U.S.A. MAV500/MKVI

VIDEO GAMING MACHINE

SERVICE MANUAL 1

28-00486-00

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ARISTOCRAT TECHNOLOGIES INCORPORATED
7230 Amigo Street, McCarran Center
Las Vegas, NV 89119
TEL: (800) 748-4156 ♦ FAX: (702)-270-1136

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CAUTION

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, and will render the warranty void.

Important Safety Information

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.

Inform yourself and your staff

You must read this document before using the equipment or opening any part of the equipment. Ensure your staff do too.
The equipment itself is marked with important warning labels detailing dangers.

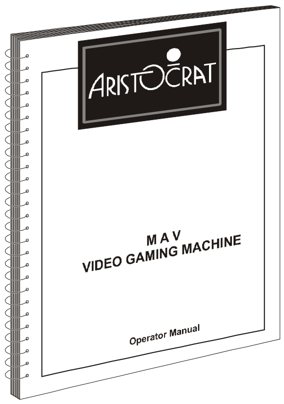
- Check for warning labels whenever opening any part of the equipment.
- Read and comply with all warning labels you see when operating or opening the equipment.
- Under no circumstances remove or alter any warning label.

Be careful

If you don't follow the directions in this manual and on warning labels you increase the risk of the following things occurring:

- **serious personal injury**, including electrocution and amputation. Unless you are a trained technician, tampering with the machine can kill you;
- serious damage to the equipment;
- serious damage to other equipment;
- serious damage to the premises housing the equipment.

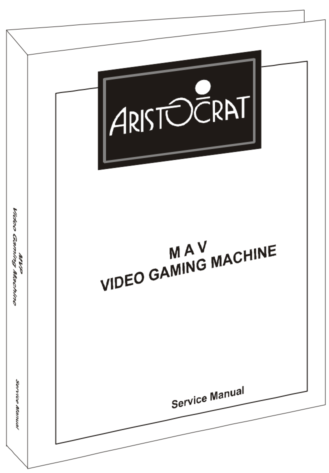
Aristocrat MAV Manuals



Operator Manual

Primarily intended for operators of Aristocrat MAV Video Gaming Machines. The Operator Manual:

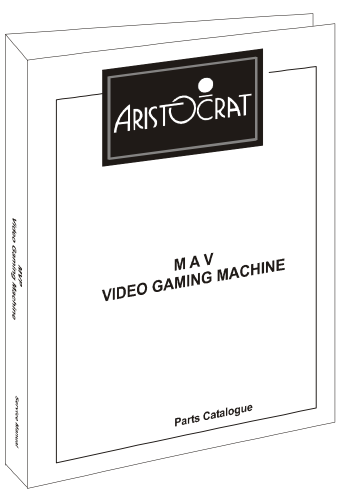
- gives a general overview of the hardware and software
- provides procedures for daily operations and simple maintenance.



Service Manual

Primarily intended for service technicians. The Service Manual:

- gives a general overview of the hardware and software
- provides instructions for installation and fault finding
- describes in detail each of the major components of the machine.



Parts Catalogue

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

- shows an illustration of each of the components of the machine
- links each illustration with a part number.

Foreword

How To Use This Manual

Purpose of the Manual

This manual provides procedures for the operation of the gaming machine. Machine installation, service, and repair must be carried out by licensed technicians.

Warnings, Cautions and Notes

WARNING
A warning immediately precedes an operating procedure or maintenance practice which, if not correctly followed, could result in personal injury or loss of life.

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

Note
A note immediately precedes or follows an operating procedure, maintenance practice or condition which requires highlighting.

About Aristocrat Technologies, Inc

Aristocrat operations in 1953 in Sydney Australia and is one of the oldest and most successful gaming machine manufacturers. Aristocrat supplies machines to every country and region in the world where gaming machines are legal, including Austria, France, Germany, Holland, Malaysia, China, the Philippines, Africa, Singapore, Russia, South America, and the USA.

Aristocrat employs over 1,600 people worldwide and has the largest gaming research and development facility in the southern hemisphere.

Offices

Corporate USA Office

Aristocrat Technologies, Inc.
7230 Amigo Street
McCarran Center
Las Vegas, Nevada 89119
(702) 270-1000

FAX 702-270-1136

Parts Department

Aristocrat Technologies, Inc.
3300 Birtcher Drive
Las Vegas, Nevada 89118
1-800-748-4156

Major USA Offices

Aristocrat Technologies Inc. (Florida),
14411 Commerce Way, Suite 230,
Miami Lakes,
Florida 33016, USA.
Tel: 888-616-4264 Fax: 305-821-4806

Aristocrat Technologies Inc. (Mississippi)
308 F Highway 90
Waveland, MS 39576
Tel: 888-446-4422 Fax: 228-466-2675

Aristocrat Technologies Inc. (New Jersey)
651 South Mill Road
Absecon, NJ 08201
Tel: 609-407-9330 Fax: 609-407-9331

Aristocrat Technologies Inc. (Michigan)
7400 West Four Road
Mesick, MI 49668
Tel: 231-2694088 Fax: 231-269-4089

Aristocrat Technologies Inc (Tucson, Arizona)
5431 E. Williams Blvd. Suite 151
Tucson, AZ 85711
Tel: 520-519-8500 Fax: 520-519-8030

Aristocrat Technologies Inc. (Oregon)
5065 Mountain Crest Way South
Salem, OR 97302
Tel: 877-581-0940 Fax: 503-581-1162

Aristocrat Technologies Inc. (Reno Nevada)
1315 Greg St. Suite 111
Sparks, NV 89431
Tel: 775 359-4411 Fax: 503-581-7050

Hanson Distributing Co. (Minnesota)
9201 Penn Ave. Suite 31
Bloomington, MN, 55431
Tel: 800-572-2463 Fax 952-881-7960

Vista Gaming (Colorado)
Heritage Square
18301 W. Colfax T1-B
Golden, CO 80401
Tel: 303-278-8701 Fax: 303-278-0974

Aristocrat Technologies Inc. (California)
230 S. Spruce Ave.
S. San Francisco, CA 94080
Tel: 650-246-1760 Fax: 650-589-6678

Chapter 1

General Description

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1.1 Physical Description

The Aristocrat MAV500/MKVI Video Gaming Machine is the latest model of a range of advanced gaming machines that incorporates the following features:

- Advanced, high-performance electronics based on the Hitachi SH-4 microprocessor and NEC graphics chip,
- Advanced software enabling a wider variety of games and simpler machine operations,
- Complete range of machine attachments enabling note and coin currency, communication links, progressive systems, and custom options,
- Comprehensive security options,
- Modular design and construction,
- A multi-voltage power supply assembly,
- Easier servicing and maintenance,
- High resolution video displays, advanced animation and graphics, and improved sounds and tunes,
- Variety of aesthetic cabinet types, colors, and game and score displays.

The machine is assembled from various sub-assemblies and major components (modules) that are described in detail in other chapters of this manual.

Figure 1-1 shows a typical external view of the machine with a bill acceptor fitted and Figure 1-2 shows an internal view.

The following table briefly identifies the various modules of the gaming machine.

Table 1-1 Video Gaming Machine Modules

Machine Module	Description
Cabinet, Door and Top Box.	The physical outer enclosure that provides for the location and mounting of other modules.
Belly Panel Door	This door is located on the main door, below the mid trim, and provides access to the note stacker (where fitted) and main door fluorescent tube. This door is fitted with a lock and a battery-backed security switch.
Video Monitor	High-resolution nominally 640 x 480 pixels. It is actually set by the game for improved-quality graphics. The monitor is the main medium for displaying game operation and status to the player.
Main Board	The Main printed circuit board (PCB) provides primary control of the gaming machine. The Main Board is interfaced (via the Backplane) to all the major components of the machine. The board receives signals from, and sends control signals to machine components. The Main Board houses the central processor and other logic components for game generation and video drivers, security items, power control, memory storage, and communications.
Backplane (may also be called the Interface Board).	The Backplane houses an array of connectors that are used to electrically connect (via direct mechanical coupling or through looms and ribbon cables) the various electrical components of the machine to the Main Board.
I/O Driver Board	The I/O Driver Board drives the lamps, receives inputs from the pushbuttons, interfaces with the coin handling system, and extends communication access.
Communication Configuration Board	The Communication Configuration Board (CCB) 'piggy-backs' to the Main Board. The board is used to set up the communications channels of the Main Board (up to three) for external networks, bill acceptor and printer.
Logic Cage	The logic cage consists of a secure, steel cabinet that houses the Main, Communications Configuration, and I/O Driver PCBAs. The section of the Interface Board that interfaces with the Main Board and the I/O Driver Board is also located within the logic cage.
Power Supply Assembly	The power supply assembly converts the AC mains input voltage into low voltage DC power for the various machine modules and circuits. Power is directed via the Interface Board to the machine components. The video monitor receives AC power directly from the power supply assembly.
Coin Handling System	The function of the coin handling system is to check the validity of coins inserted, establish a count and pass signals to the Main Board. The coin handling system directs coins to either the hopper, cash box, or coin tray. The MAV500/MKVI is compatible with several different coin handling systems.
Hopper (if used)	The hopper acts as a holding unit for coins. When instructed by the main board, the hopper returns coins to the player. For each coin ejected, the hopper sends a signal to the Main Board. When the required number of coins has been dispensed, the Main Board signals the hopper motor to stop.
Bill Acceptor (if used)	The function of the bill acceptor is to accept valid note currency and register the appropriate number of credits for gameplay. A note stacker is used to store the notes.

Player Communication (if used)	The function of player communication is to allow a player, using an identification card, to 'log on' to a network system when playing a machine. The network system maintains a record of player transactions, and allows messages to be sent to individual players. The player communication module can be attached to the side of the gaming machine or fitted in the top box.
Mechanical Meter Board	Electromechanical meters are used to record accounting data in a physical format. The signals for the meters are received from the Main Board, via the Backplane.
Ticket Printer (if used)	The ticket printer is an electronic device mounted within the cabinet, it is used for providing the player with a printed ticket for redeemable credits. The printer, when substituted for a hopper, may also keep a second copy of all tickets printed for additional audit information.
Communications Interface (if used)	The function of the communications interface is to enable the machine to be linked to a network and/or subsidiary equipment. The communications interface may be linked to various machine modules, including security, and transmits signals from these inputs as each one changes status.
Light Tower	Multi-level light towers may be used to provide an additional level of customer service and security.

Figure 1-1 Typical MAV500/MKVI Video Gaming Machine with Bill Acceptor - External View

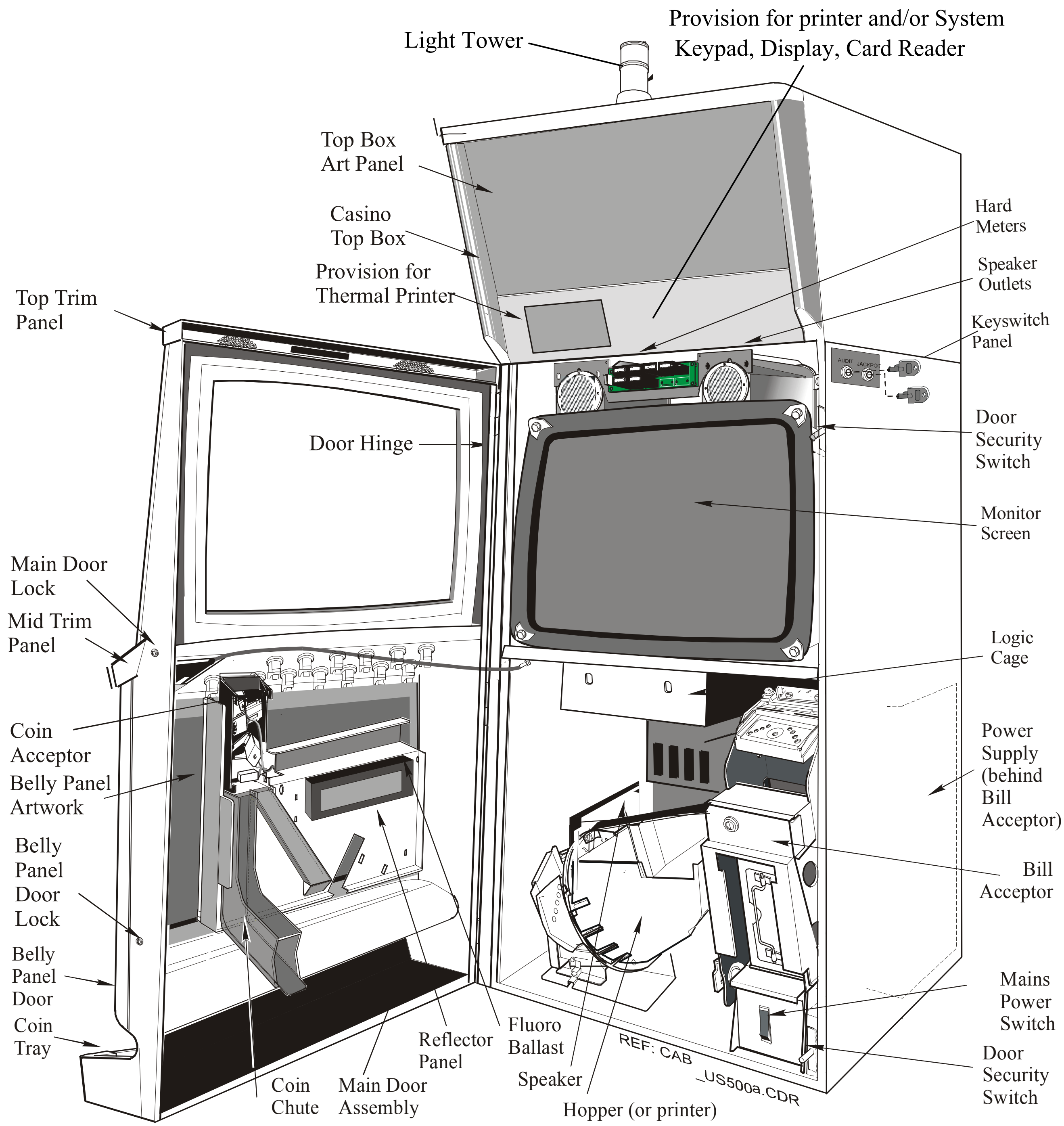


Figure 1-2 Typical MAV500/MKVI Video Gaming Machine with Bill Acceptor - Internal View

Machine Keys

The gaming machine requires keys for the following locks and switches to establish effective security and correct operation. A key may only be removed from its lock or key switch after it has been returned to the locked position. Refer to Figure 1-1 for lock and keyswitch positions.

Table 1-2 Machine Keys

Name	Function
Cabinet Door Lock	Allows the operator to open the cabinet door. Insert the cabinet door key and turn it 180° clockwise, then the door will "pop" open.
Audit Key Switch	Enables entry to the Operator Mode Menu (see Machine Modes). Insert the Audit Key and turn it 180° clockwise.
Jackpot Reset Keyswitch - also called the Cancel Credit Key Switch	Allows the operator to reset the machine after a machine fault has been corrected (see Machine Modes). Insert the Cancel Credit key, turn it 90° clockwise then back again.
Belly Panel Door	Allows the operator access to the bill acceptor note stacker and door fluorescent tube.
Logic Cage Lock (if fitted)	Allows the operator access to the PCB logic cage. Insert the logic cage key and turn it 180° clockwise.
Bill Acceptor Cage Door Lock(s) (optional)	Allows operator access to the bill acceptor stacker lock(s) and to remove the stacker. Turn keys 180° clockwise to open.
Bill Acceptor Stacker Lock	Allows the operator to remove the notes from the stacker. Insert the key and turn it 90° clockwise, open the door and remove the notes.

Note: All security door locks are 5/8-inch diameter and extend into the cabinet ½-inch. Spacers must be added if longer locks are used.

1.2 Basic Operation

The gaming machine functions are controlled by an advanced software and hardware platform that gives operators greater control over machine functions, easier maintenance, and simplified machine setup. New games developed with the software provide higher quality graphics, new sounds, and a wider variety of features.

The machine has two major modes of operation: ***Play*** mode and ***Operator*** mode.

The machine is in Play Mode when the cabinet door is closed and locked, the Audit key switch is in the OFF position and there are no fault or lock-up conditions.

The machine is in Operator Mode when the Audit key switch is in the ON position. The operator mode provides a range of operational procedures, data displays, and specific machine functions, all of which are fully controlled by the Operator Mode Menu system and the on-screen guidance. The functions of the operator mode are explained in detail in the chapter Machine Modes.

When the machine is in operator mode, normal game operation is not possible. However, demonstration mode and combination test mode enable gameplay without using currency.

1.2.1 Play Mode

When in Play Mode, the machine:

- operates security and audit features,
- runs self-checking and testing continuously,
- permits game play,
- monitors and records game activities continuously,
- displays comments and guidance for players, operators and technicians.

Basic machine operation in Play Mode is shown in Figure 1.3. Depending on the machine configuration, credits may be registered by inserting coins, tokens, bank notes (bills), coupons, or by using a cashless system. With a cashless system, credits are transferred to and from the machine through either a computer link or a smart card. The machine has security features for screening the currency tendered to ensure that only valid currency is accepted.

If the machine accepts the currency, the playbuttons on the mid-trim become active and flash. The player may then insert more currency, play a game by pressing one of the flashing playbuttons, or have the machine return the current credit total by pressing the CASHOUT pushbutton.

1. Pressing one of the pushbuttons from the lower row to select the number of credits to be wagered on each line, and then
2. Pressing one of the pushbuttons from the upper row to select the number of lines to be played.

The BET meter on the display screen shows the credits wagered.

Once the player starts a game by pressing one of the active playbuttons, the machine runs the game sequence and displays the outcome on the screen. If the result is a winning combination, the player may gamble the win (if the gamble feature is available); otherwise, the machine increments the credits won. If the result is not a winning combination, the player may continue play provided there are credits remaining.

The machine is equipped with electronic audit meters which continuously monitor and record credit movement and game activity. Electromechanical meters are also fitted. The electronic meters are accessed through the Operator Mode. The information in these meters is used for audit calculations and security purposes.

If the machine encounters an abnormal condition, it alerts the operator by automatically entering Machine Lockup. In lockup, game is disabled to prevent any further player interaction and guidance information is displayed in the game message area. Examining the Current Lockup screen, which is accessed from the Operator Mode Menu, can identify the lockup condition.

1.2.2 Operator Mode

Within Operator Mode (Audit Key ON), the following options are available:

- Machine Identification
- Accounting Information
- Diagnostic Information
- Test Diagnostic Mode
- Operator Setup/Selections
- Miscellaneous
- Current Lockup

In Operator Mode, the electronic audit meters and the electromechanical meters (if fitted) do not function. Menu selections may be used to review the machine details, select new configurations, and carry out machine tests. Refer to the Machine Modes chapter for detailed information.

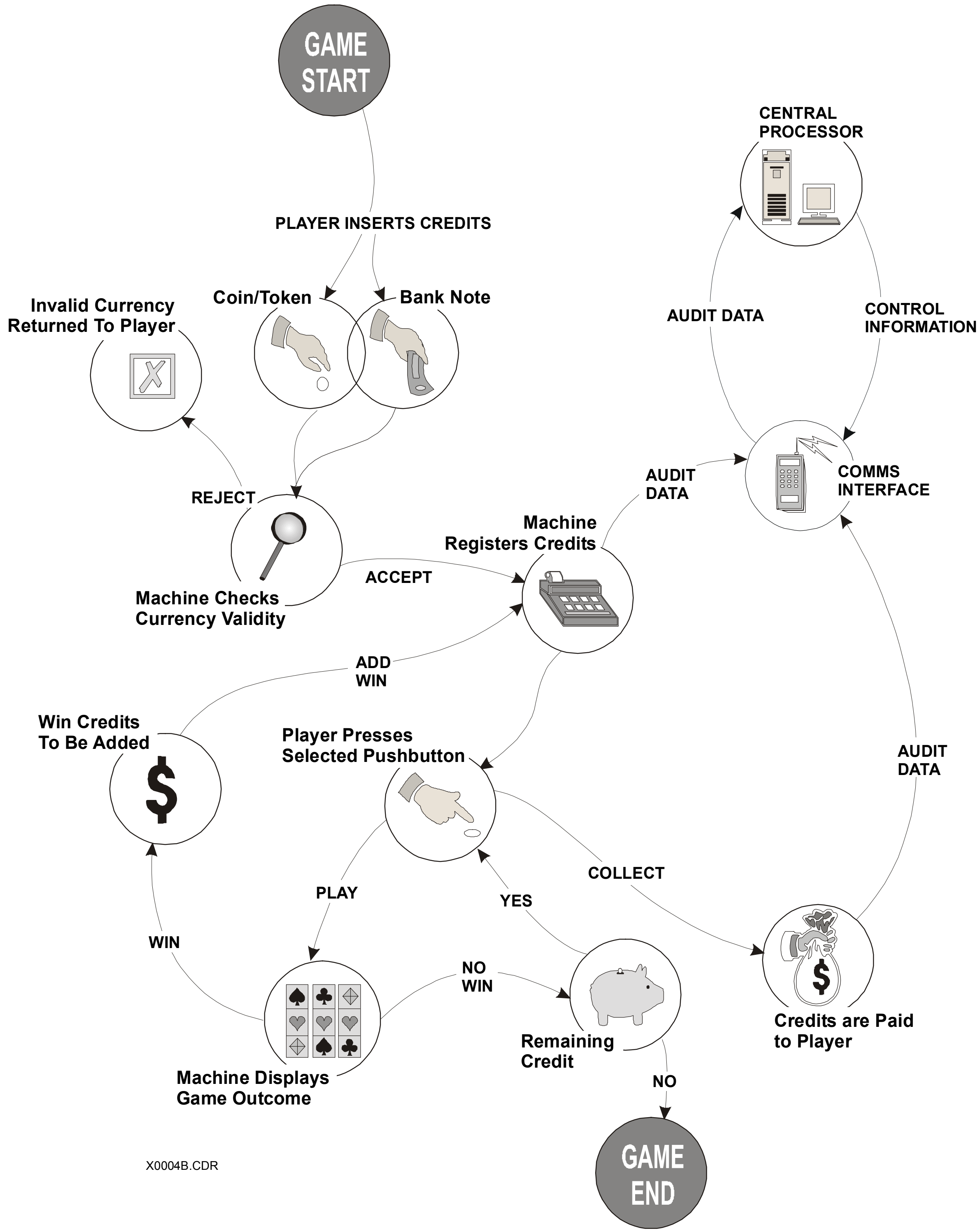


Figure 1-3 Basic Game Operation in Play Mode

1.3 Specifications

Table 1-3 Physical Characteristics

Dimensions (Typical)	
Height of cabinet with Casino/Round top box	52-1/4 inches
Height of cabinet with chop top box	43 inches
Height of low boy cabinet	35-1/4 inches
Width	21-1/4 inches
Depth	22-3/4 inches
Recommended minimum clearance between machines	6-1/4 inches
Weight (Typical)	
With casino top box and bill acceptor	approx. 225 lbs.

Table 1-4 Power Requirements

The voltage selector switch on the power supply assembly may be set for a mains voltage of either 110/120 V or 220/230/240 V.

Nominal Mains Input Voltage	120 V	240 V
Minimum	99 V AC	198 V AC
Maximum	132 V AC	264 V AC
Frequency	60 Hz	50 Hz
Mains Input Current		
Gaming Machine Idle	0.7 A	0.4 A
Gaming Machine Maximum	3.8 A	1.8 A
Gaming Machine Maximum plus Convenience Load Maximum	6.6 A	4.8 A
Power Consumption at Nominal Voltage		
Gaming Machine Idle	84 W	96 W
Gaming Machine Maximum	456 W	432 W
Gaming Machine Maximum plus Convenience Load Maximum	840 W	1152 W
Gaming Machine Typical Power Consumption	430 W	480 W

Table 1-5 Environment

	Operating	Storage
Minimum Temperature	32° F (0° C)	-4° F (-20° C)
Maximum Temperature	122° F (50° C)	176° F (80° C)
Relative Humidity	0 - 80% non-condensing	0 - 95% non-condensing

Table 1-6 Compliances

Compliances	Explanation
UL22 (Pending)	Standard for Safety Amusement and Gaming Conditions
FCC-CFR47-Pt15	Radiated EMI for ITE standard
AS1099 (Pending)	Environmental testing for electro-technology over a specified temperature and humidity range

Notes

Chapter 2

Installation

2.1 Pre-Installation Requirements

The following items are required to install a machine (see Figure 2-1, Figure 2-2, and Figure 2-3):

- verification of jurisdictional approval.
- a floor plan (only required for new installations).
- a suitable base on which to mount the machine.
- adequate clearance between the sides of adjacent machines to allow the doors to be opened (a minimum clearance of 6-1/4-inches is recommended).
- access to mains power outlets and connection cables of peripheral devices.
- machine keys (if locks are fitted).

Important Note
All mains power wiring must be installed by a qualified electrician and comply with the relevant national/jurisdictional standards for mains wiring.

WARNING
The gaming machine must be transported and handled with care. Ensure the machine is not dropped or severely bumped.

- Applicable electrical standards require a method of disconnecting gaming machines from primary power. Since the main power switch is within the gaming machine, the machine is to be switched off at the main circuit breaker panel in the event of an electrical fault.

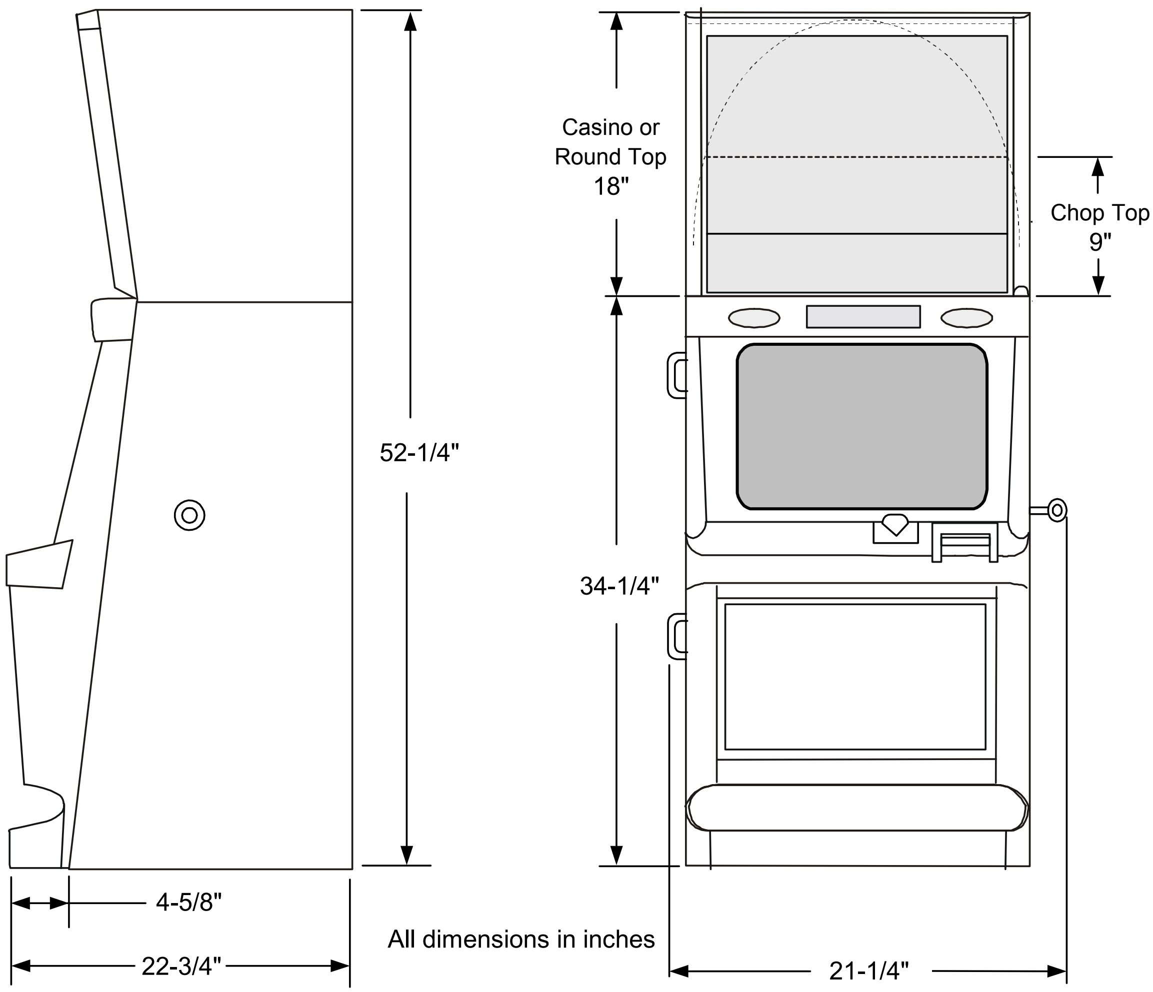


Figure 2-1 Machine Dimensions

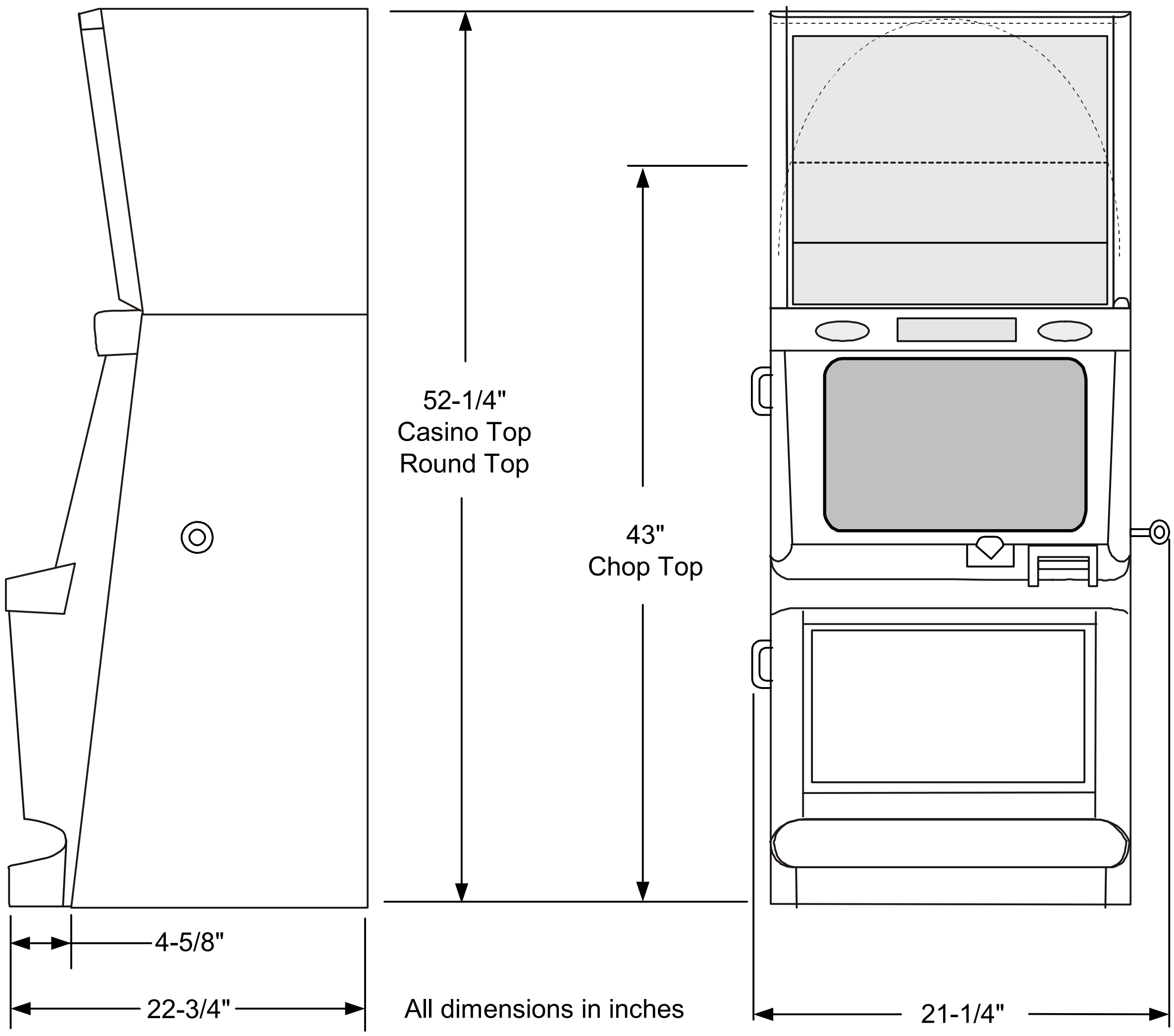


Figure 2-2 Machine Dimensions – Chop Topy

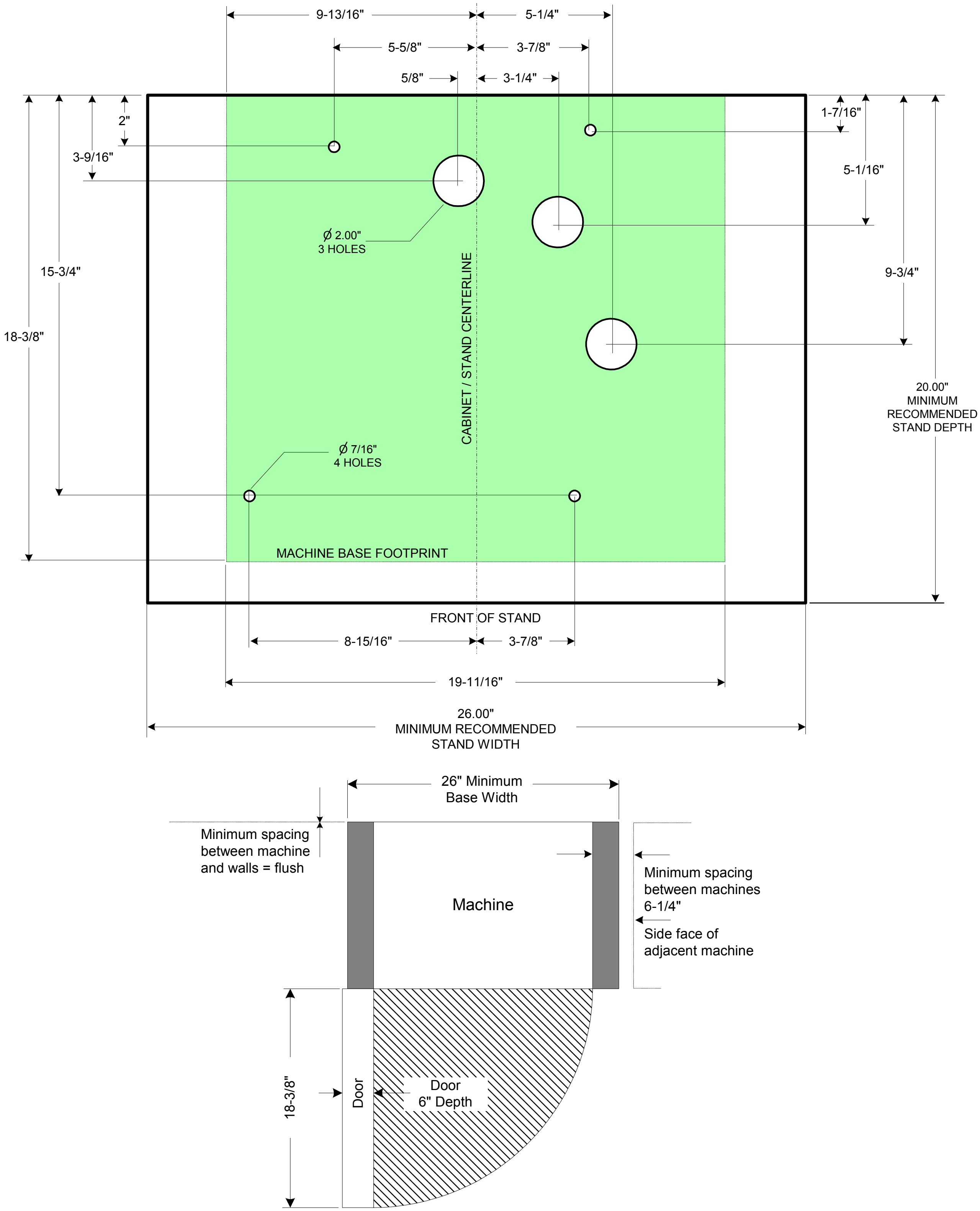


Figure 2-3 Machine Footprint and Clearances

2.2 Inspection on Delivery

Inspect all exterior panels of the cabinet for damage that may have occurred during transportation. Report any damage to your supervisor.

2.3 Installation Procedure

Installation and commissioning of machines must be carried out by an appropriately licensed technician and must comply with the regulations of the jurisdictional authority.

The following procedures are for mounting, connecting, and commissioning the gaming machine into service.

2.3.1 Mounting

WARNING
The gaming machine is a heavy item. Follow the national standard and code of practice for manual handling.

Mount the machine to the cabinet base as follows:

Warning
The gaming machine must not be operated unless it has been properly installed.

1. All holes should be pre-drilled before the machine is placed on the base.
2. Position the machine on the cabinet base, aligning it with the cash box and cable holes (refer to Figure 2-3). Drill holes in the cabinet base to match the four rectangular mounting holes of the machine base. The machine **must** be fixed in four positions, two at the front and two at the back, to meet stability requirements.
3. Secure the machine to the base using either bolts and nuts or the special-purpose fasteners provided.

2.3.2 Pre-start Connections, Checks and Power Up

Perform the following machine connections and checks:

1. Check that the printed circuit board assemblies (PCBAs) in the logic cage are firmly seated. The PCBAs are:
   - Main Board
   - Backplane Board
   - Extended USA I/O Driver Board
   - Communications Configuration Board.

Note
For accessing PCBAs, refer to the relevant chapter in the Service Manual.

2. The machine power supply is set at the factory for a mains input voltage of 110 V in North America, unless clearly labeled otherwise. Should there be a need to change the mains input voltage setting:

WARNING
Make sure the machine is disconnected from mains power before adjusting voltage settings.

WARNING
Selecting the wrong power supply voltage may cause damage to the power supply and/or gaming machine.

   Set the voltage selector switch on the power supply for the desired mains input voltage (110 VAC or 240 VAC). The switch is mounted on the metal housing of the power supply assembly, which is located at the back of the cabinet, in the bottom right-hand corner.

3. Make sure that the mains power switch is OFF. Connect the mains power cable to the machine. The power cable may enter the cabinet either via a hole in the base of the cabinet or via a hole in the rear wall of the cabinet. A hole is provided in the base of the cabinet, near the cable entrance, to allow a clamp to be fitted to the mains cable. The purpose of this clamp is to prevent the mains power cable from being accidentally disconnected. This clamp should be fitted if there is a reasonable risk that the mains power cable may be accidentally disconnected.

WARNING
Visually check that the insulation of the mains power cable is sound. Check that all machine earth wires (green/yellow stripe or braid) and screws that were moved during installation are correctly attached.

4. If the machine is fitted with a coin comparator (as opposed to a coin validator), then a sample coin (or token) must be placed in the coin comparator sensor assembly (refer to Figure 2-4) which is mounted to the reflector panel on the inside of the main door. To install a sample coin:
   a. Slide (without lifting) the scanner unit to the right.
   b. Insert the sample coin into place and carefully release the scanner unit. The coin should automatically seat itself.
   c. Check that the sample coin is seated firmly between the scanner unit and the ribs of the rail insert.

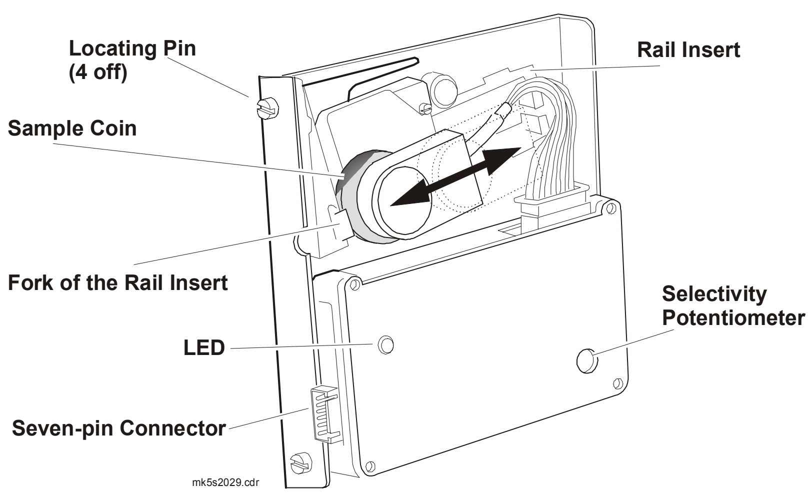


Figure 2-4 Coin Comparator Assembly (MC-62 shown)

5. Switch ON the machine and close the main door (see item 6 below). The monitor and fluorescent lighting system will then be powered up. The machine will perform self-testing procedures for a few moments and any faults detected will be highlighted by a message on the video screen. To fix detected faults, refer to Fault Mode in the Machine Modes chapter.

6. If the monitor exhibits colour aberrations, this may be the result of magnetic interference. Degaussing the monitor and cabinet, as described below, can remove the color aberrations.
   a. Power down the machine and wait for a one-minute period. This time delay enables the monitor circuits to reset and enable the degaussing operation.
   b. Power up the machine and close the door. Automatic degaussing will now occur.

c. Should color aberrations persist, use a degaussing coil to degauss the monitor and cabinet.

2.3.3 Commissioning the Machine

Carry out the following procedures to commission the machine:

1. Check that the machine program type and variation match the customer order. Use the Operator Mode menu and the options described in the chapter Machine Modes.
2. If the machine is fitted with a hopper, fill the hopper as described below.

Important Note
The procedure for filling the hopper is dependent on house rules.

   a. Obtain the correct number of coins required to fill the hopper.
   b. Open the cabinet door. If the jurisdiction requires that the hopper be weighed, turn OFF the machine before removing the hopper.
   c. Place the coins in the hopper, and close and lock the cabinet door.
   d. Record the number of coins placed in the hopper in the refill register.
3. Where the Operator permits, monitor gameplay operations for any faults:
   a. For machines that accept bills, coupons, or bank notes, insert a valid bank note (in good condition) and confirm that it is accepted and credited correctly. If the bank note is not accepted on the second attempt, repeat the test on another note. If the second bank note is also rejected, refer to the Fault Finding section in the Bank Note Acceptor chapter of the Service Manual.
   b. For machines that accept coins, check that coins are accepted, credited, and paid out correctly.

   Retrieve bank notes and coins inserted during testing.
4. Machines operating on a network system may now be connected and installed onto the network. For installation procedure refer to the manual for the particular communications network used.
5. For machines fitted with a ticket printer, carry out the general maintenance procedures as detailed in the Printer chapter of the Service Manual or the Care and General Maintenance chapter of the Operator Manual.
6. Request an Operator to record the values of the hard audit meters (if fitted) and the soft audit meters (as required by the applicable jurisdictional authority).
7. Log installation data as specified by the appropriate jurisdictional requirements.

The machine may now be placed in service pending appropriate jurisdictional approval.

Notes

Chapter 3

Machine Modes

3.1 Modes of Operation

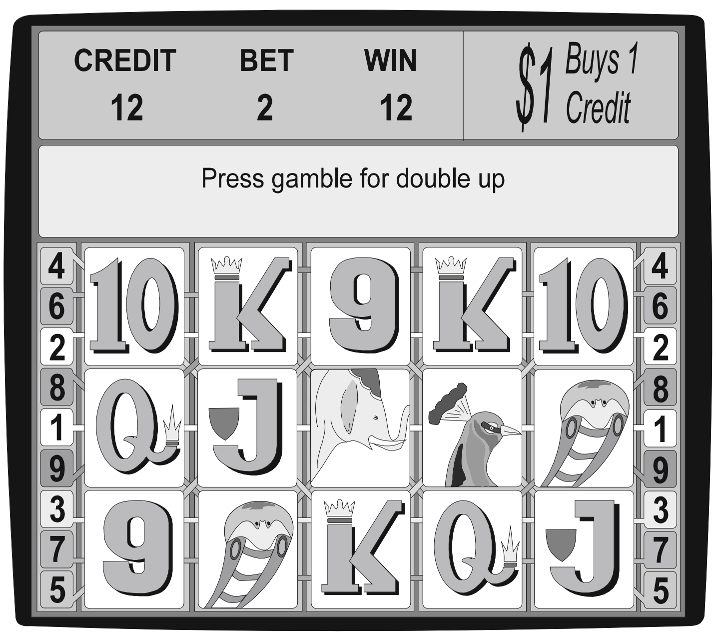
The gaming machine is operated in two main modes, Play Mode and Operator Mode. Play Mode permits gameplay while the machine is fully operational and the cabinet door is closed. Operator Mode allows the operator to configure the machine, view audit information, carry out machine tests, and reset machine faults. Turning the Audit Key ON switches the machine from Play Mode to Operator Mode.

The gaming machine may be configured to play one of several types of games, the most common being spinning reel games and poker games. Although spinning reel games are featured in this chapter, the explanations and information given can be easily adapted to other game types. The options and procedures outlined are similar for all game types.

3.2 Play Mode

The machine is in Play Mode when the cabinet door is closed and locked, and there are no active lockup conditions. In Play Mode the machine:

- shows game displays in readiness for player operation,
- carries out gameplay,
- continuously monitors and records play activities,
- continuously runs the self-test processes,
- displays comments and guidance for players, operators, and technicians.



Typical Format of Game Display

Figure 3-1 shows the format of a game display. The symbols on the screen will vary depending on the particular game software being used. The CREDIT, BET, and WIN game meters show the number of credits applicable at the current stage of the game. Comments appear in two message lines to guide players and operators as the game progresses. Machine conditions, including security alerts, are also displayed in the message area.

Examples of comments are:

- Game Over
- Main Door Open
- Coin Diverter Fault
- COMBINATION TEST

Lockup fault messages are listed in Section 3.3.6, Current Lockup Items.

In Play Mode the machine operates with full security features. For example, the machine monitors operations and alerts operators should malfunction or tampering occur. Electronic meters and electromechanical meters (if fitted) record details of gameplay and machine operations in Play Mode.

Options

Besides being able to alter machine controls to suit house preferences, the machine provides menu controls for setting important game and player preferences, including:

- Game percentage,
- Links to house and stand-alone progressives in various levels,
- Hopper coin-collect limit,
- acceptable bill ($ note) denominations
- Volume settings for sounds and tunes.

See Section 3.3.4, Operator Setup/Selection Mode.

The base credit value (a game credit), machine token amount for coin entry, and game gamble option are set using the DIP switches on the I/O Driver Board.

Note
Jurisdictional requirements must be followed when configuring machines.

3.2.1 Player Operation

When the machine is switched on and the cabinet door is closed and locked, the fluorescent tubes light up and the machine automatically initiates a self-test. If no faults are detected, gameplay may begin.

Play Pushbuttons

When a player inserts a coin or note, the machine either accepts or rejects the currency. If the machine accepts the currency, it increments the CREDIT meter on the game video display by the number of credits. The mid trim pushbuttons become active and flash. The player may now either insert more currency or press one of the pushbuttons to play the game. The player selects the number of credits to bet and this number is shown on the BET meter on the video display. A beep sound is heard when any of the BET playbuttons is pressed.

The reels then start to spin and after a short interval come to rest. When the spinning reels stop, the line combinations are evaluated. If the result is a winning combination, a win tune is played. The video display shows the number of credits won in the WIN meter.

Some games incorporate a win gamble feature that provides players with the chance to double their WIN amount. This feature is initiated by pressing the GAMBLE pushbutton. The GAMBLE feature may be selected a maximum of five times in succession. If players do not wish to gamble their WIN, they may press the TAKE WIN button to add the WIN to the CREDIT meter.

Due to the limit on the number of coins that can be held in the hopper, as well as other payout considerations, there is a limit to the number of coins that the machine can pay out. This is called the Hopper Limit and is set via the Operator Mode Menu ⇒ Operator Setup/Selections screen.

A player can collect coins up to the Hopper Limit amount by pressing the CASHOUT pushbutton. When the CASHOUT button is pressed, the machine prevents functions such as gameplay and entry of currency until the hopper has dispensed the coins into the coin tray. A hopper sensor counts the coins being dispensed. The CREDIT meter decrements to zero.

When a player presses the CASHOUT pushbutton and the value of the game credits is greater than the Hopper Limit:

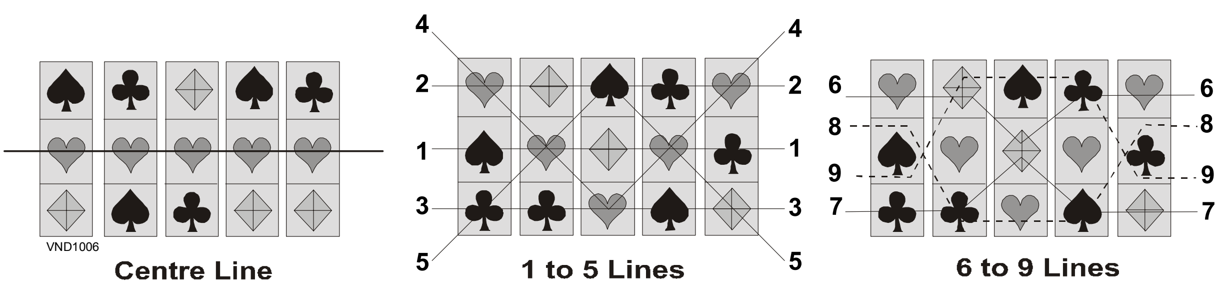
- the message **Call attendant - Cancel Credit $99.99** is displayed ($99.99 is the value of credits to be paid out).
- the attendant hand pays the value of the credits and then resets the machine by turning the Jackpot Key ON then OFF.
- the message **Credits paid out $99.99** is displayed on the screen.
- the CANCEL CREDIT electronic meters and electromechanical meters record the number of credits paid out.
- the game CREDIT on the screen and the CREDIT electronic meters are reset to zero.

Types of Games

Machines generally have one of three game types: multiplier, multiline, and multiline-multiplier:

Multiplier- A multiplier game allows a player to gamble more than one credit per game on a single winning line. Each additional credit gambled generally multiplies the value of the prize by the value of the credits bet.

Multiline- A multiline game allows a player to specify multiple lines on which to bet for a winning combination. The win total is calculated by adding each of the win lines.



Centre Line and Multi Line Combinations

3.2.2 Video Display

The video display unit provides high-resolution graphics. The unit is able to display attractive game illustrations and animations, as well as player messages, operator menus and information displays.

The simulated spinning reels take up most of the screen area. The area at the top of the screen displays CREDIT, BET, and WIN information, as well as the coin denomination accepted. Between these two areas is the message display area.

3.2.3 Sounds and Tunes

Sounds and tunes are used, in combination with the graphics and animation, to increase game appeal.

Different sounds are played to signify various machine conditions, such as alarm, reel spin/stop, win, lose, double-up win, jackpot bell, coins entering machine, and coins falling to coin tray. Each game has its own specific sounds and tunes.

The volume of the sound system can be adjusted in the Sound System Setup menu.

3.2.4 Light Tower

Multi-level light towers are fitted to provide an additional level of customer service, security and house control. The tower is color coded to identify the machine's denomination.

Typical light tower functions are as follows:

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

The Light Tower indicates one of four possible machine states:

The **IDLE** state: the default state when no other state exists.

The **SERVICE** state: when the 'Service' button has been being pressed and it is lit.

The **TILT** state: the machine will be considered to be in this state when one of the following conditions exists:

- a lockup fault condition (excluding Main Door Open and the Handpays state), such as Logic Door Accesses or Bill Acceptor Error.
- a non-lockup fault condition, such as Bill Stacker Full or Printer Paper Low.

The **HANDPAYS** state exists when one of the following conditions occur:

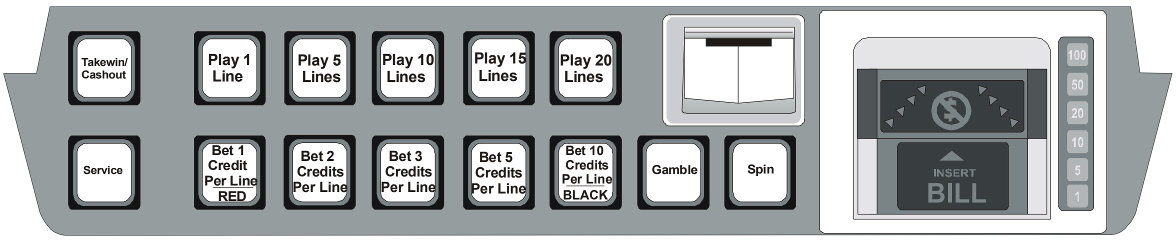
- a Jackpot lockup,
- a Cancelled Credit lockup, or
- a Progressive Link Jackpot lockup.

Note
After the Main Door has been closed, the bottom tier light should remain lit (unless it is otherwise flashing) until the start of the next game.

3.2.5 Pushbuttons

A typical layout of the pushbuttons is shown below. The pushbuttons are labelled and have the following functions: CASHOUT/TAKEWIN, SERVICE, PLAY 1/5/10/15/20 LINES, BET 1/2/3/5/10 CREDITS, GAMBLE, and RED and BLACK, which refer to features of the gamble option.

Each pushbutton has a lamp behind it that may either be lit, unlit, flashing, or flashing at double speed, depending on the circumstances and the machine mode.



Typical Pushbutton Layout

Cashout/TakeWin Button

The enabled Cashout button is used to initiate a player credit payout from the machine in the form of a hopper pay, a printer cash ticket, or a cancel credit handpay procedure.

The Cashout button will be disabled if there is no credit on the credit meter, a hopper payout is in progress, or the machine is in the process of playing a game. Otherwise, this button will be lit to indicate it is enabled.

Service Button

This button is used by the player to request service. Pressing this button will toggle the button lamp on and off, and will toggle the Service tier of the light tower on and off.

The Service tier of the light tower is also used to signal non-lockup errors. The on-screen error message is cleared by pressing the Service button again. The error is cleared when the fault has been corrected. The following faults are non-lockup faults:

- Bill acceptor disconnected fault
- Bill stacker fault
- Bill stacker full
- 5 Bills rejected
- Printer paper low.

3.2.6 Machine Self-Monitoring

Self-test

When the machine is switched on, it automatically initiates a self-test that continues in the background as long as the machine is in play mode. During the self-test, the machine checks the electronic meter data held in computer memory and also carries out an audit calculation using essential meter counts.

This self-audit calculation is defined by the formula:

CASH IN + HOPPER REFILLS + TOTAL CREDITS WON + JACKPOT HANDPAYS
=
TOTAL CREDITS BET + CANCEL CREDIT + COIN OUT

The memory holds up to three copies of the electronic meter data, METER SET 1, METER SET 2 and METER SET 3. If the data in one meter set does not match that in the other two sets, the data of the two identical sets overwrites the single set.

Security

When the machine is in Play Mode, it continuously operates the following security features:

Coin Acceptor. The coin acceptor scans inserted coins and compares them with a sample coin held in the acceptor. Invalid coins are diverted to the coin tray. Accepted coins are directed past the acceptor's internal photo-optic detector and on to the coin accept chute.

The machine software monitors the speed and direction of travel of the accepted coins. For coins travelling too slowly or travelling in the wrong direction, an error signal is generated and the machine locks up, with the appropriate error message being displayed on the screen.

If the inserted coin is valid and no error conditions are encountered, the appropriate credits are registered in the game CREDIT display and gameplay may take place. The Jurisdictional Meters CASH IN and CREDIT and the electromechanical meter CASH IN (if fitted) are incremented accordingly.

Hopper. If the hopper is empty and the player is in credit and presses the CASHOUT/TAKEWIN pushbutton, the machine locks up and displays a HOPPER EMPTY message and the electronic meter HOPPER EMPTY increments. The hopper is refilled in these circumstances according to house rules, after which gameplay may resume.

During a payout, the hopper disc rotates and passes coins onto the coin runner where they are counted by the hopper photo-optic detector. After passing the detector, they are deposited in the coin tray for the player to collect. Also:

- the CREDITS COLLECTED electromechanical meter and the TRUE OUT electronic meter are incremented by the amount paid out.

- the game CREDIT on the screen and the CREDIT electronic meter are decremented by the amount paid out.
- a payout message is displayed on the screen showing the value paid out.

The machine monitors the hopper operation and the coin's passage from the hopper to the coin tray. Unusual conditions and faults are registered by increments in the Diagnostic Meters, video messages and machine lockups. These fault conditions are ILLEGAL COIN OUT, HOPPER EMPTY, HOPPER JAMMED, and HOPPER DISCONNECTED.

Bill (Bank Note) Acceptor. The Bill Acceptor consists of an optical scanning unit and a bill stacker contained in a high-security housing. The scanning unit achieves a high percentage of acceptances, and a second-level scanning option can be initiated for high-denomination bills.

During operation, the acceptor registers acceptances and rejections. Bills accepted increment the BILLS INSERTED electronic meter and electromechanical meter (where fitted). Detailed information is recorded in the Bill Acceptor meters, which may be accessed from Operator Mode / Accounting Information Menu. These meters record the value and quantity of each note accepted. A record is also kept of the last five notes accepted.

The machine monitors the bill acceptor operation and unusual conditions and faults are registered by increments in the Diagnostic Meters, and by display messages and machine lockups. The lockups and video messages are BILL ACCEPTOR ERROR and BILL ACCEPTOR OUT OF SERVICE. Should the bill stacker door be opened, the alarm sounds and the message BILL STACKER REMOVED is displayed.

A lockup occurs should the bill acceptor stacker become full. The lockup description and video message is BILL ACCEPTOR FULL.

The belly panel door which provides access to the bill stacker is monitored by a mechanical security switch (see below for further details).

Door Access

The main door, cash box door, belly panel door, and logic cage door are monitored by mechanical security switches. If a door fitted with a security switch is opened, the following actions occur:

- One of the following messages is displayed on the screen: DOOR OPEN MAIN, DOOR OPEN CASH BOX, DOOR OPEN BILL ACCEPTOR, or SECURITY CAGE OPEN MAIN BOARD.
- The alarm sound is heard.
- One of the following lockups occurs: MAIN DOOR OPEN, CASH BOX DOOR OPEN, BILL ACCEPTOR DOOR OPEN, or LOGIC DOOR OPEN.
- gameplay is suspended.

- One of the following electronic Diagnostic Meters is incremented: MAIN DOOR ACCESSES, CASH BOX ACCESSES, BILL ACCEPTOR ACCESSES, or LOGIC ACCESSES.

The condition is reset by closing the appropriate door.

3.2.7 Electronic Meters

The electronic meters (soft meters) record a variety of details relating to machine operation, gameplay and player interaction, as well as a variety of statistical counts, security events and past games. Players have the assurance that there is a record kept of recent win or pay situations.

When the machine is switched on, it automatically initiates a self-test that continues in the background as long as the machine is in play mode. During the self-test, the machine checks the electronic meter data held in memory.

Some jurisdictions require electronic metering data to be stored in triplicate in three separate battery-backed RAM chips. In the case of a meter malfunction, where none of the meters sets match, the machine displays the error message 3-WAY MEMORY ERROR and the machine locks up. This message indicates a serious machine malfunction.

Failure in the self audit calculation also causes a machine lockup with the message SELF AUDIT ERROR being displayed.

Resetting Metering and Self Audit Errors

To clear a metering or self audit error, it is necessary to rectify the memory fault and re-establish correct operations with all corrupted meters set to zero. The lockup is removed by turning the Audit Key ON, following the on-screen guidance, and then turning the Audit Key OFF to return to gameplay. After recovering from a memory error, all electronic meters will be reset to zero. The information held in the electronic meters includes Accounting Information Menu items, Diagnostic Information Menu items, and Operator Setup / Selections Menu items as detailed in the Operator Mode.

3.3 Operator Mode

Operator Mode addresses the jurisdictional and accounting / management information requirements, allows the machine configuration to be changed, and facilitates machine testing and fault finding. Entry to Operator Mode is achieved by turning the Audit (Operator) key ON. The various options can be selected by following the on-screen guidance and pressing the appropriate pushbutton.

Note

The screen displays and options covered in this chapter are typical; however, slight variations may occur between markets.

The Operator Mode structure is shown in Figure 3-5 and the Operator Mode Menu screen is shown below

OPERATOR MODE MENU

1	Machine Identification
2	Accounting Information
3	Diagnostic Information
4	Test/Diagnostics Information
5	Operator Setup/Selections
6	Miscellaneous
7	Current Lockup

Service	– Press to select next item
Cashout/TakeWin	– Press to select previous item
Play 15 Lines	– Press to choose selected item
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Note

“Audit key - Turn off to exit” message will not be displayed if a Lockup is present.

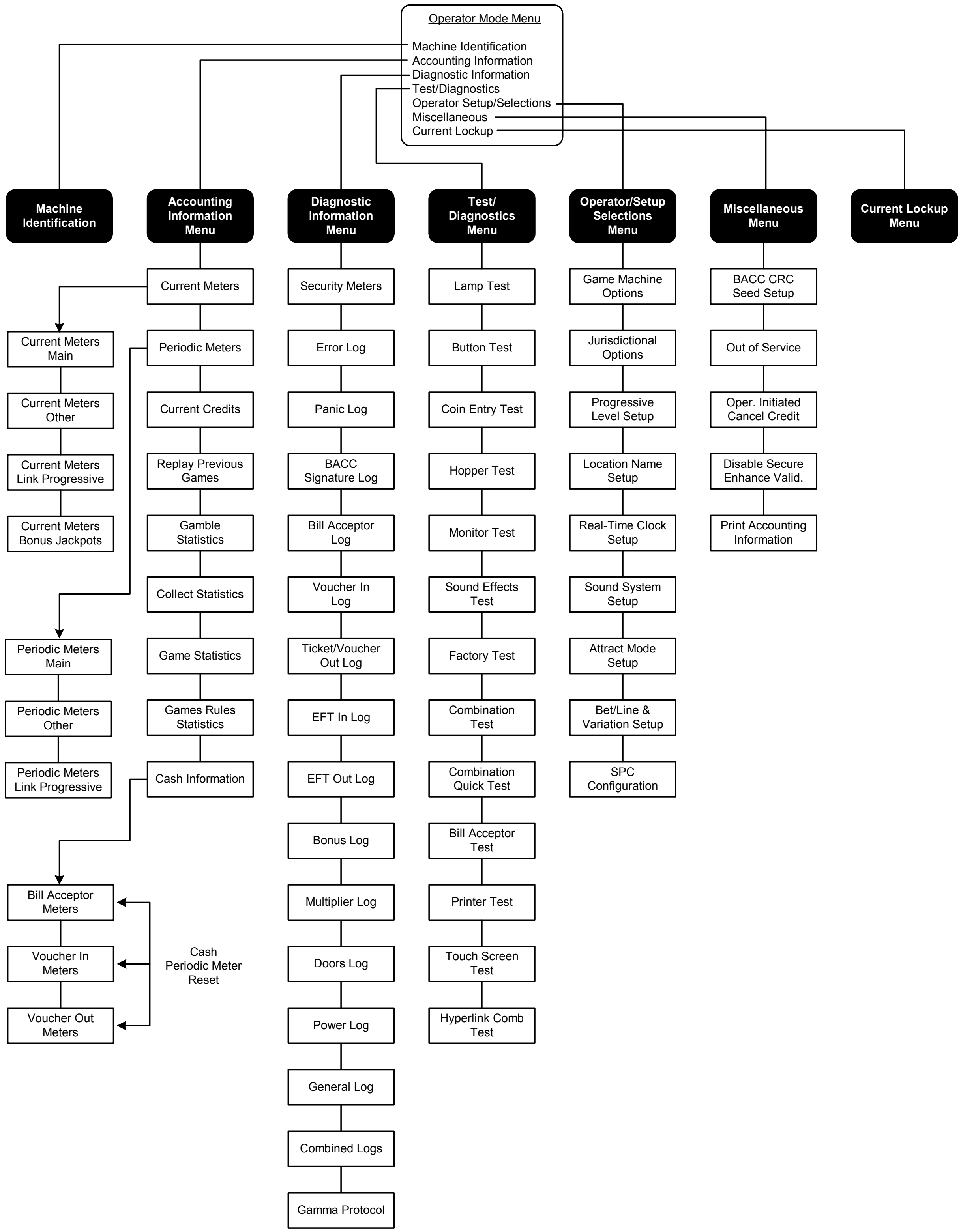
Instructions are given on each screen to guide the operator through the various menus and options available. Any active lockups (tilts) are indicated by a flashing message at the bottom of the screen.

The Set Chip used for the USA Software has the fields given in the table below, but the requirement to actually install occurs only during the initial setup of each machine for the market.

SET CHIP IDENTIFICATION AND CONFIGURATION

Jurisdictional Options Menus:	?
Money Setup Menu:	Dollar $1.00 buys 100 credits
Payout Setup Menu:	Hopper menu/OR thermal Printer
Playline Setup Menu:	9 lines max, 10 credits per line max
Miscellaneous Options:	Game Variation 99
Save All Options:	MACHINE OPTIONS ARE CURRENT
Clear All Memory	

Play 7 Lines	– Press to enter Jurisdiction Options menu
TakeWin/Cash	– Press to select previous option
Service	– Press to select next option
Audit key	– Turn off to exit



Operator Mode Menu Displays - Typical Structure

3.3.1 Machine Identification

The Machine Identification screen provides essential machine information, such as Game EPROM Id, Credit Value, Percentage Return, and Jackpot Limit.

MACHINE IDENTIFICATION AND CONFIGURATION

Machine Number (GMID):	11	Setchip Version	6.01.xx
Variation (% and no.):	87.801% 99	Value of 1 Coin:	$1.00
Actual Game Operating %:	0.000%	Value of 1 Credit:	$0.05
Actual Bonus Operating %:	0.000%		
Location Name:	“ “		
Mikohn Address:	disabled		
Progressive Links Supported:	0		
Comms Protocol Supported:	Gamma		
Hopper or Printer Installed:	Hopper selected		
Handpay Payout Limit:	20 coins $20.00		
Jackpot Win Limit:	910020 credits $9100.20		
Maximum Credit Limit:	$1199.99		
Validation Mode :	No Validation Enabled		
Firmware Identification			
System EPROM Id:	05010309		
Game EPROM Id:	0150002	BACC Id:	not activated
Combination Identification			
Number:	US001/1		
Issue:	A – 04/06/01		
Description:	50 Credit Multiplier/20 Line Multiline		

Bet 10 Credits – Press to return to previous menu

Audit key – Turn off to exit

3.3.2 Accounting Information

The Accounting Information displays provide information for gaming regulators, as well as additional financial and statistical details (including periodic performance details, game replay, and game and gamble statistics) for gaming properties. Most of the information can not be altered, although some details may be changed from the Game Machine Options menu which can be accessed from the Operator Setup / Selections menu (see previous page).

The various screen displays may be accessed by following the on-screen guidance and pressing the appropriate pushbuttons.

ACCOUNTING INFORMATION MENU

2.1 Current Meters
2.2 Periodic Meters
2.3 Current Credits
2.4 Replay of Previous Games
2.5 Gamble Statistics
2.6 Collect Statistics
2.7 Game Statistics
2.8 Game Rules Statistics
2.9 Cash Information

Service – Press to select next item
Cashout/TakeWin – Press to select previous item
Play 15 Lines – Press to choose selected item
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

Current Meters

The Current Meters provide the financial counts of machine activity. Items include turnover, total wins, and amounts inserted in the coin entry and the bill acceptor devices. In depth statistical information is also provided by the Game and Gamble displays.

CURRENT METERS – MAIN	METER SET 1	METER SET 2	METER SET 3
Current Credits:	0	0	0
Total Games Played:	0	0	0
Total Credits Bet:	0	0	0
Total Credits Won:	0	0	0
True In (Coins Inserted):	0	0	0
Bills Inserted:	0	0	0
Vouchers Inserted:	0	0	0
Coin Drop (Cashbox):	0	0	0
Gross Drop (Gross In):	0	0	0
True Out (Coins Out):	0	0	0
Split Pay Out (Coins Out):	0	0	0
Cashout Handpays:	0	0	0
Split Voucher Pays:	0	0	0
Jackpot Wins:	0	0	0
Total Handpays:	0	0	0

Service – Press to display next meter screen
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

Thee copies of the current meters are stored in memory. All three meter sets should be of equal value for each meter. If the values are not equal, a random access memory problem probably exists.

CURRENT METERS – OTHER	METER SET 1	METER SET 2	METER SET 3
EFT – Electronic Funds Transfer			
Total Electronic Credits In:	0	0	0
Cashable EFT In:	0	0	0
Player Non-Cashable EFT In:	0	0	0
Machine Non-Cashable EFT In:	0	0	0
Total Electronics Credits Out:	0	0	0
Cashable EFT Out:	0	0	0
Player Non-Cashable EFT Out:	0	0	0
Machine Non-Cashable EFT Out	0	0	0
Power Up (count):	0	0	0
Games Since Power Up:	0	0	0
Games Since Door Open:	0	0	0

Cashout/TakeWin – Press to display previous meter screen
Service – Press to display next meter screen
Bet 3 Credits – Press to return to previous menu
Audit key – Turn off to exit

CURRENT METERS – LINK PROGRESSIVES

	METER SET 1	METER SET 2	METER SET 3
Occurrences of			
JP0:	0	0	0
JP1:	0	0	0
JP2:	0	0	0
JP3:	0	0	0
JP4:	0	0	0
JP5:	0	0	0
Mystery Pay:	0	0	0
Accumulative Value of			
JP0:	$0.00	$0.00	$0.00
JP1:	$0.00	$0.00	$0.00
JP2:	$0.00	$0.00	$0.00
JP3:	$0.00	$0.00	$0.00
JP4:	$0.00	$0.00	$0.00
JP5:	$0.00	$0.00	$0.00
Mystery Pay:	$0.00	$0.00	$0.00
Mystery to Credit:	$0.00	$0.00	$0.00
Link to Credit:	$0.00	$0.00	$0.00

Cashout/TakeWin – Press to display previous meter screen
Service – Press to display next meter screen
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

CURRENT METERS – BONUS JACKPOTS

	METER SET 1	METER SET 2	METER SET 3
Total Bonuses			
Handpays (Tax Deductible):	0	0	0
Handpays (Non-Tax Ded.):	0	0	0
Handpays (Wager Match):	0	0	0
Credit Meter (Tax Ded.):	0	0	0
Credit Meter (Non-Tax Ded.):	0	0	0
Credit Meter (Wager Match):	0	0	0
Multiplier Wins (MJT)			
MJT Wins (Tax Deductible):	0	0	0
MJT Wins (Non-Tax Ded.):	0	0	0
Last Session Accum. Wins:	0	0	0
Last Session Reason:	“Multiplier Win		“

Cashout/TakeWin – Press to display previous meter screen
Bet 3 Credits – Press to return to previous menu
Audit key – Turn off to exit

The items recorded in the Current Meters screens are explained below.

Bills Inserted	The total credits of all bills inserted (and accepted) into the machine.
Cashable EFT In	Credits transferred to the machine from a player's account by a host system instead of inserting bills, coins or tickets.
Cashable EFT Out	Credits transferred to the player's account by a host system instead of being paid at the machine in coin or by tickets.
Cashout Handpays	The total of all credits paid out as handpays as a result of Cashouts exceeding the Hopper Payout Limit (or the Printer Payout Limit).
Coin Drop	Total number of all coins that are diverted to the cashbox.
Current Credits	Credits currently available to be bet or collected.
Games Since Door Open	The number of games played since the main door was last opened.
Games Since Power Up	The number of games played since the power was last restored.
Gross Drop	The total credit value of all money (coins and bills) accepted by the machine.
Jackpot Wins	The total of all credits paid out as handpays as a result of wins exceeding the Jackpot Win Limit
Machine Non-Cashable EFT In	Credits transferred to the machine from a host system. These credits stay with the machine and cannot be removed by the player and cannot be converted to cash. Example: A player presents a free coupon to play $5.00. The coupon is accepted by the casino and entered into the host system, which applies $5.00 in credits to a specific machine. The player can then play the credits. If the credits are not played, the host system can remove the credits from the machine.
Machine Non-Cashable EFT Out	See description and example above for Machine Non-Cashable EFT In.
Player Non-Cashable EFT In	Similar to the description above for Machine Non-Cashable EFT In, except the credit applied by the host system is assigned to a player instead of a specific machine. The credit can therefore be played on any number of machines.
Player Non-Cashable EFT Out	See description above for Player Non-Cashable EFT In
Power Up	The number of times the power has been restored.
Total Credits Bet	Accumulated value of all credits bet.

Total Credits Won	Accumulated value of credits won that is paid out : - to the credit meter, - as a hopper payout, or - a winning cash ticket.
Total Games Played	Total number of games played.
Total Handpays	The total credits of all combined handpays including : - Cashout Handpays, - Jackpot Handpays, - Win Handpays, and - Progressive Handpays (Links and Mysterys).
True In	The total number of all coins inserted (and accepted) into machine.
True Out	The total credits of all Cashout/TakeWins paid out by the machine, either by: - hopper payout, or - printer ticket (CASH OUT Tickets and CASH WIN Ticket).

Periodic Meters

The Periodic Meters screens contain the same information items as the Jurisdictional Meters, but the values held usually relate only to a specified period determined by the venue management. The periodic meters can be reset via the Miscellaneous option from the Operator Mode Menu.

