KONAMI

ENDEAVOUR

SERIES

Electronic Gaming Machine

Service Manual
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Preface

This electronic game machine (EGM) service manual describes the operation, maintenance, and basic fault-finding procedures for the Endeavour Series electronic gaming machines.

The information contained herein may vary according to model, game configuration and as new features are introduced: this applies particularly to machine hardware configurations and software functions

Some hardware configurations and software functions are unavailable in certain jurisdictions.

The screen layouts and button configurations described herein are for a typical twenty-line game. The actual on-screen displays may vary from game to game and are automatically configured depending on options set at the time of machine configuration.

Most of the procedures relating to on-site servicing of the EGM must be performed by appropriately trained service personnel and may require special test equipment; for further information, contact Konami Australia.

Chapter 1 Overview and Specifications – describes the functions and specifications of the machine.

Chapter 2 Game Program – provides an overview of game-related functions used in the machine.

Chapter 3 Operator Mode Instructions – describes the Operator Mode program which provides test, diagnostic, and set-up functions.

Chapter 4 Modular Components – describes procedures for maintaining and working with the main machine components.

Chapter 5 Maintenance, Troubleshooting and Parts List – describes maintenance and troubleshooting procedures for the machine.

Chapter 6 Screen Message Information – provides an explanation of the various messages and information that appear on the screen while in game and audit modes.

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1 Overview and Specifications

1.1 Introduction

NOTES
This is a Class 'A' product according to AS/NZS 3548. In a domestic environment it may cause radio interference in which case the user may be required to take adequate measures.

This chapter gives an overview of the Endeavour Series video gaming machine, and reflects Konami's long experience in electronic gaming technology. Endeavour Series machines have been designed for functionality, usability, reliability and ease of maintenance.

1.2 Features

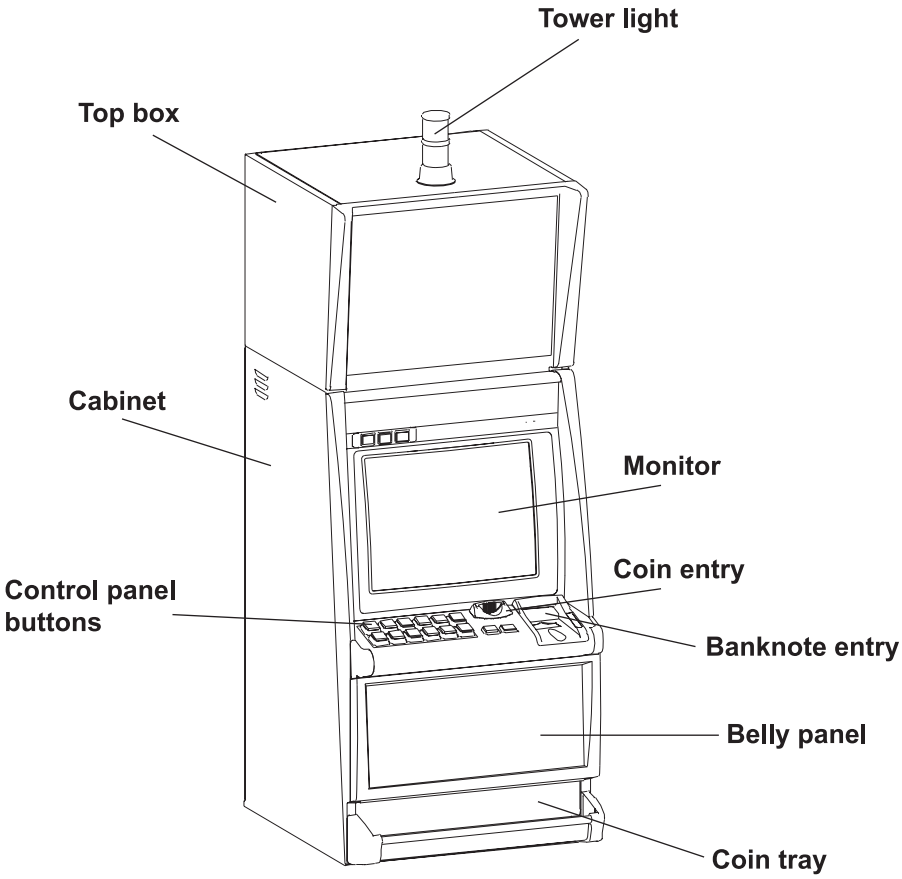

Figure 1-1 The Endeavour Series Gaming Machine

Each machine (see *Figure 1-1 The Endeavour Series Gaming Machine*) uses easy-to-maintain modular components which ensures uncomplicated maintenance and ease of player use while offering the latest in game technology and graphic display. Features include:

