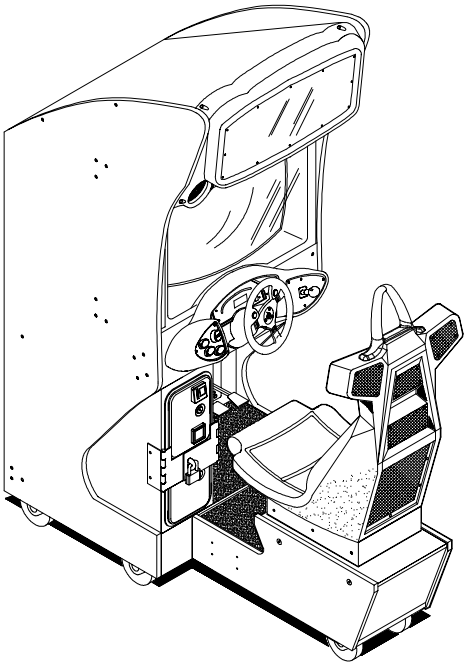
***SEPTEMBER 2000***
**16-40090-101**

MIDWAY

C·A·R·T FURY™ CHAMPIONSHIP RACING



# Game Operations Manual for 27" Dedicated Video Game

CE cULus

## Manual Includes

**Operation & Adjustments * Parts Information * Wiring Diagrams * Testing & Problem Diagnosis**

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
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# DECLARATION OF CONFORMITY

## MIDWAY AMUSEMENT GAMES LLC

**3401 N. CALIFORNIA AVE.**
**CHICAGO, IL 60618**
**U.S.A.**

**WE, HEREBY DECLARE UNDER SOLE RESPONSIBILITY THAT**

**THE MODEL:** ***"C.A.R.T. FURY" 27" 40290, 40390, 40490, 40790, 40990, 41090, 41190, 41290, 41390, 41490, 41890, 41990, 42090, 42190, 42290, 42390, 47190, 47290***

TO WHICH THIS DECLARATION RELATES IS IN CONFORMITY WITH THE FOLLOWING EUROPEAN PRODUCT SAFETY DIRECTIVES:

**ELECTROMAGNETIC COMPATIBILITY DIRECTIVE**
(89/336/EEC AND AMENDMENTS 91/C162/08, 92/31/EEC,93/68/EEC)

**ELECTRICAL EQUIPMENT DESIGNED FOR USE WITHIN CERTAIN VOLTAGE LIMITS DIRECTIVE**
(73/336/EEC AND AMENDMENTS
88/C168/02, 92/C210/01, 93/68/EEC, 94/C199/03, 95/C214/02)

**AS IS VERIFIED BY COMPLIANCE WITH THE FOLLOWING STANDARDS:**

| | | |
|---|---|---|
| **EN55014: 1993** | **EN61000-4-2: 1995** | **EN61000-4-3: 1995** |
| **EN61000-4-4: 1995** | **EN61000-4-5: 1995** | **EN61000-4-6: 1995** |
| **EN61000-4-11: 1994** | **EN61000-3-2: 1995** | **EN61000-3-3: 1995** |
| **EN60335-1: 1995** | **IEC 60335-2-82: 1999** | |

**Date issued:** **MAY 19, 2000**

**DAN GALARDE**

**CORPORATE V.P. OF QUALITY**

# CABINET LINKING INSTRUCTIONS

To link *two* cabinets, use the crossover coupler included in the spare parts bag. Connect the factory installed linking cable to the coupler and follow the instructions for “Wiring Modifications and Software Setup” located below starting with step #7.

To link *three or more* cabinets, use a standard 10 base-T ethernet hub and follow all of the instructions for “Wiring Modifications and Software Setup” located below.

## CABINET ARRAYS

To create a Video Game Machine (VGM) Array, join the cabinets together. Each VGM comes equipped with the necessary hardware to connect cabinets and provide maximum stability. Hardware is located in the spare parts bag inside the cash box.

To join cabinets, remove the flat-head carriage bolts from the top and rear of adjacent cabinet sides. Position cabinets next to one another and adjust the leg levelers until all holes are aligned. Insert long carriage bolts through the holes in both cabinets, and then fasten in place with the nuts provided.

## NETWORK CONSIDERATIONS

Each VGM comes complete with a factory installed network cable. Optionally, a hub can be installed and located remotely to monitor network activity. Cables up to 328 ft., or 100 meters, in length may be used in conjunction with the hub provided they are Category 3 or higher, 100 ohm unshielded twisted pair communications grade wiring. Standard telephone cables are not sufficient for this application and should not be used.

Take care to protect exposed wiring from player foot traffic, cleaning crews, service personnel, etc. Use approved conduit or wire channels to support cables. Please note that modular connectors do not have strain relief.

Prevent linking cables from becoming damaged by avoiding sources of extreme heat or moisture, and high amounts of electrical energy like neon signs, fluorescent fixtures, two-way radios, cordless phones, power circuits, public address system wiring, etc.

Universal RJ-45 modular plugs are not numbered or coded in any way. *Clearly label all network connections to avoid confusing network cables with computer or telephone circuits.*

## WIRING MODIFICATIONS AND SOFTWARE SETUP

1. Place the linking hub inside the base of a cabinet nearest the center of the array. Remember that the crossover couplers supplied with the game are *not* used when creating an array using the hub. Crossover couplers are only used to link two cabinets.

2. Unlock and remove the rear door from the cabinets selected to be part of the array. Inside the cabinet you will find a coil of linking cable with one end already attached to game electronics. Uncoil just enough of the cable to reach the hub, then recoil the rest of the cable and tie it in place. Repeat this procedure for each of the other cabinets. Do not reinstall the cabinet door(s) at this time.

3. Route the free end of each cable out through the notch located in the rear door opening and plug into any jack on the rear panel of the linking hub. Route the free end of the AC adapter for the hub and plug it into the 9VAC jack on the front panel of the hub. Now all of the cables can be connected to the hub.

4. Refer to the manufacturer's instructions in order to set the hub switches for *LNK* (link) and *X* (cross-over) activity.

5. Fasten the hub to the bottom of the most central cabinet using a hook-and-loop type material. Orient the hub so that the indicator lights are visible and cable jacks are accessible.

6. Make sure excess cable is tied into a coil and that all cables are routed through the notch in the rear door. Connect the AC adapter for the hub and all line cords to AC power.

| | |
|---|---|
| | **CAUTION**<br>Do not connect or disconnect any cable to the game electronics or hub with the power turned on. Circuit disruptions may damage the game and void the warranty. |

7. Switch on power and closely observe the screen for each cabinet during start up. Each automatically enters ATTRACT MODE if no errors are found. Refer to *Troubleshooting* in the operation manual if errors are detected.

8. Unlock the coin door for each cabinet to access the operator control buttons inside coin vault. Press and hold the TEST button to enter the menu system.

   •Verify linked games have compatible software versions. Newer versions may contain instructions previous versions do not, causing games to halt or reset at random.

9. Select ADJUSTMENTS from the Main Menu screen, then scroll to the ADDITIONAL ADJUSTMENTS MENU and press the Test button. Select GAME LINK NUMBER and press Test. Assign a linking number ranging from 1 to 4 to each game cabinet.

   **NOTE:** Each cabinet must have its own individual and unique number. The first cabinet on the left is always cabinet 1, the second is cabinet 2, etc.

10. Repeat these steps for each remaining game cabinet you wish to link.

11. Close and lock the coin door, and reinstall and lock the rear door for each cabinet. Lower the leg levelers for each cabinet until the casters do not touch the floor and the cabinets are level. Lock the levelers in position by tightening the nuts provided.

## CHAPTER ONE

# OPERATIONS

# SAFETY INSTRUCTIONS

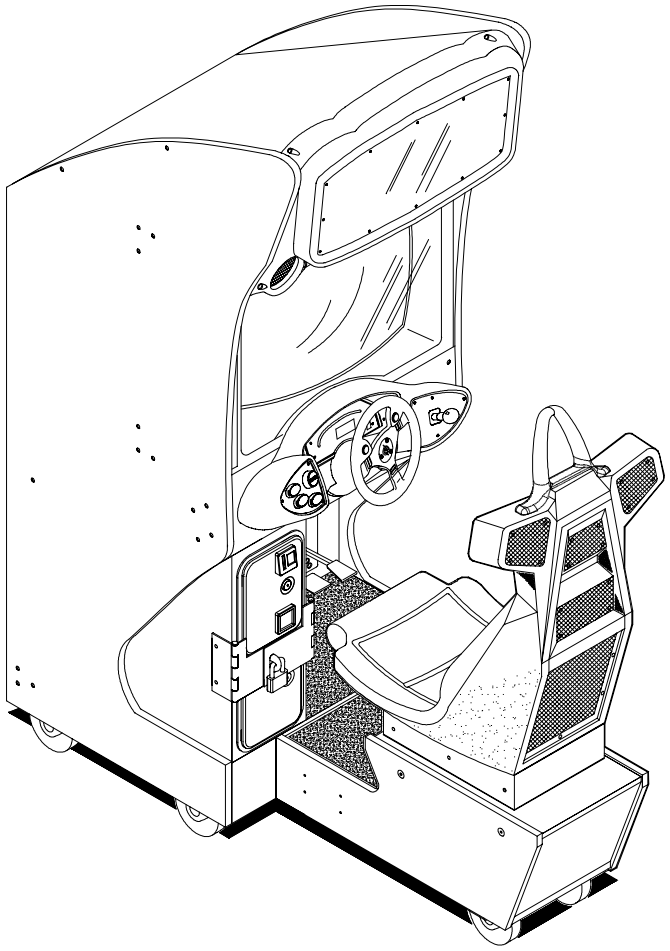
The following safety instructions apply to operators and service personnel. Read these instructions before servicing or preparing the Video Game Machine (VGM) for play. Other safety instructions appear throughout this manual.

## DEFINITIONS OF SAFETY TERMS

- **DANGER** indicates an imminent hazard. If you fail to avoid this hazard, it WILL cause death or serious injury.
- **WARNING** indicates a potential hazard. If you fail to avoid this hazard, it COULD cause death or serious injury.
- **CAUTION** indicates a potential hazard. If you fail to avoid this hazard, it MAY cause minor or moderate injury. CAUTION also alerts you about unsafe practices.
- **NOTE** indicates information of special importance.

| | |
|---|---|
| | **WARNING: TRANSPORTING GAMES.**<br>The VGM contains glass and fragile electronic devices. Use appropriate care when transporting. Avoid rough handling when moving the cabinet. Do not move with the power switched on. |
| | **WARNING: DISCONNECT POWER.**<br>Always turn the power OFF and unplug the VGM before attempting service or adjustments unless otherwise instructed. Installing or repairing boards with power switched on can damage components and void the warranty. |
| | **WARNING: GROUND GAMES.**<br>Avoid electrical shocks! Do not plug in a VGM until you have inspected and properly grounded it. Only plug this game into a grounded, three-wire outlet. Do not use a “cheater” plug, or cut off the ground pin on the line cord. |
| | **WARNING: AVOID ELECTRICAL SHOCKS.**<br>The VGM system does not utilize an isolation transformer. Internal cabinet AC is not isolated from the external AC line. |
| | **WARNING: HANDLE FLUORESCENT TUBE AND CRT WITH CARE.**<br>If you drop a fluorescent tube or CRT and it breaks, it will implode! Shattered glass can fly eight feet or more from the implosion. |
| | **CAUTION: CHECK POWER SELECTOR, LAMP.**<br>Set the 115/230VAC selector on the power supply for the correct line voltage. Check the selector setting before switching on the VGM. Verify that the fluorescent lamp assembly is correct for the local line voltage. |
| | **CAUTION: USE PROPER FUSE.**<br>Avoid electrical shock! Replacement fuses must be identically rated. Fuse voltage and current ratings must be identically rated to the original fuse. |
| | **CAUTION: ATTACH CONNECTORS PROPERLY.**<br>Be sure board connectors mate properly. If connectors do not slip on easily, do not force them. A reversed connector may damage the VGM and void the warranty. Connector keys only allow a connector to fit one set of pins on a board. |

| | |
|---|---|
| | **CAUTION: USE CARE WHEN SHIPPING HARD DISKS.**<br>The hard disk drive must be packed in an anti-static bag. When shipping the drive for repair or replacement, pack it in an approved container (P/N 08-8068). Do not stack or drop hard disk drives. |
| | **WARNING: HAZARD TO EPILEPTICS.**<br>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 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.<br><br>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.<br><br>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. |



# PRODUCT SPECIFICATIONS

## Operating Requirements

| *Location* | *Electrical Power* | *Temperature* | *Humidity* |
|---|---|---|---|
| Domestic | 120VAC @ 60Hz 4.0 Amps | 32°F to 100°F | Not to exceed 95% relative |
| Foreign | 230VAC @ 50Hz 2.0 Amps | (0°C to 38°C) | |
| Japan | 100VAC @ 50Hz 4.0 Amps | | |

## Cabinet Statistics

*Shipping Dimensions*
Width 30" (76.2 cm)
Depth 62" (157.4 cm)
Height 78" (198 cm)

*Shipping Weight (Approx.)*
350Lbs (158kg) Main Cabinet
125Lbs (57kg) Seat Assy.

*Design Type*
Sit-In Dedicated Video Game Machine with Steering Wheel Feedback

## Game Characteristics

*Player Variables*
1 to 4 players per VGM (with Linking)
High Score Recognition
Suitable for All Ages (AAMA Certified)

*Operator Variables*
Coinage, Play Mode, Difficulty, Volume, Audits, Statistics

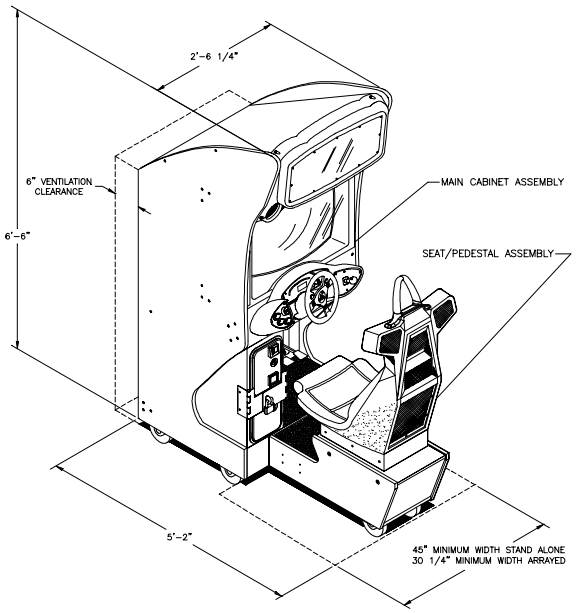
*Diagnostics*
Automatic Power-Up Self-Test
Manual Multi-Level Menu System

## Equipment Characteristics

*Video Display Monitor*
Medium Resolution RGB
27” (68.6 cm) CRT

*Audio System*
Digital Stereo
5” (12.7 cm) Coaxial Full Range Speakers

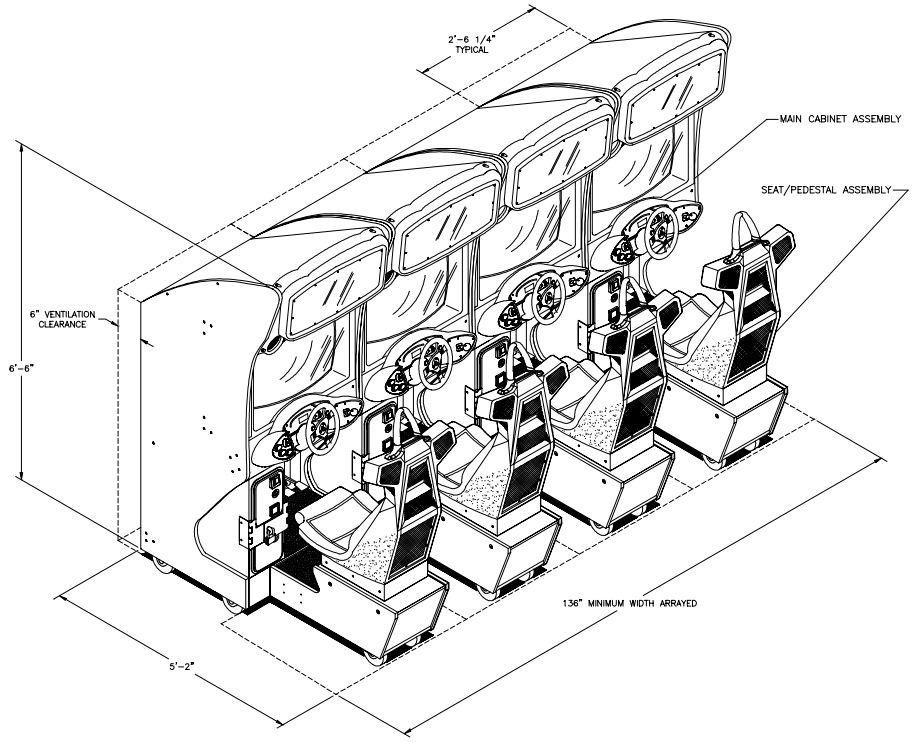
*Currency Acceptors*
2 Coin Mechanisms
Dollar Bill Validator Ready
Electronic Coin Acceptor Ready




# PRODUCT CONFIGURATION

- **Stand Alone Video Game Machine**
  Each VGM is ready to play right out of the box. Operators may use the menu screens in the game menu system to determine some player variables in advance or leave the choices up to the players.

- **Linked Video Game Machines**
  Linking allows players to compete against each other on a single course. Operator menus are used the same way as in stand-alone VGMs. Crossover couplers and linking cables to connect two VGMs are factory installed. Use an optional 10 base-T ethernet hub to interconnect up to four VGMs.




***VIDEO GAME MACHINE ARRAY***

## SET-UP

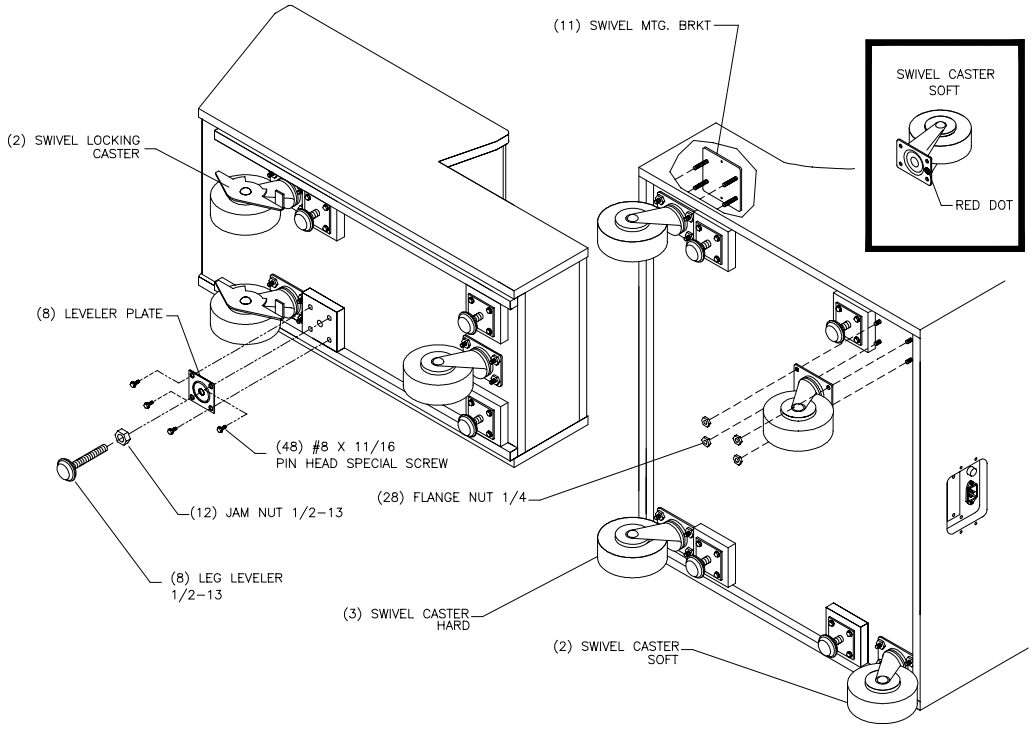
1. Remove all items from the shipping containers and set them aside. Remove all packing material. Inspect the exterior of the main cabinet, control cabinet and the seat pedestal for any damage.

| | |
|---|---|
| ⚠ | **WARNING**<br>The cabinet is top heavy. Do not push against plastic parts during movement. |

2. Remove the keys from the steering wheel. Unlock and open the rear door, and the coin and cash boxes. Electrical cords, mechanical components, and assorted spare parts are packed inside the cash box.

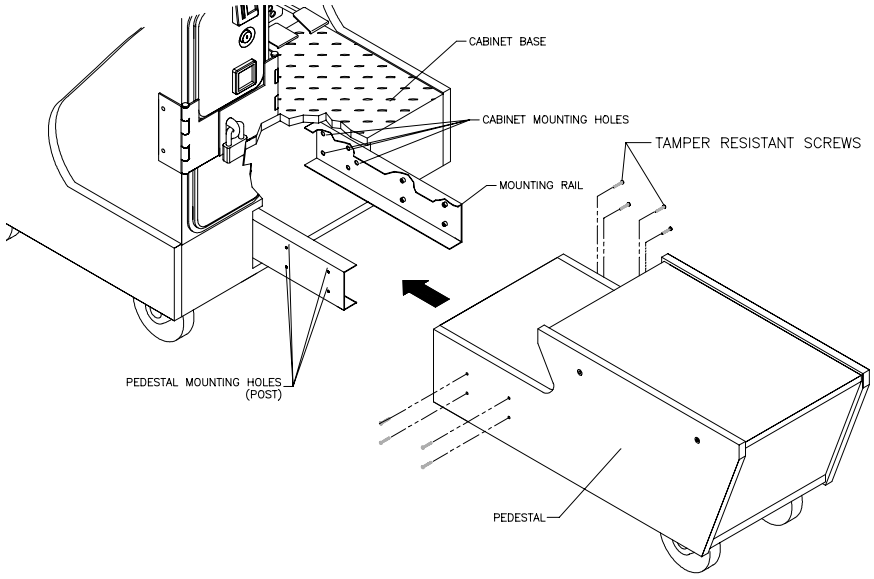
3. Install one nut onto each leg leveler. Tilt as needed to locate four threaded holes under both the main cabinet *and* three holes under the pedestal. Install a leveler and nut into each hole. Do not tighten nuts at this time.

4. The main cabinet is mounted on casters. Roll the cabinet to its intended location, maintaining clearance between the cabinet and walls, drapes, other games or obstructions.




***LOCATION OF CASTERS AND LEVELERS***

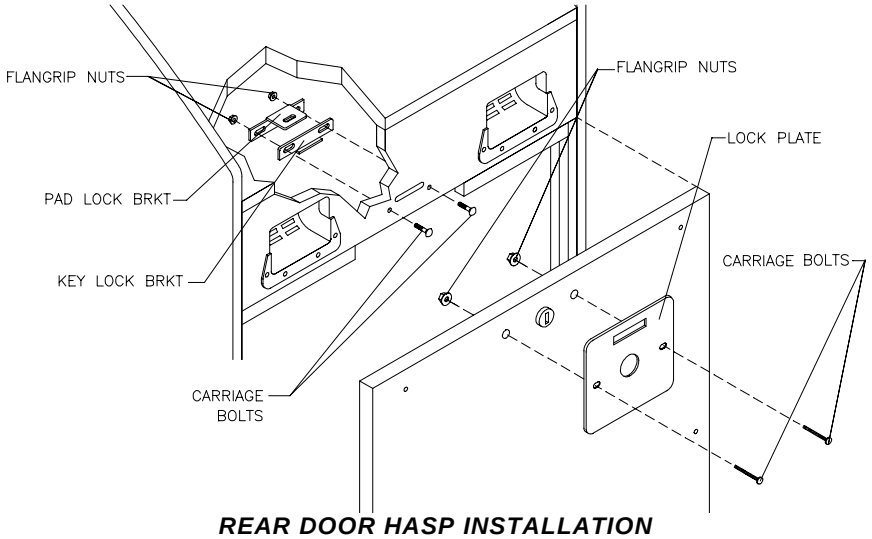
5. The pedestal assembly mounting rails are shipped bolted to the inside of the control cabinet. Remove all of the ¼ -20 hex-head bolts used to fasten the rails inside the cabinet and set aside. Individually pull each rail out of the cabinet, flip it end for end, and reinsert it. See diagram for proper placement. Fasten the rail to the inside of the control cabinet with the bolts until finger tight. Do not tighten these bolts at this time, as some movement is required in the mounting rails to align holes with pedestal assembly




***LOCATION OF PEDESTAL ASSEMBLY MOUNTING HOLES***

6. Roll the pedestal section near the cabinet, align the opening in the pedestal with the ends of the rails. Slide the pedestal forward onto extended mounting rails leaving enough space to attach the wiring harness. Mate each cable connector and press firmly to seat the contacts. Ensure no wires are pinched during pedestal attachment. Attach pedestal assembly using 1/4-20 tamper resistant screws and large flat washers provided in spare parts. A T27 wrench is included with the spare parts to tighten these screws firmly. Tighten the hex head bolts after the tamper resistant screws have been tightened.

7. Lower and adjust each leg leveler until the pedestal section is stable and level. Adjust the levelers until the bottoms of *all* pieces are flush and parallel with each other. Inspect for binding or pinched wires. Insert and firmly tighten the remaining fasteners to attach the two pieces together as a single unit.

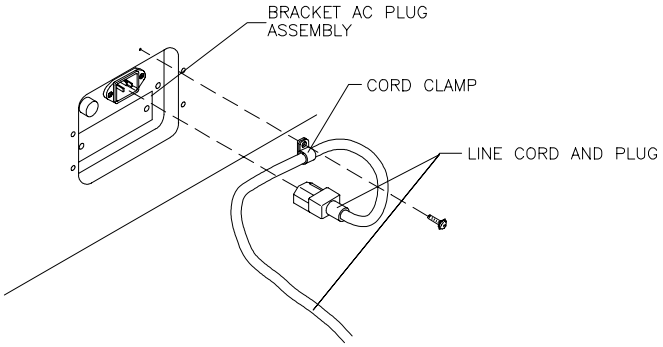



***REAR DOOR HASP INSTALLATION***

8. An extra padlock may be installed to secure the rear door. A hasp is located in the spare parts bag. Remove the two lock bracket nuts from inside the cabinet, above the rear door opening. Slide the hasp bracket onto the bolts so that it protrudes from the hole in back of the cabinet, then reinstall nuts.

9. Modify the lock plate at the top of the rear door. Remove the bolts and nuts from the lock plate, then rotate the plate so that the slot will be above the door. Reinstall the bolts and nuts and tighten firmly.

10. Reinstall the rear door onto the cabinet and close it. Lock the rear door and remove the key. If required, install the extra padlock through the hasp at this time. Install the screws at the top and sides of the rear door and tighten snugly. Leave the remaining doors open at this time.

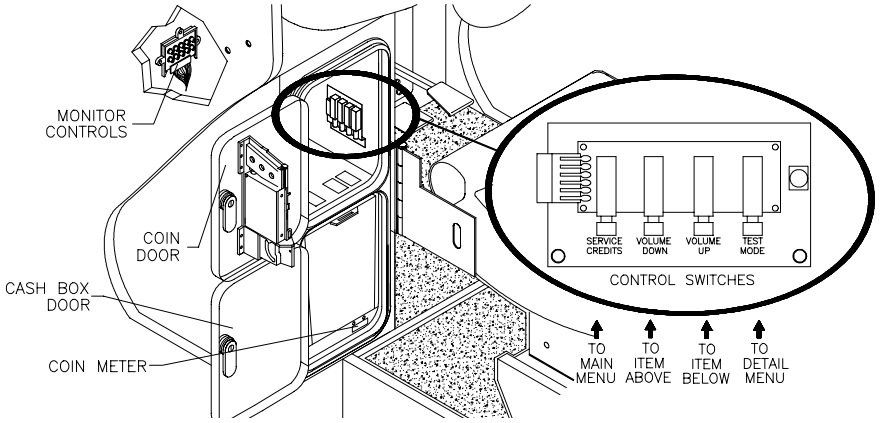



***LINE CORD INSTALLATION***

11. The power cord is packed in with the spare parts. Insert a portion of the line cord in the cord clamp leaving enough slack for the cord. Match the holes on the IEC plug with the prongs in the receptacle and push firmly to seat the line cord.

12. Plug the game into a grounded (3-terminal) AC wall outlet. Switch on power to the game using the *ON/OFF* switch located on the upper left top of the cabinet (when viewed from the player's position). The game will power up and begin its self test. If no errors are found, the game will automatically enter the attract mode of operation (scenes and sounds from typical races, player's scores, messages, etc.).

13. Open the coin door. Press and hold the *Begin Test* button on the operator control switch panel to enter the menu system. Wait until the Main Menu screen appears on the monitor.




***TYPICAL COIN DOOR SWITCH LOCATION***

14. Follow on-screen instructions to select Diagnostics, then choose **SWITCH TEST**. Follow the on-screen instructions to verify that each of the controls is operational. If no errors are found, the controls should function well.

15. Return to the Diagnostics screen, then choose **SPEAKER TEST**. Follow the on-screen instructions to verify that each of the speakers is operational. If no errors are found, the audio should function well.

16. Return to the Diagnostics screen, then choose **WHEEL FEEDBACK TEST**. Follow the on-screen instructions to verify the presence of steering resistance. If no errors are found, the aim will be good.

17. Return to the Main Menu screen, then choose **CONTROL CALIBRATION**. Follow the on-screen instructions to set steering limits. If no errors are found, the controls will have the maximum accuracy.

18. Return to the Main Menu screen, and then choose **EXIT**. The game will automatically enter its "attract" mode of operation (scenes and sounds from typical races, player's scores, messages, etc.).

19. Insert currency or tokens and play a game. Change the volume and make any other adjustments. Close and lock all open doors. Tighten the leveler nuts and engage the caster locks.

# MAINTENANCE

- **Viewing Glass**

It is not necessary to switch off power to the game to clean the glass. Apply a mild glass cleaner to a clean cloth or sponge and wipe the viewing glass. ***Do not apply the cleaner directly on the glass!*** Liquid could drip down into switch or control circuits and cause erratic game operation.