PERIODIC METERS – MAIN			
	Since Wed 20 Mar 2002 13 : 16 : 37		
	METER SET 1	METER SET 2	METER SET 3
Total Games Played:	0	0	0
Total Credits Bet:	0	0	0
Total Credits Won:	0	0	0
True In (Coins Inserted):	0	0	0
Bills Inserted:	0	0	0
Vouchers Inserted:	0	0	0
Coin Drop (Cashbox):	0	0	0
Gross Drop (Gross In):	0	0	0
True Out (Coins Out):	0	0	0
Split Pay Out (Coins Out):	0	0	0
Cashout Handpays:	0	0	0
Split Voucher Pays:	0	0	0
Jackpot Wins:	0	0	0
Total Handpays:	0	0	0
Service	– Press to select next meter screen		
Play 15 Lines	– Press to reset periodic meters		
Bet 10 Credits	– Press to return to previous menu		
Audit key	– Turn off to exit		

PERIODIC METERS – OTHER			
	Since Wed 20 Mar 2002 13 : 16 : 37		
	METER SET 1	METER SET 2	METER SET 3
EFT – Electronic Funds Transfer	0	0	0
Total Electronic Credits In:	0	0	0
Cashable EFT In:	0	0	0
Player Non-Cashable EFT In:	0	0	0
Machine Non-Cashable EFT In:	0	0	0
Total Electronics Credits Out:	0	0	0
Cashable EFT Out:	0	0	0
Player Non-Cashable EFT Out:	0	0	0
Machine Non-Cashable EFT Out	0	0	0
Power Up (count)	5	5	5
Cashout/TakeWin	– Press to display previous meter screen		
Service:	– Press to display next meter screen		
Play 15 Lines	– Press to reset periodic meters		
Bet 10 Credits	– Press to return to previous menu		
Audit key	– Turn off to exit		

PERIODIC METERS – LINK PROGRESSIVES			
		Since Wed 20 Mar 2002 13 : 16 : 37	
Occurrences of	METER SET 1	METER SET 2	METER SET 3
JP0:	0	0	0
JP1:	0	0	0
JP2:	0	0	0
JP3:	0	0	0
JP4:	0	0	0
JP5:	0	0	0
Mystery Pay:	0	0	0
Accumulative Value of			
JP0:	$0.00	$0.00	$0.00
JP1:	$0.00	$0.00	$0.00
JP2:	$0.00	$0.00	$0.00
JP3:	$0.00	$0.00	$0.00
JP4:	$0.00	$0.00	$0.00
JP5:	$0.00	$0.00	$0.00
Mystery Pay:	$0.00	$0.00	$0.00
Mystery to Credit:	$0.00	$0.00	$0.00
Link to Credit	$0.00	$0.00	$0.00
	Cashout/TakeWin	– Press to display previous meter screen	
	Play 15 Lines	– Press to reset periodic meters	
	Bet 10 Credits	– Press to return to previous menu	
	Audit key	– Turn off to exit	

Current Credit Meters

The Current Credit Meters can be reset via the Miscellaneous option from the Operator Mode Menu.

CURRENT CREDIT TYPES			
Total Available Money:	$1.87	$1.87	$1.87
	METER SET 1	METER SET 2	METER SET 3
Total Credits			
Current Credits:	187	187	187
Cashable Credits			
Cashable Credits:	187	187	187
Non-Cashable Credits			
Non-Cashable Player Credits:	0	0	0
Non-Cashable Machine Credits:	0	0	0
Fractional Money			
Fractional Cashable Money:	No fractional credit exists		
Fractional Non-Cashable Player Money:	No fractional credit exists		
Fractional Non-Cashable Machine Money:	No fractional credit exists		
Bet 10 Credits	– Press to return to previous menu		
Audit key	– Turn off to exit		

Replay Previous Games

This Replay Previous Games screen allows the operator to replay the most recent games played on the machine. The most recent game is game number 1, and thirty of the most recent games are normally available to be replayed. Because these game histories are stored dynamically in memory, the number of games available to be recalled will vary depending on the available memory.

GAME REPLAY

Previous Game	Game Summary: Credit	Bet	Win	Options
Last	Game not available			REPLAY GAME
2nd	Game not available			VIEW GAME METERS
3rd	Game not available			VIEW MONEY IN/OUT
4th	Game not available			VIEW PROGRESSIVE
5th	Game not available			GAME EVENT LOGS
6th	Game not available			CANCEL
7th	Game not available			
8th	Game not available			
9th	Game not available			
10th	Game not available			

Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

Gamble Statistics

The Gamble Statistics screen displays the gamble statistic of the machine. For each winning amount within a winning range, the selected gambled or Take win is recorded.

GAMBLE STATISTICS

Win Amount (Credits)	Gambled Half	Gambled Full	Take Win	Chosen Half	Chosen Full	Won
1 – 4	0	0	0	Red	Red	Red
5 – 9	0	0	0	0	0	0
10 – 19	0	0	0	Black	Black	Black
20 – 29	0	0	0	0	0	0
30 – 49	0	0	0	Heart	Heart	Heart
50 – 99	0	0	0	0	0	0
100 – 199	0	0	0	Diamond	Diamond	Diamond
200 – 499	0	0	0	0	0	0
500 – 999	0	0	0	Spade	Spade	Spade
1000 – 1999	0	0	0	0	0	0
2000 – 4999	0	0	0	Club	Club	Club
5000 +	0	0	0	0	0	0

Service – Press to display next gamble screen
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

GAMBLE STATISTICS

Player Takes Win After		Number of times Take Win selected Last gamble Half	Last gamble Full
1	Gamble	0	0
2	Gambles	0	0
3	Gambles	0	0
4	Gambles	0	0

Cashout/TakeWin – Press to display previous gamble screen
Bet 3 Credits – Press to return to previous menu
Audit key – Turn off to exit

The following text provides an explanation for the information in the Gamble Statistics:

Win Amount	Specifies the range of winning amount in credits.
Gambled (if applicable)	The number of times that a player chooses to Double after a winning play.
Take Win	The number of times that a player chooses to take the win after a winning play.
Won	Total number of times that card beat the dealer card.

COLLECT Statistics

The COLLECT Statistics screen displays, for each range of COLLECT credits, the number of times players COLLECT the total credits.

COLLECT STATISTICS

Collect Amount (Credits)			Times Collected
0	–	10	0
11	–	20	0
21	–	30	0
31	–	40	0
41	–	50	0
51	–	75	0
76	–	100	0
101	–	200	0
201	–	300	0
301	–	500	0
501	+		0

Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

The following text provides an explanation for the information in the COLLECT Statistics:

COLLECT Amount (Credits)	Specifies the range of COLLECT amount in credits, eg., 1 - 10, 11 - 20, 21 - 30, 31 - 40, 41 - 50, 51 - 75, 76 – 100, 101 – 200, 201 - 300, 301 - 500, 501+
Times COLLECTED	The number of times that a player COLLECTED credits in that range.

Game Statistics

Details of game play are recorded and displayed through the Game Statistics option. The types of bets and lines chosen are analysed, and the number of games played and the money won is displayed for each sub-division.

GAME STATISTICS MENU

2.7.1 Game Type Specific Statistics
2.7.2 Game Feature Statistics

Service	– Press to display next item
Cashout/TakeWin	– Press to display previous item
Play 15 Lines	– Press to choose selected item
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

GAME TYPE SPECIFIC STATISTICS

Lines	Bet	Games Played	Money Won	Lines	Bet	Games Played	Money Won
1	1	4	$0.00	7	1	0	$0.00
1	5	0	$0.00	7	2	0	$0.00
1	10	0	$0.00	7	3	0	$0.00
1	25	0	$0.00	7	5	0	$0.00
1	50	0	$0.00	7	10	0	$0.00
3	1	0	$0.00	9	1	0	$0.00
3	5	0	$0.00	9	2	0	$0.00
3	10	0	$0.00	9	3	0	$0.00
3	25	0	$0.00	9	5	0	$0.00
3	50	0	$0.00	9	10	0	$0.00
5	1	0	$0.00				
5	5	0	$0.00				
5	10	0	$0.00				
5	25	0	$0.00				
5	50	0	$0.00				

Service	– Press to display next game screen
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

GAME TYPE SPECIFIC STATISTICS

No. of Times Player Changed

Bets and Lines:	0
Lines:	0
Bets:	0

Cashout/TakeWin – Press to display previous game screen
Bet 10 Credits – Press to return to previous game
Audit key – Turn off to exit

HYPERLINK INFORMATION

Level 1 Occurance:	0
Level 2 Occurance:	0
Level 3 Occurance:	0
Level 4 Occurance:	0
Level 5 Occurance:	0

Total Num of Hyperlink Hit: 0

Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

Games Rules Statistics

Select this screen to view statistical information regarding player access to the game rules screens.

The information displayed is based on the total time since the last Game Rule meter reset.

GAMES RULES STATISTICS

Total Game Rule accesses:	7
Total time spent in Game Rules (days hh: mm: ss):	0 00: 02: 26
Average time spent in Game Rules:	20. 8 secs
Accesses > 10 sec for Page 1:	3
Accesses > 10 sec for Page 2:	2
Accesses > 10 sec for Page 3:	3

Service	– Press to scroll forward by one line
Cashout/TakeWin	– Press to scroll backward by one line
Play 15 Lines	– Press to scroll by one page
Play 10 Lines	– Press to reset Game Rule meters
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Cash Information

This menu provides access to all bill acceptor and voucher meters.

CASH INFORMATION MENU

2.9.1	Bill Acceptor Meters
2.9.2	Voucher In Meters
2.9.3	Voucher Out Meters

Service	– Press to select next item
Cashout/TakeWin	– Press to select previous item
Play 15 Lines	– Press to choose selected item
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Bill Inserted Meters

This screen provides a record of the number of bills of each denomination received, the last five bills accepted, the total value of bills received, the total value of bills in the bill stacker, the number of bills accepted / rejected, and the amount of change money obtained.

To maintain the accuracy of this information, the Bill Inserted Meters must be reset when the stacker is emptied. To reset the meters, select Miscellaneous ⇒ Reset Bills in Stacker.

BILL ACCEPTOR INFORMATION

Number Received	Total	Periodic	Since Wed 20 Mar 2002 13 : 16 : 37	Total	Periodic
$1 Bills:	0	0			
$2 Bills:	0	0			
$5 Bills:	0	0		Total	Periodic
$10 Bills:	0	0	In Stacker	0	0
$20 Bills:	0	0	Validated	0	0
$50 Bills:	0	0	Rejected	0	0
$100 Bills:	0	0			

TOTAL VALUE: $0.00 $0.00

LAST FIVE BILLS RECEIVED Time Now Wed 20 Mar 2002 13 : 16 : 37

Last:	Nothing
Second Last:	Nothing
Third Last:	Nothing
Fourth Last:	Nothing
Fifth Last:	Nothing

Play 15 Lines – Press to reset periodic cash meters
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

Voucher In Meters

The Voucher Acceptance Meters record the number of occurrences of specific voucher accesses and machine faults.

VOUCHER ACCEPTANCE INFORMATION

Number of	Total	Periodic Voucher Meters Since Wed 20 Mar 2002 13 : 16 : 37
Cashable Vouchers:	0	0
Machine Non-Cashable Vouchers:	0	0
Player Non-Cashable Vouchers:	0	0
Unknown Type Vouchers:	0	0

LAST FIVE VOUCHERS RECEIVED Time Now: Wed 27 Mar 2002 18 : 57 : 17

Last Voucher In:	Nothing
Second Voucher In:	Nothing
Third Voucher In:	Nothing
Fourth Voucher In:	Nothing
Fifth Voucher In:	Nothing

Total of Vouchers Received: $0.00 = 0 credits

Vouchers In Stacker:	0	0
Vouchers Validated:	0	0
Vouchers Confiscated:	0	0
Change Credits Obtained:	0	0

Play 15 Lines	– Press to reset periodic voucher meters
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Voucher Out Meters

VOUCHER GENERATION INFORMATION

Total and since Wed 20 Mar 2002 13 : 16 : 37

Voucher Out Type	Total #	Total Amt	Periodic	Amount
Cashable Vouchers:	0	$0.00	0	$0.00
Machine Non-Cashable:	0	$0.00	0	$0.00
Player Non-Cashable:	0	$0.00	0	$0.00
Total of Vouchers Generated:		$0.00	= 0 credits	
Cashout Vouchers:	0	$0.00	0	$0.00
Cash Win Vouchers:	0	$0.00	0	$0.00
Jackpot Vouchers:	0	$0.00	0	$0.00

LAST FIVE VOUCHERS PRINTED Time Now: Wed 20 Mar 2002 16 : 21 : 17

Last Voucher Out: Nothing
Second Voucher Out: Nothing
Third Voucher Out: Nothing
Fourth Voucher Out: Nothing
Fifth Voucher Out: Nothing

Play 15 Lines – Press to reset periodic voucher meters
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

3.3.3 Diagnostic Information Menu

The Diagnostic Information Menu provides access to the Self Test Mode and the Log displays.

DIAGNOSTIC INFORMATION MENU

3.1	Security Meters	3.9	EFT Out Log
3.2	Error Log	3.10	Bonus Log
3.3	Panic Log	3.11	Multiplier Lo g
3.4	BACC Signature Log	3.12	Doors Log
3.5	Bill Acceptor Log	3.13	Power Log
3.6	Voucher In Log	3.14	General Log
3.7	Ticket/Voucher Out Log	3.15	Combined Logs
3.8	EFT* In Log	3.16	Gamma Protocol

Service – Press to select next item
Cashout/TakeWin – Press to select previous item
Play 15 Lines – Press to choose selected item
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

* EFT = Electronic Fund Transfer

Security Meters

The Security Meters record the number of occurrences of specific security accesses and machine faults.

SECURITY METERS

Main Door Accesses:	0
Cash Box Accesses:	0
Logic Accesses:	0
Bill Acceptor Accesses:	0
Top Box Accesses	0
Mechanical Meters Disc:	0
Mechanical Meters Faults:	0
Mechanical Meters Cage Accesses:	0
Printer Faults:	0
Printer Disconnected:	0
Paper Depleted Faults:	0

Service	– Press to display next meter screen
Bet 10 Cred	– Press to return to previous menu
Audit key	– Turn off to exit

SECURITY METERS

Coin Optic Faults:	0
Coin Acceptor Faults:	0
Coin Diverter Faults:	0
Reversal Attempts:	0
Extra Coin Out:	0
Hopper Empty:	0
Hopper Jammed:	0
Hopper Disconnected:	1
Cash Box Instead Hopper:	$0.00
Hopper Instead Cash Box:	$0.00
SRAM Bank 1 Errors:	0
SRAM Bank 2 Errors:	0
SRAM Bank 3 Errors:	0

Cashout/TakeWin	– Press to display previous meter screen
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

The following events are recorded in the Security Meters:

Meter	Description
Bill Acceptor Door Accesses	Incremented when the belly panel door is opened.
Cash Box Accesses	Incremented when the cash box door is opened.
Coin Acceptor Faults	Incremented if the coin acceptor pulse exceeds 50 ms.
Coin Diverter Faults	Incremented when the software detects that the coin diverter isn't operating correctly.
Coin Optic Faults	Incremented if the coin acceptor detects a coin jam.
Extra Coin Out	Incremented when the machine is not in hopper collect, but a coin passes the hopper optic.
Hopper Disconnected	Incremented when hopper is disconnected (checked once every second).
Hopper Empty	Incremented when in hopper collect two consecutive 4 second attempts to pay out a coin fail.
Hopper Jammed	Incremented when the hopper optic is blocked for more than 350 ms.
Logic Door Accesses	Incremented when the logic security cage is opened.
Main Door Accesses	Incremented when the main door is opened.
Mechanical Meters Disconnected	Incremented if the meter board is disconnected.
Paper Depleted Faults	Incremented when the printer indicates that the paper roll has been completely depleted.
Printer Disconnected	Incremented when the printer is detected as being disconnected.
Printer Faults	Incremented when the printer indicates that an internal fault occurred.
Reverse Coin Attempts, (may also be referred to as Yoyo attempts)	Incremented when the coin acceptor device detects a coin passed through the coin optics in the reverse direction.
SRAM Bank # Errors	If any of the three SRAM banks indicate errors, a random access memory problem exists.
Top Box Accesses	Number of times that the machine top compartment has been opened.

This screen can be viewed following a replayed game.

Error Log

This log displays the last 100 game/machine events. Each event is time stamped and the type of error is displayed. This log is very useful when troubleshooting.

ERROR LOG

Event #	Timestamp	Error Type
0	Wed 20 Mar 2002 14:14:33	
1		
2		
3		
4		
5		
6		
7		
8		
9		

Service	– Press to scroll forward by one line
Cashout/TakeWin	– Press to scroll backward by one line
Play 15 Lines	– Press to change scrolling mode
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Panic Log

The panic log is an engineering diagnostic tool. This log is not generally used in the field for routine troubleshooting, but intended to display engineering review data.

PANIC LOG

#	PC	Description
1	00000000	
2	00000000	
3	00000000	
4	00000000	
5	00000000	
6	00000000	
7	00000000	
8	00000000	
9	00000000	
10	00000000	

Service	– Press to display panic time and info
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

PANIC LOG

#	Timestamp	Process Info
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Cashout/TakeWin	– Press to display panic description
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Bill Acceptor Logs

Two types of bill acceptor log are available. The first being the signature log that displays events that have occurred during routine bill acceptor firmware diagnostic routines. The signature log displays up to 35 of the last events that have occurred.

The second type of bill acceptor log displays events associated with bill acceptor operation.

Both types of event logs include time and date stamping.

BACC SIGNATURE LOG

Event #	Timestamp	Event Type
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Service – Press to scroll forward by one line
Cashout/TakeWin – Press to scroll backward by one line
Play 15 Lines – Press to change scrolling mode
Play 10 Lines – Press to display extra info
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

Additional detailed information is available on the second BACC log page.

BACC SIGNATURE DETAIL INFORMATION

Event #	Timestamp	Details
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

The bill acceptor log displays us to 100 of the events that have occurred.

BILL ACCEPTOR LOG

Event #	Timestamp	Event Type
1	Wed 20 Mar 2002 11:12:34	MMC – BACC – Disconnected
2		
3		
4		
5		
6		
7		
8		
9		
10		

Service	– Press to scroll forward by one line
Cashout/TakeWin	– Press to scroll backward by one line
Play 15 Lines	– Press to change scrolling mode
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Voucher In Display

This log displays the last 50 cash tickets that have been accepted by the bill acceptor.

VOUCHER IN LOG

Event #	Timestamp	Voucher Type	Amount
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Service	– Press to scroll forward by one line
Cashout/TakeWin	– Press to scroll backward by one line
Play 15 Lines	– Press to change scrolling mode
Play 10 Lines	– Press to display extra info
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Ticket/Voucher Out Log Display

This log displays the last 100 cash tickets that have been generated by the machine ticket printer.

TICKET/VOUCHER OUT LOG

Event #	Timestamp	Type	Amount
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Service – Press to scroll forward by one line
Cashout/TakeWin – Press to scroll backward by one line
Play 15 Lines – Press to change scrolling mode
Play 10 Lines – Press to display extra info
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

EFT Logs

Two logs are available for displaying Electronic Funds Transfer (EFT) transactions between a host casino cash transfer system and the machine.

The EFT IN log displays the last 100 transactions that have occurred from the host casino cash transfer system to the machine.

EFT IN LOG

Event #	Timestamp	EFT Type	Amount
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Service	– Press to scroll forward by one line
Cashout/TakeWin	– Press to scroll backward by one line
Play 15 Lines	– Press to change scrolling mode
Play 10 Lines	– Press to display extra info
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

The EFT OUT log displays the last 35 transactions that have occurred from the machine to the host casino cash transfer system.

EFT OUT LOG

Event #	Timestamp	EFT Type	Amount
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Service	– Press to scroll forward by one line
Cashout/TakeWin	– Press to scroll backward by one line
Play 15 Lines	– Press to change scrolling mode
Play 10 Lines	– Press to display extra info
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Bonus Log

This log displays the last 35 bonus transactions that have occurred between the machine and a casino host bonusing system.

BONUS LOG

Event #	Timestamp	Description	Amount
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Service – Press to scroll forward by one line
Cashout/TakeWin – Press to scroll backward by one line
Play 15 Lines – Press to change scrolling mode
Play 10 Lines – Press to display extra info
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

Multiplied Jackpot Log

This log displays the last 35 transactions that have occurred between the machine and a casino host jackpot multiplier system.

MULTIPLIED JACKPOT LOG

Event #	Timestamp	Description	Amount
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Service – Press to scroll forward by one line
Cashout/TakeWin – Press to scroll backward by one line
Play 15 Lines – Press to change scrolling mode
Play 10 Lines – Press to display extra info
Bet 10 Credits – Press to return to previous menu
Audit key – Turn off to exit

Doors Log

This log displays the last 100 door events that have occurred on the machine.

DOORS LOG

Event #	Timestamp		Door Type
0	Wed 20 Mar 2002	15:34:18	MMC Bill Acceptor Door Closed
1	Wed 20 Mar 2002	15:33:20	MMC Bill Acceptor Door Opened
2	Wed 20 Mar 2002	14:20:31	MMC Main Door Closed
3	Wed 20 Mar 2002	14:20:10	MMC Main Door Opened
4			
5			
6			
7			
8			
9			
10			

Service	– Press to scroll forward by one line
Cashout/TakeWin	– Press to scroll backward by one line
Play 15 Lines	– Press to change scrolling mode
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Power State Log

This log displays the last 50 machine power up events.

POWER STATE LOG

Event #	Timestamp		Event Type
0	Wed 20 Mar 2002	14:34:18	MMC - Software Restart
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Service	– Press to scroll forward by one line
Cashout/TakeWin	– Press to scroll backward by one line
Play 15 Lines	– Press to change scrolling mode
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

General Log

This log displays the last 1000 general game and machine events that have occurred. The game related event types are preceded by MMC and the game event types by GAM.

GENERAL LOG

Event #	Timestamp		Event Type
0	Wed 20 Mar 2002	15:34:18	MMC – Operator Key On
1	Wed 20 Mar 2002	15:33:20	MMC – Game Stopped
2	Wed 20 Mar 2002	14:20:31	GAM – Game Stopped
3	Wed 20 Mar 2002	14:20:10	MMC – Game End
4	Wed 20 Mar 2002	14:17:44	GAM – Game Start in Recovery Mode
5	Wed 20 Mar 2002	14:09:45	MMC – Operator Key Off
6	Wed 20 Mar 2002	14:09:23	MMC – Operator Key On
7	Wed 20 Mar 2002	13:23:32	MMC – SpinKey Pressed
8	Wed 20 Mar 2002	10:29:21	MMC – Game RulesKey Pressed
9	Wed 20 Mar 2002	09:12:23	GAM – Game Stopped
10	Wed 20 Mar 2002	08:56:01	GAM – Game End

Service	– Press to scroll forward by one line
Cashout/TakeWin	– Press to scroll backward by one line
Play 15 Lines	– Press to change scrolling mode
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Combined Log

This log displays a time and date stamped history of all other logs.

It is possible for some logs to rollover during a specific period of time. Therefore, no attempt should be made to try to compare specific events in an individual log with those in the combined log.

COMBINED LOGS

Event #	Timestamp		Event	Type
0	Thur 21 Mar 2002	18: 14: 12	MMC	Operator Key OFF
1	Thur 21 Mar 2002	18: 12: 30	ERR	Bill acceptor out of service
2	Thur 21 Mar 2002	18: 12: 11	MMC	BACC – Disconnected
3	Thur 21 Mar 2002	18: 09: 20	MMC	Operator Key On
4	Thur 21 Mar 2002	18: 09: 01	MMC	Main Door Opened
5	Wed 20 Mar 2002	14: 21: 11	MMC	Operator Key On
6	Wed 20 Mar 2002	14: 20: 09	MMC	Game Stopped
7	Wed 20 Mar 2002	14:20: 08	GAM	Game Stopped
8	Wed 20 Mar 2002	14:20: 08	MMC	Game End
9	Wed 20 Mar 2002	14:20: 08	GAM	Win Increment Complete
10	Wed 20 Mar 2002	14:20: 08	MMC	Main Door Closed

Service	– Press to scroll forward by one line
Cashout/TakeWin	– Press to scroll backward by one line
Play 15 Lines	– Press to change scrolling mode
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

(Note: Entries may expire on some logs before others)

Gamma Protocol Menu

These menus display information about the Gaming Manufacturers Association (GAMMA) interface (GamPro link protocol) that is used by the machine to communicate with external accounting, player tracking, bonusing, and other types of host casino systems.

The top level GAMMA protocol menu option provides access to additional screens that display GAMMA parameter values, devices and diagnostic information.

```
                    GAMMA MENU

        3.15.1   Gamma   Configuration
        3.15.2   Gamma   Devices
        3.15.3   Gamma   Diagnostics


     Service             – Press to select next item
     Cashout/TakeWin     – Press to select previous item
     Play 15 Lines       – Press to choose selected item
     Bet 10 Credits      – Press to return to previous menu
     Audit Key           – Turn off to exit
```

The first GAMMA configuration screen displays protocol version information as well as communications link status.

```
                 GAMMA CONFIGURATION

     Protocol Version:    01.04.004
     Protocol Status:     Gamma Enabled
     Link Status:         Link Currently Down
     Last Link Up:        Not available
     Last Link Down:      Not available
     Device Info:         31 devices found


     Service:          – Press to select next meter screen

     Bet 10 Credits:   – Press to return to previous menu
     Audit Key         – Turn off to exit
```

The second GAMMA configuration screen displays machine and host system information.

GAMMA CONFIGURATION	
EGM Identification	
Manuf. Id:	0x00
Manuf. Name:	“Aristocrat Technologies, Inc”
H/W Rev:	“Mk6 – USA”
Firmware Id:	50006
Firmware Ver:	01
Firmware Name	“USA B2.0 Base Code”
Host/MCI Identification	
Manuf. Id:	0x00
Manuf. Name	“Aristocrat Technologies, Inc.”
H/W Rev:	“SPC-2”
Firmware Id:	“GamSAS2“
Firmware Ver:	“01.08.0“
Firmware Name	“GamSAS2 GamPro-SAS”
Service:	– Press to select next meter screen
Cashout/TakeWin:	– Press to select previous meter screen
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

The third GAMMA configuration screen displays various security parameters.

GAMMA CONFIGURATION	
Security Modes	
Power Up:	Enable Game, Allow Collect
Large Win:	Handpay Lockup for Current Win
Logic Seal:	Disable Game, Disable Collect
Comms Link Failure:	Enable Game, Allow Collect
Ram Reset:	Enable Game, Allow Collect
Tax Limit Exceeded:	Handpay Lockup for Current Win
Service:	– Press to select next meter screen
Cashout/TakeWin:	– Press to select previous meter screen
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

The fourth GAMMA configuration screen displays multiplier jackpot win parameters.

GAMMA CONFIGURATION

Event Queue:	Queue Normal, 0 events lost
Bonus Limit:	$0.00 – 0 credits
MJT Device	
Lower Limit:	$0.00 – 0 credits
Upper Limit:	$0.00 – 0 credits
Max Bet Required:	No
Multiplier:	x1
Duration:	0 seconds
Tax Liability:	Tax deductible
Pay to Credit:	Pay to Credit Meter
Session Win:	$0.00 – 0 credits
Service:	– Press to display next meter screen
Cashout/TakeWin:	– Press to display previous meter screen
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

MJT = Multiplier Jackpot Win

The fifth GAMMA configuration screen displays jackpot handpay information.

GAMMA CONFIGURATION

Handpay Device:	
Total Amount:	$30.00 – 60 credits
Notification:	Settled
Transaction Time:	381929172 [11 : 26 : 30 03-21-02]
Sequence No.:	2
Handpay Amount:	$20.00 – 40 credits
Reason:	Game Jackpot Win (Ticket)
Source Id:	0 (0x00)
Source No.:	0 (0x00)
Validation No.:	"80862864"
Request Val No.:	No
Service:	– Press to display next meter screen
Cashout/TakeWin	– Press to display previous meter screen
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

The sixth GAMMA configuration screen displays various bonus system parameters.

GAMMA CONFIGURATION	
Bonus Transfer Device	
Credits In:	$0.00 – 0 credits
Cashless Prize	No
Bonus Reason:	" "
Bonus Source Id.:	0 (0x00)
Bonus Source No.:	0 (0x00)
Pay to Credit:	Pay to Credit Meter
Tax Liability:	Tax Deductible
Cashout/TakeWin:	– Press to display previous meter screen
Bet 10 Credits:	– Press to return to previous menu
Audit Key	– Turn off to exit

The GAMMA devices screen displays the current hardware devices that are compatible with the GamaPro link protocol used in the machine.

GAMMA DEVICES

C – Class, T – Type, P[ ] – Number of Parameters in Device

C1T01P[??]	Device List	C4T08P[06]	- EFT Out
C1T02P[02]	EGM Identification	C4T09P[14]	- Coin Acceptor
C1T03P[02]	Host Identification	C4T10P[08]	- Bill Stacker
C2T01P[05]	EGM Configuration	C4T12P[22]	- Vouchers
C2T02P[29]	EGM Control	C5T17P[10]	- Link Progressive 1
C2T03P[04]	EGM Audit	C5T18P[10]	- Link Progressive 2
C2T04P[15]	EGM Game Summary	C5T19P[10]	- Link Progressive 3
C2T05P[17]	EGM Money Summary	C5T20P[10]	- Link Progressive 4
C3T01P[23]	Double Dolphins (Reel)	C5T32P[07]	- Link Mystery 8
C4T01P[24]	Hopper	C6T01P[04]	- Logic Seal
C4T02P[18]	Ticket Printer	C6T02P[03]	- EGM Doors
C4T03P[02]	Hand-Pay	C6T03P[03]	- Software Signature
C4T04P[07]	Cash Box	C7T01P[03]	- Sound Effects
C4T05P[04]	Credit Transfer	C128T01P[04]	- SPC smib*
C4T06P[36]	Bill Acceptor	C128T02PC[11]	- SPC2 smib
C4TO7P[04]	EFT In		

Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

*

The GAMMA diagnostic screen provides a convenient way to monitor the GamPro communications between the machine and various hardware devices.

A link activity indicator is provided at the upper right corner of the screen to show the link status (rotating "/" = communications in progress).

Various communications parameters are listed on the left side of the screen with associated values. The host and machine commands are displayed on the right side of the screen.

To reset the values for a new starting point, press the indicated deck button.

GAMMA DIAGNOSTICS

Host Packet Received: Link Currently Up * / *

X70 x00 x32 x30

EGM* Packet Transmitted Poll_Act: x7c xbd x2c xad

X32 x34 x2b x34 x12 x23 x4c x00 x23 x13 x22 x43

Bytes Received:	1541634	Host Commands	EGM Commands
Good Packets Received:	310478	SetPar C2T4p3	SetPar C2T4pd
Polls Received:	301799	SetPar C2T4pd	SetPar C2T4p3
Link Down:	0	SetPar C2T4pd	SetPar C2T4p3
Inter-Packet Timeouts:	0	SetPar C2T4p3	SetPar C2T4pd
Inter-Byte Timeouts:	0	SetPar C2T4pd	SetPar C2T4p3
CRC Errors:	1	SetPar C2T4p3	SetPar C2T4pd
Same Sequence Num:	0	SetPar C2T4pd	SetPar C2T4pd
Bad Sequence Num:	0	SetPar C2T4p3	SetPar C2T4p3

Service:	– Press to pause display update
Cashout/TakeWin	– Press to clear display update
Bet 10 Credits:	– Press to return to previous menu
Audit Key	– Turn off to exit

*EGM = Electronic Gaming Machine

3.3.4 Test/Diagnostics Menu

The Test/Diagnostics Menu provides access to the Test Mode and the diagnostics displays.

Note
Entry to this mode is not permitted unless. The Main door is open, and a game is not currently in progress.

TEST/DIAGNOSTICS MODE MENU

4.1	Lamp Test	4.7	Factory Test
4.2	Button Test	4.8	Combination Test
4.3	Coin Entry Test	4.9	Combination Quick Test
4.4	Hopper Test	4.10	Bill Acceptor Test
4.5	Monitor Test	4.11	Printer Test
4.6	Sound Effects Test	4.12	Touch Screen

Service	– Press to select next item
Cashout/TakeWin	– Press to select previous item
Play 15 Lines	– Press to choose selected item
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Lamp Test

Select this screen to test the pushbutton lamps, animation lamps and light tower lamps. The state of individual lamps can be set to either on, off, flashing slow, or flashing fast.

1. Select Lamp Test from the Test/Diagnostics menu.

   All pushbutton, animation and light tower lamps should be flashing at a slow rate.

2. To change the lamp status to steady ON, OFF, or FAST Flash, press the appropriate button shown on the screen to set lamp status to (on/off/flash).
3. To test individual lamps, press Service or Cashout/TakeWin to scroll through the list of lamps.
4. Verify correct lamp operation.

TEST MODE – LAMP TEST

Light Tower	Lamp #	1 2
Animation	Lamp #	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Player Key	Lamp #	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

All

Current Function: ON OFF FLASH SLOW FLASH FAST

Service	– Press to select next lamp
Cashout/TakeWin	– Press to select previous lamp
Play 15 Lines	– Press to select function (on/off/flash)
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Button Test

Select this test screen to test the functionality of any game button and the associated lamps.

1. Select Button Test from the Test/Diagnostics menu.
2. Press the desired button.

   The button lamp should flash to indicate that the button is functioning and the lamp is good. The appropriate button should also be highlighted on the screen.

3. Press any other button(s) as desired.
4. To exit to the previous menu, press any two buttons simultaneously.

TEST MODE – BUTTON TEST

Button Function Description

Service
Bet 1 Credit
Bet 5 Credits
Bet 10 Credits
Bet 25 Credits
Bet 50 Credits
Spin
Gamble
Not Used
Not Used
Play 20 Lines
Play 15 Lines
Play 10 Lines
Play 5 Lines
Play 1 Line
Cashout/TakeWin

(Press any button to test)
Press any two keys to return to previous menu

Coin Entry Test

Select this screen to test the coin diverter and coin reject devices.

TEST MODE – COIN ENTRY TEST SCREEN

COIN ENTRY	
Reject State:	Chip Tray
Validator O/P	Active
Optic A:	Unblocked
Optic B:	Unblocked
CASHBOX	
Diverter State:	Cashbox
Optic A:	Not used
Optic B:	Blocked
MESSAGE	Valid Coin In
Service	– Press to change reject state
Cashout/TakeWin	– Press to change diverter state
Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

Testing Coin Reject Device

1. Note the Reject State of the reject coin device under COIN ENTRY on the screen. Chip Tray = player coin tray below the door. Internal = coin drop chute.
2. Open the machine door and drop a coin into the coin head. The coin should exit to the coin tray or drop chute depending upon the current setting.
3. Change the state of the coin reject device by pressing Service.
4. Verify that a coin exits to the appropriate coin path.

   A message is displayed to signify success or failure of the test.

Testing Coin Diverter

1. Note the Diverter State under CASHBOX on the screen. Cashbox = coin drop chute. Hopper = coin hopper bowl.
2. Open the machine door and drop a coin into the coin head. The coin should exit to the hopper bowl or drop chute depending upon the current setting.
3. Change the state of the diverter by pressing Service.
4. Verify that a coin exits to the appropriate coin path.

   A message is displayed to signify success or failure of the test.

Hopper Test

Select this test to verify that the coin hopper ejects the correct number of coins.

TEST MODE – HOPPER TEST

Hopper Test Payout:	0 / 10
Coins Reinserted:	0
Last Hopper Event:	None
Last Diverter Event:	None

Bet 5 Credits	– Press to activate payout
Service	– Press to increment payout
Cashout/TakeWin	– Press to decrement payout
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

1. Operate the Audit key.
2. Open the main door and select Hopper Test from the Test/Diagnostics menu.
3. Press Service or Cashout/TakeWin to set the desired number of coins to be ejected from the coin hopper.
4. Press the appropriate button as shown on the screen to activate the hopper payout.

Note

If a fault such as hopper empty occurs, a message is displayed on the screen.

5. Verify that the appropriate number of coins have been ejected from the hopper.
6. Close the main door and insert the coins back into the coin head.

Monitor Test

Select this screen to check the functionality of the video monitor. Appropriate action should be taken to correct any functions that are considered to be not satisfactory.

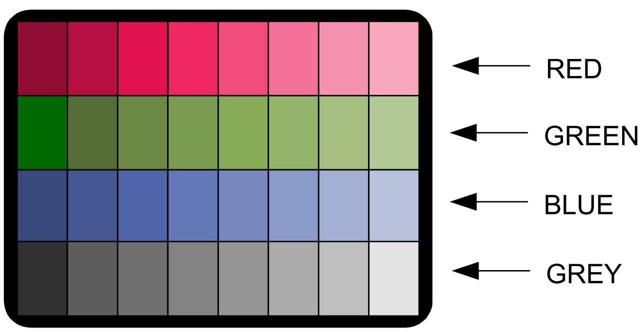
TEST MODE - VIDEO MONITOR TESTS MENU

4.5.1	Color Balance Test	4.5.8	Screen Regulation Test
4.5.2	Grey Scale Test	4.5.9	Red Color Purity Test
4.5.3	12.5% White Screen Test	4.5.10	Green Color Purity Test
4.5.4	Grid Linearity Test	4.5.11	Blue Color Purity Test
4.5.5	Magenta Grid Linearity Test	4.5.12	Black Color Purity Test
4.5.6	Basic Colors Test	4.5.13	White Color Purity Test
4.5.7	Mode Colors Test		

While in a test press any button to exit

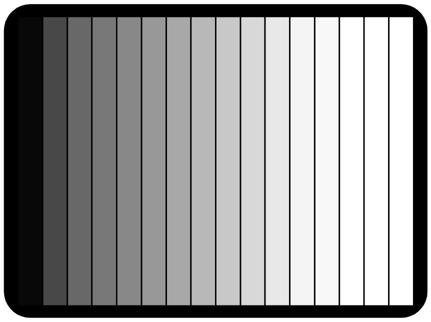
Service	– Press to select next test
Cashout/TakeWin	– Press to select previous test
Play 15 Lines	– Press to choose selected test
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Color Balance Test



The color balance test screen can be used to determine if the monitor red, green and blue color drive levels are set correctly. When the monitor is adjusted properly, no red, green, or blue tint should be evident in the grey band.

Grey Scale Test

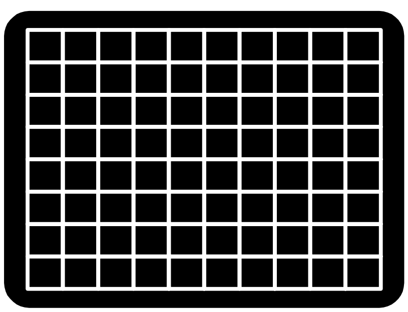


The grey scale test should be used to verify or set the monitor contrast level. When the contrast level is set properly, the left bar on the screen should be dense black and the right bar should be pure white.

12.5% White Screen Test

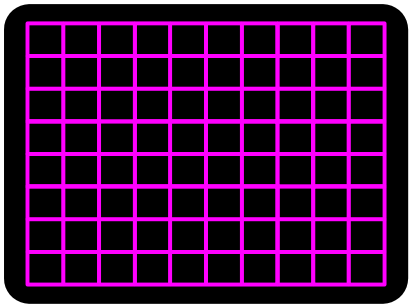
This screen can be used to verify that the monitor brightness control is set properly.

Grid Linearity Test



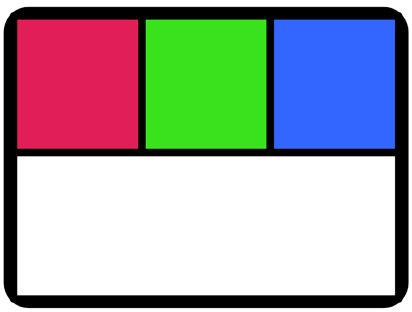
The grid linearity test is used to verify proper monitor pincushion and convergence alignment. The grids lines should all be pure white. Any evidence of other colors in the gridlines indicates improper monitor convergence alignment. The gridlines should be straight. Any bowing or other curvature indicates improper monitor pincushion adjustment.

Magenta Grid Linearity Test



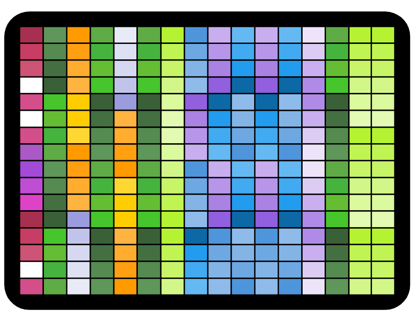
The magenta grid linearity test is very similar to the grid linearity test except that the monitor green color gun is turned off resulting in magenta grid lines instead of white lines. By eliminating the green color, it is easier to view any misalignment of the red and blue color guns.

Basic Colors Test



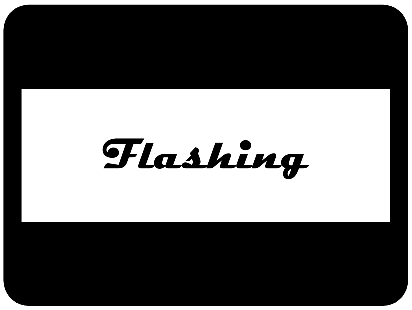
The basic colors test can be used to set or verify the monitor background controls.

Mode Colors Test



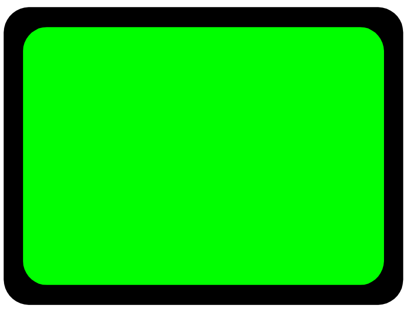
This test can be used to check the monitor color matrix.

Screen Regulation Test



The screen regulation test is used to check monitor high voltage power supply regulation. The flashing white rectangle on the screen should have straight edges and should not change in size if the regulation is sufficient.

Color Purity Tests



The green, blue, black, and white color purity tests are used to verify that the monitor CRT yoke is adjusted correctly. Each color screen should be of equal color density across the entire screen.

Sound Effects Test

This screen allows the operator to change the volume setting of the machine and to listen to all the sound effects used by the machine.

TEST MODE – SOUND SYSTEM TESTS

Service	– Press to increase volume
Cashout/TakeWin	– Press to decrease volume
Play 15 Lines	– Press to play machine tunes
Play 10 Lines	– Press to play machine instruments
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Factory Test

This screen allows the operator to change the factory test of the machine and to observe the effects used by the machine.

TEST MODE – FACTORY TEST

Test Start Time:	Wed 20 Mar 2002 15: 52: 23
Current Time:	Wed 20 Mar 2002 15: 54: 37
Cycle Count:	1
Test Description:	Coin Entry Diverter Test
Remaining Test Hours:	12

Service	– Press to start Factory Test
Cashout/TakeWin	– Press to change Test Duration
Play 15 Lines	– Press to list Factory Tests
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

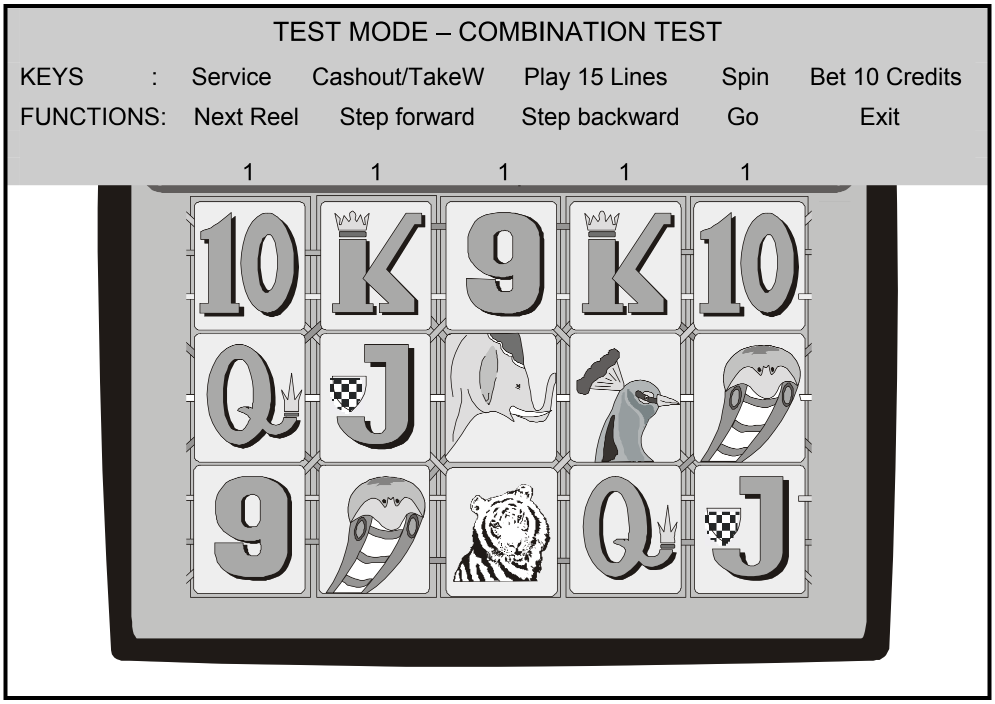
TEST MODE – FACTORY TEST	
Coin Entry Diverter Test	Grey Scale Test
Grid Linearity Test	Sound Test
Red Color Purity Test	Alphanumeric Fully On Test
Green Color Purity Test	
Blue Color Purity Test	
Service	– Press to start Factory Test
Cashout/TakeWin	– Press to change Test Duration
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

The Factory Test option automatically conducts several tests simultaneously. Tests conducted include coin validator, coin diverter, door switch, video monitor tests, and sound system tests. Failed tests are displayed on the screen. The Factory Test continues until stopped by the operator or until an error occurs, in which case the type of failure is displayed on the screen.

TEST MODE – FACTORY TEST	
Test Start Time	Wed 20 Mar 2002 08:46:43
Current Time	Wed 20 Mar 2002 08:48:34
Cycle Count:	1
Test Description:	Coin Entry Acceptor Test
Remaining Test Hours	12
Service	– Press to increment value
Cashout/TakeWin	– Press to decrement value
Play 15 Lines	– Press to accept value
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Combination Test

The combination quick test allows the operator to select a combination of cards to be dealt. This test is used to check the graphics and sound output associated with a specific winning combination.



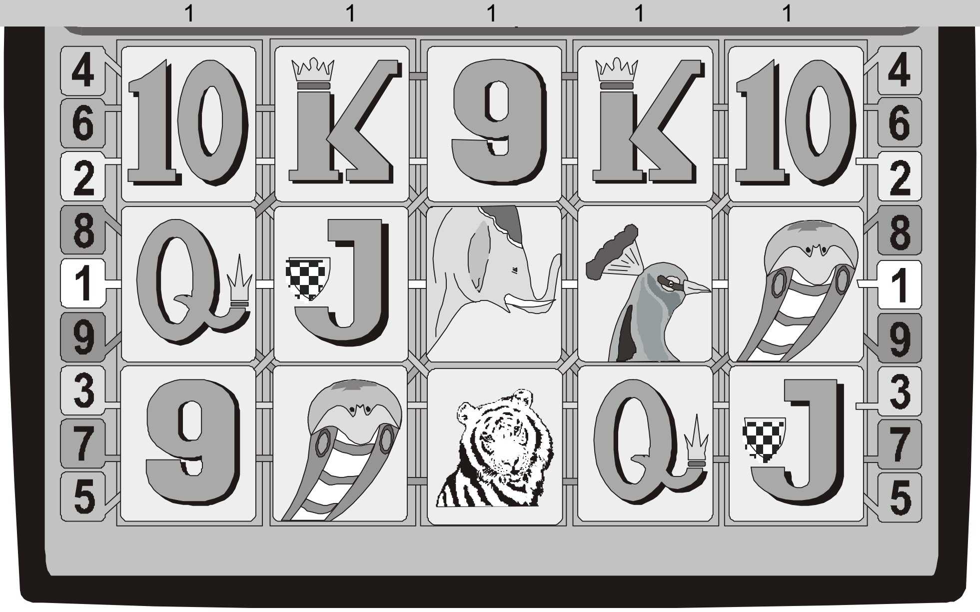
Combination Quick Test

The combination quick test allows the operator to select a combination of cards to be dealt. This test is used to check the graphics and sound output associated with any winning combination.

TEST MODE – COMBINATION QUICK TEST

KEYS :	Service	Cashout/TakeW	Play 15 Lines	Bet 10 Credits	Bet 5 Credits
FUNCTIONS:	Next Reel	Step forward	Step backward	Exit	More…

1 1 1 1 1



Bill Acceptor Test

When a bill is inserted into the bill validator, the proper denomination light.

TEST MODE – BILL ACCEPTOR TEST

$1 Bill
$2 Bill
$5 Bill
$10 Bill
$20 Bill
$50 Bill
$100 Bill
$200 Bill
$500 Bill
$1000 Bill

Barcode:
Insert a Bill or Voucher to test

Bet 10 Credits – Press to return to previous menu

Printer Test

This test allows you to test various aspects of the printer. If a printer is not fitted or enabled then the message "Printer not enabled or available" will be displayed.

> This test may not be performed unless the printer device is selected in Device Driver options.

TEST MODE - PRINTER TEST

Printer Status : CONNECTED
Paper Out status : OK
Paper Low status : OK

Service	– Press to print a test ticket
Cashout/TakeWin	– Press to formfeed a ticket
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Calibrate Touch Screen Display

Select this screen if you wish to calibrate the monitor touch screen function or to test the monitor touch screen sensitivity.

CALIBRATE TOUCH SCREEN

4.12.1 Calibrate
4.12.2 Touch Screen Test

Calibration successfully completed…Thank You

Service – Press to select next item
Cashout/TakeWin – Press to select previous item
Play 15 Lines – Press to choose selected item
Bet 10 Credits – Press to return to previous menu
Audit Key – Turn off to exit

1. Select Calibrate.

You will be prompted to touch various areas of the screen.

When the calibration is successful, the message "Calibration successfully completed…Thank You" is displayed.

2. Select Touch Screen Test.

   You will be prompted to draw something on the screen by touching the screen with your finger and moving it about the screen.

3.3.5 Operator Setup/Selections

The Operator Setup/Selections menu gives the operator access to configurable options of the gaming machine.

OPERATOR SETUP/SELECTIONS MENU

5.1 Game Machine Options
5.2 Jurisdictional Settings
5.3 Progressive Level Setup
5.4 Location Name Setup
5.5 Real Time Clock Setup
5.6 Sound System Setup
5.7 Attract Mode Setup
5.8 Bet/Line and Variation Settings
5.9 SPC Configuration

Service – Press to select next item
Cashout/TakeWin – Press to select previous item
Play 15 Lines – Press to choose selected item
Bet 10 Credits – Press to return to previous menu
Audit Key – Turn off to exit

SPC = Serial Protocol Converter (board)

Machine Options

The Machine Options Setup screen allows the operator to control and change some aspects of machine operation. Options are selected and changed by following the on-screen guidance and pressing the appropriate pushbuttons. The machine options are stored in the first EEPROM on the Main Board.

Note
Approval from the jurisdictional authority is required before the items in the Machine Options screen can be changed.

Note
The logic door must be open in order to save machine option changes to EEPROM.

GAME MACHINE OPTIONS
(The LOGIC DOOR must be opened to save any changes)

MACHINE ID	000123	BUTTON PANEL	14 Buttons
PROGRESSIVE ADDRESS	Disabled	LANGUAGE	N/A
COMMS PROTOCOL	Gamma		
SPLIT PAY TYPE	DISABLED		
HOPPER	ENABLED		
HOPPER LIMIT (coins)	20		
PRINTER	DISABLED		
		EFT/BONUS OPTIONS	
		BILL/VOUCHER OPTIONS	
JACKPOT LOCKUP LIMIT (cr)	910020	DEVICE DRIVER OPTIONS	
JACKPOT BELL LIMIT (cr)	24000		
JACKPOT BELL TRIGGER:	Trigger at Limit or Feature		
		Save Machine Options	

Play 5 Lines	– Press to select another digit
Play 10 Lines	– Press to increment a digit
Cashout/TakeWin	– Press to select previous option
Service	– Press to select next option
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

GAME MACHINE OPTIONS
(The LOGIC DOOR must be opened to save any changes)

MACHINE ID	000123	BUTTON PANEL	14 Buttons
PROGRESSIVE ADDRESS	Disabled	LANGUAGE	N/A
COMMS PROTOCOL	Gamma		
SPLIT PAY TYPE	Hopper/Printer pays split at Hopper Limit		
PAY TYPE TO SPLIT	Split Cashout Pays Only		
SPLIT LIMIT (coins)	10		
HOPPER	ENABLED		
HOPPER LIMIT (coins)	20		
PRINTER	Thermal Printer		
PRINTER LIMIT (COINS)	99999999	EFT/BONUS OPTIONS	
		BILL/VOUCHER OPTIONS	
JACKPOT LOCKUP LIMIT (cr)	910020	DEVICE DRIVER OPTIONS	
JACKPOT BELL LIMIT (cr)	24000		
JACKPOT BELL TRIGGER:	Trigger at Limit or Feature		
		Save Machine Options	

Play 5 Lines	– Press to select another digit
Play 10 Lines	– Press to increment a digit
Cashout/TakeWin	– Press to select previous option
Service	– Press to select next option
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Explanation of Terms

MACHINE ID: a number between 0 and 999999. The MACHINE ID field may be used in some circumstances to configure the SPC-1 or SPC-2 polling address. It may also be used for the 'Machine #' as printed on tickets, depending on the configuration setup. In both instances, please consult software configuration documents for correct usage on the MACHINE ID field.

PROGRESSIVE ADDRESS: a number between 1 and 32 or DISABLED.

COMMS PROTOCOL: None or GAMMA

SPLIT PAY TYPE:

None	Split pay function is disabled
Hopper/Printer pays at hopper limit	This option does ***not*** require a PAY TYPE TO SPLIT option. When this option is selected, the hopper will automatically dispense coin in the amount of the hopper limit and a cash ticket for the remainder when cashout is pressed or a single win threshold or jackpot is won.
Hopper pay below limit. Printer pay above limit	This option ***requires*** a PAY TYPE TO SPLIT option to be selected. Depending upon which PAY TYPE TO SPLIT option is selected, the hopper will payout coin for any amounts below the hopper threshold and a cash ticket for the amount above the hopper limit.

PAY TYPE TO SPLIT:

Split Cashout Pays Only	When the hopper pay below limit/printer pay above limit split pay type is selected, the split pay function will be enabled only when the cashout button is pressed.
Split Cashwin Pays Only	When the hopper pay below limit/printer pay above limit split pay type is selected, the split pay function will be enabled only when a single win threshold or jackpot is payed.
Split Both Cashwin and Cashout Pays	When the hopper pay below limit/printer pay above limit split pay type is selected, the split pay function will be enabled when the cashout button is pressed or when a single win threshold or jackpot is payed.

JACKPOT BELL LIMIT: the Jackpot Bell Limit is the minimum win for one game that will cause the jackpot bell to be activated.

ENABLE BILL ACCEPTOR: enables/disables the bill acceptor.

To save the changes made to the machine options, press the save button. Changes to all the machine options will be saved in this way. The Logic Door must be open at the time otherwise the changes will not be saved.

To exit from the machine options screen without saving any of the changes made, press the return to previous menu button.

EFT/BONUS OPTIONS

BONUS TRANSFER MODE	Disabled
BONUS TRANSFER LIMIT	$ 0.00
BONUS MJT MODE	Disabled
EFT TRANSFER IN MODE	Disabled
EFT TRANSFER OUT MODE	Disabled
EFT TRANSFER LIMIT	$ 0.00

Service	– Press to select next option
Cashout/TakeWin	– Press to select previous option
Bet 3 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

NOTES

- Bonus Awards can not be enabled from this screen. Enable GamPro and check Jurisdictional Settings.
- Play 3 Lines - Press to select another digit
  Play 5 Lines - Press to increment a digit
- Multiplier Wins can not be enabled
  enable GamPro and check Jurisdictional Settings.
- Cashless EFT In can not be enabled
  enable GamPro and check Jurisdictional Settings.
- Cashless EFT Out can not be enabled
  enable GamPro and check Jurisdictional Settings.
- EFT Transfer Limit
  Must be less than or equal to Jurisdictional Max EFT Limit
  Play 3 Lines - Press to select another digit
  Play 5 Lines - Press to increment another digit

The Bill/Vouchers Options screen is used to enable various bill and ticket options.

BILL/VOUCHER OPTIONS

5 INV. BILL REJECT	Disabled	ACCEPT $1 BILLS	YES
MAX BACC LIMIT	$ 100.00	ACCEPT $2 BILLS	NO
ACCEPT VOUCHERS	No	ACCEPT $5 BILLS	YES
VOUCHER LIMIT	$ 0: Ocr	ACCEPT $10 BILLS	YES
		ACCEPT $20 BILLS	YES
		ACCEPT $50 BILLS	YES
HANDPAY VALIDATION	No Validation	ACCEPT $100 BILLS	YES

Play 10 Lines – Press to enable/disable 5 invalid bills reject

Service	– Press to select next option
Cashout/TakeWin	– Press to select previous option
Bet 3 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Explanation of Terms

5 INV. BILL REJECT: If enabled, if a bill is rejected five times, the tower light will flash and a bill validator event is generated.

MAX BACC LIMIT: The maximum currency amount that the bill validator will accept. Example: If set to $100, a single $100 bill will be accepted or any combination of lower denomination bills totalling $100 or less will be accepted.

ACCEPT VOUCHERS: This option must be set to YES for the machine to communicate with a ticking/voucher system.

VOUCHER LIMIT: The maximum ticket/voucher amount that the bill validator will accept. Example: If set to $100, a single $100 ticket will be accepted or any combination of lower value tickets totalling $100 or less will be accepted.

ACCEPT $XX BILLS: Allows you to accept or reject individual bill denominations.

The device driver options screen is used to select various machine hardware device drivers.

DEVICE DRIVER OPTIONS

BILL ACCEPTOR	V2.2 16bit
TOUCH SCREEN	MicroTouch
COIN ENTRY	CC-62 / Condor
PRINTER	Ithaca
ALPHANUMERIC DISPLAY	None
HOPPER	Aristocrat / Paytrack

Play 10 Lines – Press to change driver

Service	– Press to select next option
Cashout/TakeWin	– Press to select previous option
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Explanation of Terms

BILL ACCEPTOR: Set for the appropriate bill acceptor. (None, V2.2 16-bit, V2.2 32-bit, VFM4, ID003 (JCM), or BDS (Mars))

TOUCH SCREEN: Set for the appropriate touch screen. (Microtouch, ELO, or None)

COIN ENTRY: Set for the appropriate coin acceptor. (CC-62/Condor, Aristocrat, or None)

PRINTER: Set for the appropriate printer. (None, Ithaca, Seiko, or Westrex)

ALPHANUMERIC DISPLAY: Set to None in USA.

HOPPER: Set for the appropriate hopper. (None or Aristocrat/Paytrack)

Jurisdictional Settings

This screen displays various parameters for the machine that have been set either from the setchip during original machine initiation or from other setup screens.

JURISDICTIONAL MACHINE SETTINGS		
Value of 1 Coin:	$1.00	Mystery: Enabled
Value of 1 Credit:	$0.05	
Gamble:	RED / BLACK WITH SUIT	
Bill Acceptor Protocol:	VFM4 ID003(JCM) BDS(Mars) V2.X/32 V2.X/16	
BACC Denomination:	Dollar [USA]	
Max Bet Coin Reject:	Disabled	
Max Credit Limit:	$ 1199.99	
Tax Limit	$ 1200.00	
Max Bet Limit:	$ 999999.99	
Max Lines:	20	
Max Credits Per Line:	50(credits)	
Play Bet Button:	Continuous Mode	
Game Percentage Variation:	87.801% 99 (95.000% maximum)	
Hyperlink:	Disabled	
Printer/Hopper Setting:	Hopper and/or any one Printer Selectable	
Cancel residual credit type:	Soft lockup	
Jurisdiction:	Minnesota	
Set Chip Version:	6.01.00	
Split Pay Type:	Allow Selection of both types of Split Pays	
Pay Type to Split	Allow CashWin, Cashout, or Both to be Split	
Max EFT Limit:	$ 0.00	
EFT Transfer Mode:	EFT In/Out allowed	
Bonus Transfer Mode:	No Bonusing allowed	
Validation Default	System	Voucher Redemption: Allowed
Validation Modes Available	None, Game, Syst, Sec Enh, Sec Enh D/A, Enh	

Progressive Level Setup

This screen allows the operator to set each winning hand to correspond to a link progressive jackpot. The operator selects the desired Winning Hand to be modified. Then the level may be changed by pressing the appropriate button to increase or decrease the level. A non-existent level (blank) implies that there is no link progressive level associated with that hand, and hence the normal credit win value will be won. Otherwise a number between 0 and 5 will appear and this indicates the level of the link that will be won.

PROGRESSIVE LEVEL SETUP	
PROGRESSIVE ADDRESS	disabled
PROTOCOL SELECTED	Type #25 Ser.
LINK ID	1
Hyperlink Type	Level
GRAND	– – –
MAJOR	– – –
MINOR	– – –
MINI	– – –
Mystery Pay	JP7
Save Options	
Play 5 Lines	– Press to decrement value
Play 10 Lines	– Press to increment value
Cashout/TakeWin	– Press to select previous option
Service	– Press to select next option
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Location Name Setup

This screen allows the operator to enter the name of the venue. This name is displayed in the Machine Identification Screen and is printed on cash tickets and metering tickets.

LOCATION SETUP

Location Name : " "

Location Address 1: " ."

Location Address 2: " ."

Save Location Info

Play 5 Lines	– Press to select next character
Play 10 Lines	– Press to increment the selected character
Play 15 Lines	– Press to decrement the selected character
Cashout/TakeWin	– Press to select the previous item
Service	– Press to select the next item
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Real Time Clock Setup

This screen allows the real time clock to be set.

REAL TIME CLOCK SETUP

HOUR	:	15
MINUTE	:	28
SECOND	:	50
DAY	:	20
MONTH	:	MARCH
YEAR	:	2002

SAVE REAL TIME CLOCK SETUP

Service	– Press to choose next item
Cashout/TakeWin	– Press to choose previous item
Play 15 Lines	– Press to select option
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Sound System Setup

This screen allows the operator to change the volume setting of the machine and to hear all the sound effects used by the machine.

SOUND SYSTEM SETUP

Service	– Press to increase volume
Cashout/TakeWin	– Press to decrease volume
Play 15 Lines	– Press to play machine tunes
Play 10 Lines	– Press to play machine instruments
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Attract Mode Setup

The contents of the Attract Mode screen display is shown on the Game Screen during game play.

ATTRACT MODE SETUP

Attract Mode Duration	MINUTES	:	00
	SECONDS	:	30
Attract Mode Interval	MINUTES	:	05
	SECONDS	:	00
Attract Mode	ENABLED	:	YES

Service	– Press to choose next item
Cashout/TakeWin:	– Press to choose previous item
Play 15 Lines	– Press to select option
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Bet/Line Variation Settings

BET, LINE AND VARIATION SETTINGS

Current Bet/Line and Variation Percentage Settings

Max Bet Limit:	$ 999999.99
Current Play Lines:	20
Current Max Credits per Line:	50 (credits)
Current % Variation:	87.801% 99 (95.000% maximum)

Variation Percentages Available

Variation:	99	01	02	03	04
Percentage:	87.957%	90.009%	92.182%	94.892%	97.279%
Hyperlink Var.:	Hyperlink is not available in this game				

Available Play Lines and Max Credits per Line

Play 1 Line (Max Bet Per Line):	N/A
Play 3 Lines (Max Bet Per Line):	N/A
Play 5 Lines (Max Bet Per Line):	N/A
Play 9 Lines (Max Bet Per Line):	(5) (10) (20)
Play 10 Lines (Max Bet Per Line):	N/A
Play 20 Lines (Max Bet Per Line):	(5) (10) (25) (50)
Play 243 Lines (Max Bet Per Line):	N/A

Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

SPC CONFIGURATION SCREEN

SPC Identification

H/W Rev.:	" "
Firmware Id:	" "
Firmware Ver:	" "
Firmware Name:	" "

SPC ID NUMBER	0
HANDPAY MODE	Basic Handpay Reporting
SINGLE/DUAL PORT	Port 0
EFT	Port 0
PROGRESSIVES	Port 0
SYSTEM BONUSING	Port 0
VALIDATION	Port 0
GENERAL CONTROL	Port 0
	Save Options

Press 5 Lines	– Press to select another digit
Press 10 Lines	– Press to increment a digit
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

SPC Configuration Screen.

This screen allows the operator to control certain aspects of the SPC-2 interface firmware. These options do not affect the operation of the Gaming Machine and have no affect when an SPC-1 is connected. These options only affect the connected SPC-2 interface board.

[Please consult the configuration documentation for a more detailed description of the usage and affects of these options in conjunction with the SPC-2 interface board and firmware.]

The following options are available:

SPC ID NUMBER: This option allows the operator to configure an Id number for the SPC-2 firmware. This is generally used to indirectly set the SAS Poll address, and replaces the use of the Game Machine ID for purposes of setting a SAS Poll address.

HANDPAY MODE: This affects the way in which handpay exceptions and data are reported to the SAS Host by the SPC-2 interface board.

VALIDATION MODE: This affects the validation mode in which the SPC-2 operates, and the options available are indirectly limited by the configuration of the Gaming Software, including whether a printer is selected, and whether Game or System Validation has been selected on the Game Machine Options Menu screen.

SINGLE/DUAL PORT: When supported by the SPC-2, this option allows the operator to configure the SPC-2 for single or dual port operation. When Dual Port operation is selected, the following five options can be set to specify which functionality should be available on which port. These options are very system-specific and it is vital that they be matched to the particular casino system installation being connected. Note that earlier versions of SPC-2 firmware did not support the dual port functionality, in which case this option has no affect.

In all cases, additional detailed configuration documentation should be consulted when modifying these options.

3.3.6 Miscellaneous Menu

The Miscellaneous Menu provides a range of operational features relating to the Bank Bill Acceptor, Periodic Meters, demonstrations, accounting print outs, and removing the gaming machine from service.

MISCELLANEOUS MENU

6.1 BACC CRC Seed Setup
6.2 Out of Service
6.3 Operator Initiated Cancel Credit
6.4 Disable Secure Enhanced Validation
6.5 Print Accounting Information

Service	– Press to select next item
Cashout/TakeWin	– Press to select previous item
Play 15 Lines	– Press to choose selected item
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

BACC CRC Seed Setup

This security procedure enables a CRC check to be carried out on a GPC/32 bill validator by an authorized attendant.

This screen also provides for changing the GPC/32 bill Validator CRC seed value.

Refer to the GPC documentation for details of setting the seed value.

BILL ACCEPTOR CRC SEED SETUP

Enter a new CRC Seed Value here: 0x00000000
Current Seed CRC seed value: 0xffffffff

Service	– Press to select another digit
Cashout/TakeWin	– Press to increment another digit
Play 15 Lines	– Press to save new seed value
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Out of Service Option

This operational option enables a floor attendant to place an EGM into, or remove a machine from, the Out of Service mode as required.

Audit key	– Turn off to START Out of Service Mode
Bet 3 Credits	– Press to return to previous menu without entering Out of Service Mode
Audit key	– Turn on again to EXIT Out of Service Mode and then Turn Reset Key to reset lockups detected in Out of Service Mode

Operator Initiated Cancel Credit

This operational option enables a floor attendant to place a machine into, or remove a machine from, the Out of Service mode as required.

OPERATOR INITIATED CANCEL CREDIT REQUEST

This operation is not available
Must be in “Host Disable – Cashout Allowed”

Bet 10 Credits	– Press to return to previous menu
Audit key	– Turn off to exit

3.3.7 Current Lockup Menu Items

The gaming machine has an extensive system of self-monitoring and should any abnormal conditions be detected, the machine will automatically enter a lockup condition. In lockup, the game is disabled to prevent any further player interaction and the game message area displays guidance information.

Lockup conditions are handled by the Operator Mode Menu item Current Lockup. The menu is displayed and the conditions requiring attention are highlighted by the characters ***. Each lockup condition has an associated help screen outlining the procedure for fixing the fault.

The Current Active Lockup Menu is shown below, followed by a summary of the associated help screens.

CURRENT ACTIVE LOCKUPS

	Cash Out Handpay	Illegal Coin Out	Bonus Handpay
***	Main Door Open	Self Audit Error	Bill Acceptor Error
***	Cashbox Door Open	3 Way Memory Error	Bill Jam
***	Logic Door Open	Game EPROMs Changed	Bill Acceptor Full
***	Bill Acceptor Door Open	Meters Disconnected	Bill Acc. Stacker
	Coin Reversal	Meters Faulty	Bill Reversal
	Coin Acceptor Fault	Game Machine Options	Bill not Credited
	Coin Optic Fault	Jurisdiction Options	Signature Error
	Coin Diverter Fault	EEPROM CRC Mismatch	Touch Screen Error
	Printer Disconnected	Battery #1 Low	Out of Service
	Printer Jam/Failure	Battery #2 Low	Progressive Disconnected
	Paper Depleted	Jackpot Win	Mikohn comm. Error
	Hopper Empty	Win Handpay	Host Disable
	Hopper Jammed	Mystery Handpay	
	Hopper Disconnected	Link Jackpot	

The characters *** indicates active lockups

Service	– Press to select next lockup
Cashout/TakeWin	– Press to select previous lockup
Play 15 Lines	– Press to see selected lockup help
Bet 10 Credits	– Press to return to previous menu
Audit Key	– Turn off to exit

Notes

Chapter 4

Cabinet, Door and Top Box

List of Figures

4.1 General Description

The gaming machine cabinet, top box, and cabinet door are of welded pressed sheet metal construction. The cabinet provides security to the inside of the machine and a rigid structure for mounting the various machine components. The cabinet door is secured to the cabinet with three high-strength hinges and latches to the cabinet with a security two-point latch. A steel reflector panel, fitted inside the cabinet door, provides mounting for the coin handling system and the door fluorescent tubes and ballasts.

The major components of the machine are located either within the cabinet, on the cabinet door, or in the top box. The following components are detailed in this chapter (see Figures 4-1 and 4-2):

In the cabinet:

- key switches,
- cabinet door security
- main door latch assembly,
- cash box chute,
- logic cage,
- game display shelf,
- loudspeaker and amplifier sound system.

On the cabinet door:

- cabinet door fluorescent lighting,
- mid trim, coin entry and playbuttons,
- cabinet door security,
- cabinet door artwork,
- reflector panel,
- belly panel door,
- monitor mask,
- coin tray.

In the top box:

- top box shell,
- top box door,
- fluorescent lighting and reflector,
- top box door artwork,
- light tower.

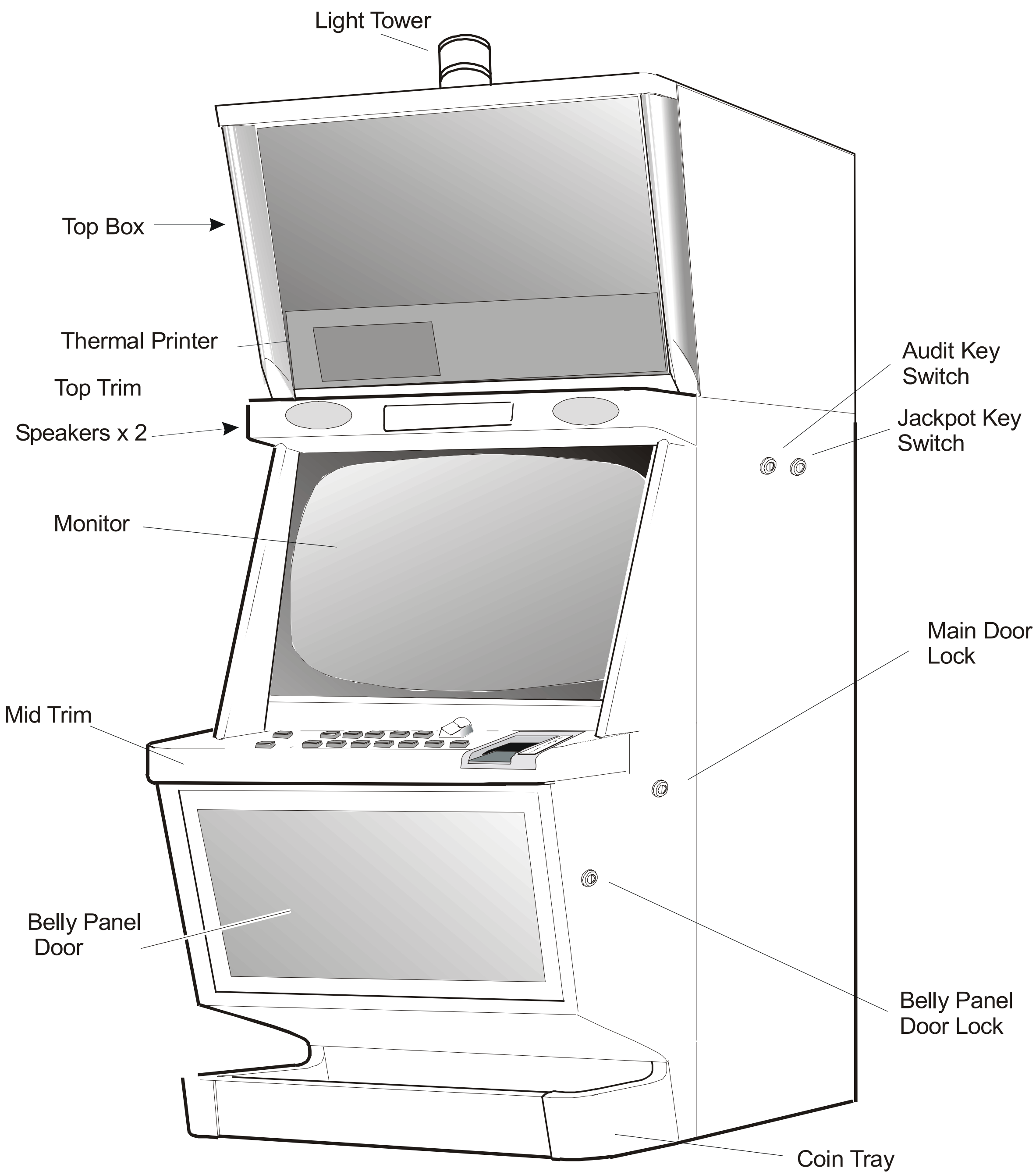


Figure 4-1 MAV500/MKVI Gaming Machine with Casino Top Box, Sound System and Bill Acceptor - External View

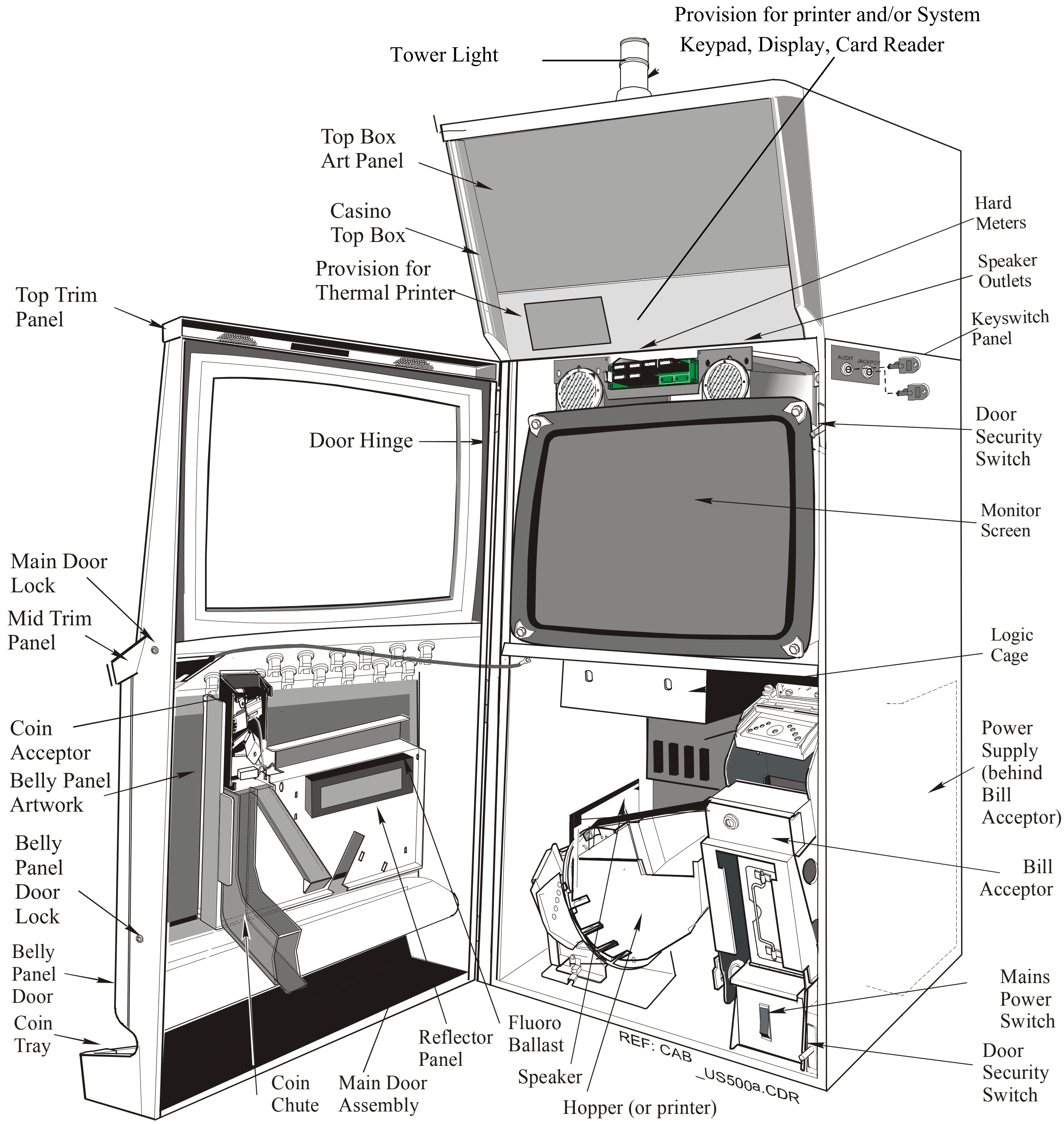


Figure 4-2 MAV500/MKVI Gaming Machine with Casino Top Box, Sound System and Bill Acceptor - Internal View

4.2 Technical Description

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

4.2.1 Cabinet

The cabinet is comprised of a one-piece shell (back and two sides) with separate top and base sections. The parts are interlocked and welded together with strengthening gussets and rails for rigidity. The cabinet door is mounted on three high-strength hinges. Various brackets and plates are welded to the assembly to provide mounting for other machine components.

