MAV500™
C3 and Xtreme®

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INTRODUCTION

The goal of this manual is to familiarize the operator with the features of the MAV500™ C3 and Xtreme® electronic gaming machine (EGM). Write comments and notes in the space provided to supplement the material in this manual.

This manual is part of a suite of manuals consisting of the Operator Manual, Service Manual and the Parts Manual. Each manual is detailed below.

Operator Manual

Primarily intended for operators of electronic gaming machines (EGM). The Operator Manual provides:

- A general overview of the hardware and software
- Procedures for daily operations and simple maintenance

Service Manual

Primarily intended for service technicians. The Service Manual provides:

- A general overview of the hardware and software
- Instructions for installation and troubleshooting
- Descriptions in detail for each of the major components of the EGM

Parts Manual

Primarily intended for operators and service technicians. It enables operators and service technicians to order machine parts. The Parts Manual provides:

- Images and illustrations for each of the serviceable components of the EGM
- Part numbers, quantities, and availablility for each of the serviceable components of the EGM

HOW TO USE THIS MANUAL

This manual provides procedures for the operation of an electronic gaming machine (EGM). Machine installation, service, and repair must be conducted by licensed technicians.

Warnings, Cautions, and Notes

A warning precedes an operating procedure or maintenance practice which, if not correctly followed, could result in personal injury or death.

A caution precedes an operating procedure or maintenance practice which, if not strictly observed, could result in damage to or destruction of the equipment, or corruption.

A note precedes or follows an operating procedure, maintenance practice or condition that requires highlighting.

An arrow symbol at the bottom of a page indicates the continuance of a section.

ADDITIONAL INFORMATION

The following documents refer to the EGM referenced within this manual and contain additional information.

Title	ATI Document
SPC2 Board Installation in the Logic Cage	29-00019
LCD Xtreme® Kit Installation in the MAV500™ C3	29-00089

IMPORTANT SAFETY INFORMATION

All functions of the machine are controlled by complex electronics. Unqualified personnel must not interfere with any mechanisms or controls, as this may permanently damage the machine and lead to expensive repairs or component replacement rendering the warranty void.

This document contains important information about the use of the equipment and hazards involved in owning and operating the equipment to which it relates. The equipment can be very hazardous if used other than in accordance with this document.

Read this document before using the equipment or opening any part of the equipment. Ensure the staff does as well.

The equipment is marked with important warning labels detailing dangers.

- Check for warning labels whenever handling any part of the equipment
- Read and comply with all warning labels when operating or handling the equipment
- Under no circumstances remove or alter any warning label

If the directions in this manual and on warning labels are not followed, the following may occur:

- Serious personal injury, including electrocution and amputation. Unless you are a trained technician, tampering with the machine can result in death.
- Serious damage to the equipment
- Serious damage to other equipment
- Serious damage to the premises

CORPORATE PROFILE

Aristocrat Technologies, Inc. (ATI), the U.S. subsidiary of global gaming leader Aristocrat Leisure Limited (Australian Stock Exchange: ALL), is responsible for the Company's North and South American operations from its headquarters in Las Vegas, Nevada.

ATI offers a diversified product line that reaches into virtually all facets of the casino floor. In addition to video and stepper slots, the company provides casino management systems and multi-site progressive systems.

The U.S. company provides products and provides services throughout North America and South America and employs more than 500 people.

Product Profile

ATI offers a full range of video gaming machines and stepper (mechanical reel) slot games. These games are sold to licensed gaming properties or placed on gaming floors in exchange for a recurring revenue stream.

Some of ATI's most innovative gaming products include:

- The highly advanced MKVI™ slot platform features 3-D effect animation, advanced audio clarity, and an array of bonusing options.
- The Mr. Cashman®, Lil' Lucy™, and Money Honey® bonus-bank games, offering five unique random second-screen bonuses, a high hit frequency, and electrifying graphics and interactive animation - available on a variety of exciting MKVI base games.
- The globally patented Reel Power® and Super Reel Power® game concept, where players buy reels instead of lines. In Super Reel Power, players have 3,125 ways to win when all reels are played!
- The Millioni$er® Hyperlink® progressive that offers players the chance to win up to $1 million on a penny slot game.

Casino Management Systems

ATI designs and markets the OASIS™ Casino Management System, which utilizes the popular Windows® operating platform and advanced electronic monitoring equipment to collect, integrate, analyze, and report information on player and gaming activity. The OASIS system enables casino operators to link all their revenue centers together, including casino, hotel, food and beverage, and point of sale.

As the premier cashless and promotions solutions provider, ATI's OASIS product suite offers features such as Quickets® ticket-in/ticket-out, promotional credit download, and coupon redemption management. Aristocrat is the global leader in gaming systems with more gaming establishments and machines monitored by Aristocrat systems worldwide than any other manufacturer.

Progressive Systems

ATI offers game-specific, local-area and multi-site progressive products, including Cash Express®, Pelé's Legendary Goals™, Zorro™, Jackpot Carnival®, and Millioni$er® local-area and multi-site progressive systems. All provide high-hit frequencies and multiple jackpots for exciting game play.

OFFICES

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Parts Department	National Service Support Center (800) 482-3723, Option 4 Hours: Monday through Friday 5:00 A.M. to 4:30 P.M. (Pacific Time)

RECORD OF AMENDMENTS

Amendment		Items and Functions	Writer Initials
Number	**Date**		
AM-1951502-01	April 2003	Initial publication for MAV500 MKVI	IW
AM-1951502-02	September 2003	Update for MAV500 MAV500 MKVI	IW
AM-1951502-03	April 2005	Upgrade for MAV500 MKVI C3 Specification	RP
28-01186-00	March 2006	Upgrade for MAV500 C3 and XTreme USA Specification	SG
28-01186-01	November 2006	Revise Corporate Profile; add Index, and User Response Reformat using Adobe CS2 Suite and update content Prepare RLOs for use in future game manuals	SG

Table of Contents

PHYSICAL DESCRIPTION

Features

MAV500™ MKVI™ electronics are used in this EGM.

The electronic gaming machine (EGM) detailed in this manual is the latest model of a range of advanced gaming machines that incorporates the following features:

- Advanced materials, finishes, colors and features that provide Aristocrat customers with numerous styling, quality and gaming enhancements
- Advanced, high-performance electronics based on the Hitachi SH-4 microprocessor and the NEC PMX graphics chip
- Enhanced video graphics that includes lifelike characters and objects, blended and transparent images, and scene animations
- Advanced software for the creation of a wider variety of games and simpler machine operations
- A complete range of machine attachments that includes coin and bill acceptors, communication links, progressive systems, and custom options
- New main door latching for greater security and easier open-close operations
- Improved event records that details errors and non-errors to assist operators and service technicians in reconciling issues
- A player marketing module area that accommodates a wide range of global system solutions
- Modular machine design and construction
- A multi-voltage power supply assembly
- Straightforward and uncomplicated service and maintenance

Optional Features

Additional features include:

- Comprehensive security options
- Simpler and faster maintenance operations
- Wide range power outlet voltage capability
- Enhanced sounds and music

The EGM is assembled from various major components and subassemblies. An overview of these components are provided within this module; details on each component are provided within the modules contained in this manual.

Cabinet Components

Advanced materials, finishes, colors and features that provide Aristocrat customers with numerous styling, quality and gaming enhancements

The cabinet consists of a pressed sheet metal shell equipped with front and top covers. The cabinet provides security to the inside of the EGM and a rigid structure for mounting the various machine components.

Cabinet components consist of:

- Cabinet assembly and security
- CRT monitor and LCD panel
- Logic cage
- Backplane
- I/O driver board
- XP main board
- Communications configuration board
- Bill acceptor, hopper and drop box

Top Box Components

Top box components consist of:

- Top box assembly and security
- Top box LCD panel
- Top box assembly, lighting and artwork
- Player marketing module
- Electromechanical meters
- Ticket printer
- Sound system
- Light tower

Main Door Components

Main door components consist of:

- Main door assembly and security
- Belly door assembly and security
- Mid trim assembly
- Coin entry mechanism
- Play buttons

EGM External View

Light Tower

LCD Display

Top Box

Player Marketing Module (PMM)

Ticket Printer

Speaker Grilles

Door Top Trim

Electromechanical Meter Viewing Window

Jackpot, Reset, Cancel-Credit Key Switch Audit, Operator, Meter Key Switch

High Resolution Monitor

Coin Entry

Buttons

Bill Entry

Mid Trim

Main Door Lock

Belly Panel Artwork

Belly Door

Aperture - Coin or Ticket Out

Belly Door Lock

Coin Tray

P0445

TECHNICAL DESCRIPTION

EGM Internal View

The following sections describe the function of each component and outline procedures for adjusting, removing and replacing, and assembling and disassembling components.

Security

The cabinet incorporates security monitoring using mechanical switches for the main door, belly door, player marketing module (PMM), and top box. If these switches do not provide the correct signals to the main board, an alarm sounds, game play disables, and the MAIN DOOR – OPEN on-screen message displays.

Main Door Security Switch

The main door mechanical security switch consists of two switches, one located in the bottom corner of the cabinet beside the switch box, and the other located in the cabinet latch channel near the top latch position. When the main door is properly closed, the switches activate and send a signal to the main board indicating that the door is closed.

Belly Door Security Switch

The belly door mechanical switch is mounted to the cabinet door. When the belly door is properly closed, the switch activates and sends a signal to the main board indicating that the door is closed.

PMM Security Switch

The PMM mechanical switch is mounted on the inside of the player tracking box assembly above the game display shelf. When the player tracking tray is properly closed, the switch activates and sends a signal to the main board indicating that the tray is closed.

Top Box Bezel Switch

The top box mechanical switch is mounted on inside of the top box bezel above the player tracking box assembly. When the top box bezel is properly closed, the switch activates and sends a signal to the main board indicating that the door is closed.

Mechanical Switch Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	Using a flathead screwdriver, remove the mechanical switch from its location.
3	Unplug the switch connectors.

Replace the switch by firmly pushing it back into position after replacing the connectors.

Key Switches

The Jackpot Reset and Audit key switches are used to access and reset the machine's software. The key switches are fixed to a common plate mounted to the outside wall of the cabinet. The switches are connected by a cable to the backplane, which transfers the switch signals to the main board for processing.

Key Switch Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	Unplug the key switch cable from the trunk cable.
3	Remove the two nuts fastening the assembly to the cabinet wall.
4	Remove the key switch assembly from the cabinet. The individual key switch may be removed from the assembly if required.

Reverse the above procedures to replace the key switch.
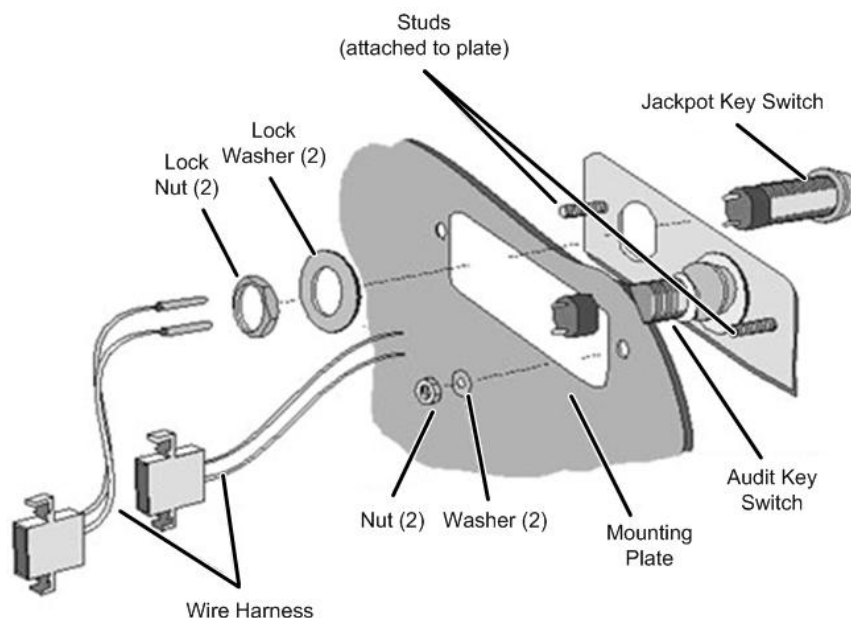
Locks

EGMs may be equipped with high-security camlocks and switchlocks, that secure the main door, belly door, bill acceptor door, logic cage, and top box bezel as required by jurisdiction.

Lock Removal and Replacement

*The procedure for lock removal is the same for all keyed locks.
If a spacer is fitted to the lock barrel on the outside of the door, this spacer must be used with any new lock fitted.*

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the cam nut, cam washer and cam from the end of the lock.
3	Remove the rotation-limiting washer from the lock. *Note the position of the stops on the rotation-limiting washer - it will make replacement easier.*
4	Remove the lock nut and lock washer from the lock barrel.
5	Remove the lock barrel from the outside of the housing.

Reverse the above procedures to replace locks.

CABINET

The cabinet is comprised of a pressed sheet metal shell (base, back, and two sides) with separate top and front sections. Various doors, brackets and plates are welded or bolted to the cabinet to provide mounting for other machine components.

Contained within the cabinet are the main display area, the logic cage, the bill acceptor, hopper and dropbox.

Main Display Area

The EGM may contain a cathode ray tube (CRT) monitor, or a liquid crystal display (LCD) panel installed in its main display area.

CRT Monitor

The CRT monitor is a 19-inch (18-inch viewable) high-resolution display manufactured by Wells-Gardner. The CRT monitor operates up to 1280 x 1024-pixel resolution.

The Monitors module contains details on the CRT monitor and the LCD panel.

The On Screen Display (OSD) controls are operated from the four-button control printed circuit board assembly (PCBA) for changing the functional settings to best meet individual conditions.
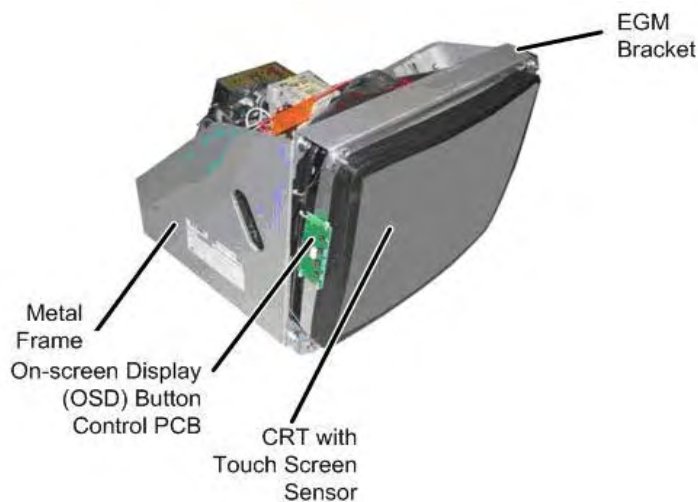
CRT Monitor

CRT Monitor Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the locating screw from the underside of the game display shelf.
3	Pull the CRT monitor assembly from the EGM; the steel frame of the monitor assembly has openings at either side to assist in handling.

Reverse the above procedures to replace the monitor; note that the shipping screw may be discarded.

LCD Panel

The LCD panel is a 19-inch, Thin Film Transistor (TFT) panel that provides a high-resolution, fast-response display system. The display is adjusted to the Aristocrat video standard resolution of 640 x 480 pixels. The unit operates with a vertical scanning frequency of 59.94 Hz and a horizontal scanning frequency of 31.47kHz. The panel uses a Fujitsu Limited Type FLC48SXC8V TFT LCD Panel.

The LCD panel is supported by a menu-based system for control and adjustment operations – the On Screen Display (OSD) system. The OSD keypad is mounted vertically at the side of the LCD panel, which enables necessary maintenance and adjustment operations via the on-screen display.

> ⚠ *Parts replacement should only be done with components identified in the official Serviceable Parts List and then with only the correct ratings, voltages, wattages, etc. When replacing the frame in the cabinet, ensure that all protective devices, such as insulating covers and strain relief, are properly installed.*
> *After servicing the unit, perform an AC current leakage test in accordance with Wells-Gardner service precautions.*
> *Use caution in lifting, removing and lowering the main LCD panel.*

Main LCD

LCD Panel Removal and Replacement

> 📌 *If left and right brackets are not provided with the replacement LCD panel, remove the left and right brackets from the defective LCD panel to install on the replacement unit.*

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the nuts on each side at the bottom of the LCD panel.
3	Release the elbow joint and carefully lift the LCD panel until it is freed from the main display kit bracket.
4	Disconnect the DB9 connector from the OSD control panel cable, the 24v power video cable from the connector behind the LCD panel, and the LCD communication cable from the connector behind the LCD panel.
5	Remove the elbow joint screws connecting to the LCD panel.
6	Unhook the right guide pin from the right hole, and the left guide pin from the left hole.
7	Remove the LCD panel from the cabinet.

Reverse the above steps to replace the main LCD panel.

Touch Screen

A touch screen is installed on the main display CRT monitor and LCD panel. Game play is enabled by touching designated areas of the screen. The touch screen is affixed to the CRT monitor and LCD panel face with a touch screen controller mounted to the monitor frame. The controller has an RS-232 interface wired into the existing self-aligning connector at the rear of the monitor assembly. The controller receives 12V DC power from the monitor.

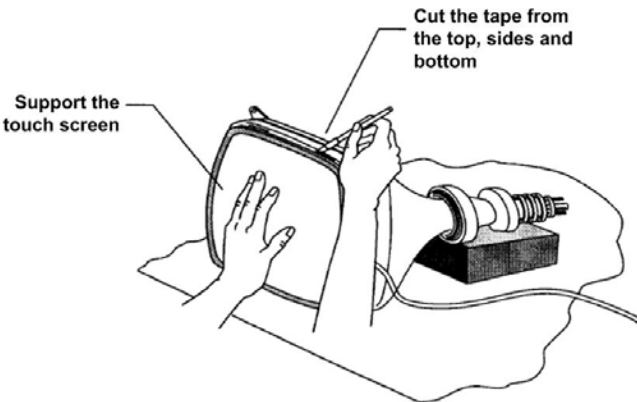### Touch Screen Removal and Replacement

Removal and replacement of the touch screen may be necessary in the following situations:

- The touch screen is off-center or crooked
- There is excessive dirt and lint behind the touch screen
- There is not enough physical space between the CRT monitor or LCD panel (CRT monitor/LCD panel) and the touch screen.

Touch Screen Removal

If left and right brackets are not provided with the replacement LCD panel, remove the left and right brackets from the defective LCD panel to install on the replacement unit.

Step	Description
1	Remove the electrical tape that covers the gap between the CRT monitor/LCD panel and the touch screen.
2	Dampen the tape adhesive with isopropyl alcohol using a cotton swab prior to cutting the tape; this makes it easier to cut the tape.
3	Cut through each piece of foam with a sharp blade; start at the top of the CRT monitor/LDC panel screen and work down the sides. *Use caution in removing the foam as to not scratch the CRT monitor/LCD panel screen or the touch screen.* *Support the touch screen as it is removed from the CRT monitor/LCD panel.*
4	Remove the touch screen. *Use caution in removing the foam as to not scratch the CRT monitor/LCD panel screen or the touch screen.* *Support the touch screen as it is removed from the CRT monitor/LCD panel.*
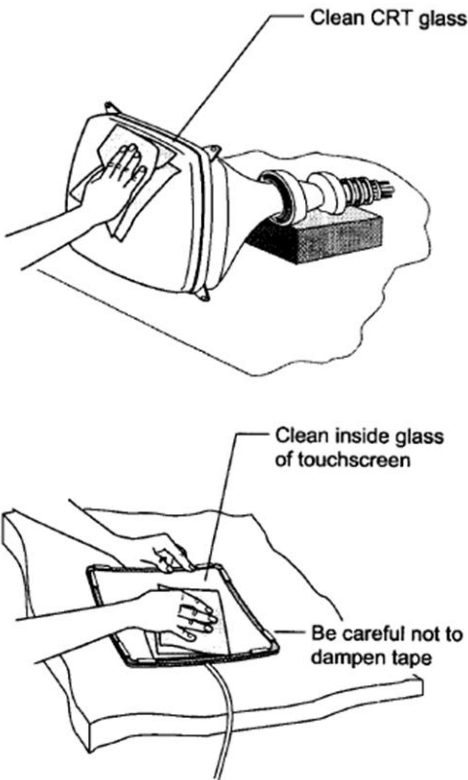
Touch Screen Replacement

Touch screen replacement is comprised of three series of steps:
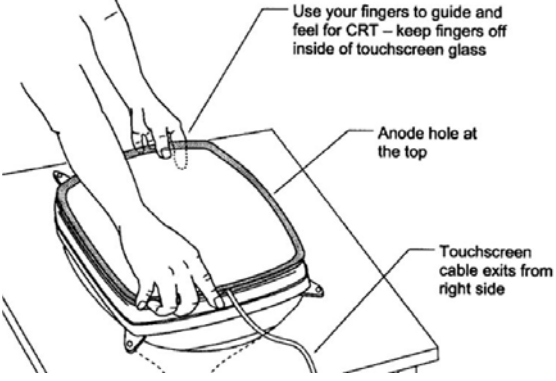
- Attaching the touch screen to the CRT monitor/LCD panel glass
- Inspecting the mounted touch screen
- Covering the gap with tape

Attaching the Touch Screen to the CRT Monitor/ LCD Panel Glass

Step	Description
1	Clean the touch screen and CRT monitor/LCD panel glass with isopropyl alcohol and a soft, lint-free cloth. Ensure the glass is clean and dry before attaching the touch screen. Avoid dampening the adhesive tape around the edge of the touch screen.
2	Remove the paper from the double-sided tape on the back of the touch screen.