- **Player Controls**

Use plastic-safe, non-abrasive cleaners to avoid damage. Apply cleaner to a clean cloth or sponge and wipe the player controls. ***Do not apply the cleaner directly on the controls!***

- **Cabinet and Seat**

Use plastic-safe, non-abrasive cleaners to avoid damage. Apply cleaner to a clean cloth or sponge and wipe the seat or cabinet. ***Do not apply cleaner directly on artwork or cabinet!***

## GAME FEATURES

*C.A.R.T. Fury: Championship Racing*™ ships configured for one-player game play. Up to four cabinets may be linked to promote player competition.

*C.A.R.T Fury™ is based on the Championship Auto Racing Teams, Inc. owned* FedEx® Championship Series *run yearly from March through October. CART races on road courses, temporary street circuits, oval tracks, and super speedways in five countries on four continents. The races are televised both domestically and around the world with a viewing audience of roughly over 57 million. Michael Andretti, Christian Fittipaldi, Juan Montoya and Jimmy Vasser are but a few of the drivers involved in the CART circuit.*

C.A.R.T Fury: Championship Racing™ features a total of 12 tracks to choose from. There are 8 actual CART courses, as well as 4 fantasy courses. Each course is packed with highly realistic scenery, immersive physics and the most amazing wrecks and crashes. Additionally, players can opt to play a full 12-race season, with points awarded for winning positions!

## STARTING UP

Each time power is switched on or restored to the game machine, the system enters Start-up Tests. The software revision level is shown at the top of the screen. A status screen to report on network activity will appear for about ten seconds. This screen is used to verify and troubleshoot connections on an array of cabinets.

The system enters Attract Mode once it passes all power-up tests. The Attract Mode screen will cycle endlessly and display a variety of scenes and sounds from a typical race on any given track. The system does not exit Attract Mode until the desired amount of coins or tokens is inserted and game play commences. **NOTE:** An error message appears on screen and the game does not enter start up if an error is detected during the Start-Up Test. Record any messages before attempting to service the game.

## GAME RULES AND OBJECTIVES

The game is configured for one-player game play, but up to four cabinets may be linked at one time to promote multiple player competition. To enter Game Mode, individual player(s) must insert the required amount of currency or tokens, press the Start button, and select a car and track. The main objective of the game is to earn top ranking against other drivers.

## PLAYER CONTROLS

- *Start Button* is used to begin game play or to select certain features before a race.
- *Boost Button***,** located on either side of the steering wheel, provides extra boost while passing other cars during competition
- *View 1 Button* shows the view from the driver's seat inside the vehicle. This is a normal driver view.
- *View 2 Button* shows the view from directly above. The player can see the front end of the vehicle.

- *View 3 Button* shows an aerial view of the vehicle. This is what a helicopter camera would see.

- *Pedals,* for both gas and brakes, are used to control vehicle speed.

- *Seat Position Adjuster* may be changed at any time, even during competition. Pull the adjustment lever to the left while seated then slide the seat forward or backward. Release the lever to lock the seat into position.

## GAME OPERATION

Access to the menu system for statistics, adjustments, and testing is secured by a keyed lock on the coin-box to prevent tampering. When the menu system is entered, on screen messages guide the operator through tasks.

### CABINET SWITCHES

- *ON/OFF SWITCH* is located on the top right side of the cabinet.

- *REMOTE MONITOR ADJUSTMENT* knobs are located inside coin vault. Use the monitor test screens with these controls to adjust the video image size, brightness, contrast, etc.

- *SLAM TILT SWITCH*, located on the inside of the coin door opening near the lock, detects any forceful vibrations against coin door. This switch prevents awarding of free games due to pounding on coin door. **NOTE:** The Slam switch is not present on Dollar Bill Validator (DBV) ready doors**.**

### CONTROL BUTTONS

- *TEST BUTTON* activates the game Menu System. Press the Test button to access the Main Menu and select individual diagnostics, audits, utilities, etc.

- *VOLUME UP BUTTON* is used to move up through the menu selections or adjustment items, as well as to increase volume level in game play. Activation of this button is accompanied by a distinct sound.
- 
- *VOLUME-DOWN BUTTON* is used to move down through the menu selections or adjustment items, as well as to decrease volume level in game play. Activation of this button is accompanied by a distinct sound.

- *SERVICE CREDIT BUTTON* is used to allot credits without affecting the game's bookkeeping total. This button is also used to exit a menu selection or to return to the main menu.

## CHAPTER TWO

# ADJUSTMENT, DIAGNOSTIC & AUDIT MENUS

# ADJUSTMENT, DIAGNOSTIC & AUDIT MENUS

## MENU SYSTEM

### WHAT IS THE MENU SYSTEM?

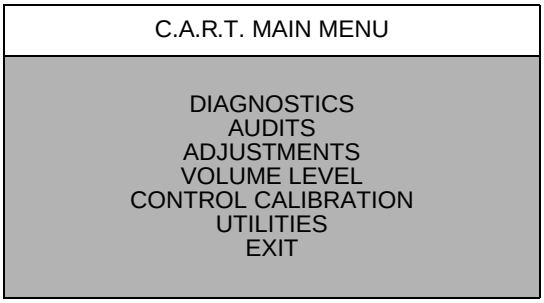
The game's Menu System is a series of auditing, game adjustments and diagnostic screens. You can easily access and apply these screens to optimize game performance. For instance…

- Use game audit screens to assess game performance.
- Use adjustment screens to help you customize game performance. For example, you can restore factory default game settings. You can also calibrate player controls for player accuracy.
- Use diagnostic screens to verify proper equipment operation.

### ACCESSING THE MENU SYSTEM

Open the coin door. Locate and press the TEST MODE switch. The game system will exit game Attract Mode and enter Diagnostic Mode. The system runs a brief self-test, and then displays the Main Menu. The Main Menu is the opening screen of the Menu System.

Game audits, adjustments and diagnostics are line items on the Main Menu. Selecting an item opens its submenu. Every submenu presents various options that you may act upon.




***TYPICAL MAIN MENU SCREEN***

### MENU LAYOUT

Observe that each menu screen basically uses the same layout. The game ID, Serial Number, and Date of Manufacture will appear on most of the menu screens. These numbers will be helpful to factory personnel when referring to your game for parts or service.

- The block at the top of each screen displays the current menu title.
- Data, such as menu items and video reports, etc., appears in the center of the screen.
- Messages, for example explanations and active control functions, etc., appear at the bottom of the screen.

### MENU NAVIGATION TOOLS

Use the operator control buttons located inside the coin door to navigate menus. Press the Volume Up or Volume Down buttons to scroll through the menu options.

Notice the options sequentially become highlighted. Press the Test button to select a highlighted option and access the next menu level. **NOTE:** Only one highlighted option can be selected at a time.

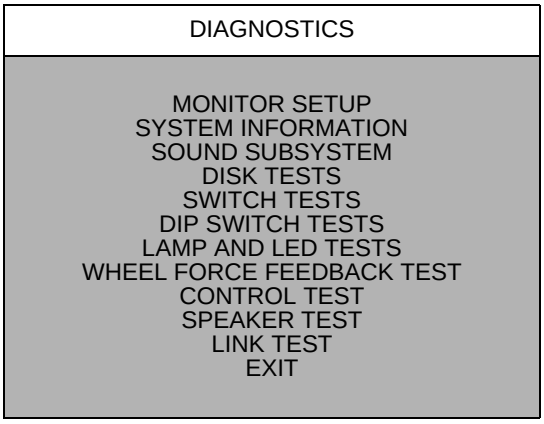
To return to play mode, select Exit and press the Test button while in the Main Menu screen.

***Main Menu, continued***

**Diagnostics Menu**

**DIAGNOSTIC MENU**

To verify the condition of the electrical and electronic hardware in the game, select Diagnostics Menu at the Main Menu. Diagnostic tests assist you in checking and adjusting the game's major systems. It is important to periodically run diagnostics to improve and maintain game performance and player satisfaction.




Use the Volume Up or Volume Down button to highlight the desired Diagnostic Menu option and press the Test button to enter.

***Main Menu***

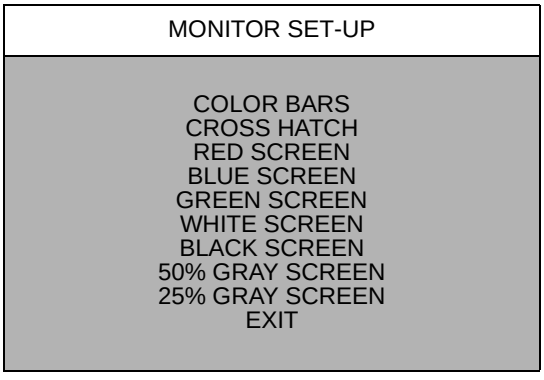
***Diagnostic Menu, continued***

**Monitor Setup**

**MONITOR SET-UP**

To verify color clarity of the monitor, select MONITOR SETUP at the Main Menu.

Use the Volume Up or Volume Down button to highlight the desired monitor setting and press the Test button. Watch for the following results on-screen during this test.



***Main Menu***
***Diagnostic Menu, continued***
**Monitor Setup, continued**

**COLOR BARS.** Observe 4 color bars in different shades appear on-screen as aids in adjusting the green, blue, and red color levels. Each color should appear sharp and clear. Check video brightness and contrast.

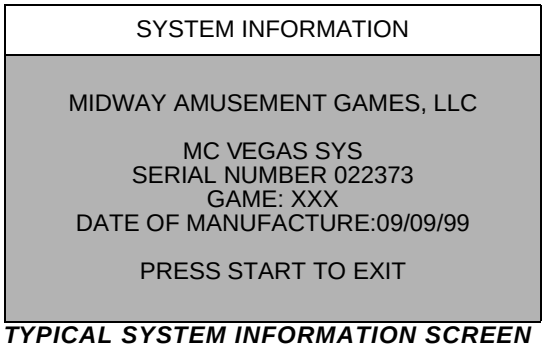
The **CROSSHATCH PATTERNS** test fills the screen with a series of dots within a grid. Observe the dots are perfectly round and that both the grid and dots are clear. Inspect monitor convergence, linearity, and screen size.

The single color screens, **RED SCREEN, BLUE SCREEN, GREEN SCREEN**, etc., fills the screen with a single color to be observed for complete saturation and clarity.

If any of the tests show a need for CRT adjustment, use the proper knobs on the Monitor Controls board.

***Main Menu***
***Diagnostic Menu, continued***
**System Information**

**SYSTEM INFORMATION**
To verify game serial number and date code select System Information at the Main Menu.




***TYPICAL SYSTEM INFORMATION SCREEN***

Use the Start button or Test button to exit this menu screen.

***Main Menu***
***Diagnostic Menu, continued***
**Sound Subsystem Test**

**SOUND SUBSYSTEM TEST**
To Verify proper operation of the sound electronics select Sound Subsystem Test at the Main Menu. Observe the following information on the screen.

***Main Menu***

***Diagnostic Menu, continued***

**Sound Subsystem Test, continued**

| SOUND SUBSYSTEM TEST |
| --- |
| BOOT VERSION D1.06<br>SDRC VERSION 5A<br>PORT STATUS GOOD<br>CHECKSUM EC40<br>SRAM OK<br>DRAM OK<br>TONE STATUS GOOD<br>OS VERSION 2.42<br><br>PRESS TEST OR START TO EXIT |

Use the Start button or Test button to exit this menu screen.

***Main Menu***

***Diagnostic Menu, continued***

**Disk Tests Menu**

**DISK TESTS MENU**

To verify hard disk drive information and perform tests, select Disk Test at the Main Menu. Use the Volume Up and Volume Down buttons to highlight an item. Use the Test or Start button to select an item.

| DISK TESTS |
| --- |
| DISK INFORMATION<br>SEQUENTIAL READ<br>SEQUENTIAL CACHE READ<br>RANDOM READ<br>RANDOM CACHE READ<br>DATA INTEGRITY TEST<br>FILE SYSTEM CHECK<br>SURFACE SCAN<br>EXIT |

- Select **DISK INFORMATION** to learn information about the IDE disk drive.
- Select **SEQUENTIAL READ** to view the sequential sector read without the cache.
- Select **SEQUENTIAL CACHE READ** to view the sequential sector read with the cache.
- Select **RANDOM READ** to view the random sector read without the cache.
- Select **RANDOM CACHE READ** to view the random sector read with the cache.
- Select **DATA INTEGRITY TEST** to perform a disk data integrity test.
- Select **FILE SYSTEM CHECK** to test the integrity of files on the disk.
- Select **SURFACE SCAN** to perform a scan of the disk's surface.

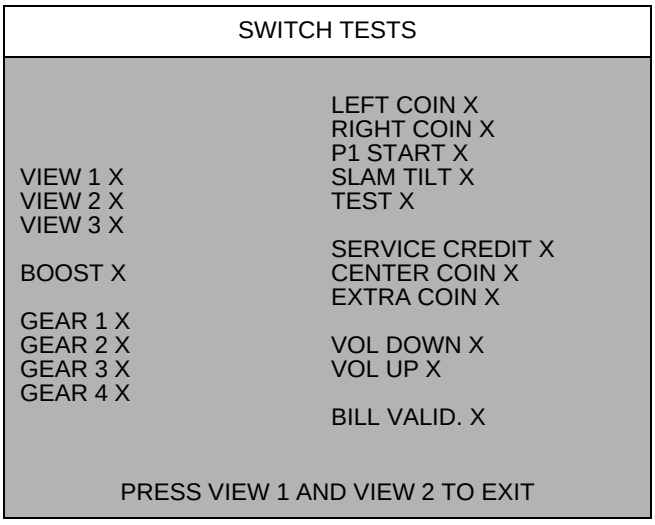
***Main Menu***

***Diagnostic Menu, continued***

**Switch Tests**

**SWITCH TESTS**

To verify proper operation of switch and button inputs in the game, select Switch Test at the Main Menu.




Use the Volume Up or Volume Down button to highlight the Switch Test option and press the Test button to access it.

Press any switch on the control panel or coin door to cause the corresponding indicator on the screen to illuminate. Each illuminated square represents one completed switch circuit.

***Main Menu***

***Diagnostic Menu, continued***

**DIP Switch Test**

**DIP SWITCH TEST**

To verify the functionality of both 8-position DIP switches on the CPU Board, select DIP SWITCH TEST at the Main Menu. Observe immediate on-screen results by changing the setting on a switch.

Use the Volume Up or Volume Down button to highlight the DIP Switch Test option and press the Test button to access it. The current settings appear on-screen.

Consult the table on the next page to determine if changes are required. The default switch positions are all OFF for standard operation.

A vertical bar next to the switch position column indicates a common switch function.

***Main Menu***

***Diagnostic Menu, continued***

**DIP Switch Test, continued**

| DIP SWITCH TEST | |
|---|---|
| DIP SWITCH U13 | DIP SWITCH U12 |
| 8 OFF UNUSED | 8 OFF GAME MODE |
| 7 OFF UNUSED | 7 OFF UNUSED |
| 6 OFF USA 1 | 6 OFF BRAKE ENABLED |
| 5 OFF USA 1 | 5 OFF UNUSED |
| 4 OFF USA 13... | 4 OFF UNUSED |
| 3 OFF USA 13... | 3 OFF UNUSED |
| 2 OFF USA 13... | 2 OFF UNUSED |
| 1 OFF DIP COINAGE | 1 OFF UNUSED |
| PRESS ANY BUTTON TO EXIT | |

***TYPICAL DIP SWITCH SCREEN***

**Coinage Setting Table for DIP Switch U13** (Factory default settings in boldface type)

| FUNCTION | SW1 | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 |
|---|---|---|---|---|---|---|---|---|
| DIP COINAGE<br>CMOS COINAGE | **OFF**<br>ON | | | | | | | |
| USA 13 GER1 FR ECA1 UK1 ECA<br>USA 11 GER2 FR ECA2 UK2 ECA<br>USA 10 GER3 FR ECA3 UK3 ECA<br>USA 1 GER4 FR ECA4 UK4<br>USA DC8 GER5 FR ECA5 UK5<br>USA DC6 GER ECA1 FR ECA6 UK6 ECA<br>USA DC5 GER ECA2FR ECA7 UK7 ECA<br>USA DC1 GER ECA3 FR ECA8<br>FREE PLAY (UK) | | **OFF**<br>ON<br>OFF<br>ON<br>OFF<br>ON<br>OFF<br>ON<br>ON | **OFF**<br>OFF<br>ON<br>ON<br>OFF<br>OFF<br>ON<br>ON<br>ON | **OFF**<br>OFF<br>OFF<br>OFF<br>ON<br>ON<br>ON<br>ON<br>ON | | | | |
| USA<br>FRANCE<br>GERMANY<br>UK** | | | | | **OFF**<br>ON<br>OFF<br>ON | **OFF**<br>OFF<br>ON<br>ON | | |
| UNUSED | | | | | | | **OFF**<br>ON | |
| UNUSED | | | | | | | | **OFF**<br>ON |

**DIP SWITCH SETTING FOR COINAGE**

There are many ways to select the type and quantity of currency recognized by the game machine.

1. The most common coin combinations for several countries are pre-programmed and may be selected from the table when Standard Pricing is activated (see Game Adjustments).

2. DIP Switch settings may be changed with the power switched on. Set any switch and then observe the screen to verify that the desired selection is enabled. **NOTE:** If CMOS Coin Settings are active, switch settings for an individual Country will have no effect.

3. Some European countries may accept currency used in other countries. The most popular coinage settings are listed beneath in the Pricing Table.

***Main Menu***

***Diagnostic Menu, continued***

**DIP Switch Test, continued**

**Setting Table for DIP Switch U12**
(Factory default settings in boldface type)

| FUNCTION | SW1 | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 |
|---|---|---|---|---|---|---|---|---|
| UNUSED | **OFF** ON | | | | | | | |
| UNUSED | | **OFF** ON | | | | | | |
| UNUSED | | | **OFF** ON | | | | | |
| UNUSED | | | | **OFF** ON | | | | |
| UNUSED | | | | | **OFF** ON | | | |
| BRAKE ENABLED<br>BRAKE DISABLED | | | | | | **OFF** ON | | |
| UNUSED | | | | | | | **OFF** ON | |
| GAME MODE<br>TEST MODE | | | | | | | | **OFF** ON |

***Main Menu***

***Diagnostic Menu, continued***

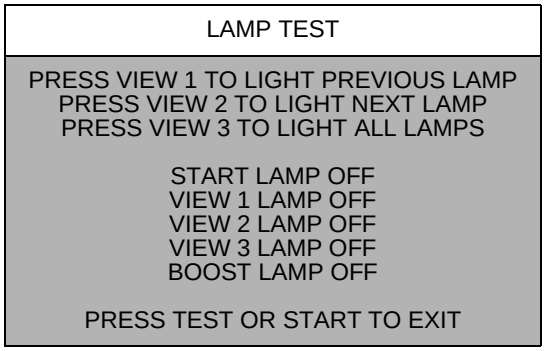
**Lamp and LED Tests**

**LAMP & LED TESTS**
To verify the proper operation of lamps and LED's, select the LAMP & LED TESTS at the Main Menu.

Use the Volume Up or Volume Down button to highlight Lamp & LED Test and press the Test button. During the test observe the selected lamp(s) switches turn on or off when the corresponding selection is made.

***Main Menu***
***Diagnostic Menu, continued***
***Lamp and LED Tests, continued***
**Lamp Tests**

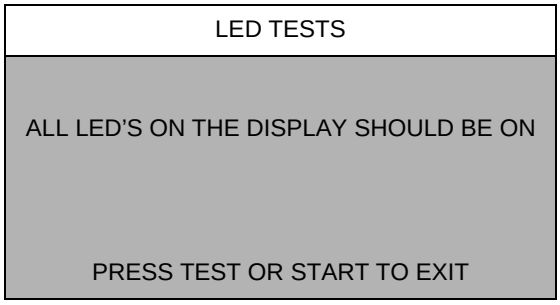
**LAMP TESTS**
To detect intermittent or faulty incandescent bulbs, select LAMP TEST at the Main Menu. This test ensures that the incandescent bulbs critical to game operation function properly.




Use the Volume Up or Volume Down button to highlight Lamp Test and press the Test button. During the test observe the Lamp(s) turn ON according to the option selected.

***Main Menu***
***Diagnostic Menu, continued***
***Lamp and LED Tests, continued***
**LED Tests**

**LED TESTS**
To verify that the LED's function properly, select LED TEST at the Main Menu. This test allows you to control and test the illumination of the LED's located on the dash PCB.

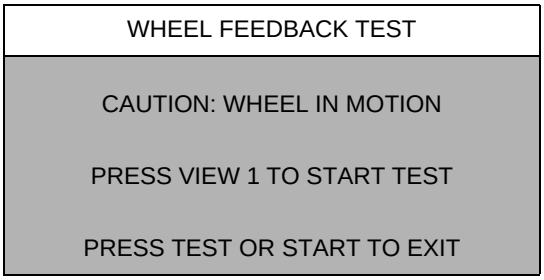



Use the Volume Up or Volume Down button to highlight LED Test and press the Test button. During the test observe the LED's turn ON.

***Main Menu***
***Diagnostic Menu, continued***
**Wheel Feedback Test**

**WHEEL FEEDBACK TEST**
To verify the proper directional movement of the steering wheel, select Wheel Feedback Test at the Main Menu. Make sure hands and other objects are clear of the steering wheel when this test is selected because the steering wheel automatically rotates on its own.

Use the Volume Up or Volume Down button to highlight Wheel Feedback Test and press the Test button.



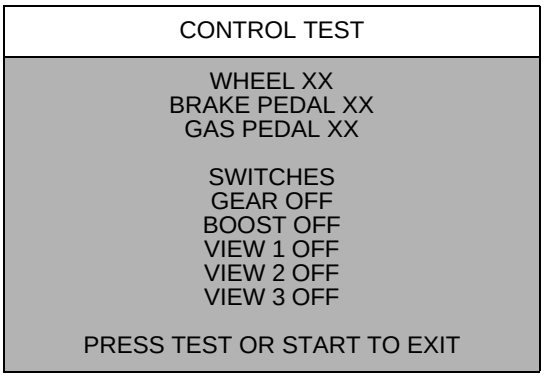

Observe and follow the on-screen instructions for conducting the test. During the test observe the steering wheel is turned automatically. Upon completion of the test, the message TEST COMPLETE appears on-screen. Press the Test or Start button to exit test once this message appears.

***Main Menu***
***Diagnostic Menu, continued***
**Control Test**

**CONTROL TEST**
To verify the presence of steering wheel control, gas pedal and brake pedal control, select Control Test at the Main Menu.

Use the Volume Up or Volume Down button to highlight Control Test and press the Test button.

During the test observe the selected control input or switch turns on or off when the corresponding selection is made. **NOTE:** Information regarding the brake pedal will not appear if DIP 6 on DIP Switch U12 is ON.



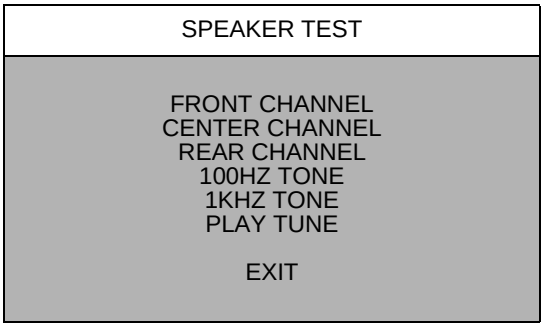
***Main Menu***

***Diagnostic Menu, continued***

**Speaker Test**

**SPEAKER TEST**

To verify proper operation of the sound components, select Speaker Test at the Main Menu. This test allows you to access and listen to the sound emitted from the speakers used in the game.




Use the Volume Up or Volume Down button to highlight the Speaker Test option and press the Test button. Use the Volume Up or Volume Down button to highlight an option within the test itself and press the Test button to activate the test option.

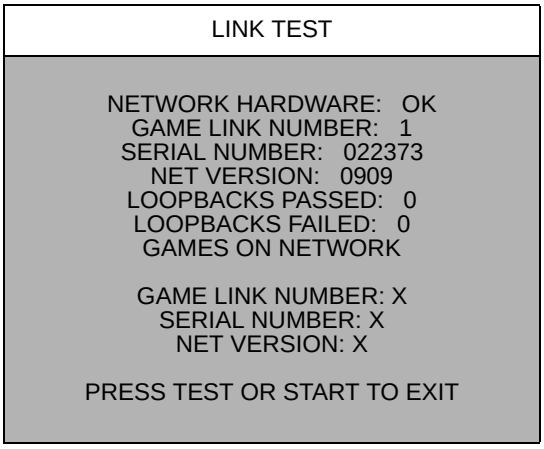
***Main Menu***

***Diagnostic Menu, continued***

**Link Test**

**LINK TEST**

To verify communications between the game machine and others connected to it, select Link Test at the Main Menu.




Use the Volume Up or Volume Down button to highlight Link Test and press the Test button. This test runs automatically and will display results on-screen.

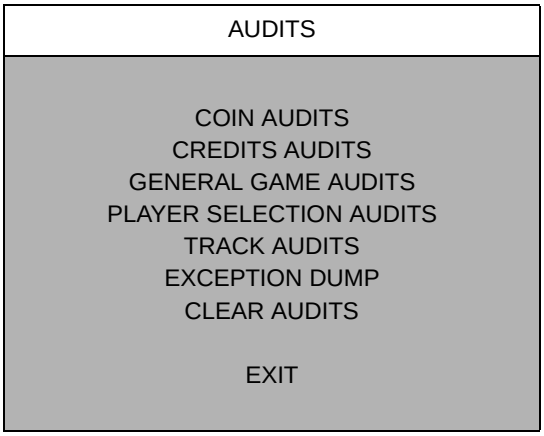
Press the Test button to exit from this menu screen.

***Main Menu***

**Audits Menu**

**AUDITS MENU**

Press the Volume Up or Volume Down button to highlight Game Audits in the Main Menu and press the Test button. To move between pages in an Audit Table, press the View 1/Volume Up or View 2/Volume Down button. Press the Test or Start button to return to the Main Menu from this screen.




The Game Audits Table displays the play statistics. The left side of the table names the Audit item; the right side shows the amount of play. Record these statistics before any service or repairs are done.

***Main Menu***

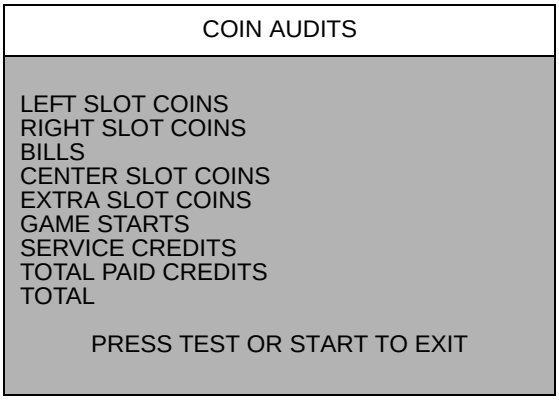
***Audits, continued***

**Coin Audits**

**COIN AUDITS**

To keep track of the number of coins collected, press the Volume Up or Volume Down button to highlight Coin Audits in the Main Menu and press the Test button.

To move between pages in an Audit Table, press the View 1/Volume Up or View 2/Volume Down button. Press the Test or Start button to return to the Main Menu from this screen.




***AUDIT TABLE, PAGE 1***

| *Main Menu* |
| --- |
| ***Audits, continued*** |
| **Credits Audits** |

**CREDITS AUDITS**

To keep track of the available number of credits, press the Volume Up or Volume Down button to highlight Credits Audits in the Main Menu and press the Test button. To move between pages in an Audit Table, press the View 1/Volume Up or View 2/Volume Down button.

| CREDITS AUDITS |
| --- |
| CREDITS AUDITS, PAGE 1<br><br>CREDITS AVAILABLE X<br><br>PRESS TEST OR START TO EXIT |

***AUDIT TABLE, PAGE 1***

| *Main Menu* |
| --- |
| ***Audits, continued*** |
| **General Game Audits** |

**GENERAL GAME AUDITS**

To keep track of the game play statistics, press the Volume Up or Volume Down button to highlight General Game Audits in the Main Menu and press the Test button.

To move between pages in an Audit Table, press the View 1/Volume Up or View 2/Volume Down button.

| GENERAL GAME AUDITS | |
| --- | --- |
| GENERAL AUDITS, PAGE 1 | |
| GAMES PLAYED | X |
| SINGLE PLAYER GAMES PERCENT | (X) X% |
| 2 PLAYER PERCENT | (X) X% |
| 3 PLAYER PERCENT | (X) X% |
| 4 PLAYER PERCENT | (X) X% |
| SEASON GAME PERCENT | (X) X% |
| SIM GAMES PERCENT | (X) X% |
| FREE GAMES | (X) X% |
| GAMES CONTINUED PERCENT | (X) X% |
| SINGLE PLAYER GAMES CONTINUED PERCENT | (X) X% |
| 2 PLAYER GAMES CONTINUED PERCENT | (X) X% |
| 3 PLAYER GAMES CONTINUED PERCENT | (X) X% |
| 4 PLAYER GAMES CONTINUED PERCENT | (X) X% |
| TOTAL UP TIME | 00:00:00 |
| TOTAL PLAY TIME | 00:00:00 |
| PERCENT PLAY TIME | (X) X% |
| AVERAGE PLAY TIME | 00:00:00 |
| AVERAGE RACE TIME | 00:00:00 |
| PRESS TEST OR START TO EXIT | |

***AUDIT TABLE, PAGE 1***

***Main Menu***

***Audits, continued***

**Player Selection Audits**

**PLAYER SELECTION AUDITS**

To keep track of game play choices like race venue, character selection, car selection and handling options, press the Volume Up or Volume Down button to highlight Player Selection Audits in the Main Menu and press the Test button.