Key Switches

The Jackpot Reset and Audit key switches are used to access and reset the machine's software. The key switch functions are covered in detail in the Machine Modes chapter.

The key switches are fixed to a common plate mounted to the outside wall of the cabinet. The switches are connected by a loom to the Backplane which transfers the switch signals to the Main Board for processing.

Removal and Replacement Procedures:

Removal of the key switches is as follows (refer to Figure 4-3):

1. Remove the monitor.
2. Open the cabinet door, and switch OFF the machine.
3. Unplug the key-switch loom from the Backplane.
4. Remove the two nuts fastening the assembly to the cabinet wall.
5. Remove the key-switch assembly from the cabinet.
6. The individual key switches may be removed from the assembly:
    a. Unplug or de-solder the loom from the key switch.
    b. Remove the lock nut and washer from the switch body.
    c. Pull the switch from the mounting plate.

Replacement is a reversal of the removal procedure.

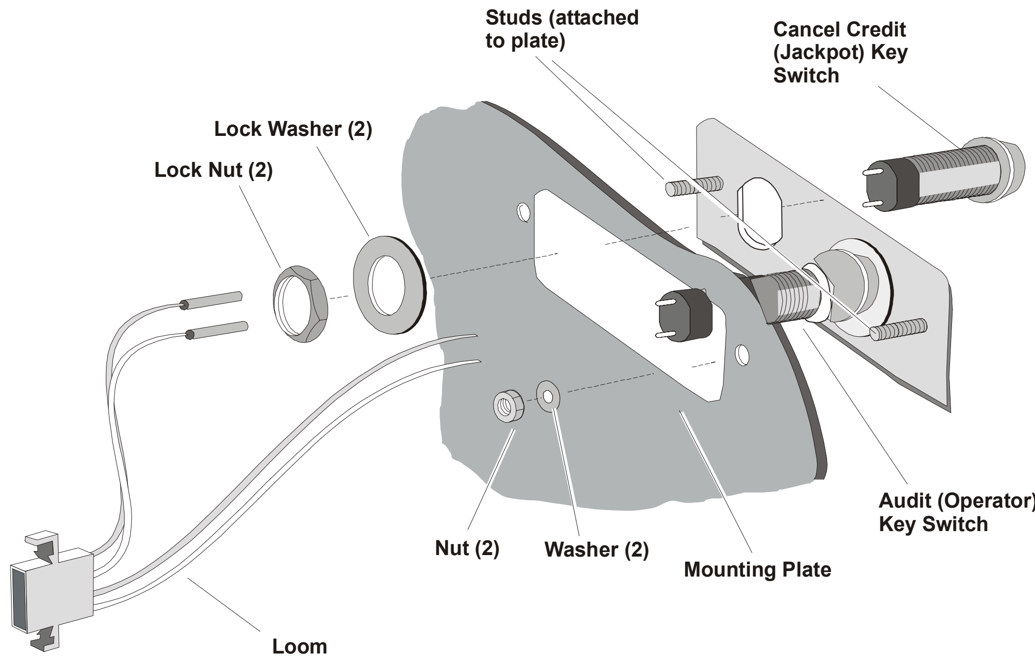


Figure 4-3 Key Switches: Removal and Replacement

Cash Box and Chute

Once the hopper is full, further coins entered into the gaming machine are collected in the cash box, which is located inside the cabinet base. A door in the cabinet base provides access to the cash box for the clearance of coins. This door is locked and monitored by a security switch.

Coins enter the cash box via the cash box chute, which is located at the bottom of the cabinet. The chute is moulded from plastic.

Removal and Replacement Procedures:

To remove the cash box chute (refer to Figure 4-4):

1. Open the cabinet door, and switch OFF the machine.
2. Remove the hopper from the machine (refer to the chapter Hopper).
3. Remove the self-tapping screw securing the chute to the base of the cabinet.
4. Pull the chute from the cash box hole in the cabinet base.

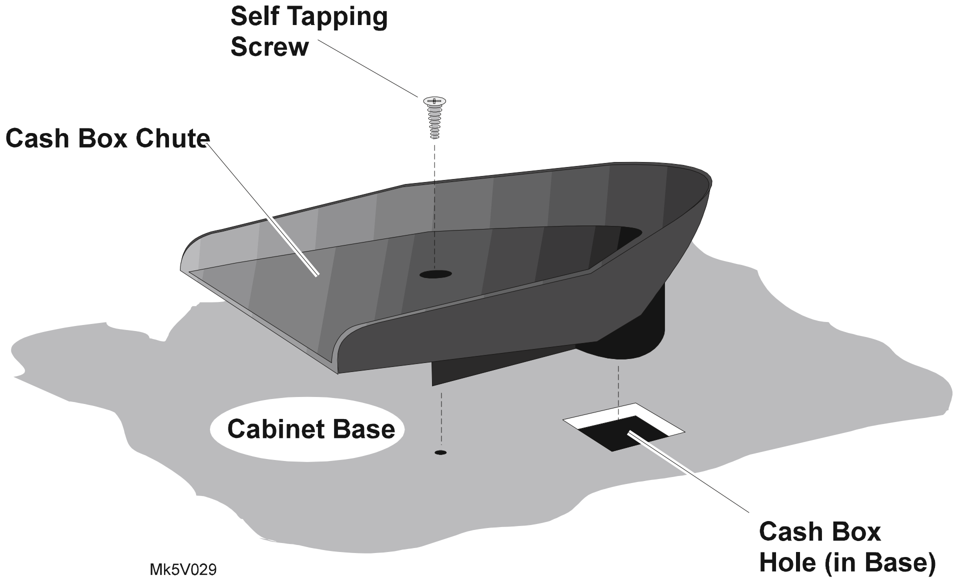


Figure 4-4 Cash Box Chute: Removal and Replacement

Logic Cage

The logic cage is a steel enclosure with a hinged door in the front. The cage houses the machine logic PCBAs and the Backplane Board. The door of the cage has a sliding latch that allows a security seal to be fitted. The cage is fitted with a microswitch used for signaling the machine software that the logic cage door has been opened. In addition, one or two security key locks may be fitted to the logic cage door.

The logic cage sits below the game display shelf. It slots into the shelf at the back (in two places) and at the front (one place); it is fastened to it by one screw at the front.

Within the logic cage are brackets and plastic guides for locating the PCBAs. The backplane is mounted at the back of the logic cage. When a PCBA is fitted into the logic cage, it travels along the guides and is aligned with the corresponding multi-way connector on the backplane.

Removal and Replacement Procedures:

To remove the logic cage and backplane (refer to Figure 4-5):

1. Open the cabinet door, and switch OFF the machine.
2. Remove the hopper from the machine (refer to the chapter Hopper).
3. Open the logic cage door; the door flips down and is spring loaded to stay completely open.
4. Carefully lever the PCBAs out using the extractors. Standard Electrostatic Discharge (ESD) prevention procedures should be followed when removing PCBAs.
5. The PCBAs should be immediately placed into anti-static bags.

6. Disconnect all of the looms from the Backplane. Label the connectors as they are removed to ensure that they can be replaced easily.
7. Remove the single screw attaching the logic cage to the game display shelf.
8. Gently pull the logic cage from the machine; the tabs at the back and front of the cage will disengage from the shelf. Remove the logic cage and Backplane from the machine.

Replacement is a reversal of the removal procedure.

Disassembly and Assembly Procedures:

To disassemble the logic cage:

1. Remove the logic cage as previously described.
2. The Backplane is removed by removing the screws securing it.
3. The door catch, microswitch, and fan unit (if fitted) are removed by removing the screws securing them.
4. The PCB guides are removed by pulling them from their location holes.

Assembly is a reversal of the disassembly procedure.

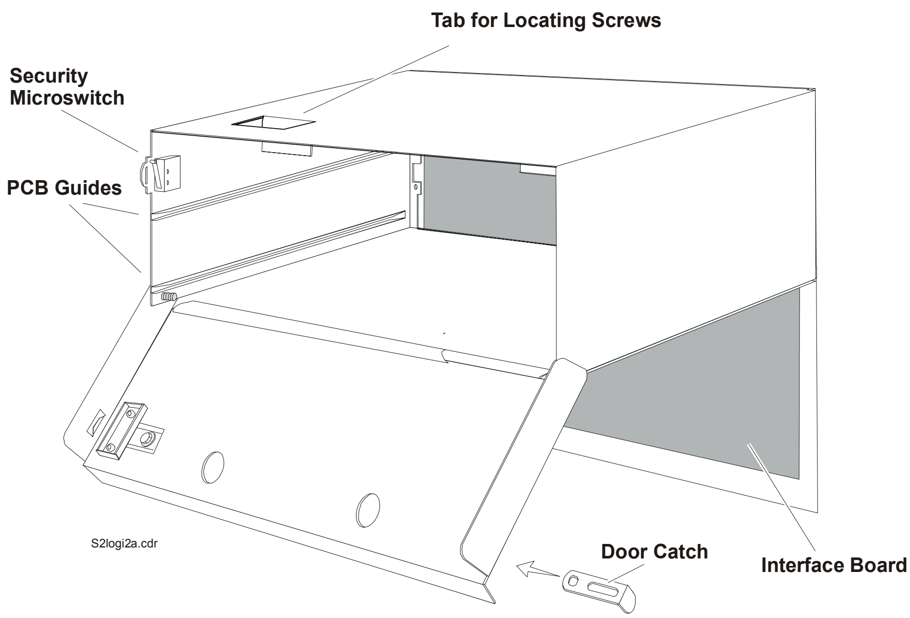


Figure 4-5 Logic Cage

PMM Panel

The PMM panel is located in the top box. If a player communications unit is fitted, it is located in the PMM Panel. A cut-out in the trim panel provides an area for players to insert identification cards into the card reader and for viewing the display. Where a player communication unit is not fitted, the PMM Panel is used to hold an artwork panel.

Removal and Replacement Procedures:

To remove the PMM panel or artwork from the top box:

1. Open the cabinet door, and switch OFF the machine.
2. Remove the top box panel by pushing vertically on the bottom.
3. Undo the two screws retaining the PMM panel and slide the assembly from the machine.

Replacement is a reversal of the removal procedure.

Sound System

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

An active crossover splits each audio signal into a high frequency and a 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 as they have different sensitivity.

A signal detecting circuit mutes the amplifier when not in use to minimize the power consumption.

A digital pot controls the volume may be controlled by a panel-mounted toggle switch located to the right of the meter assembly.

The audio amplifier is powered from the 24V rail of the EGM.

The block diagram of the amplifier module is given in Chapter 15 of this manual.

4.2.2 Door

Cabinet Security

The cabinet door and belly panel door are both fitted with battery-backed security switches. When either door is properly closed, the switches are activated and send a signal to the Main Board indicating that the door is closed. If any switch does not provide the correct signal to the Main Board, an alarm will sound, gameplay will be disabled, and the appropriate machine lockup message will be displayed on the monitor screen.

The main door mechanical security switch consists of two switches, one located in the bottom corner of the cabinet beside the mains switch box, and the other located in the cabinet latch channel near the top latch position. The belly panel door security switch is mounted to the cabinet door.

Removal and Replacement

To remove any door security switch, open the cabinet door, and switch OFF the machine.

1. Using a flat-blade screwdriver, pry the security switch from the cabinet.
2. Unplug the switch connectors.

The switch is replaced by firmly pushing it back into position.

Cabinet (Main) Door

The cabinet (or main) door is fabricated from sheet steel. The structure is welded and bolted together, using three cross braces for rigidity. Mountings are provided in the door for the coin handling system, artwork, lighting, coin tray, speakers, and other devices. The belly panel of the main door opens to allow access to the bill stacker.

The door is mounted to the cabinet on three high-strength hinges on the left-hand side of the machine. The door is secured on the right-hand side with a two-point latch mechanism.

Removal and Replacement Procedures:

To remove the door, door hinges and hinge pins:

1. Open the cabinet door, and switch OFF the machine.
2. Disconnect all looms between the door and the rest of the machine.
3. Remove the nut securing the door-open stay.
4. Remove the hinge mounting screw that secures the door lift-off stay.
5. Lift the door off the three hinge pins and remove.

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

5. The hinges and hinge pins can be removed from the door and cabinet, respectively, by removing the bolts securing them.

Replacement is a reversal of the removal procedure.

Door Latch

The door latch assembly consists of two separate cam latches operated by a lever that links the latches. The lever disengages the latches and is actuated by a cam fitted to the door lock. As the latches disengage, the door is “popped” open. The lock cam is designed to prevent the lever being operated without turning the key.

Removing the Keyed Lock from the Cabinet:

1. Open the cabinet door, and switch OFF the machine.
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. Withdraw the lock barrel from the outside of the housing.

Replacement is a reversal of the removal procedure.

The procedure for lock removal is the same for all keyed locks.

NOTE
If a spacer is fitted to the lock barrel on the outside of the door, this spacer must be used with any new lock that is fitted.

Door Fluorescent Lighting and Artwork

The cabinet door is equipped with a fluorescent lighting system for illuminating the belly panel artwork and coin tray.

The artwork panel is located in the belly panel door and held in place by a clamping bracket that is secured by four nuts.

The lighting system consists of two 6 W fluorescent tubes, and two electronic ballasts. The tubes and ballasts are mounted to a reflector panel on the inside of the main door. One ballast is powered from the 24 V DC rail on the power supply, and is daisy-chained to the second ballast.

Note
Fluorescent tubes are 6 W to IEC 81 standard.

Removal and Replacement Procedures:

To remove a fluorescent ballast from the cabinet:

1. Open the cabinet door, and switch OFF the machine.
2. The ballasts are mounted to the reflector panel on the inside the main door.
3. Unplug the fluoro loom and power loom from the ballast box.
4. Squeeze the sides of the ballast housing to disengage the plastic clips, and remove the ballast.

Replacement is the reverse of the removal procedure.

To replace a cabinet door fluorescent tube (refer to Figure 4-6):

1. Open the cabinet door, and switch OFF the machine.

Warning

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

2. Open the belly panel door.
3. Rotate the tube and carefully remove from its sockets. Insert the new fluorescent tube.
4. Close and lock the belly panel door.
5. Switch ON the machine, check the lighting system, and close and lock the main door.

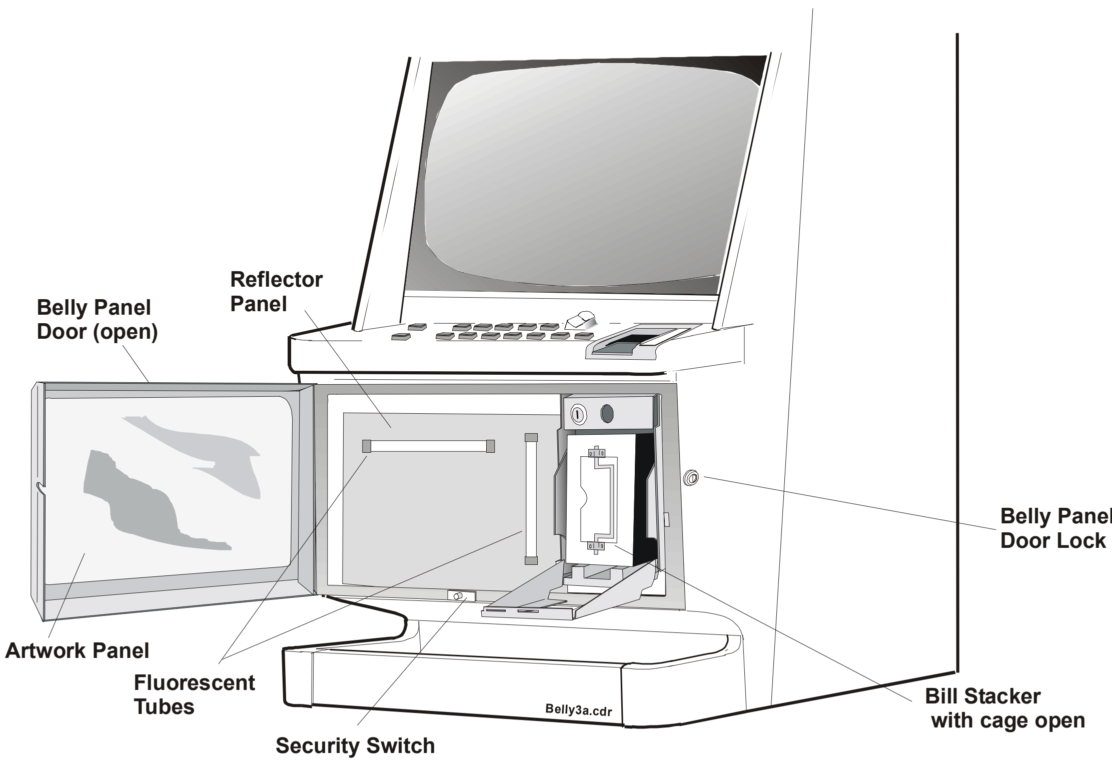


Figure 4-6 Cabinet Door Fluorescent Lighting System and Artwork

.To remove the artwork panel from the belly panel door:

1. Open the belly panel door.
2. Remove the clamping bracket by removing the four nuts that secure the bracket to the belly panel door.
3. Carefully remove the panel from the door.

Replacement is a reversal of the removal procedure.

Mid Trim Panel

The mid trim panel is fabricated from sheet steel. The function of the trim is to act as a strengthening brace for the door assembly and to provide an area for the playbuttons and coin entry to be mounted.

The mid trim panel is fitted with a “drop-in” playbutton 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 the “drop-in” panel be replaced to accommodate different playbutton 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.

Removal and Replacement Procedures:

To remove the mid trim panel from the door of the machine:

1. Open the cabinet door, and switch OFF the machine.
2. Remove the reflector panel from inside the door:
   - Remove the four screws that secure the panel to the right-hand door side, nearest the hinge at the base of the door and behind the coin comparator.
   - Disconnect the looms to the coin comparator and the fluorescent ballast.
   - Press down on the panel to disengage from under the coin entry slot on the door mid trim.
   - Carefully remove the reflector panel from its locating slots.
3. Unplug all of the playbutton microswitches from the playbutton bodies (see Playbuttons in this chapter). Mark each switch for easy identification.
4. Remove the screws on either side of the mid trim panel that attach it to the door.
5. Pull the mid trim panel from the door.

Replacement is a reversal of the removal procedure.

Playbuttons

The playbuttons function as the interface between the player and the machine. Various games have different configurations of playbuttons, and the playbuttons themselves may vary from game to game, or from market to market. The playbuttons are mounted onto the “drop-in” panel.

Removal and Replacement Procedures:

To replace a playbutton lamp (refer to Figure 4-7):

1. Open the cabinet door, and switch OFF the machine.
2. Grasp the microswitch and lamp holder unit and pull it down, out of the body of the playbutton.
3. Pull out the faulty lamp, and push in the replacement lamp.

4. Replace the microswitch and lamp holder unit by inserting it into the body of the playbutton, and then push the microswitch and lamp holder up into the playbutton body until it snaps into place.
5. Switch ON the machine, check the button lamp, and then close and lock the cabinet door.

To remove a playbutton from the mid trim panel (refer to Figure 4-7):

1. Open the cabinet door, and switch OFF the machine.
2. Grasp the microswitch and lamp holder unit and pull it down, out of the body of the playbutton.
3. From the underside of the body, squeeze together the two legs of the playbutton, then from the top of the button (with the legs of the playbutton still together) withdraw the lens/pushbutton assembly. The spring is loose in the playbutton and drops away when the lens/pushbutton assembly is removed.
4. The playbutton body can be fitted in two ways:
   a. Utilising a lock nut, or
   b. Two screws fitted from the top and located under the lens/pushbutton assembly.
5. Lift the playbutton body from the mid trim panel.

To replace a playbutton into the mid trim panel (refer to Figure 4-7):

1. Open the cabinet door, and switch OFF the machine.
2. Place the body of the button into the correct hole in the “drop-in” panel.
3. Screw on the lock nut to secure the playbutton body in the “drop-in” panel, or fit two screws as required.
4. Place the spring into the lower section of the pushbutton (between the legs) and hold it there.
5. Squeeze the two legs together, and then place the pushbutton into the body of the playbutton.
6. Push the pushbutton down into the body until the legs pop out under the body and hold the spring and pushbutton in place.
7. Place the lamp holder and microswitch into the body and push upwards until the unit clips into place.
8. Confirm that all playbuttons light up correctly (see Machine Modes chapter).

If a playbutton does not light up when it should, check the connections and the bulb.

Disassembly and Assembly Procedures:

To disassemble the playbutton (refer to Figure 4-7):

1. Remove the pushbutton assembly from the playbutton (as previously described).
2. Place a small screwdriver between the lens cover and the pushbutton and pry the lens cover off.
3. Turn the pushbutton upside-down, the lens and label should drop out.

To assemble the playbutton (refer to Figure 4-7):

1. Place the correct label between the lens cover and the lens.
2. Place the lens cover, complete with label and lens, onto the pushbutton and clip into place.
3. Replace the lens/pushbutton assembly into the playbutton, as previously described.

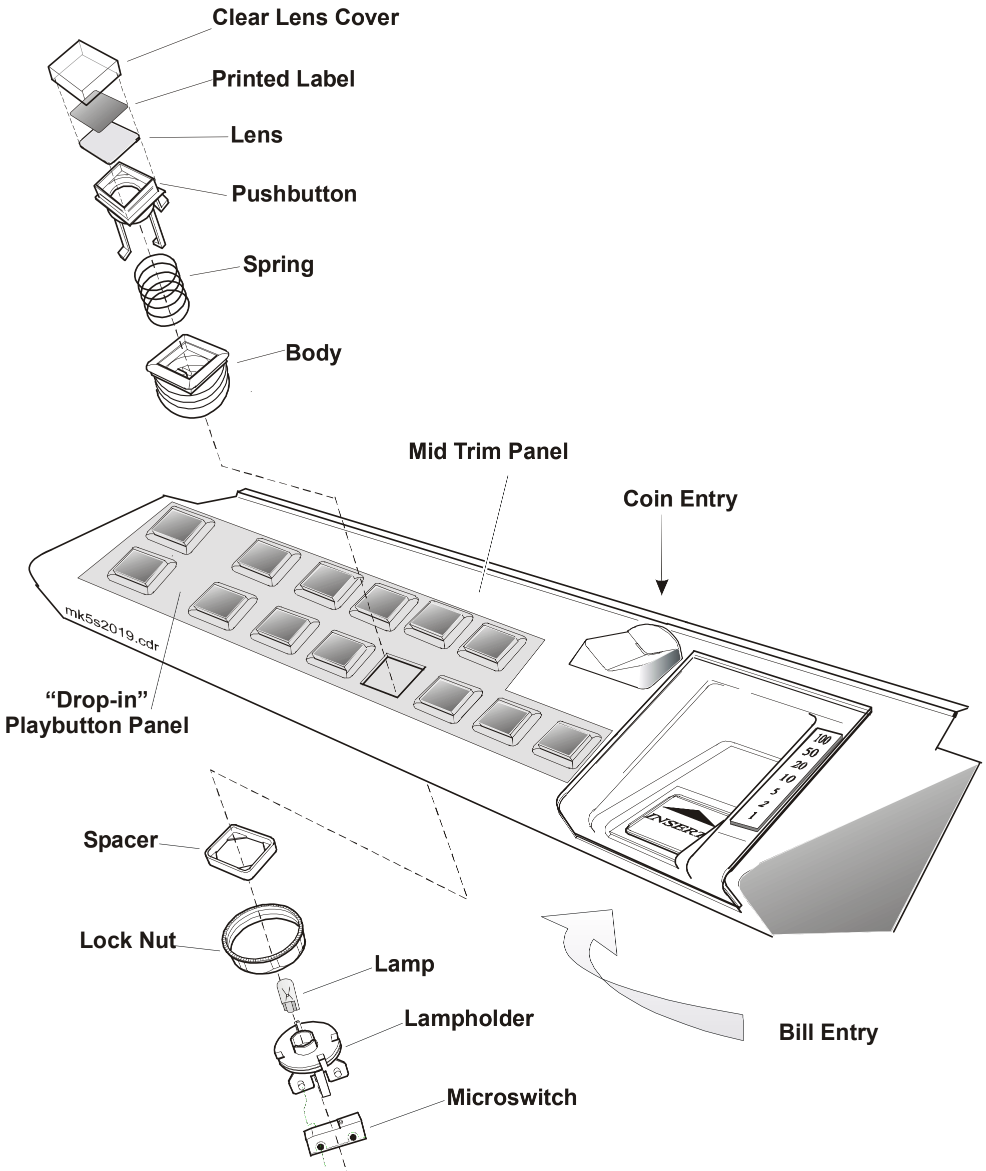


Figure 4-7 Playbutton: Exploded View

Monitor Mask

The monitor mask is molded from high-strength plastic. The mask and a foam tape gasket match the contour of the monitor to provide a protective seal against moisture and intrusion.

The mask is held in position by screws at the top and by the mid trim panel at the bottom.

Removal and Replacement Procedures:

To remove the monitor mask:

1. Open the cabinet door, and switch OFF the machine.
2. Remove the screws from the top of the mask.
3. Gently ease the monitor mask up and out of the door.

Replacement is a reversal of the removal procedure.

Coin Tray

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

Removal, Disassembly, and Replacement Procedures:

To remove the coin tray from the machine (refer to Figure 4-8):

1. Open the cabinet door, and switch OFF the machine.
2. Remove the six screws that secure the coin tray to the door.
3. Gently pull the coin tray assembly from the door.
4. The end caps can be removed from the chip tray by pressing the front panel of the chip tray in until the locating tabs disengage.

Replacement is a reversal of the removal procedure. When replacing the coin tray, the location tabs should be aligned with the corresponding slots on the bottom of the cabinet door.

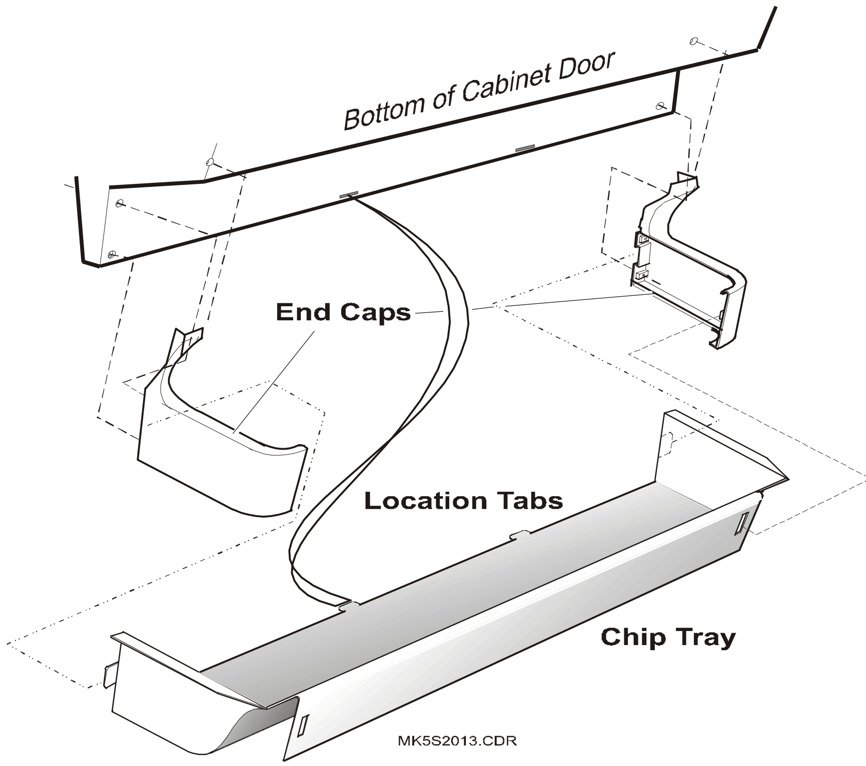


Figure 4-8 Coin Tray

4.2.3 Top Box

Machines 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 it is bolted to the top of the cabinet.

The top box front panel is molded plastic. The panel 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 top box door has lugs that fit underneath the top of the cabinet door when closed. This design ensures that the top box panel cannot be removed unless the main door is open.

The top box provides an area for displaying the game pay table and also increases the visual impact of the machine. Game theme artwork is displayed in the top box front panel. This panel is backlit by a fluorescent lamp located within the top box.

Printers, stand-alone progressive systems, and communication interfaces and Hyperlink™ meters may also be housed in the top box.

Top Box Panel

Removal and Replacement Procedures:

To remove the front panel from the top box (refer to Figure 4-9):

1. Open the cabinet panel, and switch OFF the machine.
2. Holding the panel by its sides, push it upwards to disengage the location tabs, and then pull the panel from the top box shell.

To replace the panel, locate the tabs on the top box door in the slots provided in the top box shell, then pull the door downwards into position.

Artwork

The artwork panel located in the top-box panel displays the game theme and acts as an attraction to players. It is backlit by the top box fluorescent lighting system.

Removal and Replacement Procedures:

To remove the artwork panel from the top box door (refer to Figure 4-9):

1. Open the cabinet door, switch OFF the machine, and remove the top box panel.
2. Remove the two side “hook” brackets by removing the top screw (both sides) and loosening the screw at the “keyhole” slot (both sides).
3. Loosen the center screw (“keyhole” slot position) of the top artwork-retaining bracket. Remove the bracket by sliding until the head of the screw aligns with the keyhole.
4. Gently slide the artwork panel out of the panel.

Replacement is a reversal of the removal procedure.

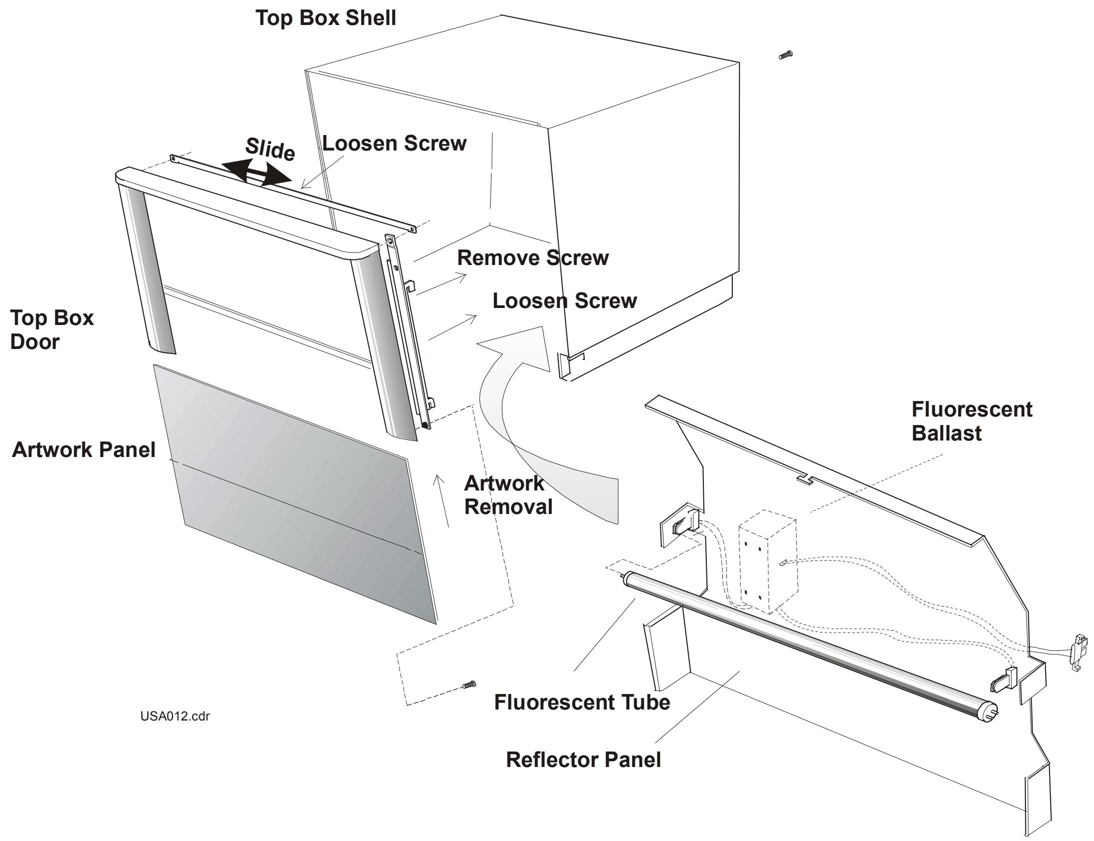


Figure 4-9 Top Box

Fluorescent Lighting

The top box is equipped with fluorescent lighting for illuminating the top box artwork panel. The fluorescent tube is mounted on the front of a reflector panel inside the top box. The tube is driven by an electronic fluorescent ballast, which is mounted to the back of the reflector panel. The fluorescent ballast receives 24 V DC from the power control assembly via a loom. The fluorescent lamp is a standard (IEC 81) 15 watt tube

Removal and Replacement Procedures:

WARNING
High voltages are present when the machine is switched ON. These voltages may be lethal.

To replace the top box fluorescent tube (refer to Figure 4-9):

1. Open the cabinet door, switch OFF the machine, and remove the top box panel.
2. To remove the fluorescent tube, rotate it 90° and pull it clear of its socket.
3. Insert the replacement fluorescent tube.

4. Replace the top box panel, turn ON the machine, and close and lock the main door. Check that the lighting system is operating properly.

To remove the top box reflector panel (refer to Figure 4-9):

1. Open the cabinet door, switch OFF the machine, and remove the top box panel.
2. Remove the two screws securing the reflector panel to the sides of the top box, then pull it forward/out of the top box.

Note
Two screws at the top secure the round top box reflector.

3. Unplug the cable from the fluorescent ballast.
4. Remove the reflector from the top box.

Replacement is a reversal of the removal procedure.

To replace the top box fluorescent lamp ballast (refer to Figure 4-9):

1. Open the cabinet door, switch OFF the machine, and remove the top box door.
2. Remove the reflector panel to gain access to the ballast.
3. Disconnect the looms from the ballast.
4. Squeeze the sides of the ballast housing to disengage the plastic clips, and remove ballast.

Replacement is a reversal of the removal procedure.

Light Tower

A light tower may be fitted to machines to provide an additional level of security, customer service and house control. The light tower is screwed to the roof of the top box (or the roof of the cabinet where a top box is not used) so that it may be seen from a distance. Light towers are available with either two or four tiers. The tiers of the light tower illuminate in response to player requests (change, reserve, etc) through the playbuttons and/or machine conditions (door open, jackpot, etc). The color of the light tower tiers and the corresponding messages and functions may vary from machine to machine. Refer to Chapter 3 - Machine Modes for a description of the light tower messages.

The light tower consists of colored plastic sleeves surrounding either two or four lamps. A threaded rod around which the circular sleeves are seated holds the assembly together. A plastic spacer on the treaded rod provides the correct spacing between the light baffles.

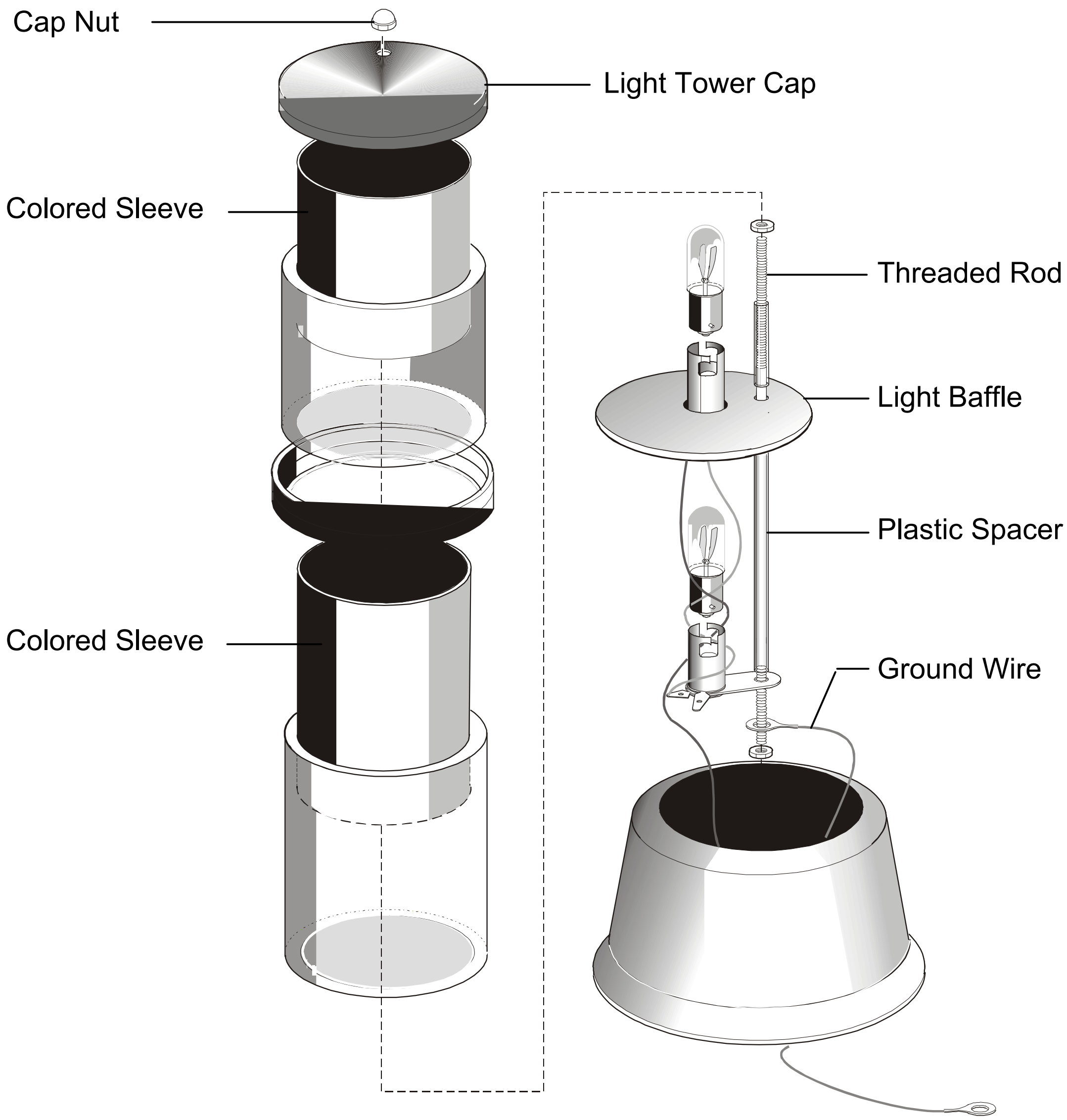


Figure 4-10 Two-tier Light Tower - exploded view.

4.3 General Maintenance

For the general maintenance of the cabinet, cabinet door and top box, the following procedures should be carried out as part of regular machine servicing:

- Clean the exterior of the machine using a non-abrasive household cleaning solution.
- Check that the belly panel door, cabinet door, and top box panel are not damaged.
- Check that all cabinet ground wires are in good condition and securely connected.
- Check the condition of the artwork panels. Replace if necessary.
- Check that the machine security features (eg: cabinet door security switch) are functioning correctly and are not damaged.
- Check the condition of the monitor mask and its sealing gasket. Replace if necessary.
- Check the fluorescent lighting system works correctly. Replace any faulty components if necessary.
- Check that all playbuttons function correctly. Replace if necessary.
- Check that there are no foreign objects in any of the security locks.
- Check that all doors and latches close and lock correctly.

Notes

Chapter 5

Power Supply Assembly

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5.1 Physical Description

The power supply assembly provides power to the electronic and electrical devices within the machine. It also performs electromagnetic interference (EMI) filtering and protects the system from adverse input disturbances such as lightning and voltage fluctuation.

The power supply metal enclosure is divided into two separate areas by an internal metal bracket. The area on one side of the bracket accommodates the mains filter, switches, fuses, surge protection, the solid-state relay, and wiring between the components mounted to the metal enclosure. The area on the other side of the bracket accommodates the off-line power supply, which consists of a switched mode power converter PCBA.

To provide easy access to the mains switch, it is located in a separate switch box that is positioned towards the front of the cabinet. The switch box is linked to the power supply box using mains cable. The mains ON/OFF switch controls the power to all equipment in the cabinet, apart from any equipment that may be powered from the auxiliary outlet, also referred to as the General Purpose Outlet (GPO).

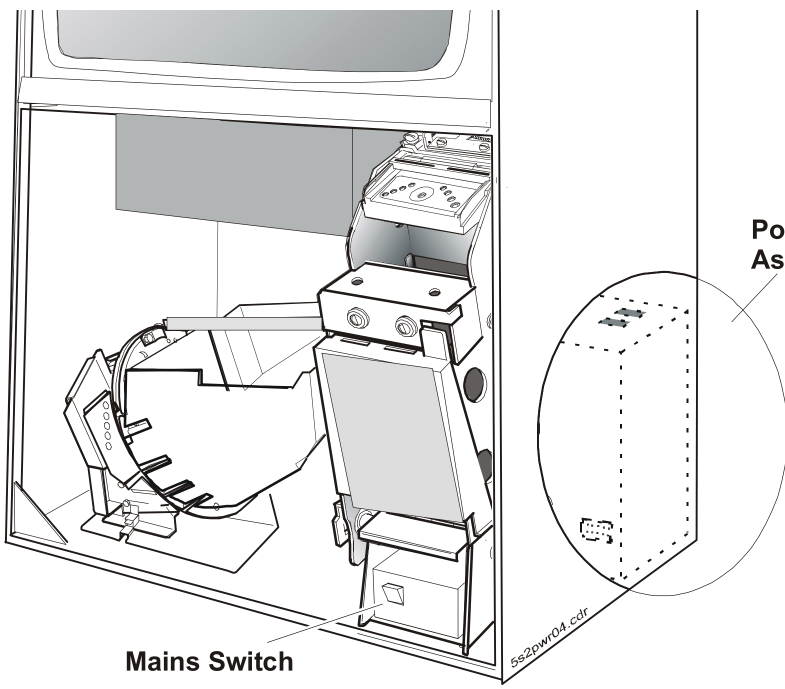

Figure 5-1 Power Supply Assembly Location

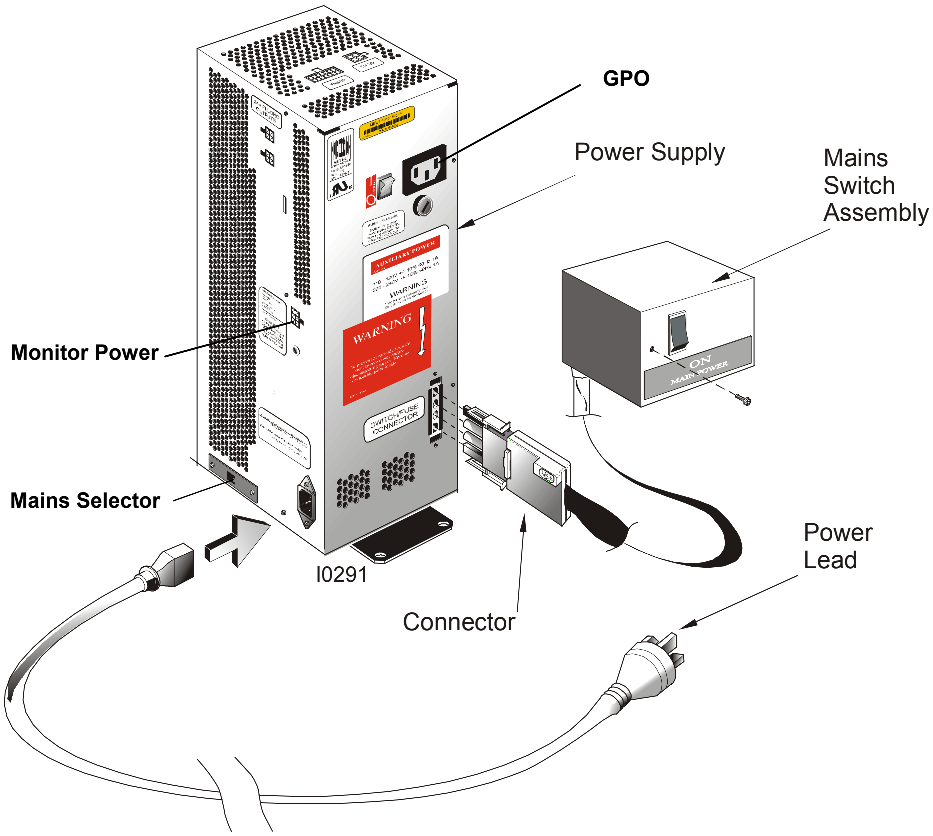

Figure 5-2 Power Supply Assembly

The power supply assembly consists of the following components:

- Mains switch (located in the switch box).
- Mains input socket.
- EMI filter and surge protection device.
- Switched mode power converter PCBA, internally fused.
- Mains selector switch. This switch is used to select the correct mains input voltage of either 120 V AC or 220/230/240 V AC.
- Generic 24 V DC output socket (connects to the Backplane to provide power for the low voltage components of the machine).
- 12 V DC output socket. This outlet provides power for subsidiary equipment.
- 24 V DC switchable output for the electronically driven fluorescent lighting system.
- Separately fused, switched mains output for the monitor
- Solid-state relay for switching monitor and fluorescent lamps to low-power mode.
- General Purpose Outlet (GPO)**.** This outlet is separately fused and switched and used to provide mains power for any accessories or test equipment that may need to be connected during maintenance.

5.2 Basic Operation

The power supply assembly receives 120/220-240 V AC mains input via a standard IEC socket.

The mains input is switched, filtered, and surge protected before connection to the monitor and the off-line power supply.

The off-line power supply unit consists of a switched mode converter on a PCB. It provides power outputs of 12 V DC and 24 V DC and the control signal Power Fail. The low-power mode feature, whereby power is switched off to the monitor and fluorescent tubes, is not used in the U.S. machine configuration.

The 24 V 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 12 V output is used to power subsidiary equipment or other machine peripherals.

A separately switched and fused mains GPO is provided via an IEC female connector.

The power supply operation and distribution are shown in the following diagrams:

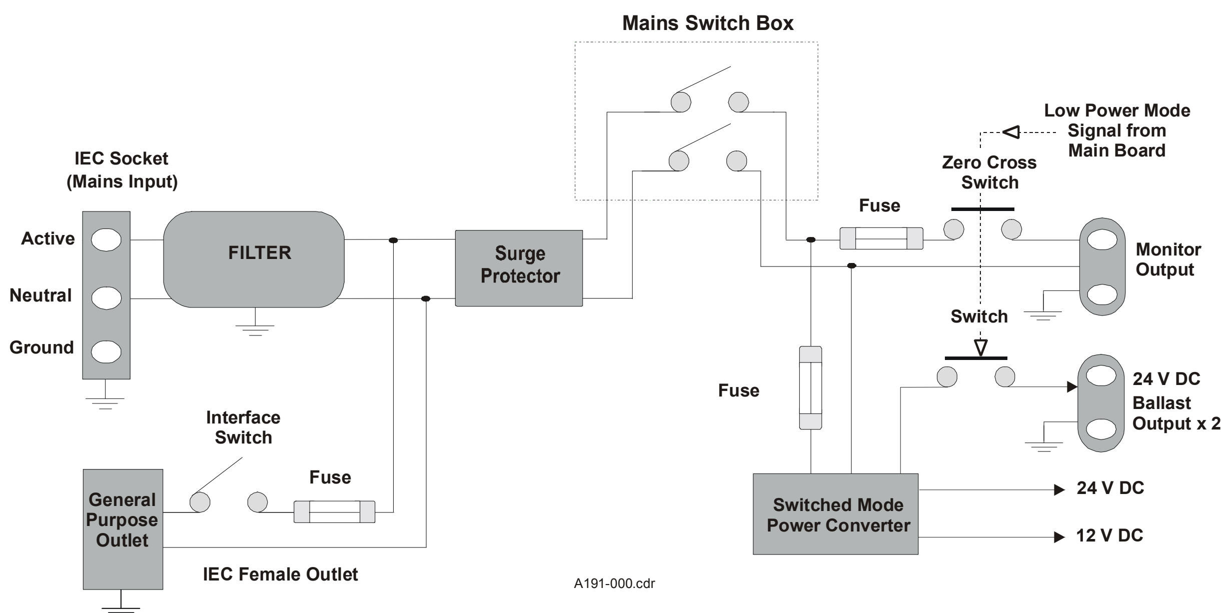

Figure 5-3 Power Supply Assembly Wiring Diagram

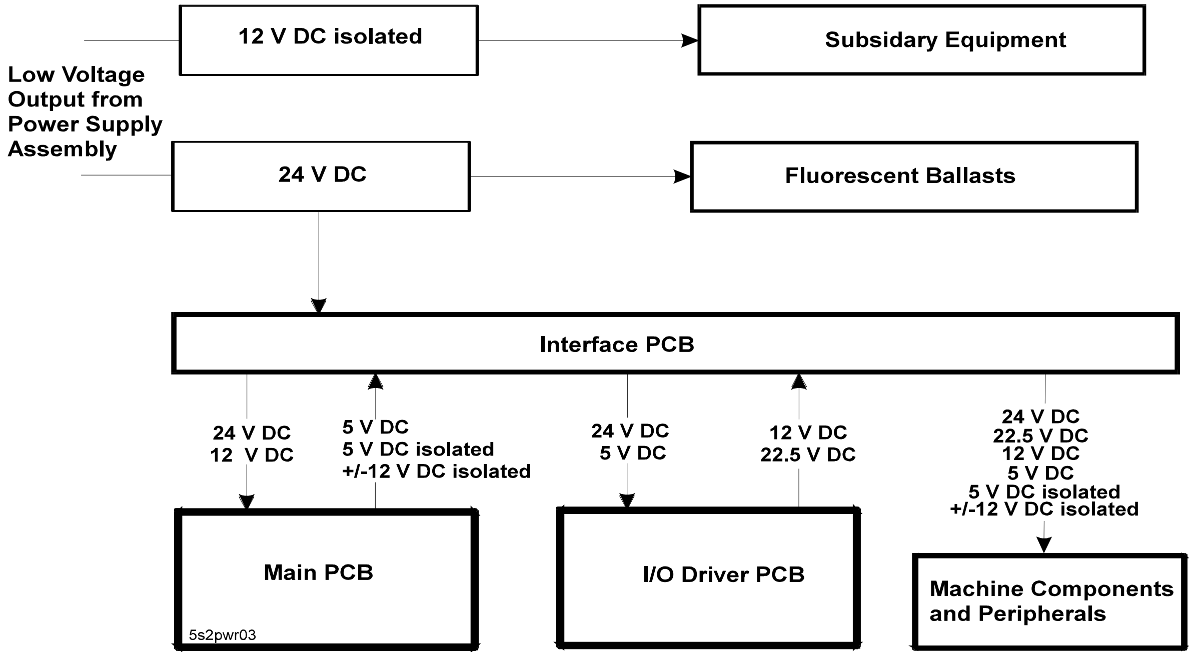

Figure 5-4 Low Voltage Power Distribution

5.3 Functional Specification

WARNING

The mains voltage selector switch must be set for the correct voltage range before power is connected to the machine. Selecting the wrong voltage may cause irrevocable damage to the machine.

5.3.1 Input Capability

The power supply assembly is designed to accept a nominal mains input voltage of either 110/120 V AC or 220/230/240 V AC. The mains input voltage defines the monitor outlet voltage and the GPO voltage. The mains selector switch must be set to the correct mains input voltage before power is connected. This switch is mounted on the metal housing of the power control assembly. The input voltage ranges are as follows:

220 V AC - 10% to 240 V AC + 10%, 50 Hz (198-264 V AC)

or

110 V AC - 10% to 120 V AC + 10%, 60 Hz (99-132 V AC)

Physical Connection

Mains input is via a standard IEC socket mounted on the metal housing.

5.3.2 Output Requirements

Mains GPO

Voltage and Current

+0%, -2% of the input mains voltage at 0 A to 1 A.

Physical Connection

Mains output is via a standard female IEC socket. This output is separately switched and fused. This fuse is accessible from outside the power supply assembly.

Monitor Output

Voltage and Current

+0%, -2% of the input mains voltage at 0 A to 1.2 A.

Physical Connection

The monitor output is provided via a Molex Minifit Junior 6-pin connector plug mounted on the metal housing. This output is separately fused, and the fuse is accessible from outside the power supply assembly.

Generic Output 24 V DC

Provides power to the Backplane for distribution to the Main Board, the I/O Driver Board, and other low-voltage machine components and peripherals. Maximum current is specified considering present requirements and allowing for future flexibility.

Vout = +24 V DC +/-5%

Iout = 0.5 to 15.0 A continuous

Ripple = 200 mVp-p, measured at 0-20 MHz

Fluoro Output 24 V DC

Provides power for the fluorescent lighting system.

Vout = +24 V DC +/-5%

Iout = 0.0 to 2.0 A continuous

Ripple = 200 mVp-p, measured at 0-20 MHz

Output 12 V DC

Provides power for subsidiary equipment. Isolation of 3 kV is provided from this output to other secondaries and primary.

Vout = +12 V DC +/-5%

Iout = 0.0 to 3.0 A continuous

Ripple = 200 mVp-p, measured at 0-20 MHz

Overcurrent Protection

Generic Output 24 V - The output is limited to current in the range 17.1 A to 22 A. The response time for the overcurrent circuit is between 20 and 150 ms.

The power will recover if the overcurrent duration is shorter than the recovery time. If the overcurrent duration is longer than the recovery time, the power supply shuts down and has to be switched off/on for 1-3 seconds to recover. During shutdown state, the output 24 voltage is less than 1 V DC.

Current limits are stated for no load condition in the fluoro 24 V output. Generic output protection includes a 2 A current margin dedicated to the fluoro lamps. Therefore, the current limits can be reduced by up to 2 A depending on the fluoro load.

Fluoro Output 24 V - The output is limited to a current exceeding 2 A. The output will recover when the overcurrent is removed.

Output 12 V - The output is limited to a current in the range 3.1-7 A. The power will recover when the overcurrent is removed. The response time for the overcurrent circuit is set to allow the fluoro drives to function correctly. During current limit status, the output voltage is less than 1 V and current is limited to 2 A maximum.

Overvoltage Protection

All peripherals connected to the 24 V output rail are protected against an accidental increase of the output voltage. When the voltage rises above 28±1 V, the entire power supply will shut down.

Inrush Current

Some peripherals exhibit significant inrush current when first powered. The power supply copes with these temporary transients and remains stable. Maximum steady-state current drawn from the 24 V output is 14.45 A. If a Westrex printer is fitted, it causes an additional current spike that increases the maximum current to 17 A. The steady-state current limitation for the output is 17.1 A. Therefore, the off-line converter is capable of handling the current demands of normal machine operation.

5.3.3 Control Signals

Low-Power Mode Signal

This signal is generated by the Main Board and is used to switch the machine to low-power mode. This feature is not used in this machine.

Power Fail Signal

The power fail signal provides a warning to the system of imminent mains failure. The power supply is designed such that one full missing period of mains (50 Hz or 60 Hz) cannot have any effect on the correct operation of the power supply assembly. The PFAIL signal is generated by the power converter PCBA when the input mains rectified voltage drops below a threshold. This feature maintains the +24 V DC output within regulation for a minimum of 25 ms following a power fail signal. This allows enough time for mechanical meters to finish counting and for the CPU to back up the audit data held in the machine RAM before the power shuts down.

After mains voltage recovery, PFAIL is inactivated when the 24 V output rises to 22.5 V.

5.3.4 Physical Connections

External Mains Switch Outputs

The mains switch is connected to the power supply box via a 4-pin AMP, Mate-N-Lock compatible, universal connector. This connector is used for its high current capability per pin.

The pin functions of this connector are shown below.

Table 5-1 External Mains Switch Connections

Pin	Signal	Comments
1	N ret	Mains neutral line switched
2	A ret	Mains active line switched
3	A	Mains active line to the mains switch
4	N	Mains neutral line to the mains switch

Off-Line Converter Output

Two secondary output connectors are provided: one for the 24 V DC output and the control signals, the other for the 12 V DC output.

The secondary output 24 V and the control signals are connected to the power supply assembly via a Molex Minifit Junior 14-pin connector soldered directly to the PCBA. The socket fits into an opening in the metal housing.

The pin functions of the connector are as described in the following table.

Table 5-2 Off-Line Converter Connections

Pin	Function	Destination	Comments
1	LowPower	J1-13	Low power mode (input)
2	OUTFAIL		Output 24 V correct (output)
3	output 24 V	P17-10	Power for machine, +24 V
4	output 24 V	P17-11	Power for machine, +24 V
5	output 24 V	P17-12	Power for machine, +24 V
6	output 24 V		Power for machine, +24 V
7	output 24 V		Power for machine, +24 V
8			
9	PFAIL	P17-14	Mains voltage missing (output)
10	output GND24	P17-3	Ground, +24 V
11	output GND24	P17-4	Ground, +24 V
12	output GND24	P17-5	Ground, +24 V
13	output GND24	P17-7	Ground, +24 V
14	output GND24		Ground, +24 V

The secondary output 12 V is connected via a 4-pin Molex Minifit Junior compatible header soldered directly onto the power supply PCBA. The socket fits into an opening in the metal housing.

The pin functions of the connector are as described in the following table.

Table 5-3 Secondary Output Pin Functions

Pin	Function	Destination	Comments
1	output 12 V	P17-1	isolated power, +12 V
2	output GND12	P17-8	ground, +12 V
3	—		—
4	—		—

These two secondary outputs connect to the 14-way Minifit Junior connector P17 on the Backplane. The pin assignment of the connector P17 is given in the following table.

Table 5-4 Connections to P17 on Backplane

Pin	Pin Name	Function
1	ISOLPIN	12V Isolated Power (before filter)
2	NC	-
3	GND	Gnd
4	GND	Gnd
5	GND	Gnd
6	NC	-
7	GND	Gnd
8	ISOLPGIN	12V Isolated Ground (before filter)
9	Keyway	Plastic Keyway
10	24V	24V
11	24V	24V
12	24V	24V
13	NC	-
14	NPFAIL	Power Fail

Fluorescent Lamp Outputs

Voltage and Current

24 V DC ±5% at 0 A to 2.0 A for all outputs.

Physical Connections

Two 24 V outputs are provided to power the top box fluorescent lamp and the cabinet door fluorescent lamps. The electronic ballasts used provide the possibility of daisy chaining the 24 V power rail for future adaptability. Outputs are via 4-pin Molex Minifit Junior compatible connectors, which are mounted on the metal housing. The pin functions are shown in the table below.

Table 5-5 Fluorescent Lamp Connections

Pin	Signal	Function
1	—	—
2	GND 24 V	ground, 24 V
3	—	—
4	+24 V	power for fluorescent lamps, +24 V

5.4 Removal and Replacement Procedures

WARNING
High voltages are present when the machine is switched ON. These voltages may be lethal.

Note
Run a complete machine test after replacing the power supply box or any power supply component.

Fuses

The switched mode power supply fuse is an internal non-serviceable component. If this fuse is blown, the power supply box must be shipped to the manufacturer for service (contact the nearest Aristocrat office).

The monitor fuse and the GPO fuse are externally accessible and may be replaced as described below (see Figure 5-2):

1. Open the cabinet door, and switch OFF the mains switch and the GPO switch.
2. Remove the fuse cap from the fuse holder by unscrewing it in a counter clockwise direction.
3. Remove the blown fuse and insert the new fuse into the cap. Insert the fuse cap into the holder, screwing it in a clockwise direction. Do not over tighten.

4. Switch ON the mains switch and the GPO switch. Check that the monitor has power and the GPO has power. Close and lock the cabinet door.

Power Supply Assembly

To remove the power supply assembly from the machine (see Figure 5-2):

1. Open the cabinet door, and switch OFF the mains switch and the GPO switch.
2. Remove the hopper to gain access to the power supply assembly (refer to the chapter Hopper).
3. Unplug all looms and connectors from the power supply box.
4. Remove the screw securing the ground lead from the power supply assembly to the cabinet.
5. Unscrew the two screws that secure the power supply assembly to the cabinet base. One of these screws is positioned below the mains input plug and cannot be removed while the plug is connected.
6. Pull the power supply assembly forward and remove from the cabinet.

Replacement is a reversal of the removal procedure. Ensure that the ground lead is correctly replaced.

5.5 General Maintenance

The following procedures should be carried out as part of regular machine maintenance: General Maintenance

- Check that all connections to the power supply box are secure.
- Remove any dust or dirt accumulating on the power supply

Chapter 6

Coin Handling Assembly

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6.1 Overview

The coin handling system consists of a coin acceptor for determining the validity of inserted coins, a coin diverter and coin chuting 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.

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

The coin acceptor, coin chuting and diverter solenoids are mounted to a panel on the inside of the cabinet door (see Figure 6-1). Coins inserted into the machine pass through the acceptor. The acceptor sends signals to the Main Board, via the Interface Board, that allow the machine software to update the credit meters. Accepted coins are directed to the accept chute, and rejected coins are directed to the chip tray via the reject chute.

The coin diverter solenoid is powered 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.

One of several comparators/validators may be fitted as part of the coin handling assembly. A coin comparator compares the properties of inserted coins with the properties of a sample coin installed in the comparator. A coin validator, on the other hand, compares the properties of inserted coins with preset limits stored in the validator software.

The machine is compatible with at least the following coin comparators/validators:

1. Coin Mechanisms Inc. MC-62 Coin Comparator.
2. Condor CP133S Validator.
3. S7 Coin Validator in single coin mode.

The MC-62 comparator and Condor validator are described in this chapter.

6.2 MC-62 Coin Comparator

6.2.1 Basic Operation

The operation of the coin chute assembly is shown in Figure 6-1.

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

Rejected Coins

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

Alarm

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

- the machine displays a fault message
- an alarm is sounded
- the machine is locks up.

Accepted Coins

If the comparator 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 are incremented. The coin diverter solenoid directs the accepted coins to the hopper. If the hopper is full, the coin diverter solenoid redirects the accepted coins to the cash box via the cash box feed chute. A photo-optic sensor is used to monitor the position of the coin diverter.

Components

The MC-62 Coin Comparator contains the following major components (see Figure 6-2):

- sensor coil
- dampener arm
- coin accept solenoid
- photo-optic emitter and detector
- comparator PCBA
- wiring loom.

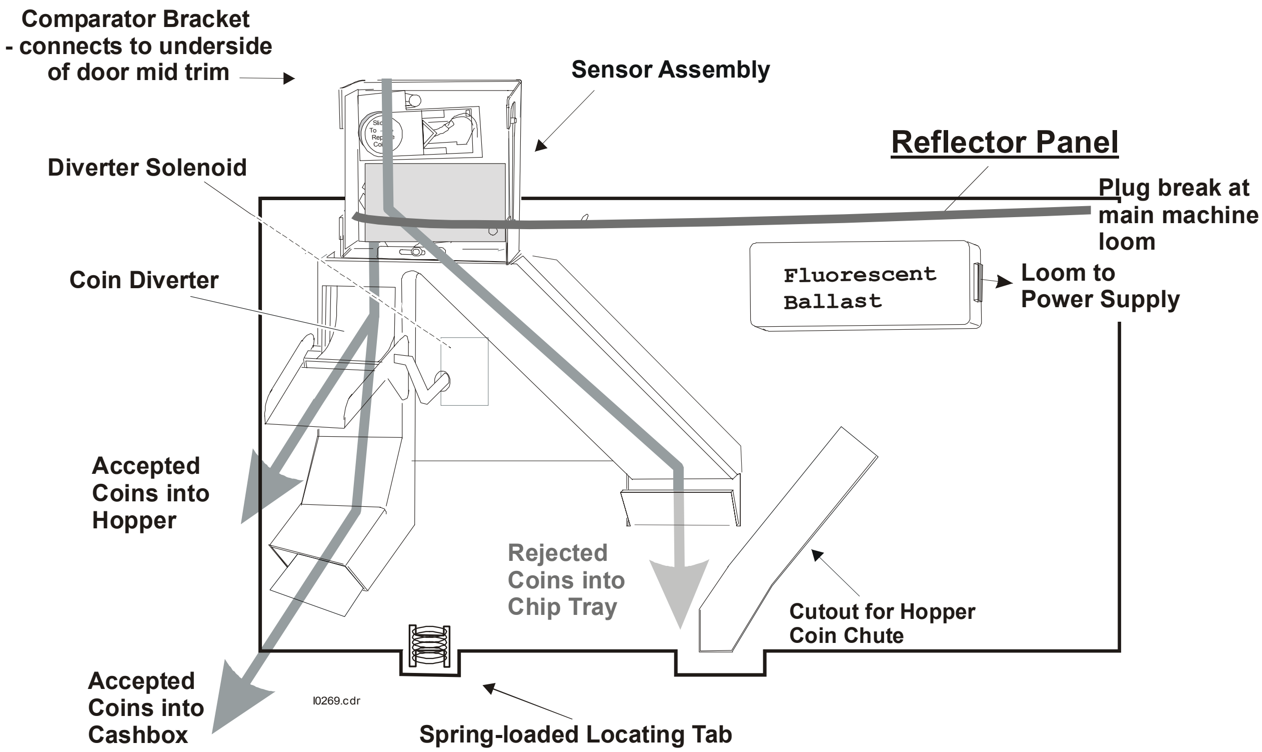
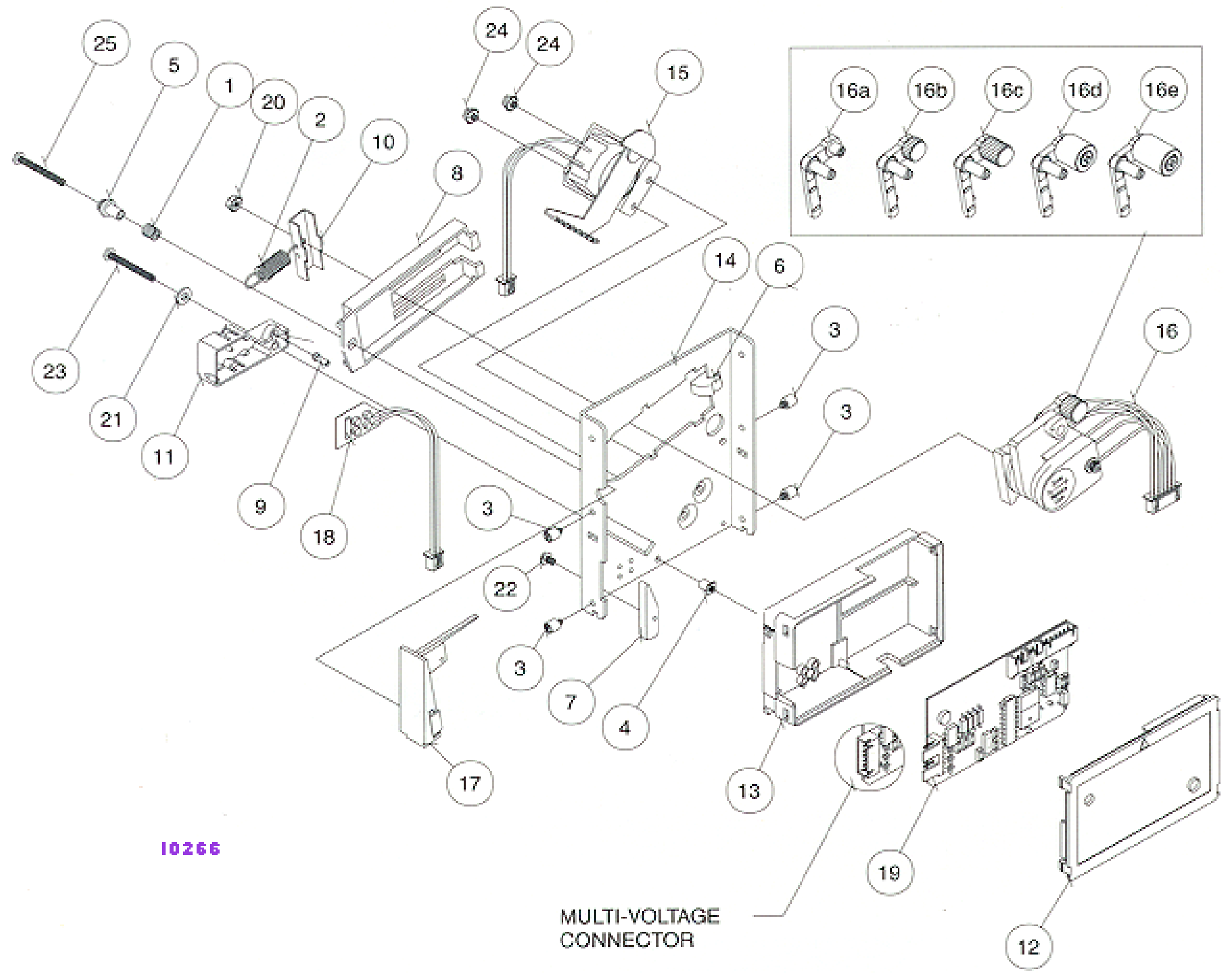


Figure 6-1 MC-62 Coin Chute Assembly - Location

6.2.2 Functional Description

The comparator performs the following functions:

- drives the sensor coils
- monitors the pick-up coil for valid coins
- activates the coin accept solenoid when a valid coin is detected
- monitors the coin travel using photo-optic sensors
- provides signals to the Main Board indicating when a valid coin has been detected, when a coin has left the sensor assembly, and when incorrect coin travel has been detected.



MATERIAL COLUMN							
ITEM	P/N	QTY	MATL DESCRIPTION	ITEM	P/N	QTY	MATL DESCRIPTION
1	04050027	1	SPRING, COMPRESSION, COIL RETAINER	16	0625XXXX	1	COIL, ASSY, SENSOR,
2	04050031	1	SPRING, EXTENSION, COIL LOCKING	16a	06660051	——	DAMPER & WEIGHT, ASSY, 0.7G
3	04060006-01	4	STUD, #6 MTG	16b	06660012	——	DAMPER & WEIGHT, ASSY, 2.6G
4	04060036	1	INS, NUT, #4-40	16c	06660013	——	DAMPER & WEIGHT, ASSY, 6G
5	04060052-01	1	BUSHING, SPRING RETAINING	16d	06660046	——	DAMPER & WEIGHT, ASSY, 12G
6	04660002	1	STOP, SENSING COIL SAFETY	16e	06660014	——	DAMPER & WEIGHT, ASSY, 14.26G
7	04660021	1	SPACER, COIN EXIT, .155	17	06660038	1	RAIL, ASSY, SM RAIL, STD INSERT
8	04660030	1	SHIELD, SENSOR COIL RETAINING	18	09270205	1	PCB, COMP, SECURITY
9	04660034-02	1	PIN, COIN DEFLECTOR	19	0927XXXX	1	PCB, CTRL, CC46,
10	04660062-01	1	BRKT, COIL LOCKING	20	436-4	1	NUT, 4-40, HEX, KEPS
11	04660150	1	HOUSING, CC-46, PCB, OPTICS, EMIT	21	600-4	1	WASHER, FLAT, #4
12	04660165	1	COVER, PCB HOUSING, UNIVERSAL	22	P-104-4-3	1	SCREW, 4-40 X 3/16, PHIL, PH, MS
13	04660166	1	HSG, PCB, UNIVERSAL	23	P-104-4-11	1	SCREW, 4-40 X 11/16, PHIL, PH, MS
14	04660151-05	1	MAINPLATE, CC-46, DBL OPTIC	24	P-186-4-3	2	SCREW, 4-40 X 3/16, PHIL\SQ, INT SEMS WASHER
15	06250001	1	COIL & BRKT ASSY GRN 4 2PST	25	P-221-4-12	1	SCREW, 4 X 3/4, PHIL, TYPE 45, PLASTITE

Figure 6-2 MC-62 Coin Comparator - Exploded View

When a coin enters the sensor assembly, it hits a weighted lever which slows down the passage of the coin. Weights on the lever can be changed to suit the coin denomination.