Attaching the Touch Screen to the CRT Monitor/ LCD Panel Glass Continued

Step	Description
3	Hold the touch screen so that the cable exits from the right side and attach the touch screen onto the CRT monitor/LCD panel with one smooth motion.

Use your fingers to guide and feel for CRT – keep fingers off inside of touchscreen glass

Anode hole at the top

Touchscreen cable exits from right side

Inspecting the Attached Touch Screen

Step	Description
1	With the CRT monitor/LCD panel in an upright position, examine the front of the CRT monitor/LCD panel to ensure the touch screen cable is exiting from the right side. If the cable is exiting from the left side, the touch screen is on backwards.
2	Check for proper alignment, ensuring that the touch screen is not off-center or crooked.
3	Look for trapped dirt and lint. Use compressed air to remove lint and dirt between the CRT monitor/LCD panel and touch screen.

Cover the Gap with Tape

Step	Description
1	After the mounted touch screen passes inspection, cover the gap between the CRT monitor/LCD panel with the tape supplied in the touch screen kit to prevent dirt and dust accumulation between the touch screen and the CRT monitor/LCD panel.
2	Ensure the tape completely covers the space between the CRT monitor/LCD panel and the touch screen; do not leave any gaps or openings.
3	Ensure the tape is not visible once the CRT monitor/LCD panel is reassembled inside the cabinet.

Logic Cage
Location and Access

The logic cage is a steel enclosure with a hinged door in the front. The logic cage houses the machine logic PCBA and the backplane. The logic door has a slide latch and accommodates up to two cabinet locks. Logic door status is monitored by the logic door switch.

The logic cage sits below the game display shelf. It slots into the shelf at the back in two places and at the front in one place, and is fastened to the shelf with one screw at the front.
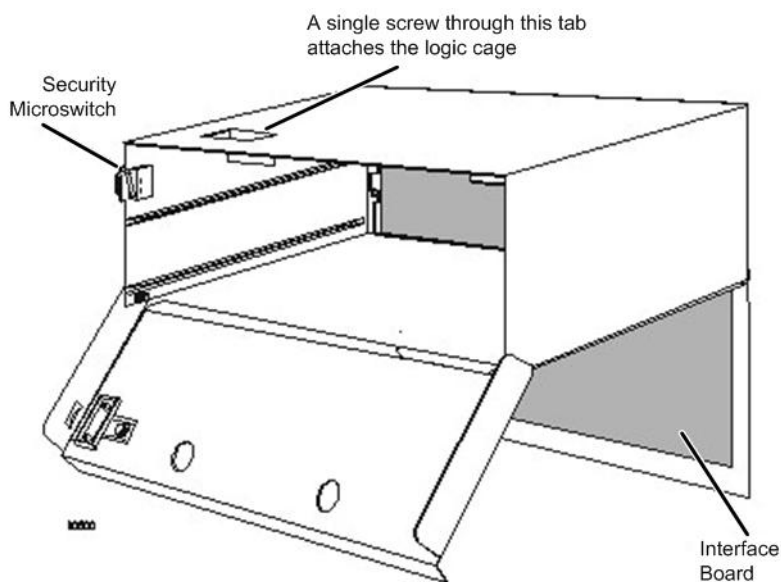
Logic Cage

Logic Cage Removal and Replacement

⚠️ *Follow Standard Electrostatic Discharge (ESD) prevention procedures when removing PCBAs.*

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the hopper from the EGM:

	Step	Description
	A	Grasp the top handle with the right hand and grasp the side handle with the left hand.
	B	Depress the thumb-operated release spring and rotate the hopper 90° counter-clockwise by sliding the left side outwards.
	C	Slide the hopper out of the EGM.

Step	Description
3	Open the logic cage door; the door flips down and is spring-loaded to stay open.
4	Carefully remove the PCBAs using extractors. The PCBAs should be immediately placed into anti-static bags.
5	Disconnect all the connectors from the backplane. Note the connector positions prior to removal to ensure correct replacement.
6	Remove the screw attaching the logic cage to the game display shelf.
7	Gently pull the logic cage from the EGM; the tabs at the back and front of the cage disengage from the shelf.
8	Remove the logic cage, with backplane attached, from the EGM.

Reverse the above procedures to replace the logic cage and backplane.

XP Main Board
Location and Access

Main Board Removal and Replacement

⚠️ *When handling electrostatic sensitive devices (ESDs) such as PCBAs, avoid physical contact with components. Do not place ESDs on metal surfaces. PCBAs should be handled by their edges. Avoid flexing the PCBA, as this can cause damage. Standard electro static discharge (ESD) prevention procedures should be followed when handling PCBAs.*

The XP Main Board, together with the other major PCBAs, is located within the security logic cage. The logic cage is a lockable, steel box located beneath the monitor shelf and provides security and protection for the PCBAs.

Step	Description
1	Open the main door and turn the power OFF.
2	Unlock and open the logic door.
3	Lift the PCBA out of the runners using the board extractors, and remove the board from the logic cage placing it in an anti-static bag immediately.

Reverse the above steps to replace the PCBA. Inspect both sides of the replacement PCBA for any signs of physical damage.

Backplane Type 2 Board
Location and Access

Backplane Removal and Replacement

The Backplane Type 2 Board (backplane) mounts vertically at the rear of the cabinet, partly behind the logic cage.

Avoid physical contact with components when handling electrostatic sensitive devices (ESDs) such as PCBAs,. Handle PCBAs by their edges. Do not place ESDs on metal surfaces.
When handling PCBAs, avoid flexing the PCBA. Flexing may cause physical damage.
Follow standard electrostatic discharge (ESD) prevention procedures when removing PCBAs.

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the hopper from the EGM: <table><tr><th>Step</th><th>Description</th></tr><tr><td>A</td><td>Grasp the top handle with the right hand and grasp the side handle with the left hand.</td></tr><tr><td>B</td><td>Depress the thumb-operated release spring and rotate the hopper 90° counter-clockwise by sliding the left side outwards.</td></tr><tr><td>C</td><td>Slide the hopper out of the EGM.</td></tr></table>
3	Open the logic cage door; the door flips down and is spring-loaded to stay open.
4	Carefully remove the PCBAs using extractors. The PCBAs should be immediately placed into anti-static bags.
5	Disconnect all the connectors from the backplane. Note the connector positions prior to removal to ensure correct replacement.
6	Remove the screw attaching the logic cage to the game display shelf. Remove the six screws that attach the logic cage to the backplane.
7	Gently pull the logic cage from the EGM; the tabs at the back and front of the cage disengage from the shelf.
8	Remove the logic cage, with backplane attached, from the EGM.

Reverse the above steps to replace the backplane.

Extended I/O Driver II Board

Location and Access

I/O Board Removal and Replacement

⚠️ *Avoid physical contact with components when handling electrostatic sensitive devices (ESDs) such as PCBAs,. Handle PCBAs by their edges. Do not place ESDs on metal surfaces.*
When handling PCBAs, avoid flexing the PCBA. Flexing may cause physical damage. Follow standard electrostatic discharge (ESD) prevention procedures when removing PCBAs.

The Extended I/O Driver II Board (I/O board) is located inside the logic cage and connects directly to the backplane board via two 64-way DIN connectors and one 96-way DIN connector.

Step	Description
1	Open the main door and turn the power OFF.
2	Unlock and open the logic door.
3	Use extractor handles to remove the I/O driver board from its connected position.
4	Remove the board from the logic cage and place the I/O driver board in an anti-static bag immediately.
5	Remove the logic cage, with backplane attached, from the EGM.

Reverse the above steps to replace the I/O board.

Communications Configuration Board
Location and Access

The Communications Configuration Board (CCB) is located within the logic cage where it connects to the main board via a 72 pin SIMM socket. The CCB configures the internal serial communications ports 2 and 3 to various communication protocols.

CCB Removal

⚠️ *Avoid physical contact with components when handling electrostatic sensitive devices (ESDs) such as PCBAs,. Handle PCBAs by their edges. Do not place ESDs on metal surfaces.*
When handling PCBAs, avoid flexing the PCBA. Flexing may cause physical damage.
Follow standard electrostatic discharge (ESD) prevention procedures when removing PCBAs.

Step	Description
1	Open the main door and turn power OFF.
2	Unlock and open the logic door.
3	Use extractor pins to remove the main board from the logic cage.
4	Locate the CCB sitting perpendicular to the main board in the top-left.
5	Release the clip at each end of the SIMM socket by drawing the top of the clip outwards along the long axis of the socket. The CCB should spring away from the socket.
6	Remove the CCB by removing it at its slant angle while holding the main board steady.

CCB Replacement

Conduct relevant machine tests after replacing the CCB.

Step	Description
1	Remove the replacement board from the anti-static bag.
2	Inspect both sides of the board for signs of physical damage.
3	Inspect the new board using the criteria contained in the General Maintenance section in the Communications Configuration Board module.
4	Insert the CCB into the SIMM socket at an angle of approximately 45° clockwise with the component side of the CCB facing away from the components of the main board. Ensure the board is fully and firmly inserted.
5	Push the outer top edge of the CCB to bring it to a vertical position. The board should click into position.
6	Slide the main board into the correct logic cage position and gently push the board into position on the interface board.
7	Close and lock the logic door.
8	Turn the power ON and close and lock the main door.

Bill Acceptor
Location and Access

*For more information, see
the Bill Acceptors module.*

The bill acceptor accepts valid bills and registers the appropriate number of credits for game play.

The bill acceptor is contained within the cabinet interior of the machine located on the right side. Access the bill acceptor by opening the main door.

Bill Acceptor Cage Removal and Replacement

*Removal and replacement
instructions relating to the cashbox
and transport assembly for specific
bill acceptor models are located in
the Bill Acceptors module.*

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the hopper from the EGM: <table><tr><td>Step</td><td>Description</td></tr><tr><td>A</td><td>Grasp the top handle with the right hand and grasp the side handle with the left hand.</td></tr><tr><td>B</td><td>Depress the thumb-operated release spring and rotate the hopper 90° counter-clockwise by sliding the left side outwards.</td></tr><tr><td>C</td><td>Slide the hopper out of the EGM.</td></tr></table>
3	Open the cashbox door, and remove the cashbox.
4	Leaving the cashbox door open, remove the two screws located at the interior bottom of the bill acceptor cage.
5	Disconnect all the connectors from the backplane. Note the connector positions prior to removal to ensure correct replacement.
6	Remove the mounting bracket and set aside.
7	Pull the bill acceptor cage forward and pivot it to the left to remove from the cabinet.

Power Supply
Location and Access

The Setec MK5PFC model power supply assembly for Aristocrat Technologies, Inc. (ATI) electronic gaming machines (EGM) provides power to the electronic and electrical devices within the EGM. The unit also performs power line (EMI) filtering and protects the EGM from adverse input disturbances, such as lightning and voltage fluctuation.

The power supply mounts into the lower right corner of the EGM with convection cooling airflow intake along the side where the power outlet inlet is located.

Power Supply Removal and Replacement

To access the power supply, the bill acceptor cage and hopper must be removed from the cabinet first.

Step	Description
1	Open the main door and turn the power OFF.
2	Unplug the power outlet input cable from the power supply unit.
3	Unplug all other cables and connectors from the power supply unit.
4	Loosen the screws that secure the power supply unit to the cabinet.
5	Pull the power supply unit forward and remove from the cabinet.

Reverse the above steps to replace the power supply.

Fuse Removal and Replacement

AC power outlet voltage is present in the power supply assembly even when the machine is switched OFF. The power outlet input cable must be unplugged before attempting to replace a fuse.

To access the power supply, the bill acceptor cage and hopper must be removed from the cabinet first.

The switched mode power supply fuse is an internal non-serviceable component. If the fuse is blown contact the nearest Aristocrat office for assistance.

The monitor fuse and the auxiliary power outlet fuse are externally accessible and may be replaced as described below:

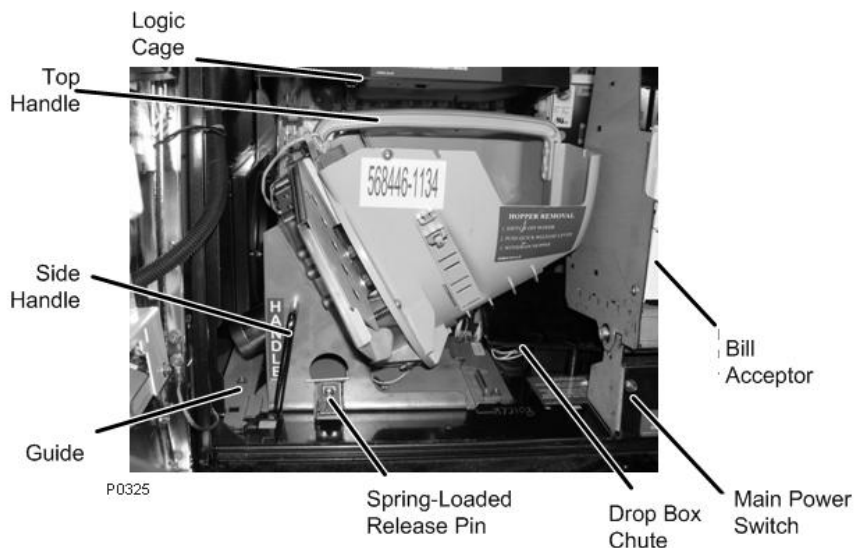| Step	Description
1	Open the main door and turn the power OFF.
2	Unplug the power outlet input cable from the power supply unit.
3	Remove the fuse cap from the fuse holder by unscrewing it in a counter-clockwise direction. The fuse should spring out of the holder.
4	Remove the blown fuse and insert the new fuse into the cap.
5	Insert the fuse cap into the holder, screwing it in a clockwise direction. Do not over tighten.
6	Reconnect the power outlet inlet cable to the power supply unit.
7	Switch the power outlet switch and the auxiliary outlets switch ON. Check that both the monitor and the power outlet auxiliary outlets have power.
8	Switch the EGM ON and close and lock the main door.

Hopper
Location and Access

The EGM is equipped with an Aristocrat Disc Hopper (ADH), which acts as a holding and dispensing unit for coins. When instructed by the main board, the hopper returns coins to the player. Coins entering the machine are fed into the hopper or the drop box through the coin handling system. Coins are diverted to the drop box when the hopper is full.

For more information, see the Aristocrat Disc Hopper module.

The hopper is mounted onto a base plate that slides into a guide on the base of the cabinet. It is locked in position by a spring-loaded release pin.

⚠ *Always use the handles to lift the hopper. Never lift the hopper by the motor and the end of the bowl, as this action may bend the motor spindle.*

Hopper Location

Hopper Replacement

Step	Description
1	Open the main door, and turn the power OFF.
2	Grasp the top handle with the right hand; grasp the side handle with the left hand.
3	Depress the thumb-operated release spring and rotate the hopper 90° counter-clockwise by sliding the left side outwards.
4	Slide the hopper straight out of the machine.

Hopper Removal

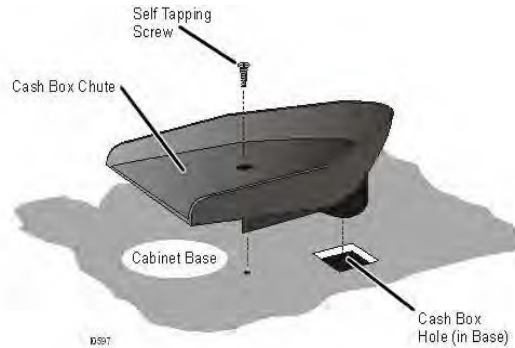| Step	Description
1	Lift the hopper by its handles.
2	Slide the hopper into the guides on the base of the cabinet until the hook on the right side is in place.
3	Push on the hopper side handle to pivot the hopper 90° clockwise until the spring-loaded pin engages in the retaining hole.
4	Switch the EGM ON, and close and lock the main door.

Drop Box

Once the hopper is full, additional coins or tokens entered into the EGM collect in the drop box located inside the cabinet base. A door in the cabinet base provides access to the drop box. This door is locked and monitored by a security switch.

Coins enter the drop box through the drop box chute located at the bottom of the cabinet. The chute is molded from plastic.

Drop Box Chute

Drop Box Removal and Replacement

⚠️ *To access the drop box, the bill acceptor cage and hopper must be removed from the cabinet first.*

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the hopper from the EGM:

	Step	Description
	A	Grasp the top handle with the right hand and grasp the side handle with the left hand.
	B	Depress the thumb-operated release spring and rotate the hopper 90° counter-clockwise by sliding the left side outwards.
	C	Slide the hopper out of the EGM.

Step	Description
3	Remove the self-tapping screw securing the chute to the base of the cabinet.
4	Pull the chute from the drop box hole in the cabinet base.

Reverse the above procedures to replace the drop box.

TOP BOX

The top box is mounted on top of the cabinet and houses an illuminated artwork panel, or an optional LCD panel, thus increasing the visual impact of the EGM.

The EGM may be fitted with one of several variations of top box. The top box consists of a welded steel shell with a door at the front, and is bolted to the top of the cabinet.

Top Box Bezel

The bezel of the top box is made of molded plastic. The bezel is mounted to the top box by four locating tabs that fit into slots provided on either side of the top box shell. The bottom of the bezel has lugs that fit underneath the top of the cabinet door when closed. This design ensures that the top box bezel cannot be removed unless the main door is open.

The top box bezel provides mounting for an artwork panel. Ticket printers, stand-alone progressive systems, communication interfaces, and a second LCD panel may also be housed in the top box.

Top Box Bezel Removal

Step	Description
1	Open the main door and turn the power OFF.
2	Holding the top box bezel by its sides, push it upwards to disengage the location tabs; pull the bezel from the top box shell.

Top Box Bezel Replacement

Step	Description
1	Locate the tabs on the top box bezel in the slots provided in the top box shell.
2	Pull the top box bezel downwards into position.

Top Box LCD Panel

The EGM may be fitted with a Liquid Crystal Display (LCD) panel in the top box that provides players with an additional level of entertainment.

The 19-inch, Thin Film Transistor (TFT) panel provides a high-resolution, fast-response display system. The display is adjusted to the Aristocrat standard video resolution of 640 x 480 pixels. The unit operates with a vertical scanning frequency of 59.94 Hz and a horizontal scanning frequency of 31.47kHz. The panel uses a Fujitsu Limited Type FLC48SXC8V TFT LCD Panel.

The LCD panel has a side mounted, button control board enabling necessary maintenance and adjustment operations via the on-screen display system.
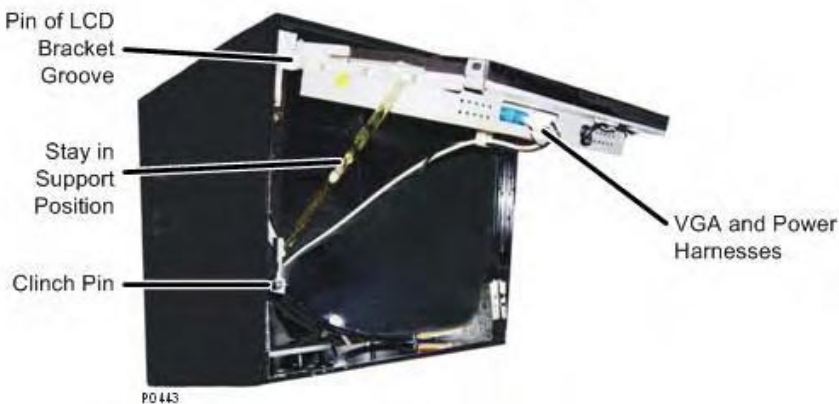
⚠️ *Parts replacement should only be done with components identified in the official Serviceable Parts List and then with only the correct ratings, voltages, wattages, etc. When replacing the frame in the cabinet, ensure that all protective devices, such as insulating covers and strain relief, are properly installed.
After servicing the unit, perform an AC current leakage test in accordance with Wells-Gardner service precautions.
Ensure that the EGM's power is OFF during installation and removal. Use caution in lifting, removing and lowering the top box LCD panel.*

LCD in Top Box

Top Box LCD Panel Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the top box bezel.
3	Remove the shipping screws (four) on the LCD panel.
4	Release the elbow joint and carefully lift the LCD panel until it is freed from the brackets.
5	Disconnect the DB9 connector, the 24v power video cable, and the LCD communication cable.
6	Remove the elbow joint screws connecting to the LCD panel.
7	Unhook the right guide pin from the right hole, and the left guide pin from the left hole.
8	Remove the LCD panel from the top box.

Reverse the above procedures to remove the top box LCD panel.