- Sophisticated door design with a simplified button layout and integrated cash input module.
- Embedded banknote acceptor with four-way note input (not applicable in all jurisdictions).
- Integrated high-speed electronic coin validator and diverter unit.
- Konami's proprietary video system, which provides a wide range of game display functions.
- A range of help screens which can be easily accessed at any time during game and idle modes.
- Large screen monitor featuring crisp, clear high-resolution graphics. In addition the ES500 Series machine features a state-of-the-art LCD monitor as standard for additional clarity and player comfort.
- Easily-accessible modular machine functions that simplify servicing and maintenance
- A high level of security to prevent unauthorised access and tampering.
- Comprehensive audit facilities including banknote acceptor statistics, transaction log, lockup log and lockup meters.
- The ability to recall the last five games and the free game sequences within each game.
- User-friendly test mode functions to simplify machine maintenance and servicing.

Security Features

- An all-metal cabinet.
- Dual main door-open sensors and switches.
- Input connector provided for a cashbox door sensor.
- The banknote stacker is housed in a safety cage with a key-operated lock.
- The processor circuit board is housed in a safety cage with a key-operated lock (the logic box).
- Access monitoring of the banknote acceptor cage and the security cage door remains active when the power is off.
- The main door is secured at three separate points by a one-piece locking bar.
- Machine accounting data and the current state of game play are stored in battery-backed RAM.
- A watchdog circuit continuously monitors the machine operation and checks the functions of all circuits.

1.3 Physical Layout

The Endeavour Series machine (see *Figure 1-2 Components in the Endeavour Series Upright Model*) is available in high-top, casino top and low-boy upright models, and a slim-line ES500 version (see *Figure 1-3 Structure of the ES500 Machine*). The main parts of all machines are the top box (top cabinet), the cabinet, the main door, and the function modules located in the cabinet.

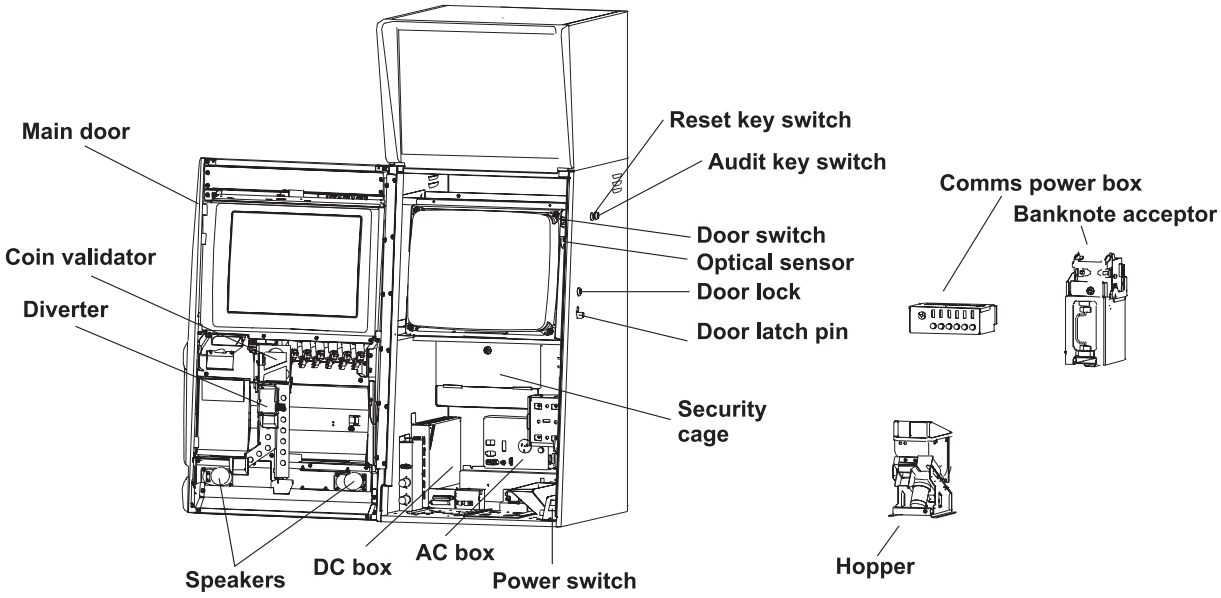

Figure 1-2 Components in the Endeavour Series Upright Model

1.4 Key Switches

The Endeavour Series model has a 'reset' switch to restore the machine to player use, and a key switch to enter the operator mode, allowing the user to configure the machine and review game and player statistics. These switches are located on the right side of the upright model, above the identification plate.

NOTE
For casino operation, the reset function may only be available via the monitoring system.