To move between pages in an Audit Table, press the View 1/Volume Up or View 2/Volume Down button.

| PLAYER SELECTION AUDITS | |
|---|---|
| PLAYER SELECTION AUDITS, PAGE 1 | |
| CHICAGO SPEEDWAY | (0) X% |
| RIO SPEEDWAY | (0) X% |
| AIRPORT RACEWAY | (0) X% |
| FRANKFURT GERMANY | (0) X% |
| HOUSTON TEXAS | (0) X% |
| LONG BEACH CALIFORNIA | (0) X% |
| TORONTO CANADA | (0) X% |
| CHICAGO ILLINOIS | (0) X% |
| ROAD AMERICA | (0) X% |
| SURFER PARADISE AUSTRALIA | (0) X% |
| LAGUNA SECA | (0) X% |
| THE SKYWAY | (0) X% |
| VIEW 1-NEXT PAGE/START TO EXIT | |

| PLAYER SELECTION AUDITS | |
|---|---|
| PLAYER SELECTION AUDITS, PAGE 2 | |
| JIMMY VASSER | (0) X% |
| JUAN MONTOYA | (0) X% |
| BRYAN HERTA | (0) X% |
| MAX PAPIS | (0) X% |
| MICHAEL ANDRETTI | (0) X% |
| CHRISTIAN FITTIPALDI | (0) X% |
| DARIO FRANCHITTI | (0) X% |
| PAUL TRACY | (0) X% |
| ADRIAN FERNANDEZ | (0) X% |
| TONY KANAAN | (0) X% |
| GIL DE FERRAN | (0) X% |
| MARK BLUNDELL | (0) X% |
| HOT ROD | (0) X% |
| ROADSTER | (0) X% |
| FUTURE CAR | (0) X% |
| VIEW 1-NEXT PAGE/START TO EXIT | |

***Main Menu***
***Audits, continued***
**Player Selection Audits, continued**

| PLAYER SELECTION AUDITS | |
|---|---|
| PLAYER SELECTION AUDITS, PAGE 3 | |
| EASY HANDLING | (0) X% |
| MEDIUM HANDLING | (0) X% |
| HARD HANDLING | (0) X% |
| EXPERT HANDLING | (0) X% |
| AUTOMATIC TRANSMISSION | (0) X% |
| MANUAL TRANSMISSION | (0) X% |
| VIEW 2- PREVIOUS PAGE/START TO EXIT | |

***Main Menu***
***Audits, continued***
**Exception Dump Audit**

**EXCEPTION DUMP AUDIT**
To display cause, PC, and register audits, press the Volume Up or Volume Down button to highlight Exception Dump Audits in the Main Menu and press the Test button.

To move between pages in an Audit Table, press the View 1/Volume Up or View 2/Volume Down button.
**NOTE**: If no exceptions are available none will be displayed as shown below.

| EXCEPTION DUMP AUDITS |
|---|
| EXCEPTION DUMP, PAGE 1 |
| NO EXCEPTIONS |
| PRESS TEST OR START TO EXIT |

***Main Menu***
***Audits, continued***
**Track Audits**

**TRACK AUDITS**
To view track statistics, press the Volume Up or Volume Down button to highlight Track Audits in the Main Menu and press the Test button.

To move between pages in an Audit Table, press the View 1/Volume Up or View 2/Volume Down button.

***Main Menu***
***Audits, continued***
**Track Audits, continued**

TRACK AUDITS

TRACK AUDITS, PAGE 1

| | |
|---|---|
| SPEEDWAY PERCENTAGE PLAYED | (0) X% |
| SPEEDWAY PERCENT FREE AWARDED | (0) X% |
| SPEEDWAY AVERAGE RACE TIME (NO DNF) | 00:00:00 |
| SPEEDWAY BEST RACE TIME (NO DNF) | 00:00:00 |
| SPEEDWAY PERCENTAGE DNF (NO DNF) | (0) X% |
| SPEEDWAY AVERAGE FINISH (NO DNF) | (0) X% |
| SPEEDWAY BEST FINISH (NO DNF) | 00:00:00 |
| SPEEDWAY WORST FINISH (NO DNF) | 00:00:00 |
| SPEEDWAY PERCENTAGE LAPS COMPLETED | (0) X% |
| SPEEDWAY PERCENTAGE SUPERBOOSTS | (0) X% |
| SPEEDWAY SUPERBOOSTS TIME IN HUNDREDTHS | X |
| SPEEDWAY DRONE TIME IN HUNDREDTHS | X |
| SPEEDWAY EXTRA LAP DRONE TIME IN HUNDREDTHS | X |

VIEW 1-NEXT PAGE/START TO EXIT

***SAMPLE TRACK AUDITS PAGE***

**NOTE:** There is an individual page of track statistics for <u>each</u> track showcased in the game.

***Main Menu***
***Audits, continued***
**Clear Audits**

**CLEAR AUDITS**
Clear Audits displays an assortment of audit clearing options. One or all audit tables can be cleared using this audit screen.

You may wish to record some or all of the statistics before clearing an audit table, due to any reason, for future reference.

CLEAR AUDITS

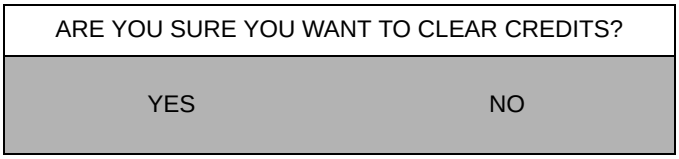
CLEAR AUDITS, PAGE 1

CLEAR COIN AUDITS
CLEAR CREDITS AUDITS
CLEAR GENERAL GAME AUDITS
CLEAR PLAYER SELECTION AUDITS
CLEAR TRACK AUDITS
CLEAR EXCEPTION DUMP
CLEAR ALL
EXIT

***Main Menu***
***Audits, continued***
**Clear Audits, continued**

Each of the menu options beneath Clear Audits presents a confirmation box, like the one shown below, which offers you the choice of accepting or declining the selected action.

Press the Volume Up or Volume Down button to highlight the desired response and press the Test button. A confirmation box will appear to confirm that the desired action has been carried out.




***TYPICAL CLEAR AUDITS BOX***

***Main Menu***
**Adjustments Menu**

**ADJUSTMENTS MENU**
To optimize game performance and earnings or to change the look or sound of the game, select the Adjustment Menu at the Main Menu.

The Attract Mode features, Game Pricing and Game Difficulty may also be customized. Free races may be awarded to encourage players. *Free game player incentives may reduce earnings.* **NOTE:** Individual Game Adjustments are explained in more detail on the following pages.

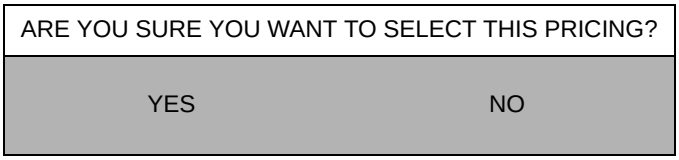
Press the Volume Up or Volume Down button to highlight the desired Adjustments Menu option on the Main Menu and press the Test button. Use these screens to optimize game performance and earnings.

The Adjustments Menu offers several options. Press the Volume Up or Volume Down button to highlight an option and press the Test button. Each time an option on the menu is activated you are provided with multiple setting choices.

Use the Volume Up or Volume Down button to change the current value setting and observe a confirmation box as shown appears.

***Main Menu***

**Adjustments Menu, continued**




***TYPICAL CONFIRMATION BOX***

Press the Volume Up or Volume Down button to select YES or NO, then press the Test button to lock in the setting. Selecting NO cancels any changes values and returns the previous values to memory.

***Main Menu***

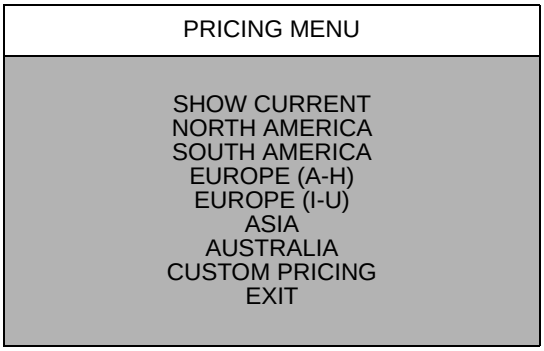
***Adjustments, continued***

**Pricing**

**PRICING MENU**

Use the Pricing Menu to specify pricing settings other than the ones listed in the Pricing Table.

Pricing can also be used to select the amount of credits required to start a game and the amount of credits required to continue a game. This option is adjusted from the Dip Switch Settings.



## Pricing Table

Use the Pricing Table illustrated below as a guide to select and/or verify the desired coin credit setting(s).

| NAME | START | CONTINUE | CREDITS/COIN | COIN 1 | COIN 2 | COIN 3 | COIN4 | BILL |
|---|---|---|---|---|---|---|---|---|
| ANTILLES | 2 | 2 | 1/25¢, 4/1G | .25¢ | 1G | | | |
| AUSTRALIA 1 | 2 | 2 | 1/3X20¢, 2/$1.00 | .20¢ | $1.00 | | | |
| AUSTRALIA 2 | 1 | 1 | 1/5X20¢, 1/$1.00 | .20¢ | $1.00 | | | |
| AUSTRIA 1 | 2 | 2 | 1/5Sch, 2/10Sch | 5 Sch | 10 Sch | | | |
| AUSTRIA 2 | 2 | 2 | 1/2X5Sch, 3/2X10Sch | 5 Sch | 10 Sch | | | |
| BELGIUM 1 | 2 | 2 | 1/20BF | 20BF | 20BF | | | |
| BELGIUM 2 | 2 | 2 | 3/20BF | 20BF | 20BF | | | |
| BELGIUM 3 | 2 | 2 | 2/20BF | 20BF | 20BF | | | |
| BELGIUM ECA | 2 | 2 | 1/20BF | 5BF | 20BF | 50BF | | |
| CANADA 1 | 2 | 2 | 1 / 2 x 25¢, 3 / $1 | 25¢ | 25¢ | | | |
| CANADA 2 | 2 | 2 | 1 / 2 x 25¢, 3 / $1 | 25¢ | $1.00 | | | |
| CANADA 3 | 2 | 2 | 3 / $1.00, 6 / $2.00 | $1.00 | $2.00 | | | |
| CANADA ECA | 2 | 2 | 1 / 2 x 25¢, 3 / $1 | 25¢ | | $1.00 | $2.00 | |
| DENMARK | 2 | 2 | 3/5DKr, 7/10DKr | 5DKr | 10DKr | | | |
| FINLAND | 2 | 2 | 1/1Fmk | 1Fmk | 5Fmk | | | |
| FRANCE 1 | 2 | 2 | 2/5Fr, 5/10Fr | 5Fr | 10Fr | | | |
| FRANCE 2 | 2 | 1 | 2/5Fr, 4/10Fr | 5Fr | 10Fr | | | |
| FRANCE 3 | 2 | 1 | 1/5Fr, 3/10Fr | 5Fr | 10Fr | | | |
| FRANCE 4 | 2 | 1 | 1/5Fr, 2/10Fr | 5Fr | 10Fr | | | |
| FRANCE 5 | 2 | 1 | 2/5Fr, 5/10Fr, 11/2 X 10Fr | 5Fr | 10Fr | | | |
| FRANCE 6 | 2 | 1 | 2/5Fr, 4/10Fr, 9/2 X 10Fr | 5Fr | 10Fr | | | |
| FRANCE 7 | 2 | 1 | 1/5Fr, 3/10Fr, 7/2 X 10Fr | 5Fr | 10Fr | | | |
| FRANCE 8 | 2 | 1 | 1/5Fr, 2/10Fr, 5/2 X 10Fr | 5Fr | 10Fr | | | |
| FRANCE 9 | 2 | 1 | 1/3 X 1Fr, 2/5Fr | 1Fr | 5Fr | | | |
| FRANCE 10 | 2 | 1 | 1/2 X 1Fr, 3/5Fr | 1Fr | 5Fr | | | |
| FRANCE 11 | 2 | 1 | 1/3 X 1Fr, 2/5Fr, 5/2 X 5Fr | 1Fr | 5Fr | | | |
| FRANCE 12 | 2 | 1 | 1/2 X 1Fr, 3/5Fr, 7/2 X 5Fr | 1Fr | 5Fr | | | |
| FRANCE ECA 1 | 1 | 1 | 2/5Fr, 5/10Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 2 | 1 | 1 | 2/5Fr, 4/10Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 3 | 1 | 1 | 1/5Fr, 3/10Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 4 | 1 | 1 | 1/5Fr, 2/10Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 5 | 1 | 1 | 2/5Fr, 5/10Fr, 11/2 X 10Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 6 | 1 | 1 | 2/5Fr, 4/10Fr, 9/2 X 10Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 7 | 1 | 1 | 1/5Fr, 3/10Fr, 7/2 X 10Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 8 | 1 | 1 | 1/5Fr, 2/10Fr, 5/2 X 10Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 9 | 1 | 1 | 1/3 X 1Fr, 2/5Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 10 | 1 | 1 | 1/2 X 1Fr, 3/5Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 11 | 1 | 1 | 1/3 X 1Fr, 2/5Fr, 5/10Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 12 | 1 | 1 | 1/3 X 1Fr, 3/5Fr, 7/10Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FRANCE ECA 13 | 1 | 1 | 1/10Fr, 2/20Fr, 4/30Fr | 1Fr | 5Fr | 10Fr | 20Fr | |
| FREE PLAY | -- | -- | -- | None | None | None | None | None |
| GERMANY 1 | 2 | 2 | 1/1DM, 6/5DM | 1DM | 5DM | | | |
| GERMANY 2 | 2 | 1 | 1/1DM, 7/5DM | 1DM | 5DM | | | |
| GERMANY 3 | 2 | 1 | 1/1DM, 8/5DM | 1DM | 5DM | | | |
| GERMANY 4 | 2 | 1 | 1/1DM, 5/5DM | 1DM | 5DM | | | |
| GERMANY 5 | 2 | 1 | 1/1DM, 6/5DM | 1DM | 5DM | | | |
| GERMANY ECA 1 | 2 | 2 | 1/1DM, 2/2DM, 6/5DM | 1DM | 2DM | 5DM | | |

| NAME | START | CONTINUE | CREDITS/COIN | COIN 1 | COIN 2 | COIN 3 | COIN4 | BILL |
|---|---|---|---|---|---|---|---|---|
| GERMANY ECA 2 | 2 | 1 | 1/1DM, 2/2DM, 6/5DM | 1DM | 2DM | 5DM | | |
| GERMANY ECA 3 | 1 | 1 | 1/1DM, 2/2DM, 6/5DM | 1DM | 2DM | 5DM | | |
| HUNGARY | 2 | 2 | 1/2X10Ft, 3/2X20Ft | 10Ft | 20Ft | | | |
| ITALY | 2 | 2 | 1/500LIt | 500LIt | 500LIt | | | |
| JAPAN 1 | 2 | 2 | 1/100Yen | 100 Yen | 100 Yen | | | |
| JAPAN 2 | 2 | 2 | 2/100Yen | 100 Yen | 100 Yen | | | |
| JAPAN 3 | 1 | 1 | 1/100Yen | 100 | 100 | | | |
| JAPAN 4 | 1 | 1 | 2/100Yen | 100 | 100 | | | |
| JAPAN 5 | 1 | 1 | 4/100Yen | 100 | 100 | | | |
| JAPAN 6 | 1 | 1 | 1/2X100Yen | 100 | 100 | | | |
| NETHERLANDS | 2 | 2 | 1/1HFI, 3/2.5HFI | 1HFI | 2.5HFI | | | |
| NEW ZEALAND 1 | 1 | 1 | 1/$1 | $1 | $2 | | | |
| NEW ZEALAND 2 | 1 | 1 | 2/$1 | $1 | $2 | | | |
| NORWAY | 2 | 2 | 3/5NKr, 6/10NKr | 5NKr | 10NKr | | | |
| SPAIN 1 | 2 | 2 | 1/100Pta, 6/500Pta | 100Pta | 500Pta | | | |
| SPAIN 2 | 2 | 2 | 1/100Pta, 5/500Pta | 100Pta | 500Pta | | | |
| SWEDEN | 2 | 2 | 1/3X1SKr, 2/5SKr | 1SKr | 5SKr | | | |
| SWITZERLAND 1 | 2 | 2 | 1/1SFr, 6/5SFr | 1SFr | 5SFr | | | |
| SWITZERLAND 2 | 2 | 2 | 1/1SFr, 7/5SFr | 1SFr | 5SFr | | | |
| SWITZERLAND 3 | 2 | 2 | 1/1SFr, 8/5SFr | 1SFr | 5SFr | | | |
| UK ECA 1 | 1 | 1 | 1/50p, 3/£1.00 | £1.00 | 50p | 20p | 10p | £2.00 |
| UK ECA 2 | 1 | 1 | 1/50p, 2/£1.00 | £1.00 | 50p | 20p | 10p | £2.00 |
| UK ECA 3 | 1 | 1 | 1/30p, 2/50p, 5/£1.00 | £1.00 | 50p | 20p | 10p | £2.00 |
| UK 4 | 1 | 1 | 1/50p, 3/£1.00 | £1.00 | 50p | | | |
| UK 5 | 1 | 1 | 1/50p, 2/£1.00 | £1.00 | 50p | | | |
| UK ECA 6 | 1 | 1 | 1/30p, 2/50p, 4/£1.00 | £1.00 | 50p | 20p | 10p | £2.00 |
| UK ECA 7 | 1 | 1 | 3/£1.00 | £1.00 | 50p | 20p | 10p | £2.00 |
| UK ECA 8 | 1 | 1 | 1/50p, 2/£1.00, 4/£2.00 | £1.00 | 50p | 20p | 10p | £2.00 |
| USA1 | 2 | 2 | 1/25¢ | 25¢ | 25¢ | | | $1.00 |
| USA2 | 2 | 1 | 1/25¢ | 25¢ | 25¢ | | | $1.00 |
| USA3 | 1 | 1 | 1/25¢ | 25¢ | 25¢ | | | $1.00 |
| USA4 | 1 | 1 | 1/50¢, 3/$1.00 | 25¢ | 25¢ | | | $1.00 |
| USA5 | 2 | 1 | 1/50¢, 4/$1.00 | 25¢ | 25¢ | | | $1.00 |
| USA6 | 1 | 1 | 1/50¢ | 25¢ | 25¢ | | | $1.00 |
| USA7 | 1 | 1 | 1/50¢, 3/$1.00 | 25¢ | 25¢ | | | $1.00 |
| USA8 | 2 | 2 | 1/50¢, 4/$1.00 | 25¢ | 25¢ | | | $1.00 |
| USA9 | 3 | 2 | 1/25¢, 4/$1.00 | 25¢ | 25¢ | | | $1.00 |
| USA10 | 3 | 3 | 1/25¢, 4/$1.00 | 25¢ | 25¢ | | | $1.00 |
| USA11 | 4 | 2 | 1/25¢, 4/$1.00 | 25¢ | 25¢ | | | $1.00 |
| USA12 | 4 | 3 | 1/25¢, 4/$1.00 | 25¢ | 25¢ | | | $1.00 |
| USA13 | 4 | 4 | 1/25¢, 4/$1.00 | 25¢ | 25¢ | | | $1.00 |
| USA ECA | 2 | 2 | 1/25¢, 4/$1.00 | $1.00 | 25¢ | 10¢ | 05¢ | $1.00 |
| USA DC 1 | 2 | 2 | 1/25¢ | 25¢ | $1.00 | | | $1.00 |
| USA DC 2 | 2 | 1 | 1/25¢ | 25¢ | $1.00 | | | $1.00 |
| USA DC 3 | 1 | 1 | 1/25¢ | 25¢ | $1.00 | | | $1.00 |
| USA DC 4 | 3 | 2 | 1/25¢, 4/$1.00 | 25¢ | $1.00 | | | $1.00 |
| USA DC 5 | 3 | 3 | 1/25¢, 4/$1.00 | 25¢ | $1.00 | | | $1.00 |
| USA DC 6 | 4 | 2 | 1/25¢, 4/$1.00 | 25¢ | $1.00 | | | $1.00 |
| USA DC 7 | 4 | 3 | 1/25¢, 4/$1.00 | 25¢ | $1.00 | | | $1.00 |
| USA DC 8 | 4 | 4 | 1/25¢, 4/$1.00 | 25¢ | $1.00 | | | $1.00 |

***Main Menu***
***Adjustments, continued***
**Free Play**

**FREE PLAY**
This option selects free play. The setting choices for this adjustment are:

-Enable
-Disable
**-Factory Setting: Disable**

***Main Menu***
***Adjustments, continued***
**Attract Sound**

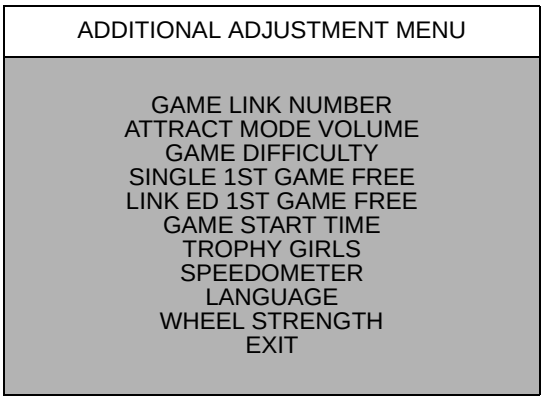
**ATTRACT SOUND**
This option selects the attract mode sounds. The setting choices for this adjustment are:

-Enable
-Disable
**-Factory Setting: Enable**

***Main Menu***
***Adjustments, continued***
**Additional Adjustments Menu**

**ADDITIONAL ADJUSTMENT MENU**
To select and set any number of useful adjustments, select the Additional Adjustment Menu. Individual Additional Adjustments are explained in more detail on the following pages.

Press the Volume Up or Volume Down button to highlight the desired Additional Adjustments Menu option on the menu and press the Test button.



***Main Menu***
***Adjustments, continued***
***Additional Adjustments Menu***
**Game Link Number**

**GAME LINK NUMBER**
This allows the game link number to be set. The setting range is:

-Maximum: 4
-Minimum: 1
**-Factory Setting: 1**

***Main Menu***
***Adjustments, continued***
***Additional Adjustments Menu***
**Attract Mode Volume**

**ATTRACT MODE VOLUME**
This selects the value and setting of the sounds heard during attract mode. The settings for this adjustment are:

-Minimum: 0
-Maximum: 255
**-Factory Setting: 100**

***Main Menu***
***Adjustments, continued***
***Additional Adjustments Menu***
**Game Difficulty**

**GAME DIFFICULTY**
This determines the level of difficulty for the game. The setting range is:

-Easiest
-Easy
-Normal
-Hard
-Hardest
**-Factory Setting: Normal**

| |
|---|
| ***Main Menu*** |
| ***Adjustments, continued*** |
| ***Additional Adjustments Menu*** |
| **Single First Free Game** |

**SINGLE FIRST FREE GAME**
This enables the single first free game option. The setting choices are:

-Enable
-Disable
**-Factory Setting: Enable**

| |
|---|
| ***Main Menu*** |
| ***Adjustments, continued*** |
| ***Additional Adjustments Menu*** |
| **Linked First Free Game** |

**LINK FIRST FREE GAME**
This enables the link first free game option. The setting choices are:

-Off
-Two Players
-Three Players
-Four Players
**-Factory Setting: Off**

| |
|---|
| ***Main Menu*** |
| ***Adjustments, continued*** |
| ***Additional Adjustments Menu*** |
| **Game Start Time** |

**GAME START TIME**
This adjusts the game start time. Use the View 1/View 2 buttons to select. The setting choices are:

-Minimum: 30
-Maximum: 60
**-Factory Setting: 50**

| |
|---|
| ***Main Menu*** |
| ***Adjustments, continued*** |
| ***Additional Adjustments Menu*** |
| **Trophy Girls** |

**TROPHY GIRLS**
This enables the viewing of trophy bearing girls following a race. The setting choices are:

-Enable
-Disable
**-Factory Setting: Enable**

| |
|---|
| ***Main Menu*** |
| ***Adjustments, continued*** |
| ***Additional Adjustments Menu*** |
| **Speedometer** |

**SPEEDOMETER**
This allows operator to select the speedometer readout. The setting choices are:

-MPH
-KPH
**-Factory Setting: MPH**

| |
|---|
| ***Main Menu*** |
| ***Adjustments, continued*** |
| ***Additional Adjustments Menu*** |
| **Language** |

**LANGUAGE**
This enables operator to select the language the game is announced in. The setting choices are:

-English
-Espanol
**-Factory Setting: English**

| |
|---|
| ***Main Menu*** |
| ***Adjustments, continued*** |
| ***Additional Adjustments Menu*** |
| **Wheel Strength** |

**WHEEL STRENGTH**
This selects the degree of wheel strength to be used for racing. The setting range is:

-Very Light
-Light
-Normal
-Heavy
-Very Heavy
**-Factory Setting: Normal**

***Main Menu***

***Adjustments, continued***

**Full Factory Restore**

**FULL FACTORY RESTORE**
This allows the operator to restore all settings to the way they were when the game left the factory. The setting range is:

-Enable
-Disable
**-Factory Setting: Disable**

***Main Menu***

**Volume Level**

**VOLUME LEVEL**
To select a desirable volume level, select Volume Level at the Main Menu.

Press the Volume Up or Volume Down button to highlight the Adjust Volume option on the Main Menu, then press the Test button. Remember that the minimum sound level is set under Game Adjustments.

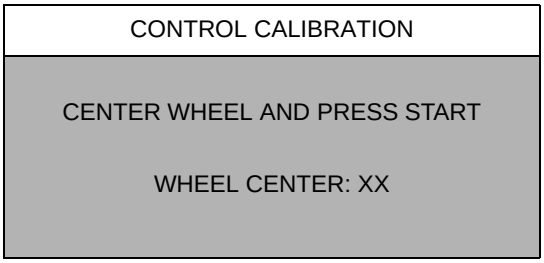
Press the Volume Up button to increase, or the Volume Down button to decrease the sound level of the game. Press the Test button to lock the volume level at the selected value and return to the Main Menu.

***Main Menu***

**Control Calibration**

**CONTROL CALIBRATION**
To calibrate the steering wheel and pedals, select Control Calibration at the Main Menu.

Press the Volume Up or Volume Down button to highlight the Control Calibration option on the Main Menu, then press the Test button. Follow the instructions on screen.

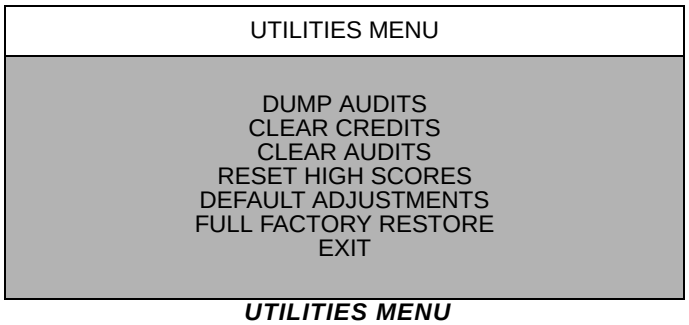



***SAMPLE CALIBRATION SCREEN***

| *Main Menu* |
| --- |
| **Utilities** |

**UTILITIES**

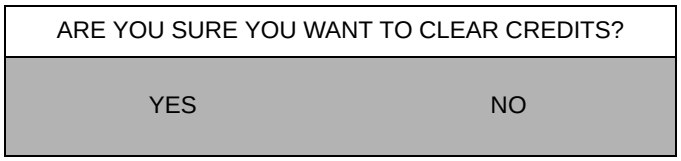
To clear bookkeeping memory and reset factory defaults, select Utilities at the Main Menu. Press the Volume Up or Volume Down button to highlight the Utilities option on the Main Menu, then press the Test button.




***UTILITIES MENU***

The Utilities Menu offers several options. Press the Volume Up or Volume Down button to highlight an option, then press the Test button. Each time an option on the menu is activated you are provided with multiple setting choices.

Use the Volume Up or Volume Down button to change the current value setting and observe a confirmation box as shown below appears.




***TYPICAL CONFIRMATION BOX***

Press the Volume Up or Volume Down button to select YES or NO, then press the Test button to lock in the setting. Selecting NO cancels any changes values and returns the previous values to memory.

**NOTE**: Record the numbers before they are cleared. These values cannot be restored once erased.

| *Main Menu* |
| --- |
| ***Utilities, continued*** |
| **Dump Audits** |

**DUMP AUDITS**

Press the Volume Up or Volume Down buttons to highlight the Dump Audits option on the Main Menu, then press the Test button. This dumps all audits to the serial port.

- Yes
- No
- **Factory Setting: No**

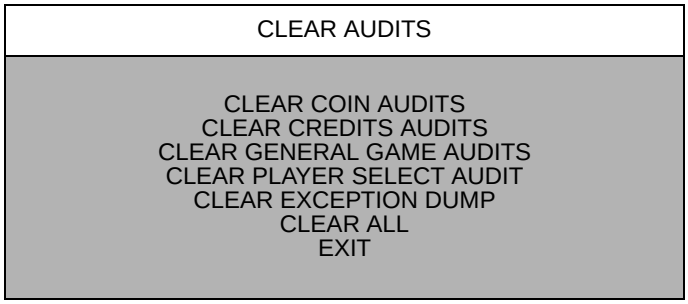
| *Main Menu* |
|---|
| ***Utilities, continued*** |
| **Clear Credits** |

**CLEAR CREDITS**
Press the Volume Up or Volume Down buttons to highlight the Clear Credits option on the Main Menu, then press the Test button. This returns all credit values to zero and removes credit amounts from memory.

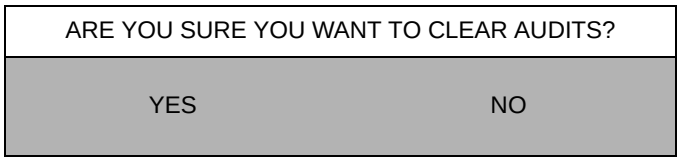
- Yes
- No
- **Factory Setting: No**

| *Main Menu* |
|---|
| ***Utilities, continued*** |
| **Clear Audits** |

**CLEAR AUDITS**
This select from a menu of assorted audit values that can be returned to zero and remove total from memory, Press the Volume Up or Volume Down buttons to highlight the Clear Audits option, then press the Test button.




Each time an option on the menu is activated you are provided with multiple setting choices. Use the Volume Up or Volume Down button to change the current value setting and observe a confirmation box as shown below appears.




***TYPICAL CONFIRMATION BOX***

Press the Volume Up or Volume Down button to select YES or NO, then press the Test button to lock in the setting. Selecting NO cancels any changes values and returns the previous values to memory.

| *Main Menu* |
| --- |
| *Utilities, continued* |
| **Reset High Scores** |

**RESET HIGH SCORES**
Press the Volume Up or Volume Down buttons to highlight the Reset High Scores option on the Main Menu, then press the Test button. This deletes all high scores and removes player identities from memory.