Light Tower

A multi-level light tower may be installed on top of the EGM to provide an additional level of customer service, security, and house control. The light tower is attached to the roof of the top box so that it may be seen from a distance. The tower can have two, three, or four tiers of different colors. The light tower colors indicate the denomination that the EGM is configured with. The typical functions of a two-tier light tower are described below.
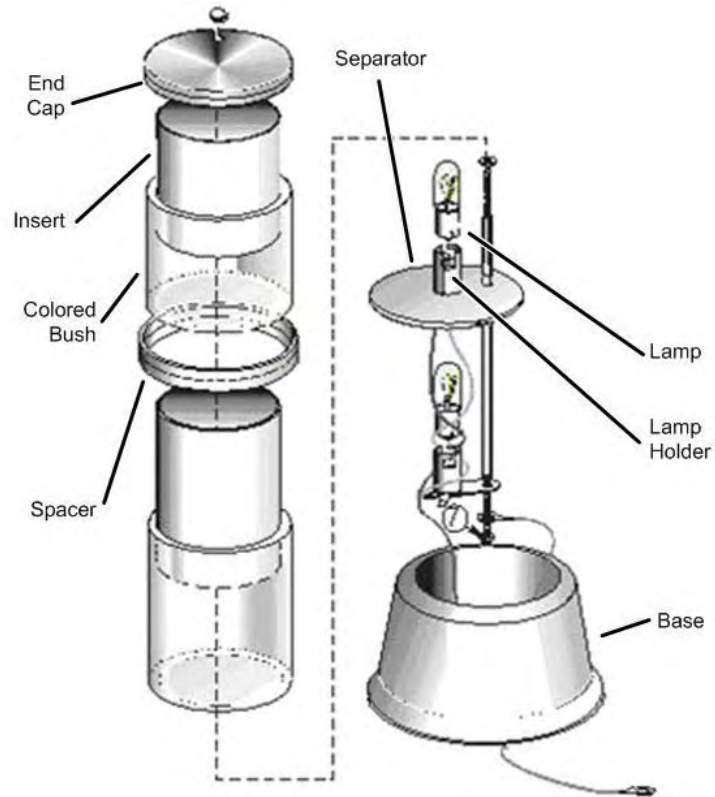
Light Tower

Denomination

The following light tower colors are ATI standard and indicate the denomination that the EGM is configured.

Color	Denom	Color	Denom	Color	Denom
Red	Multi Denom	Red	5¢	Orange	50¢
Brown	1¢	Green	10¢	Blue	$1.00
Pink	2¢	Yellow	25¢	Purple	$15.00 +

Light Tower Functions

The bottom tier light should remain illuminated after closing the main door,(unless otherwise flashing) until the start of the next game.

Condition	Door Closed		Door Open	
	Top Light	Bottom Light	Top Light	Bottom Light
Idle	OFF	OFF	OFF	Fast flash
Service	ON	OFF	ON	Fast flash
Tilt	Slow flash	OFF	Slow flash	Fast flash
Hand Pays	Slow flash	Slow flash	Slow flash	Fast flash

Light Tower Conditions

The light tower indicates one of four possible conditions; idle, service, tilt and handpays. Details of each of these conditions are shown below.

Condition	Description
Idle	The default state in which no other condition exists.
Service	The SERVICE button is pressed and illuminated.
Tilt	The EGM is either in a lockup tilt condition (excluding a main door open message and the Handpays state), such as Logic Door Accesses or Bill Acceptor Error; or a non-lockup tilt condition, such as Bill Stacker Full or Printer Paper Low.
Handpays	The EGM is in a jackpot lockup, a cancelled credit lockup, or a progressive link jackpot lockup.

Light Tower Filter Removal and Replacement

Step	Description
1	Using a socket wrench, remove the acorn nut from the top of the light tower; remove the end cap.
2	Remove the top lamp tower tier and slide the spacer off the tower; use caution in not bending the metal contact.
3	Remove the bottom lamp tower tier and remove the insert and color filter; replace the color filter with the appropriate one.
4	Replace the bottom tower tier and align the filter seams with the bolt; ensure the bottom tower tier fully seats.
5	Replace the previously removed spacer; ensure that the gold grounding tab sits on top of the spacer.
6	Ensure the spacer is fully seated; replace the previously removed top tower tier and end cap.
7	Replace the previously removed acorn nut; finger-tighten to ensure against damaging the end cap.

Player Marketing Module
Location and Access

The player marketing module (PMM) allows a player access to a network system during machine play using an identification card. The network system maintains a record of player transactions, and allows messages sent to individual players.

The PMM panel is located in the top box and has a communications tray attached. If the EGM contains a player communications unit, it is located to the rear of the PMM panel. An aperture in the panel provides player access to the card reader, display and keypad. If the EGM does not contain a player communication unit, the PMM panel houses an artwork panel.

PMM Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the top box bezel by pushing up on it vertically.
3	Unplug the keypad, card reader, and display connectors on the Sentinel II board.
4	Unplug the connector on the ticket printer, and remove the PMM tray from the top box.

Reverse the above procedures to replace the PMM panel.

Electromechanical Meters

Location and Access

Electromechanical Meters Removal and Replacement

⚠️ *Avoid physical contact with components when handling electrostatic sensitive devices (ESDs) such as PCBAs,. Handle PCBAs by their edges. Do not place ESDs on metal surfaces.*
When handling PCBAs, avoid flexing the PCBA. Flexing may cause physical damage.
Follow standard electrostatic discharge (ESD) prevention procedures when removing PCBAs.

The assembly can only move a set distance before the cables prevent further movement.

The hard meters board assembly is attached to speaker assembly and provides six electromechanical meters that can be viewed through the main door viewing window when the audit key switch is turned counter-clockwise.

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the plastic meters label from the front of the assembly, cut the security seal wire and remove the seal.
3	Remove the self-tapping hex-head screw that attaches the assembly to the speaker assembly; shift the assembly to the left and remove the unit.
4	Remove the nut on the right side, and the screw on the left side; both are used to secure the top cover to the meter plate.
5	Unclip and unplug the main cable, and remove the cable tie holding the key switch cable to the unit. Disconnect the key switch cable.
6	Remove the four screws holding the boards to the stand-offs.
7	Remove and replace the boards as required.

Reverse the above steps to replace the electromechanical meters assembly.

Ticket Printer
Location and Access

*For more information, see the
Ticket Printers module.*

The ticket printer provides players with a ticket or voucher for redeemable credits. The ticket/voucher printer may also keep a second copy of all tickets printed for additional audit information.

The ticket printer is located above the monitor in the area provided for the PMM at the base of the top box.

Ticket Printer Location

Ticket Printer Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the top box bezel by pushing up on it vertically.
3	Remove the two screws in the PMM panel and slide the PMM panel forward.
4	Unplug all connectors on the Sentinel II board (keypad, and card reader, and display).
5	Disconnect the printer cable.
6	Remove the four screws fastening the printer assembly to the game display shelf and slide the entire assembly forward.

Reverse the above procedures to replace the ticket printer.

Sound System

The audio amplifier module of the sound system receives the maing board speaker output. The amplifier module has two channels to allow for stereo sound.

An active crossover splits each audio signal into a high and low frequency and the signal is then fed to the power amplifiers. The active crossover makes it easy to balance the acoustic output of the speakers.

A signal-detecting circuit mutes the amplifier when not in use to minimize the power consumption. The audio amplifier is powered from the 24V rail of the EGM.

Sound System

Sound System Removal and Replacement

There are no serviceable components in the audio amplifier module.

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the main LCD panel and the meter pack to allow access to the module.
3	Disconnect the two connectors on each speaker.
4	Remove the two screws that secure the front of the speaker assembly mounting bracket to the cabinet top shelf.
5	Slide the complete speaker/meter module forward until the hooks at the front and rear disengage.
6	Remove the module from the machine.

Reverse the above steps to replace the audio amplifier module.

MAIN DOOR

The main door is the physical outer enclosure and includes the cabinet and door, which provides the location and mounting for other modules.

The main door is composed of welded steel construction with a removable mid trim and button panel. It has a belly door that opens to allow access to the bill acceptor.

The door is mounted to the cabinet on three hinges on the left side of the EGM.

Plug Breaks

Two plug breaks are provided for harnesses attached to components in the main door. The harnesses are not continuous cabling, but utilize connector/socket sets separating the door-side harnesses from the cabinet-side harnesses. The upper plug break provides for the buttons and the lower plug break provides for coin handling, fluorescent lighting and security items.
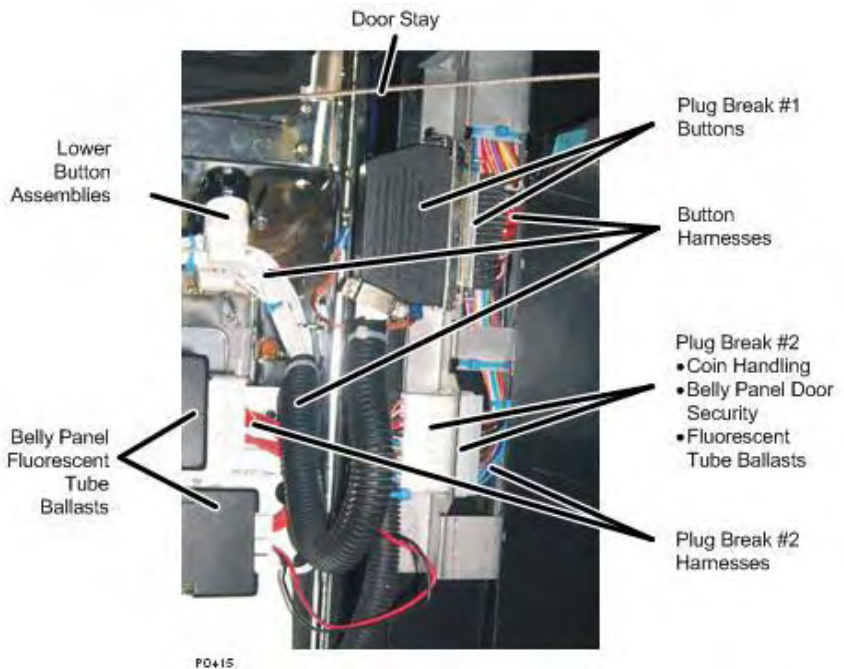
Main Door Plug Breaks

Main Door Removal and Replacement

The door is a heavy item; follow the national standard and code of practice for manual handling.

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the top box bezel by pushing up on it vertically.
3	Remove the two screws in the PMM panel and slide the PMM panel forward.
4	Unplug all connectors on the Sentinel II board (keypad, and card reader, and display).
5	Disconnect the printer cable.
6	Remove the four screws fastening the printer assembly to the game display shelf and slide the entire assembly forward.

Main Door Latching

The main door latching consists of door-side components (upper and lower latching cams and springs, link latch assembly and Reno lock cam, and cabinet-side upper and lower main door catches).

When the door closes, main door catches are secured by the large cams which lock into position by the main door latch cam via the latch spring. The door releases (unlocks) via the Reno lock cam onto the latch link which rotates the large cams that release the main door catches. The lock cam prevents the link lever from operating without turning the key.
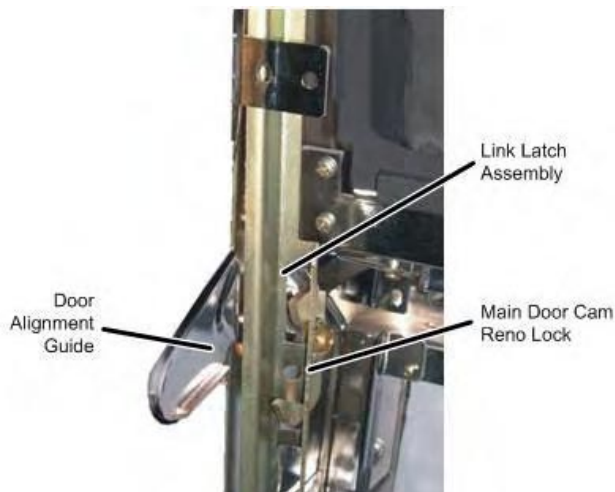

Latching Cams (Lower)   Latching Cams (Upper)   Latching Cams (View in Model Only)
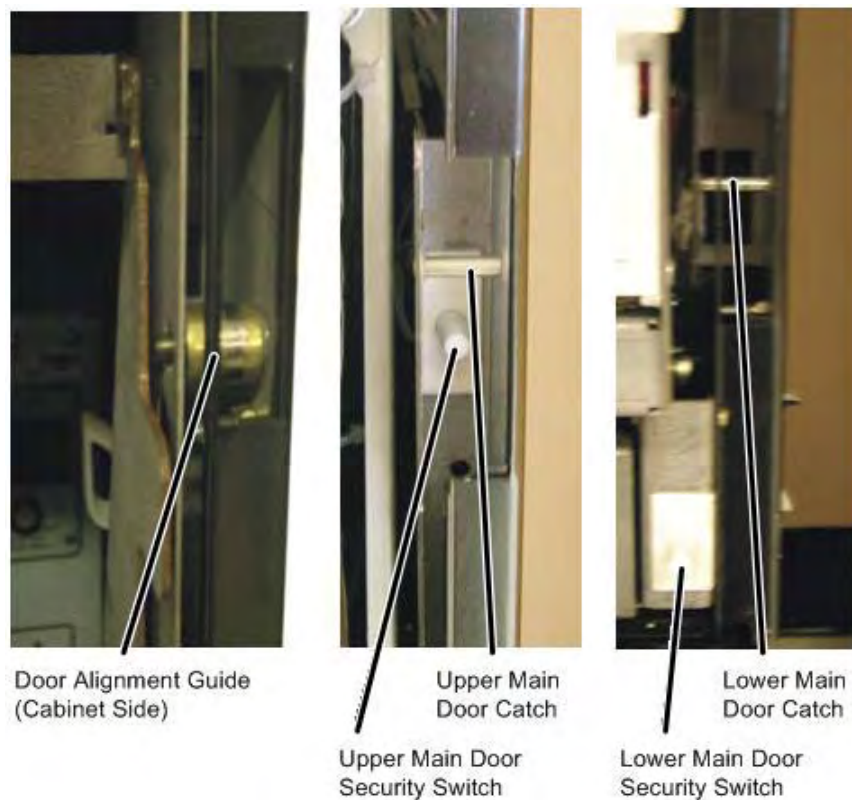
Main Door Latching

Link Latch Assembly

Door Alignment Guide

Main Door Cam Reno Lock

Main Door Alignment Guide – Main Door Side

Main Door Latching (continued)

Main Door Catches and Security Switches – Cabinet Side

Main Door Latching Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	Using an Allen key, remove the cap screws holding the latch cover plates to the door. When the latch cover plates are removed, remove the latching cams and springs.
3	Remove the holding nut to release the main door Reno lock cam from the latch link.

Reverse the above procedures to replace the latching cams and springs.

Button Panel

The button panel is fabricated from sheet steel. Its function is to act as a strengthening brace for the door assembly and to provide an area for the buttons and coin entry.

The button panel is fitted with a "drop-in" button panel and is attached to the door assembly by studs and screws. It can be removed from the door for repair or replacement.

Game conversions require that the panel be replaced to accommodate different button configurations. This panel is secured to the mid trim by four nuts fitted to studs. These nuts are accessed from the underside of the mid trim.
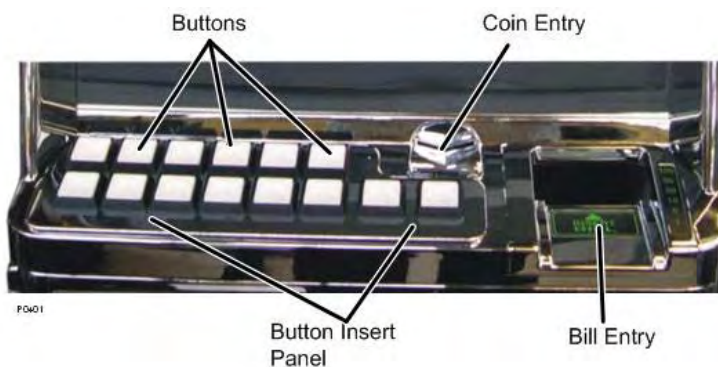
Mid Trim with Buttons

Button Panel Removal and Replacement

Step	Description
1	Unlock and open the main door and turn the power OFF; unlock and open the belly door.
2	Remove the coin acceptor: <table><tr><td>**Step**</td><td>**Description**</td></tr><tr><td>A</td><td>Open the main door and turn the power OFF.</td></tr><tr><td>B</td><td>Disconnect the coin acceptor cable.</td></tr><tr><td>C</td><td>Lift up on the assembly, pivot the assembly out, and pull the assembly from the bottom-locating groove.</td></tr></table>
3	Remove the four screws to remove reflector panel from inside the door; remove the reflector panel.
4	Disconnect the cables to the coin acceptor and fluorescent ballast; press down on the reflector panel to disengage it from under the coin entry slot on the door player panel; and remove the reflector panel from its locating slots.
5	Disconnect the plug break from the button panel to the door.
6	Remove the four nuts on the underside of the button panel that attach it to the door and pull the button panel from the door.

Reverse the above procedures to replace the button panel.

Coin Handling System
Location and Access

For more information, see the Coin Handling Systems module.

The coin handling system consists of a coin comparitor/validator for determining the validity of inserted coins, a coin diverter, a coin chute for directing the coins to the correct destination, and a photo-optic module for monitoring the position of the coin diverter. The handling system is fitted and adjusted at the factory to suit a specific coin denomination.

Coin entry, located on the main-door mid trim, is designed to accept a specific coin denomination for a particular machine. It will not accept oversized or bent coins and ensures that the coin is correctly directed into the coin comparitor/validator.
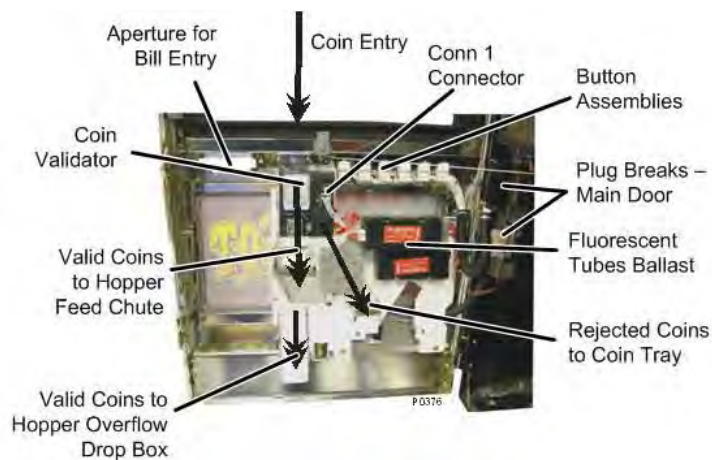
Coin Handling System

Coin Comparitor/ Validator Removal and Replacement

Specific instructions relating to removal for specific coin handling models are located in the Coin Handling System module.

Step	Description
1	Open the main door and turn the power OFF.
2	Disconnect the coin acceptor cable.
3	Lift up on the assembly, pivot the assembly out, and pull the assembly from the bottom-locating groove.

Reverse the above procedures to replace the coin comparitor/validator.

Play Buttons
Location and Access

The play buttons function as the interface between the player and the machine. Various games have different configurations of buttons, and the buttons themselves may vary from game to game, or from market to market. The buttons are mounted onto the "drop-in" panel.
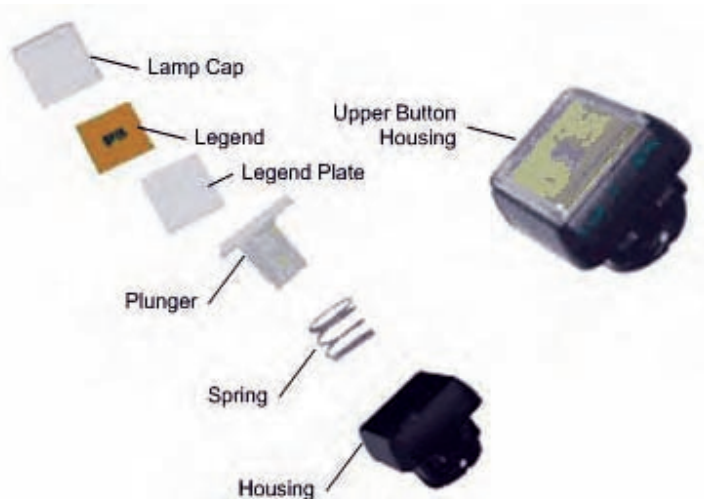
Play Button Upper Assembly

Play Button Lower Assembly

Play Buttons
(continued)

P 0400

Buttons Beneath
Mid Trim

Play Buttons – Lower Assembly

Player Panel
Mounting Plate in
the Deck Lid
above the Player
Panel

Player Panel Mounting Plate

Play Button LED Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	Identify the button assembly that contains the LED requiring replacement and remove the lamp cap by prying it up using a flathead screwdriver.
3	Use needle-nosed pliers to remove the LED from the switch.
4	Insert the replacement LED using needle-nosed pliers.
5	Snap on the previously removed lamp cap.
6	Switch the EGM ON, and close and lock the main door.

Play Button Legend (Label) Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	Identify the button assembly that contains the legend requiring replacement and remove the plastic lamp cap by prying it up using a flathead screwdriver.
3	Replace the legend (label) and snap on the plastic lamp cap.
4	Switch the EGM ON, and close and lock the main door.

If a button does not illuminate as specified, check the connections and the LED.

Bashbutton LED Removal and Replacement
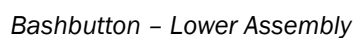
Step	Description
1	Open the main door and turn the power OFF.
2	Identify the bashbutton assembly that houses the LED requiring replacement and remove the lamp cap by prying it up using a flathead screwdriver.
3	Use needle-nosed pliers to remove the LED from the switch.
4	Insert the replacement LED using needle-nosed pliers.
5	Snap on the previously removed lamp cap.
6	Switch the EGM ON, and close and lock the main door.