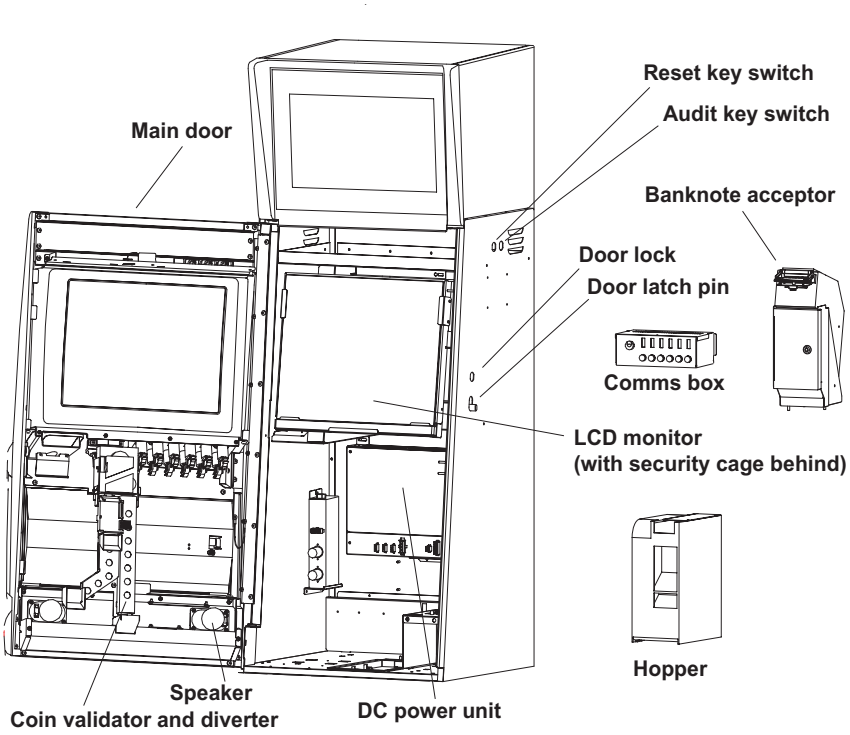

Figure 1-3 Structure of the ES500 Machine

1.5 Main Modules

The use of modular components in the machine enables faults and lockups to be found and resolved with minimum downtime. The function of each component is described in *Table 1-1 Main Machine Modules*.

Table 1-1 Main Machine Modules

Module	Description
Cabinet	Houses all internal modules.
Security cage	Houses the logic unit, which controls all of the game functions.
Monitor	Displays the game, accounting information, diagnostics and service information.
Banknote acceptor and stacker	Accepts, validates and stores banknotes.
Hopper	Stores and dispenses coins.
AC power unit	Provides AC power for the various internal components.
DC power supply	Provides various DC voltages.

Table 1-1 Main Machine Modules (cont.)

Module	Description
Comms box	Provides communication with the monitoring ssys-tem.
Main door	Houses play buttons, meters, lighting, coin-in components and the audio speakers.
Coin validator and diverter	Accepts and validates coins then directs them to either the hopper or the cashbox.
Top Box Upright only)	Houses lighting and top panel artwork.

1.6 Machine Function Tests

When the machine is installed correctly, a self-test is performed when the machine is switched on. This confirms that the RASIS (reliability, availability, serviceability, integrity, security) functions within the machine are operating normally. If no equipment failure is detected the machine switches to play mode, otherwise an error message describing any specific problem is displayed.

1.7 Machine Operation

The machine operates in various modes as follows:

- **Idle mode** – The time between the end of one game and the start of the next.
- **Game mode** – The time from accepting a bet until the game ends.
- **Lockup mode** – The time from a lockup event occurring until it is cleared.
- **Operator mode** – The audit key switch is used to enter this mode, so that audit and test functions can be selected.
- **Audit mode** – Used by the operator to display various monitoring information.
- **Test mode** – Used by the operator to test various machine functions.
- **Power Save** – Turns off the power supply to unnecessary components such as the monitor and fluorescent lamp, but leaves function modules such as security monitoring and communications turned on. (Not available in all jurisdictions.)

1.8 Physical Specifications

Endeavour Series machines come in a variety of configurations to satisfy local preferences, and the components and display features are consistent across the range. The following table lists details of each model (excluding the tower-light):

Table 1-2 Physical Specifications for Endeavour Series Gaming Machines

	Casino Top	High Top	Low Boy
Width (mm)	540	540	540
Depth (mm)	651	651	651
Height (mm)	1385	1574	978
Weight (kg)	115	121	95

Table 1-3 Physical Specifications of the ES500 Gaming Machines (without tower light)

	Casino Top	Low Boy
Width (mm)	500	500
Depth (mm)	550	550
Height (mm)	1385	978
Weight (kg)	98	78

1.9 Electrical and Environmental Specifications

Table 1-4 Electrical and Environmental Specifications lists the electrical and environmental specifications of the Endeavour Series video gaming machine.