The coin then passes the scanner unit (see Figure 6-3), which contains three sensor coils, L1, L2 and L3. L1 and L3 are driven by the PCBA to create a magnetic field. The central coil, L2, is a pick-up coil used to monitor 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. This null is detected by the comparator and registered as a valid coin.

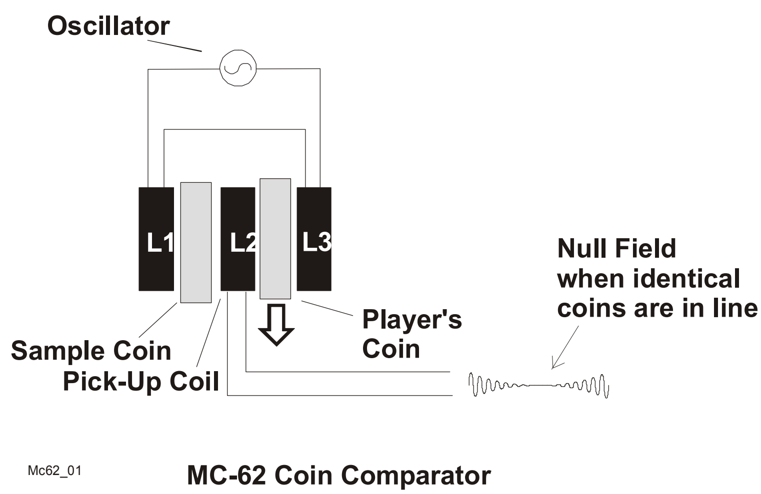


Figure 6-3 MC-62 Sensor Coil Arrangement

When the comparator registers a valid coin, it sends a CSENSE signal to the Driver Board and activates the coin accept solenoid. This solenoid is attached to a gate that opens when the solenoid is activated, allowing the valid coin to fall directly into the accept chute.

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 comparator to detect the speed and direction of the passing coin.

If the coin is travelling in the wrong direction or is travelling too slow, then a CERROR signal is sent 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 will be either a coin reverse, coin acceptor fault, or coin optic fault.

If the coin passes normally then a CCREDIT signal is sent to the Driver Board.

When the machine is paying out, the Main Board sends the signal NECOINBLK to disable the coin comparator. If any coins are inserted in the coin entry during this time, the comparator directs them to the reject chute.

6.2.3 Replacing the Sample Coin

To replace the sample coin (refer Figure 6-4):

1. Open the cabinet door, and switch OFF the machine.
2. Slide the scanner unit (on the sensor assembly) to the right on the rail insert until the sample coin can be removed.

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

3. Insert a newly minted sample coin in the scanner unit.
4. Carefully release the scanner unit.
5. Check that the sample coin is seated firmly between the scanner unit and the fork of the rail insert.
6. Switch ON the machine, and close and lock the cabinet door.

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Figure 6-4 MC-62 Sensor Assembly

6.2.4 Removal and Replacement

To remove the comparator sensor assembly (see Figure 6-4):

1. Open the cabinet door, and switch OFF the machine.
2. Carefully unplug the connector from the sensor assembly. Do not pull on the wires.
3. Push the assembly upwards, to the full extent of the top locating groove. This action causes the sensor unit to come free of the bottom locating groove.
4. Swing the bottom of the unit outwards.
5. Pull the sensor assembly downwards and clear of the coin chute assembly.

To replace the sensor assembly, reverse the above procedure.

6.2.5 MC-62 Comparator Connector Pinouts

The connector J1 on the right of the comparator PCBA connects to P14 on the Interface Board.

The coin interface section of the I/O Driver Board receives the signals from the coin comparator and solenoid optics and converts them into the form required by the Main Board. For a description of the coin-handling interface refer to the I/O Driver Board chapter.

The signals to and from the coin comparator are shown in the following table.

Table 6-1 J1 - Connects to the Interface Board

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	

6.2.6 Fault Finding

Table 6-2 Fault Finding, Comparator MC-62

Fault	Probable Cause	Corrective Action
Coins continually rejected.	A. Sample coin not in the correct location in the comparator.	Check that the sample coin is correctly located.
	B. Comparator not working.	Check that the comparator has power. If it has, replace the comparator.
Coins jamming in the cash box feed chute.	The cash box chute is blocked or misaligned.	Unblock / realign the chute and tighten the fixing screws.
All coins are going to the cash box and the hopper is empty.	The diverter solenoid is not working.	1. Check that the solenoid has power. 2. Check that the coin diverter has not jammed. 3. Check that the hopper probe is not permanently grounded.
Rejected coins not falling into the coin tray.	Coins jammed in the reject chute.	Carefully clear the reject chute.
Coins accepted by the comparator but not registered as credits. The machine locks up.	The photo-optic module in the comparator is faulty.	Check that the module and its connectors are secure. Replace if necessary.

6.3 Condor Plus Coin Validator CP133S

6.3.1 Basic Operation

The operation of the coin chute assembly is shown in Figures 6-5 and 6-6.

The Coin Validator CP133S is pre-programmed to accept a specific coin type. The Condor Plus is available in two versions: one is field reprogrammable; the other is not. The validator is clearly labelled with the pre-programmed coin type.

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

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

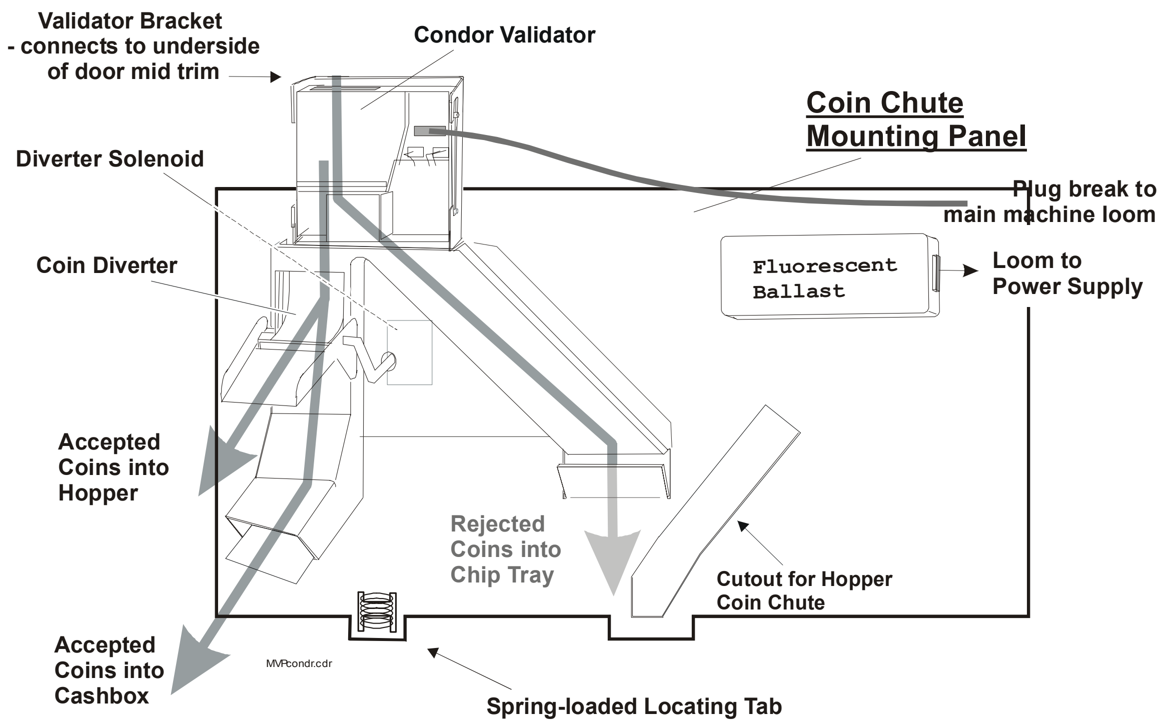

Figure 6-5 Condor Coin Handling Assembly

The inductive sensor pair has been designed to achieve 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 are positioned on opposite sides of the coin path and are switched between in-phase and anti-phase as the coin passes. The network impedance is affected by the coin thickness and conductivity. The resulting amplitude change is measured by a microcontroller and forms the basis of the inductive discrimination. The readings are compared against preset limits stored in the validator.

The opto 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 opto 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 is deemed true, the Valid Advance Coin Signal (VACS) output pulse is generated, and the coin accept solenoid is activated. 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 is generated.

Accepted coins are directed to either the hopper or the cash box, 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 travelling in the wrong direction (yoyo) or a failed or blocked credit or reject optic, an Alarm output pulse is generated.

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, the effect of removing the unit from the calibrated environment to perform a coin acceptance test (eg, while holding in the hand) might be a high reject rate.

Diagnostics

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

- Inductive Coils
- Reflective Sensors
- Diameter Opto Sensors
- Credit Opto Sensors

If there is a failure in any one of these areas, the LED will flash red continuously and the validator will not accept any coins until power is removed and the fault condition corrected.

Debris Flap

The CP133S Validator incorporates a debris flap that allows direct access to the coin path for inspection and the clearance of coin jams.

6.3.2 Removal and Replacement

To remove the validator:

1. Open the cabinet door, and switch OFF the machine.
2. Carefully unplug the loom from the validator. Do not pull on the wires.
3. Push the assembly upwards, to the full extent of the top-locating groove. This action causes the validator to come free of the bottom-locating groove.
4. Swing the bottom of the unit outwards.
5. Pull the validator downwards and clear of the coin chute assembly.

To replace the coin validator, reverse the above procedure.

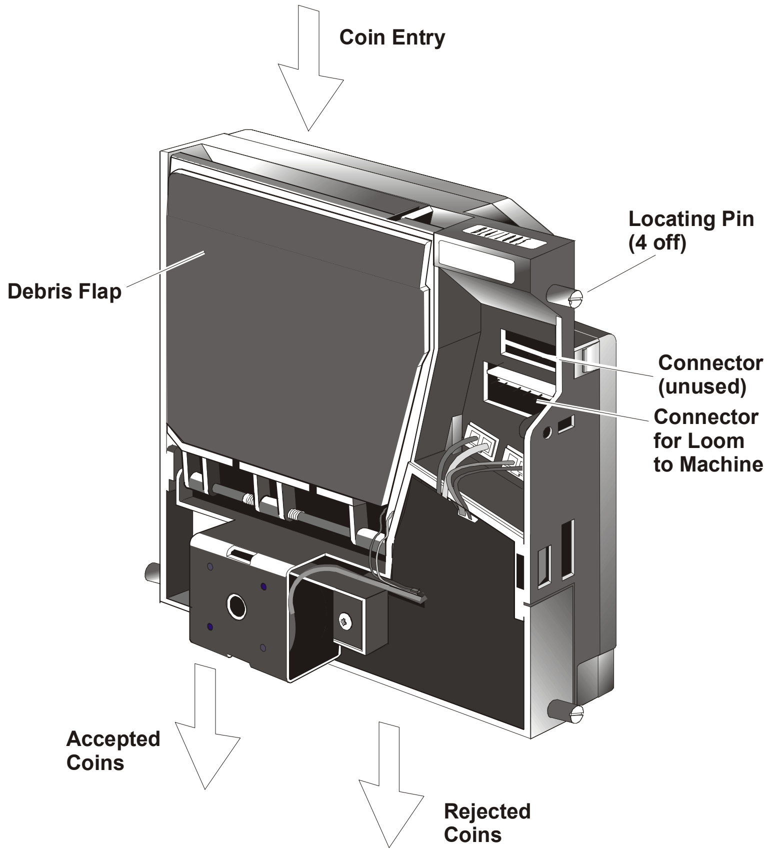

Figure 6-6 Condor Coin Validator

6.3.3 Cleaning Procedure

Equipment needed.

- Short bristle paintbrush or toothbrush.
- Clean lint free cloth.
- Pozidrive torque screwdriver and flat-blade screwdriver.
- Cotton buds.
- Water based mild detergent i.e. dish washing liquid and water.
- **Do not use solvents instead of the detergent.**

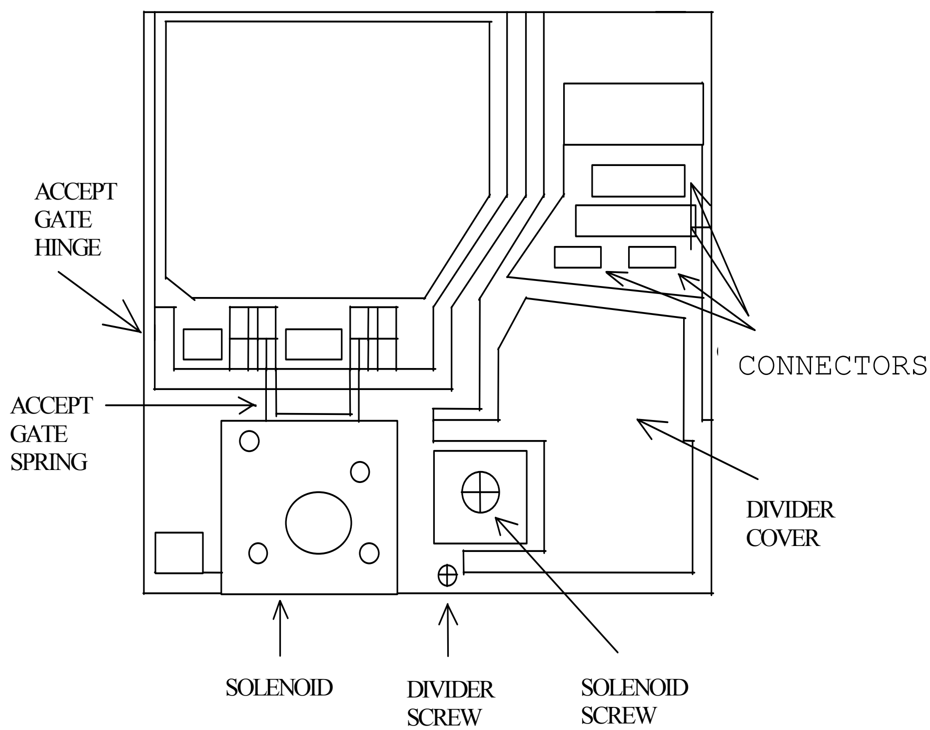

Figure 6-7 Condor Validator – components

Removal of the Accept Gate and the Divider Piece

- Remove the two connectors from their sockets, using long nosed pliers, (**do not** pull them out by the wires).
- Remove the divider screw (in large coin builds, a metal ring is fitted in the body under the screw), taking care not to lose the ring (if fitted). Refer to Figure 6-7.
- Insert a thin edged screwdriver level with the hinge, far most left of the hinge, between the body and the divider section, and pry up the divider section and remove. Refer to Figure 6-8.
- In small coin builds there is a coin deflector inserted on the bottom left-hand side of the body. Take care not to lose this piece. Refer to Figure 6-9.

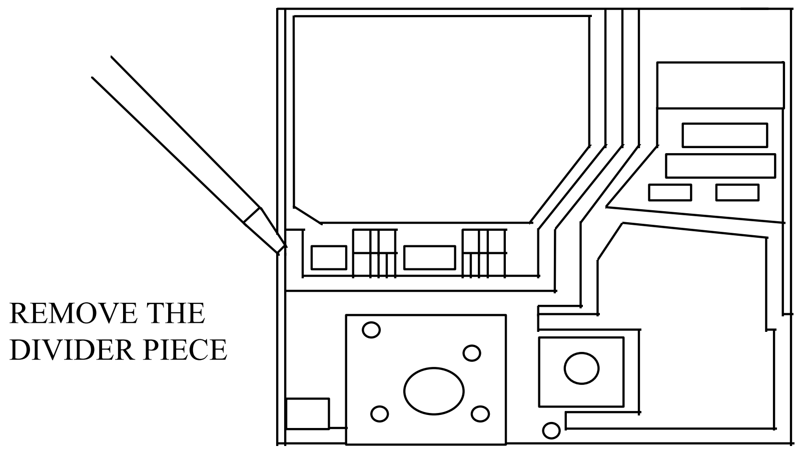

Figure 6-8 Removing the Divider Piece

Cleaning the Photo-Optics

- To clean the left and right hand optic in the coin path, moisten the paintbrush with the cleaning fluid, and remove all residue. Refer to Figure 6-9.
- To clean the deflector opto light guide, moisten the cotton bud and rub gently until the residue is removed.
- To clean the credit optic, moisten a cotton bud with the cleaning fluid, and remove the residue present.

Cleaning the Coin Path and Gate Piece

- To clean the coin path and gate piece, moisten the lint free cloth with the cleaning fluid and rub off all the residue present. Refer to Figure 6-10.

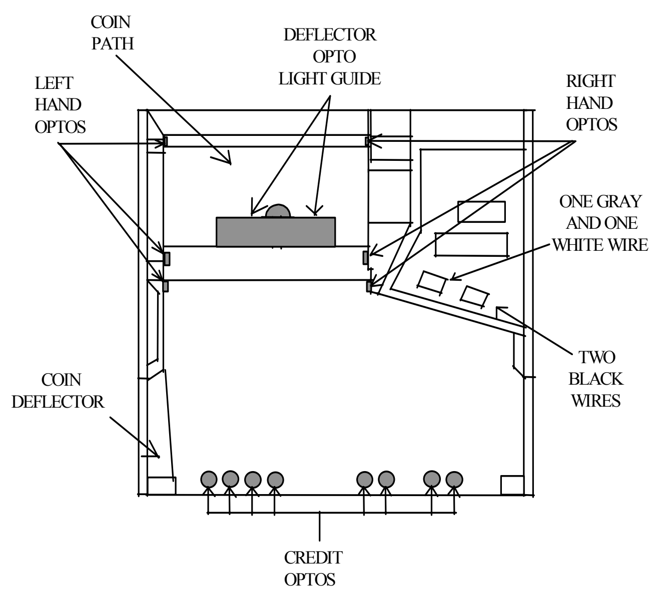

Figure 6-9 Condor Photo-Optics

Cleaning the solenoid

- Check the solenoid for any fluid residue and freedom of movement, and that the pole piece does not stick inside the solenoid. Refer to Figure 6-10.
- If residue is present, remove the solenoid screw. Refer to Figure 6-7.
- 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.
- Moisten a cotton bud with the cleaning fluid, and remove all the residue. Check that the solenoid has freedom of movement.
- Re-insert the pole piece and spring back into the solenoid and replace the circlip if one was removed. Lifting the accept gate spring out of the way, re-insert the solenoid into the divider piece, and re-insert the screw, and tighten with a torque screwdriver to 47 inch-oz.

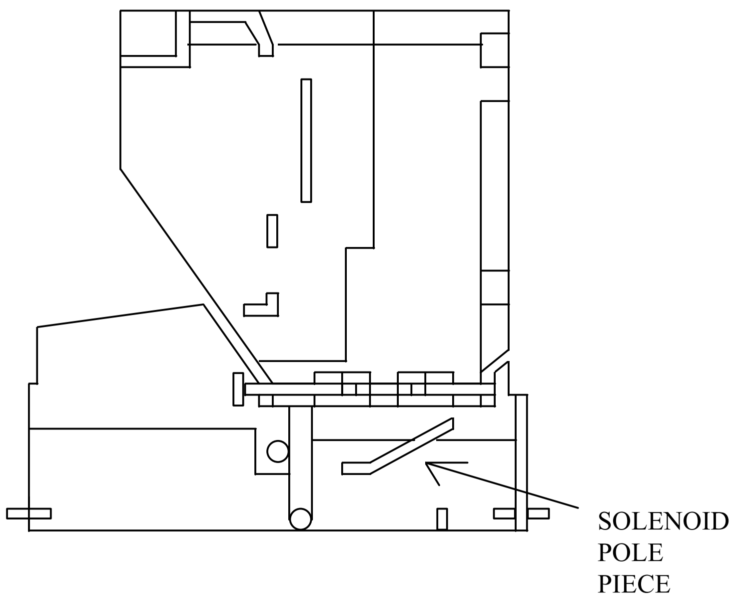

Figure 6-10 Solenoid Pole Piece

Replacing the Divider Piece and the Gate Piece

- Ensuring the coin deflector piece is in place, if one was fitted, hold the gate piece and the divider piece flush with each other.
- Position them at a 45° angle from the left-hand side (refer to Figure 6-11), align the plastic stud on the left-hand side of the divider piece with the hole on the left-hand side of the body.
- Twist the divider piece and the gate piece together to the left, ensuring the plastic stud goes into the hole in the body.
- Press down on the divider cover until the divider piece clicks into place within the body.
- Re-insert the metal ring into the body, if one was fitted. Insert the screw and tighten with a torque screwdriver to 47 inch-oz.
- Now re-insert the connectors into their relevant polarized positions.

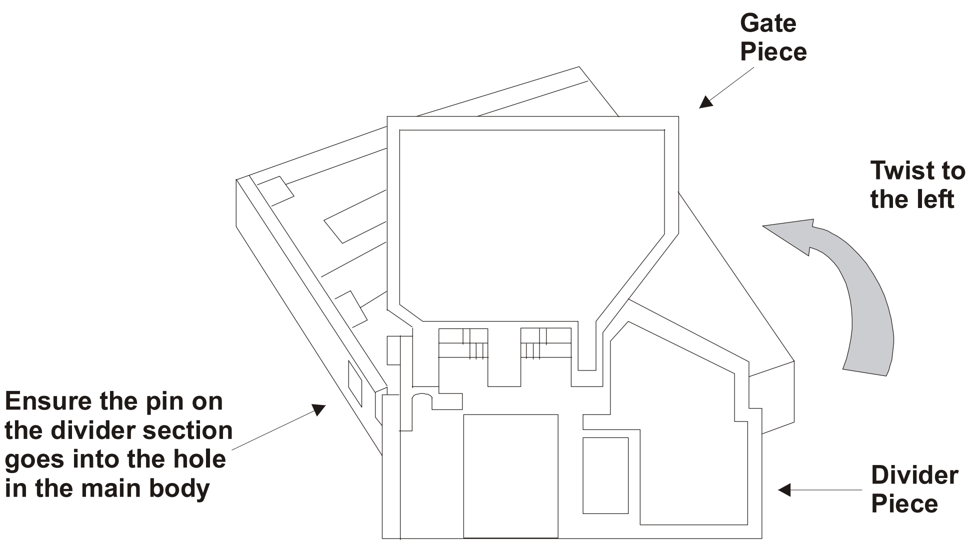

Figure 6-11 Replacing the Gate Piece and the Divider Piece

6.3.4 CP133S Coin Validator Connector Pinouts

The connector J1 on the right of the validator connects to P14 on the Interface Board.

The coin interface section of the I/O Driver Board receives the signals from the coin validator and solenoid optics and converts them into the form required by the Main Board. For a description of the coin-handling interface refer to the I/O Driver Board chapter. The signals to and from the coin validator are shown in the following table.

Table 6-3 Condor Validator Interface Signals

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

6.3.5 Fault Finding

Table 6-4 Fault Finding, Validator CP133S

Fault	Probable Cause	Corrective Action
Coins continually rejected.	Validator fault	1. Check that the validator has power. 2. Remove any blockage or debris from the validator. 3. Otherwise, replace the validator.
All coins are going to the cash box and the hopper is empty.	The diverter solenoid is not working.	1. Check that the solenoid has power. 2. Check that the coin diverter has not jammed. 3. Check that the hopper probe is not permanently grounded.
Rejected coins not falling into the reject tray.	Coins jammed in the reject chute.	Carefully clear the reject chute.

6.4 Diverter Solenoid and Photo-Optic Sensor

6.4.1 Physical Description

Figure 6-12 shows the diverter solenoid and the photo-optic sensor, mounted on the door reflector panel.

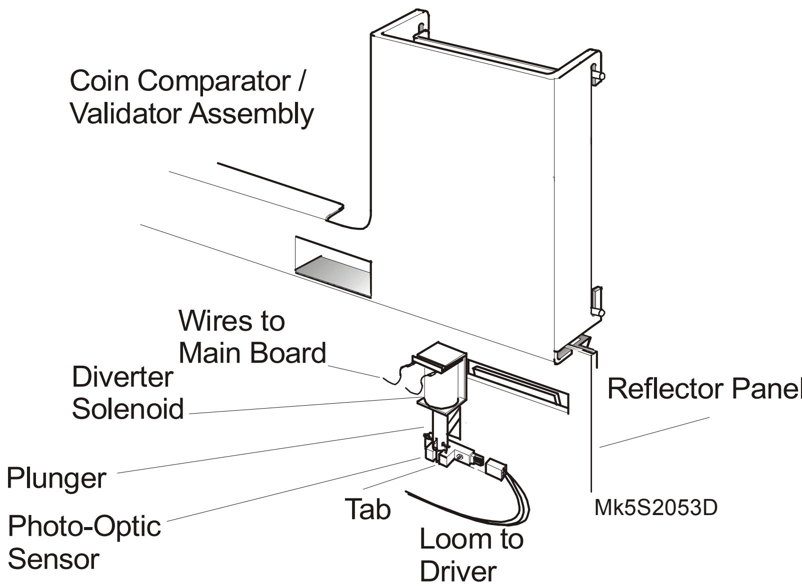

Figure 6-12 Diverter Solenoid and Photo-Optic Sensor

6.4.2 Basic Operation

The solenoid plunger is mechanically linked to the coin diverter in the coin chute assembly. When no power is applied to the solenoid, the plunger is extended and valid coins fall into the hopper. When 24 V DC is applied to the solenoid, the plunger retracts, causing the diverter to redirect valid coins to the cash box. A tab at the lower end of the plunger interrupts the beam in the photo-optic sensor when the plunger is fully extended.

In this way, the machine 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 fault message COIN DIVERTER FAULT. The diverter changes position only at the end of a game.

6.5 General Maintenance

For general maintenance of the coin handling system:

- **Coin Comparator**
  - 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.

Note
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**
  - Check that all assembly bolts and nuts are tight.
  - Clean the coin chuting 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 faces with a clean dry cloth or a soft, long-bristle paintbrush.
  - Check that the photo-optic sensor is seated correctly.
  - Check that the loom sockets are secure.

Notes

Chapter 7

Hopper

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7.1 Physical Description

The Aristocrat Disc Hopper (ADH) is mounted onto a base plate that slides into a guide plate on the base of the cabinet (see Figure 7-1). It is locked in position by a spring-loaded release pin.

When the hopper is pushed into position, a socket at the back of the hopper automatically connects to a plug on the cabinet base. This socket provides power and control signals to the Hopper PCBA, which controls the hopper.

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

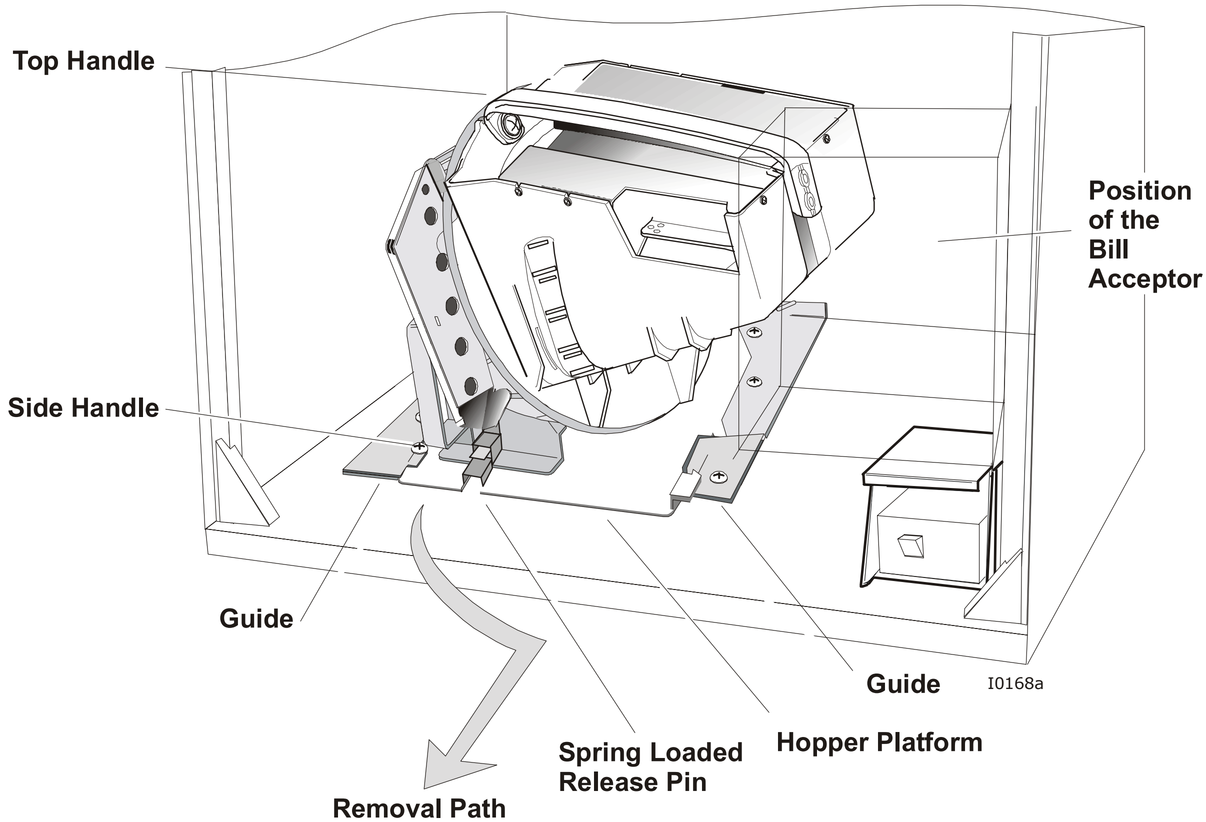

Figure 7-1 Hopper Location

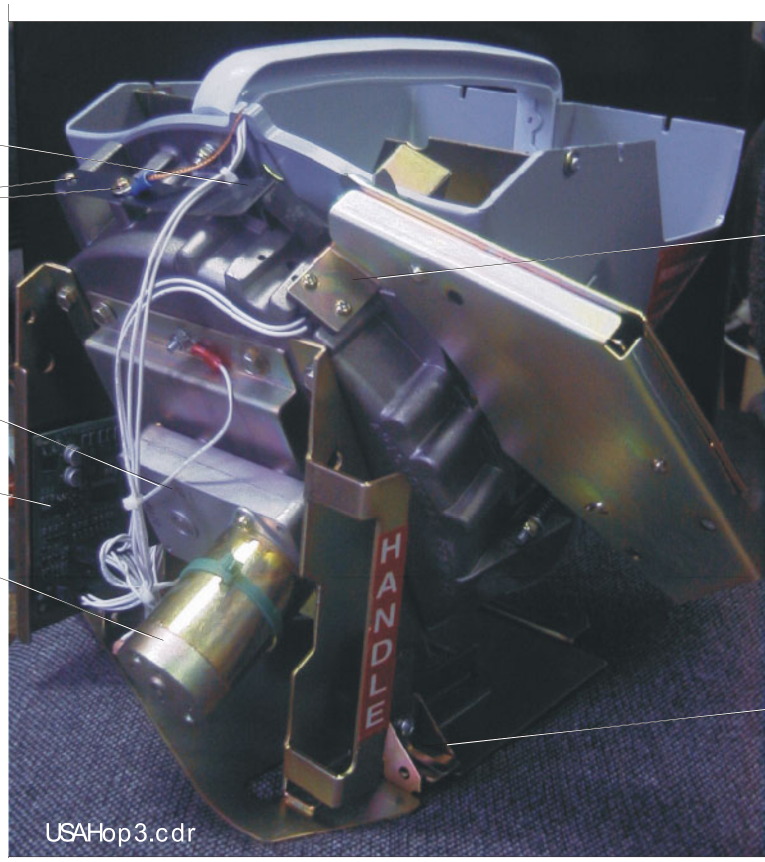

Figure 7-2 Hopper- rear view

Hopper Parts

The stationary parts of the hopper are (see Figure 7-3):

- the casting — with gearbox, side handle, and motor attached
- the bowl — with internal baffles, coin slider, and probe which is secured to the casting plate. One fixed and three spring-loaded bolts attach the bowl to the casting.
- The coin runner (also called the “knife”).

The parts of the hopper that are rotated by the motor are (see Figure 7-3):

- the disc
- the shelf wheel
- the coin stirrer.

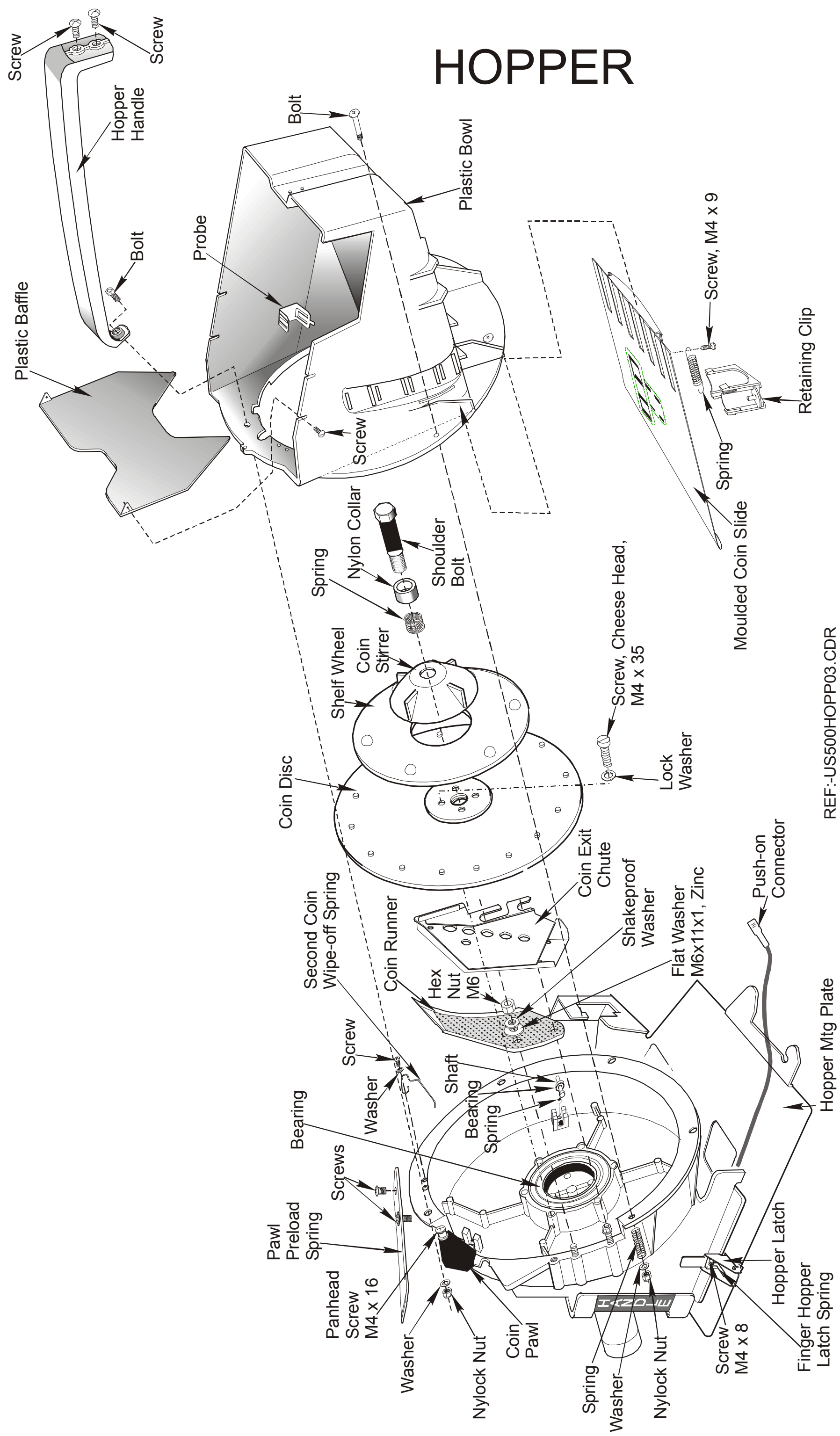

Figure 7-3 Hopper Exploded View

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.

The photo-optic detector is mounted in one of two positions: Position X or Position Y in Figure 7-2.

7.2 Basic Operation

The hopper holds and dispenses coins. Coins entering the gaming machine are fed into the hopper or the cash box through the coin handling system. Coins are fed into the cash box when the hopper is full.

The hopper dispenses coins into the coin tray when the player has sufficient credits and presses the CASHOUT pushbutton. Coins are dispensed via the hopper coin exit chute which juts out through the slot in the door reflector panel. The hopper can pay out any number of coins above the token value and below the collect limit. The token value is the coin value accepted by the machine, and the collect limit is the maximum value of coins that can be paid from the hopper. These parameters are set in the relevant audit screen.

If the player presses the CASHOUT pushbutton when the number of coins in credit is greater than the collect limit, the machine locks up. The credits are paid as a book pay by the cashier, and the machine must be reset using the Jackpot Reset (Cancel Credit) key.

If the player presses the CASHOUT pushbutton when the number of coins in credit is less than the cancel credit amount but greater than the number of coins in the hopper, all coins in the hopper are dispensed. The machine then locks up. The attendant must refill the hopper and reset the machine before the balance of coins is dispensed.

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

7.3 Functional Description

Coin Dispensing

On receiving a drive signal from the Main Board, the Hopper PCBA starts the hopper motor. The motor rotates the disc in an anticlockwise direction.

As the disc turns, the coins are caught 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 excess coins are cleared by the second coin wiper.

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. For each coin entering the exit coin chute, the photo-optic detector sends a signal to the Main Board.

The individual coins exiting the hopper interrupt the photo-optic detector, which sends a signal to the Main Board, via the Hopper PCBA and the Backplane. The Main Board counts the optic interrupts, and when the correct payout number is reached, it terminates the hopper drive signal to the Hopper PCBA. The Hopper PCBA stops the motor, which is then held by an electronic brake. The second coin wiper prevents the next coin from falling from the disc.

Hopper Full Detection

A probe is fitted onto the hopper bowl to detect a full hopper (see Figure 7-3). When the coins reach the probe, they create an electrical circuit through the coins to ground. The Main Board monitors the probe. If the probe indicates that the hopper is full, the software operates the diverter solenoid (situated on the front of the inner door) that diverts the coins to the cash box. The position of the probe in the hopper can be adjusted 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 (see Figure 7-3). A spring-loaded coin slider prevents the hopper from jamming due to coin stacking.

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

The bowl is connected to the casting by four bolts. The top bolt is fixed, but the other three are spring loaded. This is 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 will automatically stop and then restart after about four seconds. If this does not remove the jam:

- the motor automatically stops.
- the machine locks up.
- the software displays a fault message on the video monitor.

Hopper Interface Signals

The Aristocrat Disc Hopper interfaces with the Main Board via the 20-way Minifit connector P7 on the Backplane. This connector may alternatively be used to communicate with a ticket printer, where that option is fitted. The signals used for the printer are shaded in the table below.

Table 7-1 Hopper / Printer interface with Backplane

Pin	Pin Name	Connects to ...	Function
1	HOPCOIN	J1-B30	Coin Output from Hopper
2	Keyway		Plastic Keyway
3	Keyway		Plastic Keyway
4	HOPON	JP22-C1	Hopper motor drive
5	HOPHIGH	J1-A31	Hopper high probe, Detects hopper full.
6	VCC	VCC	5V for Hopper Electronics
7	GND	GND	Gnd Hopper
8	RTS3	JP20-C12	RTS for printer
9	CTS3	JP20-A10	CTS for printer
10	GNDIsol	GNDIsol	Gnd, Isolated, for Printer Comms
11	24V	24V	24V Motor Drive for Hopper
12	HOPTEST	JP22-A1	Hopper Sensor Test output
13	HOPDIR	JP22-A29	Hopper motor direction
14	GND	GND	Gnd
15	DSR3	JP20-C11	Handshake Input 1, serial channel 3
16	DTR3	JP20-B12	DTR for Printer
17	24V	24V	24V for Printer
18	SIN3	JP20-A9	Rxd from Printer
19	SOUT3	JP20-C10	Txd to Printer
20	GND	GND	Gnd

7.4 Fault Finding

Table 7-2 Fault Finding

Fault	Probable Cause	Action
Too many coins being dispensed and the machine locks out.	The leaf spring holding the second coin wiper pawl is bent or loose.	Tighten the leaf spring fixing screws or replace the spring.
Hopper not working.	A. No power is supplied.	1. Check that power is reaching the hopper.
	B. Faulty connector.	2. Check that the connector is not damaged and is correctly seated.
	C. Hopper is not in the correct location.	3. Check the hopper mounting spring-loaded bolt is in the correct position.
	D. Motor is faulty.	4. Replace the motor and gearbox assembly.
Coins jamming at the top of the coin chute	Coin runner is loose or not in the correct position.	Place the coin runner point as close as possible to the disk and tighten the securing nuts. Also check if the shims are damaged.
Coins stacking at the bottom of the bowl.	Bottom coin slide springs broken or displaced.	Refit or replace the spring.

7.5 Removal and Replacement Procedures

CAUTION
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.

CAUTION
Avoid handling the coin pawl leaf spring. If this spring is damaged, it may cause an incorrect coin payout and the machine to lock out.

To remove the hopper from the cabinet (see Figure 7-1):

1. Open the cabinet door, and switch OFF the machine.
2. Lift the spring-loaded release pin.
3. Rotate the hopper 90° by sliding the left-hand side outwards.
4. Slide the hopper straight out of the machine.
5. Lift the hopper by grabbing the handle with one hand and placing the other hand under the base of the bowl.

To replace the hopper in the cabinet:

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 hand side is in place.
3. Push on the hopper handle to pivot the hopper 90° until the spring-loaded pin is engaged in the retaining hole.
4. Switch ON the machine, and close and lock the cabinet door.

7.6 Disassembly and Assembly Procedures

Disassembly Procedure

To disassemble the hopper (see Figure 7-3):

1. Remove the bowl assembly:
   a. Remove the four bolts that attach the casting plate to the base of the hopper.
   b. Disconnect the hopper probe at the side of the bowl.
   c. Remove the photo-optic detector and the fixed bolt that restrains the wire to the detector.
   d. Pull away the bowl (still attached to the casting plate) from the base of the hopper.
2. Remove the two coin-runner retaining nuts.
3. Remove the hopper coin chute.

CAUTION
If shims are fitted under the coin runner, ensure they are not damaged when removing the coin runner or coin chute. Do not discard the shims.

4. Remove the coin runner.
5. Remove the second coin wipe-off spring.

CAUTION
Ensure that the spring-loaded bearings do not fall out from their mountings in the casting when removing the disc.

6. Remove the disc:
   a. Remove the center bolt that holds the disc assembly in place.
   b. Remove the coin stirrer and shelf wheel.
   c. Remove the four securing screws from the center of the disc and withdraw the disc from the drive boss.
7. To remove the motor/gearbox unit (refer to Figure 7-3):
   a. Mark the wire connected to the negative terminal (black) of the motor to facilitate reassembly.
   b. Disconnect the wires from the motor.
   c. Remove the nuts securing the motor/gearbox-mounting bracket to the disc and spindle housing.
   d. Tap out the drive pin, and remove the bolts securing the motor/gearbox unit to the bracket.

Assembly Procedure

To assemble the hopper:

1. Replace the disc:
   a. Slide the drive shaft end of the disc into the driving boss, ensuring the slot on the shaft engages with the drive pin in the gearbox.
   b. Insert the four disc securing screws in the center of the disc and tighten.
   c. Place the second coin wiper pawl in position, insert the screws and tighten.
   d. Place the second coin wiper spring in position, insert the two securing setscrews and tighten.
   e. Place the spigot and coin stirrer in position.
   f. Insert the center bolt through the center hole of the spigot and coin stirrer and tighten onto the driving boss.
   g. Place the coin runner on the two studs. Screw on the two nuts and washers, but do not tighten. Locate the point of the coin runner as close as possible to the spigot without rubbing, and ensure free running of the disc underneath the coin runner. Use shims if required.
   h. Slide the hopper coin chute under the two bolts holding the coin runner and tighten the nuts.

2. Replace the bowl assembly:
   a. Place the bowl assembly (still attached to the casting plate) in position on the base of the hopper.
   b. Insert the four spring-loaded bolts into the casting plate and tighten.
   c. Place the photo-optic detector in position, insert the screw and tighten.
   d. Place the fixed bolt in position so that it restrains the wire for the photo-opto detector, and tighten.

7.7 Test Procedure

To test the hopper after servicing, follow the hopper test procedure outlined in the chapter Machine Modes.

7.8 General Maintenance

For the general maintenance of the hopper:

1. Remove any dust from the photo-optic detector with a soft paintbrush or by blowing through a drinking straw. Dirt accumulating on the detector can result in faulty coin counting.

2. Check that the coin pawl pre-load leaf spring has not been bent away from the coin pawl. Replace if necessary.

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Bill Acceptor

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GPT Bill Acceptor

9.1 Technical Description

9.1.1 Overview

The GPT Bill Acceptor and ancillary items Paper Roll: provide advanced solutions for the entry, security, analysis, and accounting of bill currency. It communicates with the Main Board via generic serial channel COM 1 (which is connected through P13 on the Backplane).

The full system provides a range of features, including:

- A bill acceptor for entry, sensing and acceptance of bill currency. The unit incorporates a microcontroller, an operating system, RAM and ROM.
- A stacker unit holds accepted bills in a highly secure environment. It is electronically linked to the bill acceptor. A memory module within the stacker stores identification, diagnostic, and accounting information.
- The Bill Acceptor Cage Assembly houses the bill acceptor and stacker. The assembly is located at the right-hand side of the cabinet. The stacker or bill acceptor may be accessed by opening the belly panel door, without having to open the Cabinet main door.
- A unique number is available from a serialised, integrated circuit embedded within the main cable connecting the bill acceptor to the host machine. The number allows the tracking of stacker units for maintenance, accounting and operational control.
- Diagnostic and statistical data information are available through the RS-232 port of the bill acceptor when removed from the EGM. This is not accessible from the EGM.

9.1.2 Physical Description

The embedded bill acceptor consists of an optical scanning unit linked to a bill stacker for the entry and storage of a range of bill denominations. The bill acceptor cage assembly, which houses the bill acceptor and stacker, is located on the right-hand side of the cabinet.

The bill entry channel is situated on the gaming machine mid trim, together with the coin entry and bill-denomination display panel. The bill acceptor stacker can be accessed for removal and emptying by opening the gaming machine belly panel door, unlocking the stacker cage, and then withdrawing the stacker.

Two options are available for processing bill acceptor stacker information. The units may be withdrawn from the dual cage assembly, emptied, bills counted, and details for control and operations obtained from Operator Mode Menu selections. Alternatively, the stacker may be connected to the Soft Drop Analyser system, which automatically processes the information stored within the stacker memory module.

Security

Both the bill stacker cage door and the stacker itself can be fitted with locks. The machine software monitors a communications link between the bill stacker and the bill acceptor. When the stacker cage door is opened to gain access to the stacker, this link is broken and the machine will lock up with the error message BILL STACKER REMOVED being displayed on the screen.

Mechanics and Transport

The bill acceptor has four retaining pins which locate it in the cage assembly.

The main bill acceptor housing supports and aligns the drive rollers and drive stepper motor while providing mounts for the other subassemblies of the unit. The drive rollers provide motive power to the drive belts, which transport the bills or coupons past the circuitry and out of the unit.

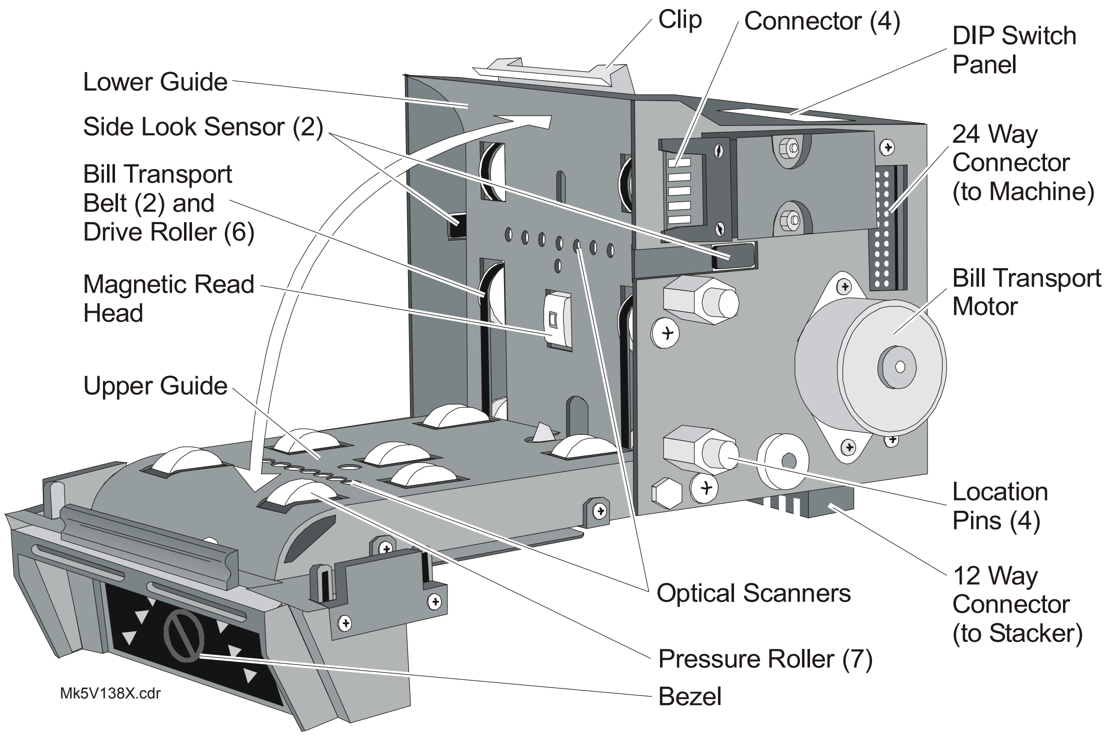


Figure 9-1 GPT Bill Acceptor with Upper Guide open

The two drive belts are individually tensioned to assure a reliable and straight feed. The belt path is interrupted to provide an area suitable for the detection of stringing devices or tails by the side looking sensor detection system.

Upper and Lower Guide Assemblies

The upper guide assembly supports and locates the pressure rollers that force the bill to the drive belts for traction. It also supports and locates part of the validation circuitry that examines the bill as it passes through the unit. The upper guide is pivoted at its lower end to allow it to swing away from the main unit for access so that the bill channel can easily be cleared of jammed currency and for cleaning of the bill channel and transport mechanism parts.

The lower guide assembly provides the lower half of the bill channel, which steers the bill onto the drive belts and pressure rollers. The lower guide also supports and locates additional validation circuitry and the magnetic read head. The guide assembly is integrated into the housing assembly, and the unit is factory aligned to the upper guide for accurate sensing operations.

Bill Entry

Operation commences when a bill of a suitable denomination, as indicated on the bill entry display, is inserted in the bill acceptor. The bill may be inserted either end first but only face up. The unit grips the inserted bill and moves it over the magnetic head and optical system.

The bill is evaluated and either accepted or rejected. If the bill is accepted, credits are issued only after the bill has exited the bill acceptor and reached the security stacker. If the bill is rejected, it is returned to the player.

A bill should be given three read attempts in different orientations before it is classed as unreadable.

Electronics Assembly

The electronics assembly provides the intelligence that controls all functional, validation, communications, diagnostic, and display functions. The bill acceptor electronics consists of a microprocessor board mounted on the main board. The assembly is mounted on the electronics tray, which can be removed for repair and replacement. The electronics tray also serves as a mount for a self-aligning connector that electronically connects the bill acceptor to the stacker.

The main electronics board contains the input connector that connects to the host machine, the top-accessed DIP switch for bill acceptor functional setup, and the status LED display.

Figure 9-2 shows the connections to the input/output connector.

Figure 9-3 displays a block diagram of the bill acceptor electronics.

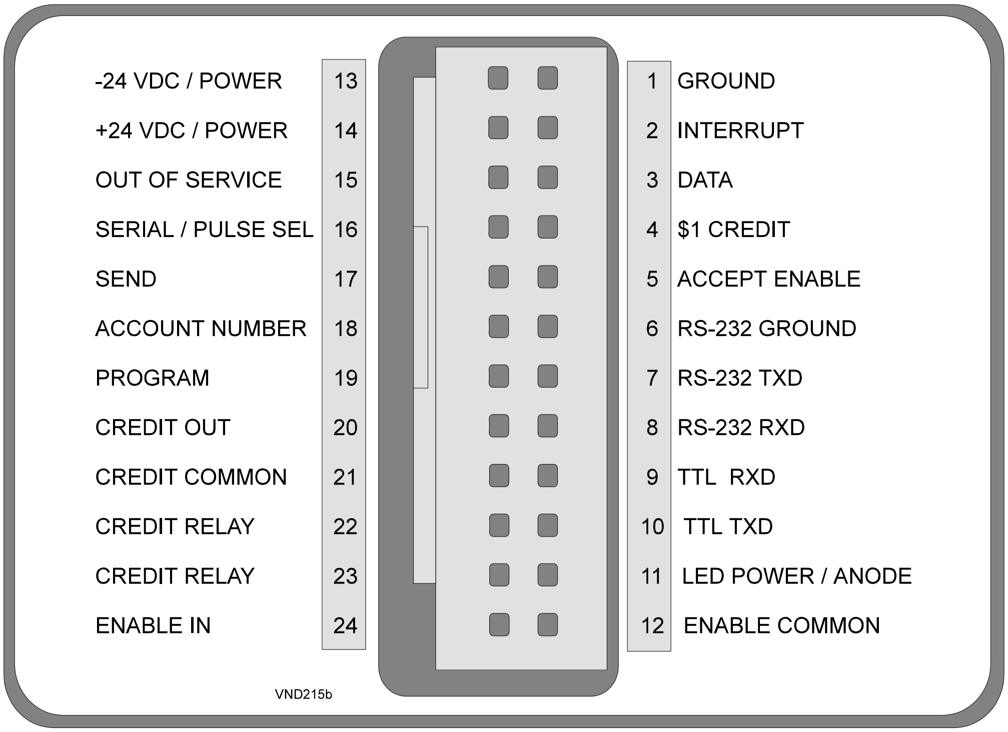


Figure 9-2 GPT Input/Output Connector

Microcontroller

The microcontroller is mounted on a SIMM printed circuit board with a 10-year battery-backed 32 kbytes RAM, and a real time clock. The microcontroller runs at 16 MHz, enabling a range of advanced functions to be implemented.

Operating System and Software Distribution

Within the first 4 kbytes of memory space of the microcontroller is the unit's Operating System (OS) which controls all machine functions. Within the OS is the encoded security number, the Factory Security Number (FSN), which must be input if a software upgrading takes place.

The OS also has a module that records machine identification, summary information on performance, and amounts of bill denominations accepted. This information is transferred to the stacker memory.

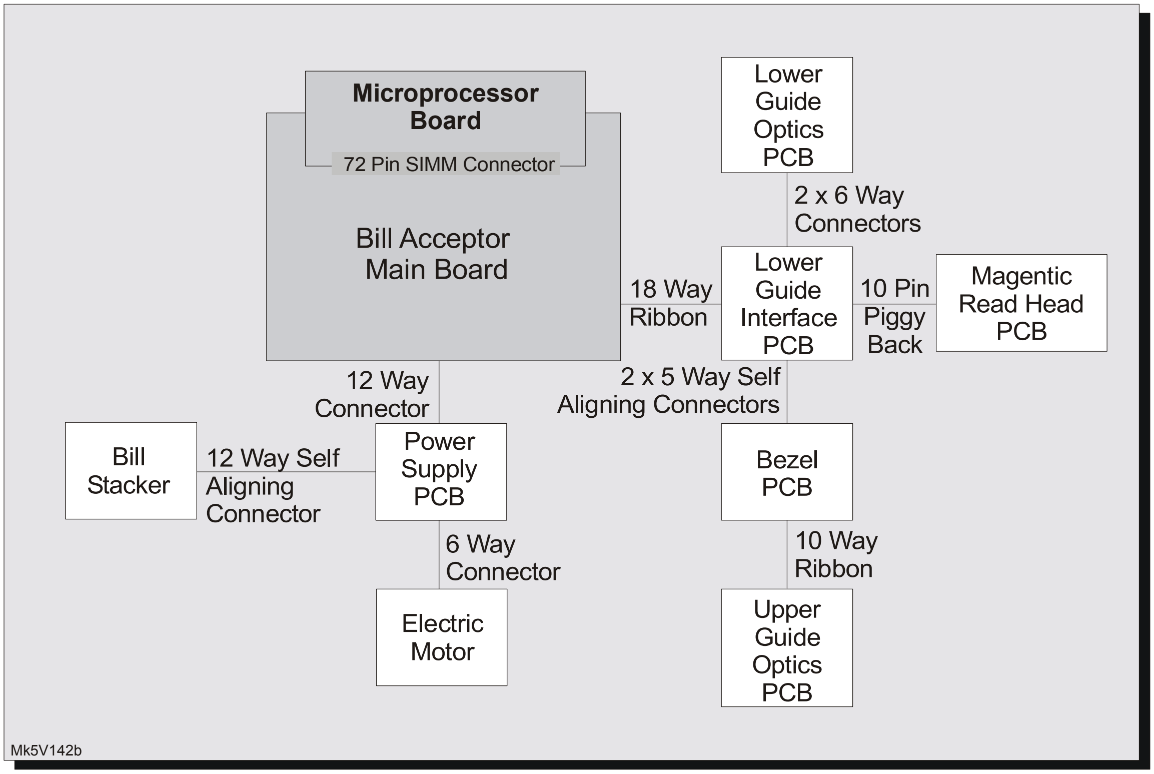


Figure 9-3 GPT Interconnection Diagram

Scanning System

The scanning transport mechanics consist of a continuous timing belt and a pressure roller configuration. The timing belts are organised to provide an area of optical inspection within the currency channel so that vertical and horizontal inspections are possible. The horizontal analysis is performed by the Side Looking Sensors (SLS) and is used exclusively for the detection of tails and/or strings attached to bank bills or coupons. Any unusual activity detected by the SLS system is cause for automatic rejection and reporting.

Stacker

The stacker is designed for the storage and control of bank bills.

Housed within the stacker is a special memory device that has a serial communications interface and is supported by a 10-year lithium battery for non-volatile memory storage. The unit records the following groups of information:

- **System Identification (if used)**: this item is copied from the unique Software Serial Number embedded in the cable attaching the host machine to the unit. The number equates to a property asset number and identifies the machine from which the stacker was removed for accounting and maintenance purposes.

The number is recorded in the stacker during the Power On Reset procedure if the unit is empty (physically and electronically). The number is checked if the stacker is removed and replaced, as might occur during maintenance activities.

- **Bill Transaction Information**: Each bill transaction and bill denomination is recorded.
- **Diagnostics**: fault information is analysed and stored in the stacker module. After processing, maintenance personnel may be targeted to specific machines to perform maintenance.

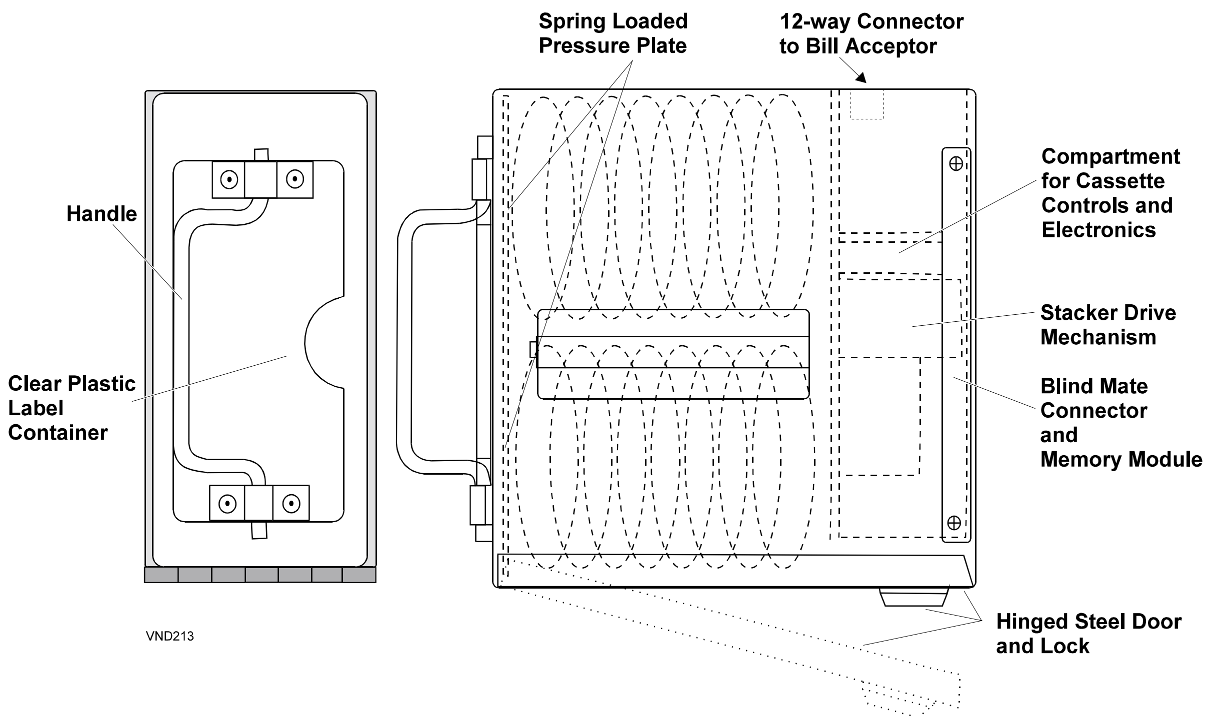


Figure 9-4 GPT Stacker

Stacker Physical Description

The stacker features a self-aligning connector that provides electrical connection and aligns the stacker to the bill acceptor. Access to the stored bills is only possible by unlocking the hinged steel door at the rear of the module with a tubular security key.

The stacker assembly is a sturdy, locked steel box capable of storing approximately 500 stacked currency bills.

The interior of the stacker contains a spring-loaded pressure plate which supports the bill stack and a pair of bill support rails on which presented bills lie prior to the stacking operation. The front surface of the stacker incorporates a handle and a clear plastic label retainer.

An upper cavity is created in the box that contains the stacker drive mechanism sealed from the bill compartment. The compartment contains a blind mate connector to the bill acceptor, and the memory module for electronically storing stacker identification, diagnostic and content information

A motor/pusher plate assembly within the stacker accomplishes bill stacking. The unit consists of a motor driven, slider-crank mechanism. On receipt of the appropriate signal from the bill acceptor, the motor turns through one revolution that cycles the pusher plate through one complete linear extension-retraction cycle. On extension, the pusher plate moves the bill past the bill support rail against the pressure plate. On retraction, the bill is trapped below the support rail and held there by the pressure plate.

Bezel

The bezel assembly is mounted to the uppermost portion of the upper guide assembly. The assembly provides currency alignment and guidance into the bill acceptor transport mechanism.

To facilitate the player recognition of the bill insertion area, eight green LEDs flash in a "runway" type effect when the machine is in idle mode. A ninth, red LED flashes if the bill acceptor operation is inhibited for any reason.

9.1.3 VFM4 Non-isolated Serial Interface

The serial communication protocol used to interface with the bill acceptor conforms to the Mars VFM4 standard. This interface provides one-way communications with the control system; where messages are sent, via the DATA line, from the bill acceptor to the control system in response to the control lines. Three control lines are used, ACCEPT, SEND (from the control system to the bill acceptor), and INTERRUPT from the bill acceptor to control system.

In normal operation, the control system activates the ACCEPT line by pulling it low, and the bill acceptor is ready to accept money. After the validation process, a DENOMINATION message for successful evaluation or a REJECT message for unsuccessful processing is sent to the control system.

The bill acceptor pulls the INTERRUPT line low and informs the control system of its intention to send a message. The control system responds (T1) by dropping the SEND line low, which grants permission to the bill acceptor to send data. After the SEND line becomes low (T2), data comes out via the DATA line in a serial fashion with 1 start bit, 8 data bits and 1 stop bit, at 600-baud rate. After the control system receives the last bit (T4) it raises the SEND line high. The bill acceptor responds (T3) by raising the INTERRUPT line high, which completes the transmission of the first message.

If the validation is not successful, the bill acceptor sends the REJECT message to the control system and then waits for another bill to be input. The REJECT message also tells the controller of the end of the communication session.

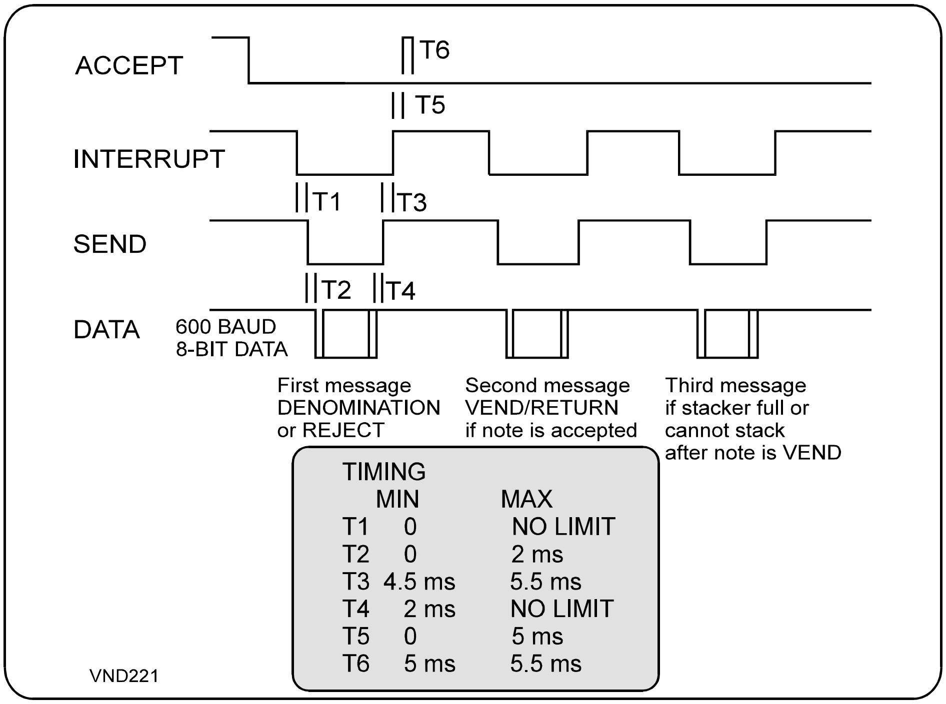


Figure 9-5 GL5 Protocol - Accept and Return Messages

Should the validation be successful, a DENOMINATION message is sent to the control system, which then has to determine whether to accept or return the bill. If the bill is to be returned, the control system raises the ACCEPT line (T5) after the INTERRUPT line goes high, and keeps the ACCEPT line high for a time duration (T6). This state tells the bill acceptor to return the bill. The rejection occurs when the bill acceptor reverses the transport and returns the bill with the returned message.

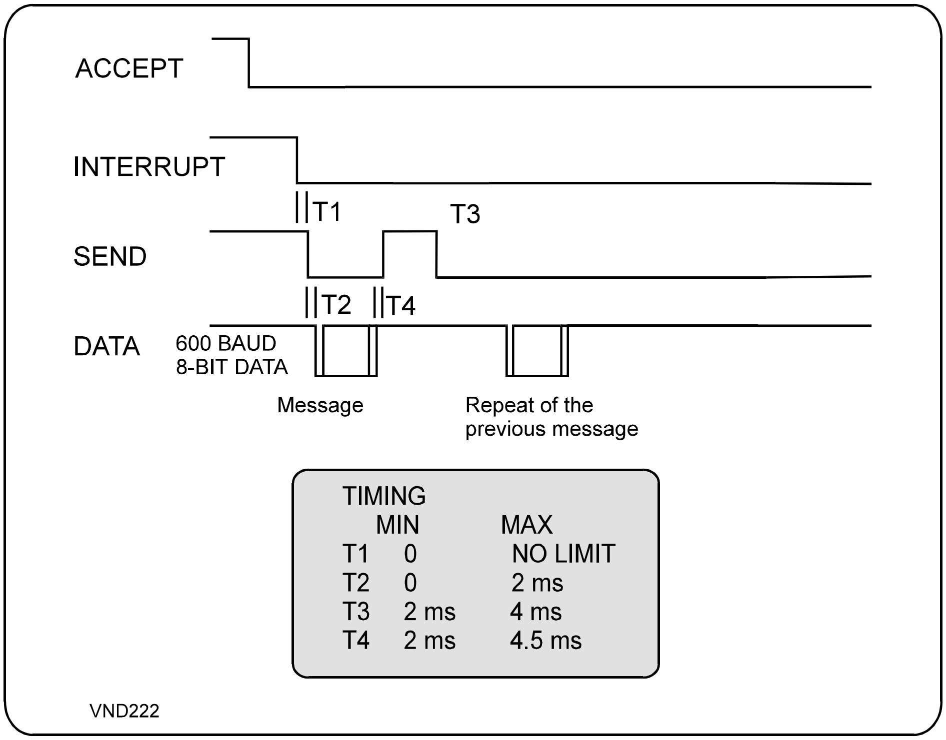


Figure 9-6 VFM4 Protocol - Request for Re-transmission Message

If the control system decides to accept the bill, the absence of the RETURNED pulse on the ACCEPT line is interpreted by the bill acceptor as an acceptance. The bill then passes through the transport system to the stacker with the message VEND.

In both cases, a second message, RETURN or VEND, is sent to the control system by the bill acceptor, and the same timing sequence is repeated for the control lines. The communication session then ends.

A possible third message, STACKER FULL or FAILURE (the bill acceptor and stacker cannot stack a bill) can be sent to the control system, and the timing sequence is repeated for the message. The communication session then ends.

The control system can request re-transmission of the previous message from the bill acceptor. Retransmission timing (T4), after a message is received, occurs when the control system raises the SEND line and keeps it high for a time (T3).

The bill acceptor sends a replica of the previous message. This process will be repeated as often as requested by the control system.

VFM4 Hexadecimal Messages

VFM4 HEX CODE MESSAGES

$1 CREDIT	81H
$ 5 CREDIT	83H
$ 10 CREDIT	84H
$ 20 CREDIT	85H
$ 50 CREDIT	86H
$ 100 CREDIT	87H
VEND	89H
RETURNED	8AH
REJECT	8BH
FAILURE	8CH
STACKER FULL	8DH
STACKER REMOVED	8EH
STACKER ATTACHED	8FH

I 0270

Figure 9-7 VFM4 Protocol - Hex Code Messages

9.2 Installation and Machine Conditions

9.2.1 Configuration Setup

Bill Acceptor configuration options are established by the use of DIP switches and the Operator Mode Menu settings. To enable bill denominations, it is necessary to set the required bill values in both the bill acceptor DIP switches and the Operator Mode menu options.

The DIP switches are conveniently located at the top of the bill acceptor housing.

The main function of the DIP switches is to set the accepted bill denominations.

The settings for accepted bill denominations are found in the Operator Mode Menu ⇒ Operator Setup / Selections Menu ⇒ Machine Options (refer to the chapter Machine Modes for more information).

A panel, located at the bill entry channel on the mid trim, identifies the accepted bill denominations (see Figure 9-8).

9.2.2 Machine Condition Indicators

The bill acceptor's operational details are indicated by the intelligent bezel displays on the mid trim and by several Operator Mode menu displays. The alarm sounds for error conditions.

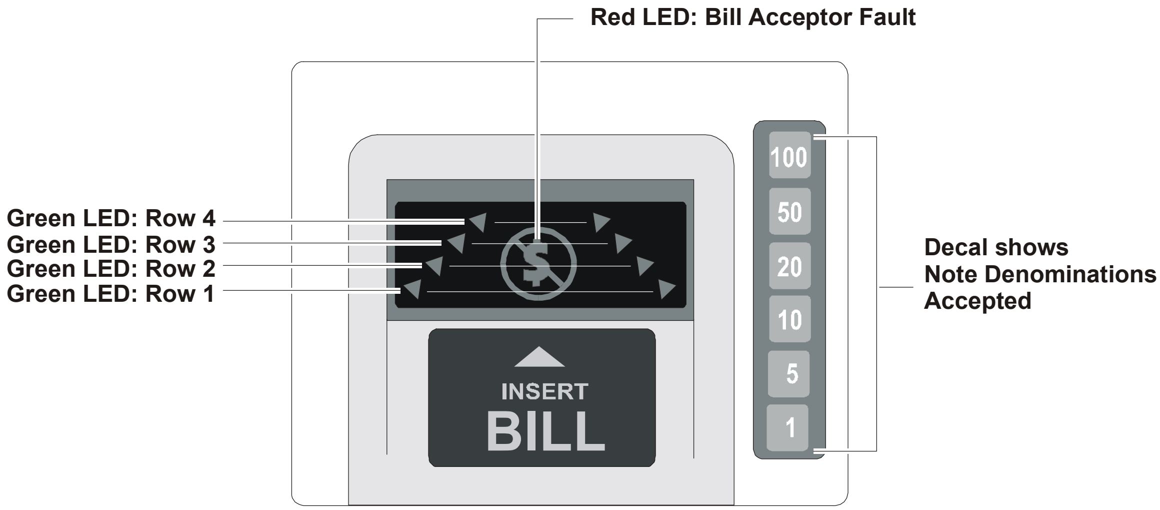


Figure 9-8 Bezel Assembly Indicators - LED Displays

Intelligent Bezel Indicators

The intelligent bezel displays eight green LEDs (2 rows of four, with a wide to narrow shape) that flash in a runway type effect when the machine is in idle mode of operation. A ninth, red LED (behind a circle, slash character, and $ sign) will flash if the bill acceptor operation is inhibited for any reason.