Bashbutton – Upper Assembly

Bashbutton – Lower Assembly

Belly Door
Location and Access

The belly door is attached to the main door below the mid trim. The belly door provides a frame to hold the belly artwork and, when opened, allows access to the bill acceptor cage door and bill stacker. The bill stacker can be removed and cleared without opening the main door. Two fluorescent tubes mounted to the reflector panel illuminate the artwork.
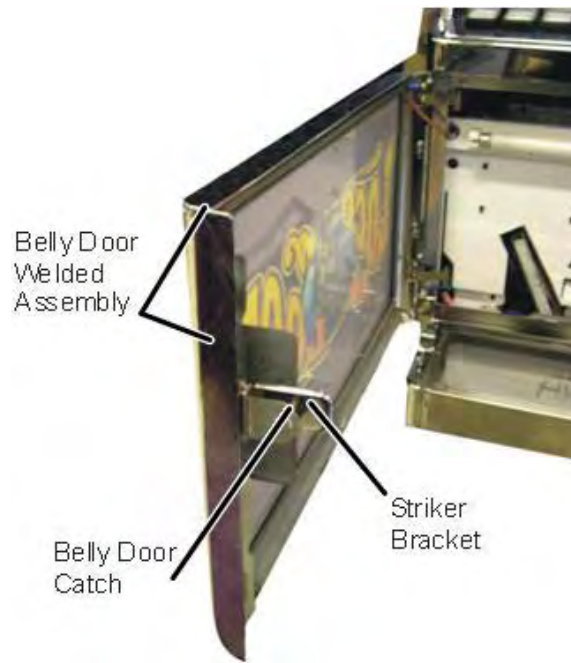
Belly Door and Catch

Belly Door Latching

The belly door latching consists of two sets of components: the belly door welded assembly with belly door catch and striker bracket, and the main-door-side latch cover, cams, latch spring, and bracket.

When the door closes, the belly door catch is secured by the large cam which is locked into position by the belly door latch cam via the latch spring.

The door is released (unlocked) via the Reno lock cam onto the latch link which rotates the large cam that releases the belly door catch.
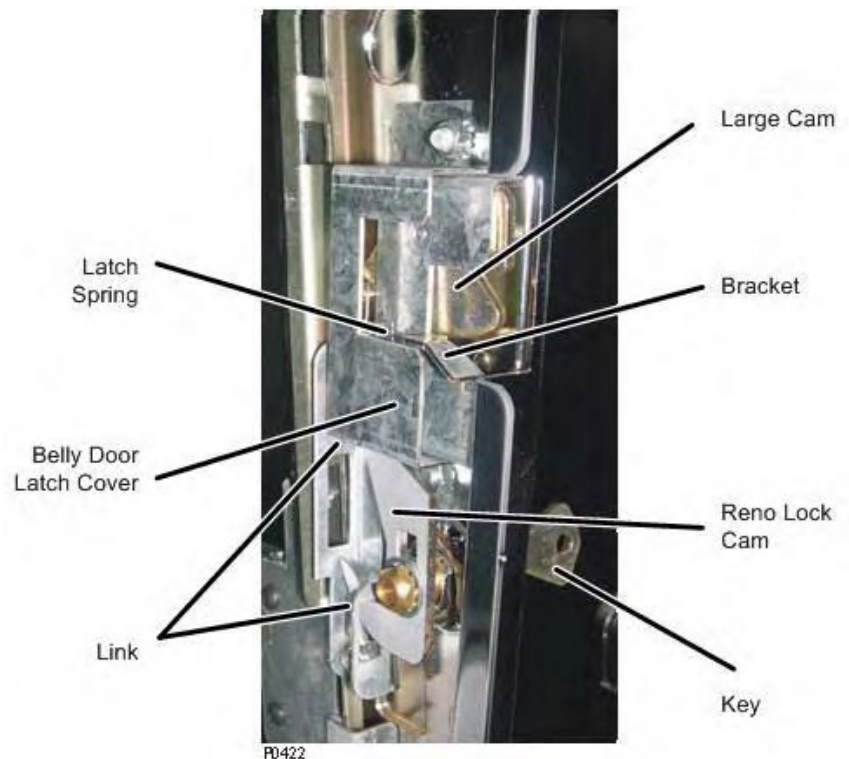
Belly Door Latching – Main Door Side

Belly Door Latching (continued)
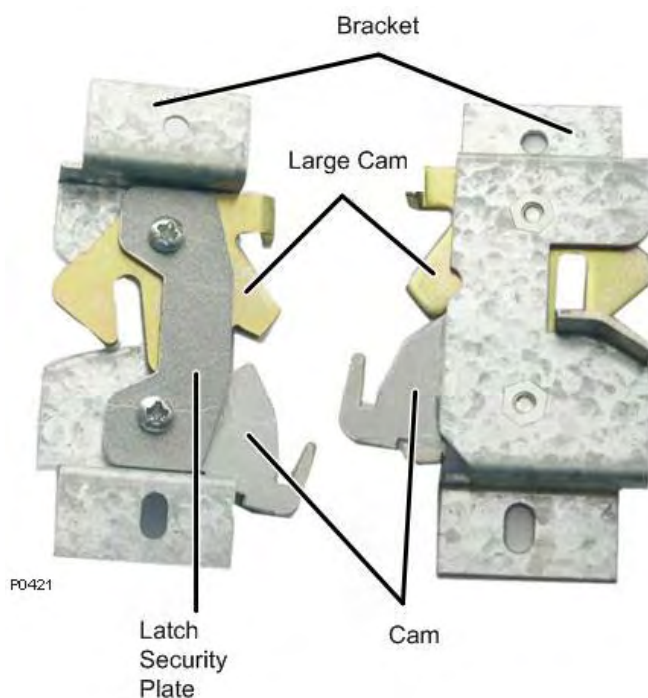
Belly Door Latching - Cams

Belly Door Latching Removal and Replacement

Step	Description
1	Open the belly door and remove the two nuts holding the belly door latch cover to the main door.
2	Unhook the cam assembly from the latch link to remove the cover and cam assembly.
3	Remove the nylon nut that holds the belly door latch link. *The belly door latch link has some play – do not tighten the nylock nut to restrict movement during reassembly.*
4	Remove the spring from the two-cam assembly and the two screws holding the cams to the bracket.

Reverse the above procedures to replace the belly door latch.

Fluorescent Lighting

Fluorescent tubes are 6W to the IEC 1981 standard.

The main door is equipped with a fluorescent lighting system that illuminates the belly door artwork. The artwork panel is located in the belly door and is held in place by a clamping bracket secured by four nuts.

The lighting system consists of two six "W" fluorescent tubes, and two electronic ballasts. The tubes and ballasts mount to a reflector panel on the inside of the main door. One of the ballasts is powered from the 24V DC rail on the power supply, and is daisy-chained to the second ballast.

Belly Panel Door Fluorescent Lighting (Artwork Removed)

Fluorescent Tube Removal and Replacement

When the lighting system is working, the fluorescent tube becomes hot.

Step	Description
1	Open the main door and turn the power OFF.
2	Open the belly door, rotate the fluorescent tube and carefully remove from its sockets. Insert the new fluorescent tube.
3	Close and lock the belly door; turn the EGM ON and close and lock the main door.

Fluorescent Ballast Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	The ballasts are mounted to the reflector panel on the inside of the main door. Unplug the fluorescent and power harnesses from the ballast box.
3	Squeeze the sides of the ballast housing to disengage the plastic clips; remove the ballast.

Reverse the above procedures to replace the fluorescent ballast.

Coin Tray
Location and Access

The coin tray provides a receptacle for coins or tokens dispensed by the hopper, and also for coins or tokens rejected by the coin handling system. The tray mounts onto the lower section of the main door and is held in position with six screws. Four screws are inserted from the inside of the main door, and two screws are inserted from the front after opening the belly door. The coin tray consists of three components held together by locating tabs. The mounting screws must be removed before coin tray disassembly.
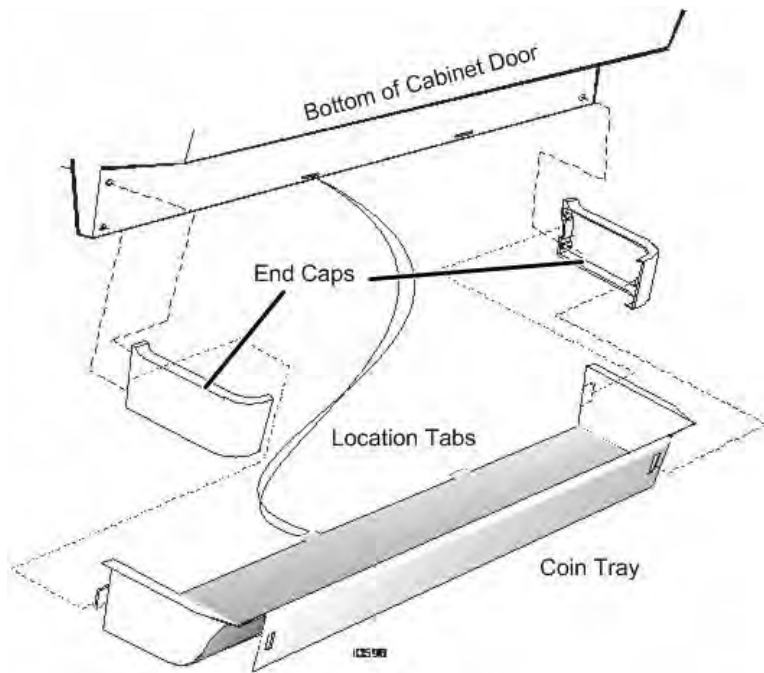
Coin Tray

Coin Tray Removal and Replacement

Step	Description
1	Open the main door and turn the power OFF.
2	Remove the four internal and two external screws that secure the coin tray to the main door.
3	Pull the coin tray assembly from the main door.
4	Remove the end caps from the coin tray; press the front panel of the coin tray in until the locating tabs disengage.

Reverse the above procedures to replace the coin tray. When replacing the coin tray, align the location tabs with the corresponding slots on the bottom of the main door.

GENERAL MAINTENANCE

For the general maintenance of the cabinet, main door, and top box, these procedures should be conducted as part of regular machine maintenance:

- Clean the exterior of the EGM using a non-abrasive household cleaning solution.
- Check that the cabinet, main door, belly door, and top box bezel are not damaged.
- Check that all cabinet earth leads are in good condition and securely connected.
- Check that the EGM's security features, such as the top box security switch, are functioning correctly and are not damaged.
- Check the condition of the fluorescent lighting system and artwork panels and replace if necessary.
- Check that all buttons function correctly and replace defective components as necessary.
- Check that there are no foreign objects in any of the security locks.
- Check that all doors and latches close and lock correctly and adjust if necessary.

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PHYSICAL DESCRIPTION

The Setec MK5PFC model power supply assembly for Aristocrat Technologies, Inc. (ATI) electronic gaming machines (EGM) provides power to the electronic and electrical devices within the EGM. The unit also performs power line (EMI) filtering and protects the EGM from adverse input disturbances, such as lightning and voltage fluctuation.

Access and Location

For convenience, the power outlet supply power switch is hosted in a separate switch box towards the front of the cabinet. The switch box is linked to the power supply box using a power outlet cable. The power outlet ON/OFF switch controls the power to all equipment in the cabinet, apart from any equipment that may be powered from the general purpose outlet, also referred to as the auxiliary outlet, located on the front of the power supply. An optional DC-DC converter can be attached to the top of the unit to provide +12V DC if required.

Main Power Supply Assembly in the EGM

Components

The power supply unit consists of:

- Power supply outlet switch (located remotely in the switch box)
- Power supply outlet input socket, IEC compatible
- EMI filter and surge protection device
- Switched mode power converter, internally fused
- Main 24V DC output socket (connects to the interface board to provide power for the low voltage components of the EGM)
- Auxiliary 24V DC output connector
- An optional sub-assembly provides a 12V DC output socket. This outlet provides power for subsidiary equipment.
- 24V DC switchable output for the electronically driven fluorescent lighting system
- Separately fused, switched power supply outlet output for the monitor
- Solid-state, zero crossing relay for switching monitor
- Auxiliary power supply outlet. This outlet is separately fused and switched and used to provide power for any accessories or test equipment that may need to be connected.

Power Supply Assembly

Basic Operation

The power supply unit receives AC power outlet input via a standard IEC socket. A wide range (90V AC to 264V AC) can be connected without the need for switch selection.

The power outlet input is switched, filtered, and surge protected before connection to the monitor and the off-line power supply. The 24V output is used to power the main board, the electronic ballasts for the fluorescent tubes, and all other machine components requiring low-voltage power.

The optional 12V output is used to power subsidiary equipment or other machine peripherals. A separately switched and fused auxiliary main outlet is provided via an IEC female connector.
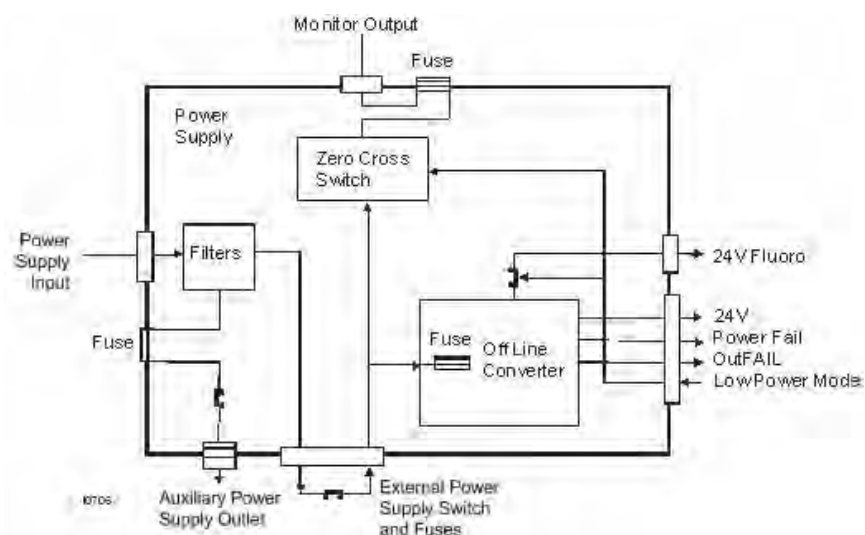
Power Supply Block Diagram

Inputs and Outputs

Name	In/Out	Function
Power Supply Input	In	Power Supply input power
Power Supply Switch Interface	In/Out	Interface for ON/OFF switch
Power Supply Auxiliary Outlet	Out	Power Supply Output Power (switched)
Monitor Output	Out	Monitor (switched by control signal)
+24V Output	Out	Output DC power
+24V Aux Output	Out	Output DC power for powering external DC-DC converter
+24V Fluoro Output	Out	Output DC power for fluorescent drivers
Control Signals	In/Out	Signals for control requirements

FUNCTIONAL SPECIFICATION: INPUTS

The following section details inputs for the power supply, inrush current, main input hold up time, and external power outlet switch.

Power Supply Input

The acceptable power outlet input voltage is 100-264V AC, 50/60Hz. The power outlet input voltage is filtered (but not transformed) and is connected to the monitor and Auxiliary Power outlet Outlet outlets.

Power Factor correction is incorporated as standard.

Inrush Current

Line current is less than 25 A peak when turned on at either 120V AC or 240V AC, excluding transient currents due to EMI suppression capacitors.

Main Input Hold Up Time

The power supply maintains its output in the event of a missing cycle at any input voltage over the input range. Operation is not interrupted nor the output signal activated. Hold up time is guaranteed for the average load shown in the table of DC Output Voltages.

External Power Outlet Switch

An interface for an external ON/OFF switch to the power supply is provided. It switches OFF the power converter generating the DC outputs and the monitor output. The switch does not turn OFF the power outlet auxiliary output.

FUNCTIONAL SPECIFICATION: OUTPUTS

The following section details outputs for the monitor, monitor output zero switching, auxiliary output voltage, and DC output voltage.

Monitor Output

The AC monitor output is used to power the video monitor of the gaming machine. The output is controlled by the Low Power Mode Signal. Monitor output voltage is the same as the AC power outlet input voltage.

AC Monitor Output Voltage

Output	Voltage	Load Current (A)	
		Minimum	**Maximum**
Monitor	Power outlet (at no load)	0	1.5 A
	Power outlet +0%, -2%		

Monitor Output Zero Switching

The monitor output employs zero crossing detection circuitry to eliminate switch ON/switch OFF surges and transients. This approach ensures that the monitor degaussing circuit can function correctly, and that high currents associated with non-zero voltage switching do not occur and erroneously trip the fuse.

Because the monitor degaussing circuitry relies on correct operation of the zero crossing switch, unusual color distortion can result from failure of this switch. If this occurs, replace the entire power supply unit.

Monitor Output EMC Filtering

Filtering of the monitor output is provided to protect against conducted EMI from the monitor, and to provide immunity from power outlet disturbances to the monitor.

Auxiliary Output Voltage

The auxiliary output voltage is used to power customer mains associated equipment and is not controlled by the remote switch input. Power at this output is controlled by a single-pole switch located adjacent to the output. The auxiliary outlet voltage is the same as the AC power outlet input voltage.

Output	Voltage	Load Current (A)	
		Minimum	Maximum
Aux power outlet	Power outlet +0%, -2%	0	1.0 A

Auxiliary Output Current Protection

Auxiliary output is over-current protected by means of a fuse. A "slow" fuse is used (rated at 3.0A) to allow for the inrush current of the peripherals. The fuse holder is located adjacent and accessible for external access.

Auxiliary Output EMC Filtering

Filtering of the auxiliary output is provided to protect against conducted EMI from the connected devices, and to also provide immunity from power outlet disturbances for the connected devices.

DC Output Voltages

All settings are at no load unless otherwise specified. The +24V nominal is set at 23.7V with its upper limit set at 24.3V to maximize the lifetime of the bulbs.

The +24VF and +24V auxiliary outputs are derived directly from the +24V output. The loading requirements add to the load requirement of the +24V internal to the PSU and make up the total from the +24V output. When the +24VF and +24V auxiliary loads are removed, their currents (including the peak) are available from the +24V output.

The maximum allowable current at any time for loading combinations of all outputs is represented by the +24V total (internal) row.

Output	Factory Setting	Load Current (A)		
		Minimum	Average	Peak
+24V	+23.7 ±0.6V	0.5	8.5	13.5
+24VF	+23.7 ±0.6V	0	3	5.0
+24V Aux	+23.7 ±0.6V	0	1.8	-
+24V Total (Internal)	+23.7 ±0.6V	0.5	11.0	18.0

DC Output Voltage Tolerance

The following outputs are guaranteed within the following limits. The percentage variations refer to the absolute voltage in each case.

All regulation limits are from the set point unless otherwise stated. Load regulation is for the current range within the minimum and maximum limits shown in DC Output Voltages.

Output	Load Regulation	Line Regulation	Temperature Coefficient
+24V & +24V Aux	-1.0%	±0.1%	±1.5%
+24VF	-2.0%	±0.1%	±1.5%

DC Output Voltage Hold Up

The power supply has sufficient output capacity to maintain DC output for at least 25 milliseconds (ms) after power outlet input is removed. This ensures that mechanical meters have enough power to complete counting while an orderly machine shutdown proceeds. Consequently, no meter pulses are "lost" in the event of power failure during mechanical meter updates.

DC Output Voltage Ripple and Noise

The peak-to-peak output ripple and noise does not exceed the values as noted below.

Output	Ripple and Noise
+24V	100 mV
+24VF	100 mV

Shutdown

The power supply shuts down for the following conditions:

- +24V output is over voltage
- Over-current on the +24V output
- Thermal shutdown is provided to protect against overload of the power supply outputs above the rated average current

Reset of the shutdown is accomplished by removing the input power for approximately five seconds.

DC Output Voltage Over-voltage Protection

The power supply incorporates over-voltage shutdown such that no single tilt with consequences can cause the +24V output or +24VF output voltage to exceed the limits as noted below.

Output	OV trip
+24V Internal	28.0V

An over-voltage condition latched the power supply OFF. The power supply may be restarted by turning the input power OFF for approximately five seconds and then turning it ON again.

DC Output Voltage Current Limit

All outputs are electronically over-loaded and short-circuit protected. Limits are shown below.

The +24V output limits are for a 3 A load on the +24VF output.
If an over-current condition for the +24VF output persists for more than approximately 800ms for currents in the range of 3 to 5.0A, the output turns off automatically; approximately 20ms to 800ms for currents in range of 5.0 to 7.0A, the output turns off automatically.

Output	Over Current Limits (A)
+24V	15.1 – 22.5
-+24VF	3.0 – 5.0 (for 800ms type) 5.0 – 7.0 (20 – 800ms)

External DC-DC Converter

The power supply accommodates an externally mounted DC-DC converter. The unit is powered from the 24V auxiliary output and produces a 12V, 3A output at a typical efficiency of 80%.

Control Signals

The following section details the low power mode signal and the power fail signal.