Table 1-4 Electrical and Environmental Specifications

Specification	Requirement
AC line voltage (single phase)	240VAC ±10%
AC line frequency	50Hz ±10%
Power Consumption	240VAC @ 50Hz 2A
Environmental specifications	Temperature: 5–40°C Humidity: 15–93% (non-condensing)

2 Game Program

2.1 Introduction

The software used in the Endeavour Series gaming machine is broadly divided into:

- **The game program** (explained in this section) – how the player interacts with the machine, as well as the program functions in idle, game, and lockup modes.
- **The operator program** – this includes the operator mode and provides the operator and service technician with machine audit, maintenance and test functions (see *Chapter 3 Operator Mode Instructions*).

2.2 Game Program

The basic operation of all games in the Endeavour Series is the same, although specific differences exist between games.

2.2.1 Game Main Screen

The main game screen (see *Figure 2-1 Game Main Screen*) displays the game reel panel, the number of credits won and bet in the current game, the available credits, the equivalent value in roubles and kopeks, and the coin denomination used in the machine. The screen may also display a status message indicating the machine and game status, or a message indicating any error.

When the player inserts coins or notes, the machine either rejects the money or accepts it to convert it into a number of credits (this calculation is set when the machine is first set up). The credit meter increments each time a note or coin is inserted, and this value displays on the game screen as the number of credits.

All winnings are paid out to the credit meter.

Figure 2-1 Game Main Screen

2.2.2 Player Meters

Player information including credit, bet, win meter readings and token value is displayed at the top of the screen.

2.2.3 Messages

Messages are displayed below the player meters and include game status information, player prompts, error messages and various game events:

- Bets per line for the game on display.
- Credit payout messages (e.g. *'Cancel Credit'*, *'Collect'*).
- Messages displayed during game cycles (e.g. *'One Free Game Remaining'*, *'Bonus Game Complete'*).
- Messages displayed when not in lockup mode (e.g. *'Game Over'*, *'Play Now'*).
- Win messages (e.g. *'Gamble'*, *'Take Win'* or *'Play On'*).
- An event other than a normal playing event occurs (e.g. *'Coin In Jam'*).
- The main door is opened or a security event occurs (e.g. *'Main Door Open'*).
- A system communications/invalid error.
- A fault occurs in the machine requiring servicing by a technician, operator, or attendant (e.g. *'Please Call Attendant XXXX'*).
- Machine status display (e.g. *'Power Up'*)
- Promotional and other similar messages (e.g. *'Welcome To Our Club'*) are displayed at the bottom of the screen in a scrolling cycle (not available in all jurisdictions).

2.2.4 Alarm

An alarm sounds for approximately three seconds when certain events and errors occur.

2.2.5 Error Messages

See *Table 5-5 Message Chart* for a complete table of error messages, their causes, and how to clear each message.

Most error messages require action by the attendant or service technician.

2.2.6 Status Messages

Status messages indicate the machine or game status, and include:

- Credit payout messages
- Messages displayed during game cycles
- Messages displayed when not in lockup mode
- Win messages

Table 2-1 Status Messages lists the messages that appear on the screen and their causes.

Table 2-1 Status Messages

Message	Cause	Type
'Hopper Paid #### Accumulated Credits'	Displayed from the time of a hopper payout until the start of the next game.	Credit payout.
'Cancel Credit''	The *'COLLECT'* button was pressed.	Credit payout.
'Cannot Cash Out – Play Remaining Credits'	Money on a ticket can't be paid when the credit is less than five kopeks (not valid if no printer attached).	Credit payout.
'Please Remove Ticket'	A ticket has been printed (not valid if no printer attached).	Credit payout.
'Please Collect Credits'	A communication error has occurred.	Credit payout.
'Printing'	A cash ticket is being printed (not valid in all jurisdictons).	Credit payout.
'Cashless Out'	A cashless transfer was completed, initiated by the host or by the player pressing *'COLLECT'*.	Credit payout.
'Credits Per Line'	The number of credits per line being bet in the current game.	Credit payout.

Table 2-1 Status Messages (cont.)