Operator Mode Menu Indicators

Several Operator Mode menu displays provide bill acceptor information that addresses bill entry history, machine status, accounting/audit/statistics data, and error and lockup information (refer to the chapter Machine Modes for further information).

9.3 Removal and Replacement Procedures

The cage assembly supports the retaining pins located on each side of the bill acceptor assembly. Electrical connection is through a single connector which supplies both power and communications.

Connection to the bill stacker is automatically made through a blind mate connector located at the bottom of the bill acceptor unit. The bill stacker automatically disconnects from the bill acceptor when the stacker door is opened.

9.3.1 Clearance of Embedded Bill Acceptor Stacker

The procedure for the clearance of bills from the bill acceptor stacker will be strictly controlled by the house.

The stacker unit and the bill acceptor unit can be accessed and removed independently.

9.3.2 Removing Bill Acceptor Stacker

To remove the stacker:

1. Open the gaming machine belly panel door. The machine lockup Bill Acceptor Door Open occurs.
2. Unlock and open the stacker cage door. Pull the top of the cage door down and forward.
3. Withdraw the stacker from the machine.
4. After the stacker is withdrawn, the stacker door must be unlocked before the bills can be withdrawn. Each stacker may be numbered to assist accounting and control operations.
5. The stacker is replaced by inserting into position through the belly panel door.
6. Close the cage door and lock if lock(s) are fitted.

9.3.3 Removing Bill Acceptor

To remove the bill acceptor:

1. Open the gaming machine main door.
2. Turn OFF the power.
3. Grasp the handle on the front of the bill acceptor head.
4. Pull forward until the bill acceptor is free of the mounting.

9.3.4 Bill Acceptor Jams

If a jam occurs, the unit is usually able to clear itself within a short period as an automatic process comes into effect. The unit runs the motor forward and then reverses in an attempt to clear the jam. This routine continues for five attempts. Should the jam persist, a fault message is initiated and a machine lockup occurs.

CAUTION
The Bill Acceptor is controlled by complex electronics. Unqualified personnel must not interfere with the unit.

The scanning and transport channel of the bill acceptor passes currency in a direct process to the stacker. Should a bill become lodged within the scanning channel, the following steps will enable the jam to be cleared:

1. Open the gaming machine main door.
2. Switch OFF the power switch.
3. It may be possible to clear the jam while the unit is in position:
   - Pull the bezel section forward to open the upper guide, and
   - Remove any obstruction from the bill channel.
4. If this fails to remove the jam:
   - Remove the bill acceptor from the housing as previously described.
   - Open the upper guide to gain complete access to the bill channel.
   - Remove any obstruction from the channel.
5. Replace and reconnect the bill acceptor.

9.4 Care and Maintenance

9.4.1 Periodic Maintenance

Occasional wiping of the plastic bezel surface is all that is required to remove surface deposits and smudges. A soft cloth dampened with a 90% solution of isopropyl alcohol is recommended for cleaning.

CAUTION
Caution must be exercised not to flood the bezel area with liquids due to the electronics in the bezel unit and because liquids must not seep down into the bill acceptor units below the bezel area. Do not use a solvent other than isopropyl alcohol as permanent damage to the bezel assembly and other items may result.

With prolonged use, a build-up of dirt from the surface of the bills will accumulate on the pressure rollers; drive belt surfaces and bill acceptor optics. These areas should be cleaned to ensure reliable operation.

The procedure to clean rollers, belt surfaces, and validation optics is as follows:

1. Remove the bill acceptor as described above.
2. Open the upper guide to gain complete access to the bill channel.
3. Using a soft lint cloth dampened with 90% isopropyl alcohol, wipe the bill channel surfaces on both the upper and lower guides to remove any surface dirt. Pay particular attention to the optics area and the magnetic head when removing deposits from the surfaces.
4. On the upper guide assembly, clean the surface of the pressure rollers. The belt surface may be cleaned by using a thumb to rotate one of the drive rollers while holding the cleaning cloth against the surface of the belt. Again, care should be taken to prevent excess liquid from reaching the bill acceptor internals.

9.4.2 Troubleshooting

The following guide provides possible solutions to faults that may be encountered during normal use. Also refer to Removal and Replacement in this chapter.

Table 9-1 Bill Acceptor Fault Finding

Fault	Remedy
Bill jammed in unit	Open the scanning channel and remove the bill.
Bill repeatedly skews and jams	Pressure rollers have incorrect tension. Belts are not adjusted properly. Make adjustments to the roller tension and transport belts.
Display electronics are non functional	The bill acceptor may not be receiving power. Ensure that all leads are correctly connected and power has been turned on.
Bill is not transported into the unit	The bill acceptor may not be receiving power. Reconnect the power. There may be a jam in the scanning channel. Remove the bill from the channel. The bill acceptor has been inhibited from further operation by the game and machine software. Remove any current machine locks (see Machine Modes).

JCM World Bill Acceptor

9.5 Technical Description

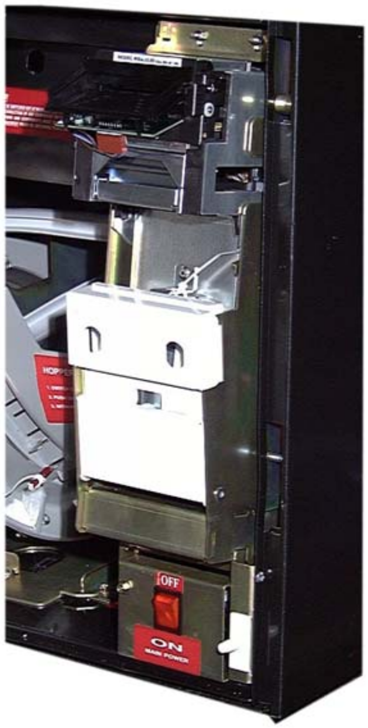
For additional information, see the JCM Service Manual for WBA (P/N TM0100).

9.5.1 Overview

The JCM WBA and ancillary items provide advanced solutions for the entry, security, analysis, and accounting of bill currency. It communicates with the Main Board via generic serial channel COM 1 (which is connected through P13 on the Backplane).

The full system provides a range of features, including:

- A bill acceptor for entry, sensing and acceptance of bill currency. The unit incorporates a microcontroller, an operating system, and RAM memory.
- A stacker unit (Cash Box) holds accepted bills in a highly secure environment. It is optically linked to the Transport.
- The Bill Acceptor Cage Assembly houses the WBA Frame, which provides mounting for the Acceptor, Transport and Cash Box, while allowing bill entry to be conveniently located on the Cabinet Top Cover. The assembly is located at the right-hand side of the cabinet. The Cash Box may be accessed by opening the gaming machine belly panel door, without having to open the Cabinet main door.
- The illuminated bezel facilitates player recognition of the bill insertion area.



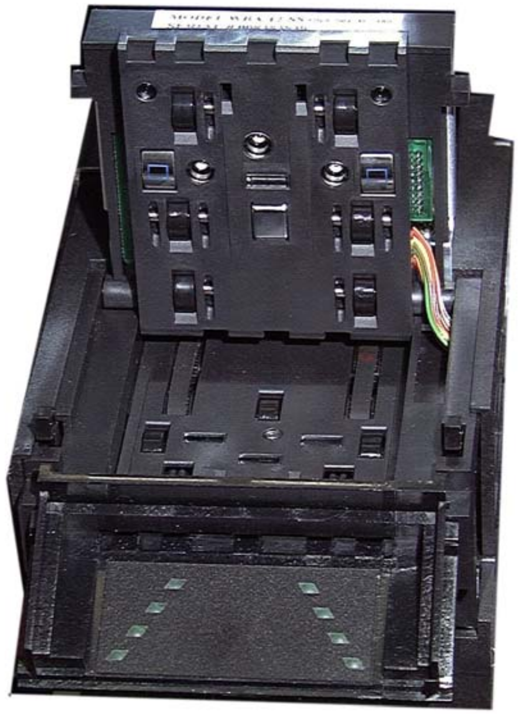


Figure 9-9 Bill Acceptor in Cabinet

Figure 9-10 Top Cover Open

Figure 9-11 Stacker Half Withdrawn

9.5.2 Physical Description

The embedded bill acceptor consists of an optical and magnetic scanning unit linked to a Transport and Cash Box assembly for the entry and storage of a range of bill denominations. The bill acceptor cage assembly, which houses the bill acceptor and stacker, is located on the right-hand side of the cabinet.

The bill entry channel is situated on the gaming machine mid trim, together with the coin entry and bill-denomination display panel. The bill acceptor stacker can be accessed for removal by opening the gaming machine belly panel door, unlocking the stacker cage, and then withdrawing the stacker.

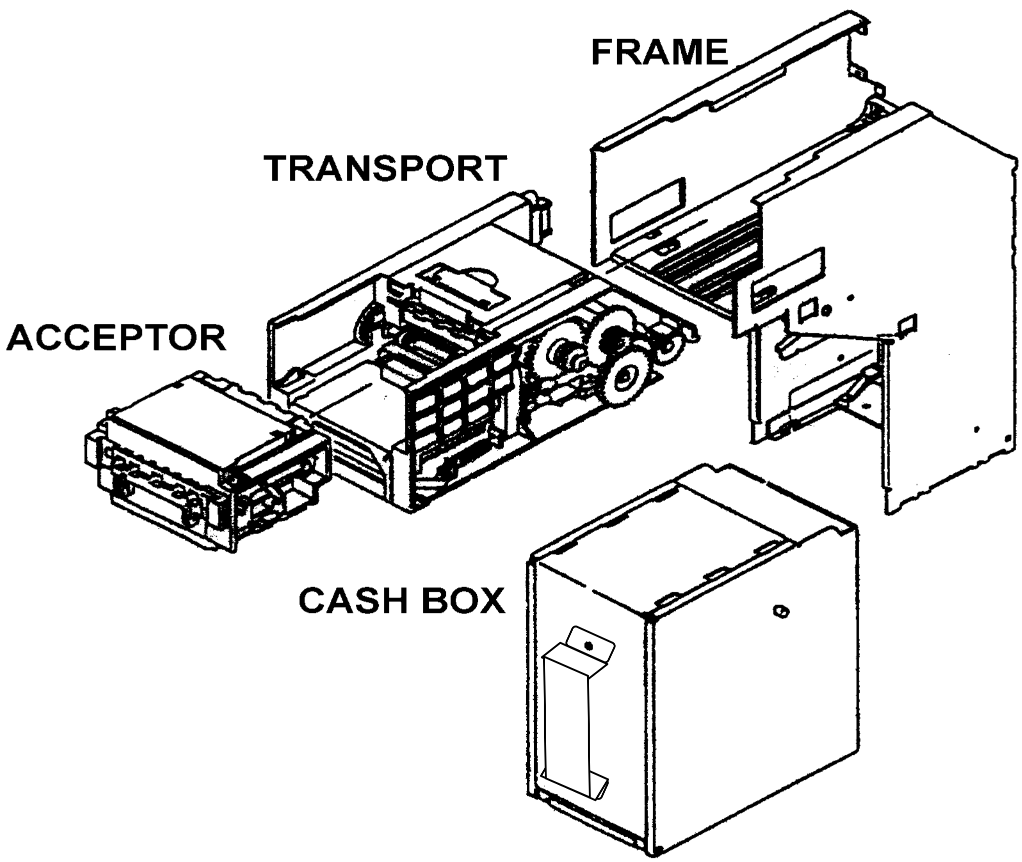


Figure 9-12 JCM Bill Acceptor Assembly Components

Security

For security reasons, both the Stacker Access Door and the Cash Box itself can be equipped with high-security locks.

The status of the belly panel door is monitored by the machine firmware. If this link is broken, the machine will lock up and display the error message:
Door Open – Bill Acceptor on the screen.

If the Cash Box is removed, the error message **Stacker Removed** is also displayed and the alarm sound is played through the speakers.

Both of these exceptions are reported to the on-line system, if installed.

Mechanics and Transport

The Bill Acceptor assembly consists of the Acceptor and Transport. It slides into the WBA Frame, where it is securely latched in place. The Cash Box slides into position and latches into the WBA Frame just below the Transport.

Transport

The Transport assembly houses the main logic assembly; two drive motors, associated gears, belts and opto-interrupters.

The main logic assembly provides all of the control functions for the acceptor.
It may be configured with either FLASH (WBA-12) or EPROM (WBA-13) program memory.

One drive motor provides motive power to the drive belts, which transport the bills or coupons through the Acceptor and into the Cash Box. The other drive motor links (via a gear train) to the stacker mechanism in the Cash Box.

The two upper timing belts are individually tensioned to assure a reliable and straight feed. The lower timing belt assures transport of the bill or coupon to the entrance of the Cash Box.

Several levers and optic sensors assure proper direction of travel and progress into the Cash Box

A connector and mounting provisions are provided for the Acceptor, which mounts into the Transport assembly.

Two opto-interrupters mounted at the rear of the Transport monitor the presence of the Cash Box and bill pusher activity.

Acceptor

Interchangeable guide rails in the Acceptor allow proper sizing for currency from a variety of countries. Acceptable bill widths are 66, 70, 75 and 80 mm. Acceptable lengths are determined in the software.

Two drive rollers in the front and two timing belts in the rear of the lower sensor unit of the Acceptor assure transport of the inserted bill while several red, infrared, and magnetic sensors scan both faces.

Cash Box

The Cash Box includes drive belts and rollers to assure transport of the bill into the stacking position. The second motor in the Transport drives them through a gear train that meshes with another gear train in the Cash Box.

When the bill has moved into position, the pusher is activated via another gear train and the bill is stacked. The Cash Box has a capacity of approximately 500 bills.

Two plastic levers mounted to the Frame contact the Cash Box and the pusher plate. These levers mesh with two opto-interrupters at the rear of the Transport, allowing the microprocessor to detect Cash Box presence and monitor bill-pusher activity.

Bill Entry

Operation commences when a bill of a suitable denomination is inserted into the bill acceptor. The bill may be inserted face up, either end first. The unit grips the inserted bill and moves it over the magnetic head and through the optical system.

Analog readings are taken every sixteenth of an inch for the entire length of the bill, converted to their digital equivalents, and stored in RAM as a profile of the bill. The stored data are then matched against the profiles stored in program memory.

The bill is evaluated and either accepted or rejected. If the bill is rejected, it is returned to the player immediately. If the bill is accepted, the machine is notified of the value of the bill.

If the value of the bill is acceptable, a STACK command is sent to the bill acceptor. Credits are issued only after the bill has exited the bill acceptor and reached the security stacker. If the value of the bill is not acceptable, a RETURN command is sent.

A bill should be given three read attempts before it is classified as unreadable.

9.1.3 Interface Connector

The interface connector, mounted at the back of the Frame, upper left corner, provides connections to the Transport from the machine backplane. Not all of the 20 available pins will be used in any given installation. Actual pins connected will depend upon the protocol (VFM4, DBV, GAMMA, etc.) used.

Table 9-2 Interface Connector Connections

Pin	Signal Name	Function
1	+24VDC	Power
2	GND	Common
3	M.Res	Input: Hi = Normal, Lo = Reset
4	TXD	Output: Transmit Data
5	+24VDC	Interface Power
6	RXD	Input: Receive Data
7	GND	Interface Common
8	P / S Select	Input: Hi = Pulse, Lo = Serial
9	Busy	Output: Hi = Idle, Lo = Busy
10	S.Res	Input: Hi = Normal, Lo = Reset
11	Data	Output: Serial Data
12	CTS	Input: Hi = Wait, Lo = Send data now
13	I/F GND	Common
14	DISP (+)	LED power
15	Reserved	
16	D / E	Input: Hi = Disable, Lo = Enable
17	RTS	Output: Hi = Not Ready, Lo = Ready to
18	DISP (-)	LED control
19	VEND	Output: 1 Lo pulse per $
20	ABN	Output: Acceptor/Stacker Error

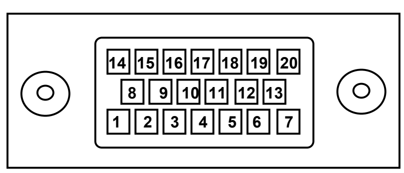


Figure 9-13 Input/Output Connector

9.6 Installation and Machine Conditions

9.6.1 Configuration Setup

Bill Acceptor configuration options are established by the use of DIP switches on the bill transport unit and the Operator Mode Menu settings. To enable bill denominations, it is necessary to set the required bill values in both the bill acceptor DIP switches and the Operator Mode menu options.

The DIP switch locations vary between manufactures. See the relevant section of this manual for details.

The settings for accepted bill denominations are found in the Operator Mode Menu ⇒ Operator Setup / Selections Menu ⇒ Machine Options (refer to Chapter 3 - Machine Modes for more information).

9.6.2 Machine Condition Indicators

Bezel LEDs will extinguish when the gaming machine disables the bill acceptor (door open, etc.). The LEDs should be ON when the bill acceptor is ready to accept and OFF when it is unable to function.

Conditions producing lockups are shown on the game screen. The alarm sounds for error conditions.

Operator Mode Menu Indicators

Several Operator Mode menu displays provide bill acceptor information that addresses bill entry history, machine status, accounting/audit/statistics data, and error and lockup information (refer to Chapter 3 - Machine Modes for further information).

9.7 Removal and Replacement Procedures

The Transport assembly slides into the Frame assembly and latches securely in place. To remove, press the lower latch down and slide the Transport forward. Electrical connection is through a single connector, which supplies both power and communications.

9.7.1 Removing WBA Cash Box

To remove the bill acceptor stacker:

1. Open the belly panel door. The **Door Open - Bill Acceptor** machine lockup occurs.
2. Unlock and open the stacker access door.
3. Depress and hold the gold colored Cash Box release lever (upper right).
4. Withdraw the Cash Box from the machine.
5. After the Cash Box is withdrawn, the currency access door in the bottom must be unlocked before the bills can be withdrawn. This is normally done only in a secure soft count facility. Each Cash Box may be numbered to assist accounting and control operations.
6. The Cash Box is replaced by pushing it into the Frame until it locks into position.

9.7.2 Removing WBA Transport

To remove the bill acceptor Transport:

1. Open the gaming machine main door.
2. Switch off mains power.
3. Press down and hold the lower latch bar located at the front of the Transport.
4. Slide the assembly toward you and out of the Frame.

9.7.3 Bill Acceptor Jams

If a jam occurs, the unit is usually able to clear itself within a short period as an automatic process comes into effect. Should the jam persist, a fault message is initiated and a machine lockup occurs.

CAUTION
The Bill Acceptor is controlled by complex electronics. Unqualified personnel must not interfere with the unit.

The scanning and transport channel of the bill acceptor passes currency in a direct process to the stacker. Should a bill become lodged within the scanning channel, the following steps will enable the jam to be cleared:

CAUTION
Ensure the power is turned off before any maintenance procedures are carried out on the bill acceptor or stacker.

1. Remove the Transport as previously described.
2. Open the Transport and inspect the bill path.
3. Remove any obstructions found.
4. Open the Acceptor and inspect the bill path.
5. Remove any obstructions found.
6. Reinstall the Transport assembly as previously described.

9.8 Care and Maintenance

9.8.1 Cleaning

Occasional wiping of the plastic bezel surface is all that is required to remove surface deposits and smudges. A soft dry cloth is recommended for cleaning. A mild solution of liquid dish washing detergent may be used if necessary.

With prolonged use, a build-up of dirt from the surface of the bills will accumulate on the pressure rollers; drive belt surfaces and bill acceptor optics. These areas should be cleaned to ensure reliable operation.

CAUTION
Caution must be exercised not to flood the bezel area, as liquids must not be allowed to seep down into the bill acceptor units. Do not use any solvent, such as isopropyl alcohol or petroleum based cleaners, as permanent damage to the validator optic lenses and other internal items may result.

The procedure to clean rollers, belt surfaces, and validation optics is as follows:

1. Remove the bill acceptor Transport as described above.
2. Open the Acceptor to gain access to the bill path.
   a. Using a soft lint-free cloth, wipe the surfaces of both the upper and lower guides to remove any surface dirt. Pay particular attention to the optics area and the magnetic head when removing deposits from the surfaces.
   b. On the upper guide assembly, clean the surface of the pressure rollers.

c. On the lower guide assembly, timing belt surfaces may be cleaned by rotating one of the drive rollers while holding the cleaning cloth against it.
d. Close and latch the Acceptor.

3. Open the Transport to gain access to the bill path.
   a. Using a soft lint-free cloth, wipe the surfaces of both the upper and lower guides to remove any surface dirt.
   b. Using a soft lint-free cloth, clean the three timing belt surfaces by rotating the appropriate drive gear while holding the cleaning cloth against the belt surface.
   c. Close and latch the Transport cover.
4. Reinstall the Transport back into the Frame so that it latches into place.
5. Close and lock the Bill Acceptor Top Cover door.

9.8.2 Calibration

Re-calibration of the Acceptor sensors should be an annual event, unless operating conditions dictate increased frequency. The automatic calibration procedure should be executed following any cleaning or repair operations. Special JCM black/white test paper (P/N 057619) is required.

In-machine Auto-calibration

Auto-calibration may be accomplished at the machine if the JCM Test Harnesses (P/N 057116 and 057121) are available. Remove the Transport from the machine, connect the harness to the plugs at the back of the Frame and at the back of the Transport and follow the Auto-calibration procedure outlined below.

Workbench Auto-calibration

To perform the auto-calibration procedure at the workbench, JCM model PS15-006 (P/N 057117) is required to supply power to the WBA Transport.

Auto-calibration Procedure

1. With the WBA transport assembly in hand, set DIP switches 1, 2, 3, and 4 to the OFF (up) position and DIP switches to the ON (down) position.
2. Apply power.
3. Insert the test paper into the Acceptor, black end first.
   a. The paper will move in and out several times and finally be ejected.
   b. The LED attached to the test harness will blink rapidly (approximately 10 flashes per second) if the calibration is successful.
   c. If the calibration is not successful, the LED will flash an error code as described in the following table.

Table 9-3 Blink Error Code

Number of Blinks	Error Detected
1	Entrance Lever
2	Solenoid Lever
3	Entrance Sensor
4	Transport Jam
5	Incorrect Gain Setting
6	Digital/Analog Conversion
7	Bar Code Sensor
8	Acceptor Head
9	Magnetic Setting
10	Write-in
11	Black Level

Refer to the JCM Service Manual for repair procedure information.

9.8.3 Troubleshooting the WBA

The following guide provides possible remedies to malfunctions that may be encountered. Also refer to Removal and Replacement earlier in this chapter.

Table 9-4 Bill Acceptor Issues and Remedies

Fault	Remedy
Bill jammed in unit	Open the Acceptor and remove the bill.
Bill repeatedly skews and jams	Pressure rollers have incorrect tension. Belts are not adjusted properly. Make adjustments to the roller tension and transport belts.
Display electronics are non functional	The bill acceptor may not be receiving power. Ensure that all leads are correctly connected and power has been turned on.
Bill is not transported into the unit	The bill acceptor may not be receiving power. Reconnect the power. There may be a jam in the bill path. Remove the bill from the channel. The bill acceptor has been inhibited from further operation by the machine software. Remove any current machine lockups (see Chapter 3 - Machine Modes).

Notes

8.1 Overview

The Wells-Gardner D9300 video monitor is a 19-inch (18-inch viewable) high-resolution display consisting of a metal frame manufactured by Aristocrat, a short neck cathode ray tube from Philips or Samsung, and electronics and development provided by Wells-Gardner Electronics Corporation. For full servicing details refer to the Wells-Gardner manuals.

CAUTION
The monitor is controlled by complex electronics. Unqualified personnel must not interfere with the unit.

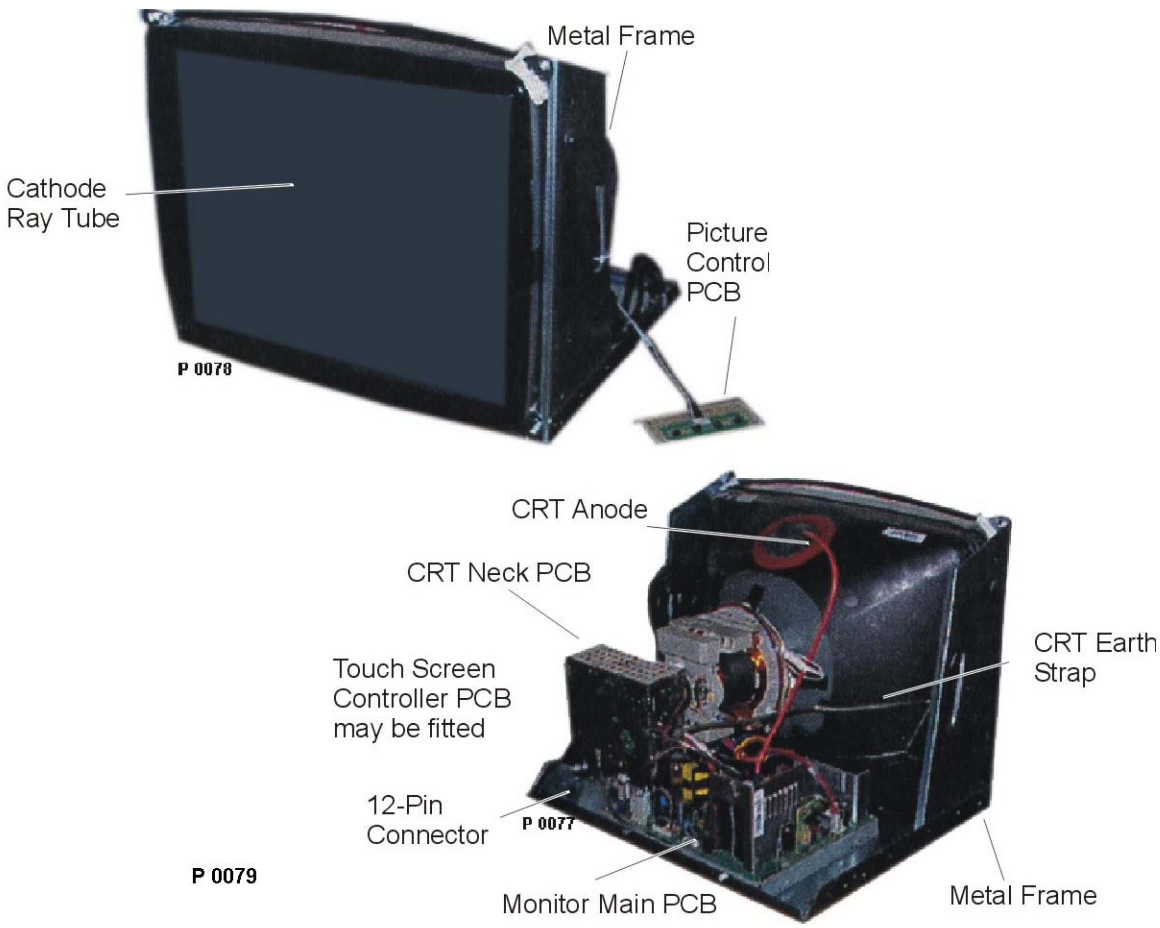


Figure 8-1 Wells-Gardner D9300 Colour Monitor

SAFETY PRECAUTIONS
Parts replacement should only be undertaken with components identified in the official parts list and then with the correct ratings, voltages, wattages, etc. When replacing the frame in the cabinet, be sure that all protective devices are properly installed – insulating covers, strain relief, etc. After servicing the unit, perform an AC current leakage test in accordance with the Wells Gardner service precautions.
Refer to the Wells Gardner Manuals for full servicing precautions and protections.

8.2 General Description

The video monitor is capable of operating in up to 1280 x 1024 pixel resolution, although the resolution used for game-play in the Aristocrat Video Gaming Machine is 640 x 480 pixels. The model is a short neck CRT that operates with a dot trio spacing of 0.26mm and a colour temperature of 9300°K. Operating temperature is 32°F to 131°F (0° to 55° C). Net weight is 37lbs (17kg).

The major components of the video monitor assembly are:
the cathode ray tube (CRT),
the video monitor printed circuit boards (PCBs) and
the video monitor frame.

The CRT and video PCBs are all mounted onto a common metal frame that slides along the game display shelf into the cabinet (refer to Figure 8-1). The video monitor assembly is secured in place by a single screw, inserted from the underside of the game display shelf.

The slide-in frame enables the video monitor assembly to be removed and replaced easily, and also to connect 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 and the video drive signals from the video interface.

The PCBs associated with the monitor assembly are:

- Picture Control PCB
- Monitor Main PCB
- CRT Neck PCB.

A feature of the monitor is the On-Screen-Display (OSD) Controls that enable the adjustment of functions and settings by the Pushbutton Control Panel in conjunction with screen displays. The panel is located on the centre-top of the display screen, making it accessible when the unit is installed in the gaming machine and the main door is open.

The monitor also features both automatic and manual degaussing.

8.3 Technical Description

Power Supply

Input voltage is 90 – 264 VAC, 50-60 Hz with no isolation transformer required. Maximum power is 95 Watts. Should an over-current condition occur in the circuit, a protection circuit operates in order to prevent component damage.

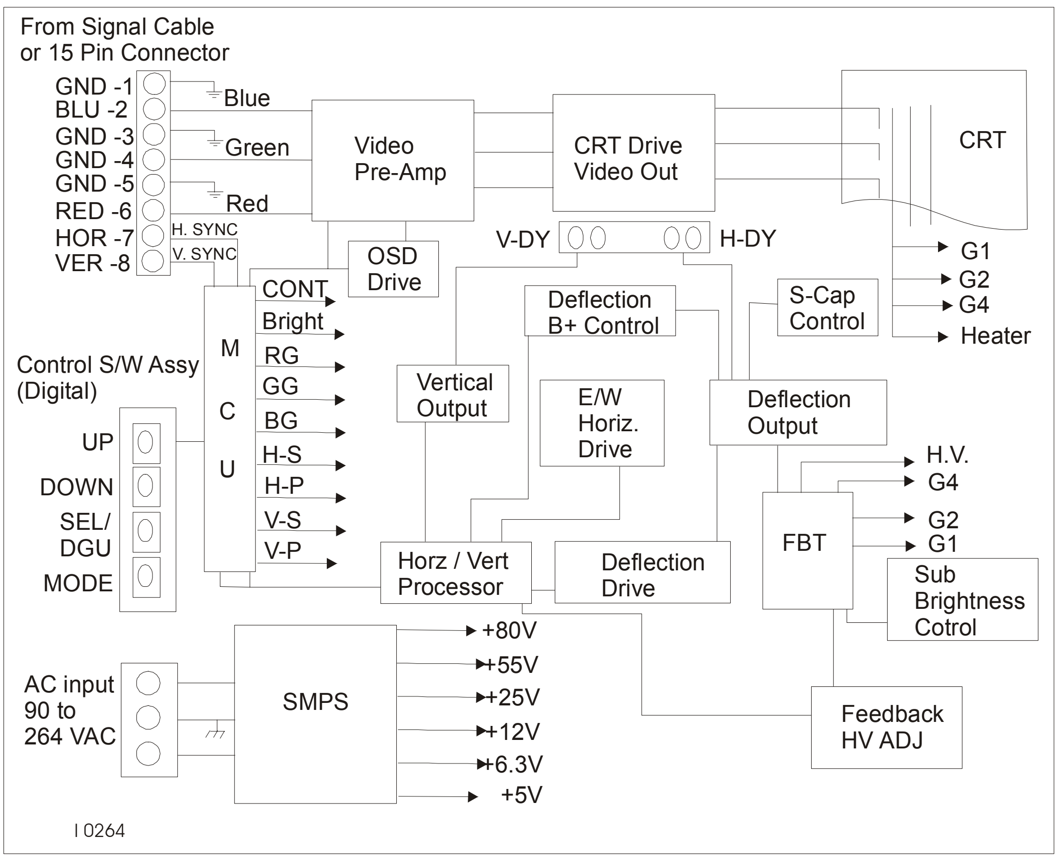


Figure 8-2 D9300 Colour Monitor Block Diagram

8.3.1 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 male connector from the gaming machine. Pin details are provided in the table below.

Table 8-1 Pin Connection Table

Pin No.	Signal	Pin No.	Signal
1	Red – Video	7	RS232RX – Touchscreen
2	Green – Video	8	GND – Touchscreen
3	Blue – Video	9	RS232TX – Touchscreen
4	0 Volt, Monitor Ground	10	240 VAC, Active
5	Vertical Sync.	11	Earth
6	Horizontal Sync.	12	240 VAC, Neutral

Figure 8-3 Wells-Gardner D9300 Monitor with Control Panel on Top Edge

8.3.2 On-Screen-Display Controls (OSD)

The OSD controls are operated from the Pushbutton Control Panel that provides four pushbuttons for changing the functional settings to best meet individual conditions.

Procedure Guidelines

General guidelines:

- The monitor requires 15 minutes to warm up before any adjustments are attempted.
- The four Control Panel pushbuttons are used to make user adjustments.
  The user presses Mode (/Exit) to enter the User Mode procedures and, at the completion of requirements, presses Mode (/Exit) 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 function may be used in this mode to return all settings to factory settings.
- The procedure for making adjustments varies with each of the following groups:
- BRIGHTNESS, CONTRAST, H.POSITION, H.SIZE, V.POSITION, V.SIZE, PINCUSHION, TRAPEZOID, PARALLELOG, PIN BALANCE.
- COLOUR.
- RECALL (Factory Reset).
- LANGUAGE: Language is set to English.

Pushbutton Control Panel

Pushbutton functions are:

MODE: (Mode-Exit) Starts the on-screen sequence by displaying the Main OSD Menu and enables the functional settings to be altered. Pressing the pushbutton a second time returns the monitor to normal game-play operations.

SEL/DGU: (Select Function or Degauss) Selects the on-screen function for adjustment. 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 if a Function Sub-Menu has been selected, by pressing the SEL pushbutton.

UP: Moves the selection on the Main Menu up the list, or increases the amplitude if a Function Sub-Menu has been selected by pressing the SEL pushbutton.

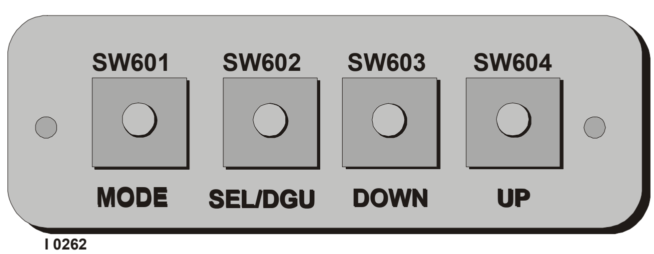


Figure 8-4 Pushbutton Control Panel

The on-screen display functions and adjustment levels are shown in the diagram below.

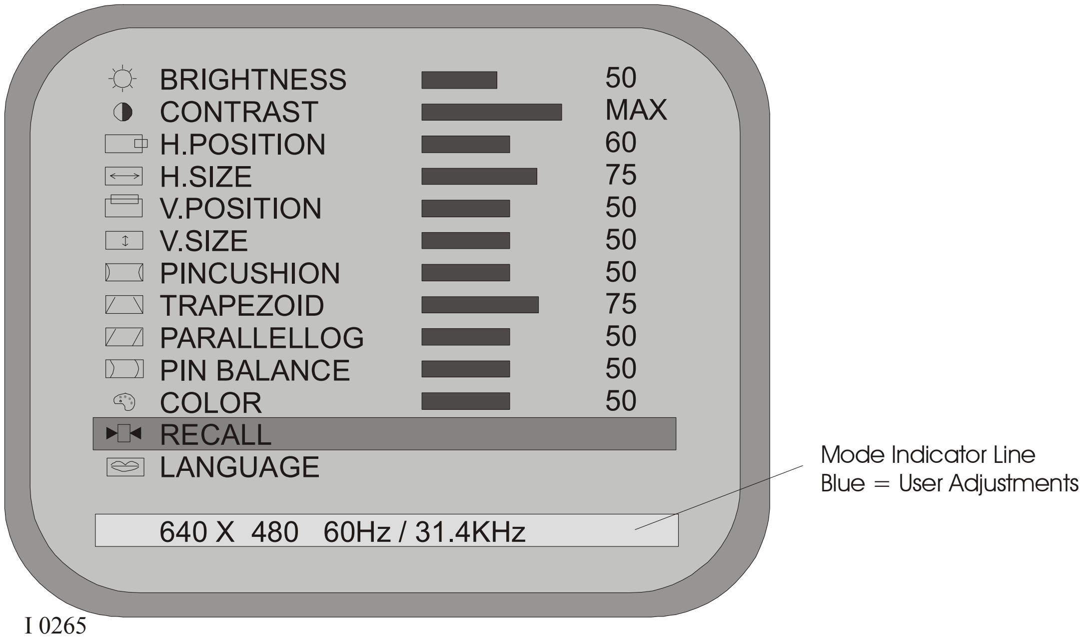


Figure 8-5 On-Screen-Display (OSD) Controls Menu

8.3.3 Adjustment Processes

Adjustments for Main Functional Group

The main functional group includes Brightness, Contrast, H. Position, H. Size, V. Position, V. Size, Pincushion, Trapezoid, Parallellog, and Pin Balance.

To adjust BRIGHTNESS:

1. Press the MODE pushbutton to display the OSD Menu.
2. Press the UP/DOWN push-button to move to the BRIGHTNESS function in the menu. The function being accessed is coloured yellow.
3. Select the required function by pressing the SEL/DGU pushbutton. The colour of the function name changes to red.
4. Adjust the function amplitude by pressing UP/DOWN pushbutton to register the setting required.
5. Press the MODE pushbutton to save the value of the required function. The colour of function name changes to yellow.

To adjust other functions:

6. Search for the required function using the UP/DOWN pushbutton.
7. When the required function is found, repeat steps three to five above.
8. Press the MODE pushbutton to finish the adjustment procedure and the OSD Menu will disappear. If no action is taken, the menu will disappear by itself in a short while.

Colour Adjustment

There is no need to adjust COLOR as it has been set to 9300°K.

Recall Function (Factory Settings)

To re-establish factory settings:

1. Press the MODE pushbutton to display the OSD Menu.
2. Press the UP/DOWN pushbutton to move to the RECALL function in the menu. The function being accessed is coloured yellow.
3. Select the required function by pressing the SEL/DGU pushbutton. The colour of the function name changes to red.
4. The values of all the functions are changed to those currently registered as factory settings.
5. Press the MODE pushbutton to save the value of the required function. The colour of function name changes to yellow.
6. After finishing adjustments, press the UP/DOWN pushbutton to move to the RECALL function in the menu. Hold down the SEL/DGU pushbutton until the OSD disappears. The adjustments values are saved and the unit exits from this mode.

Language Function

There is no need to adjust LANGUAGE as it has been set to "English".

Additional Maintenance

Should the monitor not be performing to a suitable standard after OSD Control Panel adjustments have been effected, the unit should be returned to enable factory specialists to carry out additional maintenance.

8.4 Degaussing

Magnetic interference can cause colour aberrations on the monitor screen. To restore the colour purity of the monitor picture, the monitor and cabinet need to be degaussed. AC voltage is used to de-magnetise the tube and correct any impurity or non-uniform colour aberrations.

Note that the monitor colour aberrations can occur due to normal delivery movements, installation operations, and through leaving the main door open during power-up processes.

The Wells-Gardner monitor is fitted with a degaussing coil and circuitry that emits a degaussing pulse during power up, thus providing an automatic and on-going process.

With the main door open, the Pushbutton Control Panel is accessible, providing an additional option for degaussing. Pressing the SEL / DGU (Degauss) pushbutton initiates the degaussing process.

With the main door closed, degaussing can occur but only through the use of a hand-held degaussing coil from outside the gaming machine.

8.5 Removal and Replacement Procedures

To remove the monitor assembly from the machine:

WARNING
High voltages are present at the rear of the monitor when the machine is ON. Switch OFF the machine before removing the monitor.

CAUTION
The monitor assembly is a heavy item (approximately 20-kg). Care should be taken when removing the monitor assembly to prevent personal injury or damage to the monitor.

To remove the monitor:

1. Open the cabinet door, and switch OFF the machine.
2. Remove the locating screw from the underside of the game display shelf.
3. Gently pull the monitor assembly from the machine. The steel frame of the monitor assembly has openings at either side to facilitate handling.

Replacement is a reversal of the removal procedure.

8.6 General Maintenance

For general maintenance of the video monitor:

- Remove any dust or dirt from external surfaces.
- Clean the monitor screen with a soft cloth and suitable cleaning agents.
- Check that all connectors are secure.
- Check that all monitor assembly PCBs are secure and properly connected.
- Check that the monitor and monitor mask fit correctly when the cabinet door is closed.

8.7 Touchscreen Option

The monitor may be fitted with a touchscreen that enables games to be played by touching designated areas of the screen. The touchscreen is attached to the monitor screen and a touchscreen controller in mounted within the monitor frame. The controller has an RS-232 interface with the gaming machine and all data signals are wired into the existing self-aligning connector at the rear of the monitor assembly. The controller also receives 12 V DC power from the monitor.

8.7.1 Touchscreen Operation

The MicroTouch ClearTek touchscreen 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. This electrode is taped over on the completed touchscreen 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 proportional to the distance to the finger, and the ratios of these flows are measured by the controller and used to locate the touch.

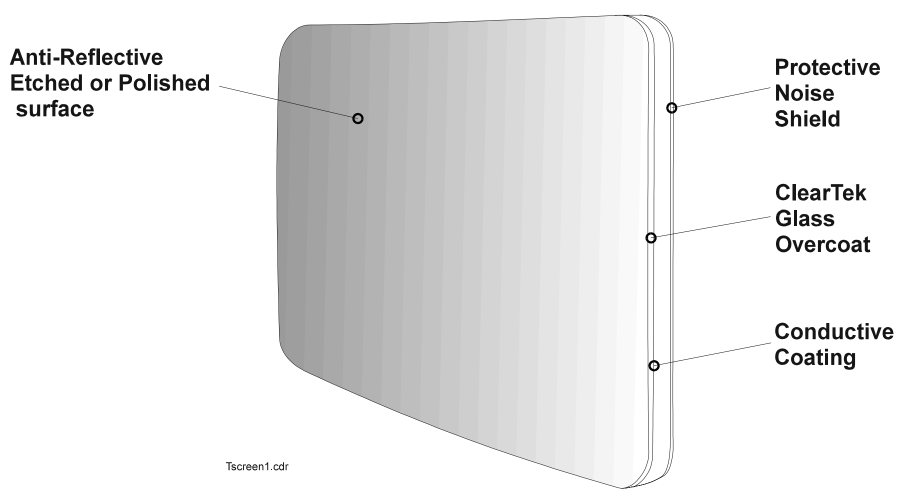


Figure 8-6 All-Glass Capacitive Sensor

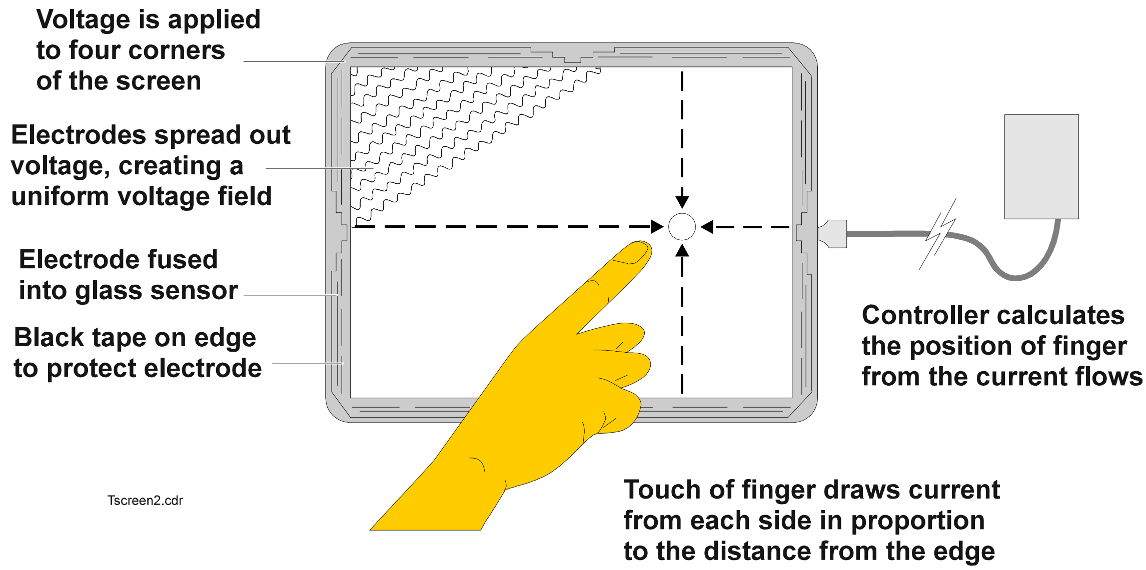


Figure 8-7 Capacitive Sensing – operation

8.7.2 Performance

The ClearTek touchscreen 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 touchscreen records a touch within 8-15 ms 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.

The touchscreen is also very robust, allowing it to perform in contaminated environments. Contaminants such as grease, water, and dirt will not interfere with the capacitive screen’s speed, accuracy, or resolution. In addition, the controller will not respond to continually to slow-moving (not moving) objects on the screen (eg. food particles). The touchscreen is also fitted with a gasket to prevent liquids or other contaminants from getting into the monitor assembly.

The touchscreen employs a solid-state sensor with no active or moving components. Its all-glass overcoat allows it to be resistant to scratches from sharp objects and not show wear over time. The ClearTek ASIC-based controller enables it to eliminate noise from EMI, drifting caused by temperature shifts and humidity, and damage from static discharges.

8.7.3 Machine Interface

The touchscreen controller has an RS-232 interface with the gaming machine Main Board. The interface signals are wired into the self-aligning connector at the back of the monitor. The pins used for the touchscreen signals are shown in the table below.

Table 8-2 Touchscreen Control Signals

Pin	Name	Function
8	Touchscreen 0 V	Reference signal for serial (RS-232) data
7	Touchscreen RS-232 Rx	RS-232 serial data **from** the touchscreen assembly
9	Touchscreen RS-232 Tx	RS-232 serial data **to** the touchscreen assembly

The touchscreen signals, along with the monitor signals, connect via a loom to connector P26 on the Interface Board. Serial Channel 0 is configured on this port to provide RS-232 communication with the Main Board.

The touchscreen controller is powered from the monitor's power supply. The 12 V DC power is taken from the Monitor Main Board.

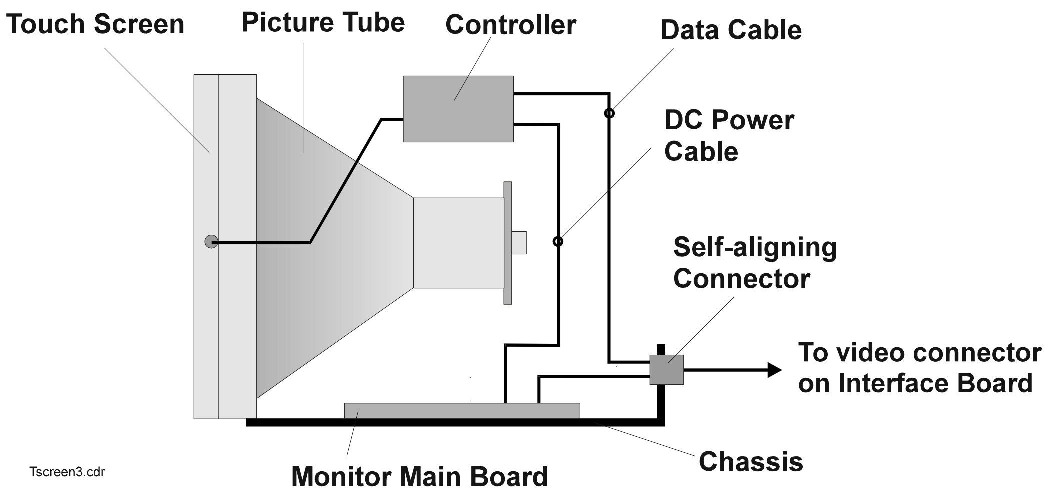


Figure 8-8 Touchscreen Connection

8.7.4 Touchscreen Specifications

Power Requirement	12 V DC
Power Consumption	Less than 2 W
Resolution	1024 x 1024 touchpoints
Baud Rate	2400 baud between controller and game
Response Time	8 ms – 15 ms
Touch Contact Requirement	3 ms
Accuracy	±1% error
Output Communications	Bi-directional asynchronous RS-232C serial communication
Operating Temperature Range	32°F to 131°F (0°C - 55°C)
Operating Humidity Range	0-95% non-condensing

8.7.5 Notes on Handling

The touchscreen has black tape protecting the electrodes at the edge of the screen. This tape must not be removed.

When unpacking a monitor, always lift directly out of the carton and place base-down on a flat bench.

If you need to place the monitor face-down, make sure there is sufficient padding on the bench and no stray pieces of metal or sharp objects around, so as to prevent scratching of the touchscreen face.

NEVER "roll" the monitor from being base-down to facedown, as the edges of the touchscreen are delicate and the overall weight of the monitor is substantial. There is a very good chance you will crack or break the edge of the touchscreen, rendering it useless. When installing the monitor into your machine, take care not to knock or bang the taped edges of the touchscreen - this area is delicate.

Check the cabinet 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. **Never slam the cabinet door onto the screen.**

The monitor must ALWAYS be transported in the original packaging. Monitors returned to MicroTouch Australia for repairs will only be accepted if they are returned in the **original packaging.** This is to provide maximum protection for the monitor, and minimise the chances of any freight damage.

CAUTION

There is also the associated safety risk of tube implosion when shipped in inadequate packaging

Periodically clean the touchscreen with water, isopropyl alcohol, Windex, or a similar non-abrasive cleaner. Ensure the use of grit-free cleaning cloths.

8.8 General Maintenance

For general maintenance of the video monitor:

- Remove any dust or dirt from external surfaces.
- Clean the monitor screen with a soft cloth and suitable cleaning agents.
- Check that all connectors are secure.
- Check that all monitor assembly PCBs are secure and properly connected.
- Check that the monitor and monitor mask fit correctly when the cabinet door is closed.

Notes

Chapter 10

Main Board
Part No. 410557

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10.1 Introduction

The Main Board provides central control of the Aristocrat Video Gaming Machine. The board is fitted with an Hitachi SH-4 microprocessor that interfaces to other equipment in the machine via the Backplane Board.

The highlights of the Main Board are as follows:

- Hitachi SuperH SH-4 (SH7750 Model) RISC microprocessor operating at 198 MHz – features a 64-bit external data bus, 16-bit fixed-length instruction set and a 128-bit vector graphics engine,
- on-board power supply regulator,
- audio amplifier for speakers,
- game EPROMS,
- security monitoring of machine door activities,
- serial channels,
- real time clock,
- silicon serial identification,
- watchdog timer and reset,
- surface mounted technology,
- compatibility with Mk V Main Board (as used in Aristocrat MVP Gaming Machines),
- design flexibility allowing for future changes in machine configuration.

10.2 Physical Description

The Main Board, along with the other major printed circuit boards, is located within the security logic cage (see Figure 10-1). The logic cage is a lockable, steel box located beneath the monitor shelf and provides security and protection for the PCBs.

The Main Board slides on guides within the cage and connects directly to the Backplane Board via three 96-way DIN 41612 connectors. Connectors are provided on the Main Board for the Communications Configuration Board and an optional Memory Expansion Board.

Figure 10-2 provides a block diagram illustrating the electronics system architecture. The system is available in various configurations to meet specific machine requirements.

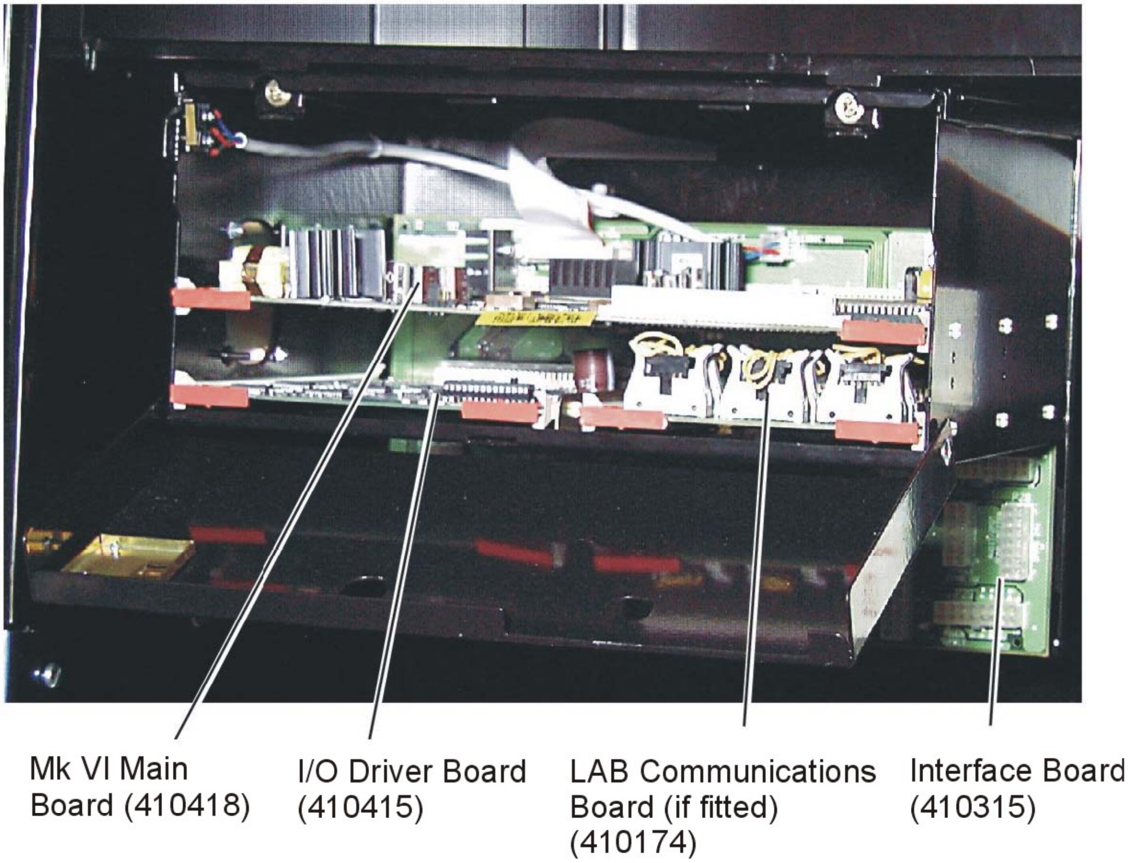

Figure 10-1 Logic Cage and Location of Main Board

10.2.1 Diagrams and Component Locations

For further information and for reference, the following additional information on the Main Board is provided in Volume II:

- **Circuit diagrams.** Structured circuit diagrams.
- **Board Layout.** Drawings of both Main Boards showing the location of the components.
- **I/O to Components and ICs.** A list of the I/O paths to each component and integrated circuit (IC) pin position.

10.3 Functional Description

The Main Board interfaces with the following devices (depending on machine features) via the Backplane Board:

- Aristocrat I/O Driver Board P/No 410355.
- Video Monitor / Touchscreen.
- Mechanical Meter Board.
- Power Supply Assembly.
- Pushbuttons and Pushbutton Lamps.
- Animation Lamps.
- Network Interface.
- Link Progressive System.
- Player Marketing Module.
- Security Devices.
- Money Management Devices.
- Printer.
- Mechanical Security Switches.
- Optical Security Switches.
- Key Switches.
- Optional I/O Connector.
- Debug Port.

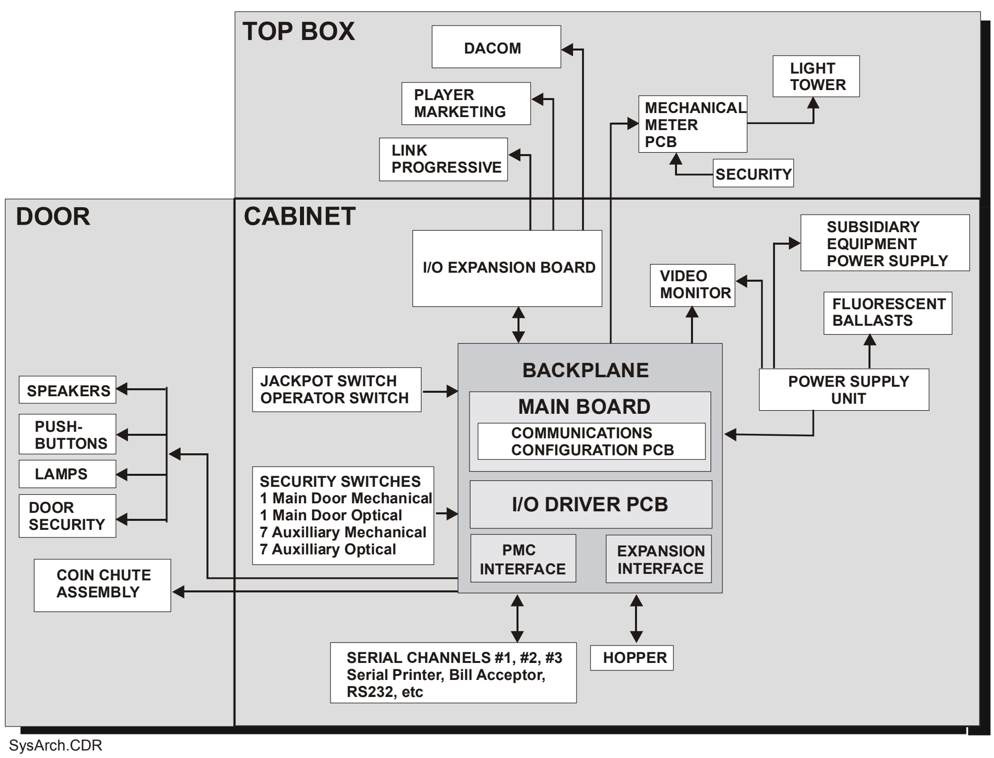

Figure 10-2 System Architecture

10.3.1 Main Board Functions

The Main Board has the following capabilities and functions:

* Core processor and memory.
  - RISC microprocessor.
  - On Board EPROMs.
  - External Memory Board Interface.
  - SDRAM – 16 Mbytes.
  - Power audio amplifier and sound volume control circuitry.
* Non-volatile storage.
  - EEPROMs (2).
  - SRAM for Electronic Meters (three devices).
* 8-bit I/O Expansion via the Backplane Board.
* Interrupt System.
  - Interrupt glue logic.
  - Timers and Operating System Tick logic.
* Coin Handling System.
  - Coin Chute.
  - Hopper Interface.
* Serial Peripheral Interface (SPI).
  - SPI bus driver and multiplexer circuitry.
* Internal Read/Write control registers.
* Security.
  - Security switches (up to 8 optical and 8 mechanical switches).
* Communications.
  - Four serial channels – one channel is configured for FIP and RS232; the other three are configurable for Bank Note Acceptor, Serial Printer, RS232, TTL, or other signal levels.
  - Mikohn Link Progressive pulse interface.
* Power Control System.
  - Onboard DC-DC converter (+24 V to +5 V, 1.8 V, 2.5 V, 3.3 V, ±12 V).
  - Power supply supervisor and reset circuitry.
  - Interface with the Solid State Relay (SSR).
  - Status monitoring.
* Reset System.
* Diagnostics.
  - Circuitry for test, diagnostics and debugging.
* Real Time Clock (RTC).
* Mechanical Switch Inputs.
  - Mechanical switch inputs for Cancel Credit/Reset, Audit, Handle and others.
* Temperature Sensor.
* Video System.
* Sound System.
* Serial Number Identification.

10.4 Technical Description

The Technical Description begins with two diagrams: a block diagram introducing the various functional subsystems of the Main Board and a layout diagram indicating the location of components on the Main Board. A description of the various functions and components of the Main Board follow these diagrams.

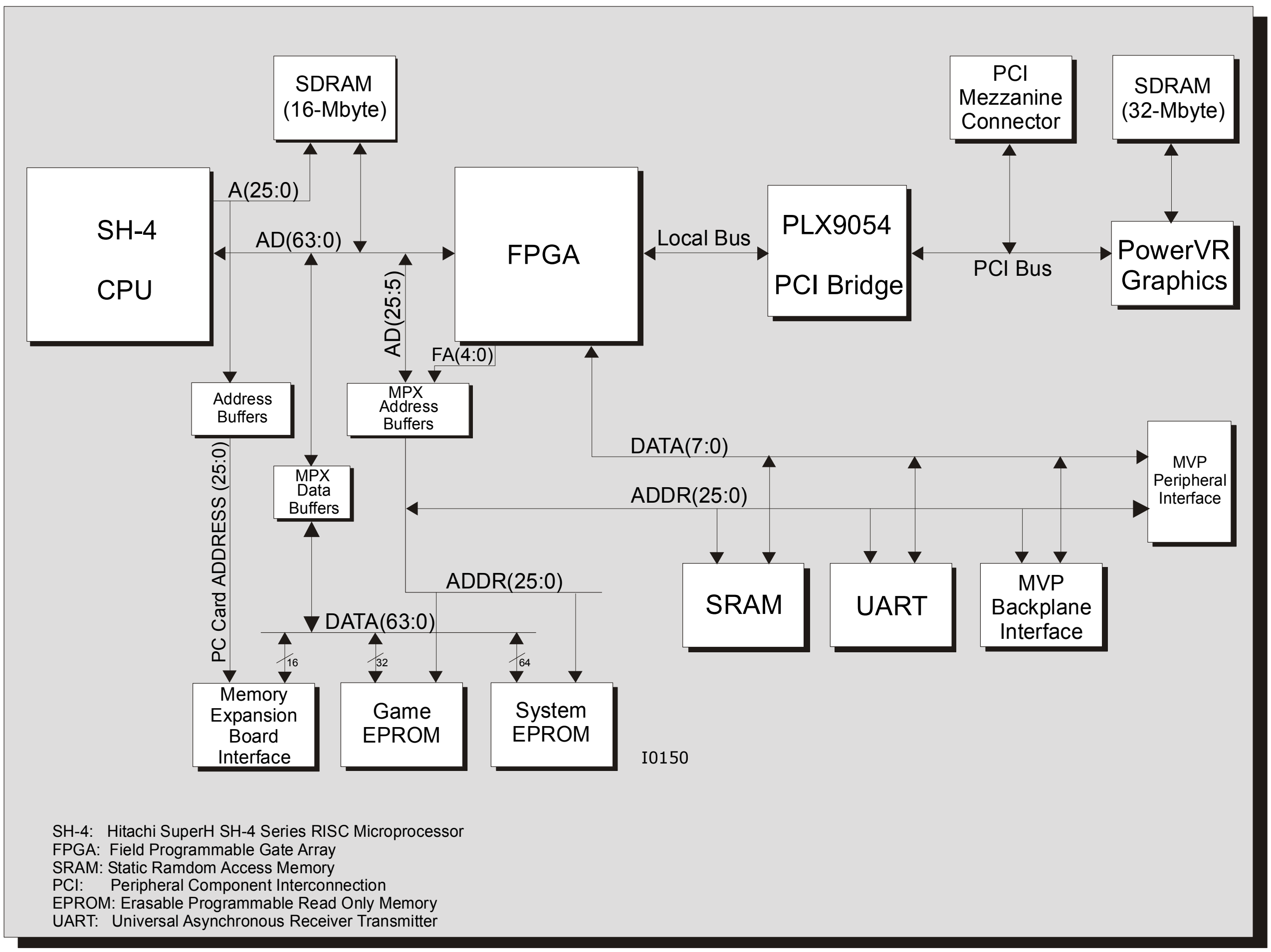

Figure 10-3 Main Board Block Diagram

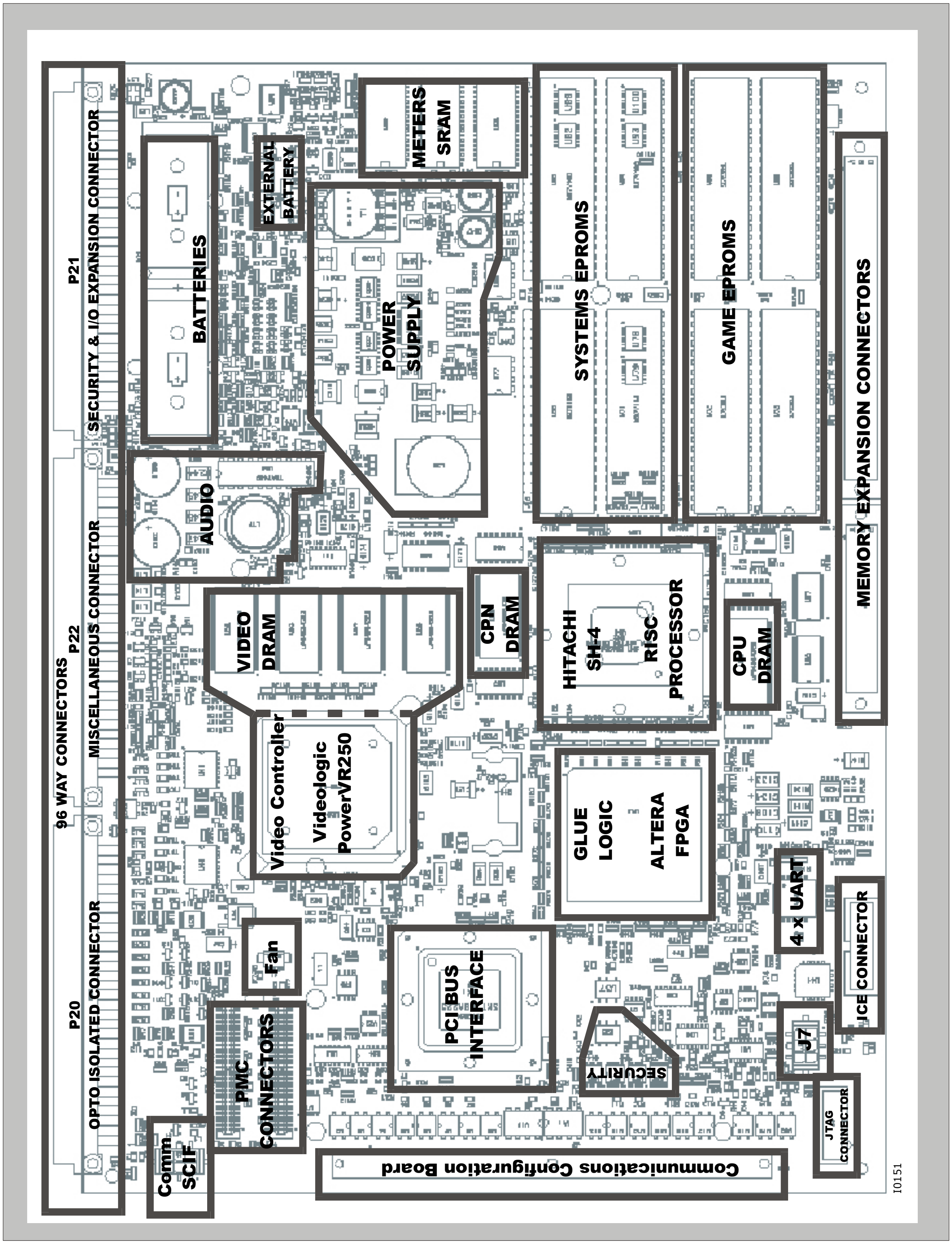

Figure 10-4 Main Board Layout

10.4.1 Microprocessor

The Hitachi SH-4 (Model SH7750) is a high performance RISC microprocessor with an architecture that is the leader in code density for this type of processor. The device features up to 360 MIPS performance and a 128-bit graphic engine for multimedia applications.

In addition to single- and double-precision floating-point operations, the on-chip FPU (Floating Point Unit) has a 128-bit graphic engine that enables 32-bit floating-point data to be processed 128 bits at a time. The unit also supports 4 x 4 array and inner-product operations that enable performance of 1.4 GFLOPS to be achieved.

A superscalar architecture is employed that enables simultaneous execution of two instructions (including FPU instructions) providing performance of up to twice that of conventional architectures, at the same frequency.

On-chip peripheral modules include oscillator circuits, an interrupt controller, direct memory access controller, timer unit, real-time clock, serial communication interfaces, and a user-break controller.

Also provided are an 8-Kbyte-instruction cache and a 16-Kbyte data cache as well as an on-chip memory management unit that handles translation from the 4-Gbyte virtual address space to the physical address space. The bus-state controller supporting external memory access can handle a 64-bit synchronous DRAM (SDRAM) 4-bank system and a 64-bit data bus as well as ROM, SRAM, DRAM, synchronous DRAM, and PCMCIA elements.

CPU Core

Processor features include:

- Up to 200 MHz and 360 MIPS,
- 16 x 32-bit general purpose registers,
- 32 x 32-bit single-precision floating point registers, or 16 x 64-bit double-precision floating point registers, or 4 x 128-bit single-precision vector registers and a register matrix,
- 16-bit fixed instruction length for high code density,
- A multiply-accumulate unit for special functions such as software modems (32- x 32 ± 64-bits is transformed to become 64–bits),
- MMU (Memory Management Unit) with 1–, 4–, 64–Kbytes and 1–Mb page sizes, 64–entry, fully associative UTLB (Unified Translation Lookaside Buffer),
- Four-entry, fully associative μITLB (Instruction TLB),
- Five-stage pipeline.

Memory

- On-chip cache, 8–Kbytes instruction and 16–Kbytes data lengths:
  a. Write back or write through, selectable by page,
  b. Low voltage cache to reduce power consumption.

- On-chip bus state controller allows direct connection to DRAM, SDRAM, SRAM, ROM and Flash ROM, with support being provided for the 8-, 16-, 32- r 64-bit data bus.

PCI Bus Controller

- 32-bit PCI (Peripheral Component Interface) bus controller – 33/66 Hz operation,
- Host/slave mode support – supports up to 4 channels at 33 Hz and 1 channel at 66 Hz,
- Operation Clock – internal or external clock,
- Dedicated 4-channel PCI DMAC (Direct Memory Access Controller) – PCI to or from memory located on SuperH bus, and on-chip FIFO (First In First Out) enables fast data transfer.

Peripherals

- DMA (Direct Memory Access) of 4 channels,
- Timers – 3 channels x 32-bits,
- Watchdog timer,
- Real Time Clock,
- PCMCIA control logic.

Serial Communications Interface

- Serial communications interface, one channel (asynchronous / synchronous, with smart card interface),
- Serial communications interface, one channel (asynchronous, with 16-bytes transmit and receive FIFOs),
- Phase-Locked Loop (PLL) circuits with x1/8, x1/6, x1/4, x1/2, x3/4, x1, x3/2, x2, x3, x6 external clock capability,
- Interrupt controller.

Other

- General purpose I/O of 16 lines,
- Dynamic power control with peripheral turn-off capability and low power modes of 'sleep' and 'standby'.

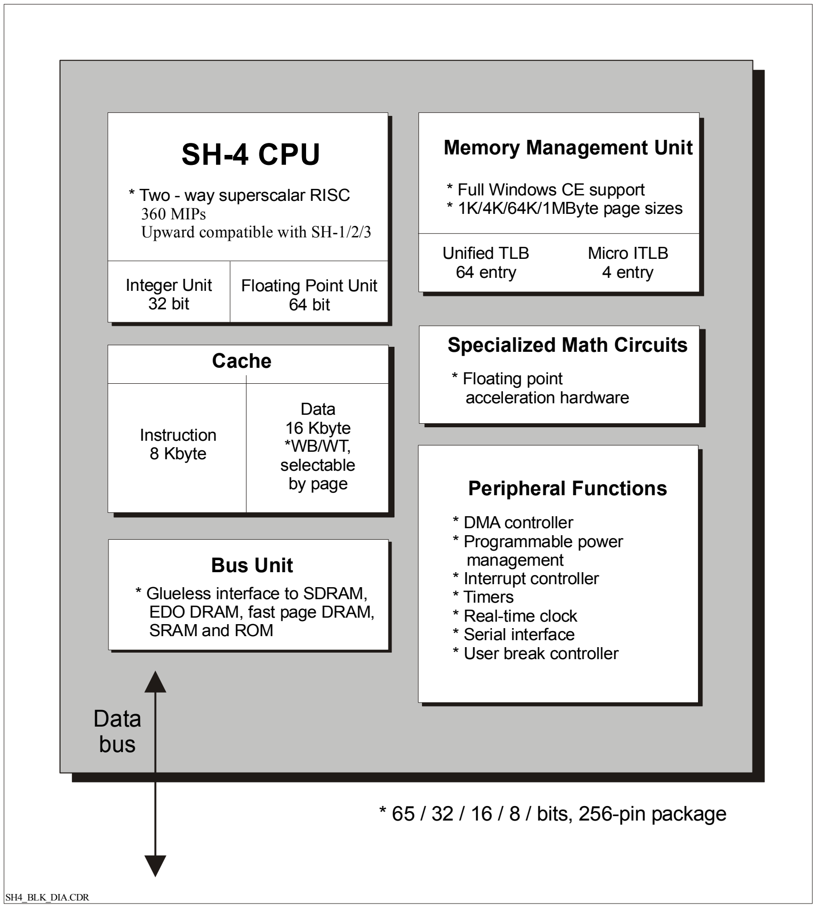

Figure 10-5 Hitachi SH-4 Microprocessor Block Diagram

I/O Data Bus

The SH-4 is designed to be interfaced to standard peripheral chips and all I/O addresses in the processor are memory mapped.

The peripheral address bus is simply the latched address lines. These are buffered to reduce loading and to avoid slowing down EPROM accesses.

Diagnostic LEDs

The SCIF communication channel is shared for LEDs on the Smart Card Interface. These are connected to 2 easily visible diagnostic LEDs to indicate diagnostic software status. The configuration of the circuit ensures that when the CPU is in reset, or when the software does not run, all the LEDs will be turned on. Therefore, faulty LEDs are easily detected and not interpreted as incorrect diagnostic code.

Interrupt System

The interrupt system of the SH-4 functions with four external interrupts. Specific registers are provided in FPGA to enable the programmer to read the source of an interrupt.

I/O Expansion Port Interrupts.
The I/O expansion port has 4 interrupts: `IL0`, `IF`, `FL`, and `FH0` (schematic IO_IN). Pull-up/down resistors pull unused interrupts to their inactive state. EMC filtering is provided to prevent spurious interrupts.