Low Power Mode Signal

The LOW POWER MODE SIGNAL is an input signal from the host equipment and is driven by an open collector output from the host. When the signal is asserted, it switches both the monitor power outlet output and the 24VF output for the fluorescent tube drivers ON. The signal is active low.

Power Fail Signal

The POWER FAIL SIGNAL provides warning to the system of power outlet failure. One full missing period of power outlet (50/60 Hz) has no effect on the power supply when its outputs are fully loaded. It does not cause the power fail signal to be asserted.

OPERATING ENVIRONMENT

Condition	Range
Temperature	0°C to 50°C (inside the customer machine – right bottom corner)
Humidity	Max. 80% RH non-condensing, annual average Max. 95% RH non-condensing, maximum
Altitude	2000 meters

STORAGE ENVIRONMENT

Condition	Range
Temperature	-20°C to 80°C
Humidity	Max. 80% RH non-condensing, annual average Max. 95% RH non-condensing, maximum

CONNECTORS

Connector types for power, external power outlet switch, monitor output, auxiliary power outlet output, +24V main output, +24v fluorescent output, and +24V auxiliary output are shown below.

Power Outlet Power

Connector Type	Qty	PIN(s)	Description
15A rated IEC320 style connector	1	1	Active
		2	Earth
		3	Neutral

External Power Outlet Switch

Connector Type	Qty	PIN(s)	Description
Amp Mate-N-Lock 4-way, female, or equivalent	1	1	Power Outlet Neutral Line
		2	Power Outlet Active Line
		3	Power Outlet Active Line (Switched)
		4	Power Outlet Neutral Line (Switched)

Monitor Output

Connector Type	Qty	PIN(s)	Description
Molex Mini-fit junior 6-way, male, or equiv.	1	1	NC
		2	Earth
		3	NC
		4	Active (controlled by LP signal)
		5	NC
		6	Neutral

Auxiliary Power Outlet Output

Connector Type	Qty	PIN(s)	Description
IEC320 style connector	1	1	Active
		2	Earth
		3	Neutral

+24V Main Output

Connector Type	Qty	PIN(s)	Description
Molex Mini-fit Junior 14-way, male, or equiv.	1	1	Low Power Signal
		2	Out Fail Signal
		3, 4, 5, 6, 7	+24V
		8	N/C
		9	Power Fail Signal
		10	0V
		11	0V
		12	0V
		13	0V
		14	0V

+24V Fluorescent Output

Connector Type	Qty	PIN(s)	Description
Molex Mini-fit, Junior 4-way, male, or equiv.	2	1	NC
		2	0V
		3	NC
		4	+24V

+24V Auxiliary Output

Connector Type	Qty	PIN(s)	Description
Molex Mini-fit, Junior 2-way, male, or equiv.	1	1	+24V
		2	0V

MECHANICAL DETAILS

The power supply mounts into the lower right corner of the EGM with convection cooling airflow intake along the side where the power outlet inlet is located.

The power supply is fully enclosed with venting holes complying with the safety standard "finger test." The enclosure meets the safety standard "fire enclosure."

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OVERVIEW

The coin handling system consists of a coin acceptor for determining the validity of inserted coins, a coin diverter and a coin chute to direct the coins to the correct destination, and a photo-optic module to monitor the position of the coin diverter. The handling system is installed and adjusted at the factory to suit a specific coin denomination.

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

Location and Access

The coin entry, located on the cabinet door mid trim, accepts a specific coin denomination for a particular machine. It will not accept oversized or bent coins. The coin entry ensures that the coin goes into the acceptor correctly.

The coin acceptor, coin chute and diverter solenoids mount to a panel on the inside of the cabinet door. Coins inserted into the machine pass through the acceptor. The acceptor sends signals to the main board, via the interface board, that allows the machine software to update the credit meters. Accepted coins are directed to the accept chute, and rejected coins are directed to the coin tray via the reject chute.

Specifications

The coin diverter solenoid receives power from the 24 V DC supply. The coin acceptor receives 12 V DC derived from the 24 V DC supply using a voltage regulator on the I/O driver board.

Coin Comparitor and Coin Validator

The coin handling assembly may consist of a coin comparitor or a coin validator.

A coin comparitor compares the properties of inserted coins with the properties of a sample coin installed in the comparitor.

A coin validator compares the properties of inserted coins with preset limits stored in the validator software.

Available Models

The electronic gaming machine (EGM) is compatible with the following coin comparitors and validators:

Information on the IDX X-10 and X-20 coin acceptor is available from the manufacturer's website at www. idxinc.com/index.htm.

- Coin Mechanisms, Inc. MC-62 coin comparitor
- Money Controls Condor CP133S validator
- IDX X-10 X-Mark® Xeptor® and X-20 Series X-Metal Xeptors® when fitted with D code personality plug

This module provides information on the Coin Mechanisms, Inc. MC-62 coin comparitor and the Money Controls Condor CP133S validator.
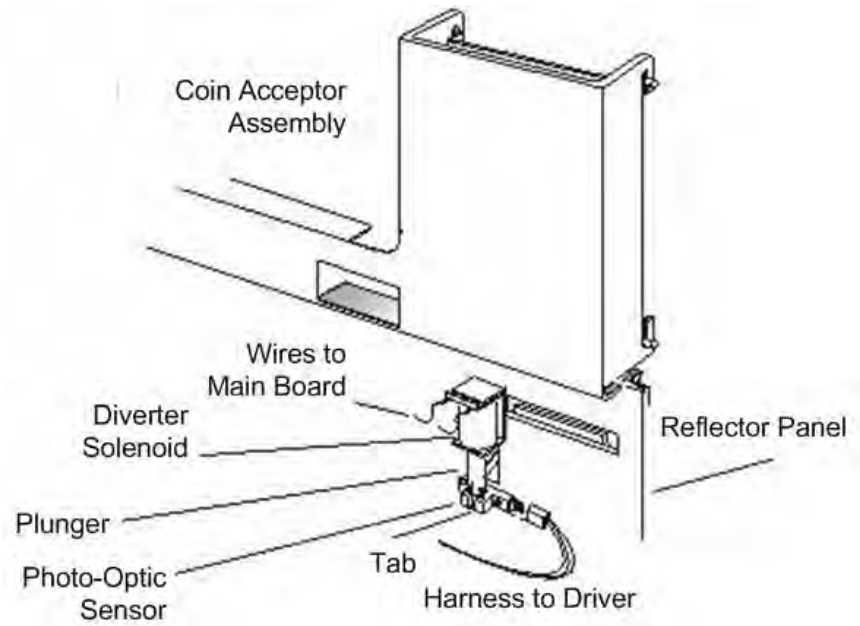
Diverter Solenoid and Photo-Optic Sensor

The following illustration shows the diverter solenoid and the photo-optic sensor, mounted on the door reflector panel.

Diverter Solenoid and Photo-Optic Sensor

Basic Operation

The solenoid plunger mechanically links to the coin diverter in the coin chute assembly. When there is no power to the solenoid, the plunger extends and valid coins fall into the hopper. When there is power (24 V DC) to the solenoid, the plunger retracts, and causes the diverter to redirect valid coins to the cashbox. When the plunger fully extends, a tab at the lower end of the plunger interrupts the beam in the photo-optic sensor.

In this way, the EGM software can indirectly monitor the destination of accepted coins by monitoring the position of the diverter. If the machine software detects that the diverter optic state does not correspond to the intended diverter position, the machine locks up with the on-screen error message COIN DIVERTER FAULT. The diverter changes position only at the end of a game.

General Maintenance

This section details general maintenance of the coin handling system for the coin comparitor, coin validator, coin chute assembly, and the photo-optic sensor.

Coin Comparitor

- Clean the rail inserts and surrounding areas using a clean dry cloth or a soft, long-bristle paintbrush.
- Remove the sample coin and clean the sensor coils, housing and surrounds.
- Replace the sample coin.

In some markets, the sample coin is sealed into position. Permission may be required to remove the sample coin.

Coin Validator

Open the debris flap and clean the coin path using a clean dry cloth or a soft, long-bristle paintbrush.

Coin Chute Assembly

- Verify that all assembly bolts and nuts are tight.
- Clean the coin chute with a clean dry cloth or a soft, long bristle paintbrush.

Photo-optic Sensor

- Remove the photo-optic sensor and clean the photo-optic detector and LED with a clean dry cloth or a soft, long-bristle paintbrush.
- Verify correct seating of the photo-optic sensor.
- Verify that the harness sockets are secure.

MC-62 COIN COMPARITOR

Additional information is available from the manufacturer's website at www.coinmech.com.

The MC-62 Coin Comparitor (MC-62), manufactured by Coin Mechanisms, Inc. (Figure 2), meets the needs of gaming operators with an enhanced, accurate counting ability over other coin optic designs, and an advanced level of security against fraud.

MC-62 Coin Comparitor

Features

Features of the MC-62 include:

- New and improved validation circuitry
- Microcontroller based technology performs coin analysis and I/O functions
- On-board quad optics for coin path security
- Improved casino dollar token performance
- Fixed credit buffering
- Bi-color LED status indicator
- Standard comparitor mounting and chassis
- Fast feed for coins and coin acceptance
- High or low logic inhibit available
- Easy removal and access to electronics
- Coin diameters ranging from .700 inch (17.8mm) through 1.47 inch (37.34mm)
- CE mark for European conformity

Basic Operation

Once in the comparitor, the coin is assessed for its diameter, mass, and magnetic signature.

Rejected Coins

If the comparitor rejects the inserted coin, it is sent to the coin tray via the reject chute.

Alarm

If the comparitor detects a slow moving coin, or a coin travelling in the wrong direction:

- The machine displays an on-screen error message
- An alarm emits
- The machine locks up

Accepted Coins

If the comparitor accepts the inserted coin, it is directed to the coin accept chute.

If the coin passes normally, a credit signal is sent to the main board and the electronic and electromechanical credit meters increment. The coin diverter solenoid directs accepted coins to the hopper. If the hopper is full, the coin diverter solenoid redirects accepted coins to the cashbox via the cashbox feed chute. A photo-optic sensor monitors the position of the coin diverter.

Components

The MC-62 contains the following major components:

- Sensor coil
- Dampener arm
- Coin accept solenoid
- Photo-optic emitter and detector
- Comparitor printed circuit board assembly (PCBA)
- Wiring harness
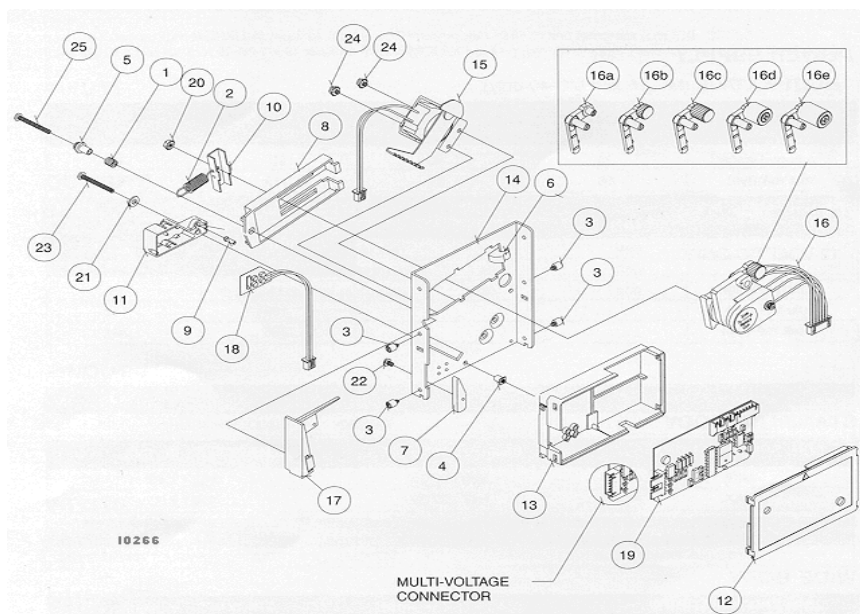
MC-62 Coin Comparitor - Exploded View

**MC-62 Coin
Comparitor Parts List**

Item	Description
1.	Coil retainer compression spring
2.	Coil locking extension spring
3.	Mounting stud (4)
4.	Nut
5.	Spring retaining bushing
6.	Sensing coil safety stop
7.	Coin exit spacer
8.	Sensor coil retaining shield
9.	Coin deflector pin
10.	Coil locking bracket
11.	PCB, optics and emitter housing
12.	PCB housing cover
13.	PCB housing
14.	CC-46 double optic mainplate
15.	Coil and bracket assembly
16.	Sensor coil assembly
17.	Small rail assembly, standard insert
18.	Security component PCB
19.	CC-46 control PCB
20.	Nut
21.	Flat washer
22.	Screw
23.	Screw
24.	Nut (2)
25.	Screw

Functional Description

The MC-62 performs the following functions:

- Drives the sensor coils
- Monitors the pick-up coil for valid coins
- Activates the coin accept solenoid upon detection of a valid coin
- Monitors the coin travel using photo-optic sensors
- Provides signals to the main board to indicate when a valid coin is detected, when a coin leaves the sensor assembly, and when incorrect coin travel is detected

Sensor Assembly

When a coin enters the sensor assembly, it hits a weighted lever, which slows down the passage of the coin. Change the weights on the lever to suit the coin denomination.

Scanner

After the coin passes through the sensor assembly, the coin enters the scanner unit, which contains three sensor coils, L1, L2 and L3 (Figure 4). The PCBA drives L1 and L3 to create a magnetic field. The central coil, L2, is a pick-up coil, which monitors the magnetic field. The sample coin sits between L1 and L2 and disturbs the magnetic field. When a coin that is identical to the sample coin passes between L2 and L3, it disturbs the magnetic field in exactly the same way as the sample coin. The result is a momentary null field in the middle. The comparitor detects this null field and registers the coin as valid.
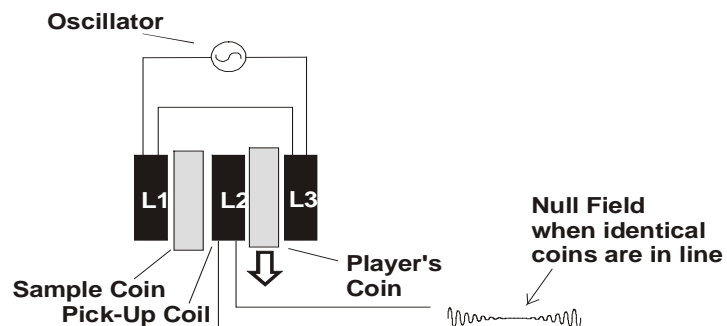
MC-62 Coin Comparator

MC-62 Sensor Coil Arrangement

Coin Accept Solenoid

When the comparitor registers a valid coin, it sends a CSENSE signal to the driver board and activates the coin accept solenoid. This solenoid attaches to a gate that opens when the solenoid is activated, which allows the valid coin to fall directly into the accept chute.

Photo-optic Sensor

As the coin exits the sensor assembly, it passes through the internal photo-optic sensor. This sensor consists of two emitter/detector pairs that allow the MC-62 comparitor to detect the speed and direction of the passing coin.

If the coin is traveling in the wrong direction, or is traveling too slow, the photo-optic sensor sends a CERROR signal to the driver board and the machine locks up. The CERROR pulse indicates a coin reverse or coin blockage condition depending on the length of the pulse. The lockup condition is a coin reverse, coin acceptor fault, or coin optic fault.

If the coin passes normally, the photo-optic sensor sends a CCREDIT signal to the driver board.

Machine Pay Out

When the machine pays out, the main board sends the signal NECOINBLK to disable the coin comparitor. Any coins inserted in the coin entry during this time is directed by the comparitor directs to the reject chute.

Replacing the Sample Coin

In some markets, the sample coin is sealed into position. Permission may be required to remove the sample coin.

Step	Description
1	Open the main door, and turn the power OFF.
2	Slide the scanner unit, which is on the sensor assembly, to the right on the rail insert until the sample coin can be removed.
3	Insert a newly minted sample coin in the scanner unit.
4	Carefully release the scanner unit.
5	Verify that the sample coin is seated firmly between the scanner unit and the fork of the rail insert.
6	Turn the power ON, and close and lock the main door.

MC-62 Sensor Assembly

MC-62 Comparitor Connector Pinouts

Refer to the Extended I/O Driver II Board module for a description of the coin-handling interface

The connector J1 on the right of the comparitor PCBA connects to P14 on the interface board.

The coin interface section of the I/O driver board receives the signals from the coin comparitor and solenoid optics and converts them into the form required by the main board.

The signals to and from the coin comparitor are shown below.

PIN	Function	Signal Type	Voltage	Pulse Width
1	GND Common.			
2	Sense Output	Open Collector	30 V DC	13 ms
3	Tilt	Open Collector	30 V DC	13 ms
4	Credit Output	Open Collector	30 V DC	13 ms
5	Not Connected.			
6	+12 V DC.	DC	+12 V DC	
7	Inhibit.	Inhibit Voltage	0 to 3.5 V DC	

CONDOR PLUS COIN VALIDATOR CP133S
Features

Additional information is available from the manufacturer's website at www.moneycontrols.com.
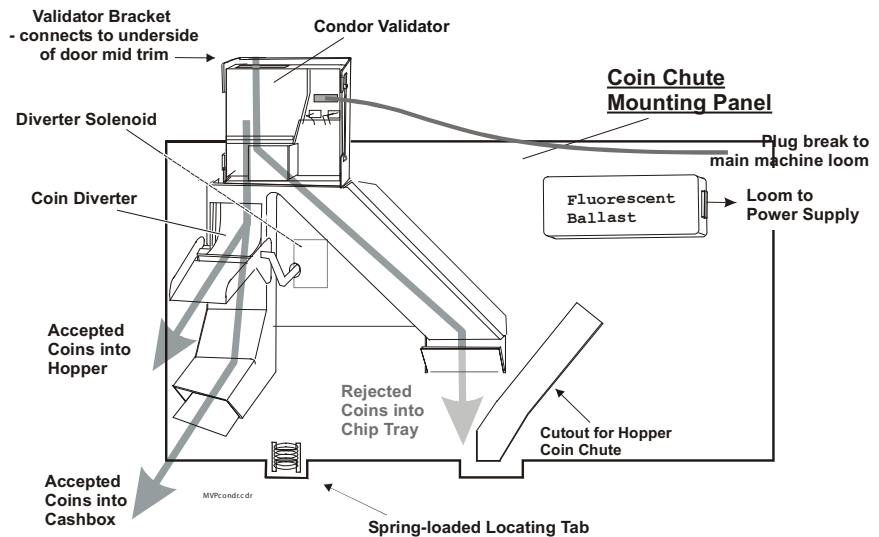
Basic Operation

The Condor Plus® CP133S coin validator (Condor), manufactured by Money Controls, is a high security, high-speed coin and token validator that delivers exceptional performance to the gaming industry. Features include:

- Single or multi-coin acceptance
- Highest levels of performance and security
- Globally compatible accepting 95% of the world's coin sets, including large US tokens
- Backwards compatible with equivalent coin validators

The following illustrations show the operation of the coin chute assembly.

The Condor is pre-programmed to accept a specific coin type and is available in two versions; field reprogrammable and not field reprogrammable. Labels on the validator clearly indicate the pre-programmed coin type.

Once in the validator, the coin passes a sensor coil that detects its diameter, thickness, and magnetic properties.
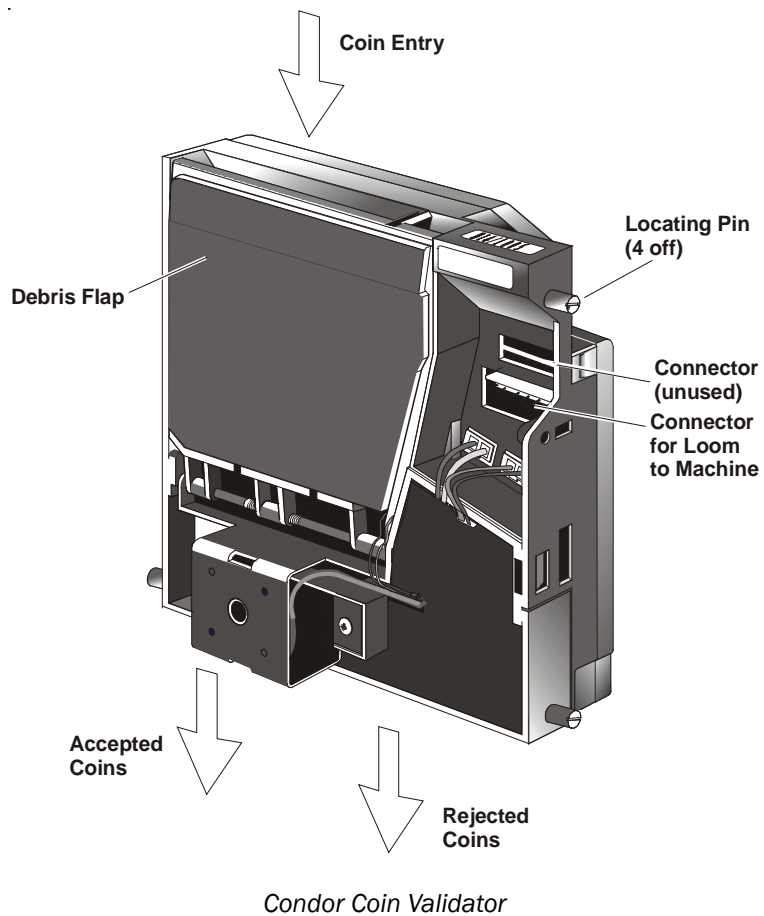

Condor Coin Handling Assembly

Basic Operation (continued)

Coin Entry

Debris Flap

Locating Pin (4 off)

Connector (unused)

Connector for Loom to Machine

Accepted Coins

Rejected Coins

Condor Coin Validator

Optical and Inductive Sensors

The validator uses two types of sensors for coin discrimination: optical and inductive. This combination gives a high degree of security.