- Yes
- No
- **Factory Setting: No**

| *Main Menu* |
| --- |
| *Utilities, continued* |
| **Default Adjustments** |

**DEFAULT ADJUSTMENTS**
Press the Volume Up or Volume Down buttons to highlight the Default Adjustments option on the Main Menu, then press the Test button. This sets the adjustments back to their original values.

- Yes
- No
- **Factory Setting: No**

| *Main Menu* |
| --- |
| *Utilities, continued* |
| **Full Factory Restore** |

**FULL FACTORY RESTORE**
Press the Volume Up or Volume Down buttons to highlight the Full Factory Restore option on the Main Menu, then press the Test button. This returns every variable in the game to the original factory settings.

- Yes
- No
- **Factory Setting: No**

## CHAPTER THREE

# SERVICE

# SAFETY INSTRUCTIONS

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

**DEFINITIONS OF SAFETY TERMS**

- **DANGER** indicates an imminent hazard. If you fail to avoid this hazard, it WILL cause death or serious injury.
- **WARNING** indicates a potential hazard. If you fail to avoid this hazard, it COULD cause death or serious injury.
- **CAUTION** indicates a potential hazard. If you fail to avoid this hazard, it MAY cause minor or moderate injury. CAUTION also alerts you about unsafe practices.
- **NOTE** indicates information of special importance.

| | |
|---|---|
| | **WARNING: TRANSPORTING GAMES.**<br>The VGM contains glass and fragile electronic devices. Use appropriate care when transporting. Avoid rough handling when moving the cabinet. Do not move with the power switched on. |
| | **WARNING: DISCONNECT POWER.**<br>Always turn the power OFF and unplug the VGM before attempting service or adjustments unless otherwise instructed. Installing or repairing boards with power switched on can damage components and void the warranty. |
| | **WARNING: GROUND GAMES.**<br>Avoid electrical shocks! Do not plug in a VGM until you have inspected and properly grounded it. Only plug this game into a grounded, three-wire outlet. Do not use a “cheater” plug, or cut off the ground pin on the line cord. |
| | **WARNING: AVOID ELECTRICAL SHOCKS.**<br>The VGM system does not utilize an isolation transformer. Internal cabinet AC is not isolated from the external AC line. |
| | **WARNING: HANDLE FLUORESCENT TUBE AND CRT WITH CARE.**<br>If you drop a fluorescent tube or CRT and it breaks, it will implode! Shattered glass can fly eight feet or more from the implosion. |
| | **CAUTION: CHECK POWER SELECTOR, LAMP.**<br>Set the 115/230VAC selector on the power supply for the correct line voltage. Check the selector setting before switching on the VGM. Verify that the fluorescent lamp assembly is correct for the local line voltage. |
| | **CAUTION: USE PROPER FUSE.**<br>Avoid electrical shock! Replacement fuses must be identically rated. Fuse voltage and current ratings must be identically rated to the original fuse. |
| | **CAUTION: ATTACH CONNECTORS PROPERLY.**<br>Be sure board connectors mate properly. If connectors do not slip on easily, do not force them. A reversed connector may damage the VGM and void the warranty. Connector keys only allow a connector to fit one set of pins on a board. |

| | |
|---|---|
| | **CAUTION: USE CARE WHEN SHIPPING HARD DISKS.**<br>The hard disk drive must be packed in an anti-static bag. When shipping the drive for repair or replacement, pack it in an approved container (P/N 08-8068). Do not stack or drop hard disk drives. |
| | **WARNING: HAZARD TO EPILEPTICS.**<br>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 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.<br><br>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.<br><br>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. |

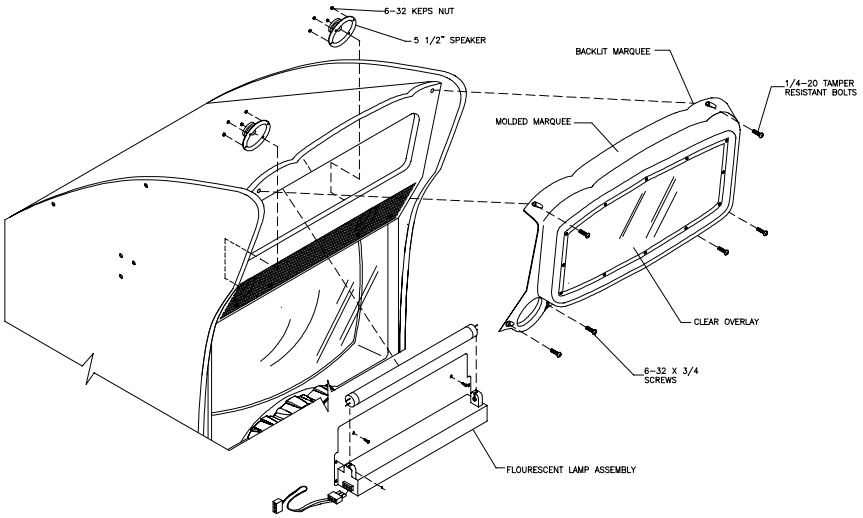
# SERVICING

Only qualified service personnel should perform maintenance and repairs. The product guidelines apply to all operators and service personnel. Specific notes, cautions, and warnings appear throughout the manual where they apply. We recommend that you read the SAFETY NOTICES section thoroughly before beginning service. **NOTE:** *Always switch off power to the game machine before servicing.*

## *To service the Marquee…*

Refer to *Marquee Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Remove the tamper-resistant screws used to fasten the marquee to the top of the cabinet.
- Lift the marquee straight out from the cabinet and set aside to expose the opening of the cabinet.
- Perform the desired repair or equipment replacement.
- To reinstall, align the contoured marquee with the contour of the cabinet.
- Fasten in place with the screws provided.




***MARQUEE SERVICE***

## *To service the Backlit Marquee …*

Refer to *Marquee Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Lift open the Marquee Housing. *Refer to service instructions for Marquee.*
- Reach up inside the opening toward the marquee artwork. The marquee artwork and marquee glass is held in place at the top and sides by spacers/brackets fastened with screws.
- Remove the screws from each of the brackets. Set the screws and brackets aside until reinstallation.
- Lift the marquee artwork or marquee glass out of the housing.
- Perform the desired repair or equipment replacement.

## *To service the Fluorescent Light Assembly…*

Refer to *Marquee Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Lift open the Marquee Housing. *Refer to service instructions for Marquee*.
- Reach up inside the opening in the cabinet and disconnect the power cable from the fluorescent light assembly.
- Loosen, but do not remove the screws fastening the assembly to the cabinet.
- Slide the assembly slightly forward to disengage the keyholes. Lift out the assembly.
- Perform the desired repair or equipment replacement.

### *To service the Fluorescent Lamp or Starter…*

Refer to *Marquee Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Lift open the Marquee Housing. *Refer to service instructions for Marquee.*
- Reach up inside the opening in the cabinet and remove the fluorescent lamp locks.
- Both the fluorescent tube and the starter require a quarter turn for removal. Grasp the tube or starter, give it a quarter turn and pull it from its socket.
- Carefully place a new starter or tube into the sockets and rotate it a quarter turn to reinstall.
- Reinstall both fluorescent lamp locks. Clean the tube to remove fingerprints and dust.

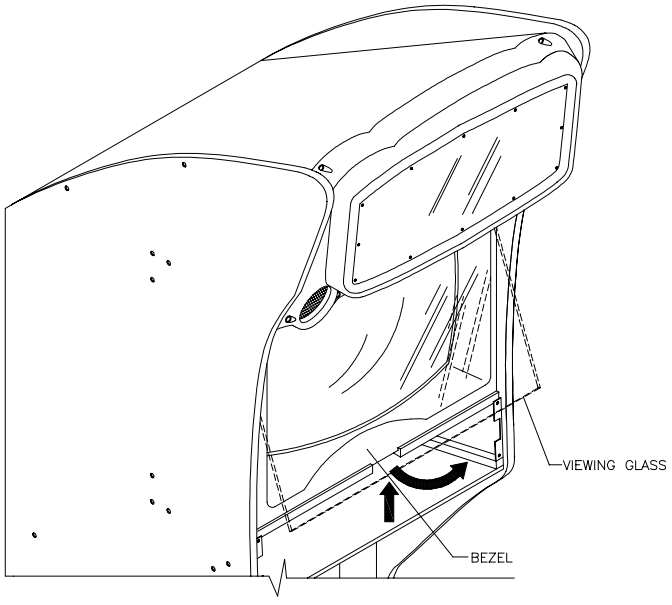
| | |
|---|---|
| ⚠ | **WARNING**<br>**Fluorescent tubes implode on impact when dropped. Use care in handling.** |

### *To service the Cabinet Speakers…*

Refer to *Marquee Service* illustration. Speakers are located on the underside of the marquee housing.

- Switch off the power to the game machine and unplug the AC line cord.
- Lift open the Marquee Housing. *Refer to service instructions for Marquee*.
- Reach up inside the opening in the cabinet and disconnect the speaker wires, including the ground strap.
- Remove the nuts on the mounting screws before removing the speakers from the enclosure.
- Perform the desired repair or equipment replacement.
- Carefully reseat the seals upon completing any task in the speaker enclosure.
- Reconnect the wires, including ground. Refer to the Cabinet Wiring Diagram for correct speaker polarity.

**NOTE:**The speakers are magnetically shielded to prevent video monitor color impurity. Be sure that any replacement speakers are also magnetically shielded.




***VIEWING GLASS AND BEZEL SERVICE***

### *To service Viewing Glass…*

Refer to *Viewing Glass and Bezel Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Remove the dashboard. *Refer to service instructions for Dashboard.*
- Gently slide the viewing glass up and lift it out of the cabinet. Set the viewing glass aside.
- Perform the desired repair or equipment replacement.
- Clean both the bezel and the viewing glass before reinstallation.

### *To service Monitor Bezel…*

Refer to *Viewing Glass and Bezel Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Remove the dashboard. *Refer to service instructions for Dashboard.*
- Gently slide the viewing glass up and lift it out of the cabinet. Set the viewing glass aside.
- Grasp the monitor bezel at the bottom and lift it out of the cabinet.
- Perform the desired repair or equipment replacement.
- Clean both the bezel and the viewing glass before reinstallation.

### *To service the Monitor (CRT)…*

We recommend that you read the WARNINGS thoroughly before beginning this procedure.

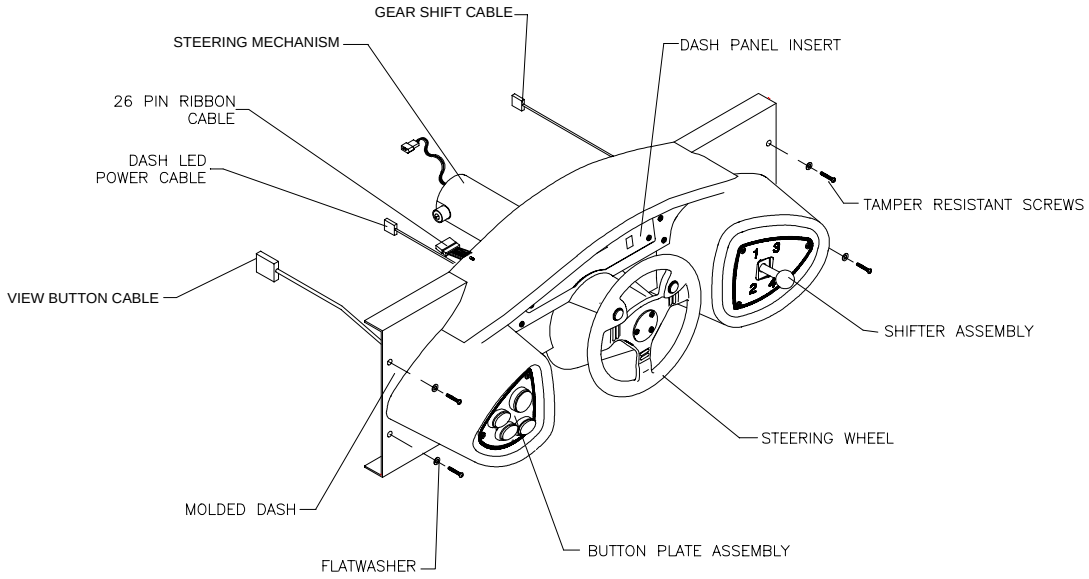
| | |
|---|---|
| | **CAUTION**<br>The video monitor is heavy, with most of the weight toward the front of the assembly. Be sure it is firmly supported as it is moved from the cabinet. |
| | **WARNING**<br>The monitor does not require isolation from the AC line voltage in normal operation. When operating outside the cabinet or servicing the monitor on a test bench, ISOLATE THE MONITOR FROM LINE VOLTAGE WITH AN ISOLATION TRANSFORMER. |

- Switch off the power to the game machine and unplug the AC line cord.
- Remove the Dashboard, Viewing Glass and Monitor Bezel. *Refer to service instructions for the Dashboard, Viewing Glass and Monitor Bezel.*
- Open the rear cabinet door and disconnect the monitor from the wiring harness and ground wires.
- Remove 4 nuts securing the monitor mounting flanges to the mounting panel.
- Pull the monitor carefully from the cabinet and set aside.
- Perform the desired repair or equipment replacement.

### *To service the Dashboard…*

Refer to *Dashboard Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Open the rear cabinet door.
- Label and disconnect all dash wiring, including the ground strap.
- Remove the four screws used to fasten the Dashboard to the cabinet.
- Firmly grab the dash and pull it straight out. **NOTE:** *The Dashboard is heavy, with most of the weight concentrated in the center near the Steering Mechanism.*
- Perform the desired repair or equipment replacement.
- To reinstall, line-up the holes on either side of the Dashboard and push straight back.
- Check for pinched wires, and then reconnect dash wiring and ground strap.
- Fasten in place with the screws provided.




***DASHBOARD SERVICE***

## *To service the Dash Panel Insert …*

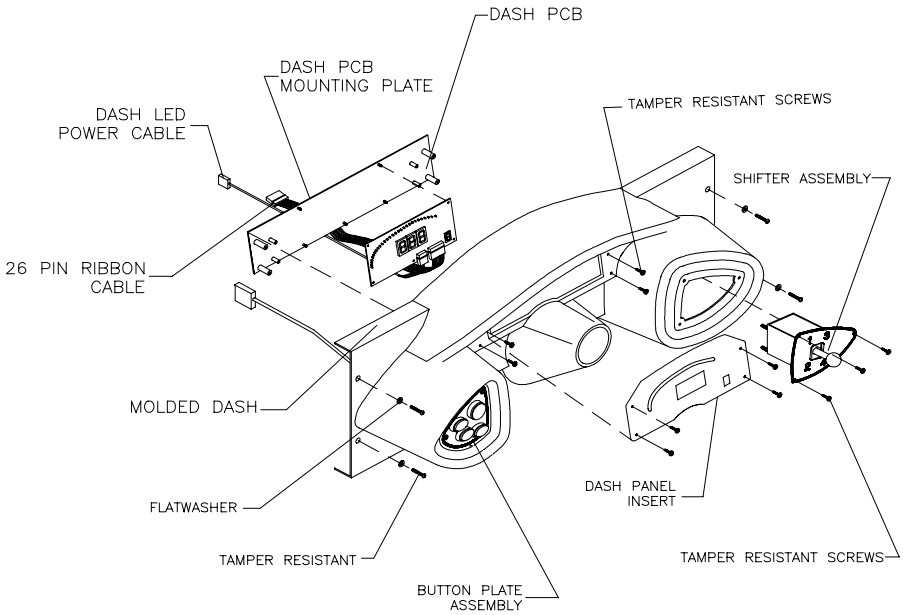
Refer to the *Dashboard Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Remove the Dashboard. *Refer to service instructions for Dashboard.*
- Remove 4 tamper resistant screws used to fasten the cover to the molded dash and set aside.
- Lift the plastic cover plate off of the PCB and dash.
- Perform the desired repair or equipment replacement. NOTE: *It may also be necessary to remove the Dash PCB. Refer to service instructions for Dashboard PCB.*
- Reinstall and fasten in place with the screws provided.

## *To service the Dashboard PCB…*

Refer to the *Dash PCB Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Remove the Dashboard. *Refer to service instructions for the Dashboard*
- Remove the steering wheel, shifter plate assembly, and buttons plate assembly. Refer to service instructions for the steering assembly, shifter and buttons.
- Remove 4 tamper resistant screws used to fasten the PCB back plate to the molded dash and set aside.
- Remove the tamper resistant screws used to fasten down the dash panel insert. Lift the insert from the dash.
- Pull out the PCB back plate from the molded dash.
- Remove the ribbon and power cable connections.
- Remove the snaps used to fasten the PCB to the back plate. Lift the PCB off the back plate.
- Perform the desired repair or equipment replacement.
- Connect the ribbon and power cable to a Dashboard PCB. NOTE: *The red stripe on the ribbon cable must be lined up with pin 1 on the PCB, and the black wire on the power cable must line up with pin 1 on the power connection for the Dashboard.*
- Reattach the PCB to the back plate, and then fasten the back plate to the molded dash.
- Check for pinched wires.
- Reinstall the Dashboard and fasten in place with the screws provided.




***DASH PCB SERVICE***

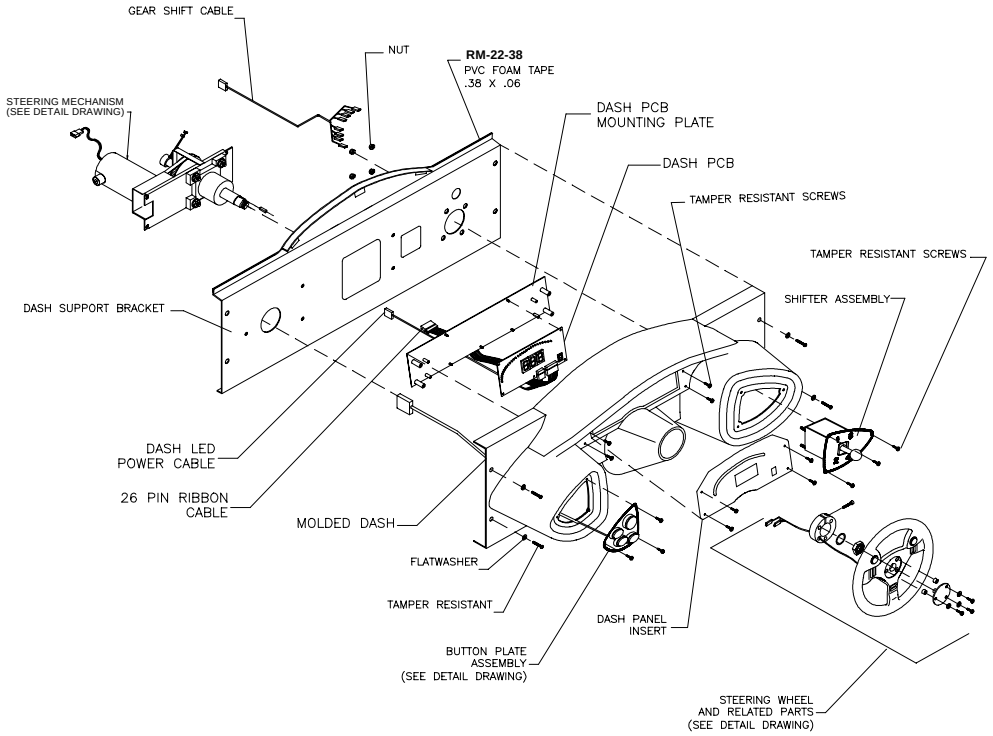
## *To service Shifter…*

Refer to the *General Dashboard Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Remove the Control Cabinet and the Dashboard. Refer to service instructions for Control Cabinet and Dashboard.
- Remove the tamper resistant screws used to fasten the molded plastic cover on the control cabinet. Lift the cover off of the cabinet and set aside.
- Label and disconnect all wiring.
- Remove the tamper-resistant screws used to fasten both of the faceplates.
- Pull the shifter plate and button plate forward enough to expose the switches. Label and disconnect wiring to switches.
- Lift button assembly completely out of the dash and set aside.
- Remove the bolts used to fasten the shifter enclosure to the dash plate.
- Lift enclosure from dash plate. Label and disconnect wires.
- Perform the desired repair or equipment replacement.
- Reconnect wires and reinstall shifter.
- Check for pinched wires.
- Fasten the faceplate with the screws provided.

## *To service Start and View Buttons…*

- Switch off the power to the game machine and unplug the AC line cord.
- Remove the 3 tamper-resistant buttons used to fasten the faceplate.
- Pull the plate forward enough to expose the switches.
- Label and disconnect the wiring.
- Lift assembly completely out of the dash and set aside.
- Perform the desired repair or equipment replacement.
- Reconnect wires and reinstall buttons.
- Check for pinched wires.
- Fasten the faceplate with the screws provided.




***GENERAL DASHBOARD SERVICE***

## *To service Steering Assembly…*

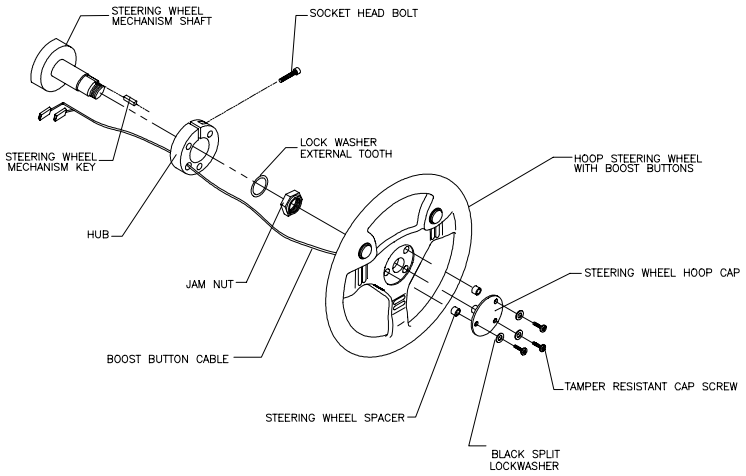
- Refer to the *General Dashboard Service* illustration.
- Switch off the power to the game machine and unplug the AC line cord.
- Remove the Dashboard. *Refer to service instructions for Dashboard.*
- Remove 6 screws used to fasten the cover plate to the center of the steering wheel. Remove the cover plate and set aside.
- Remove the 3 screws used to fasten the wheel hoop to the shaft. Pull the wheel hoop off of the dashboard. Disconnect the harness for the buttons on the steering wheel.
- Remove 4 flange nuts holding the motor shield, motor and shaft to the wheel assembly (shield not required on all cabinets).
- Slide the motor and the shaft off of the assembly.
- Perform the desired repair or equipment replacement.
- Reinstall and fasten all items in place with the screws provided.

While the steering mechanism is exposed, inspect the belt for splits in the rubber or other signs of wear at the edges of the teeth. Install a new belt if necessary following the instructions below.

## *To service Steering Belt…*

- Loosen four mounting nuts for the motor bracket.
- Tighten the tension-adjust bolt only until there is no belt deflection, then loosen the bolt one full turn and tighten the four nuts.
- Reattach the mechanism and recalibrate the assembly.

**IMPORTANT**: Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) and torque set screw to seven to nine ft.-lbs. (84 to 108 in.-lbs.) if it was loosened.




***STEERING WHEEL HOOP SERVICE***

## *To service Boost Buttons on the Steering Wheel Hoop…*

Refer to the *Steering Wheel Hoop Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Remove the screws used to fasten the wheel hoop cap to the steering wheel. Lift of the hoop cap off and set it aside with the hardware for reuse later.
- Lift out the steering wheel spacers.
- Gently pull the steering wheel forward enough to expose the boost button cable connector.
- Unplug the boost button cable. Remove the steering wheel completely from the dashboard.
- Turn the steering wheel over to observe the rear side of the wheel hoop. Remove the tamper resistant screws used to fasten the rear cover to the steering wheel hoop. Lift the cover off and set aside with the hardware for reuse later.
- Use a desoldering tool coupled with a soldering iron to remove the solder used to attach the cable wires to the button's switch. **NOTE:** Use caution when performing this step to avoid becoming burned by liquefied solder and /or to avoid melting plastic parts.
- Allow the area surrounding the switch and button to cool properly before proceeding.
- Unscrew the nut on the button. Lift the button out of the steering wheel hoop.
- Perform the desired repair or equipment replacement.
- Be sure to solder the cable wires to the button's switch when reinstalling a button(s).
- Reinstall and fasten all items in place with the screws provided.

## *To service Lower Cabinet Speaker…*

This speaker is located just above the pedal assembly.

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock and remove the rear cabinet door.
- Label and disconnect wiring, including the ground strap, to Board assemblies attached to the electronics shelf.
- Remove the screws used to fasten the electronics shelf inside the cabinet, then remove the shelf and set it aside.
- Locate the speaker. Remove the nuts on the mounting screws before removing the speaker from the enclosure.
- Perform the desired repair or equipment replacement.
- Carefully reseat the seals upon completing any task in the speaker enclosure.
- Reconnect the wires, including ground. Refer to the Cabinet Wiring Diagram for correct speaker polarity.

### *To service Pedal Assembly…*

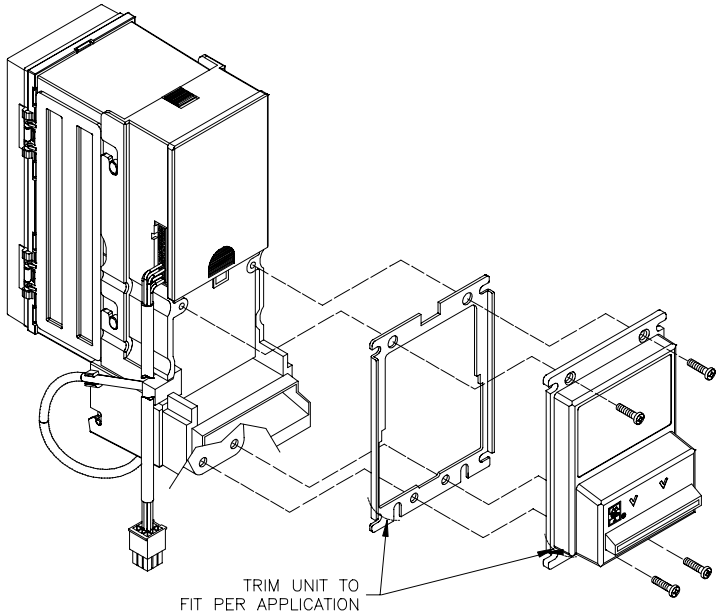
- Switch off the power to the game machine and unplug the AC line cord.
- Adjust the seat to the maximum rear position.
- Remove 4 tamper resistant screws used to fasten the Pedal assembly to the cabinet. **NOTE:** *Due to the weight of the pedal assembly it may slide or abruptly jerk out of the opening once all screws are loosened and/or removed.*
- Pull the assembly forward enough to expose wiring.
- Carefully note the orientation of the cable wiring. Label and disconnect wiring, including ground.
- Perform the desired repair or equipment replacement.
- Reinstall pedal assembly and reconnect wiring, including ground.
- Align the holes for the screws and fasten in place with the hardware provided.

### *To service Coin Meter…*

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock the cash door and swing it open. Remove the cash tubs.
- The meter is located on a plate at the vault bottom. Remove the screws and lift the plate just enough to disconnect the meter wires from the harness.
- Record the meter count before testing or replacement.
- Perform the desired repair or equipment replacement.

### *To service Coin Mechanism…*

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock the coin door and swing it open.
- Unlatch and remove each coin mechanism separately to clean or replace with a different type. Ensure mechanism seats fully in the holder upon reinstallation.
- Close and lock the release latch, then close the door.
- Turn on the game and change the mechanism setup, then test known good and bad coins to verify operation.




***DOLLAR BILL VALIDATOR SERVICE***

### *To service Dollar Bill Validator…*

(Use MARS AE2411-U3 UL recognized currency changer)
Dollar bill validators or other currency acceptors may be installed in games that are manufactured with the additional wiring connector.

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock the coin door and swing it open. Read the label affixed to the door for additional information.
- Disassemble the validator and remove material to permit it to fit inside the coin door as illustrated then reassemble unit.

### *To service PCB Board Assemblies…*

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock and remove the rear door.
- Remove the screws used to fasten the hinged, metal cage covering the PCB Assembly.
- Open the cover, which is hinged along the bottom edge, to expose the PCB assembly.
- Carefully note the orientation of the JAMMA connector and the other cables. Extract the harness and other cables from the board connectors.
- Remove the mounting screws from the desired circuit board assembly. Lift the board out of the cabinet and set in a safe place. Use anti-static bags and protective containers from new parts for storage if not reinstalled immediately.
- Perform the desired repair or equipment replacement.
- Be certain to reinstall the perforated cover so that it seals against the metal plate.

**CAUTION**
Discharge any static electricity built up in your body by touching the chassis for the power supply. Do this BEFORE touching or handling the electronic assemblies.

### *To service Wheel Driver Board Assembly…*

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock and remove the rear door.
- Remove the screws used to fasten the hinged, perforated metal cage covering the PCB Assembly.
- Open the cage, which is hinged along the bottom edge, to expose the PCB assembly.
- Carefully note the orientation of the cables. Extract the harness and other cables from the board connectors.
- Remove the wheel driver board assembly mounting screws. Lift the board out of the cabinet and set in a safe place. Use anti-static bags and protective containers for storage if not reinstalled immediately.
- Perform the desired repair or equipment replacement.
- Be certain to reinstall the metal cover so that it seals against the metal cage.

### *To service the Main Boot, PIC or Sound ROM…*

The ROM (Read Only Memory) circuits contain the computer operating instructions for the game. The Main Boot ROM is located on the Mango PCB; the sound ROM is located on the Vegas SIO PCB; the PIC chip is located on the Vegas SIO PCB.

*Memory devices are especially sensitive to static charges. Use grounding precautions when handling these parts.*

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock and remove the rear door.
- Remove the screws used to fasten the hinged, metal cage covering the desired PCB Assembly.
- Open the cover, which is hinged along the bottom edge, to expose the PCB assembly.
- Carefully note each IC position, and then remove using a chip extraction tool.
- To install memory circuits, orient a chip over the corresponding socket and press firmly to seat pins. *Do not force.*

**CAUTION**
Discharge any static electricity built up in your body by touching the chassis for the power supply. Do this BEFORE touching or handling the electronic assemblies

### *To service the Battery…*

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock and remove the rear door.
- Remove the screws used to fasten the hinged, metal cage covering the PCB Assembly.
- Open the cage, which is hinged along the bottom edge, to expose the PCB assembly.
- Locate the battery on the Vegas SIO Board assembly, and then remove using a chip extraction tool.
- To install a battery, orient a battery over the corresponding socket and press firmly to seat. **NOTE:** Do not force; the battery is notched and will only fit in the socket one way.