SH-4 Timers

The SH-4 has four built-in timers able to time intervals. The timers are controlled by a 33 Hz clock. Three primary clocks exist within the board: 14.318 Hz, 32.768 Hz, and 33 Hz. All other clocks are derived from these primaries.

- **Primary Clock.** The SH-4 uses a primary clock of 33 Hz that is internally doubled to provide 66 Hz for the Bus interfaces. The clock has a tight duty cycle specification of 66 Hz. The primary clock is multiplied by 6 to create 198 MHz for the SH-4 clock.
- **Bus Clock.** The CPU SH-4 core and memory controller has an optional clock input to allow higher speed operation.
- **Video Clock.** The video clock is 14.318 MHz which is provided by an external crystal.
- **Time Clock.** The real time clock chip uses a 32.768 kHz crystal to keep time.

10.4.2 Video

The Main Board functions with an on-board video graphics controller to provide high performance for extended graphics and video processing capabilities.

The controller, the PowerVR 250 (code-named PMX1-LC), has been produced through a joint venture of VideoLogic and NEC who have now released the advanced device with a 2D and a 3D engine, a VMI video input bus and digital interface.

The device is able to deliver VGA-standard displays of 640 x 480 in 24 bits/pixel with a video vertical frequency of 60 Hz. It is supported with a 32-Mbytes SDRAM array and is connected to the 22 MHz PCI.bus. High quality animation sequences are achieved through the improved appearance of motion resulting from the updating of displays at 30 frames per second – twice that of earlier Aristocrat gaming machines.

10.4.3 Audio

The audio system uses an audio amplifier, a 16-bit digital-to-analog converter (DAC), a conversion filter and EPROM space to store digitised, compressed, sampled audio. The process converts the digital audio using the DAC, applies a filter to remove any noise and then amplifies the output. Note that volume control, although generated by hardware, is under software control. There are three parts to the production of audio: DMA (Direct Memory Access), DAC and Power Amplification.

DMA to Serial Audio Conversion

Audio is implemented using software synthesis and two DMA channels to provide data to a DAC that implements independent volume control.

SH–4 DDT mode (On-Demand Data Transfer Mode) DMA is used since a total of three DMA channels are required on the board and only two can be implemented in normal DMA mode. Channels 1 and 3 are used for audio. The high performance Channel 2 is used for video and channel 0 is not used. DMA is supported from SDRAM only. If an audio DMA transfer is in progress, it will be allowed to finish before the next PCI data block is transferred, and vice versa.

10.4.4 Communication Port

The SH-4 has a built-in serial communications port, the SCI Communications Channel, used only for debugging. The data format is 8 data bits, 1 start bit, 1 stop bit and no parity.

10.4.5 Reset

The Main Board has 2 reset signals, NRESET and N2RESET. When reset is asserted it has a nominal period of 200 ms (guaranteed 140-280 ms).

- NRESET is the MAX705 reset output, valid for all supply voltages from one to 3.0 V DC. NRESET is used in the battery-backed circuits to prevent problems during power up/down, while N2RESET is used elsewhere.
- N2RESET is the normal active low reset generated by buffering NRESET. N2RESET is driven from FPGA logic.

Watchdog Timer

The MAX706 incorporates a watchdog timer to reset the Main Board if the CPU does not strobe the watchdog input. The watchdog timeout period is nominally 1.6 seconds, and is guaranteed to be 1.0 to 2.25 seconds. The manual reset input is asserted if the watchdog output trips (WDO) or if the external reset input is asserted.

The MAX706 voltage comparator also checks the 1.8 V supply from SH–4.

All devices that can be reset are reset to give the board a well-defined power up state. Peripheral I/O devices, FPGA, and the I/O Expansion interface are reset and the battery test outputs are disabled.

10.4.6 External I/O Expansion

Two expansion interfaces are provided:

- I/O expansion through the Backplane Board allows one general-purpose 8-bit I/O boards, and one security subsystem board to be added, using 96-way DIN41612 connectors.

- The 32-bit memory expansion interface on the Main Board has a I/O port; however, this interface is primarily designed to add extra EPROM or PCMCIA modules to the system.

I/O Boards

Twelve address lines are provided to access 4 Kbytes of I/O space on the I/O boards. The 8-bit I/O data bus is buffered onto the I/O boards. I/O is accessed using chip select `DACK`.

Peripheral PCBs take +5 V DC power from the Main Board.

PMC Board (not fitted)

The PMC Connectors (J5 and J6) may be used at a future time to interface to a PMC Board.

10.4.7 Memory

The Main Board has five types of memory:

- **SDRAM** provides memory for graphics, sound and other software requirements.
- **EPROM** contains the game software.
- **SRAM** provides memory for metering.
- **EEPROM** contains high reliability configuration data.
- The Real Time Clock (RTC) also contains a number of bytes of SRAM.

DRAM

The Main Board contains 16 Mbytes of Synchronous Dynamic RAM (SDRAM) as standard. The SH-4 directly drives the multiplexed address lines (`RA[9:0]`), row and column (`RAS`, `CAS[3:0]`) strobes, output (`OE[1:0]`), and write enable (`WE[1:0]`) signals.

EPROM

The data bus for the System EPROMs is 64-bits wide and for the Game EPROMs 32-bits wide. The Main Board contains sockets for 8 EPROMs which can be configured to 8-, 16-, or 32-Mbit chips, each being 16-bits wide. This arrangement provides a maximum of 32-Mbytes of EPROM storage.

To expand the memory beyond 32 Mbytes, the on-board EPROMs can be added to or replaced by an external memory board attached above the Main Board.

Meters SRAM

For the electronic meters, the Main Board provides three 512-Kbytes of Static Random Access Memory (SRAM) with battery back-up.

The SRAM contains machine metering information, such as money in/out, game history, and a range of other information. This critical data is preserved reliably, and various jurisdictions require multiple back-ups of the data.

The data is usually replicated three times, so that each chip contains identical data. Each memory is checked against the other to verify the stored data is correct.

Write access is mutually exclusive with only one chip writeable at a time. If an error occurs and memory is overwritten, only one of the three devices can be corrupted. On reset, the bank-select register selects bank 0, which does not exist. The SRAMs are located at banks 1,2, and 3.

The three SRAM chips are powered from two separate batteries, further reducing the possibility of losing data.

EEPROMs

The system implements two serial EEPROMs. The minimum requirement is 128 bytes per EEPROM.

Memory Expansion Port

The memory expansion port is primarily designed to add EPROM and/or PCMCIA to the Main Board. The Memory Expansion Board enables 64 Mbytes and more of EPROM to be directly addressed together with signals to accommodate paged memory, external DRAM emulation and debug facilities. The on-board EPROM is disabled when the appropriate signal is asserted from the Memory Expansion Board.

The Memory Expansion Board interfaces with the Main Board via a 96-way DIN41612 connector (J12) and a 4-way half-DIN41612 connector (J9).

10.4.8 Battery Backup Circuit

The Main Board has two lithium batteries for SRAM, the Real Time Clock and security. One battery is used for SRAM, RTC, and security, and the other is allocated to two SRAMs. Each battery is mounted in a socket with a security tie wrap.

CAUTION
Danger of explosion if battery is incorrectly replaced. Dispose of used batteries according to manufacturer’s instructions.

A resistor and diode combination in series prevents reverse charging of the battery. A lithium battery can potentially explode if reverse charged.

The Main Board includes circuitry to test each battery under CPU control. The test places a resistor load on the battery and checks the voltage after a short delay (55.6 ms). The load is enabled from a monostable so that a fault in the software will not discharge the battery.

The battery end life is at 2.0 V DC, below which the memory and logic are no longer guaranteed to work. The test will indicate a battery failure at 2.5 V DC.

Replacing Battery

When the battery is changed, power will be maintained for a limited time by the decoupling capacitors. A connector (J11) is provided to allow for external battery backup during battery replacement.

10.4.9 Real Time Clock

The Main Board utilises the Dallas DS1302 Real Time Clock (RTC) and uses a standard Dallas 3 wire interface. The real-time clock, meter RAM 0, and the battery-backed security circuit on the I/O Driver Board are powered from the same battery.

10.4.10 Security

The system caters for two types of security inputs, optical and mechanical, with eight of each. The sensor circuit is designed such that an external optional add-in security module (on the Backplane Board) is able to share the sensors.

The add-in security module has the capability of monitoring both the optical and mechanical inputs during normal operation and power off mode. The security system also allows for the time stamping and logging of security events

Optical Security

The Main Board provides the necessary circuitry to interface eight IR LED emitter/photo-transistor detector pairs. The optical security sensors are monitored by the Main Board when the machine is powered.

Sensor sharing between the Main Board and the optional security module is accomplished by the use of diodes.

The following emitters and detectors are used:

- **Emitter.** LD271A with a beam width of 50 and a frequency of 950 nm.
  - LED current: 15 mA ±20%
  - Driving Source: +5 V DC logic supply
  - Current is on at reset.
- **Detector.** BPW77N with a beam acceptance of ±10 and a peak sensitivity at 850 nm.
  - Output Signal: 10 K 5 % resistor pull up to +5 V DC.
  - Driving Source: +5 V DC logic supply.

Table 10-1 Optical Security - Typical Assignment

Switch No.	Function		Switch No.	Function
0	Main door		4	Not used
1	Not used		5	Not used
2	Not used		6	Not used
3	Not used		7	Not used

Mechanical Security

The system provides the necessary circuitry to interface eight mechanical security switches.

Up to eight of the mechanical security inputs can be used for security breach detection while the power is off (independent channel 0 and 1-7 detection). When the power is on, a random number is written to a battery-backed register on the Driver Board (channel 0 – logic door only). A breach of security (opening of the switch) while the power is off causes the register to reset. When the power is restored the absence of the original number indicates a security breach. If a changeover switch is used, the closing of the normally open contact will also reset the register.

The mechanical security sensor interface has the following specification:

- Switch type: Single pole, changeover
- Secure state: normally closed
- Driving source: 3.3 V DC.

Table 10-2 Mechanical Security - Typical Assignment

No.	Function	Monitored by...
0	Logic Cage	Battery-backed circuit.
1	Top Box	Battery-backed circuit..
2	Mechanical Meters	Battery-backed circuit.
3	Cash Box	Battery-backed circuit.
4	Main Door	Main Board only when machine is powered.
5	Bank Note Stacker	Main Board only when machine is powered.
6	Not used	Spare.
7	Not used	Spare.

10.4.11 Machine Peripherals

The Main Board can drive the following peripheral equipment:

- Hopper
- Coin handling
- Bank Note Acceptor
- Printer
- Mechanical meters.

Hopper Interface

The Main Board can interface with the Aristocrat Disc Hopper or the Himec Hopper via the Backplane Board.

The hopper receives 24 V to power the motor and an isolated 5 V to run the logic. The isolated 5 V is derived from the 12 V supply using a linear regulator on the Main Board. This voltage is also supplied, via the Backplane Board, to other peripheral boards requiring isolated 5 V.

The following table details the hopper interface signals.

Table 10-3 Hopper Control Signals

Signal Name	Function	I/O	Note
/EHOPCOIN	Coin output detector	I	From hopper photo-optic detector
/EHOPON	Hopper motor drive	O	+24 V driver output
/EHOPHI	Hopper high probe	I	Detects hopper full
/EHOPLO	Hopper low probe	I	Not used with ADH
P24V	+24 V power for motor		
/EHOPTEST	Hopper sensor test	O	output from Main Board
/EHOPOVR	Overcurrent sensor output	I	Not used with ADH
/EHOPDIR	Hopper motor direction control	O	Not used with ADH
HOP5V	+5 V from Main Board	O	Converted from +12 V
GNDA	Power and signal ground.		

Coin Handling System

Coin Chute Assembly

The Main Board interfaces with the coin chute assembly via the I/O Driver Board.

The Main Board receives the signals "NOD1A", "NOD1B", "NOD2A", "S7 ALARM", and "AUDIT" from the coin interface section of the I/O Driver Board. It sends the control signals "NEODLEDON", "NECOINBLK", and "NECOINDIV" to the I/O Driver Board, which converts these signals into the form required by the coin chuting.

All inputs have EMC R/C filtering, with a cut-off frequency of 3.4 kHz.

Coin Diverter Solenoid

The coin diverter solenoid output circuit has the following specifications:

- Switches 200 mA at 24 V
- Open collector NPN (low side drive) output
- Short circuit protected (up to +24 V)
- Diode protected against back EMF

Table 10-4 Coin Handling Signals

Signal Name	Function
+24v	Coin diverter solenoid power
+5v	Power for solenoid photo optic sensor
GND	Ground
NOD1A	Coin optic detector 1A, to Main Board
NOD1B	Coin optic detector 2B, to Main Board
NOD2A	Cash box optic detector, to Main Board
S7ALARM	Simulated valid coin output to Main Board
AUDIT	Audit pulse out for DACOM3000
/EODLEDON	NOD LED enable from Main Board.
/ECOINBLK	Coin block solenoid output from Main Board
/ECOINDIV	Coin diverter signal from Main Board.

Refer to the chapters on the Coin Chute Assembly and the Driver Board for further details.

10.4.12 SPI Bus Driver and Multiplexer Circuitry

The Main Board implements a Serial Peripheral Interface (SPI) bus for communicating with the I/O Driver Board and other external peripheral devices.

The SPI bus is multiplexed into eight separate channels. Only one channel is accessible at any given time.

This functionality is not used in the USA.

Table 10-5 SPI Channel Signals

Name	Type	Description	Comment
SPIRST2	OUTPUT	SPI Channel 2 Clear	Reset mechanical meters
SPIRST	OUTPUT	SPI Clear	Reset line to the channel. Channel #7 has no reset. Mechanical meters are reset separate to all other channels
SPIDOUT	OUTPUT	SPI Data Output	Common line for all the channels
SPIDINx	INPUT	SPI Channel x Data Input	It has to be one independent line per channel
SIOEx	OUTPUT	SPI Channel x Strobe	Enable line for the channel It has to be one independent line per channel
SCLK	OUTPUT	SPI Clock	Serial bit clock. Common for all the channels.

SPI Channels Functional Description

The board has seven SPI channels selected via three bits in an output register. Channel 0 is defined as the reset or null state. Data written to channel 0 will be read back in its bitwise inverted state as a diagnostic test.

The seven channels are allocated as follows:

Channel 1	Top box distribution board (Optional)
Channel 2	Mechanical meters board (Optional)
Channel 3	not used
Channel 4	Door inputs, via I/O Driver PCB
Channel 5	Door outputs, via I/O Driver PCB
Channel 6	Not used
Channel 7	Main board security registers.

10.4.13 Serial Channels

The board has four serial channels, referred to as channels 0,1, 2, and 3, any of which may be used to communicate with peripheral equipment and external network interfaces. The serial channels are implemented via two PC compatible DUART's. The serial debug channel is implemented on the SH-4.

Channel 0 has a non-isolated interface to a Fluorescent Interface Panel (FIP) and an RS232 interface. Channels 2 and 3 are fully isolated and are configurable via the Communications Configuration Board (CCB). Channel 1 is not isolated.

Channel 1 is allocated to the Bank Note Acceptor and is implemented on the Main Board (applies to Bank Note Acceptor V2.2).

The serial ports are implemented using an industry standard 16C554 UART. Each of the three generic serial channels (channels 1 to 3) has 1-receive-data, 1-transmit-data, 3 input and 3 output handshake lines.

The maximum baud rate supported is 9600 baud, except on channel 2 which uses fast optocouplers.

10.4.14 Communication Configuration Board

Serial channels 2 and 3 are configured through the Communications Configuration Board (CCB) which is plugged into the 72-pin SIMM socket on the Main Board. The CCB converts the opto-coupled UART I/O to any of the following signal levels:

- RS232
- Current loop (Open collector)
- Bank Note Acceptor interface
- Serial printer
- TTL compatible level
- Other

Refer to the chapter Communications Configuration Board (CCB) for additional information.

10.4.15 Interface with the Power Control System

Signal inputs and outputs

The Main Board has several signal lines to interface with the power control system as shown in the following table:

Table 10-6 Power Control System Signal Lines

Signal Name	Type	Comment
/SSR1	Output	Control signal for the solid state relay to switch to low power mode, open collector active LOW
/PFAIL 24	Input	Power Fail signal, open collector active LOW, mains voltage
/PFAIL 22	Input	Output power 24 V correct, from power supply assembly open collector
GND	Power	+ 24 Volt ground from the PMS

Power Lines and Grounding Scheme

The Main Board receives +24 V DC from the power control assembly, via the Backplane Board.

The +24 V is supplied to the:

- I/O Driver Board.
- Audio power amplifier.
- Coin handling modules.
- Bank Note Acceptor (if fitted).
- Printer (if fitted).
- Mechanical meters (if fitted).
- Handle (if fitted).

The Main Board uses a Switched Mode Power Supply (SMPS) to generate 3.3 V (for all logic), 5 V DC and an isolated +/-12 V DC from the 24 V supply. The 5 V DC is used to supply the external logic circuits (SPI, Hopper, etc.), as well as the I/O expansion boards and the optional security subsystem board. The +/-12 V DC is supplied to the generic serial channels.

The Main Board also receives 12 V DC from the I/O Driver Board. This supply is passed through a linear regulator on the Main Board to generate the isolated 5 V DC supply required by the hopper.

All outputs are protected from short circuit. The power is resumed after switching the machine OFF then ON.

10.4.16 Mikohn Link Progressive Interface

The Main Board provides an optically coupled, open-collector pulse interface to a Mikohn Link Progressive system, useable in some jurisdictions.

The output is the standard Mikohn interface:

- Switches 20 mA at 24 V.
- Optically isolated.
- Reverse protection diode.

10.4.17 In-Circuit Emulator (Not fitted)

To meet the requirements of jurisdictional authorities and to assist programmers in debugging tasks, an In-Circuit Emulator (ICE) facility is provided to enable the visibility and control of the SH-4 processor resources, such as registers and memory contents. The ICE functions are established when the JTAG connector, a 14-way DIL header, is fitted to J8.

The connector is compatible with the Hitachi User Debug Interface (Hitachi-UDI) and provides an interface that conforms to JTAG, IEEE 1149.1 and the IEEE Standard Test Access Port and Boundary-Scan Architecture. The SH-4 (Model SH7750) Hitachi-UDI does not support boundary-scan but does enable emulator connection. The Hitachi-UDI uses six pins to provide the serial transfer protocol conforming to the JTAG specification – `TCK, TMS, TD, TDO, TRST, ASEBRK/BRKACK.`

10.4.18 FPGA JTAG Interface (Not fitted)

The FPGA JTAG connector is used for Main Board development.

10.4.19 Mechanical Switches

The board senses the status of five mechanical switches (signals MSWITCH0 to MSWITCH4) in addition to the eight mechanical security switches. MSWITCH0 is the Audit reset switch, MSWITCH1 is the Jackpot reset switch, and MSWITCH2, MSWITCH3, and MSWITCH4 are spare. The spare switches may be used for an optional handle. The specifications for the inputs are:

- The switch current is 5 mA from the 5 V logic supply.
- The circuit is filtered for EMC (0.1 μF ceramic is recommended). Input filtering provides EMC protection.
- The signals are connected to the internal SPI channel via a low-pass filter and sensed with HCMOS logic levels.

10.4.20 Backplane Board

The Main Board is connected to the Backplane Board directly through three 96-way male right-angle DIN41612 connectors:

Optically Isolated Connector

All the I/O signals in this connector are optically coupled. It contains the UART serial communication channels, SPI channels, Mikohn interface, hopper interface, and control signals for the power supply. It also provides connection to the power supply for +24 V, +5 V, +12 V DC, and ±12 V.

Miscellaneous Connector

This connector contains the coin chute interface, video and audio signals, power control system solid state relay, and the serial debug. It also connects to the +24 V and +5 V power supply.

Security and I/O Expansion Connector

The connector contains optical and mechanical security signals, mechanical switch signals, and I/O expansion signals. It also provides connection to the +24 V power supply.

10.5 Removal and Replacement Procedures

CAUTION
When handling electrostatic sensitive devices (ESDs) such as PCBs, take care to avoid physical contact with components. Do not place ESDs on metal surfaces. PCBs should be handled by their edges. Care must be taken to avoid flexing the PCB, as this may lead to physical damage.

CAUTION
Turn the machine power off before removing PCBs from the logic cage.

Removal

To remove the Main Board:

1. Open the cabinet door, and switch OFF the machine.
2. Open the logic cage door.
3. Standard Electro Static Discharge (ESD) prevention procedures should be followed when handling printed circuit boards.

4. Lever the PCBA out of the runners using the board extractors, and withdraw the board from the logic cage.
5. The PCBA should be placed in an antistatic bag immediately.

Note
You must place a fault tag on any faulty boards.

Replacement

Replacement is a reversal of the removal procedure. Both sides of the replacement PCBA should be inspected for any signs of physical damage.

10.6 Description of Connectors

The following tables show the details of the principal external connectors on the Aristocrat Main Board (No. 2501-410557). Details of pinouts are provided.

Table 10-7 Description of Connectors

No.	Name	Type	Function
J1	Fan	4-way header	Connector to fan for video processor
J2	COMM SCIF	Male straight 6 way DIL header	Optional spare serial port (SCIF)
J3	CCB	72 pin SIMM socket	Interface to Communications Configuration Board
J4	JTAG FPGA Byteblaster	Male straight 10 way DIL header	Used in product development - not used in finished products
J5	PMC-Panel 1	Female straight 64 way miniature PMC	Optional PCI mezzanine plug-in board
J6	PMC-Panel 2	Female straight 64 way miniature PMC	Optional PCI mezzanine plug-in board
J7	Smart Card I/F	Male straight 6 way DIL header	Optional Smart Card interface or Diagnostic Terminal
J8	ICE	Male straight 14 way DIL header	In-Circuit Emulator for inspection of registers and memory
J9	Memory Expansion	48 way female straight DIN41612 Socket	Interface to optional Memory Expansion Board
J10	Emulator	21 way header	Used in software development
J11	External Battery	4-way header	Connector for external battery attachment during on-board battery changeover.
J12	Memory Expansion	Female straight 96 way DIN41612 connector	Interface to optional Memory Expansion Board
J13	Emulator	21 way header	Used in software development
P20	Opto Isolated Connector	Male right angle 96 way DIN41612 connector	Connector to Backplane Board
P21	Miscellaneous Connector	Male right angle 96 way DIN41612 connector	Connector to Backplane Board
P22	Security and I/O Expansion Connector	Male right angle 96 way DIN41612 connector	Connector to Backplane Board

10.6.1 Fan Connector - J1

The J1 connector is optionally loaded on the Main Board and is used to connect a fan to cool the video processor. The connector is a 4-way Header.

Table 10-8 Fan Connector - J1

Pin	Pin Name	Description
1	GND	
2	VCC 5	Power output
3	Sensor	Pulse for fan
4		

10.6.2 Communications Configuration Board - J3

A 72-pin SIMM socket is used to connect the Communications Configuration Board – for additional detail, see Chapter 14, Communications Configuration Board - Part No. 410217. The Board connects to J3 on the Main Board.

Table 10-9 Communications Configuration Board Connector - J3

Pin No	Pin Name	Description
1	CFG2	DTR0 output signal through opto emitter
2	GNDI	Ground
3	CFG4	RTS1 output signal through opto emitter
4	CFG1	DTR0 output signal through opto collector
5	SIN1	Input from channel 1 connector
6	CFG3	RTS1 output signal through opto collector
7	SOUT1	Output to channel 1 connector
8	CFG6	DTR1 output signal through opto emitter
9	CTS1	Input from channel 1 connector
10	CFG5	DTR1 output signal through opto collector
11	DSR1	Input from channel 1 connector
12	CFG8	SOUT1 output signal through opto emitter
13	CFG7	SOUT1 output signal through opto collector
14	CFG10	CTS1 input signal through opto cathode
15	I1	Input from channel 1 connector
16	CFG11	DSR1 input signal through opto anode
17	CFG9	CTS1 input signal through opto anode
18	CFG12	DSR1 input signal through opto cathode
19	RTS1	Output to channel 1 connector
20	CFG13	SIN1 input signal through opto anode
21	DTR1	Output to channel 1 connector
22	CFG14	SIN1 input signal through opto cathode
23	O1	Output to channel 1 connector
24	P12VI	+12v power
25	CFG20	RTS2 output signal through opto emitter
26	N12VI	-12v power
27	CFG19	RTS2 output signal through opto collector

Pin No	Pin Name	Description
28	GNDI	Ground
29	CFG18	SOUT2 output signal through opto emitter
30	CFG17	SOUT2 output signal through opto collector
31	CFG16	SOUT2 output signal through opto base
32	CFG15	Opto Vcc
33	SIN2	Input from channel 2 connector
34	CFG22	DTR2 output signal through opto emitter
35	SOUT2	Output to channel 2 connector
36	CFG29	SIN2 input signal through opto anode
37	CTS2	Input from channel 2 connector
38	CFG30	SIN2 input signal through opto cathode
39	DSR2	Input from channel 2 connector
40	CFG21	DTR2 output signal through opto collector
41	I2	Input from channel 2 connector
42	CFG31	CTS2 input signal through opto anode
43	RTS2	Output to channel 2 connector
44	CFG32	CTS2 input signal through opto cathode
45	DTR2	Output to channel 2 connector
46	CFG33	DSR2 input signal through opto anode
47	O2	Output to channel 2 connector
48	P12VI	+12v power
49	CFG34	DSR2 input signal through opto cathode
50	GNDI	Ground
51	CFG24	RTS3 output signal through opto emitter
52	N12VI	-12v power
53	SIN3	Input from channel 3 connector
54	CFG23	RTS3 output signal through opto collector
55	SOUT3	Output to channel 3 connector
56	CFG26	DTR3 output signal through opto emitter
57	CFG25	DTR3 output signal through opto collector
58	CFG28	SOUT3 output signal through opto emitter
59	CTS3	Input from channel 3 connector
60	CFG27	SOUT3 output signal through opto collector
61	CFG35	CTS3 input signal through opto anode
62	CFG36	CTS3 input signal through opto cathode
63	DSR3	Input from channel 3 connector
64	CFG37	DSR3 input signal through opto anode
65	I3	Input from channel 3 connector
66	CFG38	DSR3 input signal through opto cathode
67	RTS3	Output to channel 3 connector
68	CFG39	SIN3 input signal through opto anode
69	DTR3	Output to channel 3 connector
70	CFG40	SIN3 input signal through opto cathode
71	O3	Output to channel 3 connector
72	GNDI	Ground

10.6.3 PCI Mezzanine Connectors - J5 and J6

The J5 and J6 interfaces are 64-way connectors used for optional PCI Mezzanine functions. The items conform to the IEEE P1386.1 standard.

Table 10-10 PCI Mezzanine Connector - J5

Pin No	Signal Name	Pin No	Signal Name
1	+12V – Not Connected	2	TRST# – Not Connected
3	TMS – Not Connected	4	TDO – Not Connected
5	TDI – Not Connected	6	Ground
7	Ground	8	PCI-RSVD – Not Connected
9	PCI-RSVD – Not Connected	10	PCI-RSVD – Not Connected
11	BUSMODE2# – Not Connected	12	+3.3V
13	NRST	14	BUSMODE3# – Not Connected
15	+3.3V	16	BUSMODE4# – Not Connected
17	PCI-RSVD – Not Connected	18	Ground
19	PCIAD[30]	20	PCIAD[29]
21	Ground	22	PCIAD[26]
23	PCIAD[24]	24	+3.3V
25	IDSEL	26	PCIAD[23]
27	+3.3V	28	PCIAD[20]
29	PCIAD[18]	30	Ground
31	PCIAD[16]	32	NCBE(2)
33	Ground	34	Clk
35	NTRDY	36	+3.3V
37	Ground	38	NSTOP
39	NPERR	40	Ground
41	+3.3V	42	NSERR
43	NCBE(1)	44	Ground
45	PCIAD[14]	46	PCIAD[13]
47	Ground	48	PCIAD[10]
49	PCIAD[08]	50	+3.3V
51	PCIAD[07]	52	H
53	+3.3V	54	V
55	VID(R2)	56	Ground
57	VID(G2)	58	VID(B2)
59	Ground	60	VID(VS2)
61	ACK64# – Not Connected	62	+3.3V
63	Ground	64	VID(HS2)

Table 10-11 PCI Mezzanine Connector - J6

Pin No	Signal Name	Pin No	Signal Name
1	TCK – Not connected	2	-12V – Not connected
3	Ground	4	INTA# - NINTPMC
5	INTB# - NINTPMC	6	INTC# - NINTPMC
7	BUSMODE1# – Not connected	8	+5V
9	INTD# - NINTPMC	10	PCI-RSVD – Not connected
11	Ground	12	PCI-RSVD – Not connected
13	PCICLK(2)	14	Ground
15	Ground	16	NGNT
17	NREQ	18	+5V
19	V (I/O) – Not connected	20	AD[31] – PCIAD(31)
21	AD[28] – PCIAD(28)	22	AD[27] – PCIAD(27)
23	AD[25] – PCIAD(25)	24	Ground
25	Ground	26	NCBE(3)
27	AD[22] – PCIAD(22)	28	AD[21] – PCIAD(21)
29	AD[19] – PCIAD(19)	30	+5V
31	V (I/O) – Not connected	32	AD[17] – PCIAD(17)
33	NFRAME	34	Ground
35	Ground	36	NIRDY
37	NDEVSEL	38	+5V
39	Ground	40	NLOCK
41	SDONE# - Not connected	42	SBO# - Not connected
43	PAR	44	Ground
45	V (I/O) – Not connected	46	AD[15] – PCIAD(15)
47	AD[12] – PCIAD(12)	48	AD[11] – PCIAD(11)
49	AD[09] – PCIAD(9)	50	+5V
51	Ground	52	NCBE(0)
53	AD[06] – PCIAD(6)	54	AD[05] – PCIAD(5)
55	AD[04] – PCIAD(4)	56	Ground
57	V (I/O) – Not connected	58	AD[03] – PCIAD(3)
59	AD[02] – PCIAD(2)	60	AD[01] – PCIAD(1)
61	AD[00] – PCIAD(0)	62	+5V
63	Ground	64	REQ64# - Not connected

10.6.4 Smart Card - J7

The J7 connector provides an interface for an optional Smart Card Connection.

Table 10-12 Smart Card Connector - J7

Pin No	Pin Name	Description
1	SCK2	Clock signal
2	Kout	Transmitted data from microprocessor
3	Kin	Received Data to microprocessor
4	Vcc_5	5 V Power Output
5	Vcc_3	3.3 V Power Output
6	Gnd	DC return

10.6.5 Memory Expansion Board - J9 and J12

J9 is a 48-way straight female DIN41612 connector optionally used for memory expansion.

Table 10-13 Memory Expansion Board Connector - J9

Pin No	Pin Name	Main Bd I or O	Comment
A1	Vcc_3	Power output	Logic power
B1	-	-	-
C1	P24V	Power output	24 V Power
A2	NIORQ2	Input	Interrupt IORQ2
B2	Gnd	Common	Logic Gnd
C2	NICIORD	Input	
A3	NIORQ1	Input	Interrupt IORQ1
B3	NICIOWR	Input	
C3	NREG	Output	
A4	NCE1A	Output	
B4	Gnd	Common	Logic Gnd
C4	NIOIS16	Output	
A5	NCE1B	Output	
B5	NWE1	Output	
C5	-	-	Not connected
A6	Vcc_5	Power output	5 V Power
B6	Gnd	Common	Logic Gnd
C6	BPCA(25)	Output	PC Address bus
A7	BPCA(0)	Output	PC Address bus
B7	BPCA(23)	Output	PC Address bus
C7	BPCA(24)	Output	PC Address bus
A8	BPCA(1)	Output	PC Address bus
B8	Gnd	Common	Logic Gnd
C8	BPCA(5)	Output	PC Address bus
A9	BPCA(2)	Output	PC Address bus
B9	BPCA(3)	Output	PC Address bus
C9	BPCA(4)	Output	PC Address bus
A10	BPCA(22)	Output	PC Address bus
B10	Gnd	Common	Logic Gnd
C10	BPCA(6)	Output	PC Address bus
A11	BPCA(21)	Output	PC Address bus
B11	BPCA(8)	Output	PC Address bus
C11	BPCA(7)	Output	PC Address bus
A12	BPCA(13)	Output	PC Address bus
B12	Gnd	Common	Logic Gnd
C12	BPCA(9)	Output	PC Address bus
A13	BPCA(12)	Output	PC Address bus
B13	BPCA(11)	Output	PC Address bus
C13	BPCA(10)	Output	PC Address bus
A14	BPCA(14)	Output	PC Address bus
B14	Gnd	Common	Logic Gnd
C14	BPCA(20)	Output	PC Address bus
A15	BPCA(15)	Output	PC Address bus
B15	BPCA(16)	Output	PC Address bus

Pin No	Pin Name	Main Bd I or O	Comment
C15	BPCA(19)	Output	PC Address bus
A16	BPCA(17)	Output	PC Address bus
B16	Gnd	Common	Logic Gnd
C16	BPCA(18)	Output	PC Address bus

Memory Expansion Board - J12

J12 is a 96-way straight female DIN41612 connector optionally used for memory expansion.

Table 10-14 Memory Expansion Board - J12

Pin No	Pin Name	Main Bd I or O	Comment
A1	Gnd	Common	Logic Gnd
B1	-	-	Not connected
C1	Vcc_5	Power Output	Power
A2	Gnd	Common	Logic Gnd
B2	NROMGDIS	Input	
C2	Vcc_5	Power Output	Power
A3	NMEBQTY	Input	
B3	NBWR	Output	
C3	NBRD	Output	
A4	MD3_NCE2A	Output	
B4	Gnd	Common	Logic Gnd
C4	NBCS(4)	Output	Bank select 4
A5	NBCS(0)	Output	Bank select 0
B5	NBCS(2)	Output	Bank select 2
C5	Vcc_3	Power Output	Logic Power
A6	BD(0)	I/O	Data bus
B6	Gnd	Common	Logic Gnd
C6	N2RESET	Output	Mainboard reset signal
A7	BD(1)	I/O	Data bus
B7	BD(2)	I/O	Data bus
C7	NROMSDIS	Input	
A8	BD(3)	I/O	Data bus
B8	Gnd	Common	Logic Gnd
C8	BD(5)	I/O	Data bus
A9	BD(31)	I/O	Data bus
B9	BD(4)	I/O	Data bus
C9	BD(6)	I/O	Data bus
A10	BD(29)	I/O	Data bus
B10	Gnd	Common	Logic Gnd
C10	BD(7)	I/O	Data bus
A11	BD(30)	I/O	CPU Data bus
B11	BD(9)	I/O	Data bus
C11	BD(8)	I/O	Data bus
A12	BD(10)	I/O	Data bus
B12	Gnd	Common	Logic Gnd
C12	BD(11)	I/O	Data bus
A13	BD(12)	I/O	Data bus

Pin No	Pin Name	Main Bd I or O	Comment
B13	BD(13)	I/O	Data bus
C13	NMEBWAIT	Input	
A14	BD(14)	I/O	Data bus
B14	Gnd	Common	Logic Gnd
C14	NMEBINT	Input	
A15	BD(15)	I/O	Data bus
B15	BD(16)	I/O	Data bus
C15	-	-	-
A16	BD(17)	I/O	Data bus
B16	Gnd	Common	Logic Gnd
C16	BD(18)	I/O	Data bus
A17	BD(28)	I/O	Data bus
B17	BD(19)	I/O	Data bus
C17	BD(20)	I/O	Data bus
A18	BD(27)	I/O	Data bus
B18	Gnd	Common	Logic Gnd
C18	BD(21)	I/O	Data bus
A19	BD(26)	I/O	Data bus
B19	BD(22)	I/O	Data bus
C19	BD(23)	I/O	Data bus
A20	BD(24)	I/O	Data bus
B20	Gnd	Common	Logic Gnd
C20	BD(25)	I/O	Data bus
A21	BA(16)	Output	Address bus
B21	BA(17)	Output	Address bus
C21	Vcc_3	Power Output	Logic Power
A22	BA(15)	Output	Address bus
B22	Gnd	Common	Logic Gnd
C22	BA(18)	Output	Address bus
A23	BA(13)	Output	Address bus
B23	BA(14)	Output	Address bus
C23	BA(19)	Output	Address bus
A24	BA(11)	Output	Address bus
B24	Gnd	Common	Logic Gnd
C24	BA(12)	Output	Address bus
A25	P24V	Power output	24 V Power (referenced to Gnd)
B25	BA(9)	Output	Address bus
C25	BA(10)	Output	Address bus
A26	BA(21)	Output	Address bus
B26	Gnd	Common	Logic Gnd
C26	BA(8)	Output	Address bus
A27	BA(22)	Output	Address bus
B27	BA(6)	Output	Address bus
C27	BA(7)	Output	Address bus
A28	BA(4)	Output	Address bus
B28	Gnd	Common	Logic Gnd
C28	BA(5)	Output	Address bus
A29	BA(2)	Output	Address bus
B29	BA(3)	Output	Address bus
C29	BA(23)	Output	Address bus

Pin No	Pin Name	Main Bd I or O	Comment
A30	BA(1)	Output	Address bus
B30	Gnd	Common	Logic Gnd
C30	BA(24)	Output	Address bus
A31	BA(0)	Output	Address bus
B31	BA(20)	Output	Address bus
C31	BA(25)	Output	Address bus
A32	-	-	Not connected
B32	NBUTRES	Input	
C32	MD4_NCE2B	Output	

10.6.6 Optically Isolated Connector - P20

P20 connector interfaces with P1 on the Backplane Board.

Table 10-15 Optically Isolated Connector - P20

PIN No	Pin Name	Comment
A1	SIN1	Receive data, serial channel 1
B1	N12VI	-12V from main board, isolated
C1		---
A2	CTS1	Handshake Input 0, serial channel 1
B2	GNDI	Ground of ±12 voltage, isolated
C2	SOUT1	Transmit Data, serial channel 1
A3	I1	Handshake Input 2, serial channel 1
B3	P12VI	+12V from main board, isolated
C3	DSR1	Handshake Input 1, serial channel 1
A4	O1	Handshake Output 2, serial channel 1
B4	DTR1	Handshake Output 1, serial channel 1
C4	RTS1	Handshake Output 0, serial channel 1
A5	SIN2	Receive data, serial channel 2
B5	N12VI	-12V from main board, isolated
C5		---
A6	CTS2	Handshake Input 0, serial channel 2
B6	GNDI	Ground of ±12 voltage, isolated
C6	SOUT2	Transmit data, serial channel 2
A7	I2	Handshake Input 2, serial channel 2
B7	P12VI	+12V from main board, isolated
C7	DSR2	Handshake Input 1, serial channel 2
A8	O2	Handshake Output 2, serial channel 2
B8	DTR2	Handshake Output 1, serial channel 2
C8	RTS2	Handshake Output 0, serial channel 2
A9	SIN3	Receive data, serial channel 3
B9	N12VI	-12V from main board, isolated
C9		---
A10	CTS3	Handshake Input 0, serial channel 3
B10	GNDI	Ground of ±12 voltage, isolated
C10	SOUT3	Transmit data, serial channel 3
A11	I3	Handshake Input 2, serial channel 3
B11	P12VI	+12V from main board, isolated
C11	DSR3	Handshake Input 1, serial channel 3

PIN No	Pin Name	Comment
A12	O3	Handshake Output 2, serial channel 3
B12	DTR3	Handshake Output 1, serial channel 3
C12	RTS3	Handshake Output 0, serial channel 3
A13		---
B13		---
C13		---
A14		---
B14		---
C14		---
A15		---
B15		---
C15		---
A16		---
B16		---
C16		---
A17	/ESPIDIN2	Data from meter board
B17	GNDA	Ground
C17	/ESPIDIN1	Data from top box
A18	/ESPIDIN5	Serial data input to main logic from serial input driver. Open collector output.
B18	GNDA	Ground
C18	/ESPIDIN4	Serial data input to main logic from serial output driver. Open collector output.
A19	ESPIRST	SPI reset signal
B19	GNDA	Ground
C19	/ESPIDOUT	Data output to meter board
A20	ESCLK	Serial clock
B20	GNDA	Ground
C20	ESPIRST2	Reset signal to meter board
A21	/ESIOE2	Strobe signal to meter board
B21	GNDA	Ground
C21	/ESIOE1	Serial output enable to top box
A22	/ESIOE5	Serial output enable #5 which selects SPI output driver.
B22	GNDA	Ground
C22	/ESIOE4	Serial output enable #4 which selects SPI input driver.
A23	/EHOPOVR	Overcurrent sensor output, hopper
B23	GNDA	Ground
C23		---
A24	/EHOPHI	Hopper high probe, Detects hopper full, hopper
B24	GNDA	Ground
C24	/EHOPCOIN	Coin output detector, hopper
A25	/EHOPDIR	Hopper motor direction, hopper
B25	GNDA	Ground
C25	/EHOPLO	Detects hopper low, hopper
A26	/EHOPTEST	Hopper Sensor Test output, hopper
B26	GNDA	Ground
C26	/EHOPON	Hopper motor drive, hopper
A27		---
B27	GNDA	Ground
C27	VCC	+5V

PIN No	Pin Name	Comment
A28	EPSU2SND	---
B28	GNDA	Ground
C28	/EPSU2OVR	---
A29	/ESPARE01	Spare output signal
B29	GNDA	Ground
C29	/EHANDLE	---
A30	P24VA	+24V
B30	GNDA	Ground
C30	P24VA	+24V
A31	EMIKOHNP	Mikohn signal
B31	P12V	+12V from driver board
C31	P12V	+12V from driver board
A32		---
B32	GNDA	Ground
C32	EMIKOHNN	Mikohn signal

10.6.7 Miscellaneous Connector - P22

P22 connector interfaces with P2 on the Backplane Board.

Table 10-16 Miscellaneous Connector - P22

PIN No	Pin Name	Comment
A1	/ES2OVERDE	Door detector on Mk4 (never used)
B1	GNDD	Ground
C1	/EODLEDON	NOD1 LED enable
A2	S7ALARM	S7 Alarm or Coin Comparator coin valid
B2	/ECOINDIV	Coin Divert Drive (NPN trans. to GND)
C2	/ECOINBLK	Coin Comparator enable (switches power through NOD) / S7 Inhibit
A3	NOD1B	NOD1 Coin output B / S7 Coin output 5
B3	GNDD	Ground
C3	NOD1A	NOD1 Coin out. A / S7 accumulator out.
A4	CVP0	S7 Coin output
B4	NOD2B	NOD2 Coin output B
C4	NOD2A	NOD2 Coin output A
A5	CVP2	S7 Coin output
B5	GNDD	Ground
C5	CVP1	S7 Coin output
A6	/SSR1	solid state relay for ballast and monitor On/Off (LED cathode)
B6	CVP4	S7 Coin output
C6	CVP3	S7 Coin output
A7	RS232TX	serial 0, nonisolated transmitter
B7	GNDD	Ground
C7	FIPOUT	Serial Transmit Data out
A8	RS232RX	serial 0, nonisolated receiver
B8	RS232RTS	nonisolated handshake Output 0, serial channel 0
C8	RS232CTS	nonisolated handshake Input 0, serial channel 0
A9		---

PIN No	Pin Name	Comment
B9	RED	Red, video
C9	REDGND	red colour signal ground
A10	BLUE	Blue, video
B10	GREENGND	blue colour signal ground
C10	GREEN	Green, video
A11	BLUEGND	green colour signal ground
B11	VSYNC	Vsync, video
C11	SYNCGND	synchro signal ground
A12	SPEAKER	Audio output
B12		---
C12	HSYNC	Hsync, video
A13	SPEAKER2	Stereo speaker output
B13	SPKRGND	speaker signal ground
C13	P24VSND	+24V, single track on PCB
A14	GNDD	Ground
B14	VCC	+5V from main board, converted from 24V
C14	GNDD	Ground
A15	VCC	+5V from main board, converted from 24V
B15	GNDD	Ground
C15	VCC	+5V from main board, converted from 24V
A16	GNDD	Ground
B16	VCC	+5V from main board, converted from 24V
C16	GNDD	Ground
A17	VCC	+5V from main board, converted from 24V
B17	GNDD	Ground
C17	VCC	+5V from main board, converted from 24V
A18		---
B18	KOUT	Serial data OUTPUT
C18	KIN	Serial data INPUT
A19		---
B19	GNDD	Ground
C19		---
A20		---
B20		---
C20		---
A21		---
B21	GNDD	Ground
C21		---
A22		---
B22		---
C22		---
A23		---
B23	GNDD	Ground
C23		---
A24		---
B24		---
C24		---
A25		---
B25	GNDD	Ground
C25		---

PIN No	Pin Name	Comment
A26	VBATE	External battery backup
B26		---
C26	/PFAIL	Power fail signal, active low
A27	/MIKOHN	Emitter of link progressive for DACOM3000
B27	GNDD	Ground
C27		---
A28		---
B28		---
C28		---
A29		---
B29	GNDD	Ground
C29		---
A30		---
B30		---
C30		---
A31		---
B31	GNDD	Ground
C31	Mk6 ID	Mk 6 identification
A32		---
B32		---
C32	EBACK type	Type of Backplane

10.6.8 Security and I/O Expansion Connector - P21

P21 connector interfaces with P3 on the Backplane Board.

Table 10-17 Security and I/O Expansion Connector - P21

PIN No	Pin Name	Comment
A1	MSWITCH1	mech. switch, JACKPOT RESET
B1	GNDD	Ground
C1	MSWITCH0	mech. switch, AUDIT RESET
A2	MSWITCH4	mech. switch, spare
B2	MSWITCH3	mech. switch, spare
C2	MSWITCH2	mech. switch, spare
A3		---
B3	GNDD	Ground
C3		---
A4	MSS0	Logic Door Security Switch 7 contact - NC
B4	OPRIS0	Door security detector output, no driver/buffer exists.
C4	EMCS0	door optical emitter
A5	EMCS1	Emitter 1 Drive signal, security 1
B5	GNDD	Ground
C5	MSSO0	Logic Door Security Switch 7 contact - NO
A6	MSSO1	Mechanical Security Switch 1 contact - NO
B6	MSS1	Mechanical Security Switch 1 contact - NC
C6	OPRIS1	Receiver 1 Sense signal, security 1
A7	OPRIS2	Receiver 2 Sense signal, security 2
B7	GNDD	Ground
C7	EMCS2	Emitter 2 Drive signal, security 2

PIN No	Pin Name	Comment
A8	EMCS3	Emitter 3 Drive signal, security 3
B8	MSSO2	Mechanical Security Switch 2 contact - NO
C8	MSS2	Mechanical Security Switch 2 contact - NC
A9	MSS3	Mechanical Security Switch 3 contact - NC
B9	GNDD	Ground
C9	OPRIS3	Receiver 3 Sense signal, security 3
A10	OPRIS4	Receiver 4 Sense signal, security 4
B10	EMCS4	Emitter 4 Drive signal, security 4
C10	MSSO3	Mechanical Security Switch 3 contact - NO
A11	EMCS5	Emitter 5 Drive signal, security 5
B11	GNDD	Ground
C11	MSS4	Mechanical Security Switch 4 contact - NC
A12	EMCS6	Emitter 6 Drive signal, security 6
B12	MSS5	Mechanical Security Switch 5 contact - NC
C12	OPRIS5	Receiver 5 Sense signal, security 5
A13	MSS6	Mechanical Security Switch 6 contact - NC
B13	GNDD	Ground
C13	OPRIS6	Receiver 6 Sense signal, security 6
A14	MSS7	Mechanical Security Switch 7 contact - NC
B14	OPRIS7	Receiver 7 Sense signal, security 7
C14	EMCS7	Emitter 7 Drive signal, security 7
A15		---
B15	GNDD	Ground
C15		---
A16	VBAT0	Backup battery 0
B16		---
C16		---
A17	RNW	CPU, read not write signal
B17	GNDD	Ground
C17		---
A18	/EIF	CPU, IF interrupt
B18	EFHO	CPU, FH0 interrupt
C18	/DACK	CPU, data acknowledge
A19	/EFL	CPU, FL interrupt
B19	GNDD	Ground
C19	/EIL0	CPU, IL0 interrupt
A20	/ERESET	CPU, external reset output
B20	/EIOW	CPU, IO write signal
C20	/EIOR	CPU, IO read signal
A21	EA13	CPU, address bus
B21	GNDD	Ground
C21	ECLK8M	CPU, clock signal
A22	EA10	CPU, address bus
B22	EA11	CPU, address bus
C22	EA12	CPU, address bus
A23	EA8	CPU, address bus
B23	GNDD	Ground
C23	EA9	CPU, address bus
A24	EA5	CPU, address bus
B24	EA6	CPU, address bus

PIN No	Pin Name	Comment
C24	EA7	CPU, address bus
A25	EA3	CPU, address bus
B25	GNDD	Ground
C25	EA4	CPU, address bus
A26		---
B26		---
C26	EA2	CPU, address bus
A27		---
B27	GNDD	Ground
C27		---
A28	ED5	CPU, data bus
B28	ED6	CPU, data bus
C28	ED7	CPU, data bus
A29	ED3	CPU, data bus
B29	GNDD	Ground
C29	ED4	CPU, data bus
A30	ED0	CPU, data bus
B30	ED1	CPU, data bus
C30	ED2	CPU, data bus
A31	GNDD	Ground
B31	P24VD	+24V
C31	GNDD	Ground
A32	P24VD	+24V
B32	GNDD	Ground
C32	P24VD	+24V

Notes

Chapter 11

Extended I/O Driver Board -- 410355

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11.1 Physical Description

The Extended I/O Driver Board is located inside the logic cage and connects directly to the MAV/6 Backplane via two 64-way DIN connectors and one 96-way DIN connector. Two extractors are positioned on the front edge of both the Driver Board and the Main Board to facilitate the removal of the boards from the mounting rails.

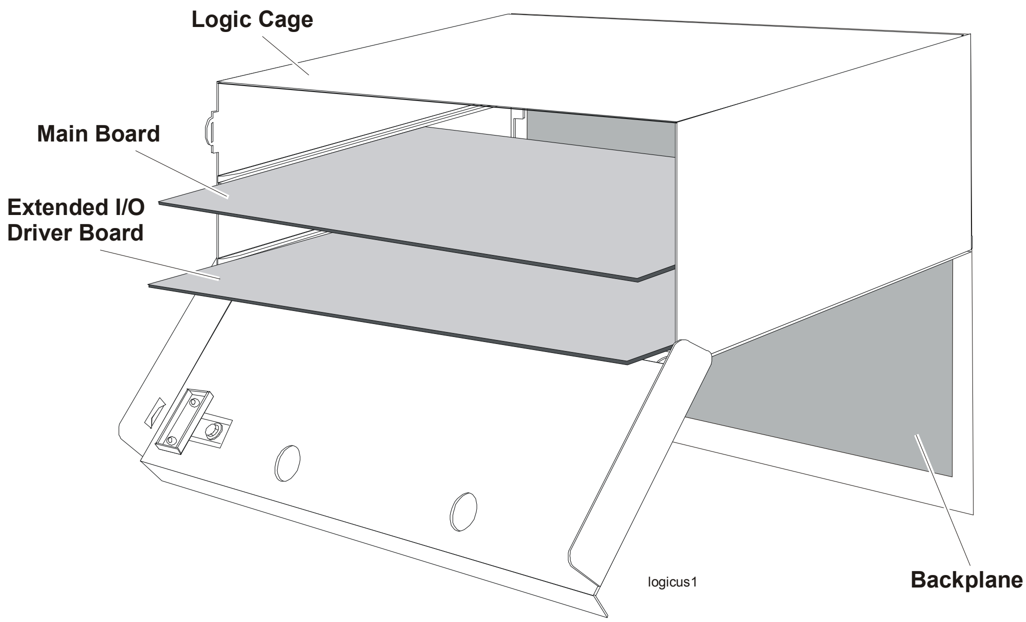

Figure 11-1 I/O Driver Board - Location

11.1.1 Circuit Diagrams and Component Locations

The component layout of the I/O Driver Board is shown in Figure 11-2. For further information and for reference, the following additional information on the extended I/O Driver Board is provided in Volume II:

Circuit diagrams. Structured circuit diagrams.

I/O to Components and ICs. A list of the I/O paths to each component and integrated circuit (IC) pin position.

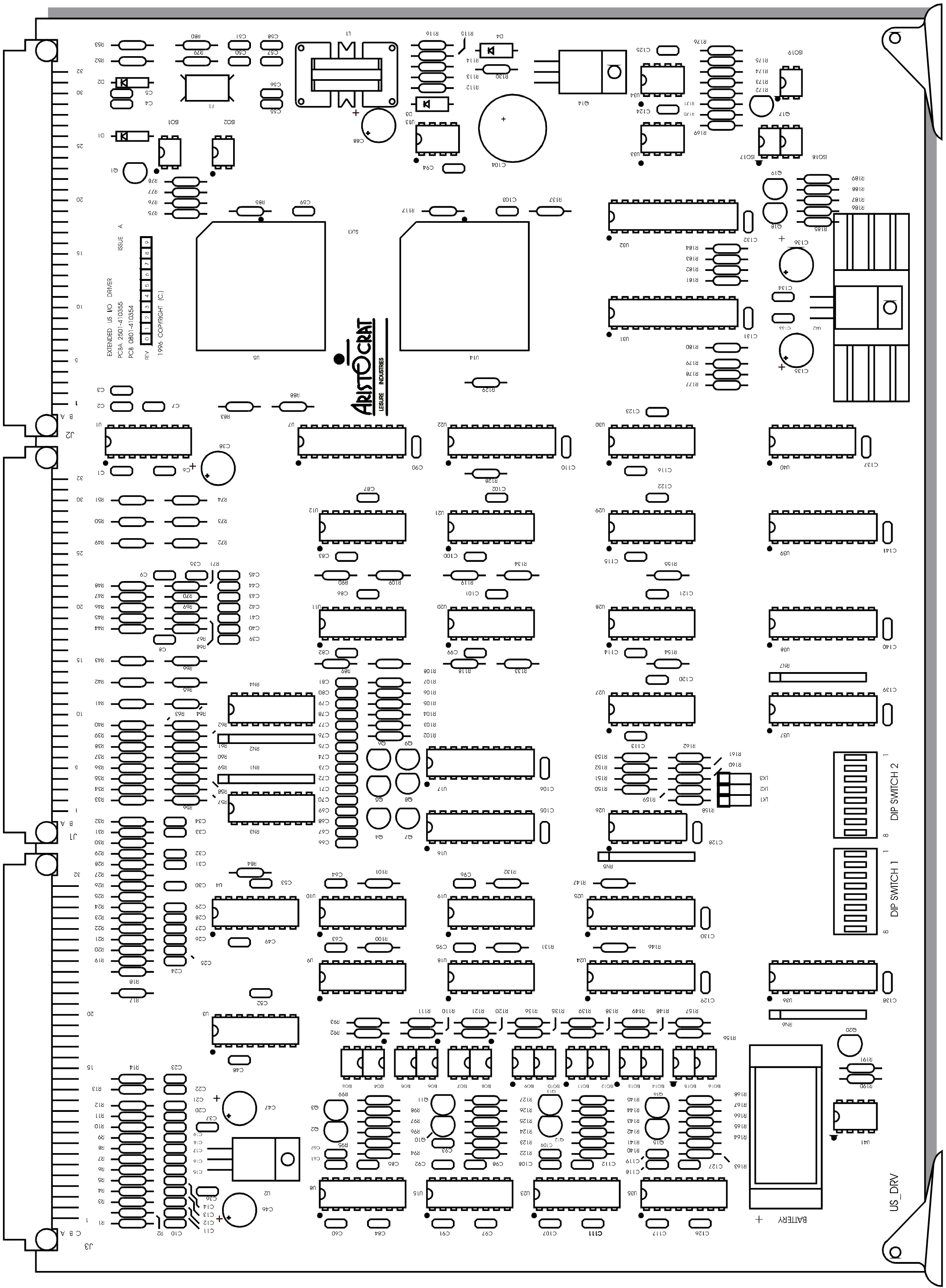

Figure 11-2 Extended I/O Driver Board Layout

11.2 Functional Description

The I/O Driver Board provides an interface between some of the machine equipment and the Main Board via the Backplane. The extended I/O Bus on the Main Board is connected to the I/O Driver Board, allowing the Main Board to address all I/O attached to the I/O Driver Board.

The I/O Driver Board consists of seven main functional blocks:

- Address Decoding
- Mikohn Interface
- Pushbuttons
- Hard Meters and Lamps
- Spare I/O
- Power and Door Security
- Communications Interface

Each of these sections is discussed in this chapter.

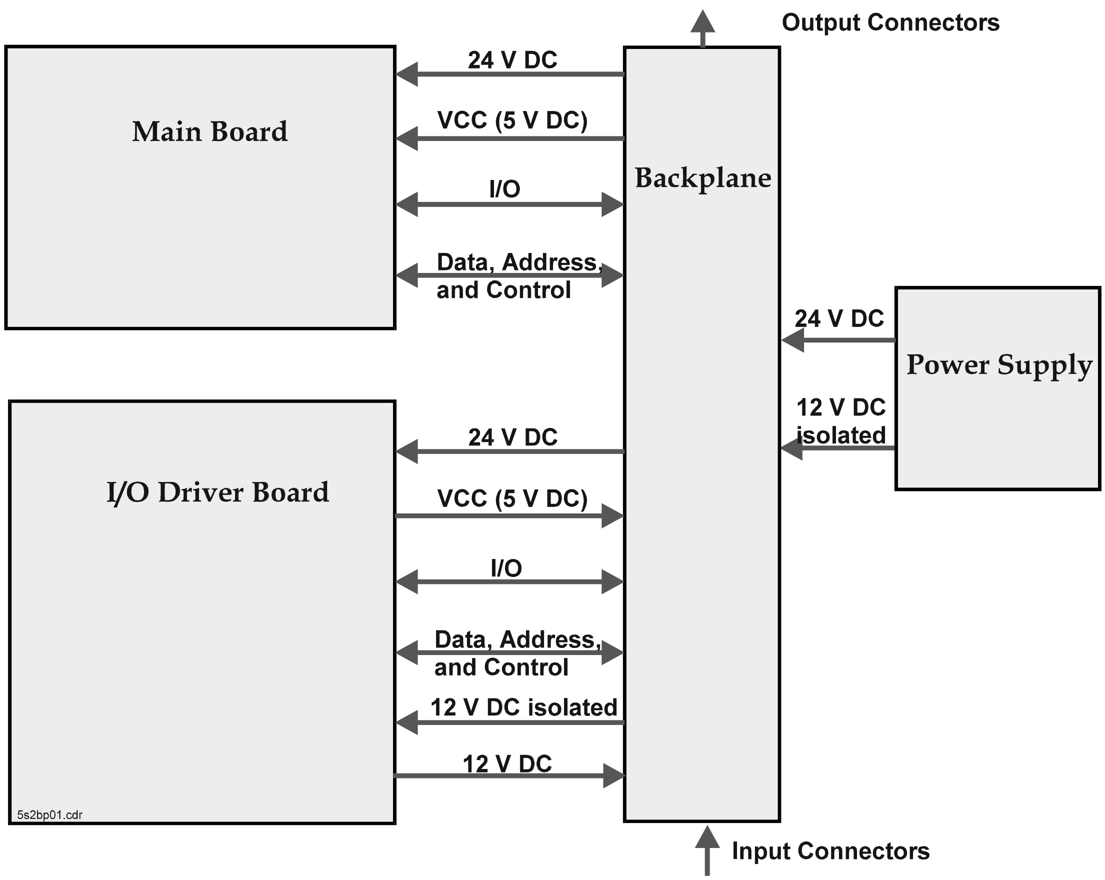

Figure 11-3 System Architecture

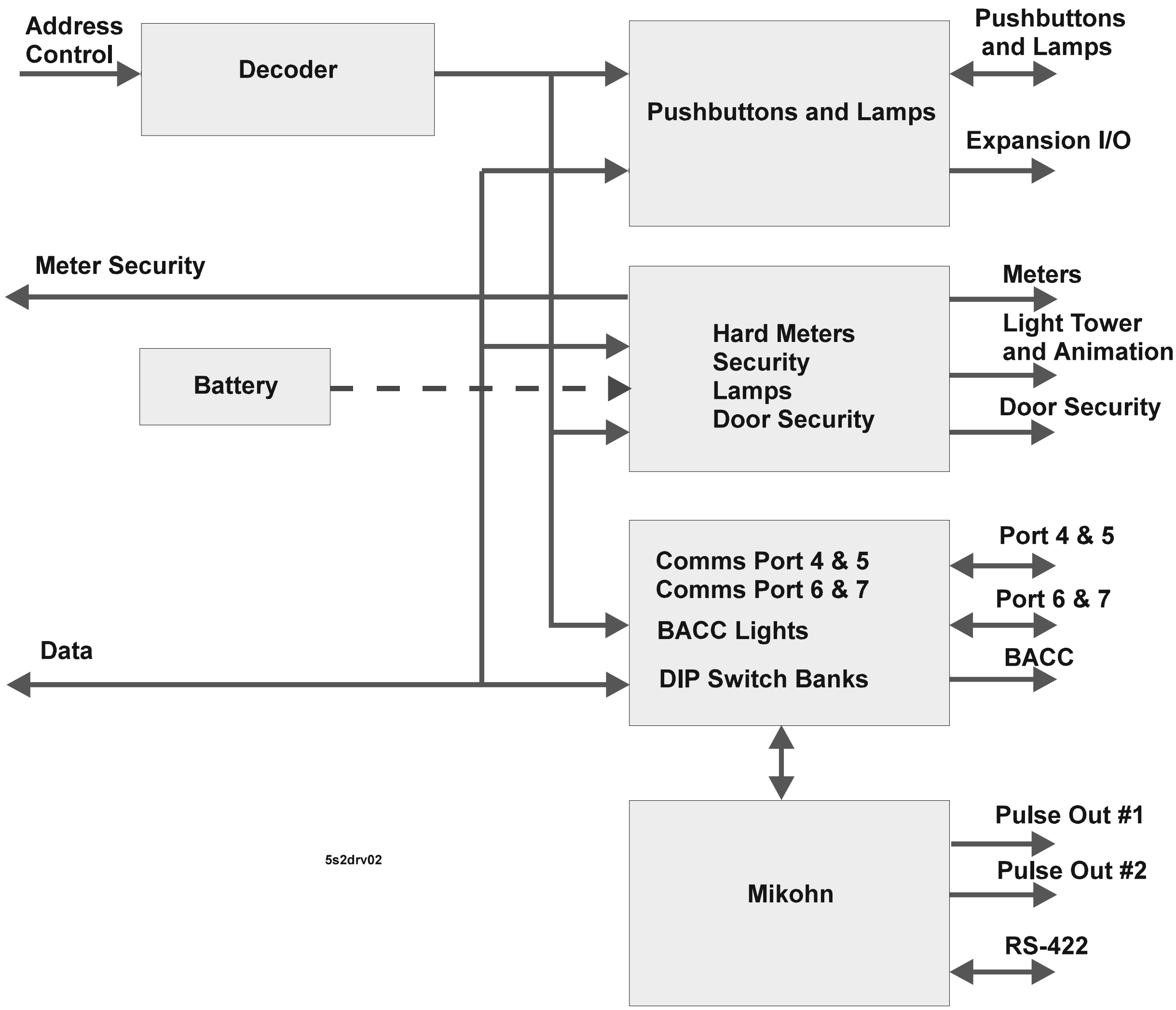

Figure 11-4 Extended US I/O Driver Board Block Diagram

The Extended I/O Driver Board facilitates the 'writing' of data to various outputs such as mechanical meters or the light tower lamps, and it 'reads' data from inputs such as the pushbutton switches or audit key switch. Table 11-1 lists those I/Os which are included on either the Extended I/O Driver Board or the Depopulated MkV Main Board.

In addition to the signals listed in Table 11-1, there are other input signals required by the I/O Driver Board. These are mainly control signals, and include the following: CLK8, NDACK, READ, WRITE, BATTERY, and various Power lines as well as address lines and the data bus. These signals are generated on the MkV Main Board and connect to the Extended I/O Driver Board via the Backplane.

Table 11-1 I/O Signals for I/O Driver Board and Main Board

Description	I/O	Qty	Name	Type	Where
Hard Meters	O	6	HM1-6	OC24	I/O DRIVER
Pushbutton switches	I	14	PBS1-14	24->TTL	I/O DRIVER
Pushbutton lamps	O	14	PBL1-14	OC24	I/O DRIVER
Battery Backed Logic Door Switch	I O	1 1	BBLI BBLO	TTL	I/O DRIVER
Animation Lamps	O	3	AL1..3	OC24	I/O DRIVER
Logic Door Security	O I	1 1	LDSECO LDSECIN	TTL	I/O DRIVER
Light Tower Lamps	O	4	LTL1-4	OC24	I/O DRIVER
Hopper	I O	2 3	HOPHIGH HOPCOIN HOPTEST HOPON HOPDIR	TTL OC24	I/O DRIVER MAIN
Mikohn	O O I	2 2 1	MIKPULS MIKTX MIKTX_EN MIKRX	OPTO RS422 TTL RS422	I/O DRIVER
Expansion Serial	O I	2 2	Driver Spare	TTL	I/O DRIVER
Expansion Parallel	I/O	6	Spare I/O	TTL	I/O DRIVER
Mechanical Door Switch	I	1	MECHSW	TTL	MAIN
Cashbox Door Switch	I	1	CBOXSW	TTL	MAIN
Belly Panel Door Switch	I	1	SECSW	TTL	MAIN
Jackpot Keyswitch	I	1	JPSW	TTL	MAIN
Audit Keyswitch	I	1	AUSW	TTL	MAIN
Coin Comparator	I O	3 1	CCSEN CCERROR CC_CRED CCINH	TTL	MAIN
Jackpot Bell	O	1	JPBELL	OC24	MAIN
Solenoid Diverter	O	1	SOLDIV	OC24	MAIN
Solenoid Optic	I	1	SOLOPT	TTL	MAIN
DUART Port 6	O I	3 3	TxD, DTR, RTS RxD,DCR,CTS	TTL TTL	I/O DRIVER EXPANDED
DUART Port 7		3 3 +2	TxD, DTR, RTS RxD,DCR,CTS	TTL TTL	I/O DRIVER EXPANDED
DUART Parallel	O		BACCLIT[1..8]	TTL	EXPANDED I/O
DIP SWITCH 1	I	8	DIPSW1	OC24	EXPANDED I/O
DIP SWITCH 2	I	8	DIPSW2	TTL	EXPANDED I/O
Battery Backed Door Security	I/O	6	DDOR_NC,GDOR_NC SEC_NC DDOR_NO, GDOR_NO SEC_NO	TTL/Battery	EXPANDED I/O

11.2.1 Address Decoding

The I/O Driver Board includes address decoding which defines the address of each I/O on the board. The I/O Driver does not manage all the I/O for the Main Board. Refer to the chapter Main Board for a description of the I/O connected directly to the Main Board. The following table lists the addresses of all I/Os on the I/O Driver Board and the Main Board. The various signal names for MkV Main Board I/O have been included as they are existing signals already used with previous MkV Main Board designs.

Table 11-2 I/O Address Map

	ADDRESS	READ / WRITE	BIT/S	NAME	SPARES
MAIN BD.		WRITE			
NWRCS0	0x3010400		D7	DOPTOUT	
NWRCS1	0x3010410		D0	CCINH	
			D2	HOPDIR	
NWRCS5	0x3010450		D0	SOLDIV	
			D1	JPBELL	
			D2	HOPON	
NWRCS4	0x3010440		D2	HOPTEST	
I/O DRIVER	0x3012000	WRITE	D0..D7	PBL1..8	
	0x3012010		D0..D7	PBL9..14	4 + 2
	0x3012020		D0..D5	HM1..6	2x NC
	0x3012030		D0..3	LTL1..4	
			D4..6	AL1..3	1x NC
	0x3012070		D0	LDSECO	
			D1	GDSHRIN	
			D2	BDSHRIN	
			D3	DDSHRIN	
	0x3012380 base address		PARALLEL Port DUART Channel 6,7	BACCLIT[1..8]	
MAIN BD.		READ			
NIOCS3	0x3010580 is base address		ERROR	CCERROR	
			SELECT	CCSEN	
			PE	CCRED	
			BUSY	SOLOPT	
			P3	AUSW	
			P4	JPSW	
			P5	BASW	
			P6	MECHSW	
			P7	CBOXSW	
I/O DRIVER	0x3012000	READ	D0..7	PBS1..8	
	0x3012010		D0..7	PBS9..14	4 + 2 EXP
	0x3012020		D0	GDSHRO	
			D1	BDSHRO	
			D2	DDSHRO	
			D4	HOPCOIN	
			D5	HOPHIGH	
			D6	DOPTIN	
			D7	LDSECIN	
	0x3012200		D0..D8	DIPSW1[1..8]	
	0x3012210		D0..D8	DIPSW2[1..8]	

	0x3012220		D4..D7	IRQ_CS DUART	Channel 4..7
I/O DRIVER		RD/WR	COMM Ports 4 & 5		
	0x3012100		CHANNEL A	MIKOHN	
	0x3012140		CHANNEL B	EXP SER	Rx Tx RTS CTS
	0x3012180		PARALLEL	EXP I/O	6x TTL I/O
			COMM Ports 6 & 7		
	0x3012300 base address		CHANNEL A	VLC	Rx Tx RTS CTS DTR, DCD
	0x3012340 base address		CHANNEL B		Rx Tx RTS CTS DTR, DCD

11.2.2 Mikohn Interface

The I/O Driver Board provides the interface used with Mikohn Progressive Super Controllers (CON2). This interface is electrically isolated from the remainder of the board and requires an isolated 5 V DC supply, which is provided by the extended I/O Driver Board.

The MAV power supply provides 12 V DC isolated to the I/O Driver Board. The isolated 5 V DC supply required by the Mikohn interface is generated from this 12 V supply using a 12 V to 5 V step-down DC/DC regulator on the Extended I/O Driver Board.

The Mikohn signals must also be physically separated from other signals.

The Mikohn interface provides two Mikohn pulse outputs for two separate Mikohn Super Controller (CON2) systems as well as a bi-directional RS422 interface to allow for:

1. Information to be returned to the machine on current jackpot values - to be used in conjunction with the pulse system,
2. A true bi-directional serial interface to a controller as soon as the supporting software is available.

Mikohn uses channel A of the DUART (serial COM Port 4). The serial port supports transmit and receive lines only. No hardware handshaking is used.

Each pulse output provides at least 20 mA of current to the Mikohn circuitry.

11.2.3 Pushbuttons

This includes all pushbutton lamps and pushbutton switches. The lamps used are rated at 28 V DC and are driven from OC current sinking drivers. The 24 V DC pushbutton switch signals are converted to TTL levels before being input.

Sixteen pushbutton lamp outputs are provided. All lamp outputs, including light tower lamps and animation lamps, include warm-up resistors to reduce inrush current in the case where several lamps are illuminated simultaneously.

Similarly, sixteen pushbutton switch inputs are provided. All pushbutton switch inputs are initially at 24 V DC; hence voltage dividers are used to convert these voltage levels into TTL levels. These inputs are filtered to reduce noise on the signals.

11.2.4 Communication

The extended I/O driver board design provides four serial ports, labelled COM4 to COM7. Serial Ports COM0 to COM3 are provided on the Main Board.

COM4 is allocated to the Mikohn Interface.

COM5 is an RS-232 compatible port, with RTS and CTS to be used as hardware handshake or as general input or output pins.

COM6 and COM7 are modem-compatible ports with full handshaking.

11.2.5 BACC Denomination Lamps

The Extended I/O Driver Board has eight lamp or LED outputs which can be used to indicate the BACC denomination.

Table 11-3 BACC Denomination Lamps

Lamp	Data Bit	Label	Function
1 to 7	D0.. D6	BACCLIT1..7	Available Bill Values - Denomination Lamps BACCLIT1 = Highest denomination LED BACCLIT7 = Lowest denomination LED
8	D7	BACCLIT8	“Insert Bill” Lamp

11.2.6 DIP Switch Banks

Two 8-bit DIP switch banks are provided. The switches are placed close to the bottom edge of the Driver Board for easy access. The settings and functions of these switches are software dependent and may be viewed via the Operator Mode Menu ⇛ Operator Setup/Selections ⇛DIP Switch Settings.

Bank 1

The first DIP switch bank allows the coin/token value and the base credit value of the machine to be set. These settings can only be changed during a 3-way metering error. To cause a 3-way metering error:

- remove the battery temporarily

or

- replace the game EPROMs.

To recover from a metering error, follow the on-screen instructions. All electronic meters will be reset after recovery.

Bank 2

The second DIP switch bank allows certain game options to be enabled/disabled. Changes to these settings only take effect during machine power-up.

11.2.7 Interrupt Request

The table below shows the interrupt request Bit map for DUART COM Ports 4, 5, 6, and 7.

The read-only address “0x3012220” provides a quick way to determine which channel has generated the interrupt.

Table 11-4 Interrupt Request Bit Map

Bit	Label	Function
D4	INTA	DUART COM Port 4 - Address 0x3012100
D5	INTB	DUART COM Port 5 - Address 0x3012140
D6	INT2A	DUART COM Port 6 - Address 0x3012300
D7	INT2B	DUART COM Port 7 - Address 0x3012340

11.2.8 Hard Meters and Lamps

The Extended I/O Driver Board can verify if the correct number of hard meters are actually connected. This provides meter security which is a requirement of some markets. A minimum of three and a maximum of six hard meters are used, depending on the specific market. Unused hard meter inputs have to be linked on the Driver Board to prevent misleading signals.

The hard meters are the 24 V DC type and use the same type driver that is used for the pushbutton lamps. Animation lamps and light tower lamps are driven in the same manner. There is provision for up to three animation lamps and four light tower lamps.

11.2.9 Expansion I/O

As well as providing for the I/O in Table 1, the system includes additional I/O for possible future use. Of the 16 pushbutton lamp driver outputs (as discussed in section 11.2.3 Pushbuttons), two 24 V DC driver outputs are specified as expansion outputs. Similarly, two pushbutton switch type inputs are specified as expansion inputs.

At least six expansion TTL I/Os are included. The TTL I/O lines are filtered to prevent external noise entering the board via these lines.