Inductive Sensors

The inductive sensor pair achieves a linear field independent of coin position. In a typical validator, the coin position relative to sensors is critical for accurate discrimination.

Two inductive sensors positioned on opposite sides of the coin path switch between in-phase and anti-phase as the coin passes. Coin thickness and conductivity affect network impedance. The resulting amplitude change is measured by a microcontroller and forms the basis of the inductive discrimination. Readings compare against preset limits stored in the validator.

Optical Sensor

The optical sensor system measures coin diameter. There are three longitudinal IR beams across the coin path. A 16-bit timer uses a 3-point measurement system to obtain a precise measurement of diameter. The resulting calculation of diameter is compared against preset limits. Like the inductive sensors, the optical sensors are part of a closed loop system that maintains very fast triggering for accurate timing. It also ensures that slight variations, which occur from mechanism to mechanism (such as component tolerance), are irrelevant.

Rejected Coins

If any set of sensor readings is outside the required limits, the validator rejects the inserted coin and sends it to the coin reject tray.

Accepted Coins

If all sensor readings are within the required limits, the coin validated, the Valid Advance Coin Signal (VACS) output pulse generates, and the coin accept solenoid activates. This solenoid is attached to a gate that allows the valid coin to fall directly into the accept chute.

As the coin exits the validator, it passes a photo-optic sensor and a credit output pulse generates.

Accepted coins go to either the hopper or the cashbox, depending on the position of the coin diverter, which depends on whether or not the hopper is full.

Alarm

If the validator detects a coin traveling in the wrong direction (yoyo) or a failed or blocked credit or reject optic, an alarm output pulse generates.

On receiving this alarm signal:

- An alarm is sounded
- A fault message is displayed on the screen
- The gaming machine locks up

Inhibit All

For greater functionality and overall security, the host machine can send the Inhibit All signal to prevent the validator from accepting any coins or tokens.

Self Calibration

The validator automatically recalibrates itself in relation to its magnetic environment approximately every 210 seconds.

Consequently, removing the unit from the calibrated environment to perform a coin acceptance test may result in a high reject rate.

Diagnostics

At power ON, the validator automatically runs a self-diagnostic test on the following critical areas:

- Inductive coils
- Reflective sensors
- Diameter optical sensors
- Credit optical sensors

Failure in any one of these areas results in the LED flashing red continuously. In addition, the validator will not accept coins until the EGM powers OFF and the error condition is corrected.

Debris Flap

The Condor incorporates a debris flap that allows direct access to the coin path for inspection and the clearance of coin jams.

Cleaning Procedure
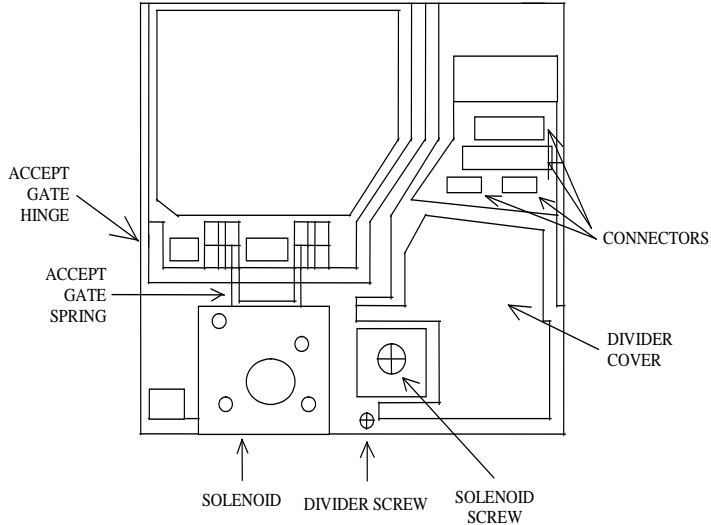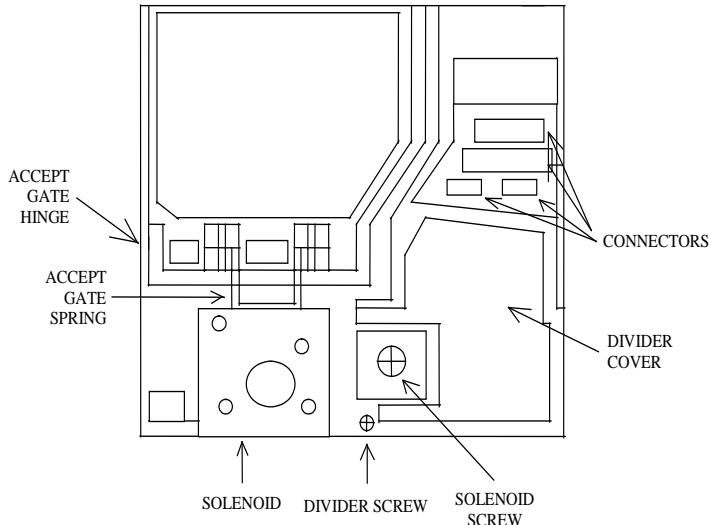### Tools/Equipment Required

This section details the removal of the accept gate and divider piece in preparation for cleaning the photo-optics, coin path, gate piece and solenoid, followed by the replacement of the previously removed accept gate and divider.

The procedures listed below require the following tools/equipment:

- Short bristle paintbrush or toothbrush
- Clean, lint-free cloth
- PoziDrive screwdriver
- Flat-blade screwdriver
- Needle-nosed pliers
- Cotton balls
- Water based mild detergent, such as dish washing liquid and water

Removal of the Accept Gate and Divider Piece

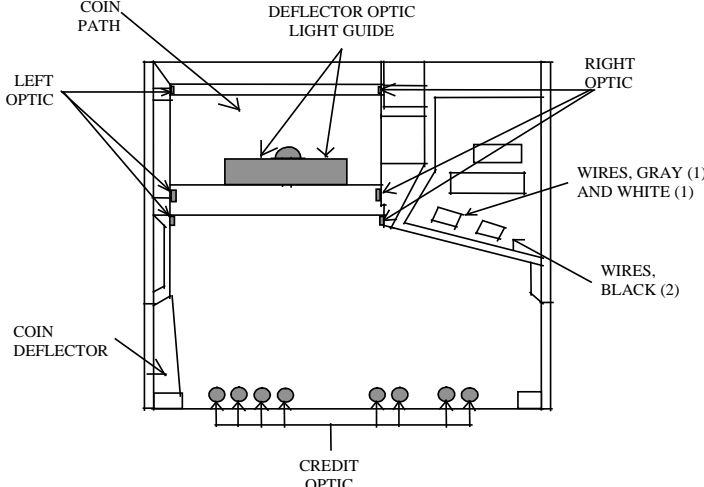| Step	Description
1	Remove the two connectors from their respective sockets using needle-nosed pliers (do not pull the connectors out by the wires).
2	Remove the divider screw (in large coin builds, a metal ring is installed in the body under the screw), using caution in not losing the ring (if installed).
3	Insert a thin edged screwdriver level with the hinge, far-most left of the hinge, between the body and the divider section; pry up the divider section and remove.
4	In small coin builds there is a coin deflector inserted on the bottom left side of the body. Use caution in not losing the coin deflector.

Cleaning the Photo-Optics

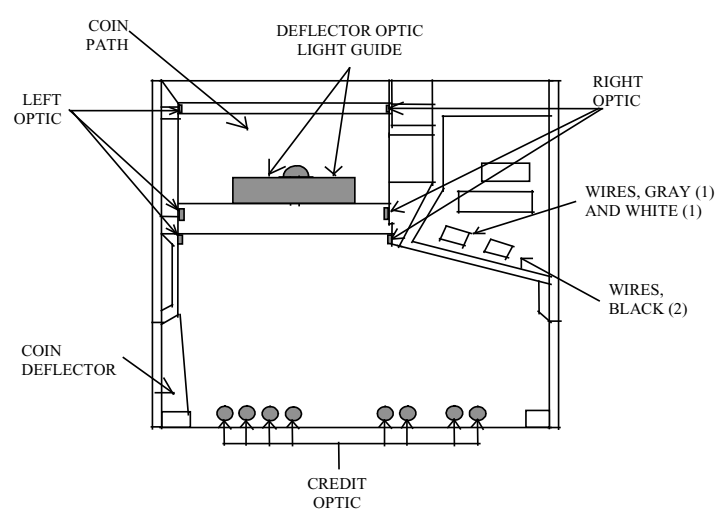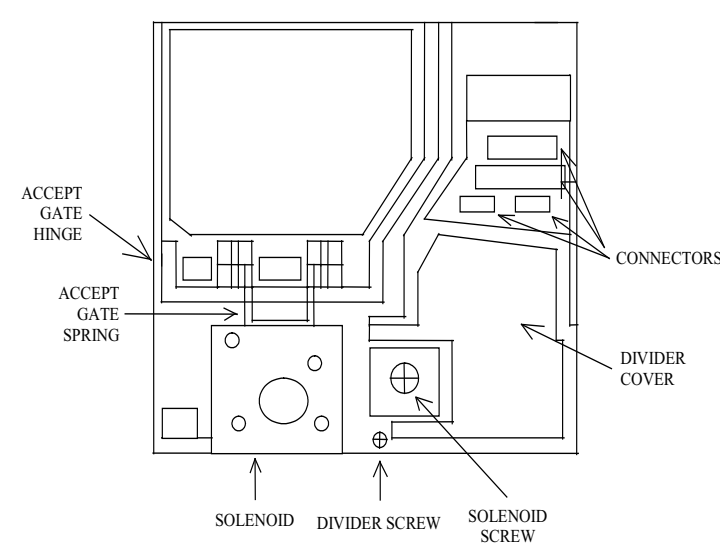| Step	Description
1	Moisten the paintbrush with the cleaning fluid, and remove the residue from the left and right optic in the coin path.
2	Moisten the cotton ball with the cleaning fluid and gently rub until the residue is removed from the deflector optic light guide.
3	Moisten a cotton ball with the cleaning fluid, and remove the residue present from the credit optic.

Cleaning the Coin Path and Gate Piece

Step	Description
1	Moisten the clean, lint free cloth with the cleaning fluid and rub off the residue present on the coin path and gate piece.
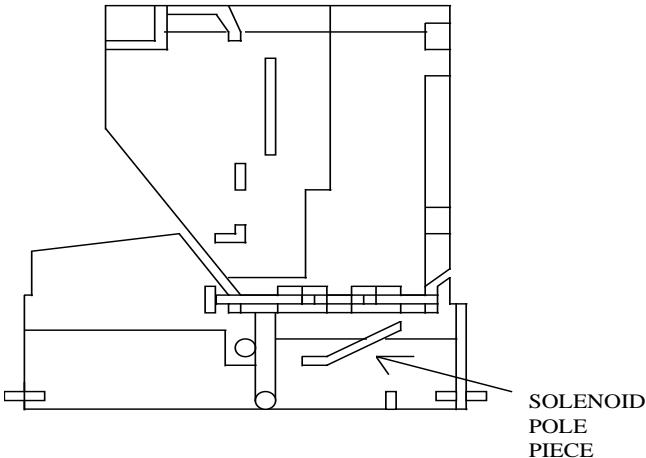
Cleaning the Solenoid

Step	Description
1	Check the solenoid for any fluid residue and freedom of movement, and that the pole piece does not stick inside the solenoid.
2	If residue is present, remove the solenoid screw.
3	Gently lift the solenoid clear of the body. On standard solenoids the pole piece can be easily lifted out of the solenoid and cleaned. On reverse action solenoids, the circlip must be removed from the pole piece before removing the pole piece.

**Cleaning the
Solenoid
(continued)**

Step	Description
4	Moisten a cotton ball with the cleaning fluid, and remove the residue. Check that the solenoid has freedom of movement.
5	Re-insert the pole piece and spring back into the solenoid and replace the circlip if one was removed.

SOLENOID
POLE
PIECE

Step	Description
6	Lift the accept gate spring out of the way and re-insert the solenoid into the divider piece.
7	Re-insert the screw and tighten with the PoziDrive screwdriver to 47 inch-oz.

Replacing the Divider Piece and the Gate Piece

Step	Description
1	If the coin deflector piece was installed, ensure that it is in place by holding the gate piece and the divider piece flush with each other.
2	Position the gate piece and the divider piece at a 45° angle from the left side.
3	Align the plastic stud on the left side of the divider piece with the hole on the left side of the body.
4	Twist the divider piece and the gate piece together to the left and ensure that the plastic stud goes into the hole in the body.
5	Press down on the divider cover until the divider piece clicks into place within the body.
6	If a metal ring was installed, re-insert it into the body.
7	Insert the screw and tighten with a PoziDrive screwdriver to 47 inch-oz.
8	Re-insert the connectors into their relevant polarized positions.

Condor Connector Pinouts

The connector J1 on the right connects to P14 on the interface board.

The coin interface section on the I/O driver board receives signals from the coin validator and solenoid optics and converts them into the form required by the main board.

Refer to the Extended I/O Driver II Board module for details on the coin-handling interface.

The signals to and from the coin validator are shown below.

PIN	Signal	Description
1	0V	Ground
2	VACS	Generated when valid coin is sensed
3	Alarm	Coin reverse or optic blocked
4	Credit	Generated when valid coin exits validator
5	Keyed PIN	
6	+12V	Power from I/O Driver Board
7	Inhibit	Inhibit signal from host machine

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BASIC OPERATION

*Removal and replacement
instructions are located in the
Cabinet, Door and Top Box module.*

The hopper holds and dispenses coins. Coins entering the electronic gaming machine (EGM) feed into the hopper or the drop box through the coin handling system. Coins divert to the drop box when the hopper is full.

The hopper dispenses coins into the coin tray when the player has accumulated sufficient credits and presses the CASHOUT/TAKEWIN button. Coins dispense through the hopper coin exit chute, which extends through the slot in the door reflector panel.

Hopper Payout Limit

*Information on Game Machine Options
is located in the Machine Modules
module of the Operator Manual.*

The hopper can pay out any number of coins above the token value and below the Hopper Payout Limit. The token value is the coin value accepted by the EGM; the Hopper Payout Limit is the maximum value of coins paid from the hopper. These parameters are set in Game Machine Options [5.1].

Greater than Hopper Payout Limit

Pressing the CASHOUT/TAKEWIN button when the number of coins in credit is greater than the Hopper Payout Limit results in a machine lock up. Credits are paid as a handpay by the attendant, and the machine must be reset using the Jackpot Reset (Cancel Credit) key.

Less than Hopper Payout Limit

Pressing the CASHOUT/TAKEWIN button when the number of coins in credit is less than the cancel credit (Hopper Payout Limit) amount, but greater than the number of coins in the hopper, results in all coins in the hopper dispensing, followed by a machine lock up. The attendant must refill the hopper and reset the machine before the balance of coins is dispensed.

*The numbers in brackets
[ ] represent the selection
as it appears on-screen.*

If the machine pays out too many coins, or not enough, the machine locks up and cannot be played until the problem is resolved.

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PHYSICAL DESCRIPTION

Access and Location

The Aristocrat Disc Hopper (ADH) mounts onto a base plate that slides into a guide on the base of the cabinet. It locks into position by a spring-loaded release pin.

When the hopper slides into position, a socket on the side of the hopper self-aligns and connects to a plug on the cabinet base. This socket provides power and control signals to the hopper printed circuit board assembly (PCBA), which controls the hopper.

The hopper PCBA drives a 24V DC motor, which rotates the disc within the hopper through the gearbox. The motor and gearbox are one assembly, and replace as one unit.

The hopper PCBA transmits two outputs from detectors:

- Output to the machine from a probe, which detects when the hopper is full
- Output to the machine from a photo-optic detector, which detects coins as they are dispensed from the hopper

Hopper Location

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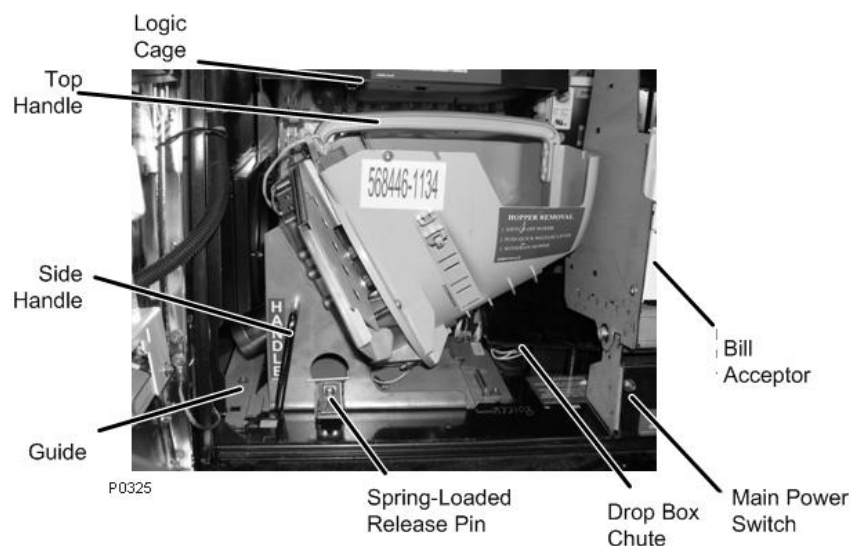
PHYSICAL DESCRIPTION
(continued)
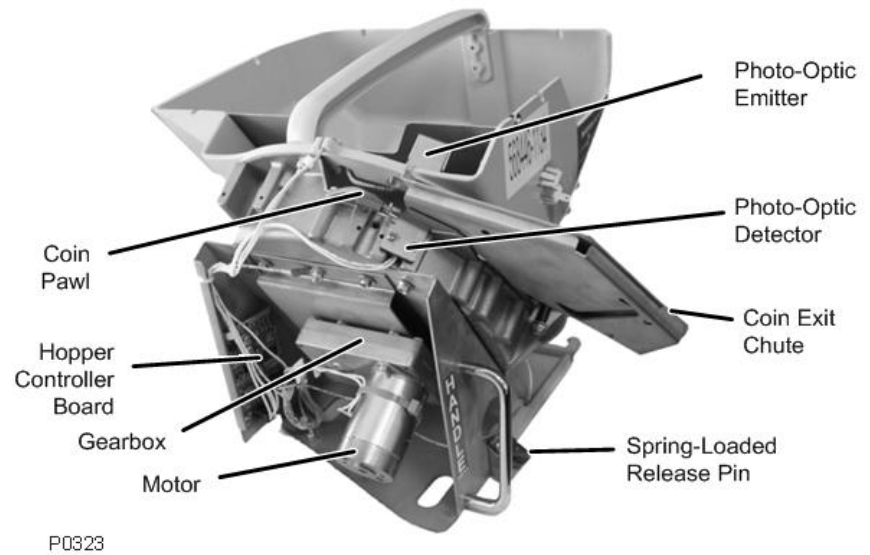
Coin
Pawl

Hopper
Controller
Board

Gearbox

Motor

P0323

Photo-Optic
Emitter

Photo-Optic
Detector

Coin Exit
Chute

Spring-Loaded
Release Pin

Hopper - Rear View

Components
Non-Moveable Parts

The stationary parts of the hopper are:

- The frame, which includes a side handle, driver board and casting attached.
- The casting, which includes the exit chute and bowl attached.
- The bowl, which includes the internal baffle, coin slider, and probe. The bowl is attached to the casting by one fixed and three spring-loaded bolts.
- The baffle (in two parts); the lower part is reversible for handling different coin sizes.
- The coin runner, which is also referred to as the "knife."

Moveable Parts

The parts of the hopper rotated by the motor are:

- The disc
- The shelf wheel
- The coin stirrer

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Hopper Components

Coin Dispensing

Upon receiving a drive signal from the EGM, the hopper PCBA starts the hopper motor, which rotates the disc in a counter-clockwise direction.

As the disc turns, the coins catch between the disk pins and the edge of the shelf wheel. If there is more than one coin between two pins on the disc, the second coin wiper clears the excess coins.

The coin runner guides the coins into the exit coin chute. The coin pawl ejects the payout coins from the rotating disc into the hopper coin chute. The photo-optic detector sends a signal to the EGM for each coin entering the exit coin chute.

The EGM counts each optic interrupt and terminates the hopper drive signal to the hopper PCBA upon reaching the correct payout number. The hopper PCBA stops the motor held by an electronic brake. The second coin wiper prevents the next coin from falling from the disc.

Hopper Full Detection

A probe fits onto the hopper bowl to detect a full hopper. When the coins reach the probe, they create an electrical circuit through the coins to ground. The EGM monitors the probe. If the probe indicates that the hopper is full, the software operates the diverter solenoid (situated in the coin entry chute), which diverts the coins to the drop box. Adjust the position of the probe in the hopper, as necessary, to alter the maximum coin level.