### *To service an Auxiliary Board Assembly…*

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock and remove the rear door.
- Remove the screws used to fasten the hinged, metal cage covering the PCB Assembly.
- Open the cover, which is hinged along the bottom edge, to expose the PCB assembly.
- Carefully note the orientation of the cables. Extract the harness and other cables from the board connectors.
- Remove the assembly mounting screws. Lift the board out of the cabinet and set in a safe place. Use anti-static bags and protective containers for storage if not reinstalled immediately.
- Perform the desired repair or equipment replacement.
- Be certain to reinstall the metal cover so that it seals against the metal cage.

### *To service the Power Supply…*

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock and remove the rear cabinet door.
- Unplug the IEC AC connector from the rear of the supply and the DC connector from the front.
- Remove the two front and two rear screws from the supply, then lift it off of the power chassis. Note voltage setting.
- Perform the desired repair or equipment replacement.
- Be sure to set the voltage switch to the correct value prior to reinstallation.
- Set the supply on the power chassis and align the mounting holes. Install the four screws and the two power connectors.

### *To service the Transformer…*

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock and remove the rear door.
- If the power to the Video Game Machine (VGM) was only recently disconnected, the transformer may still be warm. Allow the transformer to cool completely before handling.
- Label and disconnect all wiring, including ground.
- Remove the screws used to fasten the transformer to the base of the cabinet.
- Perform the desired repair or equipment replacement.

**DANGER**
High voltage present. Exercise extreme caution while servicing transformer.

### *To service Fan Assembly…*

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock and remove the rear door.
- Remove the perforated metal cover to expose the fan assembly and set aside.
- Unplug the fan power connector from the wiring.
- Remove the screws used to fasten a fan down and then lift fan out.
- Perform the desired repair or equipment replacement.

### *To service Speakers in Head Rest…*

Refer to the *Seat Pedestal Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Remove the tamper resistant screws from the speaker grille.
- Remove the tamper resistant screws used to fasten the speaker plate to the seat and pull forward.
- Label and disconnect wires, including ground.
- Remove the nuts used to fasten the speaker to the plate and remove speaker(s).
- Perform desired repair or equipment replacement.
- Reinstall the speaker(s) to the speaker plate and reattach wiring, including ground. Attach the speaker plate to the seat.
- Reinstall speaker grille and fasten in place with hardware provided.

### *To service Speaker in Seat Back…*

Refer to the *Seat Pedestal Service* illustration.

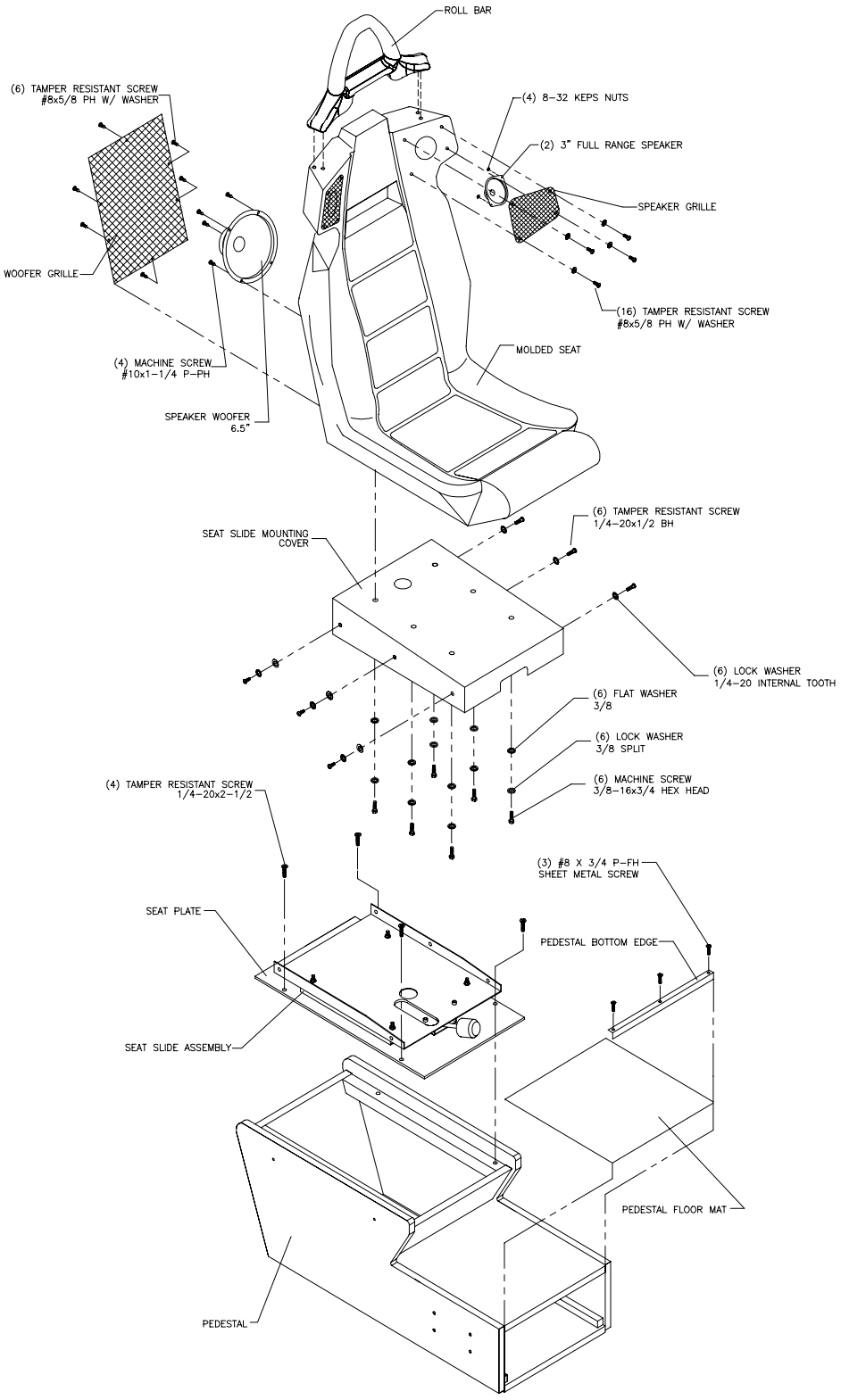
- Switch off the power to the game machine and unplug the AC line cord.
- Remove the tamper resistant screws used to fasten the grille to the seat and pull forward.
- Label and disconnect wires, including ground.
- Remove 4 Phillips head screws used to fasten the speaker to the seat and remove speaker.
- Perform desired repair or equipment replacement.
- Reinstall speaker and reattach wiring, including ground.
- Reinstall speaker grille and fasten in place with hardware provided.

### *To service the Seat Slide Assembly…*

Refer to the *Seat Pedestal Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Disconnect the Seat Assembly from the cabinet by removing the tamper resistant screws used to fasten the assembly to the slide rails in the cabinet.
- Slide the Seat Assembly halfway back along the rails to expose wiring.
- Disconnect the speaker cable and slide the seat the rest of the way off the rails.
- Remove 3 tamper resistant screws from each side of the seat mounting plate. Lift the seat and mounting plate assembly off the pedestal and set aside.
- Slide the seat assembly forward, and remove the two tamper resistant screws from the rear of the metal panel on top of the pedestal assembly.
- Slide the seat assembly backward and remove the two tamper resistant screws from the front of the metal panel.
- Lift the metal panel out of the pedestal base and turn the unit over.
- Remove the four nuts holding the metal panel to the slide assembly. Set the metal panel aside and slide assembly is exposed.
- Perform the desired repair or equipment replacement.
- Reinstall by performing the steps in reverse and fasten in place using the hardware provided.

**IMPORTANT:** Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) and torque each bolt to seven to nine ft.-lbs. (0.7 to 1.0 Nm) if it was loosened (see illustration).




***SEAT PEDESTAL SERVICE***

### *To service the Seat Assembly…*

*The Seat Assembly includes the pedestal base***.** Refer to the *Seat Pedestal Service* illustration.

- Switch off the power to the game machine and unplug the AC line cord.
- Disconnect the Seat Assembly from the cabinet by removing 8 tamper resistant screws used to fasten the assembly to the slide rails in the cabinet.
- Slide the Seat Assembly halfway back along the rails to expose wiring.
- Disconnect the speaker cable and slide the seat the rest of the way off the rails.
- Remove 3 tamper resistant screws from each side of the seat mounting plate. Lift the seat and mounting plate assembly off the pedestal.
- Place the seat on its back, on a flat surface. Perform the desired repair or equipment replacement.
- Reinstall using the hardware provided.

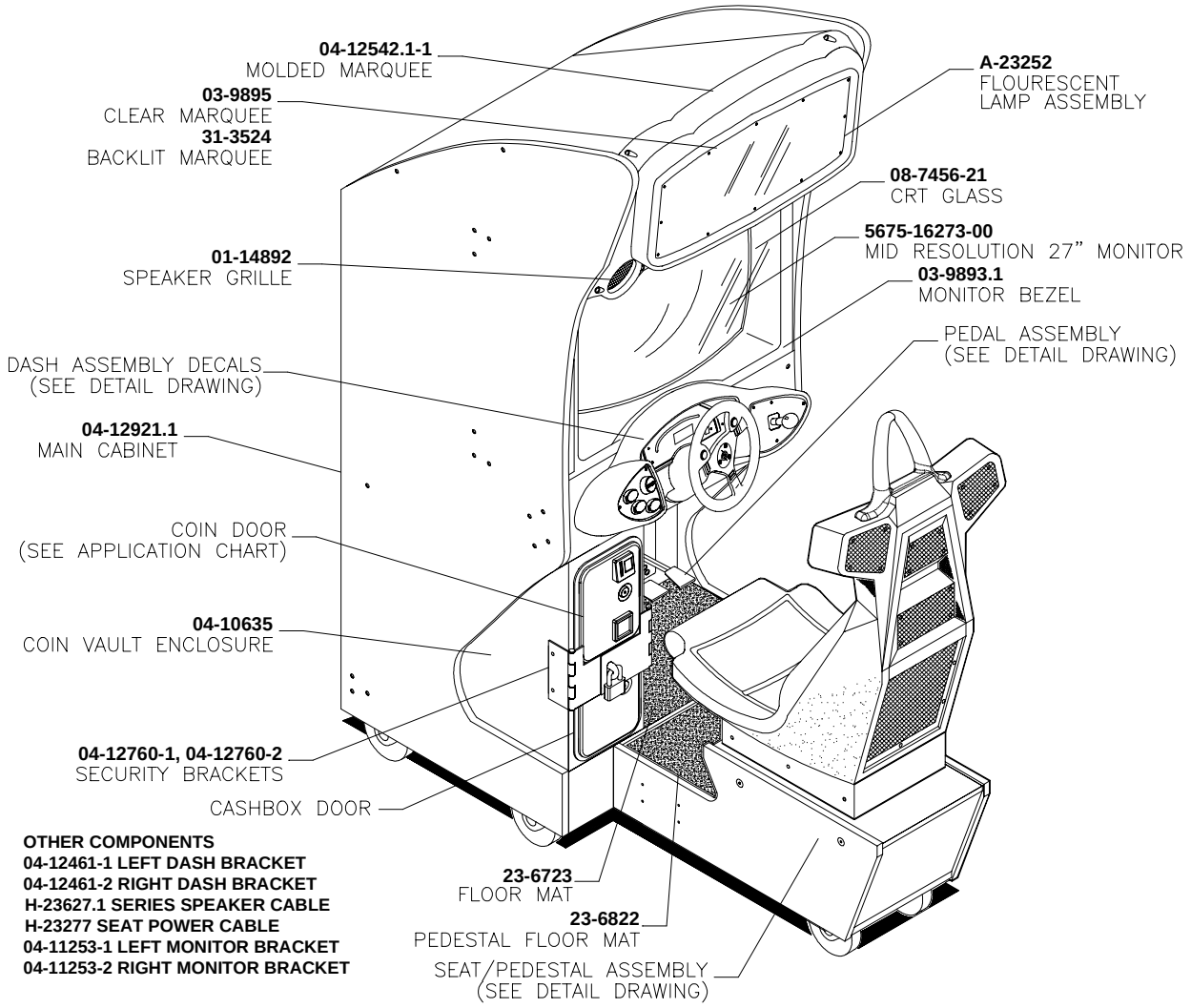
**IMPORTANT:** Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) and torque each bolt to seven to nine ft.-lbs. (0.7 to 1.0 Nm) if it was loosened (see illustration).

## CHAPTER FOUR

# PARTS

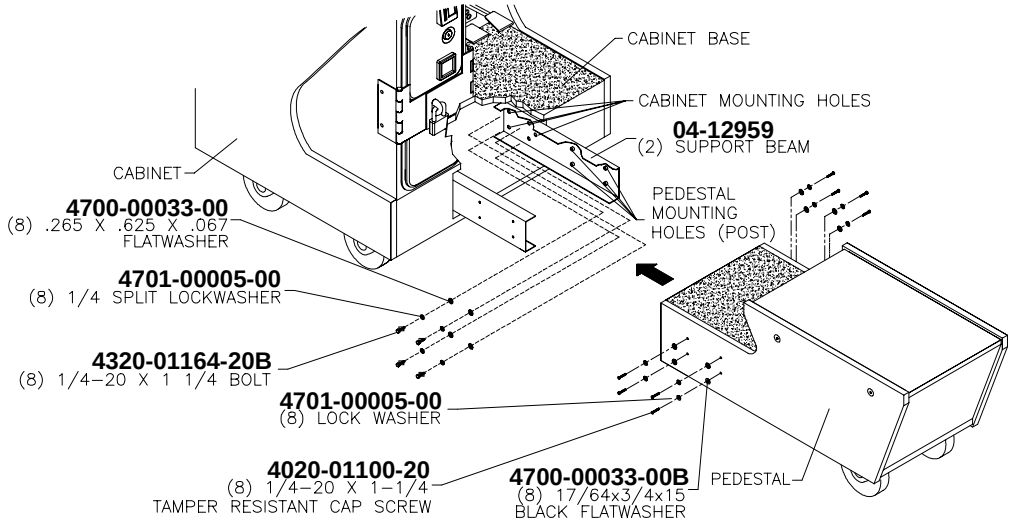
| | |
|---|---|
| | WARNING: Use of Non-Midway parts or circuit modifications may cause serious injury or equipment damage! Use only Midway authorized parts.<br>• For safety and reliability, substitute parts and modifications are not recommended.<br>• Substitute parts or modifications may void EMC directive or FCC type acceptance. |

### *Cabinet Front View*

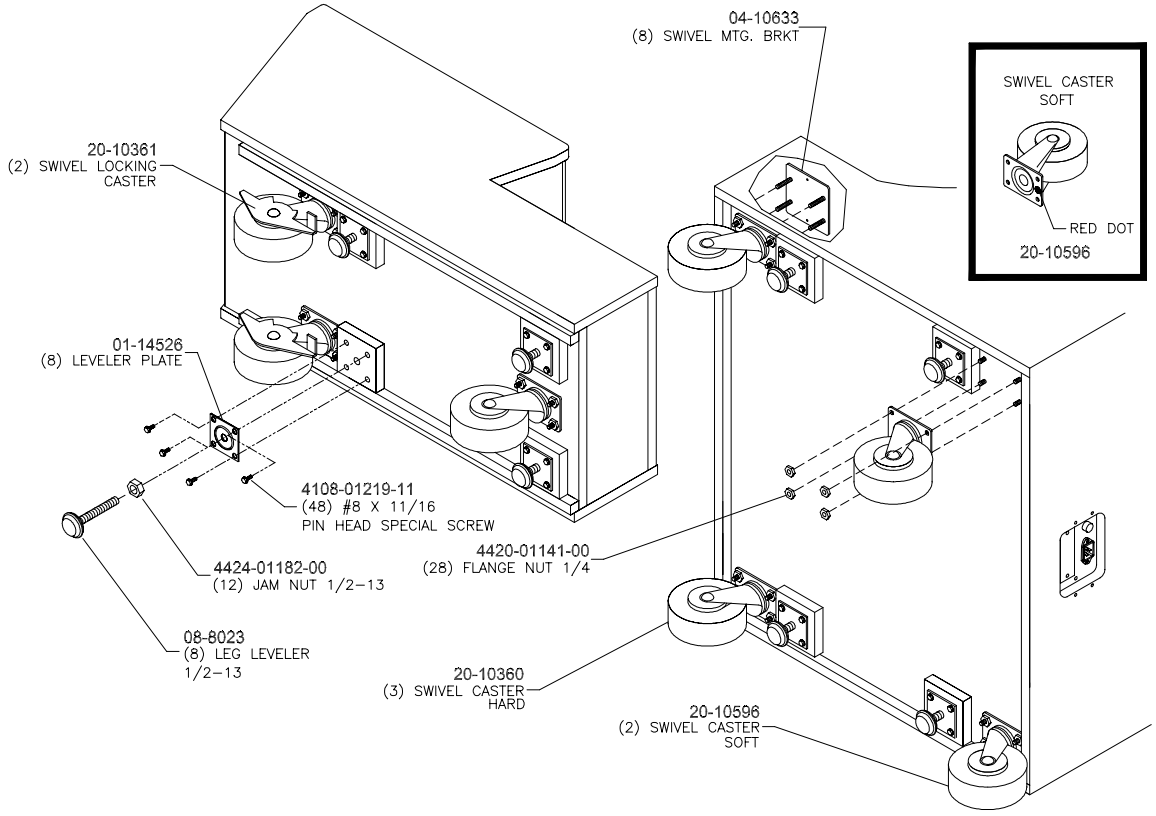



**OTHER COMPONENTS**
**04-12461-1 LEFT DASH BRACKET**
**04-12461-2 RIGHT DASH BRACKET**
**H-23627.1 SERIES SPEAKER CABLE**
**H-23277 SEAT POWER CABLE**
**04-11253-1 LEFT MONITOR BRACKET**
**04-11253-2 RIGHT MONITOR BRACKET**