Message	Cause	Type
'Press Red or Black to Gamble' ***'Press 'TAKE WIN' to Return to the Game'***	Options available in the double-up game.	Appears during the game cycle.
'RESERVED' **(Labelled as *'SERVICE'* n some jurisdictions.**	The machine is reserved.	When not in lock-up mode.
'Insert Coin' ***'Play Now'***	A normal game has ended.	
'Free Game Completed'	A free game has ended.	
'Double-up Completed'	A double-up game has ended.	
'Free Spin Completed'	A free game has ended.	
'Bonus Game Completed'	A bonus game has ended.	
'Free Spin Completed'	A free game has ended.	
'Second-screen Game Completed'	A second-screen game has ended.	
'Double Up, Take Win or Play On'	Asks a player with winnings from previous games whether to double up.	Appears during the game cycle.
'Double-Up Completed'	A double up game has ended.	
'Game Over, R500 Win Limit Reached'	A free game has terminated because the win limit has been exceeded.	

Table 2-1 Status Messages (cont.)

Message	Cause	Type
'Feature Game Over, R500 Win Limit Reached'	A free game has terminated because the win limit has been exceeded.	
'No Coins or Notes Accepted if Credit Exceeds R###'	The value on the credit meter has reached the maximum cash-in limit of R###.	

2.3 Buttons

The button layout on the Endeavour Series machine is standard. The betting and play options are prominent and easily understood, and the buttons act as switches in the operator mode menu, where service, configuration and monitoring procedures are carried out (see next chapter).

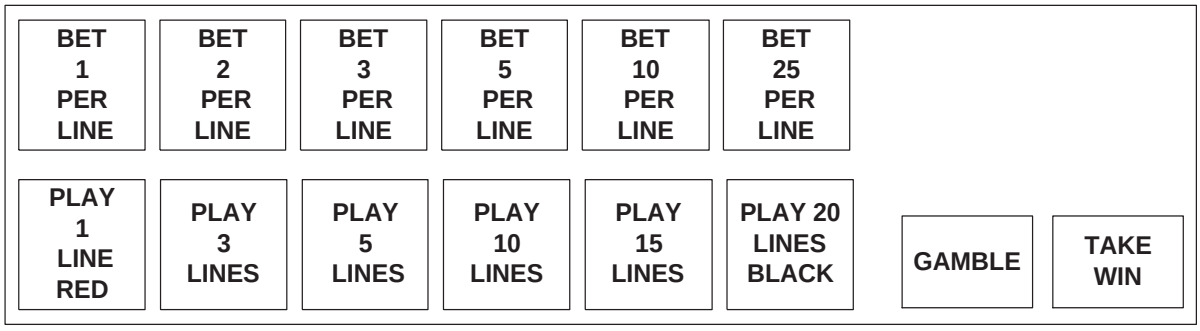

Figure 2-2 Typical Button Layout

COLLECT – Pays out any credit owed to the player.

RESERVE – A player can reserve a machine for three minutes (see *Figure 2-3 The 'RESERVED' Screen*), and press it again while the machine is reserved to release the machine for use.

HELP – This feature allows a player to get more game information about the game (see *Figure 2-4 The HELP Screen*). The help screen leaves the top half of the game screen clear so that players can view current credits while accessing help. The 'HELP' button can be pressed at any time, and pressing it again while in a help screen will return the player to the game.

The above three buttons are located above the upper left corner of the screen.

GAMBLE – Bets all the credits accumulated during the game. Pressing this button when the machine is waiting for a play request performs an auto gamble set/reset.

TAKE WIN – Transfers game winnings to the total in credits held. Taking this option cancels the opportunity to use the double-up feature.

BET ## PER LINE – Changes the number of credits to bet per game play line.

PLAY ## LINE – Selects the number of lines to play and starts the game.

Figure 2-3 The 'RESERVED' Screen

2.4 Game Play

The player selects how much to bet by pressing one of the *'BET ## PER LINE'* buttons. The button flashes and the message *'## Credits Per Line'* appears in the message display area.

This starts the available *'PLAY ## LINE(S)'* buttons flashing for the player to select the number of lines to play. If the number of lines multiplied by the size of the bet exceeds the available credits, the game does not start and the input is ignored. The maximum number of credits that can be used per game depends on the game program and is defined at set-up when the machine is first commissioned (see *Table 3-6 Machine ID Set-up*.

The total number of credits being bet is displayed as 'the bet'. This value remains displayed until the next game is started. When the game starts, the 'reels' rotate and then halt one after another from the left.

A win combination occurs when the symbols displayed in each selected line, or scattered, match the symbols in the pay table (see *Figure 2-5 Typical Pay Table*). The line indicator starts flashing to indicate the winning lines and symbols, and an animation is run for the winning symbols.

2.5 The Player 'Help' Function

The Endeavour Series machine features a series of help screens that can be accessed by the player at any time during the game. The *'HELP'* button is situated at the top of the screen, to the right of the *'COLLECT'* and *'RESERVE'* buttons.