Coin Jamming Prevention

A shelf wheel and coin stirrer, friction-fitted to the disc, keep the coins moving in the hopper bowl. A spring-loaded coin slider prevents the hopper from jamming resulting from coin stacking.

A baffle controls the coin level in the disk area of the hopper.

The bowl connects to the casting by four bolts. The top bolt is fixed, but the other three are spring loaded to prevent serious damage to the casting if there is a large coin jam in the bowl.

An opening on the hopper casting allows dirt and foreign objects to escape.

In the event of a coin jam, the motor automatically stops and restarts after approximately four seconds. If this does not remove the jam, the:

- Motor automatically stops
- Machine locks up
- Software displays an error message on-screen

Hopper Interface Signals

The hopper interfaces with the EGM via the 20-way Minifit connector P7 on the backplane. This connector may optionally be used to communicate with a ticket printer. The signals used for the printer use Pins 10, 16, 18, 19, and 20.

PIN	PIN Name	Function
1	HOPCOIN	Coin Output from Hopper
2	Keyway	Plastic Keyway
3	Keyway	Plastic Keyway
4	HOPON	Hopper motor drive
5	HOPHIGH	Hopper high probe, Detects hopper full.
6	VCC	5V for Hopper Electronics
7	GND	Gnd Hopper
8	-	No connection
9	-	No connection
10	GNDIsol	Gnd, Isolated, for Printer Comms
11	24V	24V Motor Drive for Hopper
12	HOPTEST	Hopper Sensor Test input
13	-	No connection
14	-	No connection
15	-	No connection
16	DTR3	DTR for Printer
17	-	No connection
18	SIN3	Rxd from Printer
19	SOUT3	Txd to Printer
20	-	No connection

GENERAL MAINTENANCE

For the general maintenance of the hopper, remove any dust from the photo-optic detector using a soft paintbrush, concentrated compressed air, or by blowing through a drinking straw. Dirt accumulating on the detector can result in errors in coin counting.

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OVERVIEW

The components discussed in this module include the main display area, the touch screen, and the top box display area.

Main Display

Removal and replacement of the CRT monitor and main LCD panel are located in the Cabinet, Door and Top Box module.

The electronic gaming machine (EGM) described in this manual may contain a cathode ray tube (CRT) monitor, or a liquid crystal display (LCD) panel installed in its main display area. Details on the CRT monitor are located in the CRT Monitor section. Details on the LCD panel are located in the LCD Panel section.

Touch Screen

Removal and replacement of the touch screen is located in the Cabinet, Door and Top Box module.

The CRT monitor and LCD panel installed in the main display area contain a touch screen, which enables access to the game's paytables, rules, and play gamble/bonus features, by touching designated areas of the screen. Details on the touch screen are located in the Touch Screen section.

Top Box

Removal and replacement of the top box LCD panel is located in the Cabinet, Door and Top Box module.

Some EGMs contain a second LCD panel in the top box. This second LCD panel is the same as the LCD panel in the main display area; except that it does not contain a touch screen and has different mounting hardware.

EGMs with a casino style top box convert into a second LCD panel using the LCD XTreme Kit. The LCD panel contained in the XTreme Kit is the same as the main LCD panel, except that it does not contain a touch screen and has different mounting hardware.

Details on the top box LCD panel are located in the Top Box LCD Panel section.

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CRT MONITOR

⚠️ *Complex electronics controls this monitor. Unqualified personnel must not interfere with the unit.*

The CRT monitor is a 19-inch (18-inch viewable) high-resolution display manufactured by Wells-Gardner.
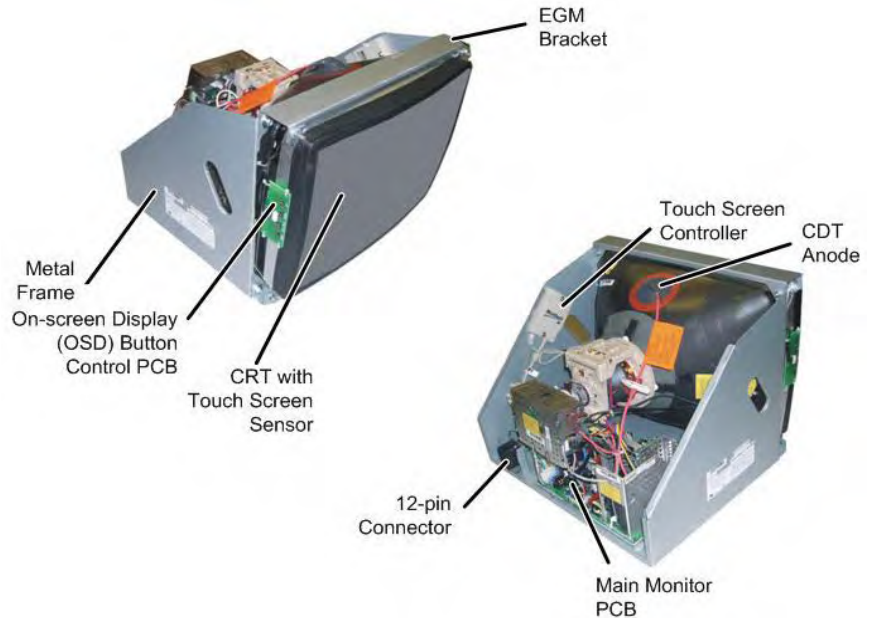
CRT Monitor

General Description
Resolution, Temperature and Weight

The CRT monitor operates up to 1280 x 1024-pixel resolution; the resolution used for game-play in the EGM is 640 x 480 pixels. The CRT monitor operates with a dot trio spacing (dot pitch) of 0.25mm. Operating temperature is 0° to 55° Centigrade (32° to 131° Fahrenheit). The total weight of the CRT monitor with integrated touch screen sensor is approximately 21kilograms (46 pounds).

On Screen Display

The CRT monitor features On Screen Display (OSD) controls, which enables adjustment of the functions and settings by the button control panel in conjunction with screen displays. The OSD panel is located on the left side of the display screen, and it is accessible when the main door is open.

Degaussing

The CRT monitor features both automatic and manual degaussing. Automatic degaussing initiates upon a cold startup. Manual degaussing initiates via the OSD control panel, or by using a hand-held degaussing wand. See the Degaussing section for more information.

Components

The major components of the video monitor assembly are the display tube, the video monitor printed circuit boards (PCBs) and the video monitor metal frame.

The CRT and video printed circuit assemblies (PCBA) all mount onto a common metal frame that slides along the game display shelf into the cabinet (Figure 1). The video monitor assembly secures for transport by a single screw, inserted from the underside of the game display shelf.

The slide-in frame enables easy removal and replacement of the video monitor assembly, and connection to the rest of the machine via a single, self-aligning, multi-pin connector on the back of the frame. This connector transmits the monitor power's video drive and touch screen signals.

The PCBAs associated with the monitor assembly are:

- Picture control
- Monitor main
- CRT neck

Technical Description

Item	Specification
CRT outside face diagonal	19 inch (46cm)
Dot Pitch	0.25mm P22 Phosphor
Light Output	50fL min center block
35fL min white field	
Resolution	VGA, SVGA, XGA to 1280 x 1024
13 preset factory modes	
Video Input	RGB Analog, Positive Signal (0.7V p-p)
Input Impedance 75ohm	
Power Supply	90-264V AC at 60/50Hz
Fuse Rating	250V, 3.15A.
Power Consumption	Less than 95 Watts
Operating Temperature	0°C - 55°C
Operating Humidity	10% - 90% (Noncondensing)
Weight	20.5kg including integrated touch screen system.

Power Supply

Details are shown in the Technical Description section. No isolation transformer is required. The following illustration shows the functional block diagram.
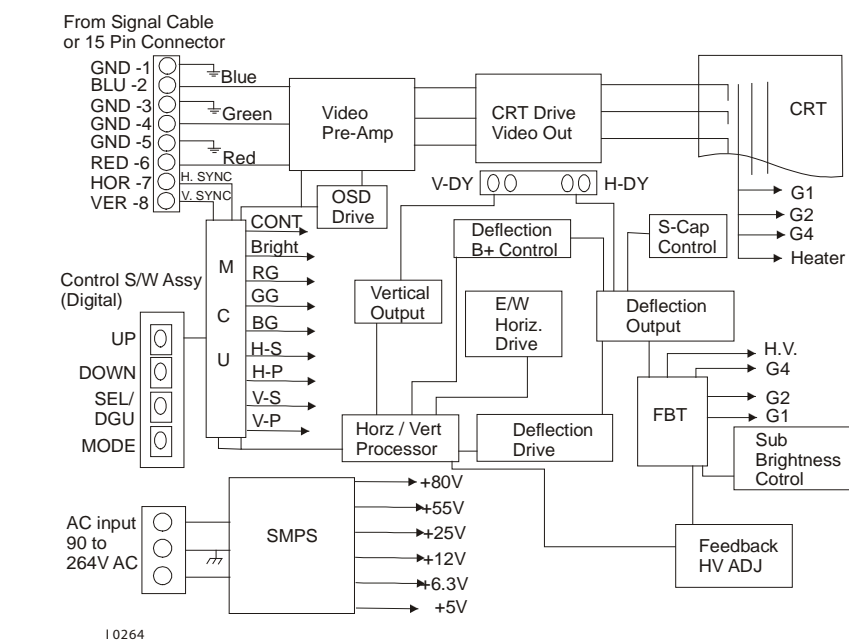
Color Monitor Block Diagram

Cable Connector

The 12-pin power and input connector is an AMP 12-way receptacle housing located at the right rear of the unit where it mates with the female connector on the gaming machine. See the PIN Connections section for details.

PIN Connections

PIN	Signal	PIN	Signal
1	Red – Video	7	RS232RX – Touch screen
2	Green – Video	8	GND – Touch screen
3	Blue – Video	9	RS232TX – Touch screen
4	0 Volt, Monitor Ground	10	AC Mains, Hot
5	Vertical Sync.	11	Earth Ground
6	Horizontal Sync.	12	AC Mains, Neutral

On Screen Display Controls

The On Screen Display (OSD) controls are operated from the button control PCBA, which provides four buttons for changing the functional settings to best meet individual conditions.
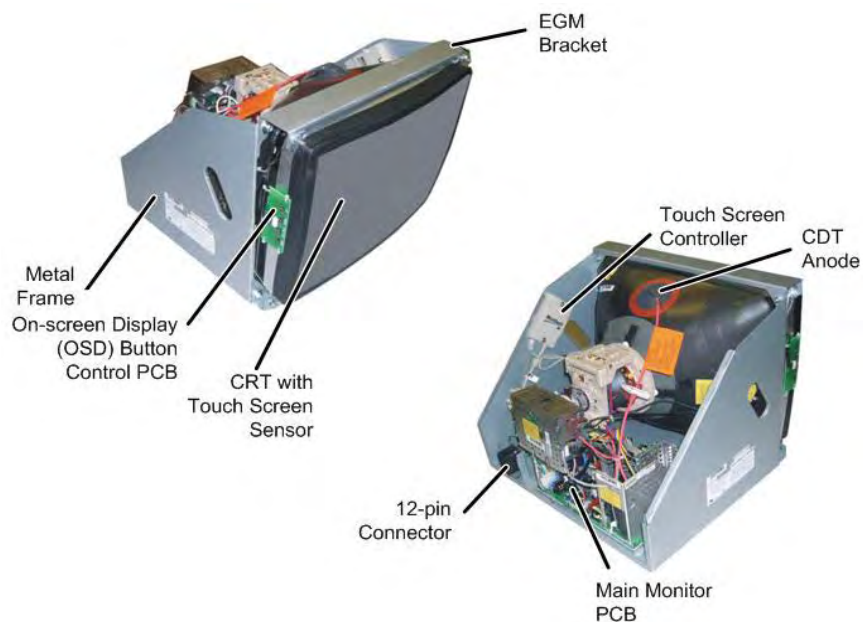
CRT Monitor
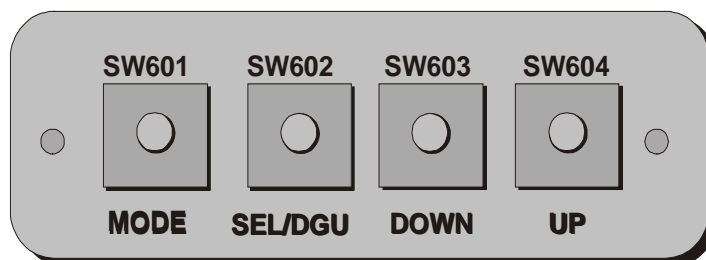
OSD Control Panel Layout

Guidelines

■ The monitor requires 15 minutes of warm up time before attempting any adjustments.

■ Four control panel buttons make adjustments.

■ Press MODE to enter the User Mode procedures and, at the completion of requirements, press MODE to exit and return to normal monitor operations. A wide blue line at the base of the screen indicates that User Mode is active. RECALL returns all settings to factory settings.

■ Making adjustments varies with each of the groups.

OSD Button Control Panel

Button	Description
MODE	(Mode-Exit) Starts the on-screen sequence by displaying the main OSD menu and enables altering of the functional settings. Press the MODE button a second time to return the monitor to normal game-play operations.
SEL/DGU	(Select Function or Degauss) Selects the on-screen function for adjustment. This starts a manual degauss if the mode is not set to OSD.
DOWN	Moves the selection on the main menu down the list, or decreases the amplitude upon selection of a function sub-menu, by pressing the SEL button.
UP	Moves the selection on the main menu up the list, or increases the amplitude upon selection of a function sub-menu, by pressing the SEL button.

OSD Menu and Adjustment Levels

Brightness

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN on the main menu to highlight the BRIGHTNESS sub-menu (yellow).
3	Press SEL/DGU to enable the BRIGHTNESS sub-menu (red).
4	Use UP/DOWN to adjust the brightness.
5	Press MODE after adjusting the brightness (yellow). The BRIGHTNESS sub-menu disappears and the settings automatically save.
6	Press MODE to finish adjustments after which the OSD menu disappears.

Contrast

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN on the main menu to highlight the CONTRAST sub-menu (yellow).
3	Press SEL to enable the CONTRAST sub-menu (red).
4	Use UP/DOWN to adjust the contrast.
5	Press MODE after adjusting the contrast (yellow). The CONTRAST sub-menu disappears and the settings automatically save.
6	Press MODE to finish adjustments after which the OSD menu disappears.

Color

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN on the main menu to highlight the COLOR sub-menu (yellow).
3	Press SEL to enable the COLOR sub-menu; the COLOR sub-menu appears at the bottom of the main menu.
4	Use UP/DOWN to highlight USER. *Auto-alignment machines adjust COLOR1 and COLOR2 in the factory.*
5	Press SEL to adjust the red, green and blue. Select each color by pressing SEL.
6	Use UP/DOWN to adjust the red, green and blue settings. The red, green and blue function lines are now colored red, green and blue respectively.
7	Press MODE to return to the COLOR sub-menu.
8	Press MODE again to return to the main menu.
9	Press MODE again to finish adjustments.

Vertical/Horizontal Position and Size

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN to highlight H.POSITION, H.SIZE, V.POSITION or V.SIZE (yellow).
3	Press SEL to select H.POSITION, H.SIZE, V.POSITION or V.SIZE (red).
4	Use UP/DOWN to change the H.POSITION, H.SIZE, V.POSITION or V.SIZE.
5	Press MODE to return to the H.POSITION, H.SIZE, V.POSITION or V.SIZE sub-menu.
6	Press MODE again to return to the main menu.
7	Press MODE again to finish adjustments.

Pincushion, Trapezoid, Parallelogram, and PIN Balance

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN to highlight PINCUSHION, TRAPEZOID, PARALLELOG or PIN BALANCE (yellow).
3	Press SEL to select PINCUSHION, TRAPEZOID, PARALLELOG or PIN BALANCE (red).
4	Use UP/DOWN to change the PINCUSHION, TRAPEZOID, PARALLELOG or PIN BALANCE.
5	Press MODE to return to the PINCUSHION, TRAPEZOID, PARALLELOG or PIN BALANCE sub-menu.
6	Press MODE again to return to the main menu.
7	Press MODE again to finish adjustments.

Recall

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN on the main menu to highlight the RECALL sub-menu (yellow).
3	Press SEL to enable the RECALL sub-menu (red); the values of all the functions change to those currently registered as factory settings.
4	Press MODE to finish adjustments (yellow).
5	After finishing adjustments, press UP/DOWN to highlight the RECALL sub-menu. Press and hold down the SEL/DGU button until the OSD disappears.

Language

Language selection is dependent upon availability per jurisdiction and selections made during the SetChip procedure.

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN on the main menu to highlight the LANGUAGE sub-menu (yellow).
3	Press SEL to enable LANGUAGE (red).
4	Use UP/DOWN to highlight any language.
5	Press SEL to select a language.
6	Press MODE to finish and save the selected language.
7	Press MODE again to finish adjustments.

Degaussing

Magnetized metalwork near the monitor can cause color aberrations on the CRT screen. To restore the color purity of the picture, the CRT and cabinet need to be degaussed. AC voltage demagnetizes the affected metalwork and corrects any impurity or color aberrations.

Magnetization can occur due to normal delivery movements and installation operations.

The CRT contains a degaussing coil and circuitry that emits a degaussing pulse during power ON, which provides an automatic and on-going process. To demagnetize the affected metalwork (including the main door) at the time of power ON, close the main door within five seconds of switching on the main power switch.

With the main door open, the OSD control panel is accessible; the OSD control panel provides an additional option for degaussing. Press the SEL/DGU (Degauss) button to initiate the degaussing process.

If degaussing via the OSD control panel does not clear the color aberration, a hand-held degaussing wand may be required.

Maintenance

For information relating to touch screen, see the Touch Screen section in this module.

- Remove any dust or dirt from external surfaces.
- Clean the monitor screen with a soft cloth and suitable cleaning agents.
- Ensure the monitor and monitor mask fit correctly when the main door is closed.

LCD PANEL

⚠️ *Complex electronics controls this monitor. Unqualified personnel must not interfere with the unit.*

📌 *The main LCD panel is NOT available in US jurisdictions without the touch screen. Only the top box LCD panel is non touch screen. Refer to the Touch Screen section for more information.*

The EGM uses the 19-inch, Thin Film Transistor (TFT) LCD panel for both the main LCD panel and top box LCD panel. Manufactured for Aristocrat by Wells-Gardner Electronics Corporation, the LCD provides a high-resolution, fast-response display system. The display is adjusted to the Aristocrat video standard resolution of 640 x 480 pixels, and the unit operates with a vertical scanning frequency of 59.94 Hz and a horizontal scanning frequency of 31.47kHz. The panel uses a Fujitsu Limited Type FLC48SXC8V TFT LCD Panel.

LCD Panel

Components

Major functional components of the LCD panel assembly include:

- LCD panel module
- Display conversion analog/digital printed circuit board assembly (PCBA)
- Power supply 24V to 12V DC DC-DC converter PCBA
- Mix PCBA (inverter with 12V to 5V and 3.3V DC-DC converter PCBA

LCD Panel Module

The 19-inch LCD panel is an active TFT technology LCD. The module consists of a replaceable cold-cathode fluorescent backlight assembly, driver circuits and various optical materials to enhance brightness, contrast, and viewing angle of the panel.

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Specifications

Item	Specification
Display Type	Active Matrix Color TFT LCD
Display Pixel	1280 x 1024 (RGB)
Display Area	404 (W) x 330mm (H), 19 inch diagonal
Pixel Pitch	0.294 mm (H) x 0.294 (W)
Pixel Arrangement	RGB Vertical Stripe
Display Color	16.7 million colors
Contrast Ratio	600 typical
Response Time	15ms rise / 10ms fall typical @ 25°C
Brightness	250cd/m2 typical
Viewing Angle	
(Contrast Ratio≥)	Vertical up/down = 85 deg. minimum
Horizontal left/right = 85 deg. minimum	
All directions = 80 deg. minimum	
Backlight Lamp	Two dual CCFT
Backlight Lamp Voltage	750Vrms typical
Backlight Lamp Current	14.0mArms typical

Video Input Signal Characteristics

Parameter	Unit	Data
Video Bandwidth (-3dB)	MHz	>= 135
Video Input Mode		RGB Analog, Positive Video input must be locked to this mode only without any "Source Search" function
Video Input Coupling		AC Coupling with black level recovery
Video Level	Vp-p	0.7
Video Input Impedance	Ohm	75

Sync Input Signal Characteristics

Parameter	Unit	Data
Horizontal Frequency	kHz	29-80
Vertical Frequency	Hz	59-75
Sync Level and Format		TTL Level, separate H/V sync
Sync Pulse Polarity		Auto polarity detection and able to sync with both positive and negative pulses
Sync Input Impedance	Ohm	1-2k

Supported Video Timings

Item	Mode	Standard	Res. Pixels	Ver. Freq. Hz	Hor. Freq. kHz	Sync. Polarity H/V
1	New ATA MkVI	ATA	640x480	59.94	31.47	H,- V,-
2	Hyperlink Blackbox	Paltronics	1024x768	60.02	48.37	H,+ V,+
3	SVGA/60	VESA	800x600	60.32	37.88	H,+ V,+
4	SVGA/75	VESA	800x600	75.00	46.88	H,+ V,+
5	XGA/60	VESA	1024x768	60.00	48.36	H,- V,-
6	XGA/75	VESA	1024x768	75.03	60.02	H,+ V,-
7	SXGA/60	VESA	1280x1024	60.02	63.98	H,+ V,+
8	SXGA/75	VESA	1280x1024	75.03	79.98	H,+ V,+

Image Specifications

The LCD Panel meets the required image specifications after a 20 minute warm up. However, the picture quality should be very close to the specifications after switching on for less than five minutes. Unless otherwise stated the specifications apply to the full range of brightness and across the range of operating temperatures.