11.2.10 Door Security

The I/O Driver Board incorporates a battery-backed circuit for monitoring door security even while the machine is not powered. This circuit indicates to the system software that the door has been opened. Logic for 4 battery-backed door security switches is provided, and a typical allocation is shown in the table below:

Door	Signal Label
Main Door	GDOR
Logic Cage Door	LDOR
Belly Panel Door	SEC
Cash Box Door	DDOR.

11.2.11 Power

The I/O Driver Board receives 24 V DC and 12 V DC isolated from the Power Supply Assembly.

The 24 V DC supply is converted on-board to provide a regulated 12 V DC ±5% supply to the coin comparator and a 5 V DC (VCC) supply to power the Main Board logic. VCC is also supplied to any peripheral logic circuits requiring 5 V DC.

A separate step-down DC/DC regulator on the I/O Driver Board is used to convert the isolated 12 V DC supply to the 5 V DC isolated required for the Mikohn interface.

11.3 Removal and Replacement Procedures

CAUTION
When handling electrostatic sensitive devices (ESDs) such as PCBAs, take care to avoid physical contact with components. PCBAs should be handled by their edges. ESDs should not be placed on metal surfaces.

CAUTION
When handling PCBAs, take care to avoid flexing the PCBA. Flexing may cause physical damage.

Removal

To remove the I/O Driver Board

1. Open the cabinet door, and switch OFF the machine.
2. Open the logic cage door.
3. Standard Electrostatic Discharge (ESD) prevention procedures should be followed when removing PCBAs.
4. Release the I/O Driver Board from its connected position using the extractor handles. Withdraw the board from the logic cage.
5. Place the I/O Driver Board in an antistatic bag immediately.

Note
A Fault Tag must be placed on any faulty boards.

Replacement

The replacement procedure is the reverse of the removal procedure.

11.4 Connector Pin Assignments

The I/O Driver Board connects to the Backplane via two 64-way DIN connectors, labelled J1 and J2, and a 96-way DIN connector, labelled J3.

Connector J1 includes most of the main I/O lines such as pushbutton lamps and switches, light tower lamp outputs, animation lamp outputs, hard-meter outputs, and all spare I/O lines whether they be driver outputs, simple TTL I/O, or serial communication lines.

Table 11-5 J1 Connector Pinout

PIN	Pin Name	Comment
A1	GND	Ground
B1	GND	Ground
A2	PBS1	Pushbutton Switch 1
B2	PBS2	Pushbutton Switch 2
A3	PBS3	Pushbutton Switch 3
B3	PBS4	Pushbutton Switch 4
A4	PBS5	Pushbutton Switch 5
B4	PBS6	Pushbutton Switch 6
A5	PBS7	Pushbutton Switch 7
B5	PBS8	Pushbutton Switch 8
A6	PBS9	Pushbutton Switch 9
B6	PBS10	Pushbutton Switch 10
A7	PBS11	Pushbutton Switch 11
B7	PBS12	Pushbutton Switch 12
A8	PBS13	Pushbutton Switch 13
B8	PBS14	Pushbutton Switch 14
A9	SPARESW1	Spare 24V Input 1
B9	SPARESW2	Spare 24V Input 2
A10	PBL1	Pushbutton Lamp 1
B10	PBL2	Pushbutton Lamp 2
A11	PBL3	Pushbutton Lamp 3
B11	PBL4	Pushbutton Lamp 4
A12	PBL5	Pushbutton Lamp 5
B12	PBL6	Pushbutton Lamp 6
A13	PBL7	Pushbutton Lamp 7
B13	PBL8	Pushbutton Lamp 8
A14	PBL9	Pushbutton Lamp 9
B14	PBL10	Pushbutton Lamp 10
A15	PBL11	Pushbutton Lamp 11
B15	PBL12	Pushbutton Lamp 12
A16	PBL13	Pushbutton Lamp 13
B16	PBL14	Pushbutton Lamp 14
A17	DRVSP1	Spare 24V output 1
B17	DRVSP2	Spare 24V output 2
A18	SPAREIO0	Spare TTL I/O
B18	SPAREIO1	Spare TTL I/O
A19	SPAREIO2	Spare TTL I/O
B19	SPAREIO3	Spare TTL I/O
A20	SPAREIO4	Spare TTL I/O
B20	SPAREIO5	Spare TTL I/O
A21	SPRTS	Spare serial

PIN	Pin Name	Comment
B21	SPCTS	Spare serial
A22	SPRXD	Spare serial
B22	SPTXD	Spare serial
A23	GND	Ground
B23	GND	Ground
A24	HM1	Hard Meter 1
B24	HM2	Hard Meter 2
A25	HM3	Hard Meter 3
B25	HM4	Hard Meter 4
A26	HM5	Hard Meter 5
B26	HM6	Hard Meter 6
A27	LTL1	Light Tower Lamp 1
B27	LTL2	Light Tower Lamp 2
A28	LTL3	Light Tower Lamp 3
B28	LTL4	Light Tower Lamp 4
A29	AL1	Animation Lamp 1
B29	AL2	Animation Lamp 2
A30	AL3	Animation Lamp 3
B30	HOPCOIN	Hopper Coin Output
A31	HOPHIGH	Hopper Hi Probe
B31	DOPTIN	Door Optic In
A32	24V	+24 V DC
B32	24V	+24 V DC

The J2 connector has all the power and ground pins for 24 V DC, 5 V DC (or VCC), and the isolated 5 V supply to be used with the Mikohn interface section. Most of the Mikohn lines are on this connector, although one Mikohn pulse output is on connector J1. The I/O Driver Board generates 12 V DC to supply the coin comparator. This 12 V DC line is also on connector J2. All control lines, data bus lines, and address bus lines are connected to J2.

Table 11-6 J2 Connector Pinouts

PIN	Pin Name	Comment
A1	P12VDC	12 V from Driver for Coin Comparator
B1	GND	Gnd
A2	VCC	5V from Main Board
B2	VCC	5V from Main Board
A3	LDOR_NC	Logic door switch - Normally Closed
B3	LDOR_COM	Logic door switch - Normally Common
A4	LDOR_NO	Logic door switch - Normally Open- Grounded
B4	NC	
A5	NEILO	CPU, IL0 interrupt
B5	NDACK	CPU, data acknowledge
A6	IRQDMON	“DEMON” - Debug interrupt
B6	NEIOR	CPU, IO read signal
A7	NEIOW	CPU, IO write signal
B7	NERESET	CPU, external reset output
A8	ECLK8M	CPU, clock signal
B8	GND	Ground
A9	24V	+24V
B9	24V	+24V

PIN	Pin Name	Comment
A10	NC	
B10	NC	EA12
A11	NC	CPU, address bus - bit EA11
B11	EA10	CPU, address bus
A12	EA9	CPU, address bus
B12	EA8	CPU, address bus
A13	EA7	CPU, address bus
B13	EA6	CPU, address bus
A14	EA5	CPU, address bus
B14	EA4	CPU, address bus
A15	EA3	CPU, address bus
B15	EA2	CPU, address bus
A16	24V	+24 VDC
B16	24V	+24 VDC
A17	GND	Ground
B17	GND	Ground
A18	ED7	CPU, data bus
B18	ED6	CPU, data bus
A19	ED5	CPU, data bus
B19	ED4	CPU, data bus
A20	ED3	CPU, data bus
B20	ED2	CPU, data bus
A21	ED1	CPU, data bus
B21	ED0	CPU, data bus
A22	VCC	+5VDC
B22	VCC	+5VDC
A23	GND	Ground
B23	GND	Ground
A24	NC	
B24	NC	
A25	NC	
B25	NC	
A26	EMIKP2	Data A2
B26	EMIKN2	Machine ID2
A27	NC	
B27	NC	
A28	NC	
B28	NC	
A29	ISOLPGND	Isolated Power Supply rail - Ground
B29	ISOLPWR	Isolated Power Supply rail - +5 V DC or +12 V DC
A30	EMIKP1	Data A1
B30	EMIKN1	Machine ID1
A31	TXDA+	Mikohn 422 Serial Comms
B31	TXDA-	Mikohn 422 Serial Comms
A32	RXDA+	Mikohn 422 Serial Comms
B32	RXDA-	Mikohn 422 Serial Comms

The functions provided by J3 include communication ports 6 and 7, door security, bill acceptor animation lamps, and power supply signals P12VI, N12VI, L12VDC, VCC, L5VDC, GNDISOL, and GND.

Table 11-7 J3 Connector Pinouts

PIN	Pin Name	Comment
A1	NC	
B1	232DTR7	COM port 7
C1	VCC	
A2	232DSR7	COM Port 7
B2	NC	
C2	GND	
A3	NC	
B3	P12VI	12 VDC isolated
C3	NC	
A4	NC	
B4	232DTR6	COM Port 6
C4	NC	
A5	232DSR6	COM Port 6
B5	NC	
C5	NC	
A6	NC	
B6	P12VI	12VDC isolated
C6	VCC	
A7	GNDISOL	Ground Isolated
B7	232TXD6	COM Port 6
C7	GND	Ground
A8	232RXD6	COM Port 6
B8	232RTS6	COM Port 6
C8	GND	Ground
A9	232CTS6	COM Port 6
B9	232DCD6	COM Port 6
C9	NC	
A10	GNDISOL	Ground Isolated
B10	232TXD7	COM Port 7
C10	NC	
A11	232RXD7	COM Port 7
B11	232RTS7	COM Port 7
C11	NC	
A12	232CTS7	COM Port 7
B12	232DCD7	COM Port 7
C12	P12VI	12 VDC isolated
A13	NC	
B13	NC	
C13	COMS_RST	Communication Channels RESET - SX system
A14	NC	
B14	NC	
C14	NC	
A15	NC	
B15	NC	
C15	VCC	5 VDC
A16	NC	
B16	BACCLIT8	BACC Denomination Lamp 8
C16	GND	Ground

PIN	Pin Name	Comment
A17	BACCLIT1	BACC Denomination Lamp 1
B17	BACCLIT2	BACC Denomination Lamp 2
C17	P12VI	
A18	BACCLIT3	BACC Denomination Lamp 3
B18	BACCLIT4	BACC Denomination Lamp 4
C18	N12VI	
A19	BACCLIT5	BACC Denomination Lamp 5
B19	BACCLIT6	BACC Denomination Lamp 6
C19	NC	
A20	BACCLIT7	BACC Denomination Lamp 7
B20	NC	
C20	NC	
A21	AL4	Animation Lamp 4
B21	NC	
C21	IRQ11	Interrupt request 11 - SX system
A22	AL5	Animation Lamp 5
B22	NC	
C22	IRQ5	Interrupt request 5 - SX system
A23	NC	
B23	NC	
C23	IRQ12	Interrupt request 12 - SX system
A24	DDOR_NO	Drop box door switch - Normally open
B24	DDOR_NC	Drop box door switch - Normally closed
C24	NC	
A25	DDOR_COM	Drop box door switch - Common
B25	NC	
C25	NC	
A26	GDOR_NO	Game door switch - Normally Open
B26	GDOR_NC	Game door switch - Normally Closed
C26	L12VDC	Logic 12 VDC
A27	GDOR_COM	Game door switch - Common
B27		
C27	L5VDC	Logic 5 VDC-
A28	SEC_NO	SEC Door switch - Normally Open
B28	SEC_NC	SEC Door switch - Normally Closed
C28	L5VDC	Logic 5 VDC
A29	SEC_COM	SEC Door switch - Common
B29	NC	
C29	LGND	Logic ground
A30	NC	
B30	NC	
C30	LGND	logic ground
A31	NC	
B31	NC	
C31	LGND	logic ground
A32	NC	
B32	NC	
C32	LGND	logic ground

Notes

Chapter 12

MKVI Backplane -- 410351

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12.1 Physical Description

The Backplane distributes signals between the Main Board, I/O Driver Board, and all peripheral sub-systems.

The MAV/6 Backplane is a printed circuit board assembly (PCBA) mounted vertically at the rear of the cabinet, partly behind the logic cage (see Figure 12-1). The Backplane mounts onto standoffs which are studded onto the back wall of the logic cage.

The Backplane is fitted with two types of connectors: Minifit Junior and DIN. The Main Board and I/O Driver Board are inserted directly onto the Backplane. Peripheral subsystems are connected to the Backplane via ribbon cables or wire looms. The layout of the connectors on the Backplane is shown in Figure 12-2.

12.1.1 Diagrams and Component Locations

For further information and for reference, the following additional information on the Backplane Board is provided in Volume II:

- **Circuit diagrams.** Structured circuit diagrams.
- **I/O to Components and ICs.** A list of the I/O paths to each component and integrated circuit (IC) pin position.

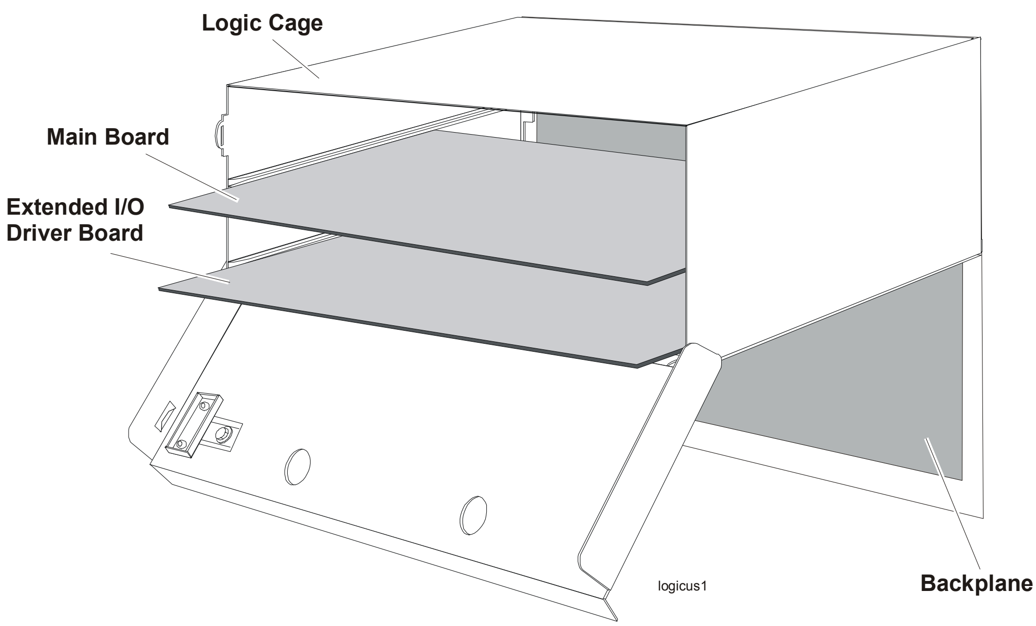

Figure 12-1 Backplane Location

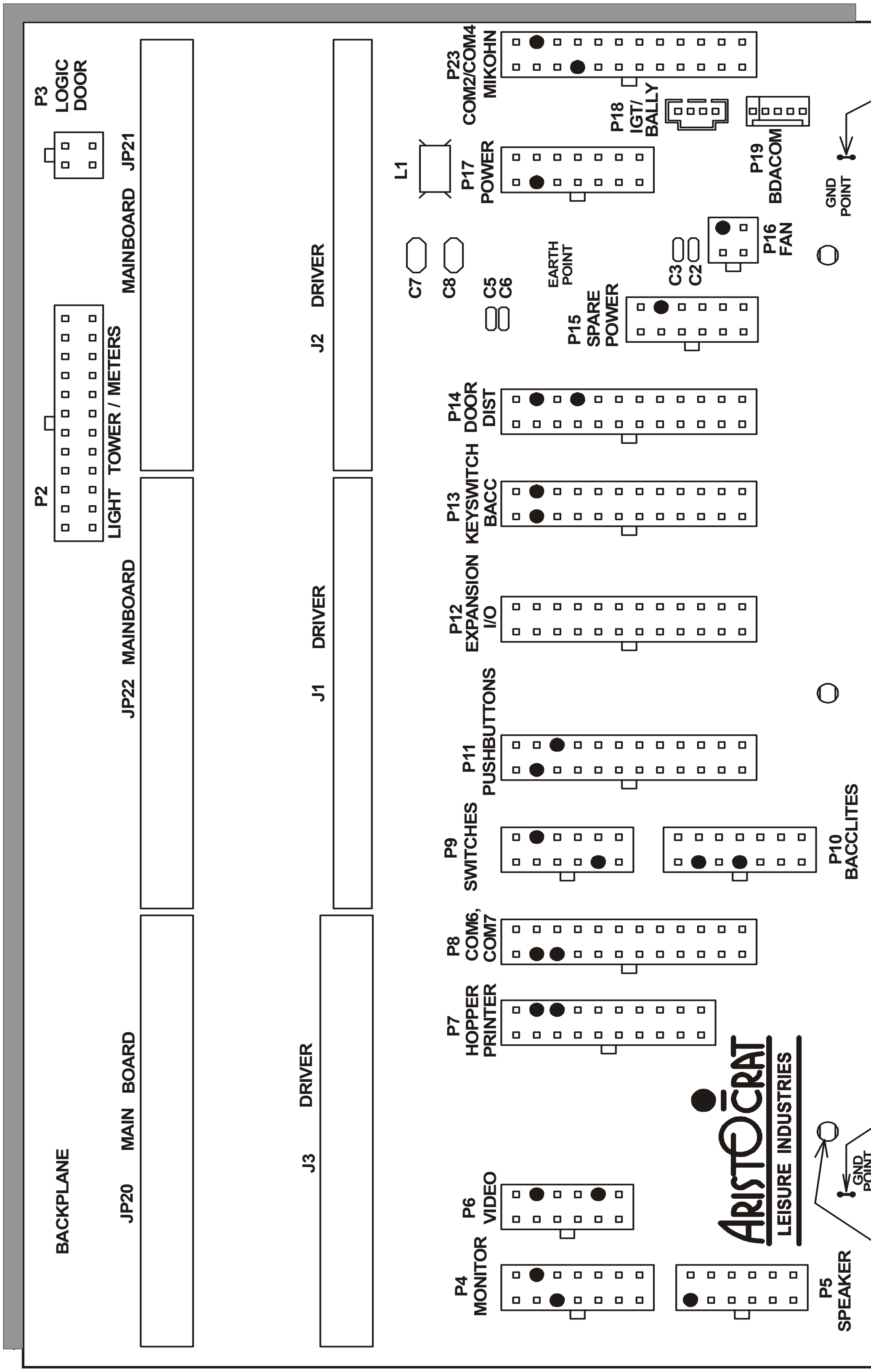

Figure 12-2 Backplane Component Location

12.2 System Overview

The Backplane is used to electrically connect the following boards and I/O peripheral devices (depending on machine configuration) used in the MAV500/MK6 machine:

- MKVI Main Board
- Extended I/O Driver Board
- Video Monitor / Touchscreen
- Pushbuttons and Pushbutton lamps
- Mechanical Meters
- Light Tower
- Power Supply
- Animation Lamps
- Coin Handling System
- Bill Acceptor
- Speakers
- Jackpot / Audit Keyswitches
- Mechanical and Optical Switches
- Hopper or Printer
- Cooling Fan
- Progressives (RS-422)
- IGT SAS+ / Bally SDS / RS232 / ASP 1000 Head System
- Spare Power Connector
- Two Spare Serial Ports (via one connector)

The Backplane has the following physical connectors:

- three 96-way DIN41612 connectors used to electrically connect the Main Board to the Backplane Board.
- two 64-way DIN41612 connectors and one 96-way DIN41612 connector used to electrically connect the Extended I/O Driver Board to the Backplane Board.
- A 4-way Molex connector is used for IGT SAS+ (PT95A) and Bally SDS compatibility.
- A 5-way Mascon connector is used for Broadcast DACOM compatibility.
- Minifit Junior connectors are used for the rest of the connectors. The main reason for using Minifit Junior type connectors is because of their current-handling capacity and to simplify looming.

The accessible Minifit Junior connectors on the Backplane are keyed to reduce the possibility of incorrect connection during machine configuration.

12.2.1 Electrical Connections

The Backplane electrically and mechanically connects the boards and connectors listed in the table below. Circuit diagrams of the Backplane are provided in Volume II of this manual.

Table 12-1 Backplane Connections

Designator	Function	Connector Type
P1 *	Keyboard In/Out	4 Way Minifit
P2	Light Tower Mechanical Meters	24 Way Minifit
P3	Logic Door	4 Way Minifit
P4	Monitor Touchscreen	14 Way Minifit
P5	Speakers (stereo and shielded cable)	12 Way Minifit
P6	Low Res. Video	12 Way Minifit
P7	Hopper Printer	20 Way Minifit
P8	Com6 and Com7 serial I/O ports	24 way Minifit
P9	Power-down detection	12 way Minifit
P10	Bill Acceptor Lights	14 Way Minifit
P11	Pushbuttons & Pushbutton Lamps	24 Way Minifit
P12	Expansion I/O	24 Way Minifit
P13	Jackpot Key Audit Key Main Door Switch Door Detector Cashbox Bill Acceptor	24 Way Minifit
P14	Animation Lamps Coin Comparator Solenoid Optic Diverter Solenoid Bill Acceptor Switch Speaker 1 Door Emitter	24 Way Minifit
P15	Spare / Auxiliary Power	12 Way Minifit
P16 *	Fan	4 Way Minifit
P17	Power Supply	14 Way Minifit
P18	IGT SAS+ (PT95A) or Bally SDS Head System	Molex 70543-0003
P19	Broadcast DACOM Head System	5 way Mascon
P23	Com2 Com4 = Mikohn	24 Way Minifit
JP20,JP21, JP22	Main Board	DIN41612 96 pin vertical female
J1,J2,J3	Extended I/O Driver Board	DIN41612 64 pin vertical female

* Optional Connectors

12.3 Description of Connectors

12.3.1 MKVI Main Board

The MKVI Main Board interfaces with the other peripheral devices via the Backplane through three 96-pin DIN41612 connectors.

Main Board/Backplane DIN, JP20/P20

JP20 on the Backplane board connects to P20 on the Main Board.

PIN	Pin Name, MAV/6 Main Board	Connects to ...	Comment
A1	SIN1	P13-3	Receive data, serial channel 1 (BACC DATA)
B1	N12VI	N12VI	-12V from Main Board, isolated
C1	NC	-	-
A2	CTS1	P13-15	Handshake Input 0, serial channel 1 (BACC SERVICE)
B2	GNDISOL	GNDISOL	ground of ±12 voltage, isolated
C2	SOUT1	P13-1	Transmit Data, serial channel 1 (Used for loopback testing to DTR1)
A3	I1	P13-17	Handshake Input 2, serial channel 1 (LED ANODE)
B3	P12VI	P12VI	+12V from Main Board, isolated
C3	DSR1	P13-16	Handshake Input 1, serial channel 1 (INTERRUPT)
A4	Not Used	-	Handshake Output 2, serial channel 1
B4	DTR1	P13-20	Handshake Output 1, serial channel 1 (SEND)
C4	RTS1	P13-19	Handshake Output 0, serial channel 1 (ACCEPT ENABLE)
A5	SIN2	P23-11 P18-3 P19-2	Receive data, serial channel 2 (232 TX - uP RX)
B5	N12VI	N12VI	-12V from Main Board, isolated
C5	NC	-	-
A6	CTS2	P23-22	Handshake Input 0, serial channel 2 (232 CTS)
B6	GNDISOL	GNDISOL	ground of ±12 voltage, isolated
C6	SOUT2	P23-10 P18-2 P19-3	Transmit data, serial channel 2 (232 RX - uP TX)
A7	I2	P23-23 P18-4	Handshake Input 2, serial channel 2 (BALLY TX - uP RX)
B7	P12VI	P12VI	+12V from Main Board, isolated
C7	Not Used	-	Handshake Input 1, serial channel 2
A8	O2	P23-9 P18-1	Handshake Output 2, serial channel 2 (BALLY RX - uP TX)
B8	Not Used	-	Handshake Output 1, serial channel 2
C8	RTS2	P23-21	Handshake Output 0, serial channel 2 (232 RTS)
A9	SIN3	P7-18	Receive data, serial channel 3 (PRINTER TX - uP RX)
B9	N12VI	N12VI	-12V from Main Board, isolated
C9	-	-	-
A10	CTS3	P7-9	Handshake Input 0, serial channel 3
B10	GNDISOL	GNDISOL	ground of ±12 voltage, isolated
C10	SOUT3	P7-19	Transmit data, serial channel 3 (PRINTER RX - uP TX)
A11	Not Used	-	Handshake Input 2, serial channel 3
B11	P12VI	P12VI	+12V from Main Board, isolated

PIN	Pin Name, MAV/6 Main Board	Connects to ...	Comment
C11	DSR3	P7-15	Handshake Input 1, serial channel 3
A12	Not Used	-	Handshake Output 2, serial channel 3
B12	DTR3	P7-16	Handshake Output 1, serial channel 3
C12	RTS3	P7-8	Handshake Output 0, serial channel 3
A13	COMS_RESET	J3-C13	Communications ports reset
B13	NC	-	-
C13	NC	-	-
A14	NC	-	-
B14	NC	-	-
C14	NC	-	-
A15	NC	-	-
B15	NC	-	-
C15	NC	-	-
A16	NC	-	-
B16	NC	-	-
C16	NC	-	-
A17	Not Used	-	Data from meter board
B17	Not Used	-	Gnd
C17	Not Used	-	Data from top box
A18	Not Used	-	Serial data input to main logic from serial input driver. Open collector output.
B18	Not Used	-	Gnd
C18	Not Used	-	Serial data input to main logic from serial output driver. Open collector output.
A19	Not Used	-	SPI reset signal
B19	Not Used	-	Gnd
C19	Not Used	-	Data output to meter board
A20	Not Used	-	Serial clock
B20	Not Used	-	Gnd
C20	Not Used	-	Reset signal to meter board
A21	Not Used	-	Strobe signal to meter board
B21	Not Used	-	Gnd
C21	Not Used	-	Serial output enable to top box
A22	Not Used	-	Serial output enable #5, which selects SPI, output driver.
B22	Not Used	-	Gnd
C22	Not Used	-	Serial output enable #4, which selects SPI, input driver.
A23	Not Used	-	Overcurrent sensor output, hopper
B23	Not Used	-	Gnd
C23	NC	-	-
A24	Not Used	-	Hopper high probe, Detects hopper full, hopper
B24	Not Used	-	Gnd
C24	Not Used	-	Coin output detector, hopper
A25	Not Used	-	Hopper motor direction, hopper
B25	Not Used	-	Gnd
C25	Not Used	-	Detects hopper low, hopper
A26	Not Used	-	Hopper Sensor Test output, hopper
B26	Not Used	-	Gnd
C26	Not Used	-	Hopper motor drive, hopper
A27	NC	-	-
B27	Not Used	-	Gnd
C27	Not Used	-	P5V
A28	Not Used	-	EPSU2SND
B28	Not Used	-	Gnd

PIN	Pin Name, MAV/6 Main Board	Connects to ...	Comment
C28	Not Used	-	/EPSU2OVR
A29	Not Used	-	ESPARE01
B29	Not Used	-	Gnd
C29	Not Used	-	/EHANDLE
A30	Not Used	-	PS2 section, +22V
B30	Not Used	-	Gnd
C30	Not Used	-	PS2 section, +22V
A31	Not Used	-	EMIKOHNP
B31	Not Used	-	PS2 section, +9V
C31	Not Used	-	PS2 section, +9V
A32	NC	-	-
B32	Not Used	-	Gnd
C32	Not Used	-	EMIKOHNN

Main Board/Backplane DIN, JP22/P22

JP22 on the Backplane Board connects to P22 on the Main Board.

PIN	Pin Name, MAV/6 Main Board	Connects to ...	Comment
A1	HOPTEST	P7-12	Hopper Sensor Test output, hopper
B1	GND	GND	Gnd
C1	HOPON	P7-4	Hopper motor drive, hopper
A2	AUSW	P13-5	mech. switch, AUDIT RESET
B2	SOLDIV	P14-9	Coin Divert Drive (NPN trans. to GND)
C2	JPBELL	P13-4	Jackpot Bell
A3	MECHSW	P13-7	Mechanical Door Switch
B3	GND	GND	Gnd
C3	CBOXSW	P13-6	Mechanical Security Switch - cash box door
A4	CCSEN	P14-10	CC46 Coin output
B4	JPSW	P13-8	mech. switch, JACKPOT RESET
C4	BASW	P14-20	Mechanical Security Switch - BACC door
A5	CCERROR	P14-19	Coin Error
B5	GND	GND	Gnd
C5	CC_CRED	P14-7	Valid Coin Input
A6	Not Used	-	solid state relay for ballast and monitor On/Off
B6	Not Used	-	S7 Coin output
C6	SOLOPT	P14-15	Solenoid Optic
A7	RS232TX	P4-14	serial 0, nonisolated transmitter
B7	GND	GND	PS1 section, ground 24V
C7	Not Used	-	Serial Transmit Data out
A8	RS232RX	P4-7	serial 0, nonisolated receiver
B8	Not Used	-	nonisolated handshake Output 0, serial channel 0
C8	Not Used	-	nonisolated handshake Input 0, serial channel 0
A9	GND	GND	Gnd
B9	RED	P4-4	Red, video
C9	GND_RED	P4-3	red colour signal ground
A10	BLUE	P4-6	Blue, video
B10	GND_GREEN	P4-11	Green colour signal ground
C10	GREEN	P4-12	Green, video

PIN	Pin Name, MAV/6 Main Board	Connects to ...	Comment
A11	GND_BLUE	P4-5	Blue colour signal ground
B11	VSYNC	P4-9	Vsync, video
C11	GND_SYNC	P4-8	synchro signal ground
A12	SPEAKER	P5-1, P12-21	Audio output
B12	GND	GND	Gnd
C12	HSYNC	P4-1	Hsync, video
A13	SPEAKER2	P5-3	Audio output to speaker 2
B13	SPKRGND	P5-2, P12-22	speaker signal ground, connected with PS1 ground on MkV only
C13	P24VSND	24V	PS1 24V, single track on PCB
A14	GND	LGND	Gnd
B14	VCC	L5VDC	5V
C14	GND	LGND	Gnd
A15	VCC	L5VDC	5V
B15	GND	LGND	Gnd
C15	VCC	VCC	+5V from driver, converted from 24V
A16	GND	LGND	Gnd
B16	VCC	VCC	+5V from driver, converted from 24V
C16	GND	LGND	Gnd
A17	VCC	VCC	+5V from driver, converted from 24V
B17	GND	LGND	Gnd
C17	VCC	VCC	+5V from driver, converted from 24V
A18	NC	P6-3	Sync for low res. composite video
B18	KOUT	P1-2	Serial data OUTPUT from ARM250 - keyboard debug
C18	KIN	P1-1	Serial data INPUT from ARM250 - keyboard debug
A19	NC	P6-1	-
B19	GND	GND	Gnd
C19	NC	P6-7	-
A20	NC	-	-
B20	NC	-	-
C20	NC	P6-8	-
A21	NC	-	-
B21	GND	GND	Gnd
C21	NC	-	-
A22	NC	-	-
B22	NC	-	-
C22	NC	-	-
A23	NC	-	-
B23	GND	GND	Gnd
C23	NC	-	-
A24	NC	L12VDC	12V (SX only)
B24	NC	-	-
C24	NC	-	-
A25	NC	-	-
B25	GND	GND	Gnd
C25	NC	-	-
A26	not used	-	External battery backup
B26	not used	-	external reset
C26	NPFAIL	P17-14	power fail signal, active low
A27	not used	-	emitter of link progressive for DACOM3000
B27	GND	GND	Gnd
C27	NC	-	-
A28	CCINH	P14-6	CC46 Inhibit

PIN	Pin Name, MAV/6 Main Board	Connects to ...	Comment
B28	not used	-	Current control for winding 2
C28	NC	-	-
A29	HOPDIR	P7-13	Hopper motor direction, hopper
B29	GND	GND	Gnd
C29	not used	-	Current control for winding 2
A30	not used	-	Phase winding 1 + lamp 1 test
B30	not used	-	Phase winding 2 + lamp 2 test
C30	not used	-	Current control for winding 1 + lamp3
A31	not used	-	For reel selection
B31	GND	GND	Gnd
C31	not used	-	For reel selection
A32	not used	-	Strobe for latching the lamps
B32	not used	-	For reel selection
C32	not used	-	Strobe for latching the motor

Main Board/Backplane DIN, JP21/P21

JP21 on the Backplane Board connects to P21 on the Main Board.

PIN	Pin Name, MAV/6 Main Board	Connects to ...	Comment
A1	not used	-	mech. switch, JACKPOT RESET
B1	GND	GND	Gnd
C1	not used	-	mech. switch, AUDIT RESET
A2	not used	-	mech. switch, spare
B2	not used	-	mech. switch, spare
C2	not used	-	mech. switch, spare
A3	NC	-	-
B3	GND	GND	Gnd
C3	NC	-	-
A4	not used	-	Logic Door Security Switch 7 contact - NC
B4	not used	-	Door security detector output, no driver/buffer exists.
C4	DOPTOUT	P14-5	Door Optic Output
A5	not used	-	Emitter 1 drive signal, Security 1
B5	GND	GND	Gnd
C5	not used	-	Logic Door Security Switch 7 contact - NO
A6	not used	-	Mechanical Security Switch 1 contact - NO
B6	not used	-	Mechanical Security Switch 1 contact - NC
C6	not used	-	Receiver 1 Sense signal, security 1
A7	not used	-	Receiver 2 Sense signal, security 2
B7	GND	GND	Gnd
C7	not used	-	Emitter 2 Drive signal, security 2
A8	not used	-	Emitter 3 Drive signal, security 3
B8	not used	-	Mechanical Security Switch 2 contact - NO
C8	not used	-	Mechanical Security Switch 2 contact - NC
A9	not used	-	Mechanical Security Switch 3 contact - NC
B9	GND	GND	Gnd
C9	not used	-	Receiver 3 Sense signal, security 3
A10	not used	-	Receiver 4 Sense signal, security 4
B10	not used	-	Emitter 4 Drive signal, security 4
C10	not used	-	Mechanical Security Switch 3 contact - NO
A11	not used	-	Emitter 5 Drive signal, security 5
B11	GND	GND	Gnd

PIN	Pin Name, MAV/6 Main Board	Connects to ...	Comment
C11	not used	-	Mechanical Security Switch 4 contact - NC
A12	not used	-	Emitter 6 Drive signal, security 6
B12	not used	-	Mechanical Security Switch 5 contact - NC
C12	not used	-	Receiver 5 Sense signal, security 5
A13	not used	-	Mechanical Security Switch 6 contact - NC
B13	GND	GND	Gnd
C13	not used	-	Receiver 6 Sense signal, security 6
A14	not used	-	Mechanical Security Switch 7 contact - NC
B14	not used	-	Receiver 7 Sense signal, security 7
C14	not used	-	Emitter 7 Drive signal, security 7
A15	IRQDMON	J2-A6	Demon Interrupt Line
B15	GND	GND	Gnd
C15	NC	-	-
A16	VBAT	J2-B4	Battery Backup Voltage
B16	NC	-	-
C16	not used	-	Spare IO
A17	not used	-	CPU, read not write signal
B17	GND	GND	Gnd
C17	NC	-	-
A18	NEIF	J3-C23	CPU, IF interrupt
B18	NEFHO	J3-C21	CPU, FH0 interrupt
C18	NDACK	J2-B5	CPU, data acknowledge
A19	NEFL	J3-C22	CPU, FL interrupt
B19	GND	GND	Gnd
C19	NEIL0	J2-A5	CPU, IL0 interrupt
A20	NERESET	J2-B7	CPU, external reset output
B20	NEIOW	J2-A7	CPU, IO write signal
C20	NEIOR	J2-B6	CPU, IO read signal
A21	not used	-	CPU, address bus 13
B21	GND	GND	Gnd
C21	ECLK8M	J2-A8	CPU, clock signal
A22	EA10	J2-B11	CPU, address bus
B22	EA11	J2-A11	CPU, address bus 11
C22	EA12	J2-B10	CPU, address bus 12
A23	EA8	J2-B12	CPU, address bus
B23	GND	GND	Gnd
C23	EA9	J2-A12	CPU, address bus
A24	EA5	J2-A14	CPU, address bus
B24	EA6	J2-B13	CPU, address bus
C24	EA7	J2-A13	CPU, address bus
A25	EA3	J2-A15	CPU, address bus
B25	GND	GND	Gnd
C25	EA4	J2-B14	CPU, address bus
A26	NC	-	-
B26	NC	-	-
C26	EA2	J2-B15	CPU, address bus
A27	NC	-	-
B27	GND	GND	Gnd
C27	NC	-	-
A28	ED5	J2-A19	CPU, data bus
B28	ED6	J2-B18	CPU, data bus
C28	ED7	J2-A18	CPU, data bus
A29	ED3	J2-A20	CPU, data bus
B29	GND	GND	Gnd

PIN	Pin Name, MAV/6 Main Board	Connects to ...	Comment
C29	ED4	J2-B19	CPU, data bus
A30	ED0	J2-B21	CPU, data bus
B30	ED1	J2-A21	CPU, data bus
C30	ED2	J2-B20	CPU, data bus
A31	GND	GND	Gnd
B31	24V	24V	+24V
C31	GND	GND	Gnd
A32	24V	24V	+24V
B32	GND	GND	Gnd
C32	24V	24V	+24V

12.3.2 Extended I/O Driver Board

The Extended I/O Driver Board interfaces with the other peripheral devices via the Backplane through two 64 pin DIN41612 connectors and a 96-way DIN41612 connector.

I/O Driver Board 64-way DIN41612 connector, J1

J1 on the Backplane connects to J1 on the I/O Driver Board.

PIN	Pin Name, MAV/6 I/O Driver Board	Connects to ...	Comment
A1	GNDI	GND	Ground
B1	GNDI	GND	Ground
A2	PBS1	P11-24	Pushbutton Switch 1
B2	PBS2	P11-23	Pushbutton Switch 2
A3	PBS3	P11-22	Pushbutton Switch 3
B3	PBS4	P11-21	Pushbutton Switch 4
A4	PBS5	P11-20	Pushbutton Switch 5
B4	PBS6	P11-19	Pushbutton Switch 6
A5	PBS7	P11-18	Pushbutton Switch 7
B5	PBS8	P11-17	Pushbutton Switch 8
A6	PBS9	P11-16	Pushbutton Switch 9
B6	PBS10	P11-15	Pushbutton Switch 10
A7	PBS11	P12-22	Pushbutton Switch 11
B7	PBS12	P12-21	Pushbutton Switch 12
A8	PBS13	P12-20	Pushbutton Switch 13
B8	PBS14	P12-19	Pushbutton Switch 14
A9	SPARESW1	P12-18	Spare 24V Input 1
B9	SPARESW2	P12-17	Spare 24V Input 2
A10	PBL1	P11-2	Pushbutton Lamp 1
B10	PBL2	P11-4	Pushbutton Lamp 2
A11	PBL3	P11-5	Pushbutton Lamp 3
B11	PBL4	P11-6	Pushbutton Lamp 4
A12	PBL5	P11-7	Pushbutton Lamp 5
B12	PBL6	P11-8	Pushbutton Lamp 6
A13	PBL7	P11-9	Pushbutton Lamp 7
B13	PBL8	P11-10	Pushbutton Lamp 8
A14	PBL9	P11-11	Pushbutton Lamp 9
B14	PBL10	P11-12	Pushbutton Lamp 10
A15	PBL11	P12-15	Pushbutton Lamp 11
B15	PBL12	P12-16	Pushbutton Lamp 12
A16	PBL13	P12-1	Pushbutton Lamp 13
B16	PBL14	P12-14	Pushbutton Lamp 14
A17	DRVSP1	P12-3	Spare 24V output 1
B17	DRVSP2	P12-2	Spare 24V output 2
A18	SPAREIO0	P12-5	Spare TTL I/O
B18	SPAREIO1	P12-4	Spare TTL I/O
A19	SPAREIO2	P12-7	Spare TTL I/O
B19	SPAREIO3	P12-6	Spare TTL I/O
A20	SPAREIO4	P12-9	Spare TTL I/O
B20	SPAREIO5	P12-8	Spare TTL I/O
A21	SPRTS	P12-11	Spare serial
B21	SPCTS	P12-23	Spare serial
A22	SPRXD	P12-24	Spare serial
B22	SPTXD	P12-12	Spare serial

PIN	Pin Name, MAV/6 I/O Driver Board	Connects to ...	Comment
A23	GNDI	GND	Ground
B23	GNDI	GND	Ground
A24	HM1	P2-5	Hard Meter 1
B24	HM2	P2-6	Hard Meter 2
A25	HM3	P2-7	Hard Meter 3
B25	HM4	P2-8	Hard Meter 4
A26	HM5	P2-9	Hard Meter 5
B26	HM6	P2-10	Hard Meter 6
A27	LTL1	P2-20	Light Tower Lamp 1
B27	LTL2	P2-21	Light Tower Lamp 2
A28	LTL3	P2-22	Light Tower Lamp 3
B28	LTL4	P2-23	Light Tower Lamp 4
A29	AL1	P14-18	Animation Lamp 1
B29	AL2	P14-17	Animation Lamp 2
A30	AL3	P14-16	Animation Lamp 3
B30	HOPCOIN	P7-1	Hopper Coin Output
A31	HOPHIGH	P7-5	Hopper Hi Probe (Hopper Full)
B31	DOPTIN	P13-9	Door Optic In
A32	P24VI	24V	24V
B32	P24VI	24V	24V

I/O Driver Board 64-way DIN41612 Connector, J2

J2 on the Backplane connects to J2 on the I/O Driver Board.

PIN	Pin Name, MAV/6 I/O Driver Board	Connects to ...	Comment
A1	P12VDC	P12VDC	12V from Driver for CC46
B1	GND	GND	Gnd
A2	VCC	VCC	5V
B2	VCC	VCC	5V
A3	LDOR_NC	P3-2	Logic Door Security Normally Closed Contact
B3	LDOR_COM	P3-3	Logic Door Security Sense
A4	LDOR_NO	P3-1	Logic Door Security - Hi-Z Battery Output
B4	VBAT	JP21-A16	Battery Backed Power
A5	NEIL0	JP21-C19	CPU, IL0 interrupt
B5	NDACK	JP21-C18	CPU, data acknowledge
A6	IRQDMON	JP21-A15	Demon Interrupt Line
B6	NEIOR	JP21-C20	CPU, IO read signal
A7	NEIOW	JP21-B20	CPU, IO write signal
B7	NERESET	JP21-A20	CPU, external reset output
A8	ECLK8M	JP21-C21	CPU, clock signal
B8	GND	GND	Gnd
A9	24V	24V	24V
B9	24V	24V	24V
A10	not used	-	CPU, address bus
B10	EA12	JP21-C22	CPU, address bus
A11	EA11	JP21-B22	CPU, address bus
B11	EA10	JP21-A22	CPU, address bus
A12	EA9	JP21-C23	CPU, address bus

PIN	Pin Name, MAV/6 I/O Driver Board	Connects to ...	Comment
B12	EA8	JP21-A23	CPU, address bus
A13	EA7	JP21-C24	CPU, address bus
B13	EA6	JP21-B24	CPU, address bus
A14	EA5	JP21-A24	CPU, address bus
B14	EA4	JP21-C25	CPU, address bus
A15	EA3	JP21-A25	CPU, address bus
B15	EA2	JP21-C26	CPU, address bus
A16	24V	24V	24V
B16	24V	24V	24V
A17	GND	GND	Gnd
B17	GND	GND	Gnd
A18	ED7	JP21-C28	CPU, data bus
B18	ED6	JP21-B28	CPU, data bus
A19	ED5	JP21-A28	CPU, data bus
B19	ED4	JP21-C29	CPU, data bus
A20	ED3	JP21-A29	CPU, data bus
B20	ED2	JP21-C30	CPU, data bus
A21	ED1	JP21-B30	CPU, data bus
B21	ED0	JP21-A30	CPU, data bus
A22	VCC	VCC	5V
B22	VCC	VCC	5V
A23	GND	GND	Gnd
B23	GND	GND	Gnd
A24	NC	-	not used
B24	NC	-	not used
A25	NC	-	not used
B25	NC	-	not used
A26	EMIKP2	P23-19	Data A2
B26	EMIKN2	P23-7	Machine ID2
A27	NC	-	not used
B27	NC	-	not used
A28	NC	-	not used
B28	NC	-	not used
A29	ISOLPGND	ISOLPGND	Ground 12v/5v Power Supply filtered/isolated
B29	ISOLPWR	ISOLPWR	12v/5v Power Supply filtered/isolated
A30	EMIKP1	P23-17	Data A1
B30	EMIKN1	P23-5	Machine ID1
A31	TXDA+	P23-14	Mikohn 422 Serial Comms
B31	TXDA-	P23-3	Mikohn 422 Serial Comms
A32	RXDA+	P23-13	Mikohn 422 Serial Comms
B32	RXDA-	P23-1	Mikohn 422 Serial Comms

I/O Driver Board 96-way DIN41612 Connector, J3

J3 on the Backplane connects to J3 on the Extended Mk V I/O Driver Board.

PIN	Pin Name, MAV/6 I/O Driver Board	Connects to ...	Comment
A1	NC	-	-
B1	232DTR7	P8-16	RS232 Serial Port Com7 Data Terminal Ready
C1	VCC	VCC	5 Volts
A2	232DSR7	P8-17	RS232 Serial Port Com7 Data Set Ready
B2	NC	-	-
C2	GND	GND	0 Volts referenced to SX Main Board Logic
A3	NC	-	-
B3	P12VI	P12VI	+12V for communications
C3	NC	-	-
A4	NC	-	-
B4	232DTR6	P8-22	RS232 Serial Port Com6 Data Terminal Ready
C4	NC	-	-
A5	232DSR6	P8-23	RS232 Serial Port Com6 Data Set Ready
B5	NC	-	-
C5	NC	-	-
A6	NC	-	-
B6	P12VI	P12VI	+12V for communications
C6	VCC	VCC	5 Volts
A7	GNDISOL	GNDISOL	Isolated GND for communications
B7	232TXD6	P8-12	RS232 Serial Port Com6 Transmitted Data
C7	GND	GND	0 Volts
A8	232RXD6	P8-11	RS232 Serial Port Com6 Received Data
B8	232RTS6	P8-10	RS232 Serial Port Com6 Request To Send
C8	GND	GND	0 Volts
A9	232CTS6	P8-9	RS232 Serial Port Com6 Clear To Send
B9	232DCD6	P8-8	RS232 Serial Port Com6 Data Carrier Detect
C9	NC	-	-
A10	GNDISOL	GNDISOL	Isolated GND for communications
B10	232TXD7	P8-6	RS232 Serial Port Com7 Transmitted Data
C10	NC	-	-
A11	232RXD7	P8-5	RS232 Serial Port Com7 Received Data
B11	232RTS7	P8-4	RS232 Serial Port Com7 Request To Send
C11	NC	-	-
A12	232CTS7	P8-3	RS232 Serial Port Com7 Clear To Send
B12	232DCD7	P8-2	RS232 Serial Port Com7 Data Carrier Detect
C12	P12VI	P12VI	12 Volts
A13	NC	-	-
B13	NC	-	-
C13	COMMS_RESET	JP20-A13	Communications ports reset
A14	NC	-	-
B14	NC	-	-
C14	NC	-	-
A15	NC	-	-
B15	NC	-	-
C15	VCC	VCC	5 Volts
A16	NC	-	-
B16	BACCLITE8	P10-8	Bill Acceptor Light #8
C16	GND	GND	
A17	BACCLITE1	P10-1	Bill Acceptor Light #1

PIN	Pin Name, MAV/6 I/O Driver Board	Connects to ...	Comment
B17	BACCLITE2	P10-2	Bill Acceptor Light #2
C17	P12VI	P12VI	+12V for communications
A18	BACCLITE3	P10-3	Bill Acceptor Light #3
B18	BACCLITE4	P10-4	Bill Acceptor Light #4
C18	N12VI	N12VI	-12V for communications
A19	BACCLITE5	P10-5	Bill Acceptor Light #5
B19	BACCLITE6	P10-6	Bill Acceptor Light #6
C19	NC	-	-
A20	BACCLITE7	P10-7	Bill Acceptor Light #7
B20	NC	-	-
C20	NC	-	-
A21	AL4	P14-21	?
B21	NC	-	-
C21	-	JP21-B18	Interrupt to SX Main Board
A22	AL5	P14-22	?
B22	NC	-	-
C22	-	JP21-A19	Interrupt to SX Main Board
A23	NC	-	-
B23	NC	-	-
C23	-	JP21-A18	Interrupt to SX Main Board
A24	DDOR_NC	P9-12	Battery backed Cashbox switch Normally Closed
B24	DDOR_NO	P9-10	Battery backed Cashbox switch Normally Open
C24	-	-	-
A25	DDOR_COM	P9-9	Battery backed Cashbox switch Common contact
B25	NC	-	-
C25	NC	-	-
A26	GDOR_NC	P9-8	Battery backed main door switch Normally Closed
B26	GDOR_NO	P9-7	Battery backed main door switch Normally Open
C26	NC	L12VDC	12V
A27	GDOR_COM	P9-1	Battery backed main door switch Common contact
B27	NC	-	-
C27	NC	L5VDC	5V
A28	SEC_NC	P2-17	Battery-backed belly panel door switch. Normally Closed
B28	SEC_NO	P2-18	Battery-backed belly panel door switch. Normally Open
C28	NC	L5VDC	5V
A29	SEC_COM	P2-19	Battery-backed belly panel door switch. Common contact
B29	NC	-	-
C29	NC	LGND	Gnd
A30	-	-	-
B30	NC	-	-
C30	NC	LGND	Gnd
A31	-	-	-
B31	NC	-	-
C31	NC	LGND	Gnd
A32	-	-	-
B32	NC	-	-
C32	NC	LGND	Gnd

12.3.3 Backplane Peripheral Connectors

The MAV/6 Backplane routes the various peripheral connectors to the Main Board and the I/O Driver Board. The peripheral connectors are outlined below.

Debug, P1

Pin	Pin Name	Connects to ...	Function
1	KIN	JP22-C18	Keyboard In
2	KOUT	JP22-B18	Keyboard Out
3	GND	GND	Ground
4	VCC	VCC	5V

This port is not usually loaded on the Backplane.

Light Tower / Meters / BACC Security, P2

Pin	Pin Name	Connects to ...	Function
1	24V	24V	24V for Meters
2	24V	24V	24V for Meters
3	24V	24V	24V for Meters
4	24V	24V	24V for Meters
5	HM1	J1-A24	Meter 1
6	HM2	J1-B24	Meter 2
7	HM3	J1-A25	Meter 3
8	HM4	J1-B25	Meter 4
9	HM5	J1-A26	Meter 5
10	HM6	J1-B26	Meter 6
11	5V	VCC	5V power for meters
12	GND	GND	Gnd for Meters
13	24V	24V	24V for Meters
14	24V	24V	24V for Meters
15	24V	24V	24V Light Tower Lamps
16	24V	24V	24V Light Tower Lamps
17	SEC_NC	J3-A28	Battery-backed Belly Panel Door Security Switch, Normally Closed Contact
18	SEC_NO	J3-B28	Battery-backed Belly Panel Door Security Switch, Normally Open Contact
19	SEC_COM	J3-A29	Battery-backed Belly Panel Door Security Switch, Common Contact
20	LTL1	J1-A27	Light Tower Lamp 1
21	LTL2	J1-B27	Light Tower Lamp 2
22	LTL3	J1-A28	Light Tower Lamp 3
23	LTL4	J1-B28	Light Tower Lamp 4
24	GND	GND	Gnd for Meters

Logic Door, P3

Pin	Pin Name	Connects to ...	Function
1	LDOR_NO	J2-A4	Logic Door Security - Normally Open contacts
2	LDOR_NC	J2-A3	Logic Door Security - Normally Closed contacts
3	LDOR_COM	J2-B3	Logic Door Security - Common
4	GND	GND	Ground

Monitor, P4

The video connector connects to an IBM VGA standard monitor. It also has facility for a touchscreen monitor.

Pin	Pin Name	Connects to ...	Function
1	HSYNC	P22-C12	Horizontal Synchronisation Signal
2	Keyway		Plastic key way
3	GND_RED	P22-C9	Return path for Red video signal
4	RED	P22-B9	Red video signal
5	GND_BLUE	P22-A11	Return path for Blue video signal
6	BLUE	P22-A10	Blue video signal
7	RS232Rx	P22-A8	Received Data from Touchscreen
8	GND_SYNC	P22-C11	Video reference signal
9	VSYNC	P22-B11	Vertical Synchronisation Signal
10	Keyway		Plastic key way
11	GND_GREEN	P22-B10	Return path for Green video signal
12	GREEN	P22-C10	Green video signal
13	GND	GND	Return path for Touchscreen signals
14	RS232Tx	P22-A7	Touchscreen Transmitted Data

Speakers, P5

Pin	Pin Name	Connects to ...	Function
1	SPEAKER	JP22-A12	Sound Signal (stereo 1st (Left) speaker)
2	SPKRGND	JP22-B13	Speaker Gnd
3	SPEAKER2	JP22-A13	Sound Signal 2 (stereo 2nd (Right) speaker)
4	SPKRGND	JP22-B13	Speaker Gnd
5	-	-	-
6	-	-	-
7	Keyway		Plastic Keyway
8	GND	GND	Ground Lug or braid
9	GND	GND	Ground Lug or braid
10	-	-	-
11	-	-	-
12	-	-	-

Low Resolution Video, P6

Pin	Pin Name	Goes to ...	Function
1	DigGreen	JP22-A19	Green, Low resolution Video Signal
2	Keyway		Plastic Keyway
3	DigcSync	JP22-A18	Sync, Low resolution composite Video Signal
4	-	-	-
5	Keyway		Plastic Keyway
6	GND	GND	Ground Lug or braid
7	DigRed	JP22-C19	Red, Low resolution Video Signal
8	DigBlue	JP22-C20	Blue, Low resolution Video Signal
9	GND	GND	Ground Lug or braid
10	-	-	-
11	-	-	-
12	-	-	-

Hopper / Printer, P7

Pin	Pin Name	Connects to ...	Function
1	HOPCOIN	J1-B30	Coin Output from Hopper
2	Keyway		Plastic Keyway
3	Keyway		Plastic Keyway
4	HOPON	JP22-C1	Hopper motor drive
5	HOPHIGH	J1-A31	Hopper high probe, Detects hopper full.
6	VCC	VCC	5V for Hopper Electronics
7	GND	GND	Gnd Hopper
8	RTS3	JP20-C12	RTS for printer
9	CTS3	JP20-A10	CTS for printer
10	GNDIsol	GNDIsol	Gnd, Isolated, for Printer Comms
11	24V	24V	24V Motor Drive for Hopper
12	HOPTEST	JP22-A1	Hopper Sensor Test output
13	HOPDIR	JP22-A29	Hopper motor direction
14	GND	GND	Gnd
15	DSR3	JP20-C11	Handshake Input 1, serial channel 3
16	DTR3	JP20-B12	DTR for Printer
17	24V	24V	24V for Printer
18	SIN3	JP20-A9	Rxd from Printer
19	SOUT3	JP20-C10	Txd to Printer
20	GND	GND	Gnd

Com6 and Com7 Spare Serial Outputs, P8

Pin	Pin Name	Connects to ...	Function
1	GNDISOL	GNDISOL	Return from 12V DC, Isolated
2	232DCD7	J3-B12	Com 7 Data Carrier Detect
3	232CTS7	J3-A12	Com 7 Clear To Send
4	232RTS7	J3-B11	Com 7 Request To Send
5	232RxD7	J3-A11	Com 7 Received Data
6	232TxD7	J3-B10	Com 7 Transmitted Data
7	GndIsol	GndIsol	Return from 12V DC
8	232DCD6	J3-B9	Com 6 Data Carrier Detect
9	232CTS6	J3-A9	Com 6 Clear To Send
10	232RTS6	J3-B8	Com 6 Request To Send
11	232RxD6	J3-A8	Com 6 Received Data
12	232TxD6	J3-B7	Com 6 Transmitted Data
13	P12VI	P12VI	12V DC, Isolated
14	Keyway		Plastic Keyway
15	Keyway		Plastic Keyway
16	232DTR7	J3-B1	Com 7 Data Terminal Ready
17	232DSR7	J3-A2	Com 7 Data Set Ready
18	NC	-	-
19	P12VI	P12VI	12V DC, Isolated
20	NC	-	-
21	NC	-	-
22	232DTR6	J3-B4	Com 6 Data Terminal Ready
23	232DSR6	J3-A5	Com 6 Data Set Ready
24	NC	-	-

Battery Backed Security Switches, P9

Pin	Pin Name	Connects to ...	Function
1	GDOR_COM	J3-A27	Battery Backed Main Door Switch, Common Contact
2	Keyway		Plastic Keyway
3	NC	-	-
4	NC	-	-
5	NC	-	-
6	NC	-	-
7	GDOR_NO	J3-B26	Battery Backed Main Door Switch, Normally Open Contact
8	GDOR_NC	J3-A26	Battery Backed Main Door Switch, Normally Closed Contact
9	DDOR_COM	J3-A25	Battery Backed Cashbox Switch, Common Contact
10	DDOR_NO	J3-B24	Battery Backed Cashbox Switch, Normally Open Contact
11	Keyway		Plastic Keyway
12	DDOR_NC	J3-A24	Battery Backed Cashbox Switch, Normally Closed Contact

Bill Acceptor (BACC) Lights, P10

Pin	Pin Name	Connects to ...	Function
1	BACClite1	J3-A17	BACC Light #1
2	BACClite2	J3-B17	BACC Light #2
3	BACClite3	J3-A18	BACC Light #3
4	BACClite4	J3-B18	BACC Light #4
5	BACClite5	J3-A19	BACC Light #5
6	BACClite6	J3-B19	BACC Light #6
7	BACClite7	J3-A20	BACC Light #7
8	BACClite8	J3-B16	BACC Light #8
9	Keyway		Plastic Keyway
10	24V	24V	24V
11	Keyway		Plastic Keyway
12	NC	-	-
13	NC	-	-
14	GND	GND	Gnd

Pushbuttons & Pushbutton Lamps, P11

Pin	Pin Name	Connects to ...	Comments
1	24V	24V	24V Lamps
2	PBL1	J1-A10	Pushbutton Lamp 1
3	keyway		Plastic Keyway
4	PBL2	J1-B10	Pushbutton Lamp 2
5	PBL3	J1-A11	Pushbutton Lamp 3
6	PBL4	J1-B11	Pushbutton Lamp 4
7	PBL5	J1-A12	Pushbutton Lamp 5
8	PBL6	J1-B12	Pushbutton Lamp 6
9	PBL7	J1-A13	Pushbutton Lamb 7
10	PBL8	J1-B13	Pushbutton Lamp 8
11	PBL9	J1-A14	Pushbutton Lamp 9
12	PBL10	J1-B14	Pushbutton Lamp 10
13	24V	24V	24V Pushbuttons
14	keyway		Plastic Keyway
15	PBS10	J1-B6	Pushbutton 10
16	PBS9	J1-A6	Pushbutton 9
17	PBS8	J1-B5	Pushbutton 8
18	PBS7	J1-A5	Pushbutton 7
19	PBS6	J1-B4	Pushbutton 6
20	PBS5	J1-A4	Pushbutton 5
21	PBS4	J1-B3	Pushbutton 4
22	PBS3	J1-A3	Pushbutton 3
23	PBS2	J1-B2	Pushbutton 2
24	PBS1	J1-A2	Pushbutton 1

Spare I/O, P12

Pin	Pin Name	Connects to ...	Function
1	PBL13	J1-A16	OUT 3 SPARE PUSHBUTTON LAMP 13
2	DRVSP2	J1-B17	Spare 24V Output
3	DRVSP1	J1-A17	Spare 24V Output
4	SPAREIO1	J1-B18	Spare TTL I/O
5	SPAREIO0	J1-A18	Spare TTL I/O
6	SPAREIO3	J1-B19	Spare TTL I/O
7	SPAREIO2	J1-A19	Spare TTL I/O
8	SPAREIO5	J1-B20	Spare TTL I/O
9	SPAREIO4	J1-A20	Spare TTL I/O
10	GND	GND	Gnd
11	SPRTS	J1-A21	Spare Serial Com5
12	SPTXD	J1-B22	Spare Serial Com5
13	24V	24V	
14	PBL14	J1-B16	OUT 4 SPARE PUSHBUTTON LAMP 14
15	PBL11	J1-A15	OUT 1 SPARE PUSHBUTTON LAMP 11
16	PBL12	J1-B15	OUT 2 SPARE PUSHBUTTON LAMP 12
17	SPARESW2	J1-B9	Spare 24V Input
18	SPARESW1	J1-A9	Spare 24V Input
19	PBS14	J1-B8	IN 4 SPARE PUSHBUTTON 14
20	PBS13	J1-A8	IN 3 SPARE PUSHBUTTON 13
21	PBS12	J1-B7	IN 2 SPARE PUSHBUTTON 12
22	PBS11	J1-A7	IN 2 SPARE PUSHBUTTON 11
23	SPCTS	J1-B21	Spare Serial Com5
24	SPRXD	J1-A22	Spare Serial Com5

Keyswitches & BACC, P13

Pin	Pin Name	Goes to ...	Function
1	SOUT1	P20-C2	Loopback testing for DTR1
2	Keyway		Plastic Keyway
3	SIN1	P20-A1	Data (BACC)
4	JPBELL	P22-C2	Jackpot Bell
5	AUSW	P22-A2	Audit Keyswitch
6	CBOXSW	P22-C3	Cashbox Switch
7	MECHSW	P22-A3	Main Door Switch
8	JPSW	P22-B4	Jackpot Key
9	DOPTIN	-	Door Optic Detector
10	GND	GND	Cashbox Gnd
11	GND	GND	Audit Switch Gnd
12	NC	-	-
13	24V	24V	BACC 24V
14	Keyway		Plastic Keyway
15	CTS1	P20-A2	Service
16	DSR1	P20-C3	Int (BACC)
17	I1	P20-A3	LED Anode (BACC)
18	GndIsol	GndIsol	Isolated Ground for BACC Pin 1
19	RTS1	P20-C4	Acc. En (BACC)
20	DTR1	P20-B4	Send
21	GND	GND	Gnd
22	GND	GND	Jackpot Key Gnd
23	GND	GND	Main Door Switch Gnd (& BACC)
24	NC	-	-

Door Distribution, P14

Pin	Pin Name	Goes to ...	Comments
1	24V	24V	Animation Lamp 24V Power
2	Keyway		Plastic Keyway
3	24V	24V	24V Power Diverter Solenoid
4	Keyway		Plastic Keyway
5	DOPTOUT	-	Door Optic Emitter (on body)
6	CCINH	JP22-A28	Inhibit
7	CC_CRED	JP22-C5	Valid Coin Input
8	P12VDC	P12VDC	Coin Comparator 12V Power from driver
9	SOLDIV	JP22-B2	Control Signal for Diverter Solenoid
10	CCSEN	JP22-A4	Coin Sense
11	GND	GND	Coin Comparator gnd
12	GND	GND	BACC Security Switch Gnd
13	24V	24V	24V Power for Jackpot Bell
14	VCC	VCC	5V for Solenoid Optic
15	SOLOPT	JP22-C6	Ctl Solenoid Optic
16	AL3	J1-A30	Animation Lamp 3
17	AL2	J1-B29	Animation Lamp 2
18	AL1	J1-A29	Animation Lamp 1
19	CCERROR	JP22-A5	reverse coin
20	BASW	JP22-C4	BACC Security Switch
21	AL4	J3-A21	Animation Lamp 4
22	AL5	J3-A22	Animation Lamp 5
23	GND	GND	Gnd for Solenoid Optic
24	GND	GND	Gnd for BACC

Spare Power, P15

Pin	Pin Name	Connects to ...	Function
1	ISOLPGND	ISOLPGND	Gnd Isolated, 5V or 12V
2	keyway		Plastic keyway
3	GND	GND	Ground
4	GND	GND	Ground
5	24V	24V	24V
6	24V	24V	24V
7	ISOLPWR	ISOLPWR	5V or 12V, Isolated
8	NC	-	-
9	GND	GND	Ground
10	GND	GND	Ground
11	24V	24V	24V
12	24V	24V	24V

Fan, P16

Pin	Pin Name	Connects to ...	Function
1	Keyway		Plastic Keyway
2	24V	24V	24V
3	GND	GND	Gnd fan
4	-	-	-

Power Supply, P17

Pin	Pin Name	Connects to ...	Function
1	ISOLPIN	ISOLPIN	5V or 12V Isolated Power (before filter)
2	NC	-	-
3	GND	GND	Gnd
4	GND	GND	Gnd
5	GND	GND	Gnd
6	NC	-	-
7	NC	-	-
8	ISOLPGIN	ISOLPGIN	5V or 12V Isolated Ground (before filter)
9	Keyway		Plastic Keyway
10	24V	24V	24V
11	24V	24V	24V
12	24V	24V	24V
13	NC	-	-
14	NPFAIL	P22-C26	Power Fail

IGT SAS+ (PT95A) or Bally SDS Port, P18

Pin	Pin Name	Connects to ...	Function
1	O2	JP20-A8	Depends on configuration
2	SOUT2	JP20-C6	Depends on configuration
3	SIN2	JP20-A5	Depends on configuration
4	I2	JP20-A7	Depends on configuration

Although SAS+ (PT95A) and Bally SDS both use the same type of connector, the pinouts are different; therefore, the port pins are labelled in a generic fashion. The Communications Configuration Board determines the actual pinouts.

Broadcast DACOM Port, P19

Pin	Pin Name	Connects to ...	Function
1	GND	GND	Signal reference
2	SIN2	JP20-A5	Received data from network
3	SOUT2	JP20-C6	Transmitted data from EGM
4	-	-	-
5	VCC	VCC	+5 volts

Com2 / Com4 Mikohn, P23

Pin	Pin Name	Connects to ...	Function
1	RXDA-	J2-B32	Mikohn isolated 422 serial
2	Keyway		Plastic Keyway
3	TXDA-	J2-B31	Mikohn isolated 422 serial
4	NC	-	-
5	EMIKN1	J2-B30	Machine ID1
6	NC	-	-
7	EMIKN2	J2-B26	Machine ID2
8	NC	-	-
9	O2	JP20-A8	BALLY RX - uP TX
10	SOUT2	JP20-C6	232 RX - uP TX
11	SIN2	JP20-A5	232 TX - uP RX
12	P12VI	P12VI	12V for BALLY BLACKOUT
13	RXDA+	J2-A32	Mikohn isolated 422 serial
14	TXDA+	J2-A31	Mikohn isolated 422 serial
15	ISOLPGND	ISOLPGND	Mikohn isolated 422 serial Ground
16	Keyway		Plastic Keyway
17	EMIKP1	J2-A30	Data A1
18	NC	-	-
19	EMIKP2	J2-A26	Data A2
20	NC	-	-
21	RTS2	JP20-C8	232 RTS
22	CTS2	JP20-A6	232 CTS
23	I2	JP20-A7	BALLY TX - uP RX
24	GndIsol	GndIsol	Isolated Ground for COM2

Com2 is used for Bally-232 and RS-232 ports. Com4 is used for Mikohn.

12.4 Removal and Replacement Procedures

CAUTION

When handling electrostatic sensitive devices (ESDs) such as PCBAs, take care to avoid physical contact with components. PCBAs should be handled by their edges. ESDs should not be placed on metal surfaces. When handling PCBAs, take care to avoid flexing the PCBA, as this may lead to permanent damage.

Removal

The procedures for removing and replacing the Backplane Board are detailed in the chapter Cabinet, Door and Top Box, under the section describing how to remove and disassemble the logic cage.

Note

A fault tag must be placed on any faulty equipment.

Run a complete machine test after replacing the Backplane.

Notes

Chapter 13

Communications Configuration Board - Part No. 410165, 217, 244, 291, 294, 403

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13.1 Physical Description

The Communications Configuration Board (CCB) is located within the logic cage where it connects to the Main Board via a 72-pin SIMM socket (refer to Fig 13-1). The CCB is used to configure the internal serial communications ports 1, 2 and 3 for various signal levels.

Each channel connects to a 16-way Minifit connector on the Interface Board. Channel 3 also connects to a 10-way ribbon cable connector for the DACOM.

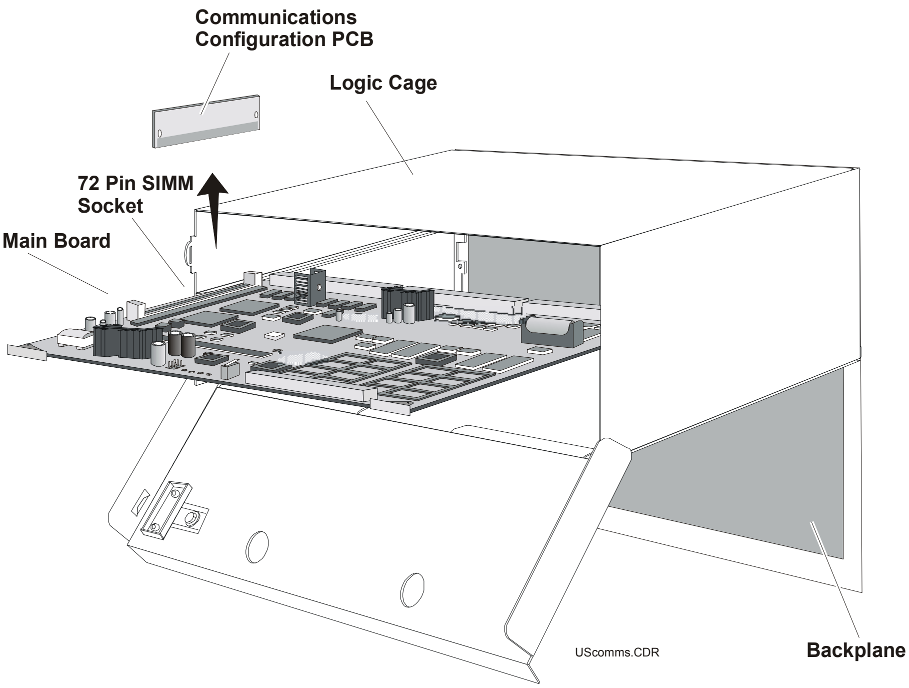

Figure 13-1 Communications Configuration Board – Location in Logic Cage

13.1.1 Circuit Diagrams and Component Locations

For further information and for reference, the following additional information on the Communications Configuration Board is provided in Volume II:

- **Circuit diagrams.** Structured circuit diagrams.
- **I/O to Components and ICs.** A list of the I/O paths to each component and integrated circuit (IC) pin position.

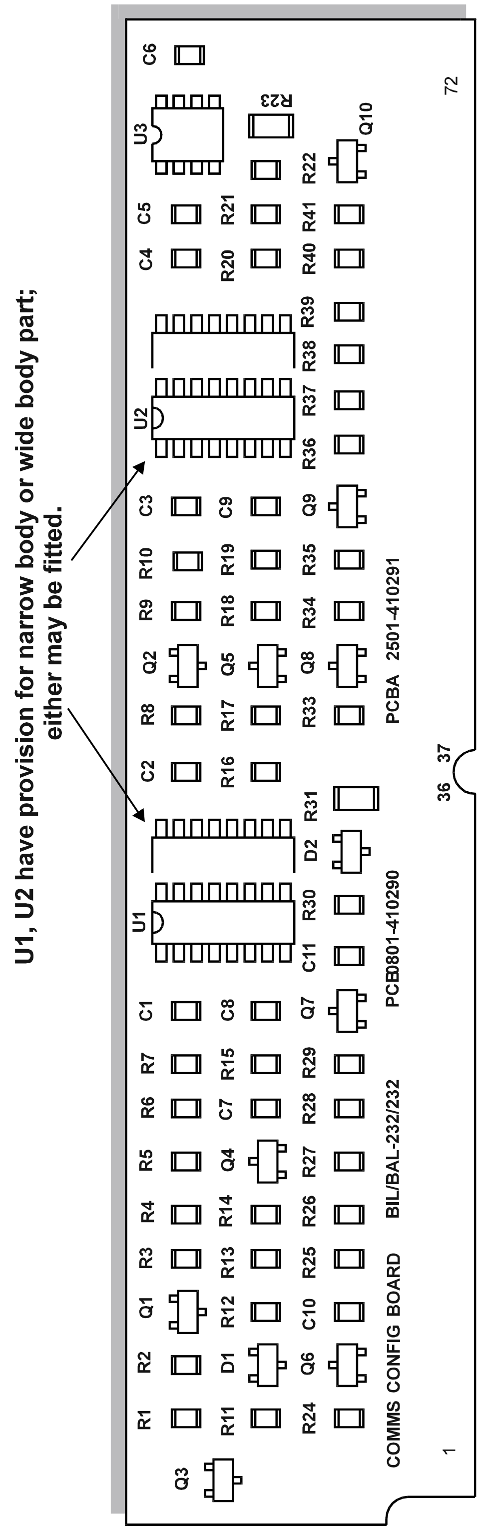

Figure 13-2 Communications Configuration Board - Component Layout

13.2 Functional Description

The Main Board has four serial channels - 0, 1, 2 and 3. Channel 0 has a non-isolated interface to a FIP display (stepper only) and an RS232 interface. This channel is reserved for communications with a Touchscreen interface or a Serial Keno Panel interface. Channels 1, 2 and 3 are fully isolated and can be configured using the Communications Configuration Board.

On Board 410165, COM 0 is reserved for RS-232 communications with a touchscreen. COM 1, COM 2, and COM 3 are fully isolated and are configurable via the Communications Configuration Board (CCB). The CCB is supplied from the main board with isolated ±12V at 100 mA for the communications channels and 5 V DC (VCC) (converted from the 24 V DC supply by the I/O Driver Board) to power the logic.