The help screen overlays the game (a sample screen is shown in *Figure 2-4 The HELP Screen*) and provides the player with information relating to winning sequences and the line configurations available for the game being played.

Figure 2-4 The HELP Screen

To return to the game the player presses the *'HELP'* button again.

2.6 Double Up/Gamble

This option allows the player to bet all credits accumulated from each win (see *Section 2.7 Red/Black Double Up*). The option to 'double-up' can occur either when the player has a win during the game, or else the player can select *'GAMBLE'* before starting the game, in which case double-up activates each time the player has a win.

When *'GAMBLE'* is selected before starting the game, an on-screen message displays *'Auto Gamble Is On'*. To quit double-up mode, press the *'GAMBLE'* button before starting the next game; it will also clear automatically when credits reach zero.

Figure 2-5 Typical Pay Table

2.7 Red/Black Double Up

A card appears face down, and the player must guess whether it is red or black (see *Figure 2-6 Red/Black Double-Up Screen*). The player loses all credits bet if the guess is incorrect and the game goes to the double-up 'lost' state. If the player guesses correctly, the current number of credits being bet is doubled and the player can guess again or end the game. A maximum of five games can be played, after which a message is displayed indicating that the double-up game has ended, and the display returns to the main game screen.

Figure 2-6 Red/Black Double-Up Screen

2.8 Features

Each game has built-in mini-games that are part, or a combination, of one or more other features. These features are initiated when a trigger condition occurs in the primary game.

2.8.1 Free Spin

A free spin (re-spin) rotates some of the reels after a win. This feature is designed to increase the payout from the original win, as well as to allow another attempt if the combination is insufficient for the trigger.

When the free spin is used to attempt generating another trigger, the result after the re-spin determines whether some other feature is triggered.

A message appears before and after a free spin indicating it has been awarded and completed. The method for determining when to award a free spin is described in more detail in each game's pay table.

2.8.2 Free Game

A free game is an extra game that starts without any action by the player when the trigger condition occurs. No bet is placed on the extra game.

The options for defining free games include the following:

- Number of free games
- Whether or not to allow re-triggering of free games
- Changes to the multiplier for wins in a free game
- Special symbols for use in free games

The method for determining the winnings from a free game is described in the game's pay table. The multiplier and remaining plays for wins in a free game are displayed on the screen.

When a free game is re-triggered, the number of plays won is added to the existing number of remaining plays. The accumulated winnings from each free game appear on the screen as the game is played.

When the free game ends, the screen displays the total winnings and a message advising that the free game has ended.

2.8.3 Pay Game

NOTE
Playing a pay game increments the 'games played' meter and the 'turnover' meter.

A pay game is the same as a free game except that the player must make a bet for each game.

If a re-trigger occurs during an active pay game (provided the game allows re-triggering), the number of plays for the re-trigger is added to the number of remaining plays.

The display during and after a pay game is the same as for a free game (multiplier and number of remaining plays).

2.8.4 Mini-Game (Second-screen Game)

A mini-game is played on a different screen to the reel-based game described above. No bets are placed on mini-games, and the player follows the instructions on the screen.

The display switches back to the standard screen after the mini-game ends and a message is displayed indicating that the mini-game has ended.

2.9 Collect/Cancel Credit/Residual Credit Removal

Pressing the *'COLLECT'* button causes the hopper to pay out the value of the remaining credit (provided the sum does not exceed the maximum payout value of the hopper). The credit value is paid up to the value that can be paid out as coins. After the machine has paid out as much as the credit value as possible, the player can either press the *'COLLECT'* button again to have an attendant pay out the remaining credits, or play off the residual.

The *'Please Call Attendant – Cancel Credit'* message appears if the sum to be paid out exceeds the maximum payout value of the hopper. In this case, the attendant must pay out the specified sum, and turn the Reset key to clear the credit meter.

To cancel a payout requested by the player, press the *'COLLECT'* button, which is located on the left side, above the screen.

2.10 Refilling the Hopper

Periodically, the hopper needs to be refilled. The number of coins to be added for a hopper refill is set in *Table 3-8 Configuration Setup*, and is fixed for the venue.

Reset the machine with the reset key, and add the required number of coins to the hopper. In the 'Hopper Refill' option of the Operator Mode menu, press the *'PLAY 1 LINE'* and *'TAKE WIN'* buttons at the same time for the machine to recognise the refill, after which the *'Hopper Refill Has Completed'* message is displayed. Close the main door and return to the game screen.

3 Operator Mode Instructions

3.1 Introduction

The operator mode program allows the operator and technician to audit, monitor and test the machine, and to set and display a range of machine functions. A schematic diagram is shown in *Figure 3-1 The Operator Mode Menu*, and *Figure 3-2 Typical Operator Mode Main Screen* shows an actual screen-shot of this function.