**Aristocrat Image
Display Settings**

The display panel is adjusted for the following settings – settings are stored in memory as the default display characteristics.

Item	Setting Requirements
Default Video Sync Mode	New ATA MkVI Mode, 640 x 480 pixels
Picture Image Size	Horizontal: 374 ± 2mm Vertical: 299 ± 2mm
Picture Centre Deviation	± 1mm Max.
Brightness (centre)	180 ± 10 cd/m² at full white screen
Contrast	16 grey scales, even and clear
White Color Temperature (center of display)	Close to D6500 CIE Coordinates: x = 0.313 ± 0.015 y = 0.329 ± 0.015

**Brightness
Adjustment Range**

With Contrast control set at maximum level, adjusting Brightness control from minimum for maximum position, the white pattern light output increases by more than 60cd/m².

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Power

The LCD panel functions with the following 24 VDC power supply from P35 of the electronic gaming machine (EGM) backplane board:

- Voltage: +24V±2V
- Current: 3A Max.

The LCD panel powers ON when the EGM main power switch is turned ON – there is no separate power switch for the LCD panel. A green LED on the keypad indicates the power ON/OFF status.

A 4-pin Microfit connects to the backplane board and a 3-pin Minifit connects to J1 on the LCD panel side. A ferrite core attaches to the monitor end for noise reduction. Pinout is shown below.

4-PIN Minifit Connector PIN Connections

PIN No. P35 B/P Board	PIN No. J1 LCD	Signal
1	1	24 VDC
2	2	Not connected
3		Not connected
4	3	GND

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EGM Connectors

The cable that connects the LCD panel to the EGM is a standard low-voltage VGA harness with male-to-male, 15-way, high-density, D-SUB connectors. Ferrite cores are attached at each end for noise reduction. Connector pinouts for the top box LCD and main LCD panel are detailed below.

Connector Pinouts – Top Box

PIN No. P20 B/P Board	PIN No. LCD Panel	Signal
1	1	Red
2	2	Green
3	3	Blue
4	4	GND
5	5	LCD-OK
6	6	Red GND
7	7	Green GND
8	8	Blue GND
9	9	-
10	10	Synch GND
11	11	GND
12	12	DDC-Data
13	13	Horizontal Sync
14	14	Vertical Sync
15	15	Power Save
Shell	Shell	Braid and Drain

Connector Pinouts – Main LCD Panel

PIN No. P4 B/P Board	PIN No. LCD Panel	Signal
4	1	Red
12	2	Green
6	3	Blue
	4	GND
	5	LCD-OK
3	6	Red GND
11	7	Green GND
5	8	Blue GND
	9	-
8	10	Synch GND
13	11	GND
	12	DDC-Data
1	13	Horizontal Sync
9	14	Vertical Sync
	15	Power Save
	Shell	Braid and Drain
7		Touchscreen Rx
14		Touchscreen Tx

LCD Panel Power Detection and Power Save Request

Signal Definition for LCD Power Detection

Two signals exist for LCD power detection and power save request from the EGM. These signals are connected through the video cable. Pins 5 and 15 on the LCD-EGM connector are used for this purpose. Signal definitions for LCD power detection are detailed below.

Signal	PIN	I/O	Description
LCD-OK	5	Output	'0'=LCD connected and powered '1'=LCD not connected or not powered
Power Save Request	15	Input	'1'=normal operation '0'=power save mode
Ground	11		Ground connection

On Screen Display Control Functions

Location and Access

The LCD panel is supported by a menu-based system for control and adjustment operations – the On Screen Display (OSD) system. The OSD keypad is mounted vertically at the side of the LCD panel. The OSD consists of four contact buttons and one LED power indicator that operates the system.

To operate the OSD system and make adjustment to the various settings, press MODE to display the the following sub-menus:

- Brightness
- Contrast
- Sharpness
- Image
- Color
- Language
- Recall

The power LED illuminates when the LCD panel is ON. A signal must be applied to the LCD panel to access the OSD functions. If no signal is applied, the NO SIGNAL message displays on-screen. If the video signal does not comply with the supported video timing list, the OVER RANGE message displays on-screen.
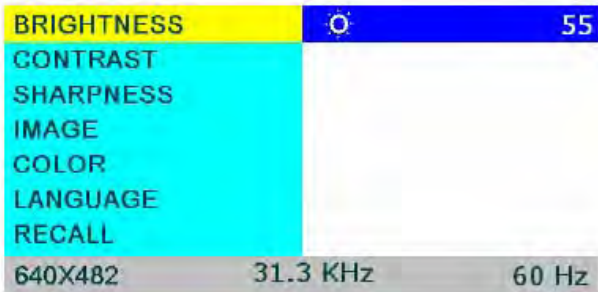
OSD Control Keypad
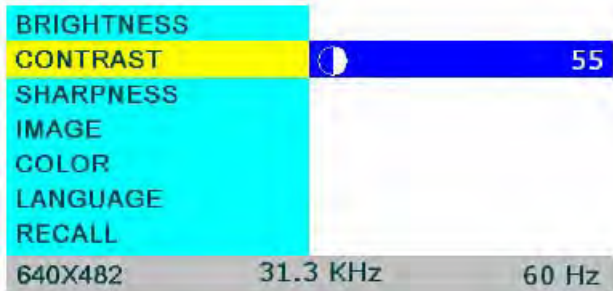
Brightness

If there is no activity in the OSD within 16 seconds, the menu automatically disappears.

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN on the main menu to highlight the BRIGHTNESS sub-menu. BRIGHTNESS CONTRAST SHARPNESS IMAGE COLOR LANGUAGE RECALL 640X482 31.3 KHz 60 Hz
3	Press SEL to enable the BRIGHTNESS sub-menu. BRIGHTNESS ☀ 55 CONTRAST SHARPNESS IMAGE COLOR LANGUAGE RECALL 640X482 31.3 KHz 60 Hz
4	Use UP/DOWN to adjust the brightness.
5	Press MODE after adjusting the brightness. The BRIGHTNESS sub-menu disappears and the settings automatically save.
6	Press MODE to finish adjustments upon which the OSD menu disappears.

Contrast

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN on the main menu to highlight the CONTRAST sub-menu.
3	Press SEL to enable the CONTRAST sub-menu.
4	Use UP/DOWN to adjust the contrast.
5	Press MODE after adjusting the contrast. The CONTRAST sub-menu disappears and the settings automatically save.
6	Press MODE to finish adjustments upon which the OSD menu disappears.

Color

If the monitor appears to differ in its brightness from others with the same model number, the Auto Gain feature renormalizes the light output.
9300K and 6500K are adjusted in factory and are standard presets.

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN on the main menu to highlight the COLOR sub-menu.
3	Press SEL to enable the COLOR sub-menu.
4	Use UP/DOWN to highlight USER.
5	Press SEL to adjust the red, green and blue. Select each color by pressing the SEL key. The selected item is highlighted yellow.
6	Use UP/DOWN to adjust the red, green and blue settings.
7	Press MODE to return to the COLOR sub-menu.
8	Press MODE again to return to the main menu.
9	Press MODE again to finish adjustments.

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Image Menu

The Image menu allows adjustment of phase, clock, and vertical and horizontal positioning. Vertical Position (VERT. POS.) adjusts the vertical position of the image and Horizontal Position (HORIZ. POS.) adjusts the horizontal positioning of the image. Phase and clock are preset in the factory and compensated in the Auto-Adjust feature as necessary.

Vertical/Horizontal Position

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN to highlight the IMAGE sub-menu.
3	Press SEL to select IMAGE. The IMAGE sub-menu appears on-screen.
4	Use UP/DOWN to highlight VERT. POS. or HORIZ. POS. BRIGHTNESS PHASE CONTRAST CLOCK SHARPNESS HORIZ. POS. IMAGE VERT. POS. 33 COLOR ADVANCE ADJ OSD POS 640X482 31.3 KHz 60 Hz
5	Press SEL to select VERT. POS. or HORIZ. POS.; the Vertical Position or Horizontal Position sub-menu appears on-screen.

Language

The menu is available in five languages: English, German, French, Spanish and Portuguese.

Language selection is dependent upon availability per jurisdiction and selections made during the SetChip procedure.

For more information on language selection, refer to the Installation module of the Operator Manual.

Step	Description
1	Press MODE to display the main menu.
2	Use UP/DOWN on the main menu to highlight the LANGUAGE sub-menu.
3	Press SEL to select LANGUAGE; the LANGUAGE sub-menu appears on-screen. BRIGHTNESS ENGLISH CONTRAST GERMAN SHARPNESS FRENCH IMAGE SPANISH COLOR PORTUGESE LANGUAGE RECALL 640X482 31.3 KHz 60 Hz
4	Use UP/DOWN to highlight any language.
5	Press SEL to select a language.
6	Press MODE to finish and save the selected language.
7	Press MODE again to finish adjustments.

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Recall

Select the RECALL option from the main menu to restore all user adjustment values to factory defaults.

Auto Adjusting

The LCD panel has an auto-adjust feature. To activate auto-adjust, press the UP key while the OSD is not active. The screen turns black except for a box that reads AUTO ADJUSTING ... When finished, the screen returns to its previous display.

LCD panel Auto Adjust

No Signal Display

When the LCD panel does not detect an input signal, it displays a black screen with the message NO SIGNAL INPUT.

No Signal Display

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Main LCD Panel

Information on the calibration and test functions are located in the Machine Modes module of the Operator Manual.

Top Box LCD Panel

*The main monitor LCD is NOT available in US jurisdictions without a touch screen. Only the top box LCD panel is non touch screen.
The numbers in brackets [ ] represent the selection as it appears on-screen.*

The main LCD panel contains a touch screen that enables game play by touching designated areas of the screen.

The RS-232 control signals from the controller are wired directly to the EGM's backplane. The correct device driver must be selected from the Operator Mode Menu → Operator Setup/Selections [5] → Game Machine Options [5.1] → Device Driver Options → Touch Screen = Microtouch to support the corresponding touch sensor technology. Calibration and Test functions are located in the Operator Mode Menu → Miscellaneous [6] → Touch Screen [6.8] → Calibrate [6.8.1] and Test [6.8.2].

The EGM may contain a second LCD panel in the top box. This second LCD panel is the same as the LCD panel in the main display area; with the exception, that it does not contain a touch screen.

EGMs with a casino style top box may be converted into a second LCD panel using the LCD XTreme Kit. The LCD panel contained in the XTreme Kit is the same as the main LCD panel, except that it does not contain a touch screen and has different mounting hardware.
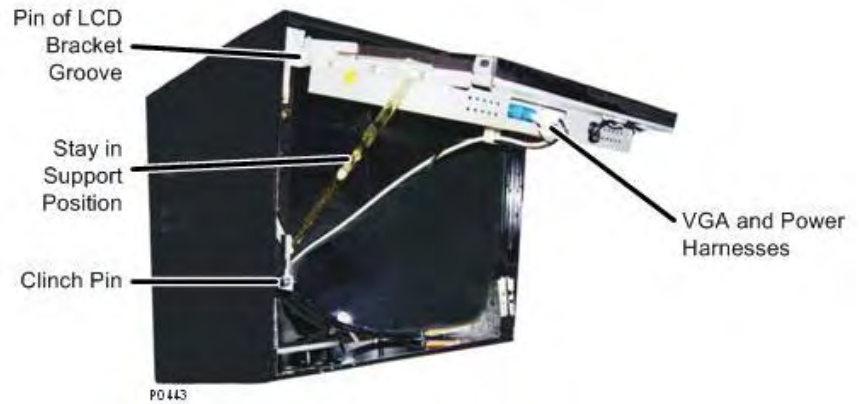

Top Box LCD (External View)

Top Box LCD Panel (continued)

Pin of LCD
Bracket
Groove

Stay in
Support
Position

Clinch Pin

VGA and Power
Harnesses

PO 443

Top Box LCD (Internal View)

TOUCH SCREEN

A touch screen is installed on the main display CRT monitor and LCD panel. This enables game play by touching designated areas of the screen. The touch screen adheres to the CRT monitor and LCD panel face with a touch screen controller mounted to the monitor frame. The controller has an RS-232 interface wired into the existing self-aligning connector at the rear of the monitor assembly. The controller receives 12V DC power from the monitor.

Operation

The ClearTek™ II Touch Screen, manufactured by 3M Touch Systems, uses analog capacitive touch technology. At the core of this technology is an all-glass sensor with a transparent, thin-film conductive coating fused to its surface. A proprietary glass overcoat is applied over the conductive coating, completely protecting and sealing the entire sensor. Along the edges is a narrow, precisely printed copper electrode pattern that uniformly distributes a low voltage, AC field over the conductive layer.

Anti-Reflective Etched or Polished surface

Protective Noise Shield

Conductive Coating

ClearTek Glass Overcoat

I0727

All-Glass Capacitive Sensor

Voltage is applied to four corners of the screen

Electrodes spread out voltage, creating a uniform voltage field

Electrode fused into glass sensor

Black tape on edge to protect electrode

Controller calculates the position of finger from the current flows

Touch of finger draws current from each side in proportion to the distance from the edge

I0728

Capacitive Sensing – Operation

Functionality

This electrode is taped-over on the completed touch screen to protect it. When a finger makes contact with the screen surface, it "capacitively couples" with the voltage field, drawing a minute amount of current to the point of contact. The current flow from each corner is related from the distance to the finger, and the ratios of these flows are measured by the controller and used to locate the touch.

Machine Interface

The touch screen controller has an RS-232 connection to the EGM main board. The interface signals are wired into the self-aligning connector at the back of the monitor.

The touch screen signals, along with the monitor signals, connect via a harness to connector P4 on the backplane board.

The touch screen controller is powered from the monitor's power supply. The 12V DC power is taken from the monitor main board.

Performance
Resolution and Sensitivity

The ClearTek touch screen has a resolution of 1,024 x 1,024 touch points. The controller averages the entire area of finger contact to a single point, giving users pixel-by-pixel control when touching the screen. The touch screen records a touch within 8-15ms of finger contact. This performance gives users virtually instant response. Because the point of capacitive coupling occurs exactly when a finger makes contact with the screen surface, only the slightest touch is required to register.

Durability

The touch screen is very robust, allowing it to perform in contaminated environments. Contaminants such as grease, water, and dirt do not interfere with the capacitive screen's speed, accuracy, or resolution. In addition, the controller does not respond to stationary objects, such as food particles, on the screen. The touch screen is also fitted with a gasket to prevent liquids or other contaminants from getting into the monitor assembly.

The touch screen employs a solid-state sensor with no active or moving components. Its all-glass overcoat allows resistance to scratches from sharp objects and not show wear over time. The ClearTek ASIC-based controller enables it to eliminate noise from electromagnetic interference (EMI), drifting caused by temperature shifts and humidity, and damage from static discharges. However, if the protective ClearTek overcoat is damaged, either accidentally or maliciously, to such an extent that the underlying conductive coat is disturbed, severe inaccuracies in determining finger position may occur.

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Interface

The touch screen controller has an RS-232 connection to the EGM's main board via the backplane. The interface signals are wired into the self-aligning connector at the back of the CRT monitor or main LCD panel. The pins used for the touch screen signals are detailed in the Touch Screen section.

The touch screen signals, along with the monitor signals, connect via a harness to connector P4 on the backplane board.

The CRT monitor's power supply powers the touch screen controller. The CRT monitor's main board supplies the 12V DC power.
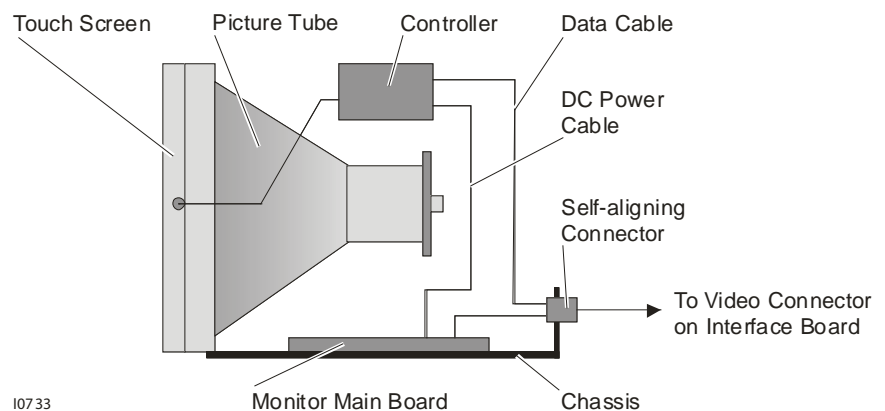
Touch Screen Connection on a CRT Monitor

Handling the Touch Screen

The CRT monitor and main LCD panel touch screen contains glass and must be handled with care (including dropping or bumping) to avoid breakage. Be aware of cracked or broken touch screens with sharp edges. Ensure that all work area surfaces are clean and free from small particles that could scratch the touch screen surface. When handling a touch screen, follow these instructions fully:

⚠️ *NEVER "roll" the monitor from base down to face down, as the edges of the touch screen are delicate, and the overall weight of the monitor is substantial. Rolling the monitor may crack or break the edge of the touch screen, rendering it useless. When installing the monitor, use care in not knocking or banging the taped edges of the touch screen - this area is delicate.*
NEVER slam the cabinet door onto the screen.

- The touch screen has black tape protecting the electrodes at the edge of the screen. The tape also excludes light and dust. Do not remove this tape.
- Blow any contaminants from the surface with a filtered de-ionized air source before cleaning with a soft, lint-free cloth dampened with isopropyl alcohol. Ensure that there are no contaminants in the cloth.
- Never remove the touch screen by gripping and pulling the cable. This may break the cable.
- Handle the product with gloves to avoid leaving fingerprints or smudges. The transparency of the touch screen is critical.
- Once removed from the original package, do not stack touch screens. The edges may cause scratching.
- Do not place heavy objects on the touch screen.
- Prevent assembly tools from coming into contact with the touch screen. Whenever possible, use plastic tools.
- Do not apply undue stress to the cable area (this is the most fragile section).
- Check the main door to ensure that no pressure is applied to the taped area. Excessive pressure on the taped area may result in edge breakages or vibrational wear damage to the electrode pattern.

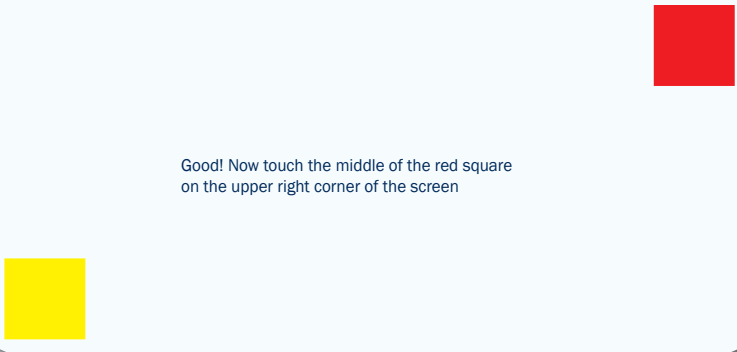## Touch Screen Calibration and Test

Perform periodic recalibration of the touch screen as recommended. The numbers in brackets [ ] represent the selection as it appears on-screen.

Touch screen calibration and testing the touch screen is relevant when the prize awarded depends upon the accurate registration of a player's selection.

Perform calibration and touch screen testing on at least the following occasions:

- Installation of the EGM in the venue
- Moving the machine within the venue
- Converting the game to another game theme
- Adjusting any of the monitor controls, including brightness and contrast, but particularly height, width or position
- Repairing, replacing or exchanging the monitor

Calibration

Step	Description
1	Turn the Audit key switch ON to access the Operator Mode Menu.
2	Navigate to Miscellaneous [6] → Touch Screen [6.8].
3	Select Calibrate [6.8.1] and follow the on-screen instructions. Please touch the middle of the red square on the lower left corner of the screen Good! Now touch the middle of the red square on the upper right corner of the screen
4	Touch, then lift, the finger from the center of the square. The touch screen calibrates with reference to where the finger is lifted from the screen.

Touch Screen Test

The numbers in brackets [ ] represent the selection as it appears on-screen.

Step	Description
1	Select Touch Screen Test [6.8.2] from the Touch Screen menu.
2	Draw a pattern on the screen with a finger and note the display appearing on-screen. Draw something on the screen Press Service to exit
3	Confirm that the pattern coincides with the points touched by the finger.
4	Ensure that locations near the edges of the screen are checked.

Specifications

Item	Specification
Power Requirement	12V DC
Power Consumption	Less than 2W
Resolution	1024 x 1024 touchpoints
Baud Rate	2400 baud between controller and game
Communications Parameters	N81
Response Time	8ms – 15ms
Touch Contact Requirement	3ms
Accuracy	±1% error
Output Communications	Bi-directional asynchronous RS-232C serial communication
Operating Temperature Range	0°C - 55°C
Operating Humidity Range	0-95% non-condensing