration errors in this kit. |

| “Touch Controller Not Found” error message | Poor connection | 1. Turn off AC power. |
|                                           | 2. Unlock snap latch plunger handles and lift up rear edge of CPU Board Assembly. |
|                                           | 3. Release cable ties and lift controller up just enough to expose Touchscreen connector. |
|                                           | 4. Check that cable is fully seated in the connector. |
|                                           | 5. Ensure that Touchscreen Controller operates properly by placing in a known good unit. |
# Audio Malfunctions

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Problem</th>
<th>Suggested Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio is non-functional.</td>
<td>Volume set to zero in software.</td>
<td>1. Unlock and remove the cash door.</td>
</tr>
<tr>
<td>Video is functional</td>
<td></td>
<td>2. Open rear cover.</td>
</tr>
<tr>
<td>Machine appears to operate normally.</td>
<td></td>
<td>3. Enter Menu System by pressing the SETUP button.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. From the SYSTEM SETUP menu, go to <strong>DIAGNOSTICS</strong> and choose <strong>SOUND TEST</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Verify that volume is not set to zero.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Change level to maximum to make sound audible.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Volume set to zero on CPU Board Assembly</th>
<th>While in SOUND TEST menu, select <strong>PLAY</strong> and use <strong>NEXT</strong> to advance through all 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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor connection</td>
<td>1. Turn AC power off. Verify correct cabinet wiring.</td>
</tr>
<tr>
<td></td>
<td>2. Ensure that speaker is properly connected to audio output wires from Audio connector.</td>
</tr>
<tr>
<td></td>
<td>3. Verify speaker continuity.</td>
</tr>
<tr>
<td></td>
<td>4. Refer to Typical Cabinet Wiring Diagram for specific wiring information.</td>
</tr>
</tbody>
</table>

| Poor power continuity                   | 1. Turn AC power on. Using 20 Volt DC range on a digital voltmeter, measure DC voltages present at the Power connector pins. |
|                                        | 2. Verify +5V, -5V and +12V sources.                                                     |
|                                        | 3. Refer to Typical Cabinet Wiring Diagram for specific wiring information and voltage limits. |
|                                        | 4. Using 2 Volt AC range on a digital voltmeter, measure same DC voltages as above.      |
|                                        | 5. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise. |
|                                        | 6. Verify proper operation of CPU Board Assembly by placing in a known functional unit.  |

<p>| Audio is distorted or muffled.          | 1. Unlock and remove cash door.                                                          |
| A constant low hum may be present.      | 2. Enter Menu System by pressing SETUP button.                                           |
| Sounds may be                           | 3. From the SYSTEM SETUP menu, go to <strong>DIAGNOSTICS</strong> and choose <strong>SOUND TESTS</strong>.         |</p>
<table>
<thead>
<tr>
<th>Issue</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad speaker</td>
<td>1. Turn off AC power. Unlock and remove cabinet cover.</td>
</tr>
<tr>
<td></td>
<td>2. Locate speaker and ensure it is full range (100 to 10,000 Hz response) and rated for at least 15 watts continuous power.</td>
</tr>
<tr>
<td>Poor connection</td>
<td>1. Inspect speaker and its wires.</td>
</tr>
<tr>
<td></td>
<td>2. Ensure no loose parts or wires are caught in speaker cone, terminals, mounting screws, or stuck to magnet.</td>
</tr>
<tr>
<td>Bad board assembly</td>
<td>1. Verify that the sound ROM is correct. There is only one sound ROM in this set. The ROM is labeled with assembly number and software version.</td>
</tr>
<tr>
<td></td>
<td>2. Check that the cabinet wiring is correct.</td>
</tr>
<tr>
<td></td>
<td>3. Ensure all cabinet ground wires are connected.</td>
</tr>
<tr>
<td></td>
<td>4. Refer to Typical Cabinet Wiring Diagram for specific wiring information.</td>
</tr>
<tr>
<td>Poor voltage</td>
<td>1. Using 2 Volt AC range on a digital voltmeter, measure voltages at speaker terminals. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise.</td>
</tr>
<tr>
<td></td>
<td>2. Verify that speaker operates properly by placing in a known functional unit.</td>
</tr>
</tbody>
</table>
## Video Problems