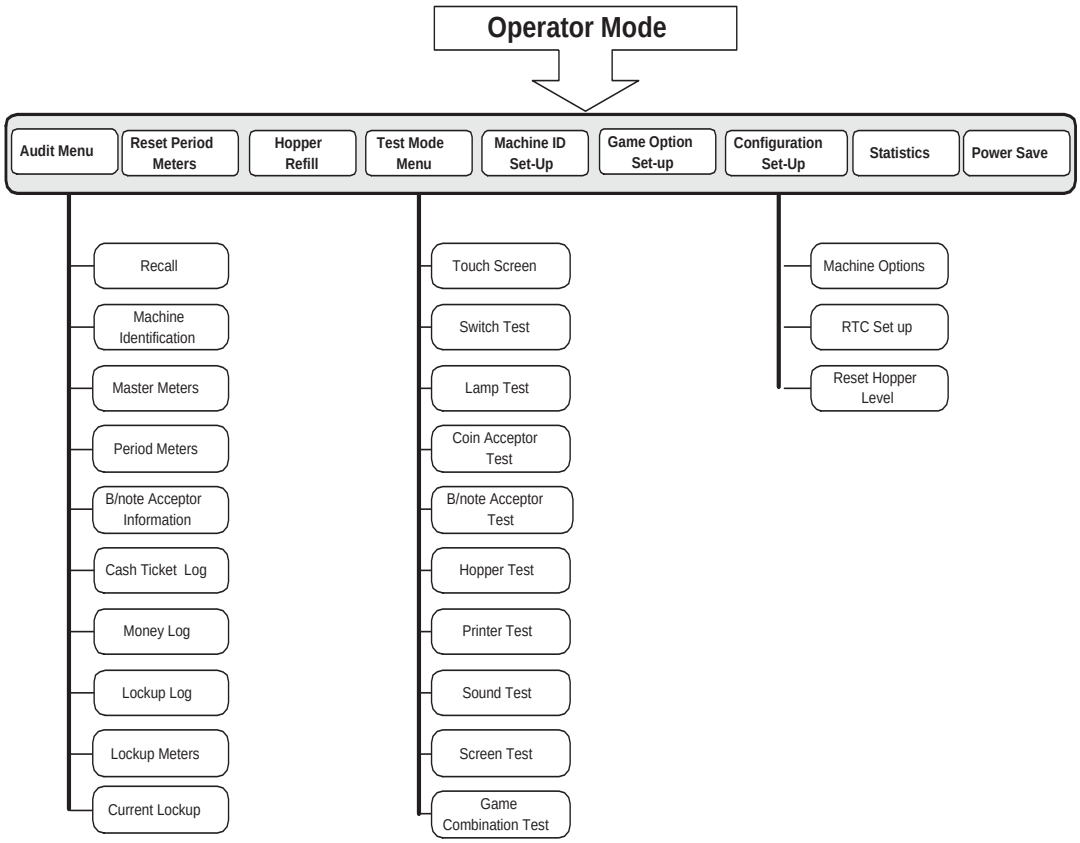

Figure 3-1 The Operator Mode Menu

3.2 Operator Mode

The screens in operator mode are menu-driven, providing the user with easy-to-follow instructions for each step or process. The relevant buttons for a particular mode are displayed across the bottom of the screen (for simplicity only the *'PLAY XX LINES'* buttons are depicted) with the function for that mode displayed above the button. The button image on the screen is highlighted when the corresponding machine button is pressed.

Figure 3-2 Typical Operator Mode Main Screen

While the screen layouts and button configurations shown are for a typical 20-line game, the actual on-screen displays may vary from game to game, and are automatically configured depending on the options set when the machine is installed.

3.3 Entering Operator Mode

Turn the audit key on the right side of the machine to switch from the game to the operator mode menu. Each menu item leads to a sub-menu, which takes the user further into the various test, configuration and audit options.

3.4 Operator Mode Categories

The following sections detail the typical button function and on-screen button display for the four primary categories of operator mode screens.

The values of some items in these screens appear in blue. These items are either for viewing only or else indicates that the value may not be changed in that screen unless a pre-determined condition (such as closing the main door or opening the security cage door) is satisfied. A list of possible error conditions is shown at the bottom of the screen for these menu options, with any current unsatisfied conditions shown in red.

3.4.1 Information

The user scrolls through the various menu items and returns to the main menu without making any changes to the settings.