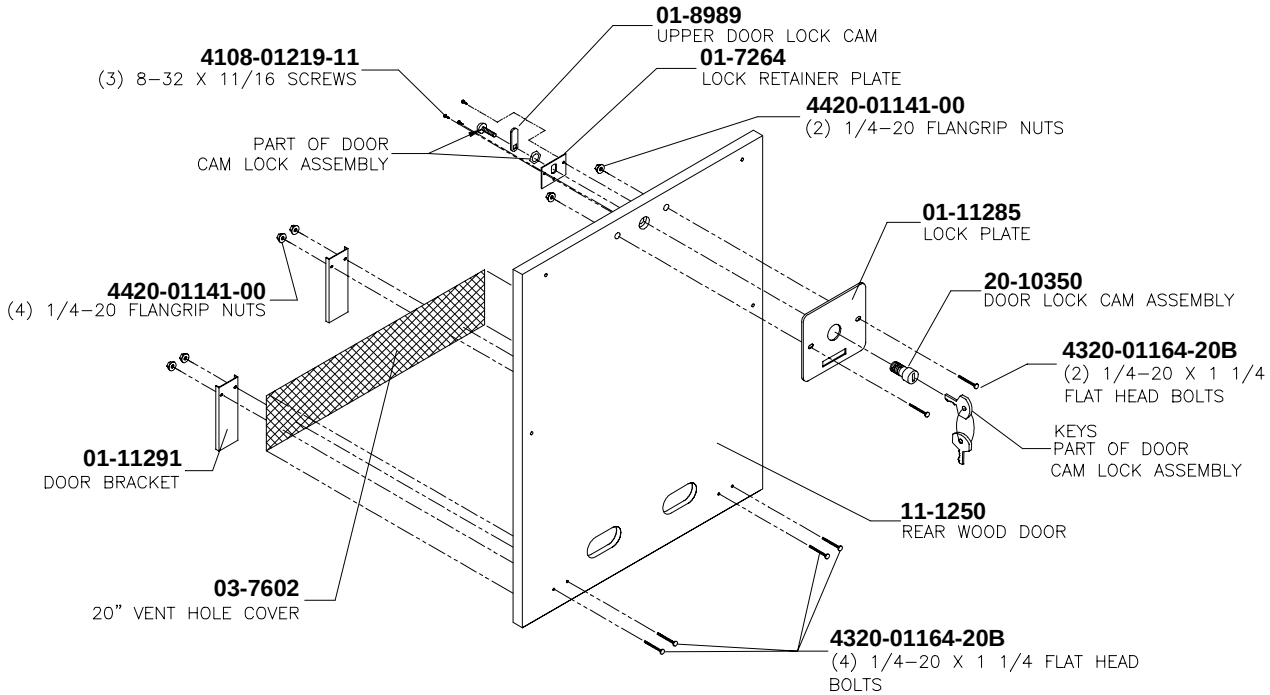
### *Pedestal Assembly*



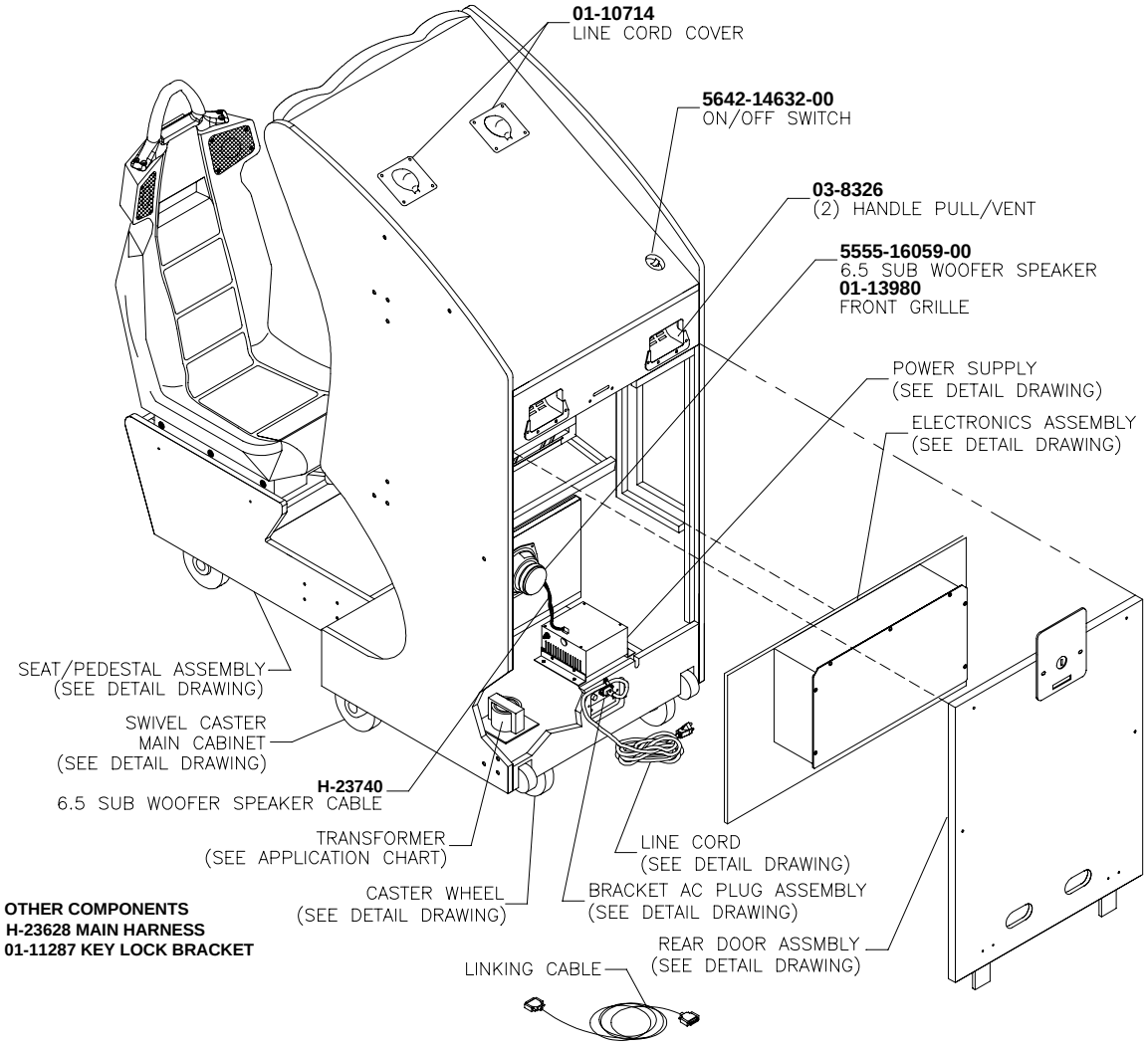
### *Caster & Leveler Assemblies*



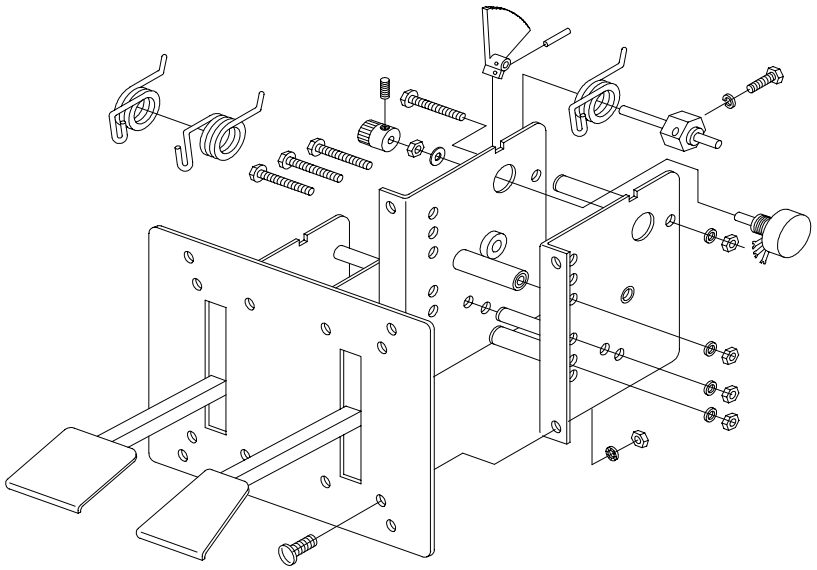

### *Rear Door Assembly*



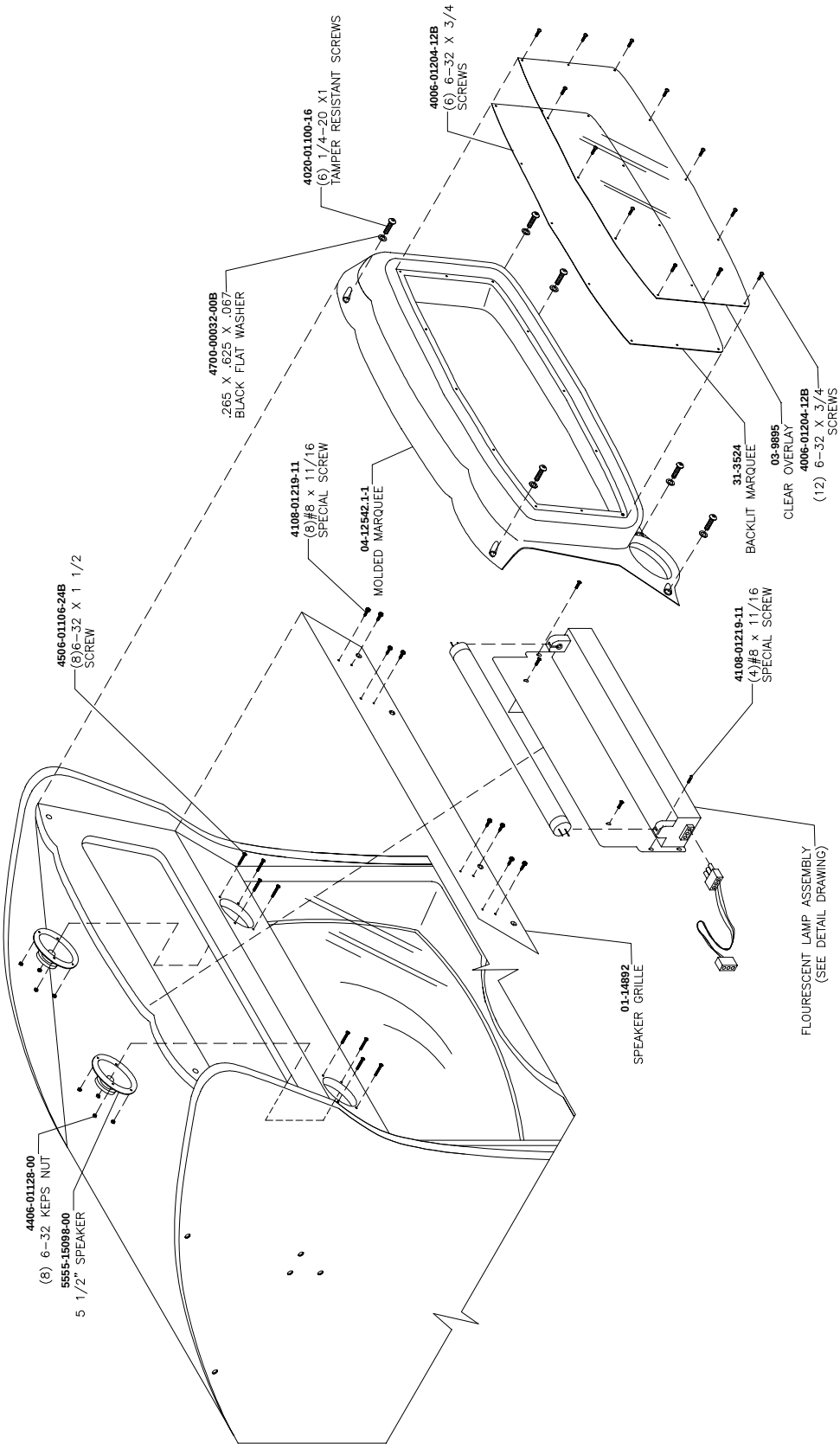
### *Cabinet Rear View*



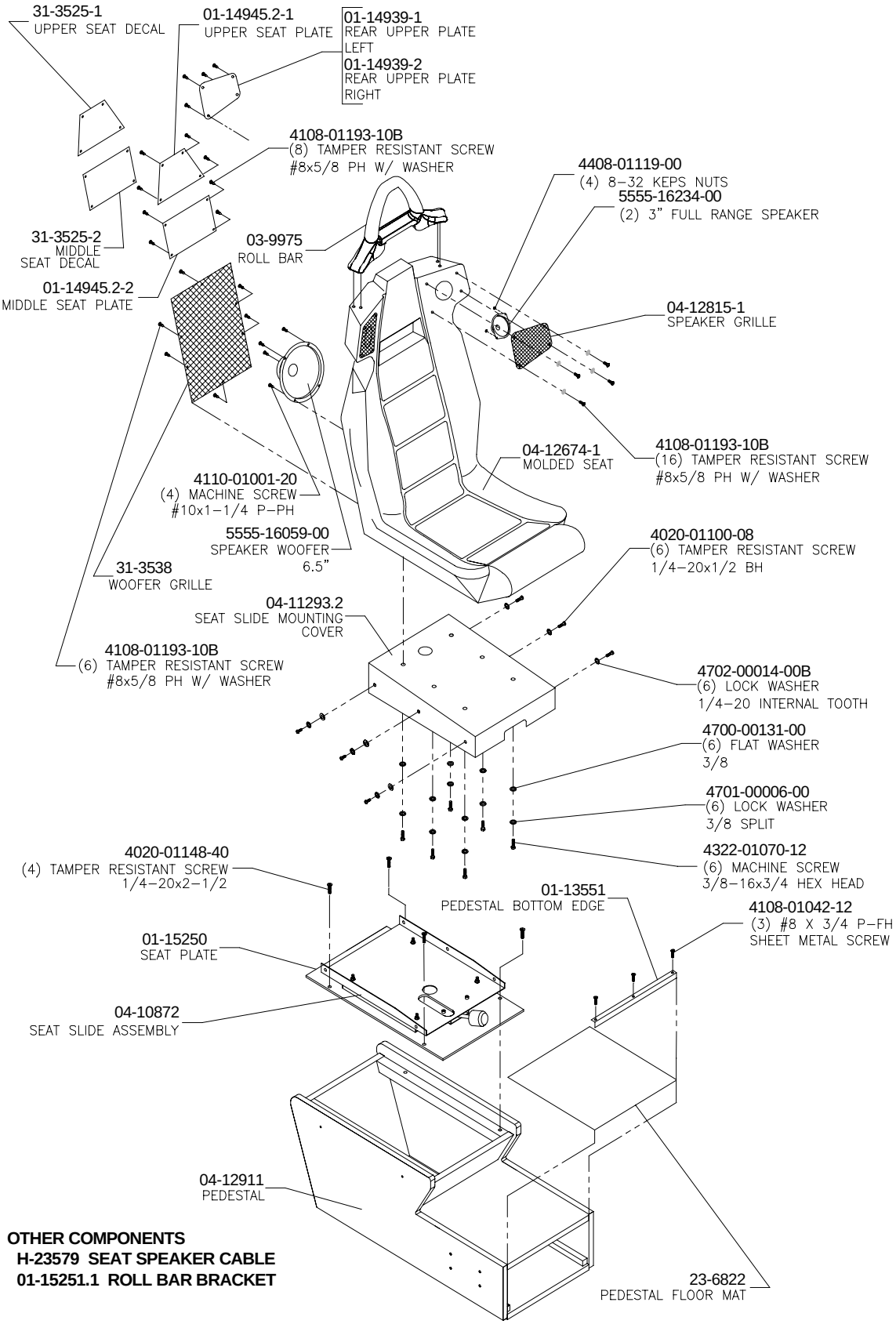

### *Pedal Assembly 20-10135*



***Marquee Assembly***

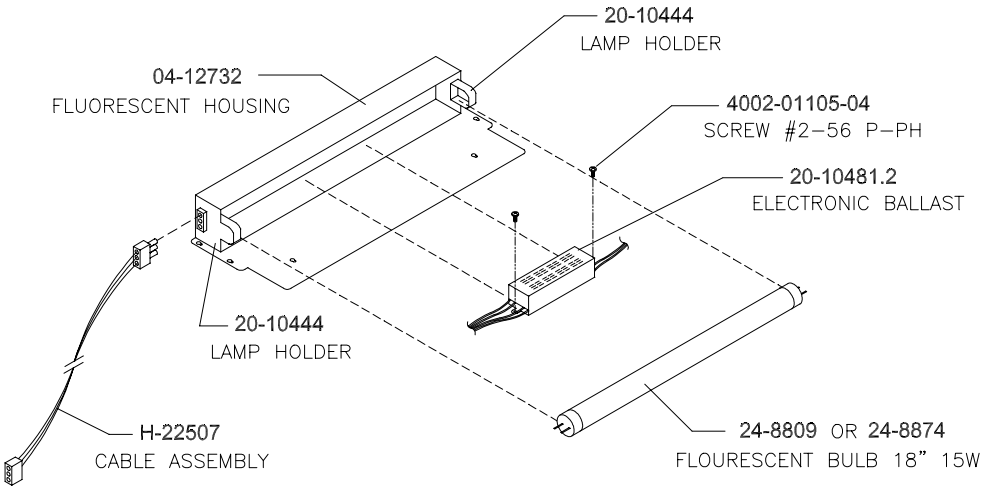


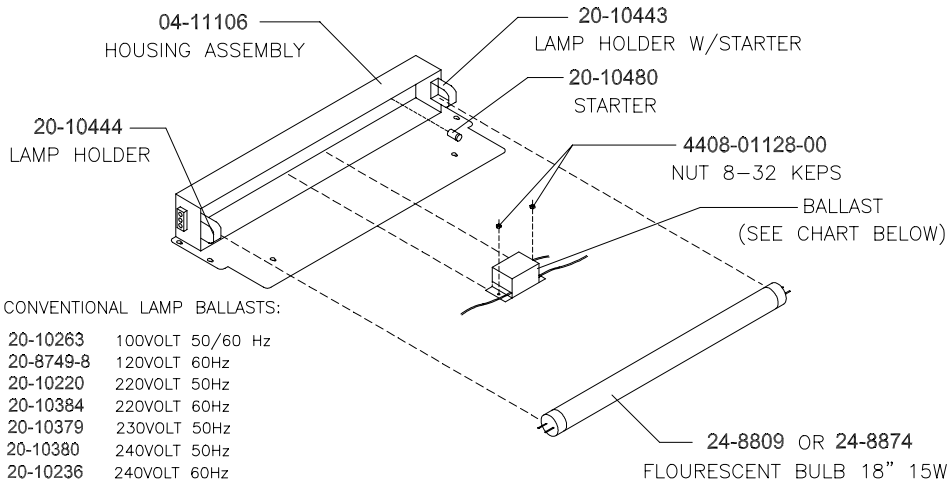
## *Seat Pedestal Assembly*




**OTHER COMPONENTS**
**H-23579 SEAT SPEAKER CABLE**
**01-15251.1 ROLL BAR BRACKET**

***Lamp Assembly A-23252***

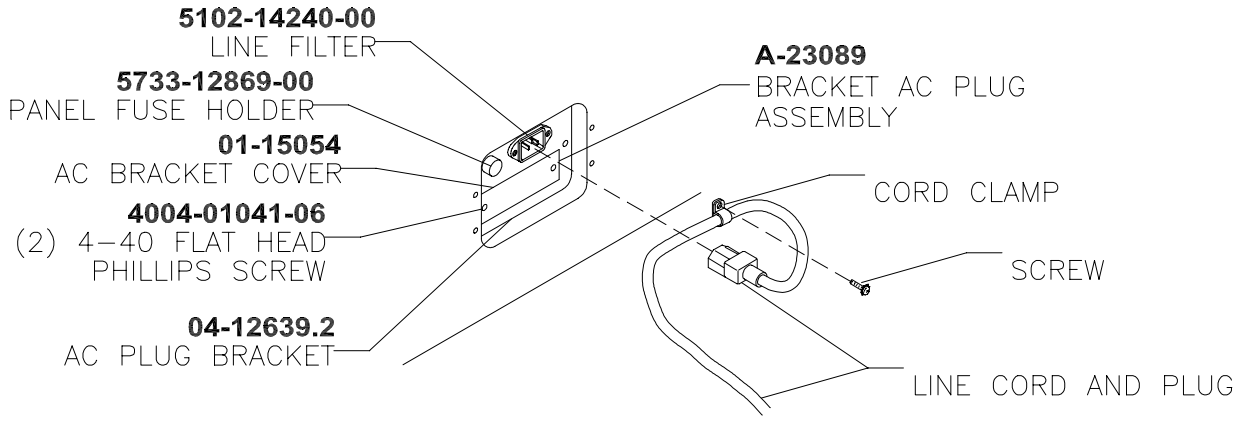


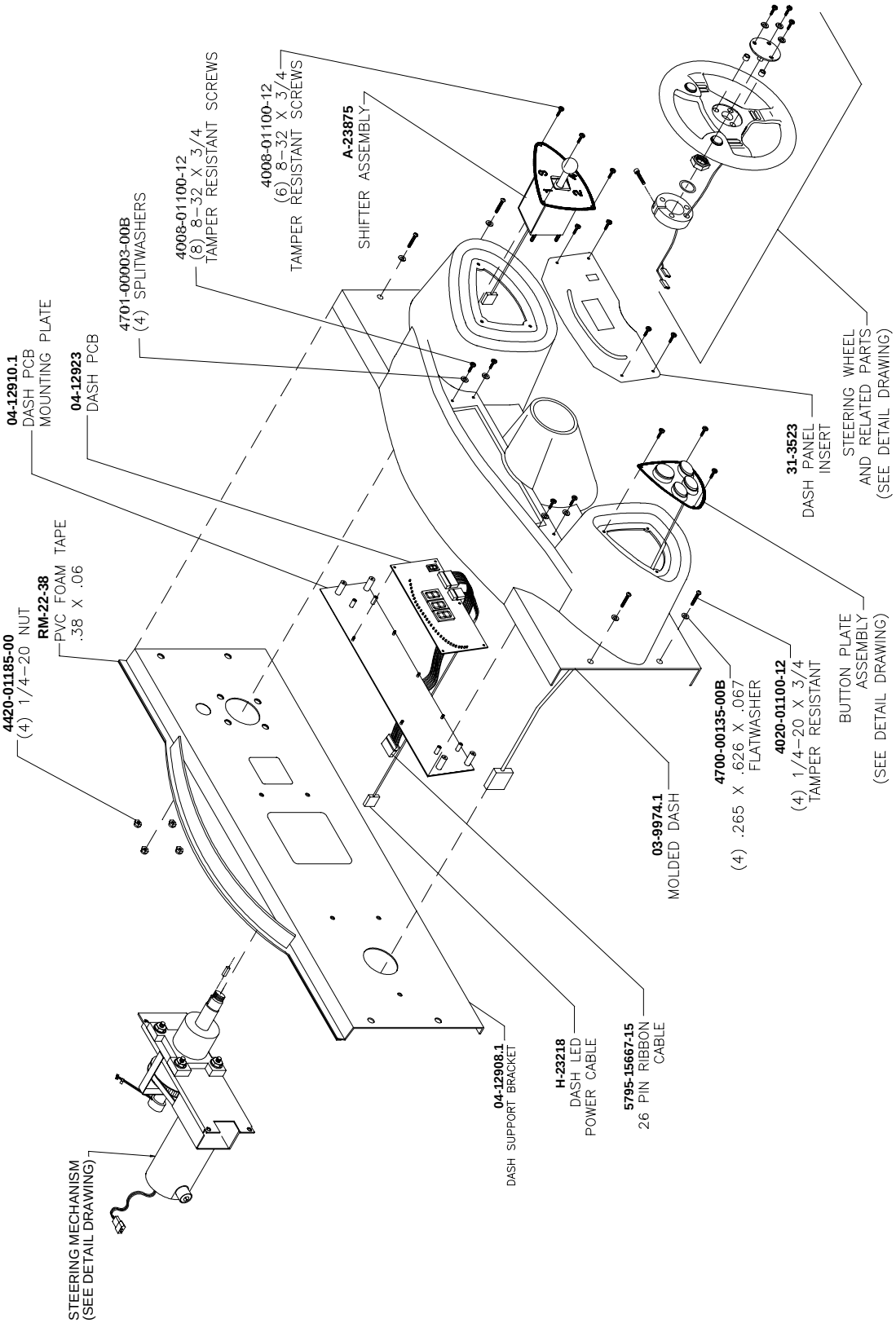

CONVENTIONAL LAMP BALLASTS:

| | |
|---|---|
| 20-10263 | 100VOLT 50/60 Hz |
| 20-8749-8 | 120VOLT 60Hz |
| 20-10220 | 220VOLT 50Hz |
| 20-10384 | 220VOLT 60Hz |
| 20-10379 | 230VOLT 50Hz |
| 20-10380 | 240VOLT 50Hz |
| 20-10236 | 240VOLT 60Hz |

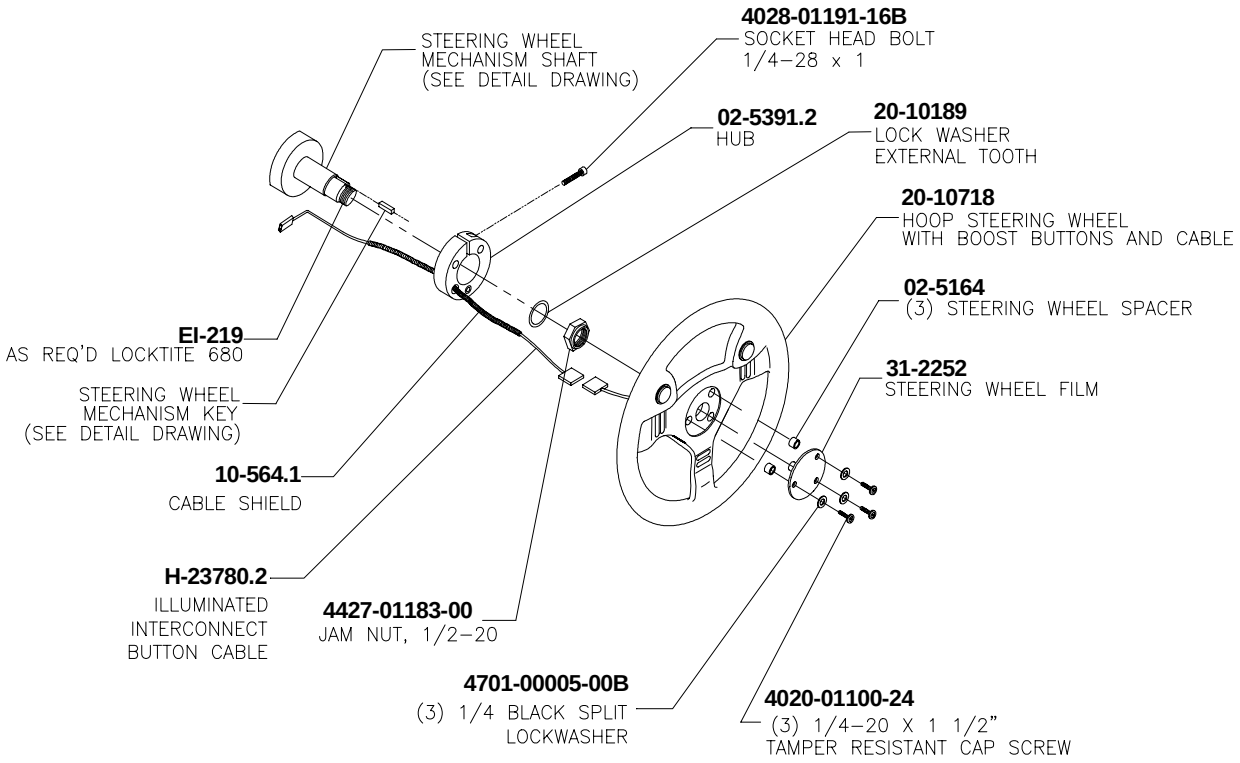
***A C Power Assemblies***



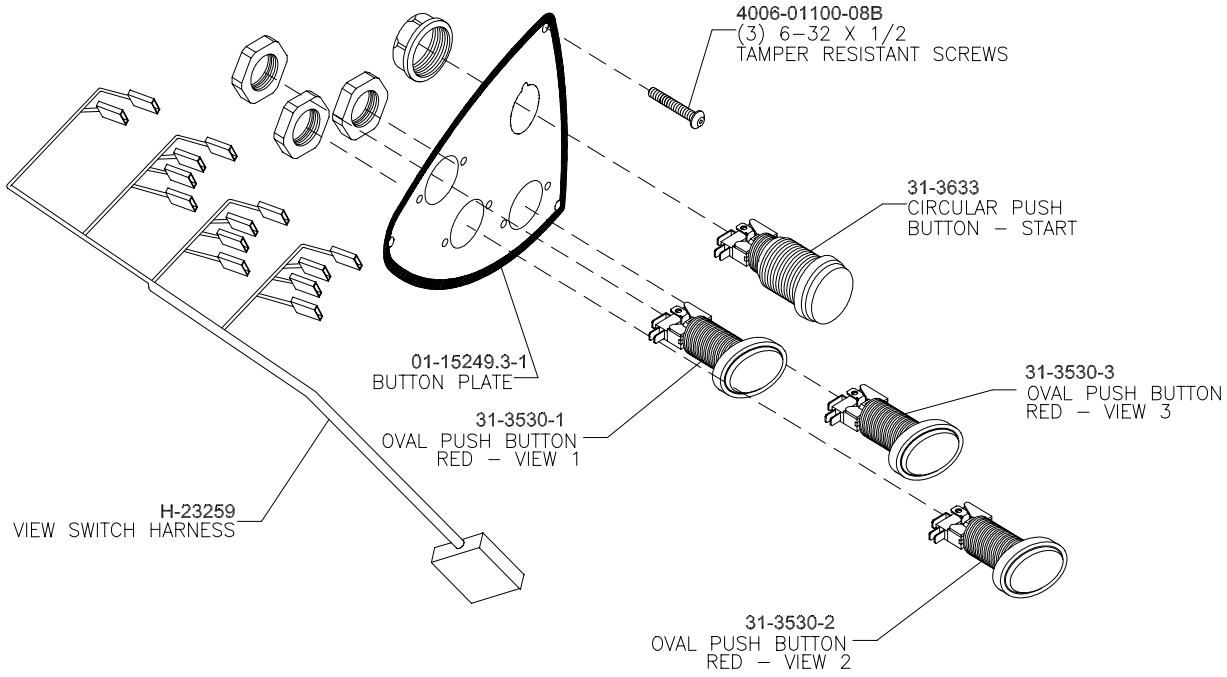
***Dashboard Assembly***



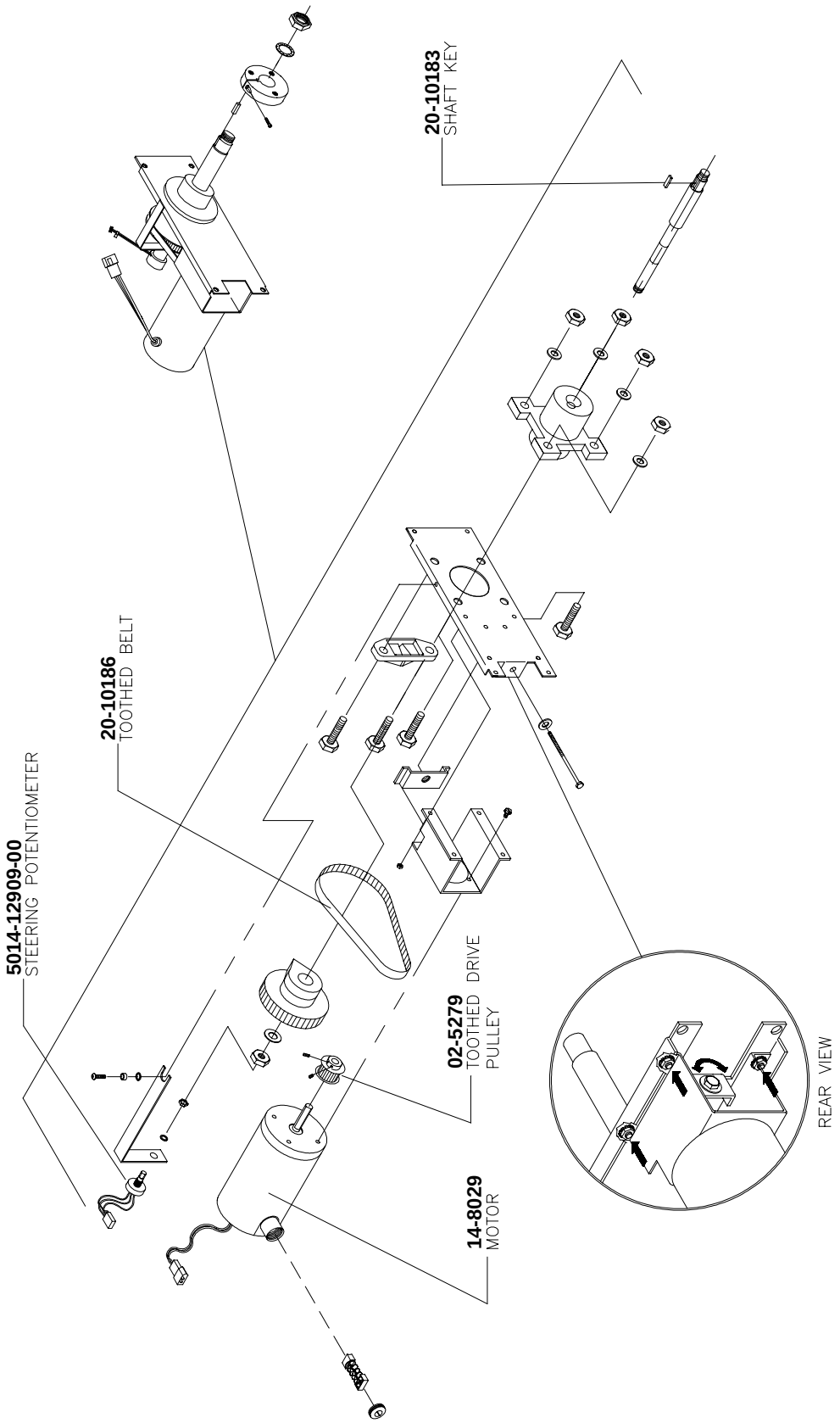
### *Steering Wheel*



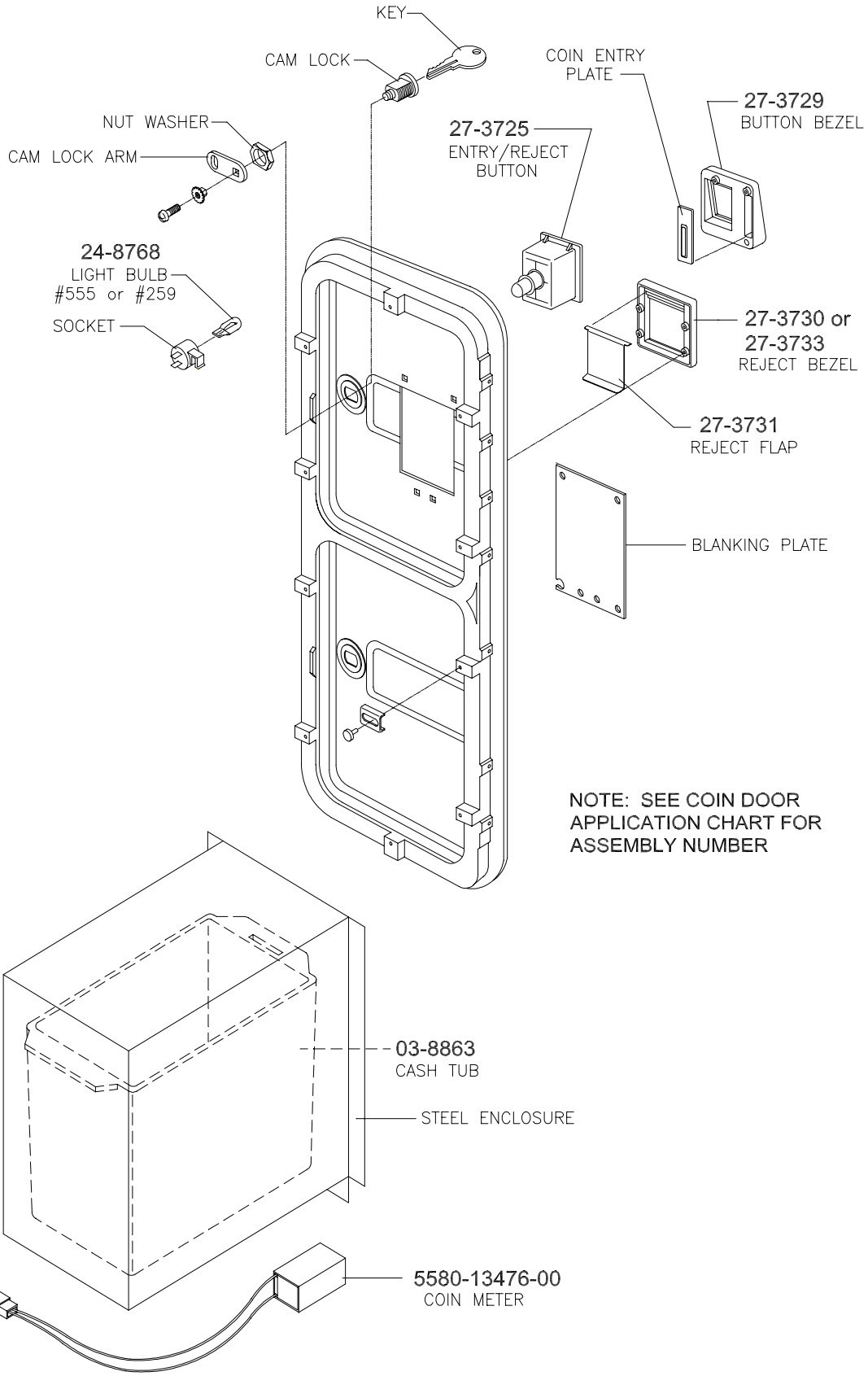

### *Button Plate Assembly A-23562*



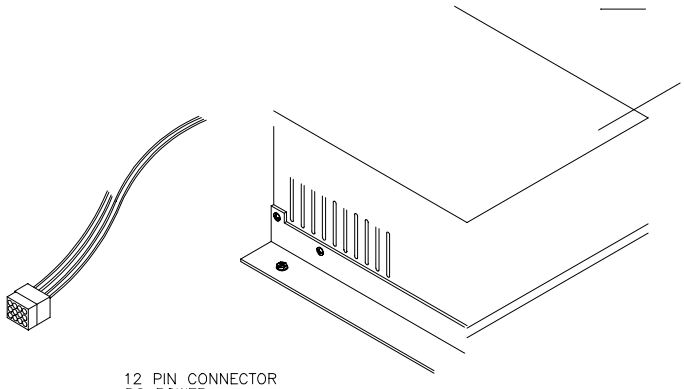
***Steering Mechanism 20-10713***



***Coin Door Assembly***



***Power Supply 20-10537***



12 PIN CONNECTOR
DC POWER

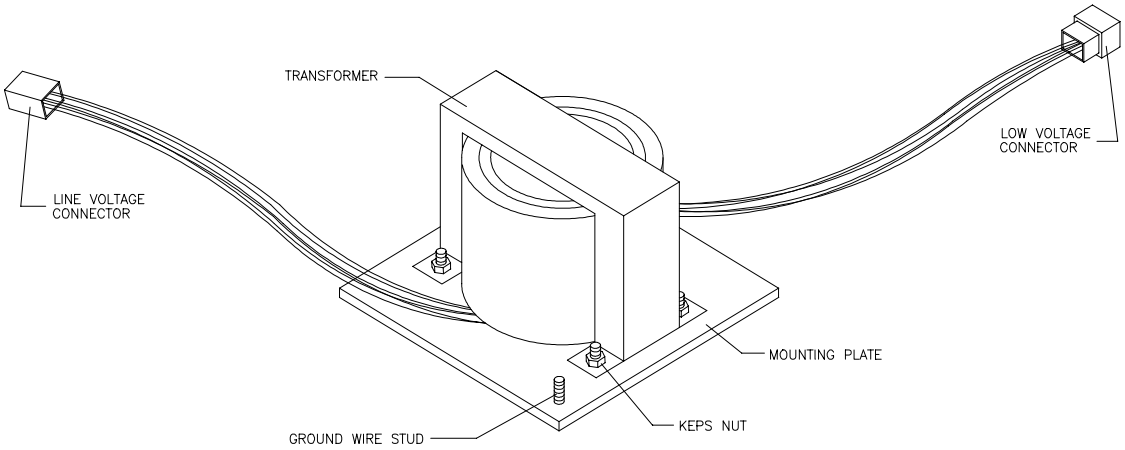
D.C. MAIN POWER
CONNECTOR

| PINS | FUNCTION | COLOR |
|---|---|---|
| 1,2,3 | +5 VDC | RED |
| 4,5,6,7,8 | GROUND | BLACK |
| 9 | −5 VDC | WHITE |
| 10,11 | +12 VDC | YELLOW |
| 12 | −12 VDC | BLUE |

| Line Cord Application Chart | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Part Number | | | | | | |
| COUNTRY | 5850-14699-00 | 5850-14699-01 | 5850-14699-02 | 5850-14699-03 | 5850-14699-04 | 5850-14699-05 | 5850-14699-06 |
| Australia | | | | | | x | |
| Austria | | | x | | | | |
| Belgium | | | x | | | | |
| Canada | | x | | | | | |
| Denmark | | | x | | | | |
| Finland | | | x | | | | |
| France | | | x | | | | |
| Germany | | | x | | | | |
| Holland | | | x | | | | |
| Hungary | | | x | | | | |
| Italy | x | | | | | | |
| Japan | | | | | | | x |
| New Zealand | | | | | | x | |
| Norway | | | x | | | | |
| Spain | | | x | | | | |
| Switzerland | | | | | x | | |
| United Kingdom | | | | x | | | |
| United States | | x | | | | | |

| Coin Door Application Chart | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Part Number 09-96023- | | | | | | | | | | | | | | | | |
| Country | 02 | 03 | 04 | 06 | 07 | 09 | 11 | 13 | 14 | 15 | 17 | 18 | 20 | 22 | 23 | 24 | 33 |
| Australia | | | | x | | | | | | | | | | | | | |
| Austria | | x | | | | | | | | | | | | | | | |
| Belgium | | | | | x | | | | | | | | | | | | |
| Canada | | | | | | | | | | | | | | | | x | |
| Denmark | | | | | | x | | | | | | | | | | | |
| Finland | | | | | | | x | | | | | | | | | | |
| France | | | x | | | | | | | | | | | | | | |
| Germany | x | | | | | | | | | | | | | | | | |
| Holland | | | | | | | | x | | | | | | | | | |
| Hungary | | | | | | | | | | | | | | | x | | |
| Italy | | | | | | | | | x | | | | | | | | |
| Japan | | | | | | | | | | x | | | | | | | |
| New Zealand | | | | | | | | | | | x | | | | | | |
| Norway | | | | | | | | | | | | x | | | | | |
| Spain | | | | | | | | | | | | | x | | | | |
| Switzerland | | | | | | | | | | | | | | x | | | |
| United Kingdom | 09-80000 | | | | | | | | | | | | | | | | |
| United States | | | | | | | | | | | | | | | | | x |