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Problem</th>
<th>Suggested Solution</th>
</tr>
</thead>
</table>
| Monitor appears non-functional.  
Audio is functional.  
Controls operate normally. | Lack of electricity | 1. Unlock and remove cabinet cover.  
2. Verify AC Power is connected to Video Monitor.  
3. Inspect neck of CRT under low light conditions. A glow near the CRT base while voltage is in filament circuits indicates some monitor circuits are receiving power. |
| | Poor connection | 1. Turn off AC power. Verify that Video Signal and Remote Adjustment Board connectors are fully seated on the Video Monitor Board Assembly.  
2. Ensure video connector pins are in the same orientation as the original connector.  
3. Check other connectors in same way. Do not operate monitor without Remote Adjustment Board. |
| | Faulty fuse | Examine AC line fuse on Monitor Board Assembly. Replace faulty fuse with identical one of proper voltage and current rating. |
| | Loose parts | Ensure no loose parts or wires are caught or pinched by chassis or the mounting brackets. |
| | Incorrect adjustments | 1. Check that brightness (intensity) and contrast are not been set to minimum levels.  
2. Verify that Video Monitor operates correctly by placing in known functional unit. |
| | Poor voltage | 1. Plug in line cord and turn AC power on.  
2. Using 20 Volt DC range on a digital voltmeter, measure DC voltages at CPU power connector pins.  
3. Refer to Typical Cabinet Wiring Diagram for specific wiring information and voltage limits.  
4. Adjust +5V source if it is variable.  
5. Using 2 Volt AC range on a digital voltmeter, measure DC voltages as above. Any reading here indicates that supply voltages are unstable and may contain ripple or noise. |
| Power-up self-test is functional.  
Game does not appear.  
Audio is not functional. | Error message | 1. Note and record error messages during self-test.  
2. Turn off AC power. Restore after one minute.  
3. Note and record new messages that appear.  
4. Unlock and remove cash door. Enter Menu System by pressing the SETUP button.  
5. From the SYSTEM SETUP menu, go to DIAGNOSTICS and choose VIDEO TEST. These tests verify some functions of the video circuits. |
| Wrong board assembly | Turn off AC power. Verify CPU Board Assembly is correct. CPU Boards are marked with manufacturer name, assembly number and hardware version. |

Troubleshooting - 8  Midway Amusement Games, LLC
<table>
<thead>
<tr>
<th>Issue Description</th>
<th>Possible Cause</th>
<th>Troubleshooting Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct ROM</td>
<td>Verify correct ROM instruction set. There is more than one ROM in a set. Each ROM circuit is labeled with assembly number and software version.</td>
<td></td>
</tr>
<tr>
<td>Monitor does not lock onto signal and provide stable picture.</td>
<td>Poor connection</td>
<td>Check connectors and cables for wiring continuity from CPU Board Assembly to Video Monitor.</td>
</tr>
</tbody>
</table>
| Colors missing, etc. | Wrong board assembly | 1. Ensure correct CPU Board Assembly. Some monitors require different sync polarity than Midway production units. Units with incorrect polarity or unusual sync connections result in what appears to be horizontal tearing or complete loss of sync.  
2. Verify that Video Monitor operates correctly by placing in known functional unit. |
| Machine operates normally. | Poor connection | 1. Check connectors and cables for wiring continuity from the CPU Board Assembly to Video Monitor.  
2. Ensure all cabinet ground wires are connected, especially at Video Monitor Chassis. |
| Video wavers or rolls, has dark bars, uneven colors, etc. | Interference | 1. Move cabinet away from appliances, other cabinets, etc. Some equipment normally emits very strong electrical or magnetic fields.  
2. Verify Video Monitor operates correctly by placing in a known functional unit. |
## Miscellaneous Malfunctions

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Problem</th>
<th>Suggested Solution</th>
</tr>
</thead>
</table>
| • Machine operates normally.  
• Cabinet gets very warm after several hours of use. | Poor air flow | 1. Check bottom and rear of cabinet for blocked air flow.  
2. Move cabinet away from heat sources.  
3. Turn off AC power.  
4. Apply a high-power vacuum cleaner to fan vent holes to remove dust. |
| Poor cooling system | Unlock and open rear door. Ensure all fans are connected and operate at full speed. |
| • Touchscreen requires excessive recalibration to maintain accuracy. | Touchscreen abuse | 1. Clean entire cabinet frequently, especially video screen glass and Touchscreen area. It is not necessary to switch off AC power for cleaning. Apply isopropyl alcohol and warm water to a clean cloth or sponge use it to wipe the surface. *Do not apply cleaner directly on unit.* Liquids could drip into circuits and cause erratic operation.  
2. Warn players to use one finger at a time. Multiple, simultaneous touches confuse the controller. |
| Infrequent calibration | Repeat Calibrate and Calibrate Test sequence each time cabinet is relocated. |
| • Error messages appear on screen.  
• Machine is not functional.  
• Audio is not functional. | Defined by message | 1. Check assembly (RAM, ROM, battery, Touchscreen, etc.) identified in error message.  
2. If errors seem to occur at random, 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 people are playing, periods of low or high humidity, etc.).  
3. Call your authorized distributor for help with unresolved screen messages. |
| • “Security Key Error” message | Security failure | 1. Check if security key is missing or incorrectly installed on CPU Board Assembly.  
2. 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.

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