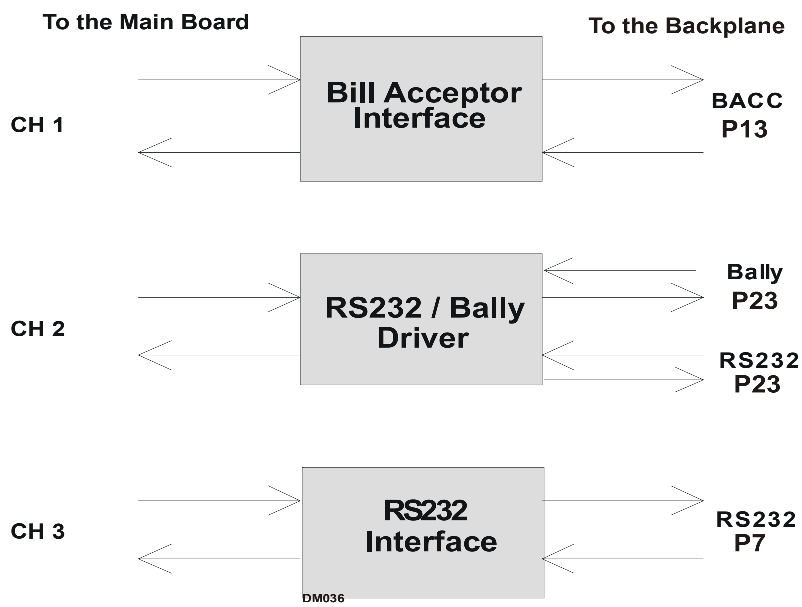

Figure 13-3 Communications Configuration Board - Block Diagram

The CCB plugs into the Main Board via a standard 72-pin SIMM socket and converts the opto-coupled UART serial and I/O signals into the desired signal levels. There are several different CCBs used to configure the communications channels for different signals to suit different markets. The table below shows the CCB part numbers and the associated configuration.

Table 13-1 CCBs Configuration - Explanation

PCBA Number	Channel 1	Channel 2	Channel 3
410217	Note Acceptor	RS232	DACOM
410165	Note Acceptor	RS232	RS232
410403	Note Acceptor	RS232	Generic
410244	Note Acceptor	Bally	Generic
410291	Note Acceptor	Bally	Bally 232-23
410294	Note Acceptor	Mercury II	DACOM

The connectors on the Interface Board used for the serial channels are as follows:

Table 13-2 Channel Numbers vs Connector Designation

Channel 0	Channel 1	Channel 2	Channel 3
P14	P18	P15	P17

The external network connections for DACOM (where used) are routed via an external network interface board.

The serial channels are supplied with isolated ±12 V at 100 mA from the Main Board, as well as +5 V to run the logic circuits.

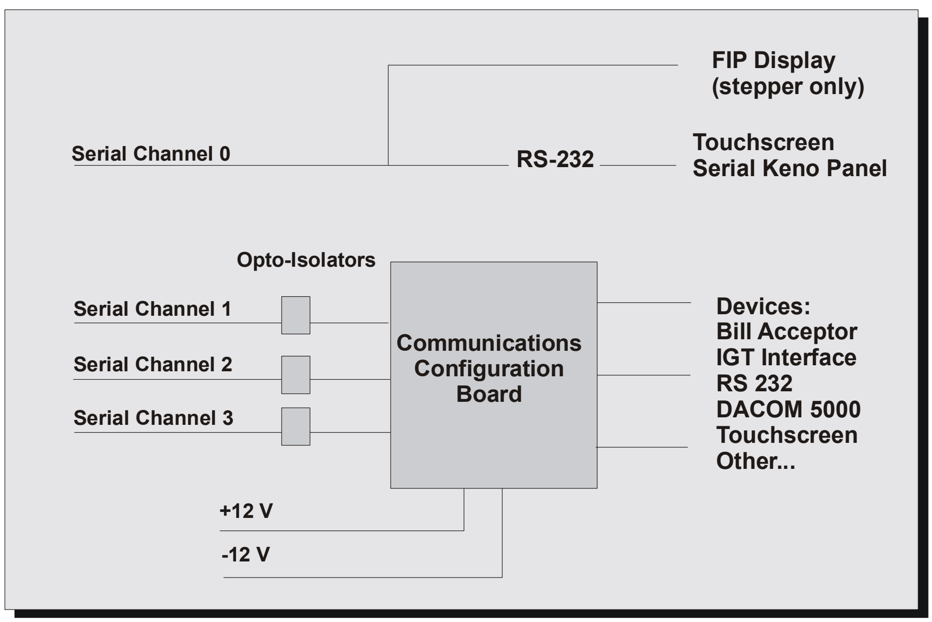

Figure 13-4 Communications Configuration Board - block diagram

Note Acceptor Interface

The note acceptor interface provides TTL/CMOS communication (serial input only from note acceptor) with handshaking.

The data transfer rate is 600 baud fixed, 8 bit data, 1 start bit, 1 stop bit and no parity. This port uses the 16-way Minifit connector P18 on the Interface Board.

The serial communication protocol used with the note acceptor conforms to the Mars GL5 standard (see the Note Acceptor chapter). The serial protocol is 'one way' in that the note acceptor sends to the host an ASCII code, depending on the type of note inserted or the status of the note acceptor. The host enables, disables or accepts the note via two control lines - ACCEPT ENABLE and SEND.

The connection supports several functions within the note acceptor and a subset of these signals that is specifically related to the serial GL5 interface. The Note Acceptor signals are shown below.

Table 13-3 CCB Pin Names Carrying BNA Signals

Pin Name	I/O	Note Acceptor	Description
SIN1	Input	Data	Serial data input in the NRZ format LSB first
SOUT1	Output	-	Serial data output, Not used
CTS1	Input	Out of Service	Active low input for note acceptor not available
DSR1	Input	Interrupt	Active low input that indicates the activity has occurred in the note acceptor and a status message is ready to be transmitted.
I1	Input	-	not used
RTS1	Output	Accept Enable	Active low output to enable the note acceptor
DTR1	Output	Send	Active low as a response of the interrupt signal that allows the note acceptor to transmit the message
O1	Output	-	not used
P12V	-	-	+12volt
N.C.	-	-	No connection
N12V	-	-	-12volt
GND	-	-	Ground

RS232 Interface

This interface provides RS232 communications between the Main Board and an external interface board. The channel has six I/O signals, including data I/O. The opto LED drivers on the Main Board are configured to an OFF state when the line is inactive or not connected to minimise power consumption. This port can be run at a minimum 9600-baud rate. The RS232 interface signals, as configured on Channel 2, are shown below.

Table 13-4 RS232 Interface Signals - Explanation

Pin Name	Function	I/O	Description
SIN3	PRN Tx	Input	Serial data input.
SOUT3	PRN Rx	Output	Serial data output
CTS3	RS232	Input	Active low input
DSR3	RS232	Input	Active low input
I3		-	not used
RTS3	RS232	Output	Active low output
DTR3	RS232	Output	Active low output
O3		-	not used
P12V		-	+12volt
N.C.		-	No connection
N12V		-	-12volt
GND		-	Ground

DACOM Interface

DACOM is a current loop connection with a source voltage of 24 V. Normally, DACOM transfers data at 2400 baud, 8 bits, no parity and 1 stop bit.

The Interface Board provides the 10-way header P21 for connection to a DACOM 5000 system parallel to the Channel 3 connector. The DACOM signals are shown below.

Table 13-5 DACOM Signals- Explanation

Pin Name	Signal Name	Function
SIN3	TX DAC	Receive data.
SOUT3	TX DAC	Receive data.
CTS3	COM	Common.
DSR3	COM	Common.
I3	RX DAC	Transmit data.
RTS3	RX DAC	Transmit data.
DTR3	COM	Common.
O3	COM	Common.
GND	-	Ground
GND	-	Ground

Bally Serial Interface

The Bally serial interface is a current loop interface defined by the Bally Gaming organisation. The facility normally runs at 9600-baud rate, 1 start bit, 8 data bits, 1 stop bit, and no parity.

Data line input to Bally is an npn transistor collector with 1K pull-up resistor to 5 V. Idle state is transistor on for an output low. The Bally signals are shown below. Only a Tx line, an Rx line, and a Blackout line are required for the Bally Interface.

Table 13-6 BALLY Signals

Pin Name	Function	I/O	Description
SIN2	Rx+	Input	Serial data input for Bally
SOUT2	Tx+	Output	Serial data output for Bally
CTS2		Input	not used
DSR2		Input	not used
I2		Input	not used
RTS2		Output	not used
DTR2		Output	not used
O2	Blackout	Output	+5 volts as black out signal to Bally system
P12V		-	+12volt
N.C.		-	No connection
N12V		-	-12volt
GND		-	Ground

Generic Interface

The term "generic" means that this port is not dedicated to any specific physical interface. This port is connected to an external communication interface board.

The signals are connected to the opto couplers on the external communication interface board. The primary use of this channel is for the Mikohn Link Progressive display, which is connected through an interface communications inlet board. The Generic signals are shown below.

Table 13-7 Generic Signals

Pin Name	I/O	Description
SIN3	Input	Serial data input
SOUT3	Output	Serial data output
CTS3	Input	Active low input
DSR3	Input	Active low input
I3	-	not used
RTS3	Output	Active low output
DTR3	Output	Active low output
O3	-	not used
P12V	-	+12volt
N.C.	-	No connection
N12V	-	-12volt
GND	-	Ground

Mercury II Interface

Asynchronous serial data 10 mA current loop from 5 V source at 2400 baud, transmit and receive only. Protocol is as follows:

- 1 Start Bit
- 8 Data Bits
- Odd Parity Bit
- 1 Stop Bit

Data is transmitted in 35 byte blocks no less than 2 times per second. For transmission delays greater than 2 seconds, the system will assume the game has been switched off and record this in the game history.

Table 13-8 Mercury II Interface Signals

Pin	Name	I/O	Description
1	SIN2	Input	Serial data input, high current LED driver to ensure the high speed switching of the opto.
2	SOUT2	Output	Serial data output
5	I2	Power	5 V via 330 R for 10 mA current loop (receive).
8	O2	Power	5 V for 10 mA current loop (transmit). 330 R resides in Mercury 2 interface.

13.3 Removal and Replacement Procedures

CAUTION

When handling electrostatic devices (ESDs) such as PCBAs, take care to avoid physical contact with components. Handle PCBAs by their edges. Do not place ESD items on metal surfaces. When handling PCBAs, take care to avoid flexing the PCBA. Flexing may cause physical damage.

CAUTION

Turn the machine power OFF before removing any PCBs from the logic cage.

To remove the Communications Configuration Board (refer to Figure 13-1):

1. Open the cabinet door, and switch OFF the machine.
2. Open the logic cage door.
3. Standard Electrostatic Discharge (ESD) prevention procedures should be followed when removing PCBAs.
4. Release the Main Board using the extractor pins, and withdraw it from the cage.
5. Locate the Communications Configuration Board sitting perpendicular to the Main Board in the top left.
6. Remove the board by lifting it upwards while holding the Main Board steady.

Note

A fault tag must be placed on any faulty PCBAs.

To replace the Communications Configuration Board:

1. Standard Electrostatic Discharge (ESD) prevention procedures should be followed when replacing PCBAs.
2. Remove the replacement board from the antistatic bag.
3. Inspect both sides of the board for any signs of physical damage.
4. Press the Communications Configuration Board into position on the Main Board.
5. Slide the Main Board into the correct logic cage grooves and gently move the board into position on the Interface Board. Close the logic cage door.

6. Switch the machine on, and close the cabinet door.

Note
Run relevant machine tests after replacing the Communications Configuration Board.

13.4 Connector Pin Assignments

This table lists the input/output signals between the Communications Configuration Board and the Main Board. The pin assignments for the serial channel connectors P14, P15, P17, and P18 are listed in the relevant sections of the Interface Board chapter.

Table 13-9 CCB 72-pin connector to Main Board

Pin No.	Pin Name	Description
1	CFG2	PDA0 output signal through opto emitter.
2	GNDI	Ground.
3	CFG4	RTSA1 output signal through opto emitter.
4	DFG1	PDA0 output signal through opto collector.
5	SINA1	Input from channel 1 connector.
6	CFG3	RTSA1 output signal through opto collector.
7	SOUTA1	Output to channel 1 connector.
8	CFG6	DTRA1 output signal through opto emitter.
9	CTSA1	Input from channel 1 connector.
10	CFG5	DTRA1 output signal through opto collector.
11	DSRA1	Input from channel 1 connector.
12	CFG8	SOUTA1 output signal through opto emitter.
13	CFG7	SOUTA1 output signal through opto collector.
14	CFG10	CTSA1 input signal through opto cathode.
15	IA1	Input from channel 1 connector.
16	CFG11	DSRA1 input signal through opto anode.
17	CFG9	CTSA1 input signal through opto anode.
18	CFG12	DSRA1 input signal through opto cathode.
19	RTSA1	Output to channel 1 connector.
20	CFG13	SINA1 input signal through opto anode.
21	DTRA1	Output to channel 1 connector.
22	CFG14	SINA1 input signal through opto cathode.
23	OA1	Output to channel 1 connector.
24	P12VI	+ 12V power.
25	CFG20	DTRB0 output signal through opto emitter.
26	N12VI	- 12V power.
27	CFG19	DTRB0 output signal through opto collector.
28	GNDI	Ground.
29	CFG18	SOUTB0 output signal through opto emitter..
30	CFG17	SOUTB0 output signal through opto collector.
31	CFG16	SOUTB0 output signal through opto base.
32	CFG15	Opto Vcc.
33	SINB0	Input from channel 2 connector.

Pin No.	Pin Name	Description
34	CFG22	RTSB0 output signal through opto emitter.
35	SOUTB0	Output to channel 2 connector.
36	CFG29	SINB0 input signal through opto anode.
37	CTSB0	Input from channel 2 connector.
38	CFG30	SINB0 input signal through opto cathode.
39	DSRB0	Input from channel 2 connector.
40	CFG21	RTSB0 output signal through opto collector.
41	IB0	Input from channel 2 connector.
42	CFG31	CTSB0 input signal through opto anode.
43	RTSB0	Output to channel 2 connector.
44	CFG32	CTSB0 input signal through opto cathode.
45	DTRB0	Output to channel 2 connector.
46	CFG33	DSRB0 input signal through opto anode.
47	OB0	Output to channel 2 connector.
48	P12VI	+ 12V power.
49	CFG34	DSRB0 input signal through opto cathode.
50	GNDI	Ground.
51	CFG24	RTSB1 output signal through opto emitter.
52	N12VI	- 12V power.
53	SINB1	Input from channel 3 connector.
54	CFG23	RTSB1 output signal through opto collector.
55	SOUTB1	Output to channel 3 connector.
56	CFG26	DTRB1 output signal through opto emitter.
57	CFG25	DTRB1 output signal through opto collector.
58	CFG28	SOUTB1 input signal through opto emitter.
59	CTSB1	Input from channel 3 connector.
60	CFG27	SOUTB1 output signal through opto collector.
61	CFG35	CTSB1 input signal from opto anode.
62	CFG36	CTSB1 input signal from opto cathode.
63	DSRB1	Input from channel 3 connector.
64	CFG37	DSRB1 input signal through opto anode.
65	IB1	Input from channel 3 connector.
66	CFG38	DSRB1 input signal through opto cathode.
67	RTSB1	Output to channel 3 connector.
68	CFG39	SINB1 input signal through opto anode.
69	DTRB1	Output to channel 3 connector.
70	CFG40	SINB1 signal through opto cathode.
71	OB1	Output to channel 3 connector.
72	GNDI	Ground.

13.5 General Maintenance

CAUTION
Do not attempt component level repair without access to a workshop facility.

For general maintenance of the Communications Configuration Board:

- Remove any dust or dirt from external surfaces.
- Make sure that all contacts on the PCBA and in the SIMM socket on the Main Board are clean.
- Check that the connectors are in good condition and secure.

Notes

Chapter 14

Electromechanical Meters Board (P/N 572391)

List of Figures:

List of Tables:

14.1 Physical Description

Mechanical Meters Board

The Mechanical Meters Board is located in the top box (refer to Figure 14-1). It is a conventional double-sided PCB that interfaces with the Extended I/O Driver Board via a 24-way Minifit Junior connector on the Backplane. Up to six mechanical meters may be mounted to the board.

Mechanical Meters

The mechanical meters are used to record audit information such as games played, credits won, etc. The specifications of the meters are as follows:

Table 14-1 Mechanical Meters Specifications

Number of digits	7
Rated voltage:	24 V DC
Power consumption:	46 mA 1.1W
Operating volume range	90 to 110% of rated voltage
Count speed:	20 CPS (standard)
Allowable ripple ratio	<10%
Ambient temperature.	-25°C to +60°C (operating)
Dielectric strength	1500 V AC, 50/60 Hz for 1 minute

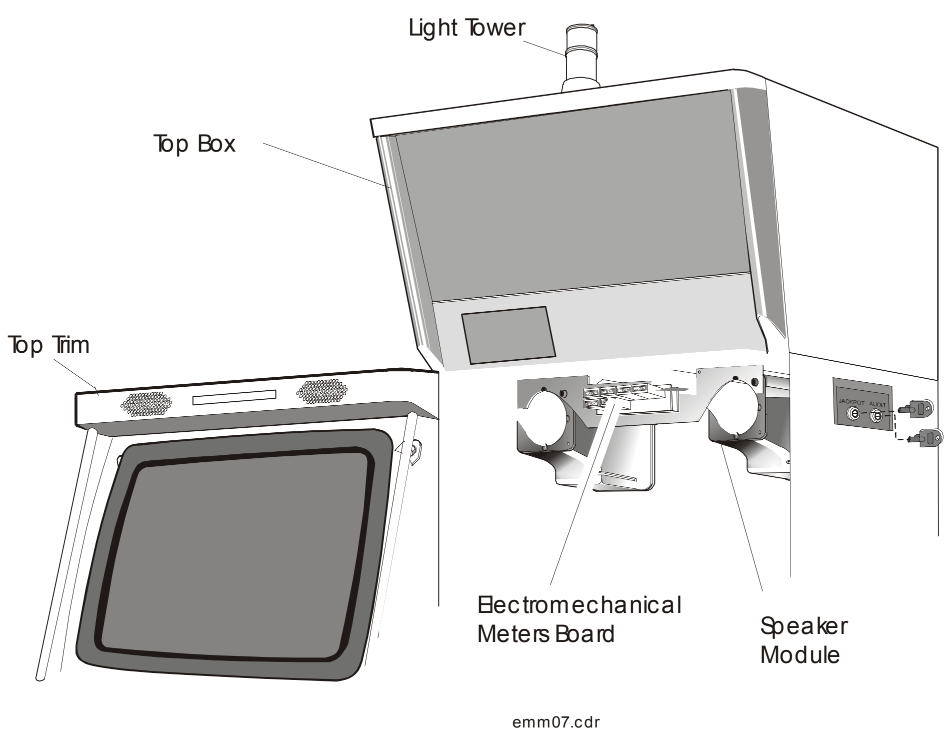

Figure 14-1 Electromechanical Meters Board - Location

14.1.1 Circuit Diagrams and Component Locations

A component layout of the Mechanical Meters Board is shown in Figure 14-2 below. For further information and for reference, the following additional information on the Mechanical Meters Board is provided in Volume II:

- **Circuit Diagrams.** Structured circuit diagrams.
- **I/O to Components and ICs.** A list of the I/O paths to each component.

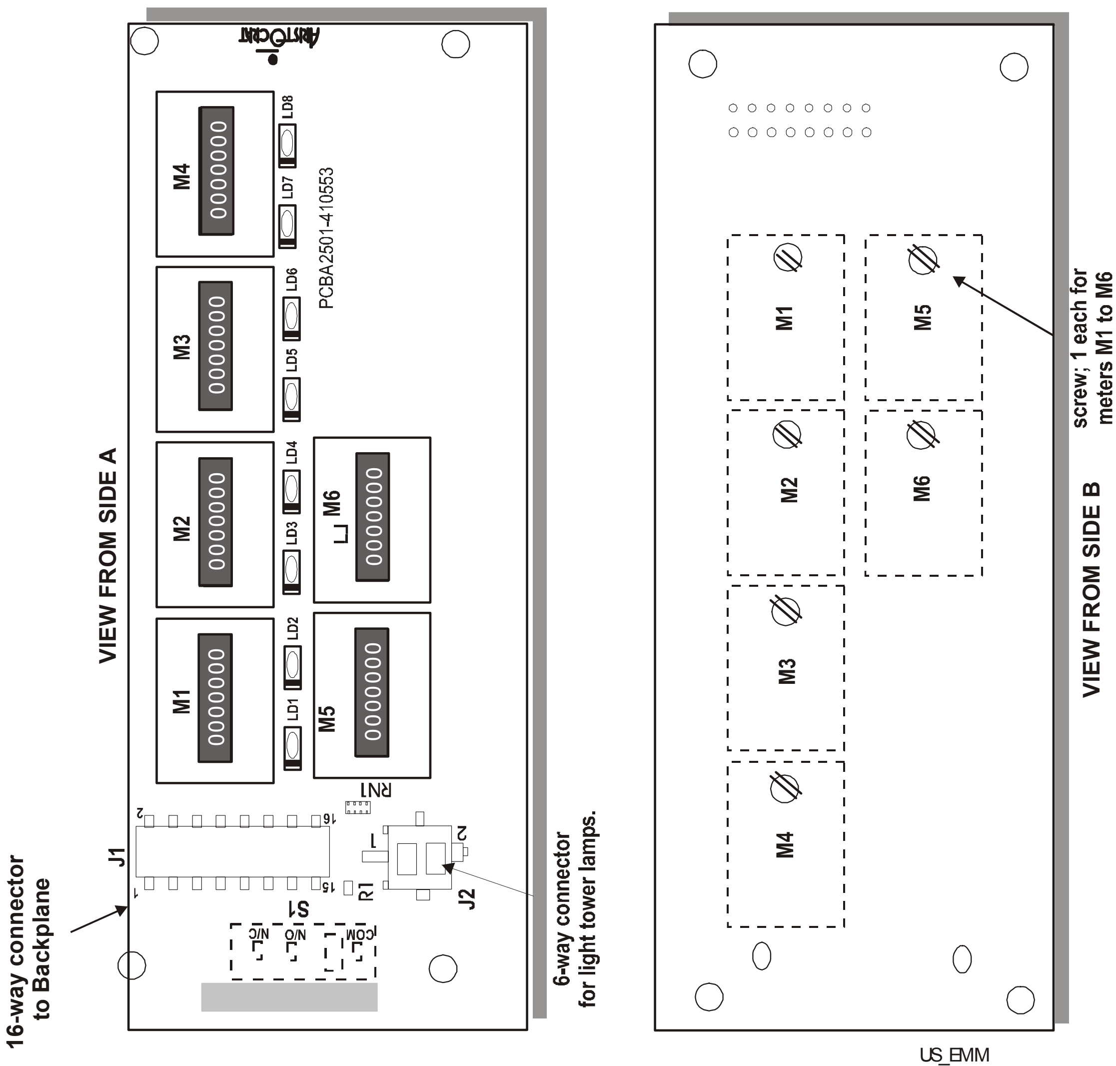

Figure 14-2 Electromechanical Meters Board - Component Layout

14.2 Functional Description

The function of the Mechanical Meters Board is to (refer to Figure 14-3):

- provide physical location for up to six electromechanical meters
- provide an interface to the light tower lamps.

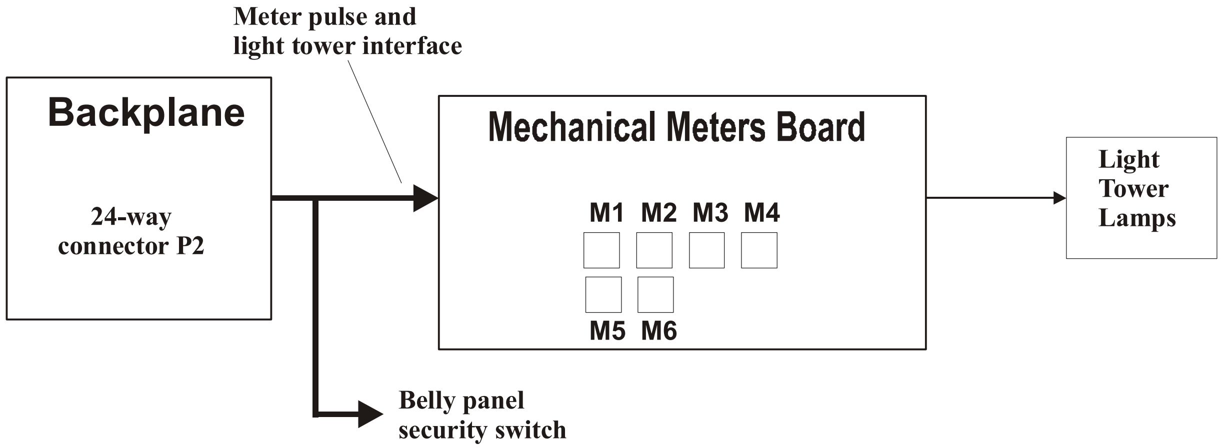

Figure 14-3 Electromechanical Meters Board - Block Diagram

Meters Interface:
The I/O Driver Board sends drive signals, via the Backplane, to the Mechanical Meters Board to increment the appropriate meter.

Overcurrent Protection:
An 'intelligent' power driver is used for switching power on and off through the meter drive outputs. The power switch used incorporates built-in overcurrent sensing and protection.

Light Tower Interface:
When a light tower is used, it is interfaced with the machine via a connector on the Mechanical Meters Board. Lamp driver outputs from the I/O Driver Board are directed by the Meters Board to the appropriate light tower lamp.

Meter Detection:
The interface allows the I/O Driver Board logic to detect if the correct number of mechanical meters is actually connected.

14.3 Connector Pin Assignments

14.3.1 Connection from Backplane Board

The Mechanical Meters Board connects to the 24-way Minifit Junior connector P2 on the Backplane.

Note
The shaded signals (SEC_NC, SEC_NO, and SEC_COM) provide for the belly panel door battery-backed security switch.

Table 14-2 Mechanical Meters Board Connections to Backplane

Pin	Signal	Function	Comment
1,2,3,4, 13,14	MET24V	+24 V DC (input to meters board)	24 V DC supply for meters
5	HM1	Signal to control hard meter no.1 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
6	HM2	Signal to control hard meter no.2 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
7	HM3	Signal to control hard meter no.3 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
8	HM4	Signal to control hard meter no.4 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
9	HM5	Signal to control hard meter no.5 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
10	HM6	Signal to control hard meter no.6 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
11	VCC	+5 V DC (input to meters board)	not used on meters board
12,24	GND	Ground	Ground reference
15,16	LTL24V	+24 V DC (input to meters board)	24 V DC supply for light tower
17	SEC_NC	Security switch - normally closed contact	Belly panel door battery-backed security
18	SEC_NO	Security switch - normally open contact	Belly panel door battery-backed security
19	SEC_COM	Security switch - common contact	Belly panel door battery-backed security
20	LTL1	Signal to control light tower lamp no.1 (input to meters board)	Signal for direct connection to the light tower (pull-down)
21	LTL2	Signal to control light tower lamp no.2 (input to meters board)	Signal for direct connection to the light tower (pull-down)
22	LTL3	Signal to control light tower lamp no.3 (input to meters board)	Signal for direct connection to the light tower (pull-down)
23	LTL4	Signal to control light tower lamp no.4 (input to meters board)	Signal for direct connection to the light tower (pull-down)

14.3.2 Connection to Light Tower Lamps

A 6-way cable header connector provides the interface to the light tower lamps. The connector is a Minifit Junior type.

Table 14-3 Mechanical Meters Board Connections to Light Tower Lamps

Pin	Signal	Function	Comment
1,6	LTL24V	+24Vdc (output to tower lamps)	24V dc supply for tower lamps
2	LTL1	Signal to control light tower lamp no.1 (output from meters board)	Signal for direct connection to the top lamp (pull-down)
3	LTL2	Signal to control light tower lamp no.2 (output from meters board)	Signal for direct connection to the 2nd lamp (pull-down)
4	LTL3	Signal to control light tower lamp no.3 (output from meters board)	Signal for direct connection to the 3rd lamp (pull-down)
5	LTL4	Signal to control light tower lamp no.4 (output from meters board)	Signal for direct connection to the 4th lamp (pull-down)

14.4 Removal and Replacement Procedures

CAUTION
When handling electrostatic sensitive devices (ESDs) such as PCBAs, take care to avoid physical contact with components. PCBAs should be handled by their edges. ESDs should not be placed on metal surfaces. When handling PCBAs, take care to avoid flexing the PCBA, as this may lead to permanent damage.

To remove the Mechanical Meters Board:

1. Open the cabinet door, and switch OFF the machine.
2. Remove the monitor to gain access to the meters.
3. Remove the meters assembly from the speaker module by removing one screw and sliding the assembly sideways.
4. Remove the meters board assembly from the housing.
5. Disconnect the looms from the meters board, and remove the board.

Replacement is a reversal of the removal procedure.

14.5 General Maintenance

For general maintenance of the Mechanical Meters Board:

- Remove any dust or dirt from external surfaces.
- Check that all connectors are in good condition and are secure.

Notes

Chapter 15

Audio Amplifier and Power Supply

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15.1 Functional Description

The Audio Amplifier Module 410539 amplifies the signal from the speaker output of the main board. The amplifier module has two channels to allow for stereo sound.

An active crossover splits each audio signal into a high frequency and a low frequency and the signal is then fed to the power amplifiers. The active crossover allows easy balance of the acoustic output of the speakers as they have different sensitivity.

A signal detector circuit mutes the amplifier when not in use to minimize the power consumption.

A digital potentiometer controls the volume. This can be controlled by a panel-mounted toggle switch.

The audio amplifier is powered from the 24V rail of the EGM.

A power supply generates the correct voltage required for the amplifier.

15.2 Block Diagram of Amplifier Module

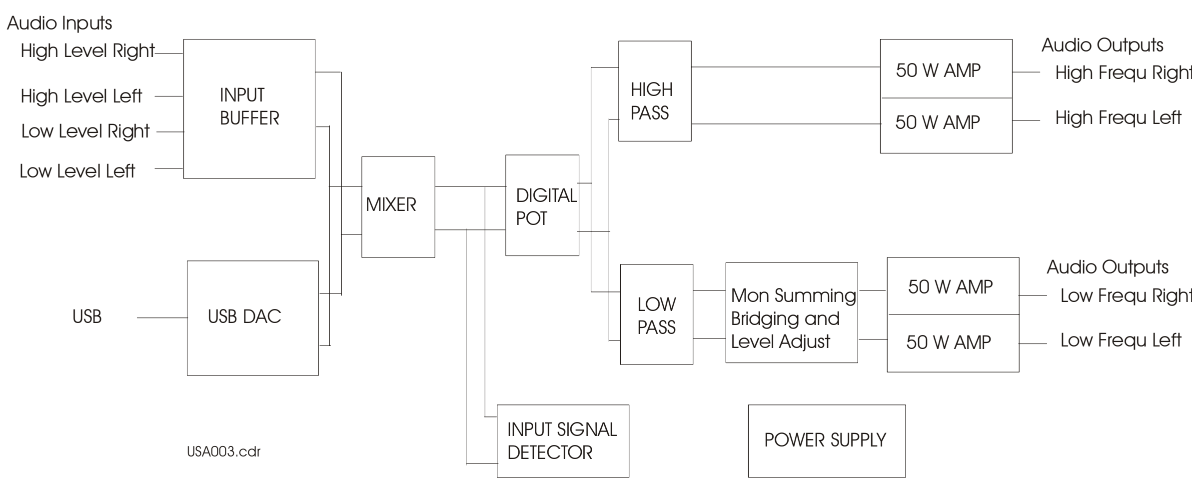

Figure 15-1 Block Diagram of Amplifier Module

15.3 Audio SPL Requirement of EGM

The audio SPL requirement of the EGM is for a sound pressure level of 105dB at 0.5m from the front of the EGM measured from the top of the monitor. The frequency response is from 50 Hz to 10kHz ± 6dB.

15.4 Amplifier Power Required

There are two high frequency speakers and one low frequency speaker.

Requirement is to achieve 105dB at a distance of 0.5m from the front of the machine. The high frequency speaker has a sensitivity of 82dB/W at 1m. In other words, with 1 watt at 1 metre the SPL is 82dB. At a distance of 0.5m the output is 85db. With two speakers, an additional 3dB is obtained, achieving 88 dB. A power increase from one watt to 50 watts achieves the additional 17 dB required.

15.5Interface Requirements

15.5.1 Power Interface

This is the power input, nominally 24V DC ± 10%. All the pins are used as there is a high current through the pins.

Table 15-1 Pin Connections for Power Connector

Pin Number	Signal Name	Signal Description
1	24V	Power in
2	24V	Power in
3	0V	Ground
4	0V	Ground

Table 15-2 Power Requirements

Signal Name	Description
Voltage	24V ± 10%
Current	< 1A cont. 8.0 A peak
Power Consumption	< 200 W

15.5.2 Spare Power Interface

This spare power input allows the 24V to be used by another peripheral. All the pins are used as there is a high current through the pins.

Table 15-3 Pin Out For Spare Power Connector

Pin Number	Signal Name	Signal Description
1	24V	Power in
2	24V	Power in
3	0V	Ground
4	0V	Ground

Table 15-4 Spare Power Specification

Signal Name	Description
Voltage	24V ± 10%
Current	< 1A cont. 8.0 A peak
Power Consumption	< 200 W

15.5.3 Optional AC Power Interface

This is the optional AC power input, which allows the use of a mains isolating transformer with an output of 25 – 0 – 25. All the pins are used as there is a high peak current through the pins.

Table 15-5 Pin Out For Optional AC Power Connector

Pin No.	Signal Name	Signal Description
1	24VAC1	AC1 in
2	24VAC1	AC1 in
3	0V	Ground
4	0V	Ground
5	24VAC2	AC2 in
6	24VAC2	AC2 in

Table 15-6 Optional AC Power Specification

Signal Name	Description
Voltage	25 – 0 – 25 VAC rms
Current	4A rms
Power Consumption	< 300 W

15.5.4 Stereo Audio Input Interface

This stereo audio input has both low level inputs and high level inputs.

Table 15-7 Pin Out For Stereo Audio Input Connector

Pin Number	Signal Name	Signal Description
1	AIN_L	Audio Input Left
2	AIN_L_GND	Audio Input Left Ground
3	0V	Ground
4	AIN_L_Mk5	Audio Input Left Mk5
5	AIN_L_Mk6	Audio Input Left Mk6
6	AIN_R	Audio Input Right
7	AIN_R_GND	Audio Input Right Ground
8	0V	Ground
9	AIN_R_Mk5	Audio Input Right Mk5
10	AIN_R_Mk6	Audio Input Right Mk6

Table 15-8 Stereo Audio Input Specification

Signal Name	Description
Low Level Input Voltage	750mV rms (2.1 Vp-p)
Low Level Input Impedance	10kΩ
Mk5 Input Voltage	8.0V rms (22.6 Vp-p)
Mk5 Input Impedance	100Ω
Mk6 Input Voltage	4.9V rms (13.8 Vp-p)
Mk6 Input Impedance	100Ω

15.5.5 Audio Level Adjustment Input Interface

This audio level adjustment input interface is a digital input that allows for remote adjustment of the volume. This allows for the use of two remote buttons or a three-position toggle switch.

Table 15-9 Pin Out For Audio Level Adjust Input Connector

Pin Number	Signal Name	Signal Description
1	UC	Up Contact Input
2	0V	Ground
3	DC	Down Contact Input
4	0V	Ground
5	D	Digital Input
6	0V	Ground

Table 15-10 Audio Level Adjust Input Specification

Signal Name	Description
Voltage	5V
Input impedance	100kΩ pull up

15.5.6 Audio High Frequency Left and Right Output Interfaces

This is the audio high frequency left and right output. There are two separate connectors, one for left and one for the right channel.

Table 15-11 Pin Out For Audio High Frequency Left Output Connector

Pin Number	Signal Name	Signal Description
1	AOUT_HF_L	Audio Output High Frequency Left
2	0V	Ground

Table 15-12 Pin Out For Audio High Frequency Right Output Connector

Pin Number	Signal Name	Signal Description
1	AOUT_HF_R	Audio Output High Frequency Right
2	0V	Ground

Table 15-13 Audio High Frequency Speaker Output Specification

Signal Name	Description
Speaker Impedance	4Ω to 8Ω
Frequency Response of speaker	200 Hz to 10 kHz ± 6dB.
Speaker Power handling	68W rms into 4Ω 48W rms into 6Ω 36W rms into 8Ω

15.5.7 Audio Low Frequency Left and Right and Bridge Mono Output Interface

This is the audio low frequency left and right output.

Table 15-14 Pin Out For Audio Low Frequency Speaker Connector

Pin #	Signal Name	Signal Description
1	AOUT_LF_L/BRIDGE_P	Audio Output Low Frequency Left /Bridge Output Plus
2	AOUT_LF_L/BRIDGE_P	Audio Output Low Frequency Left /Bridge Output Plus
3	AOUT_LF_L/BRIDGE_P	Audio Output Low Frequency Left /Bridge Output Plus
4	0V	Ground
5	AOUT_LF_R/BRDGE_M	Audio Output Low Frequency Right /Bridge Output Minus
6	AOUT_LF_R/BRDGE_M	Audio Output Low Frequency Right /Bridge Output Minus
7	AOUT_LF_R/BRDGE_M	Audio Output Low Frequency Right /Bridge Output Minus
8	0V	Ground

Table 15-15 Audio Low Frequency Speaker Output Specification

Signal Name	Description
Speaker Impedance	8Ω
Frequency Response of speaker	50Hz to 200Hz ± 6dB.
Speaker Power handling	68W rms into 4Ω 48W rms into 6Ω 36W rms into 8Ω 136W rms in bridge mode into 8Ω

15.6 Other Specifications

15.6.1 Physical

The PCB is a size of 8-7/8-inch (200mm) by 8-7/8-inch (200mm).

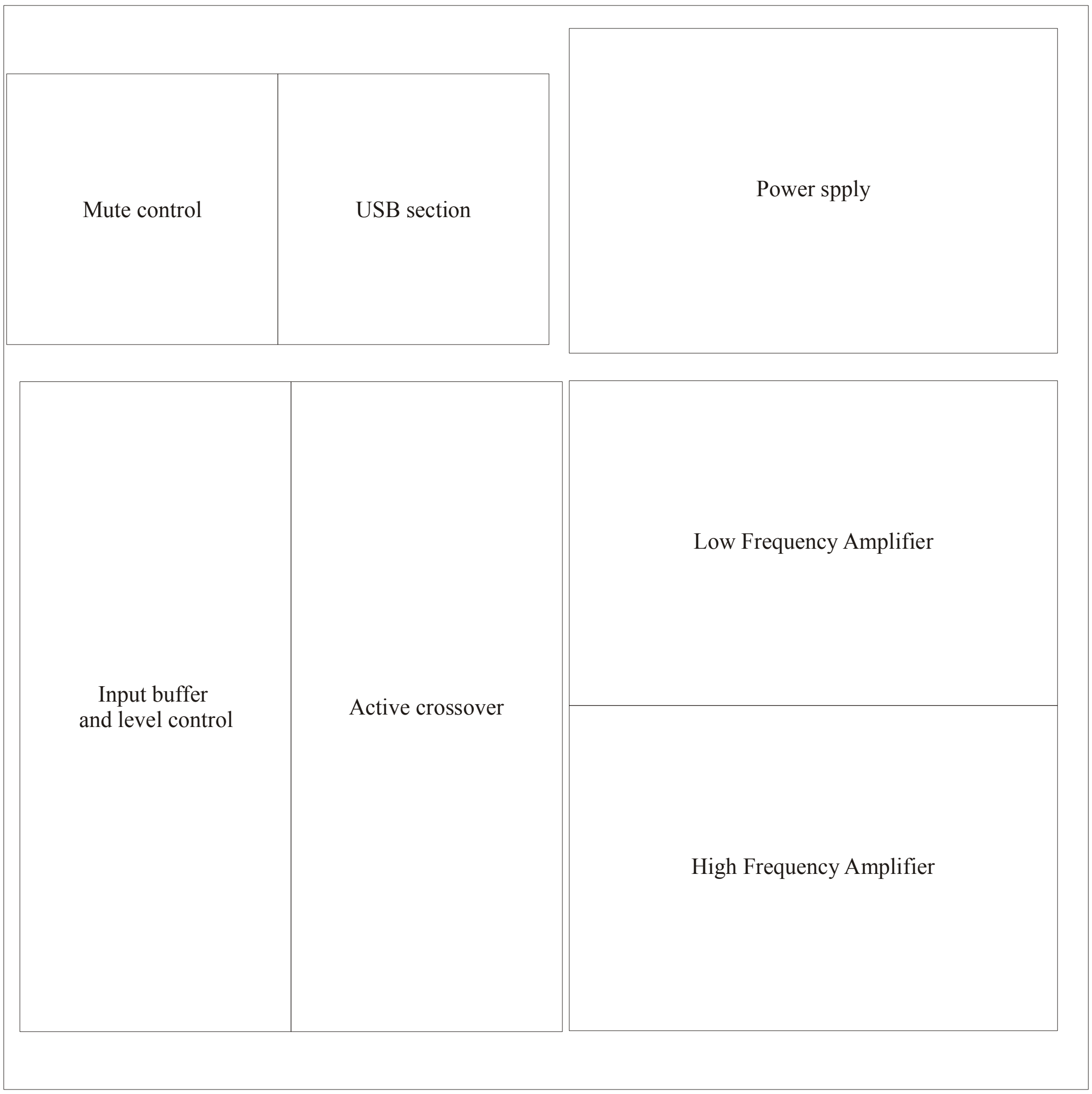

Figure 15-2 Board Layout

15.6.2 Mounting Arrangements

The PCB is mounted on a piece of aluminium chassis that acts as a heatsink for the amplifiers.

Figure 15-3 Mounting of the PCB and Amplifier Chips to the Chassis

15.7 Removal and Replacement

There are no serviceable components in the Audio Amplifier module:

To remove the Audio Amplifier module:

1. Remove the monitor to allow access to the module.
2. Remove the two screws that secure the front of the speaker assembly-mounting bracket to the cabinet top shelf.
3. Slide the complete speaker/meters module forward until the hooks at the front and rear disengage.
4. Disconnect the connecting cables and remove the module from the machine.

Replacement is a reversal of the removal procedure.

Notes

Chapter 16

Machine Fault Finding

Table 16-1 Fault Finding

Fault	Probable Cause	Action
Equipment connected to auxiliary power socket & has no power.	Auxiliary power socket fuse is blown.	Replace auxiliary power socket fuse.
Machine has no power.	A. Mains socket supplying the machine is not live.	1. Check that the mains socket is live. 2. If the mains socket is dead, check that the circuit breaker at the distribution board is on.
	B. Main board not showing 4 lit red LEDs (ie, sequential display).	3. Turn off mains power for 5 seconds, then turn power on. 4. Check main board seating and links. If condition continues, replace the Main Board.
No power-up cycle.	A. Coin jam in the Coin Chute Assembly.	1. Clear coin jam from the Coin Chute Assembly.
	B. Faulty hopper photo-optic detector.	2. Check that the hopper photo-optic detector is not damaged or disconnected. If the detector is damaged, replace the detector.
	C. Cable fault.	3. Check that the looms are correctly seated and have continuity.
	E. Faulty Backplane.	4. If the looms are OK, replace the Backplane.
	F. Faulty Main Board.	5. If there is still no power, replace the Main Board.

Table 16-1 Fault Finding (continued)

Fault	Probable Cause	Action
Fluorescent lamps, animation lamp, and pushbutton lamps not lit.	A. Faulty lamp or fluorescent driver.	1. If only one lamp is faulty, replace the fluorescent tube or driver, the animation lamp, or the pushbutton lamp or microswitch.
	B. Faulty power supply assembly.	2. Check that the power supply assembly is operating correctly. If not, replace the power supply assembly.
	C. Faulty loom between: • the fluorescent lamps and the power supply assembly.	3. Check cables and looms and ensure lamps are correctly seated.
	D. Faulty connection or loom between: • the animation lamps / pushbutton lamps and Backplane. • the power supply assembly and the Backplane. • the Backplane and the Main Board. • the Backplane and the Driver Board.	4. Check cables, looms, boards and lamps are correctly seated and have continuity.
	E. Faulty Main Board.	5. If there are still no lamps lit, replace the Main Board.
Video monitor blank.	A. Faulty power supply assembly.	1. Check that mains power is available at the power supply. See Power Supply Assembly.
	B. Faulty video monitor.	2. Check that the mains power supply is available at the monitor. If available, replace the monitor.
	C. Faulty loom between the monitor and the power supply or between the Main Board and the monitor.	3. Check that the looms are correctly seated and have continuity.
	D. Faulty Main Board.	4. If the condition persists, replace the Main Board.

Table 16-1 Fault Finding (continued)

Fault	Probable Cause	Action
Video monitor colour or picture incorrect.	A. Monitor settings incorrect.	1. Carry out Basic Colours Test from the Video Monitor Test Menu in Operator Mode. Work through the procedure for adjusting and testing the video monitor as detailed in the chapter Video Monitor.
	B. Faulty monitor.	2. If the condition persists, replace the monitor.
YOYO message while machine not being played.	A. Coin jammed in the coin comparator sensor assembly.	1. Remove jammed coin.
	B. Faulty coin comparator.	2. Replace the coin comparator.
	C. Fault in the loom between the coin comparator and the Backplane.	3. Check that the loom is correctly seated and has continuity.
Sound too loud or too soft.	A. Volume control requires adjustment.	1. Adjust the volume using Sound System Setup in the Operator Setup / Selections Menu. 2. If the condition persists, replace the Backplane. 3. If the condition still persists, replace the Main Board.

Table 16-1 Fault Finding (continued)

Fault	Probable Cause	Action
No sound.	A. Volume control requires adjustment.	1. Adjust the volume using Sound System Setup in the Operator Setup / Selections Menu.
	B. Speaker open circuit.	2. Remove the connectors from the speaker terminals and check that there is 6 to 8 Ω across the speaker terminals. If not, replace the speaker. Reconnect the speaker terminals.
	C. Faulty loom between the Backplane and the speaker.	3. If there is no power at the speaker, check that the looms are correctly seated and are physically sound.
	D. Faulty Backplane	4. If the looms are OK, replace the Backplane.
	E. Faulty Main Board.	5. If the condition persists, replace the Main Board.
Hopper does not rotate.	A. Faulty loom between hopper and Backplane.	1. Check that the loom is correctly seated and has continuity.
	B. Faulty hopper motor.	2. If motor is not operating, replace the hopper.
Hopper motor running slowly.	A. Hopper disc is binding.	1. Remove hopper, dismantle it and remove foreign matter.
	B. Motor spindle bent.	2. Replace the hopper.
	C. Faulty hopper motor controller.	3. Replace the hopper motor controller.
COIN ACCEPTOR FAULT, COIN OPTIC FAULT message.	A. Faulty loom between: • the coin comparator and Backplane • the comparator PCBA and the sensor assembly.	1. Check that the looms are correctly seated and have continuity.
	B. Sample coin not correct or not in correct position in sensor assembly.	2. Check that the sample coin is correct and is located in the correct position.
	C. Coins jammed in coin comparator sensor assembly.	3. Remove coin jam.

Table 16-1 Fault Finding (continued)

Fault	Probable Cause	Action
Coins jamming in the diverter window.	Coin diverter jamming.	Adjust the position of the diverter.
Coins continually rejected.	A. Sample coin not in the correct location in the sensor assembly.	1. Check that the sample coin is located firmly between the scanner unit and the fork of the rail insert.
	B. Faulty comparator.	2. Replace the comparator.
ILLEGAL COIN OUT message on power-up.	A. Dirty hopper photo-optic detector/emitter.	1. Clean the hopper photo-optic detector/emitter.
	B. Faulty hopper.	2. Run a hopper test (see Machine Modes) to check that the hopper motor stops when the correct number of coins have been ejected.
All coins are going to the cash box and the hopper is empty.	A. Hopper probe shorted to ground.	1. Clear the short.
	B. Faulty coin diverter solenoid on the coin chute assembly.	2. Run a coin chuting test (see Machine Modes) to check that the solenoid has power.
	C. Coin diverter jamming.	3. Adjust the position of the coin diverter.
Reject coins not falling into the coin tray.	Coins jammed in the reject chute.	Carefully clear the reject chute.
Coins accepted by the comparator but not registered on the coin counter and the machine locks out.	A. Faulty loom between the coin comparator and the Backplane.	1. Check that the loom is correctly seated and has continuity.
	B. Faulty coin comparator.	2. Replace the comparator.
3 WAY METERING ERROR message.	Corrupt data. Inconsistent data across all three electronic audit meter sets.	Perform a memory reset (see Machine Modes).

Notes

Chapter 17

Ticket Printer

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List of Tables:

17.1 Technical Description

Note
The information provided in this chapter is a general overview of the Westrex serial printer. Full servicing details can be obtained from the Westrex Service Manual.

17.1.1 Physical Description

The printer module is located at the bottom of the cabinet, in place of the hopper. It is positioned by a guide plate on the floor of the cabinet and is secured by two screws. The printer interfaces with the machine logic via a 20-way loom that connects to P7 on the Backplane. This connector is alternatively used for the hopper signals. Machines may be fitted with either a hopper or a printer, not both. Figure 17-1 shows the location of the printer module.

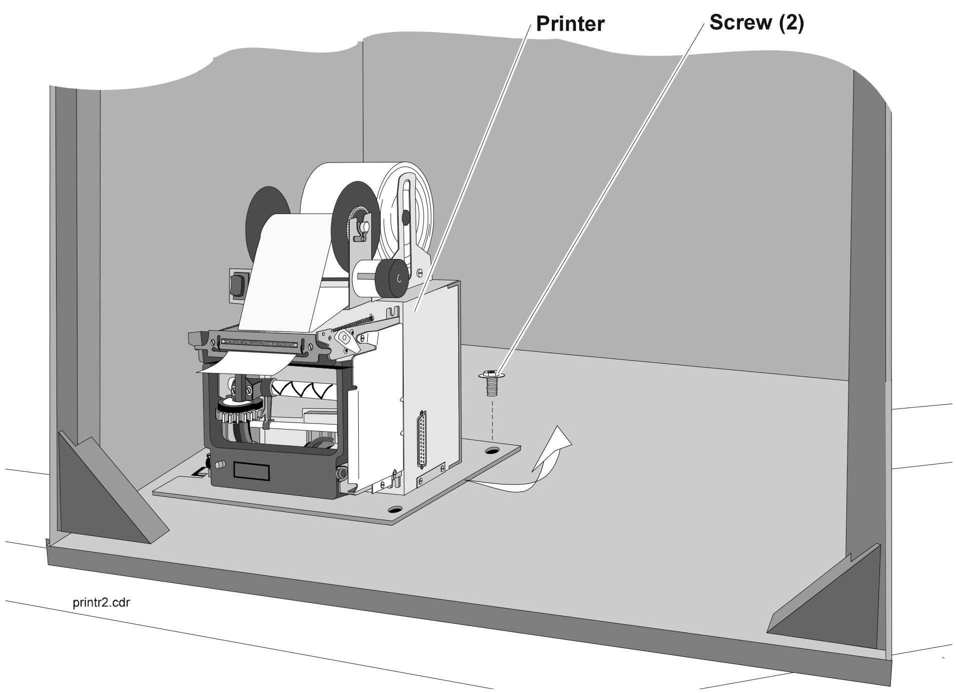

Figure 17-1 Location of Printer

The major components of the printer module are as follows (refer to Fig 17-2):

- Chassis assembly,
- Electronic controller PCB,
- Take-up unit,
- Westrex 4800 serial printer with:
  - Electric motor, gear train and encoder gear,
  - Print head and drive shaft,
  - Paper and ribbon feed mechanisms,
  - Bail.

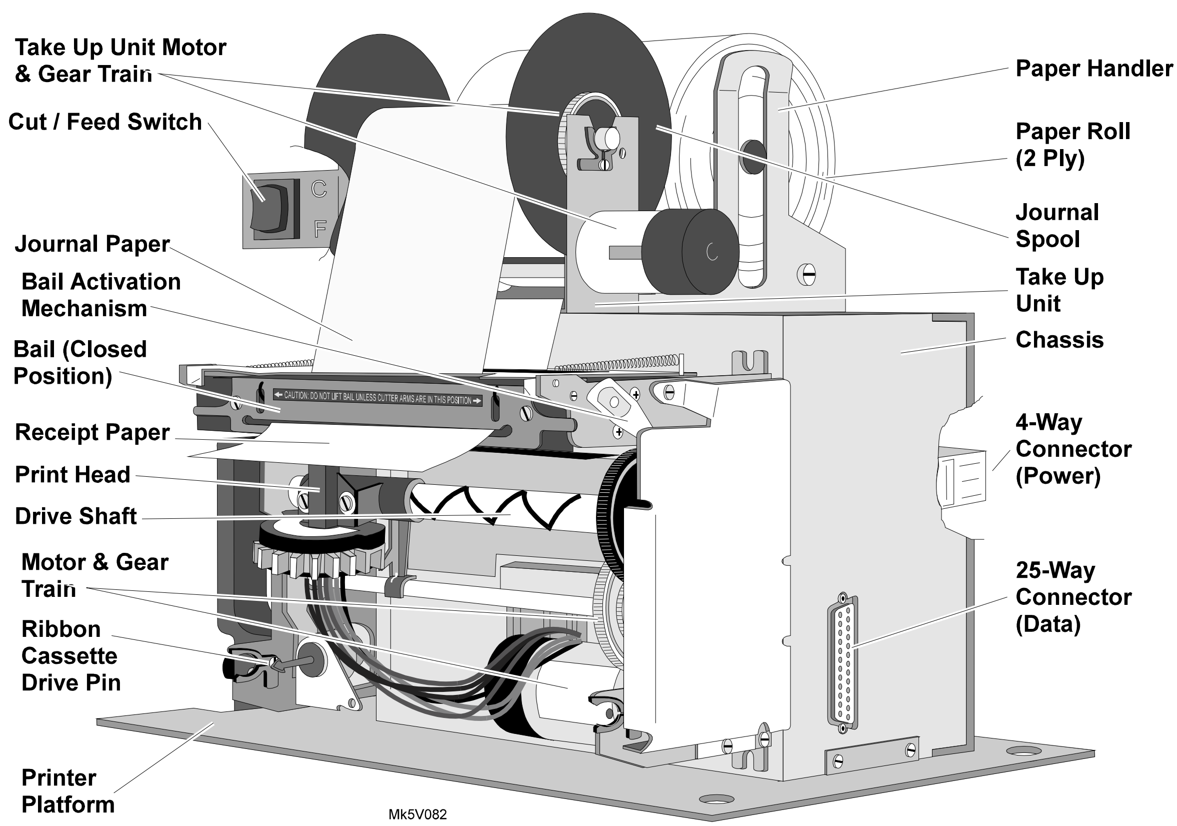

Figure 17-2 Westrex Printer - Physical Description

Table 17-1 Printer Specifications

Parameter	Value
Print method	Impact, 9-pin dot matrix.
Print speed	Up to 185 characters per second (CPS).
Paper feed	Friction rollers.
Paper	Width: 83mm (3.25"); Diameter: 100mm (4"), 2-ply, Aristocrat Part No. 6213-563356
Inking	Replaceable ribbon cassette.
Ribbon cassette	Aristocrat Part No.. 6213-563357 (Black)..
Power requirements	24V DC ± 5%, 1.5 A (3.0 A peak).
Input interface	RS232C serial interface, variable baud rate, default is 2400 baud.

Printer:

The dot matrix print head is used with the following print formats:

Table 17-2 Print Formats

Parameter	Value
Font matrix	4 x 9 or 5 x 9 normal; 8 x 9 or 10 x 9 elongated.
Columns	60 (19.5 characters per inch) or 66 (21.5 characters per inch).
Printer area width	78mm (3.07") on the 83mm (3.25") wide paper.

CAUTION

The printer is controlled from the machine software. The variable printer formats can be changed via the printer EEPROM parameters. However, attempting to change any of the standard parameters may cause a malfunction.

Electronic Controller PCB:

The electronic controller PCB is mounted within the printer chassis. It communicates with the Main Board logic of the machine via the RS-232 interface configured on COM3. This communications channel has six input/output signals including data I/O. Refer to the chapter Communications Configuration Board for further details.

Paper Roll:

The paper is two-ply self carbonating, the inner ply goes to the journal spool (copy - yellow colour). The outer ply is cut and deposited to the coin tray after printing (original - white colour).

When the paper is running low, the machine will display a **Printer Paper Low** message until the paper is renewed.

Figure 17-3 shows the paper path through the feed rollers. The two plies of paper must follow their correct paths to ensure correct operation and that the journal copy is not cut off with the original and deposited into the coin tray.

Ribbon Cassette:
The average life expectancy of a ribbon cassette is 1.5 million characters. The ribbon cassette should be replaced when the printouts become unclear. The printer will not function if a ribbon cassette is not installed.

CAUTION
Never add ink to a used cassette, always replace it with a new one.

Take-up Unit:
The take-up unit is mounted on top of the chassis. It provides a motor driven shaft for the journal paper to spool onto, as well as a shaft for mounting the two-ply paper roll.

17.1.2 Functional Description

Depending on the machine software configuration, the printer can provide the following:

- A ticket showing the customer's winnings (which would usually be redeemable from the cashier).
- A printout of audit information.
- A printout of machine security events such as:
  - Main door opening,
  - Logic cage door opening,
  - Cash box door opening,
  - Mechanical meter accesses
  - Resetting of the electronic meters - both before and after the reset.

The printer module receives data, control signals, and 24 V DC power from the machine via the 20-way Minifit Junior connector P7 on the Backplane.

Movement of the print head (left to right and right to left) is provided by a mechanical drive shaft on which the print head is mounted. The drive shaft is driven by the electric motor and gear train. The drive motor mechanism includes an encoder gear and sensor which derives timing pulses from the motor. The electronic controller PCB uses the timing pulses to determine the exact position of the print head along the drive shaft.

The printing process is achieved by the print head needles striking the inked ribbon and leaving corresponding dots on the paper. Printed characters are formed by combinations of print head needles, the activation of the needles is controlled by the printer electronics.

Each complete movement (left to right or right to left) of the print head constitutes a print cycle (a printed line). To complete a print cycle the drive shaft rotates four times and the encoder gear rotates 24 times (geared 6:1 reduction ratio between motor and drive shaft). Thus, each print cycle contains a fixed number of encoder pulses, a print head needle can be energised on every other encoder pulse. A print cycle includes the actual printing time and the time needed to change the direction of the print head movement.

Paper is friction fed from one printed line to the next by the feed roller. The feed roller is controlled by a pawl and solenoid mechanism which activates the feed roller once for each revolution of the drive shaft by a cam on the drive shaft.

Ribbon advancement is controlled by the ribbon feed assembly which is driven off the same cam as the line feed mechanism.

The bail cuts off the receipt from the paper roll. It is activated by reversing the motor drive direction and energising a solenoid (cutter lockout solenoid). A lever arrangement driven by a drive shaft cam operates the blade mechanism to cut the paper. When the motor drive direction is reversed again, the blade mechanism is retracted and normal printing operations can resume.

Note
The paper cutting mechanism is designed to cut single ply paper only.

The take up unit consists of a separate chassis which is secured to the printer chassis. The take up unit has a paper handler for mounting the journal ply of the paper roll and provides an electric motor, shaft, gear train and clutch assembly for the journal paper, the Cut/Feed switch is also mounted to the take up unit. The motor runs faster than actually required to spool the journal, the clutch providing slippage to keep the tension of the journal spool constant regardless of the diameter of the spool. The motor is driven by the electronic controller PCB.

The following diagram provides examples of cash, audit meter and test printouts. The information printed on the tickets may vary somewhat between machines due to customer and gaming authority requirements.

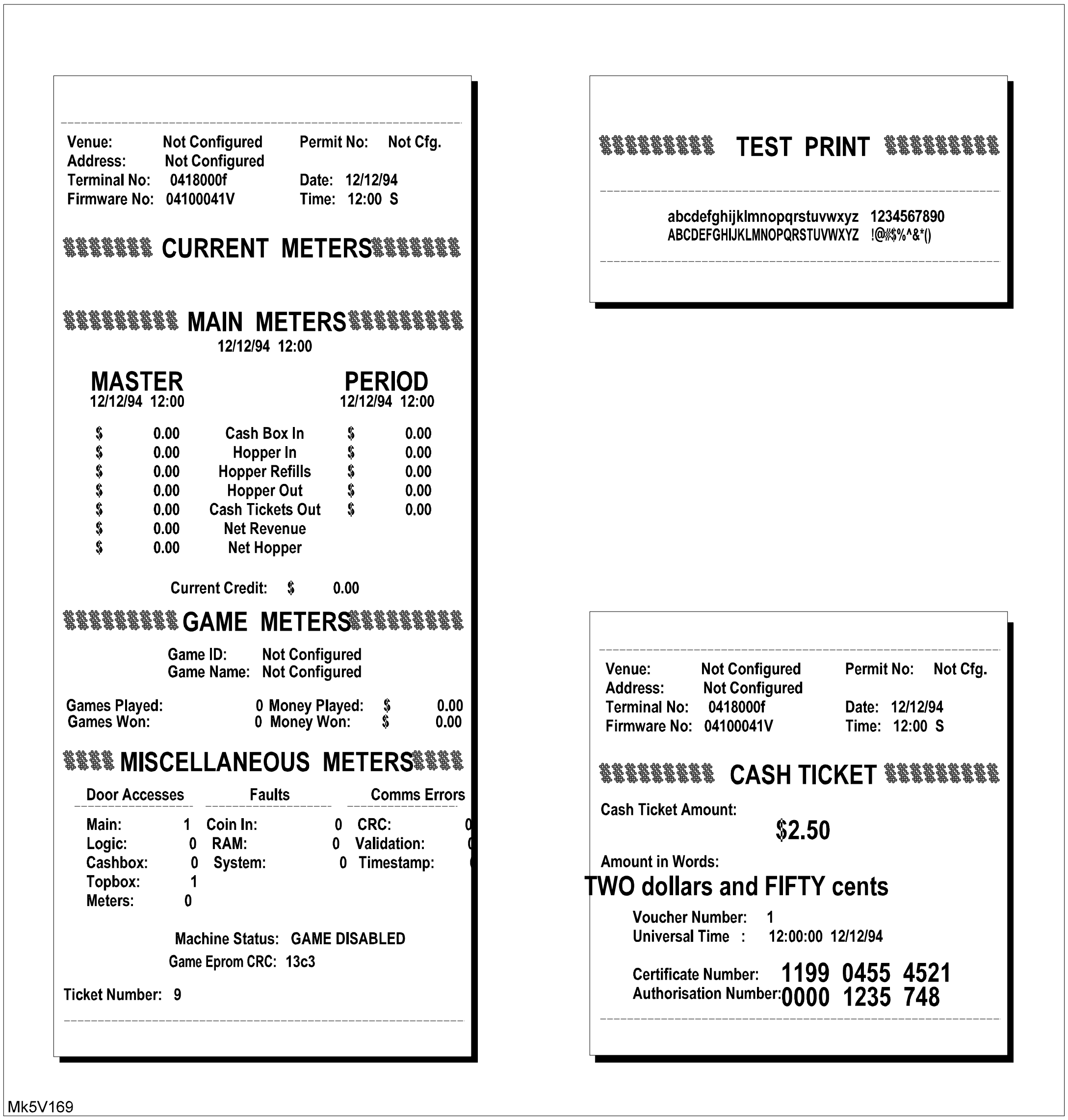

Figure 17-3 Printed Ticket Examples

17.2 Removal and Replacement Procedures

To remove the printer from the machine (refer to Fig 17-1):

1. Open the cabinet door, and switch OFF the machine.
2. Disconnect the loom connector from the printer.
3. Remove the two screws securing the printer module to the cabinet base.
4. Slide the printer to the right until the location tabs are disengaged from the machine base and lift the printer from the machine.

Replacement is a reversal of the removal procedure.

Note
It is advisable to run a printer test or a complete machine test after replacement.

17.2.1 Paper Roll Replacement

It is not necessary to remove the printer from the machine to replace the paper roll.

To remove the paper roll (refer to Fig 17-4):

1. Open the cabinet door, and switch OFF the machine.
2. Tear through both plies of paper at the tear point.
3. Remove the journal spool by lifting it off the take-up unit. Remove the paper from the journal spool and replace the spool into the take up unit, it should *snap* into place.
4. Remove the old paper roll, retaining the roller pin for the new paper roll.

CAUTION
Take care not to damage the Paper Low micro-switch when handling the paper roll.

To replace the paper roll:

1. Insert the roller pin through the center of the new paper roll.
2. Place the paper roll into the paper handler. Make sure the paper can unroll.
3. Direct the 2-ply paper down into the guide slot until the paper stops against the feed mechanism. It may be easier to remove the journal spool while guiding the paper into the guide slot.
4. The paper can now be advanced automatically through the printer.
5. Turn the machine power ON. After a few seconds, press the Feed switch (shown in Fig 17-2) until about 150 mm (6") of paper is extended beyond the

bail. You may need to help feed the paper into the feed mechanism (through the guide slot) until it is picked up by the feed mechanism.

6. Lift the bail and pull both plies out of the bail slot.
7. Separate the two plies and guide the journal paper back through the bail slot, then up and through the journal slot.
8. Split the journal spool, wrap the paper over the spool ①**,** then clip the other end of the journal spool over the paper and spool to secure it ②. Advance the journal spool by hand until the journal paper is taut.
9. Guide the receipt paper back through the bail slot and close the bail. Press the Cut switch (shown in Fig 17-2) to verify.
10. The paper is now loaded.

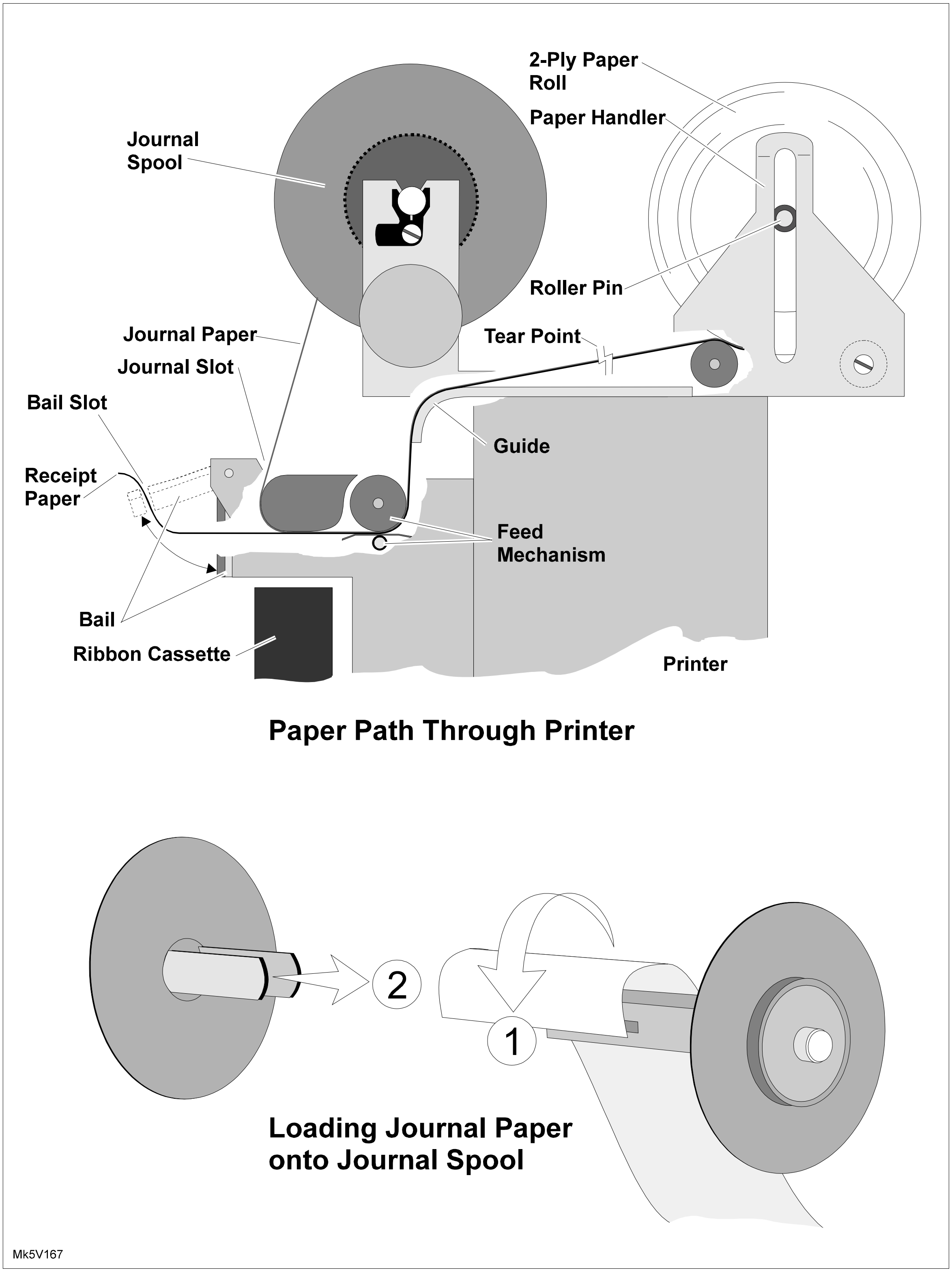

Figure 17-4 Replacing the Paper Roll

17.2.2 Ribbon Cassette Replacement

Note
Use only the specified ribbon cassettes to ensure print quality and ribbon life.

To replace the ribbon cassette (refer to Fig 17-5):

1. Open the cabinet door, and switch OFF the machine.
2. Lift the bail, and remove the used cassette by pulling it from the chassis and off the drive pin.
3. Before inserting the new cassette, turn the knob anti-clockwise until the ribbon is taut.
4. Open the bail; mount the cassette onto the drive pin whilst keeping the ribbon between the platen and the print head. When the cassette is properly mounted it will *snap* onto the chassis.
5. Make sure the ribbon is threaded through the guide slot and is taut.
6. Lower the bail. The ribbon cassette is now loaded.

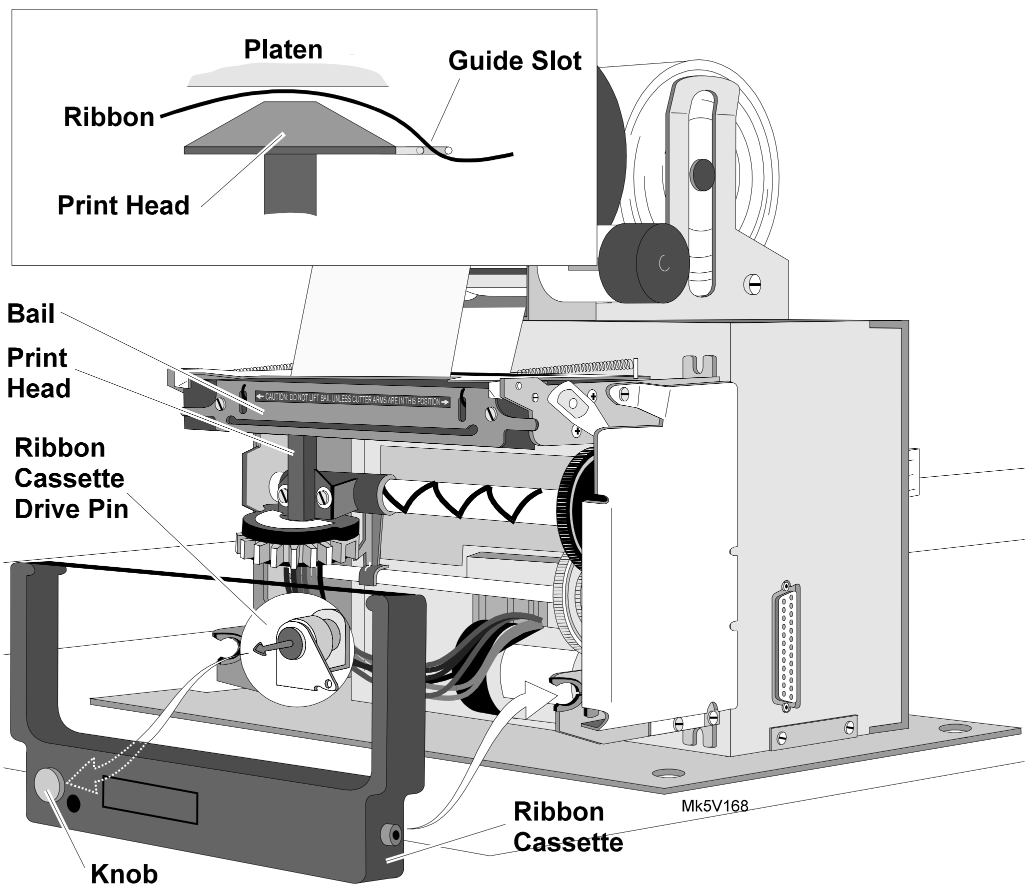

Figure 17-5 Replacing the Ribbon Cassette

17.3 Connector Pin Assignments

The 20-way Minifit connector P7 on the Backplane is used to interface with either a printer or hopper. The hopper signals are shaded in the table below.

Table 17-3 Printer / Hopper Connection to Backplane P7

Pin	Pin Name	Connects to ...	Function
1	HOPCOIN	J1-B30	Coin Output from Hopper
2	Keyway		Plastic Keyway
3	Keyway		Plastic Keyway
4	HOPON	JP22-C1	Hopper motor drive
5	HOPHIGH	J1-A31	Hopper high probe, Detects hopper full.
6	VCC	VCC	5V for Hopper Electronics
7	GND	GND	Gnd Hopper
8	RTS3	JP20-C12	RTS for printer
9	CTS3	JP20-A10	CTS for printer
10	GNDIsol	GNDIsol	Gnd, Isolated, for Printer Comms
11	24V	24V	24V Motor Drive for Hopper
12	HOPTEST	JP22-A1	Hopper Sensor Test output
13	HOPDIR	JP22-A29	Hopper motor direction
14	GND	GND	Gnd
15	DSR3	JP20-C11	Handshake Input 1, serial channel 3
16	DTR3	JP20-B12	DTR for Printer
17	24V	24V	24V for Printer
18	SIN3	JP20-A9	Rxd from Printer
19	SOUT3	JP20-C10	Txd to Printer
20	GND	GND	Gnd

17.4 General Maintenance

General maintenance for the Westrex Serial Printer consists of the following activities:

- Perform a printer self-test:
  1. Open the cabinet door, and switch OFF the machine.
  2. While depressing the Feed switch (shown in Fig 17-2), switch the machine power ON.
  3. After a few seconds, the self-test will start printing. Once printing, the feed switch can be released.
  4. Check the print quality of the self-test. If the printout is not clear, replace the ribbon cassette.
- Check that all connectors are secure.
- Make sure that receipts are falling correctly into the coin tray.
- Check that the journal is being rolled properly onto the journal spool.

Notes