***Transformer Assembly***
***(Refer to application chart)***




| **Transformer Application Chart** | | | |
|---|---|---|---|
| **Voltage & Country** | **Part Number** | | |
| | **5610-14926-00** | **5610-14927-00** | **5610-15275-00** |
| 230 VAC Australia | x | | |
| 230 VAC Austria | x | | |
| 230 VAC Belgium | x | | |
| 230 VAC Canada | | x | |
| 230 VAC Denmark | x | | |
| 230 VAC Finland | x | | |
| 230 VAC France | x | | |
| 230 VAC Germany | x | | |
| 230 VAC Holland | x | | |
| 230 VAC Hungary | x | | |
| 230 VAC Italy | x | | |
| 100 VAC Japan | | | x |
| 230 VAC New Zealand | x | | |
| 230 VAC Norway | x | | |
| 230 VAC Spain | x | | |
| 230 VAC Switzerland | x | | |
| 230 VAC United Kingdom | x | | |
| 120 VAC United States | | x | |

### *Supplementary Parts*

| **Power & Protection** | |
|---|---|
| AC Line Filter, 6A, 250V | 5102-14240-00 |
| Ferrite Bead | 5556-15272-00 |
| Ferrite Beads | 5556-13956-00 |
| Fuse, 0.63A, 250V, FB, 5 x 20 mm | 5731-15627-00 |
| Fuse, 3A, 250V, SB, 1/4 x 1 1/4 | 5731-10356-00 |
| Fuse, 4A, 250V, SB, 5 x 20 mm | 5731-14094-00 |

| **Cables** | |
|---|---|
| 26-Pin Ribbon Cable | 5795-15667-48 |
| AC Line Harness | H-23626.2 |
| Gear Shift Cable W/Dual Grd. | H-23949 |
| Dash LED Power Cable | H-23218 |
| 40 ckt Ribbon Cable W/Grd Bus | 5795-16308-12 |
| Bill Acceptor Adapter Cable | H-23639 |
| 20 Pin Ribbon Cable | 5795-10937-18 |
| Circuit Board Harness | H-23618.2 |
| Shielded Video Cable | 20-10493 |
| Dash Cable | H-23259 |
| Linking Cable | 5797-15276-00 |
| Flourescent Lamp Cable | H-22507 |
| Hard Drive Power Cable | 20-10383 |
| Series Speaker Cable | H-23627.1 |
| AC IDC Cable | H-20353 |
| Main Wiring Harness | H-23628.6 |
| Seat Speaker Harness | H-23579 |
| Seat DC Power Cable | H-23277 |
| Grnd Braid With Ring Term | H-22327-86 |
| Illuminated Button Inter Cable | H-23780.2 |
| Noise Reduction Fan Inter Cable | H-23880 |

| **Documentation** | |
|---|---|
| Caster Installation Instructions | 16-11010 |
| Operators Manual | 16-40090A-101 |
| Product Registration Card | 16-10650 |

| **Tools & Game Installation Hardware** | |
|---|---|
| Bolt,Hex Head, 1/4-20 x 1 | 4320-01124-16 |
| Bulb, #555, 6.3V, .25 Amps | 24-8768 |
| Bulb, #161 | 24-8840 |
| Crossover Coupler | 5796-15262-00 |
| Screw, SMS, #8 x 1 1/2 TRX | 4108-01160-24B |
| Screw, Tamper-Resistant, 1/4-20 1 1/4 | 4020-01100-20 |
| T-20 Tamper-Resistant Wrench | 20-9620 |
| T-27 Tamper-Resistant Wrench | 20-10140 |
| Washer, Flat, .265 x 1.00 x.067 | 4700-00135-00B |
| Washer, Flat, .265 x .750 x .067 | 4700-00033-00 |
| Washer, Lock, 1/4 Split | 4701-00005-00B |
| Washer, Lock, 1/4 Internal Tooth | 4702-00014-00B |

## CHAPTER FIVE

# WIRING

## JAMMA CHART

| Function | Wire Color | Pin | Pin | Wire Color | Function |
|---|---|---|---|---|---|
| Ground | Black | A | 1 | Black | Ground |
| Ground | Black | B | 2 | Black | Ground |
| +5VDC | Red | C | 3 | Red | +5VDC |
| +5VDC | Red | D | 4 | Red | +5VDC |
| -5VDC | Yellow | E | 5 | Yellow | -5VDC |
| | N/C | F | 6 | Orange | +12VDC |
| | Key | H | 7 | Key | |
| Coin Counter 2 | Brown/Red | J | 8 | Brown | Coin Counter 1 |
| | N/c | K | 9 | N/C | |
| -Cabinet Speaker | Brown/Gray | L | 10 | Red/Gray | +Cabinet Speaker |
| | N/C | M | 11 | Red/White | +Seat Speaker |
| Video Green | Yellow/Green | N | 12 | Yellow/Red | Video Red |
| Video Sync | Yellow/White | P | 13 | Yellow/Blue | Video Blue |
| Service Credits | White/Gray | R | 14 | Yellow/Black | Video Ground |
| Slam Tilt | Black/Green | S | 15 | Black/Blue | Test Switch |
| Coin 2 | Black/Red | T | 16 | Black/Brown | Coin 1 |
| | N/C | U | 17 | White | Start |
| Gear 1 | Green/Black | V | 18 | N/C | |
| Gear 2 | Green/Brown | W | 19 | N/C | |
| Gear 3 | Green/Red | X | 20 | N/C | |
| Gear 4 | Green/Orange | Y | 21 | N/C | |
| | N/C | Z | 22 | White/Yellow | View 1 Switch |
| | N/C | a | 23 | White/Green | View 2 Switch |
| | N/C | b | 24 | White/Blue | View 3 Switch |
| | N/C | c | 25 | N/C | |
| | N/C | d | 26 | N/C | |
| Ground | Black | e | 27 | Yellow/Brown, Black | Ground |
| Ground | Black | f | 28 | Black | Ground |
| SOLDER SIDE | | | COMPONENT SIDE | | |

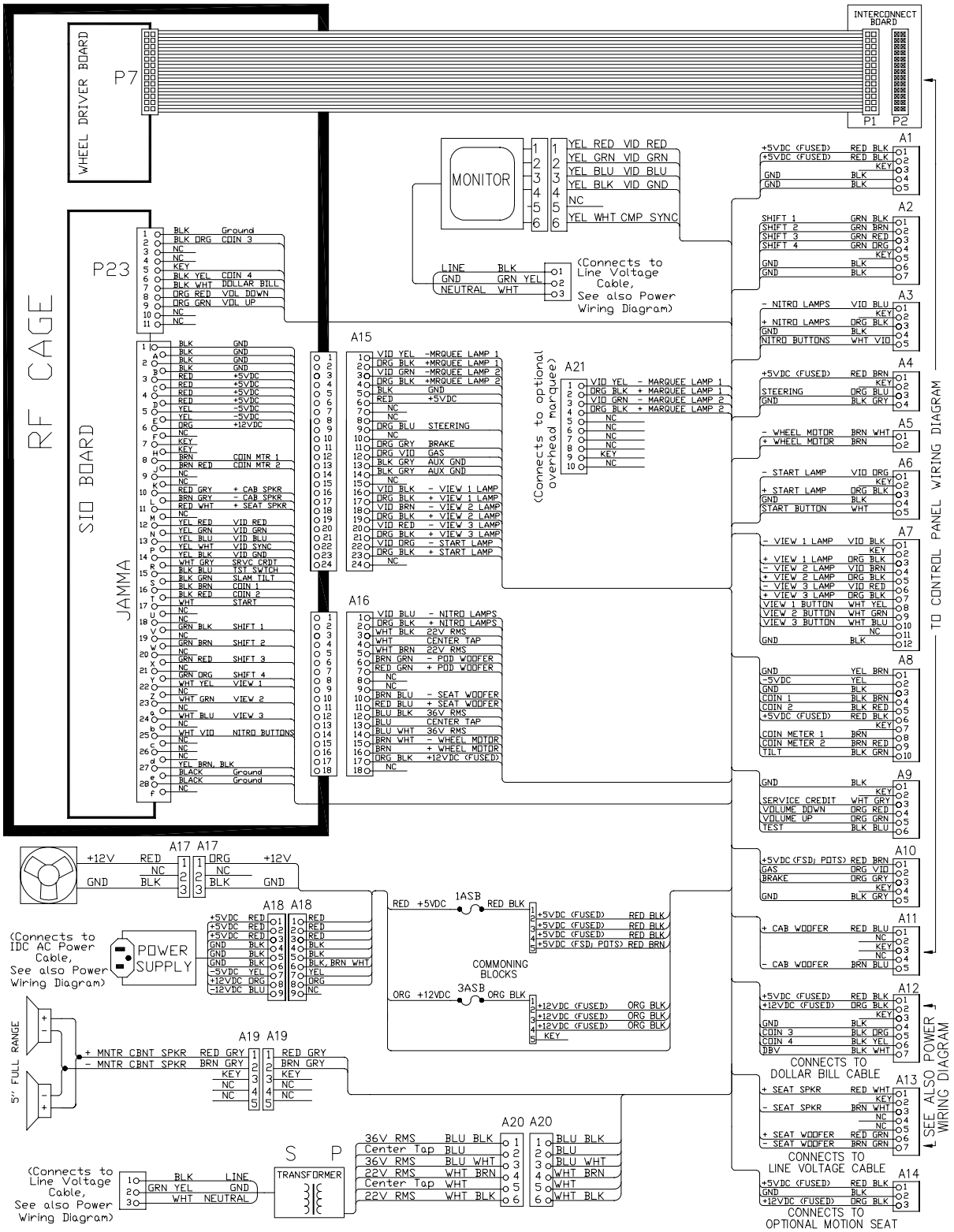
## DASHBOARD WIRES (NOT PART OF THE MAIN JAMMA HARNESS)

| | | | |
|---|---|---|---|
| **WHEEL MOTOR BLACK** | Brown/White - | Green/Black | **GEAR SHIFT 1 (1st)** |
| **WHEEL MOTOR RED** | Brown + | Green/Brown | **GEAR SHIFT 2 (2nd)** |
| Red | **+ 5V STEERING** | Green/Red | **GEAR SHIFT 3 (3rd)** |
| Orange/Blue | **STEERING POSITION** | Green/Orange | **GEAR SHIFT 4 (4th)** |
| Black | **GROUND STEERING** | Black | **GEAR GROUND** |

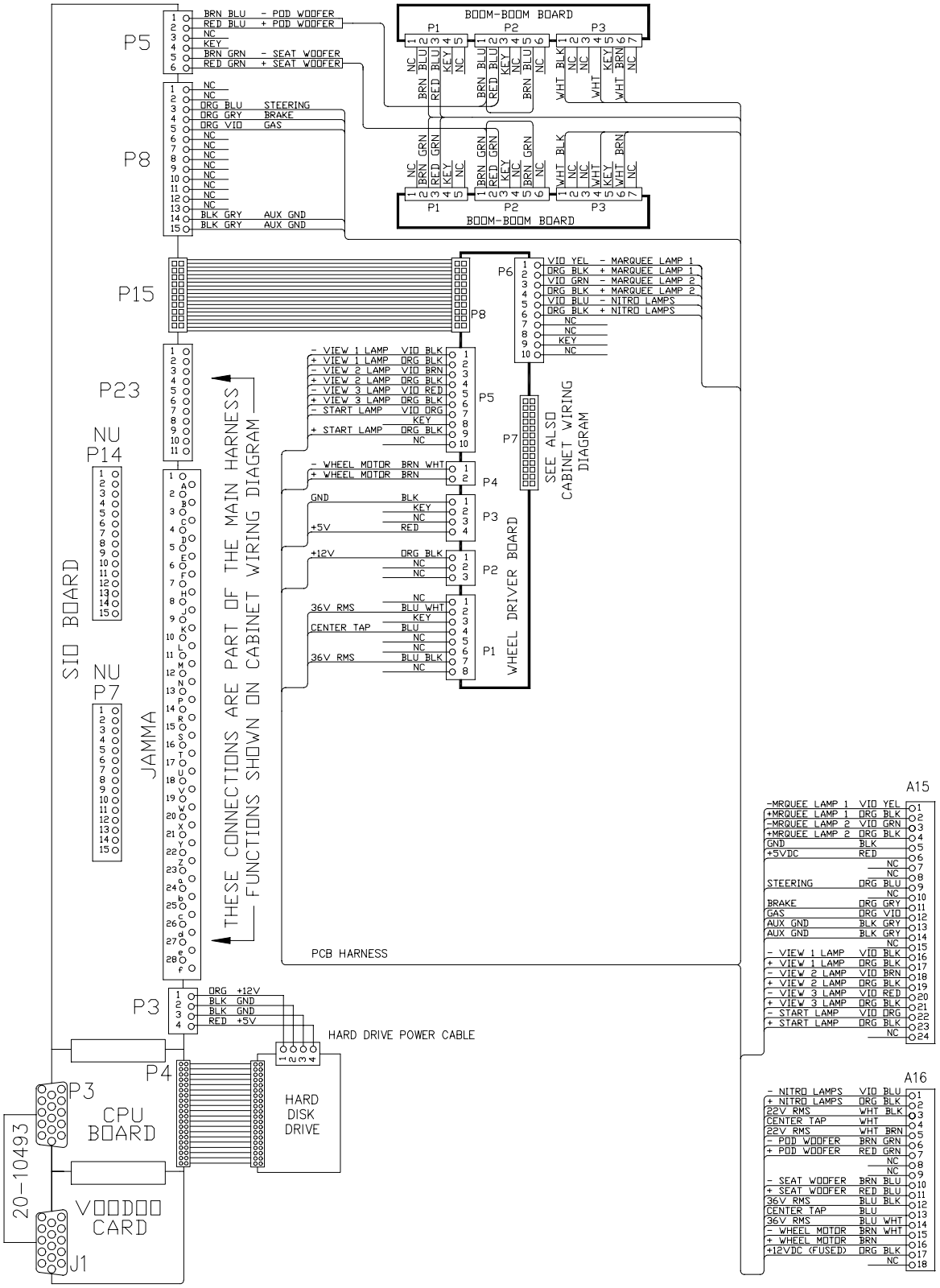
## DC POWER SOURCE VOLTAGE LIMITS

| Function | Range Limits | ID | ID | Range Limits | Function |
|---|---|---|---|---|---|
| Digital Circuits | +4.90V to +5.10V | +5V | -5V | -4.75V to -5.25 | Audio lights |
| Audio; DBV | +11.5V to +12.5V | +12 | NOTE: +5V is adjustable on the power supply | | |

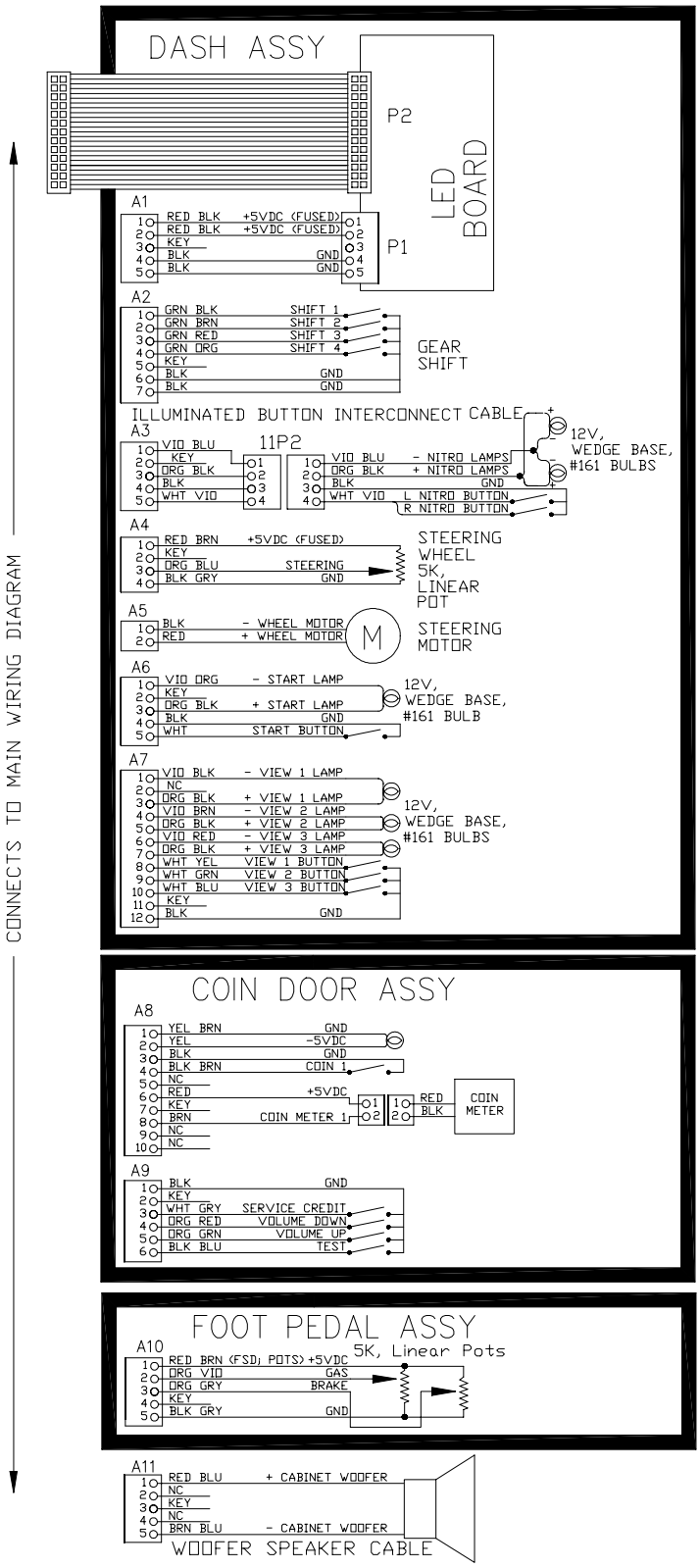
# Main Cabinet Wiring



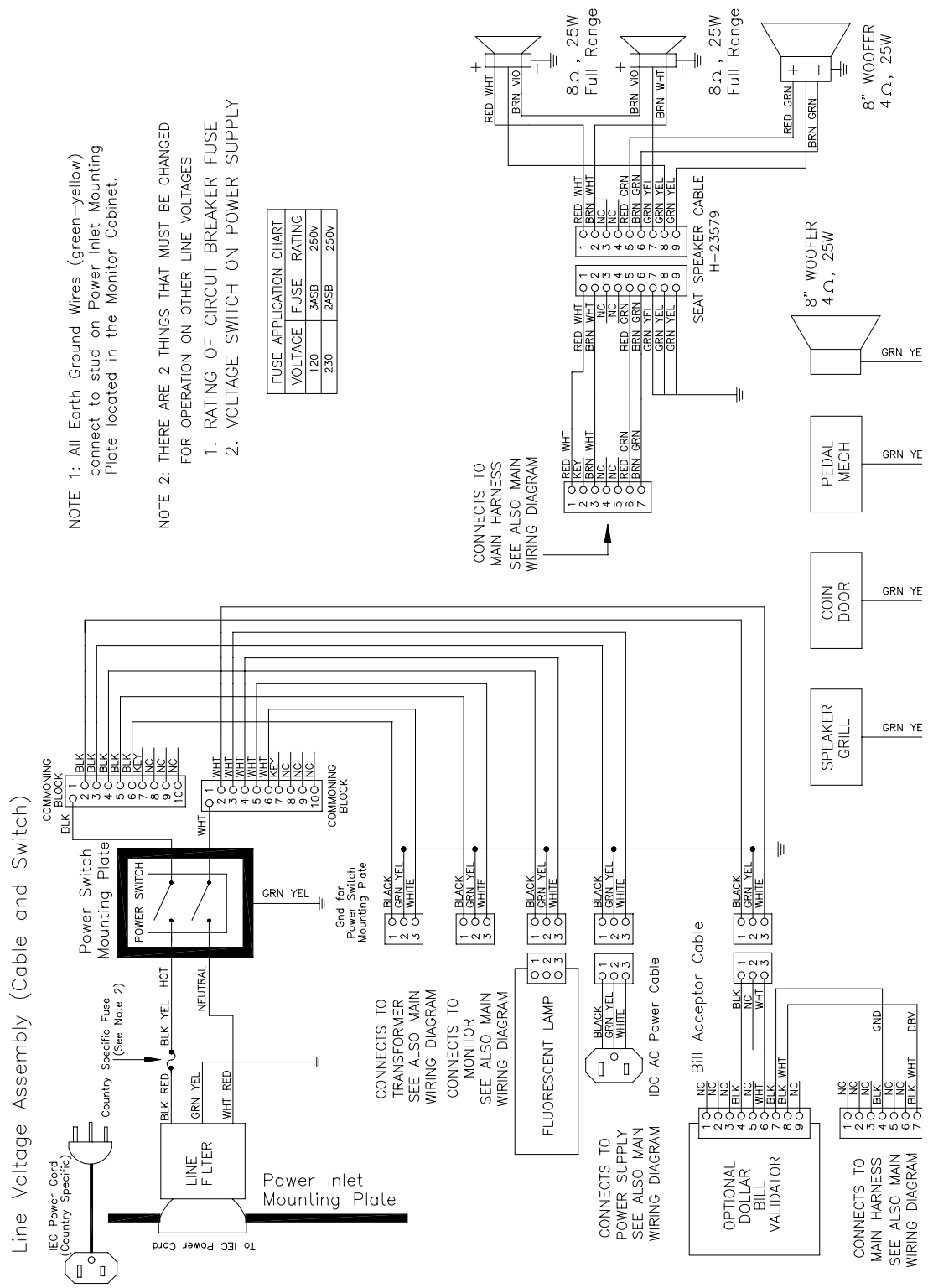
# RF Cage Wiring



# Control Panel Wiring



# Power Wiring Diagram



## DIP SWITCH U13 SETTING TABLE

| FUNCTION | SW1 | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 |
|---|---|---|---|---|---|---|---|---|
| DIP COINAGE<br>CMOS COINAGE | OFF<br>ON* | | | | | | | |
| USA 13 GER1 FR ECA1 UK1 ECA<br>USA 11 GER2 FR ECA2 UK2 ECA<br>USA 10 GER3 FR ECA3 UK3 ECA<br>USA 1 GER4 FR ECA4 UK4<br>USA DC8 GER5 FR ECA5 UK5<br>USA DC6 GER ECA1 FR ECA6 UK6 ECA<br>USA DC5 GER ECA2FR ECA7 UK7 ECA<br>USA DC1 GER ECA3 FR ECA8<br>FREE PLAY (UK) | | **OFF**<br>ON<br>OFF<br>ON<br>OFF<br>ON<br>OFF<br>ON<br>ON | **OFF**<br>OFF<br>ON<br>ON<br>OFF<br>OFF<br>ON<br>ON<br>ON | **OFF**<br>OFF<br>OFF<br>OFF<br>ON<br>ON<br>ON<br>ON<br>ON | | | | |
| USA<br>FRANCE<br>GERMANY<br>UK** | | | | | **OFF**<br>ON<br>OFF<br>ON | **OFF**<br>OFF<br>ON<br>ON | | |
| UNUSED | | | | | | | **OFF**<br>ON | |
| UNUSED | | | | | | | | **OFF**<br>ON |

**DIP Switch Setting for Coinage**

There are many ways to select the type and quantity of currency recognized by the game machine.

1. The most common coin combinations for several countries are pre-programmed and may be selected from the table when Standard Pricing is activated (see Game Adjustments).

2. DIP Switch settings may be changed with the power switched on. Set any switch then observe the screen to verify that the desired selection is enabled. **NOTE**: If CMOS coin settings are active, switch settings for an individual Country will have no effect.

3. Some European countries may accept currency used in other countries. The most popular coinage settings are listed in the Pricing Table.

## DIP SWITCH U12 SETTING TABLE

| Function | SW 1 | SW 2 | SW 3 | SW 4 | SW 5 | SW 6 | SW 7 | SW 8 |
|---|---|---|---|---|---|---|---|---|
| Unused | OFF<br>ON | | | | | | | |
| Unused | | OFF<br>ON | | | | | | |
| Unused | | | OFF<br>ON | | | | | |
| Unused | | | | OFF<br>ON | | | | |
| Unused | | | | | OFF<br>ON | | | |
| Brake Enabled<br>Brake Disabled | | | | | | OFF<br>ON | | |
| Unused | | | | | | | OFF<br>ON | |
| Game Mode<br>Test Mode | | | | | | | | OFF<br>ON |

## CPU BOARD JUMPER LOCATION TABLE

| Jumper | J1 | J2 | J3 | J4 | J5 | J6 |
|---|---|---|---|---|---|---|
| **Location** | U28, P5 | U28, P5 | U28, P5 | U28, P5 | U28, P5 | U22, U27 |

## CPU BOARD JUMPER POSITION TABLE

| ROM Type | Default | Options* | J1 | J2 | J3 | J4 | J5 | J6 |
|---|---|---|---|---|---|---|---|---|
| Boot (U27) | * | 27C080, 1M X 8, EPROM | 1-2 | 2-3 | 1-2 | 1-2 | ---- | --------- |
| | | 27C040, 512K X 8, EPROM | 1-2 | 1-2 | 1-2 | 1-2 | ------ | --------- |
| | | 27C010, 128K X 8, EPROM | 1-2 | 1-2 | 1-2 | 2-3 | ------ | --------- |
| | | 29F040, 512K X 8, Flash | 2-3 | 1-2 | 2-3 | 1-2 | ------ | --------- |
| | | 29F020, 256K X 8, Flash | 1-2 | 1-2 | 2-3 | 1-2 | ------ | |
| | | 29F010, 128K X 8, Flash | 1-2 | 1-2 | 2-3 | 1-2 | ------ | |
| Expansion (28) | * | 27C080, 1M X 8, EPROM | ------ | ------ | ------ | ------ | 2-3 | --------- |
| | | 27C040, 512K X 8, EPROM | ------ | ------ | ------ | ------ | 1-2 | --------- |
| | | 27C010, 128K X 8, EPROM | ------ | ------ | ------ | ------ | 1-2 | |
| External Boot | * | Boot from CPU ROM | ------ | ------ | ------ | ------ | ------ | 1-2 |
| | | Boot from SIO ROM | ------ | ------ | ------ | ------ | ------ | Empty |

**Notes on CPU Jumper Position**

1. Boxes containing "----" means not applicable

2. Memory type numbers shown are for blank parts. Your game requires programmed parts.

## SOUND SIO BOARD JUMPER POSITION TABLE

| Jumper | Location | Function | Meaning | Position | State |
|---|---|---|---|---|---|
| J1 (Note1) | U9, Y3 | I/O Connector P2 | Input Mode<br>Output Mode | Pins 1 & 2<br>Pins 2 & 3 | * |
| J2 | U35, U10 | Video Sync | Positive Sync<br>Negative Sync | Jumper not installed<br>Pins 1 & 2 | * |
| J3 (Note 2) | U15 | I/O Connector P4 | Input Mode<br>Output Mode | Pins 1 & 2<br>Pins 2 & 3 | * |
| J4 | None | None | Not used | None | --- |
| J5 (Note 2) | U15, P2 | I/O Connector P4 | Input Mode<br>Output Mode | Pins 1 & 2<br>Pins 2 & 3 | * |
| J6 | None | None | Not used | None | --- |
| J7 | None | None | Not used | None | --- |
| J8 (Note 1) | U9, P4 | I/O Connector P2 | Input Mode<br>Output Mode | Pins 1 & 2<br>Pins 2 & 3 | * |

**Notes on SIO Jumper Position**

1. Configure I/O port P2 by setting both jumpers J1 and J8 to input or output mode.

2. Configure I/O port P4 by setting both jumpers J3 and J5 to input or output mode.

# SOUND I/O BOARD LED INDICATOR STATUS TABLE

| LED | Location | Function | Color | State | Meaning |
|---|---|---|---|---|---|
| LED 1<br>(Note 1) | U11 | Not Used (Remains Off) | Green | OFF<br>ON<br>BLINKING | ---<br>---<br>--- |
| LED 2<br>(Note 2) | U34, Y1 | Linking Connector Status | Green | OFF<br>ON | Not in use (No game linking)<br>Link continuity good |
| LED 3<br>(Note 2) | JAMMA Connector | -5V power indicator | Red | OFF*<br>ON* | No power<br>Normal operation |
| LED 4<br>(Note 2) | U35, P14 | +12V power indicator | Red | OFF<br>ON | No power<br>Normal operation |
| LED 5<br>(Note 2) | P23 | +5V power indicator | Red | OFF<br>ON | No power<br>Normal operation |
| LED 6<br>(Note 2) | U34, Y1 | CPU linking activity | Red | OFF<br>ON | Not in use<br>CPU and ethernet contact |
| LED 7<br>(Note 2) | U34, Y1 | Linking and transmission of data | Red | OFF<br>ON<br>BLINKING | Not in use (No game linking)<br>Sending data<br>Normal operation |
| LED 8<br>(Note 1) | U14, Y1 | Audio activity | Yellow | OFF<br>ON<br>BLINKING | No sound boot ROM<br>Locked up<br>Normal operation |
| LED 9<br>(Note 2) | U34, Y1 | Linking receiving data | Yellow | OFF<br>ON | Not in use (No game linking)<br>Receiving data |
| LED10<br>(Note 1) | U44, Y2 | Not used (Remains On) | Green | OFF<br>ON<br>BLINKING | ---<br>---<br>--- |
| LED 11<br>(Note 1) | U44, Y2 | Not used (Remains On) | Red | OFF<br>ON<br>BLINKING | ---<br>---<br>--- |
| LED 12<br>(Note 1) | U44, Y2 | Not used (Remains On) | Yellow | OFF<br>ON<br>BLINKING | ---<br>---<br>--- |
| LED 13<br>(Note 1) | U44, Y2 | Not used (Remains On) | Yellow | OFF<br>ON<br>BLINKING | ---<br>---<br>--- |

**Notes on SIO LED Indicator Status**

1. Software controls this LED. Indications are game and revision specific. Changing the EPROM's on this board may alter the function of this LED. Firmware damage may also cause new or different LED behavior.

2. Hardware controls this LED. Indications depend on hard-wired circuitry. A change in normal LED behavior may indicate a circuit fault. Changing the EPROM's on this board shouldn't alter the function of this LED.

# CPU BOARD LED INDICATOR STATUS TABLE

| Device | Location | Function | Color | State | Meaning |
|---|---|---|---|---|---|
| LED 1 | U6, U7, U16 | 3.3V CPU Power | Red | OFF<br>ON<br>BLINKING | Insufficient power<br>Power OK<br>Power supply fault |
| LED 2 | U28, P5 | Disk Drive Activity | Green | OFF<br>ON<br>BLINKING | Disk not in use<br>Locked up disk<br>Normal disk activity |
| RP63 | U22, U26 | Indicator | Red | OFF*<br>ON*<br>BLINKING* | See *NOTE 3*, below |

**Notes on LED Indicator Status**

1. LED 1 monitors CPU power (+3.3V). If this LED is off or blinking, investigate processor circuits. If other LED's are off or blinking at the same time, check +5V circuits or the game power supply.

2. LED 2 flashes when the hard disk is operating during game play. LED 2 may light continuously during start-up. If this LED remains lighted, the hard drive may be locked-up or faulty.

3. Software controls RP63. In this game, RP63 initially indicates program start-up stages. This LED is a seven-segment, alphanumeric display device. Normally, RP63 will display a lowercase "b" or "o" pattern with sequentially blinking segments. During Self-Test screens, RP63 displays a "bouncing bar" that resembles a hypen ("-").

## CHAPTER SIX

# TROUBLESHOOTING

**CAUTION**
This Video Game Machine (VGM) uses complex electronic components that are very sensitive to static electricity. Observe the following precautions before handling electronic assemblies. Failure to do so may void your warranty and could damage electronic assemblies.

- Before servicing electronics, turn off AC power to the VGM. Wait for capacitors to discharge.
- Before touching or handling electronic assemblies, discharge static electricity on your body. To discharge static, begin by connecting the line cord to a properly grounded outlet, but do not turn on the power! Next, touch the safety ground stud of the power supply chassis.
- Store electronic assemblies in an anti-static area. Use anti-static bags to store or transport circuit boards. Transport the hard drive in original shipping container.
- Do not remove or connect electronic assemblies when the power to the cabinet is switched on. Otherwise you'll damage electronic assemblies and void the warranty.
- Replace ground wires, shields, safety covers, etc., upon completion of maintenance or service. Install and firmly tighten all ground and mounting screws.

## COIN MECHANISM AND PRICING TROUBLESHOOTING

| Symptom | Cause | Required Action |
|---|---|---|
| • Video Game Machine (VGM) accepts currency or tokens, but number of credits per coin or bill is incorrect. | Improper settings at Pricing Menu | 1. Press and hold TEST MODE switch inside coin door to enter Menu System. Select SWITCH TEST from Diagnostics menu. Conduct test to confirm operation of game switches.<br>2. Select either the STANDARD *or* CUSTOM PRICING MENU from Game Adjustments Menu. |
| | Faulty wiring | 1. Confirm cabinet wiring is correct for this game.<br>2. Assure coin meter and coin switches connect properly to control input wires. |
| • VGM will not accept currency or tokens.<br>• VGM will not enter play mode.<br>• Audio and video are present. | Improper currency | 1. Unlock and open cash door. Empty cash box and inspect revenue for counterfeit currency.<br>2. Check vault. Remove any items that block path from mechanism. |
| | Faulty coin mechanism | 1. Unlock and open coin door. Check each mechanism for proper mounting.<br>2. Remove mechanism.<br>3. Clear currency path.<br>4. Reinstall mechanism and close latch. |
| | Tilted coin mechanism or game | 1. Verify mechanism is level after doors close.<br>2. Repair or replace coin door if it is bent or damaged.<br>3. If necessary, adjust cabinet leg levelers to keep mechanisms level. |
| • Coin indicators do not light | Burned-out bulb | 1. Burned-out bulbs may appear white or darkened. Check continuity with digital voltmeter.<br>2. Replace burned-out bulb with an identically rated part. |
| | Open fuse circuit | 1. Check fuse continuity with digital voltmeter.<br>2. If fuse is blown, replace fuse with an identically rated part.<br>3. If fuse isn't blown, check wiring. |

**CAUTION**
Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards, ROM's or hard disk and void the warranty.

## START UP TROUBLESHOOTING

| Symptom | Cause | Required Action |
|---|---|---|
| • Video Game Machine (VGM) does not start.<br>• VGM appears completely non-functional.<br>• No audio<br>• No illumination<br>• No video display | Power problem | 1. Check power is switched on.<br>2. Make sure fans are turning. If not: Is the power supply connected to its power cable? Is power supply turned on?<br>3. Plug cord into AC power outlet. Verify presence of AC line voltage. |
| | Improper line voltage switch setting | 1. Turn off power. Unplug AC line cord. Check line voltage switch. If necessary, set it to agree with local AC line voltage. Retest game. |
| | Open fuse | 1. Turn off power. Examine AC fuse on power chassis.<br>2. Examine DC fuses on cabinet wall or electronic equipment shelf.<br>3. Replace faulty fuses with identically rated parts.<br>4. Turn on game power. If fuse opens again, check DC wiring harness and connectors. |
| | Faulty wiring | 1. Remove line cord. Test line cord, power plug, and IEC connector for breaks or damage. Verify continuity of each wire in cord. Install cord on power chassis. Press connector firmly to seat it.<br>2. Assure that cabinet wiring harness connectors fully seat in corresponding power supply and board connectors.<br>3. Inspect wiring for breaks or damage. |
| • Video Game Machine (VGM) does not start.<br>• VGM accepts currency or tokens.<br>• Audio and video are present. | Faulty coin mechanism | 1. Unlock and open coin door. Check each currency acceptor to assure proper mounting. Verify each release latch is closed and locked.<br>2. Test mechanism with good and bad coins to see if mechanism accepts and rejects currency correctly.<br>3. Inspect to see if external acceptor indicators (Pricing, Flashing Arrows, etc.) are lit.<br>4. Verify each acceptor operates properly by placing it in working game. Replace bad parts. |
| | Faulty switches | 1. Press and hold the TEST MODE switch inside coin door to enter Menu System. Select SWITCH TESTS from the Diagnostics Menu. Conduct test to confirm operation of each switch.<br>2. Assure no loose parts or wires are caught in switch contacts.<br>3. Check for continuity in each suspect switch connection (Common to Normally Open or Common to Normally Closed).<br>4. Replace faulty switches (bent levers, broken actuators, etc.). |

| Symptom | Cause | Required Action |
|---|---|---|
| • Video Game Machine (VGM) does not start.<br>• VGM accepts currency or tokens.<br>• Audio and video are present. | Faulty wiring | 1. Assure no wires are caught in hinges, latches or switch contacts.<br>2. Check wiring continuity from circuit board connectors to acceptors. |
| • Video Game Machine (VGM) appears non-functional.<br>• Currency acceptor price indicator is illuminated. | Power problem | 1. Inspect circuit boards under low-light conditions. The LED's glow and the fan turns when processor circuits receive voltage and indicate presence of DC from power supply. However, voltages or signals may not be normal.<br>2. Turn on power. Set the digital voltmeter to the 20-volt DC setting and measure DC voltages at power connector pins. Adjust the +5V source if necessary. Refer to the Cabinet Wiring Diagram for specific wiring information and voltage limits.<br>3. Set the digital voltmeter to the 2-volt AC setting and measure DC voltages at power connector pins. Any reading here indicates that supply voltages are unstable and may contain ripple or noise. |
| | Faulty wiring | 1. Turn off power. Check wiring harness connectors attach and fully seat onto mating board connectors. Verify harness connects to CPU Board. Check other connectors in same way. |
| | Improper DIP switch settings | 1. Check DIP switch settings. |
| | Faulty circuit boards | 1. Run power-up self-test sequence. Note errors or failures during test. Compare LED's with LED indicator status charts. Note discrepancies.<br>2. Press and hold TEST MODE switch inside coin door to enter Menu System. Select MONITOR TEST from Diagnostics Menu. Conduct test to confirm operation of each screen used in the game. |

## LINKING PROBLEM TROUBLESHOOTING

| Symptom | Cause | Required Action |
|---|---|---|
| • Cannot connect multiple Video Game Machines (VGMs) together | Faulty wiring | 1. Do not extend linking cables supplied with VGM.<br>2. Install required crossover between cabinets. Each coupler connects two VGMs (one pair). Do not use standard telephone type couplers or wiring for linking.<br>3. Use only 10 Base-T, Ethernet-type, Category 5, twisted-pair wiring. |
| | Improper linking hardware | 1. Use required network hub for your local network. A Hub Link Kit permits up to four VGM connections. Array completion requires basic kit brackets and spacers. |
| • VGM does not recognize other players in linking operation<br>• VGM functions normally by itself | Improper settings | 1. Record any error messages that occur during self-test.<br>2. From the Diagnostic Menu select DIP SWITCH TEST. Confirm the link is enabled.<br>3. Be sure that each VGM has a unique ID number.<br>4. Select LINKING TEST from the Diagnostic menu. Run tests for each linked VGM. |
| | Power problem | 1. Verify the hub receives power. AC adapter wires are thin and easily damaged. |
| | Faulty wiring (3 or more VGMs) | 1. Inspect hub indicator lights. Illuminated indicator lights for each active port light up if the cable(s) are properly connected. Check for cable continuity from hub to VGM for each indicator that failed to light.<br>2. Assure no loose wires are caught in hinges, doors or under cabinet.<br>3. Verify linking cable connects to CPU Board for each game.<br>4. Verify each linking cable operates properly by placing it in working game. |

**CAUTION**
Do not remove or install any connector when the power is turned on. Installation under power will damage the circuit boards, ROM's or hard disk drive and void the warranty.

## LINKING PROBLEM TROUBLESHOOTING

| Symptom | Cause | Required Action |
|---|---|---|
| • Some Video Game Machines (VGMs) in group link properly, while others do not | Improper hub switch setting | 1. Assure switches on hub are set according to Hub Link Kit instructions. (VGMs on a network do not require couplers. Hub has electronic crossover.)<br>2. Inspect hub indicator lights for link activity. See manufacturer's literature for diagnostics. |
| | Wrong software version | Verify all linked VGMs use same version of software. Error message "VERSION MISMATCH" will appear if you try to link different versions. Contact your distributor. |
| | Faulty wiring (2 VGMs) | 1. Insert only the supplied crossover connection between coupled VGMs. Standard couplers appear identical to devices supplied with games, but do not include an internal crossover.<br>2. Verify each linking crossover coupler operates properly by placing it in a working link between two VGMs. |
| | Faulty wiring (3 or more VGMs) | 1. Use an additional crossover connector and cable to extend game or hub link connection. Two crossovers cancel each other out and results in same problem as no link crossover.<br>2. Connect cables directly to hub. Do not use a crossover coupler and hub together in single network.<br>3. Separate communications wiring from other wiring. Wires that must cross can only cross at right angles to limit noise pickup. |

**CAUTION**
Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards, ROM's or hard disk drive and void the warranty.

## PLAYER CONTROL TROUBLESHOOTING

| Symptom | Cause | Required Action |
|---|---|---|
| • Intermittent or completely non-functional player controls<br>• Video Game Machine (VGM) starts normally. | Faulty switches or lamps | 1. Press and hold TEST MODE switch inside coin door to enter Menu System. Select SWITCH TEST from Diagnostic Menu. Conduct tests to confirm switch operation.<br>2. Press and hold TEST MODE switch inside coin door to enter Menu System. Select LAMP TEST from Diagnostic Menu. Conduct tests to confirm lamp operation.<br>3. Check for loose parts or wires caught in switch contacts.<br>4. Check continuity at each switch connection (Common to Normally Open or Common to Normally Closed).<br>5. Verify player control operates properly by placing it in working VGM.<br>6. Verify light bulbs used for dashboard switches are type specified in parts listing. Other types will light, but may produce too much heat. Excess heat may cause switches to bind. |
| | Faulty switch wiring | 1. Check for wires caught in door hinges, latches, or switch contacts.<br>2. Verify harness connectors are attached and fully seated.<br>3. Assure control switches connect properly to control input wires.<br>4. Check cabinet wiring is correct for this VGM. |
| • Steering pulls to one side | Faulty Wheel Driver Board | 1. Find power amp on Wheel Driver Board's large heatsink. Test and replace bad part or board. |
| • No wheel feedback<br>• Steering aims vehicle as expected | Improperly set feedback | 1. Select STEERING WHEEL TEST on the Diagnostics Menu.<br>2. Set feedback to match player requirements. Maximum force may be too extreme for very young or inexperienced customers. |
| | Faulty circuit | 1. Examine fuses and cables on Wheel Driver Board.<br>2. Check cables and wiring between CPU board, wheel driver and motor.<br>3. Check resistance of motor series resistors.<br>4. Replace bad parts. |
| | Faulty motor | 1. Turn off power. Open dashboard. Support steering wheel and remove outer mounting screws.<br>2. Remove metal shield (if VGM has one) over motor.<br>3. Unscrew caps.<br>4. Inspect motor brushes. Replace worn parts. |

| Symptom | Cause | Required Action |
|---|---|---|
| • Sloppy, unpredictable or ineffective steering<br>• Video is present<br>• Video Game Machine (VGM) operates normally | Blocked or faulty fan | Fan located on power supply functions as an exhaust fan. With power on, check airflow near each fan to assure that nothing blocks airflow. |
| | Faulty mechanical parts | Turn off power. Open dashboard. Support steering wheel and remove outer mounting screws. Remove metal shield (if VGM has one) over motor. Inspect for faulty or worn belts, bearings, couplings, gears, etc. |
| | Faulty Wheel Driver Board | 1. Inspect Wheel Driver Board under low-light conditions. To indicate presence of AC from the transformer the LED's glow when voltage is received. However, voltages or signals may not be normal.<br>2. Examine fuses and cables on Wheel Driver Board. Replace bad fuses. Use digital voltmeter to verify AC voltage between each fuse holder and ground. You should measure approximately 25V. See Wiring Diagram.<br>3. Use the 20-VAC setting on digital voltmeter to measure DC voltage at motor. Do not move steering wheel, drive belt, or motor while making this measurement. Any reading indicates unstable supply that may contain ripple or noise.<br>4. Select the STEERING WHEEL TEST from the Diagnostic Menu. Follow on-screen instructions to verify operation of the wheel motor and steering position sensor.<br>5. Verify proper operation of Wheel Driver Board by placing it in working VGM. |
| | Loose or worn drive belt | 1. Turn off power. Open dashboard. Support steering wheel and remove outer mounting screws. Remove metal shield (if VGM has one) over motor. Inspect for faulty or worn belts, bearings, couplings, gears, etc.<br>2. If drive belt isn't worn or damaged, check its tightness. |
| • Inability to make a transmission selection.<br>• Video Game Machine (VGM) operates normally. | Improper DIP Switch setting(s) | From the Diagnostics Menu, choose DIP SWITCH TEST. Make sure DIP 1, SW 1 is set to the OFF position. |

**WARNING**
The Wheel Driver Board heatsink, power resistors, and other components may be very hot. The DC Motor in the steering wheel may also be hot.

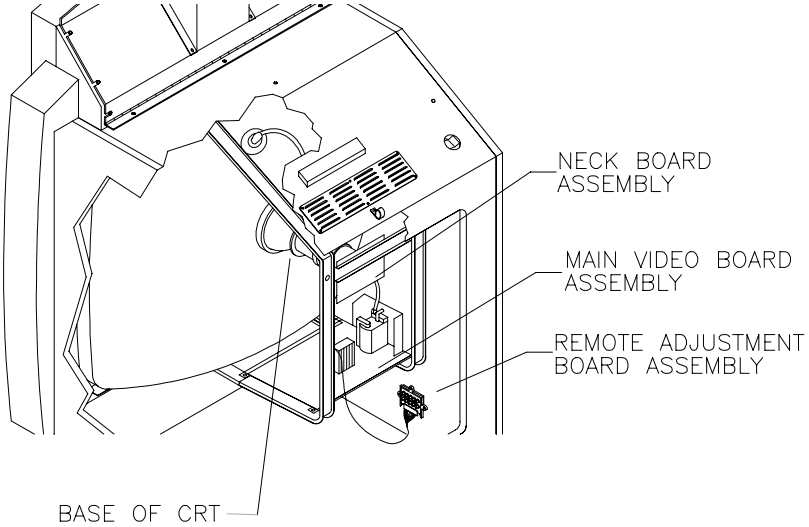
## VIDEO TROUBLESHOOTING

| Symptom | Cause | Required Action |
|---|---|---|
| • Monitor appears non-functional<br>• Audio is present<br>• Video Game Machine (VGM) controls operate normally | Power problem | Verify connection of AC Power to video monitor. Inspect neck of CRT in dim light. Glowing filament near CRT base confirms monitor circuits receive power. However, voltages or signals may not be normal. |
| | Faulty wiring | 1. Turn off game power. Verify that video signal and Remote Adjustment Board connectors seat properly on Video Monitor Board.<br>2. Assure that no wires are caught on chassis or mounting brackets. |
| | Improper monitor adjustments | Check BRIGHTNESS (intensity) and CONTRAST are set above their minimum levels. |
| | Faulty monitor circuitry | 1. Examine AC line fuse on Video Monitor Board. If fuse is faulty, replace it with an identically rated fuse.<br>2. If the fuse is good, verify video monitor operates correctly by placing it in a working VGM.<br>3. If monitor is bad; Check monitor power supply.<br>4. If the power supply is good, Check monitor horizontal output transistor and related circuitry. |
| • Graphic images from game do not appear<br>• No audio<br>• Power-up self-test runs | Improper components | 1. Verify circuit boards are correct for this game. Labels on each board record manufacturers' name, assembly number and hardware version.<br>2. Verify ROM instruction set is correct for this game. Game set includes more than one ROM. Label on each ROM records assembly number and software version. |
| | Faulty Circuit Board | 1. Allow game to load normally. Note and record any error messages that occur during self-test.<br>2. Press and hold TEST MODE switch inside coin door to enter Menu System. Select Diagnostic Menu from the Main Menu. Then select CPU BOARD TEST. Conduct this test to check operation of critical components.<br>3. Turn off power. Inspect CPU Board to ensure JAMMA cable connector is fully seated onto the mating edge connector of the CPU. Check all other cable connectors for correct alignment and continuity.<br>4. Compare activity of LED's on CPU with the CPU Indicator Chart. |

| Symptom | Cause | Required Action |
|---|---|---|
| | Power Problems | 1. Turn on Power. Use 20-volt DC setting on digital voltmeter to measure DC voltages present at Power connector pins. Verify +5V source if it is adjustable. Refer to Cabinet Wiring Diagram for specific wiring information and voltage limits.<br>2. Use 2-Volt AC setting on digital voltmeter to measure DC voltages at Power Connector pins. Any reading indicates the supply voltages are unstable and may contain ripple or noise. |
| • White areas at screen edges appear tinged with color<br>• Dots at screen edges appear ovoid or cylindrical | Picture tube dynamic convergence is out of alignment | Have service bureau dynamically re-converge monitor. This procedure requires removing and repositioning yoke. Service bureau must follow instructions from monitor manufacturer. |
| • Video images tear or roll, or have black bar down middle of screen | Faulty wiring | 1. Check connectors and cables for wiring continuity. Video cables connect circuit boards to video monitor.<br>2. Assure connection of all cabinet ground wires, especially at video monitor chassis. |
| | Faulty monitor circuitry | 1. Verify video monitor operates correctly by connecting it to working Video Game Machine (VGM).<br>2. Assure video monitor is correct type for this game. Video monitors with wrong resolution can't lock sync. |
| | Improper sync signals | 1. Check to see if Video Board puts out type of sync that your monitor requires.<br>2. Verify jumpers are set correctly for monitor. |
| | Electromagnetic fields | Move cabinet far away from machines, appliances, or competitors' video games. |
| • Missing colors | Faulty wiring | Check connectors and cables for wiring continuity from circuit boards to video monitor. |
| | Faulty monitor color drive circuitry | Verify video monitor operates correctly by connecting it to working Video Game Machine (VGM). |
| • One color is dimmer or brighter than others<br>• Whites appear tinted everywhere on screen | Maladjusted color bias pots | 1. Turn on Video Game Machine (VGM).<br>2. From Diagnostic Menu select MONITOR TEST.<br>3. Watch Color Bars screen in mirror.<br>4. Adjust three bias pots for best colors. (Most monitor neck boards include these pots.)<br>5. Check White Screen. Touch up controls.<br>6. If whites still seem tinted, have service bureau rejuvenate picture tube. |

| Symptom | Cause | Required Action |
|---|---|---|
| • Picture is too narrow | Maladjusted WIDTH pot. | From Diagnostic Menu select MONITOR TEST. Watch Crosshatch Screen while adjusting WIDTH pot for best picture. You'll find this pot on Monitor Remote Control Board, behind coin door. |
| • Picture is too short | Maladjusted HEIGHT pot or damaged vertical circuit | 1. From Diagnostic Menu select MONITOR TEST. Watch Crosshatch Screen while adjusting HEIGHT pot for best picture. You'll find this pot on Monitor Remote Control Board, behind coin door.<br>2. If pot has no effect, service vertical output circuit. |
| • Picture seems shifted to one side | Maladjusted HORIZONTAL POSITION pot | From Diagnostic Menu select MONITOR TEST. Watch Crosshatch Screen while adjusting HORIZONTAL POSITION pot for best picture. You'll find this pot on Monitor Remote Control Board, behind coin door. |
| • Keystone-shaped picture | Shorted turns in yoke | 1. Substitute working yoke.<br>2. Have service bureau converge monitor.<br>3. Retest monitor. |
| • Blotches of color appear on screen | Picture tube aperture mask is magnetized | Demagnetize monitor with external degaussing coil. Take care not to magnetize neighboring games. Monitor may be left on or off during this procedure. |
| • White areas in center of screen appear tinged with color<br>• Object edges have fringe of one or more colors | Picture tube purity or static convergence is out of alignment | 1. Turn on Video Game Machine (VGM).<br>2. Press and hold TEST MODE to enter Menu System. Select Diagnostic Menu from the Main Menu. Select MONITOR TEST. Perform tests for Crosshatch, Red, Green and Blue screens to find clearest display of problem.<br>3. Display screen with the most severe problem.<br>4. Display Crosshatch Screen. Locate purity and static convergence ring magnets on back of monitor neck. Watch screen in mirror. Adjust magnets to minimize problem. Follow instructions from monitor manufacturer.<br>5. Display Crosshatch Screen. Touch up adjustments while watching screen in mirror. |
| • Picture is dim or faded | Maladjusted BRIGHTNESS pot or subnormal picture tube emission | 1. From Diagnostic Menu select MONITOR TEST.<br>2. Watch Color Bars screen. Adjust BRIGHTNESS and CONTRAST pots for greatest number of grays. You'll find these pots on Monitor Remote Control Board, behind coin door.<br>3. If pots have no effect, have service bureau rejuvenate picture tube. |

| | |
|---|---|
| ⚠ | **CAUTION**<br>Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards or ROM's and void the warranty. |
| ⚠ | **WARNING: HIGH VOLTAGE.**<br>Video Game Machine *(VGM)* monitors generate and store potentially lethal high voltages. Avoid touching any part of the monitor until power has been off for some time. A picture tube can maintain a hazardous charge for up to several days. Only qualified technicians should service monitors. Turn off the power, unplug the *VGM* and discharge the CRT before attempting service. Even properly discharged tubes can revert to a highly charged state, *without reapplication of power.* |
| ⚠ | **WARNING**<br>In normal operation, the monitor doesn't require isolation from AC line voltage. During bench servicing, you may need to operate the monitor outside the cabinet. If you do, *isolate the monitor from line voltage with an isolation transformer.* |




***TYPICAL CUTAWAY REAR VIEW***

| | |
|---|---|
| ⚠ | **CAUTION**<br>Do not operate the monitor without its Remote Adjustment Board. |
| ⚠ | **WARNING: HANDLE FLUORESCENT TUBE AND CRT WITH CARE.**<br>If you drop a fluorescent tube or CRT and it breaks, it will implode! Shattered glass can fly eight feet or more from the implosion. |

## AUDIO TROUBLESHOOTING

| Symptom | Cause | Required Action |
|---|---|---|
| • No audio<br>• Video is present<br>• Video Game Machine (VGM) appears to operate normally | Improper volume setting | Press and hold TEST MODE switch inside coin door to enter Menu System. Select VOLUME MENU from the Main Menu. Make sure the Attract Music is on (enabled). Verify all volume levels are set well above zero. If necessary, change levels to make game audible. |
| | Faulty wiring | Turn off power. Assure wiring harness connectors attach and fully seat onto mating board connectors. Verify harness connects to CPU Board. Check audio cable connectors in same way. |
| | Faulty or obstructed speaker | Remove grilles and inspect speakers. Free speaker cones, terminals, mounting screws and magnets of loose parts or wires. |
| | Faulty Audio Board | Verify proper operation of Audio Board by placing it in a working VGM. |
| | Power Problems | Use 20-volt DC setting on digital voltmeter to measure DC voltages present at Power connector pins. Verify +5V, -5V and +12V sources. Refer to Cabinet Wiring Diagram for specific wiring information and voltage limits. |
| • Audio is distorted, muffled or has missing frequencies. | Faulty or improper speaker | 1. Turn off power. Remove grilles and check speakers. Verify that speakers are full range (100 to 10,000 Hz response) and rated for at least 20 watts. Woofers must be rated for at least 40 watts.<br>2. Verify proper speaker operation by placing speaker in question in a working VGM. |
| | Faulty wiring | Multiple-speaker installations: Check for reversed wires at one speaker. Weak or low frequencies and thin or hollow sound quality are symptom of incorrectly phased speakers. Sound tests may not detect this condition, but you can hear it during operation. |
| | Improper Setting | Press and hold TEST MODE switch inside coin door to enter Menu System. Select SOUND TEST from Diagnostics Menu. Increase volume as required. This test will verify some audio circuit functions. |
| • Dead sound channel | Faulty speaker | 1. From Diagnostics Menu, choose SOUND TEST. Recheck speakers with audio signals provided by test.<br>2. Verify proper speaker operation by connecting speaker in question to working Video Game Machine (VGM). |

| Symptom | Cause | Required Action |
|---|---|---|
| | Faulty circuit board | Run power-up self-test sequence. Note errors found during tests. Compare CPU Board LED's with LED Indicator Status Charts. Note discrepancies. |
| • Constant low hum from all speakers. | Faulty wiring | 1. Check cabinet wiring is correct.<br>2. Verify cabinet wiring provides separate wires (not common return) for each speaker.<br>3. Check connection of all cabinet ground wires. |
| | Faulty power supply | Use 2-Volt AC setting on digital voltmeter to measure voltages at speaker terminals. Any reading indicates unstable supply that may contain ripple or noise. |

## MISCELLANEOUS PROBLEM TROUBLESHOOTING

| Symptom | Cause | Required Action |
|---|---|---|
| • Marquee lamp is intermittent or non-functional<br>• Video Game Machine (VGM) starts and plays normally | Faulty fluorescent tube | 1. Remove fluorescent tube from sockets. If you find cracks or darkened ends, install new lamp. Clean tube.<br>2. Check continuity of both fluorescent tube filaments.<br>3. Check lamp ballast is rated for local AC line voltage and frequency.<br>4. Verify fluorescent tube operates by placing it in working VGM. |
| | Faulty lamp fixture | 1. Verify lamp pins make good connection with socket contacts.<br>2. Check the ballast and/or starter are working properly. |
| | Faulty wiring | Measure fluorescent lamp AC voltages. Check wiring and connector continuity from AC power chassis to lamp assembly. |
| • VGM operates normally<br>• Cabinet becomes warm after several hours of use | Obstructed fan | 1. Check bottom and rear of cabinet for blocked airflow.<br>2. Move VGM away from sources of heat.<br>3. Turn off power. Remove dust from vent holes with high-power vacuum cleaner. |
| | Faulty Wiring | Check fan wiring and connectors. |
| | Faulty fan | Check operation of all fans. |
| • Error messages appear on screen | Faulty hardware | 1. Check any assembly (RAM, ROM, Battery, etc.) identified in error messages.<br>2. Call your authorized distributor for help with unresolved screen messages. |

# WARNINGS & NOTICES

**WARNING**

Use of non-MIDWAY parts or circuit modifications may cause serious injury or equipment damage!

- Use only MIDWAY authorized components and parts. Failure to do so will void your warranty and may result in incorrect or unsafe operation. Substitute parts or modifications may void the EMC directive or FCC type acceptance.
- Federal copyright, trademark and patent laws protect this Video Game Machine (VGM). Unauthorized modifications may be illegal under Federal law. The modification ban also applies to Midway Amusement Games, LLC and VGM 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 Amusement Games, LLC components.

**WARNING**

Prevent shock hazard and assure proper VGM operation. Plug this VGM 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.

**WARNING**

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**

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 warrants.

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**NOTICE**

This equipment generated, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interferance to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**NOTICE**

When Midway Amusement Games, LLC ships a VGM, it complies with FCC regulations. Your label is proof of compliance. Legal repercussions to the owner or distributor may result if the label is missing or damaged. If your VGM does not contain an FCC compliance label, call Midway Amusement Games, LLC immediately.

For Service:Call your authorized Midway Amusement Games, LLC distributor.

**MIDWAY AMUSEMENT GAMES, LLC**
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