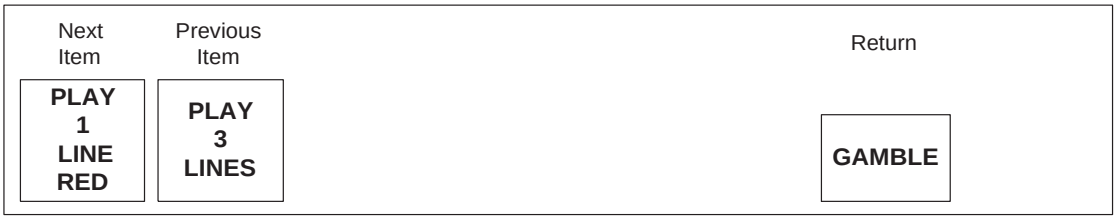

Figure 3-3 Typical Button Layout – Machine Information

PLAY 1 LINE: Scrolls forward through the menu items.

PLAY 3 LINES: Scrolls backward through the menu items.

GAMBLE: Returns to the next highest menu.

3.4.2 Game Settings

Use the buttons to change settings and configuration characteristics of the machine.

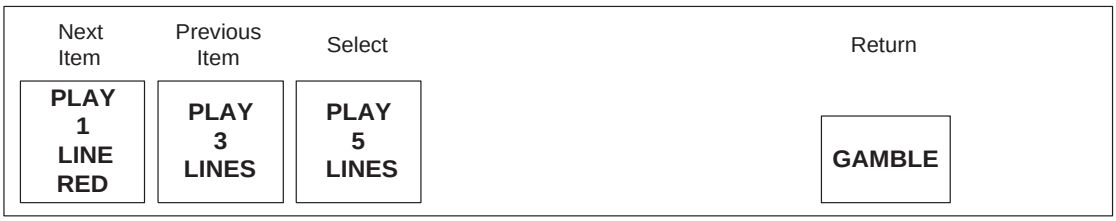

Figure 3-4 Typical Button Layout for Configuring Game Settings (1)

PLAY 1 LINE: Scrolls forward through the menu items.

PLAY 3 LINES: Scrolls backward through the menu items.

PLAY 5 LINES: Selects the menu item at the cursor.

GAMBLE: Returns to the next highest menu.

Once a selection is made to enter a value for a parameter, the button labels change to the following:

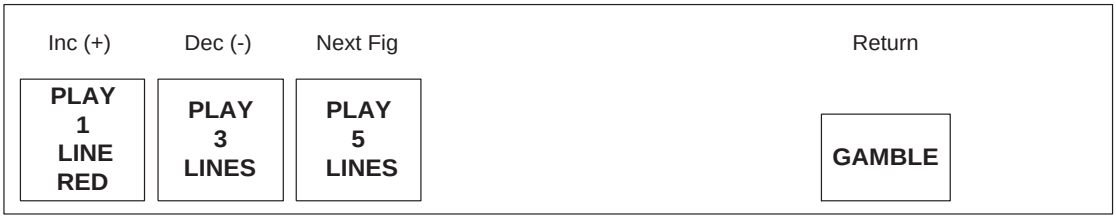

Figure 3-5 Typical Button Layout for Configuring Game Settings

PLAY 1 LINE: Increments the digit at the cursor.

PLAY 3 LINES: Decrements the digit at the cursor.

PLAY 5 LINES: Moves the cursor to the next digit.

GAMBLE: Returns to the next highest menu.

3.4.3 Performance Check – Components and Settings

Used to activate various components for maintenance and test purposes.

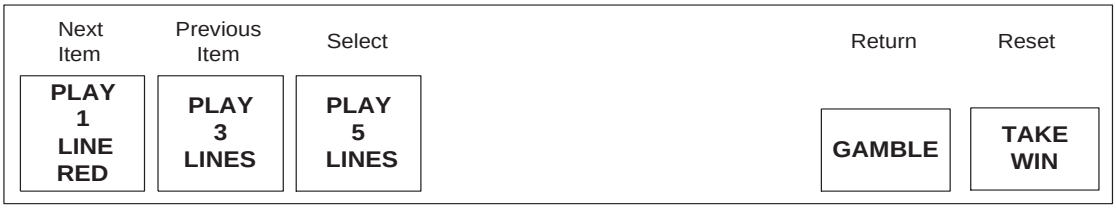

Figure 3-6 Typical Button Combination – Performance Checking

PLAY 1 LINE: Scrolls forward through menu items.

PLAY 3 LINES: Scrolls backward through menu items.

PLAY 5 LINES: Changes the status of the component being set up or tested.

GAMBLE: Returns to the next highest menu.

TAKE WIN: If the machine has any lockups when this screen is first opened, pressing thhis button resets the machine so that troubleshooting for the lockup can begin.

3.4.4 Current Lockup – Help Resolution

Used to help identify the cause of lockups when they occur.

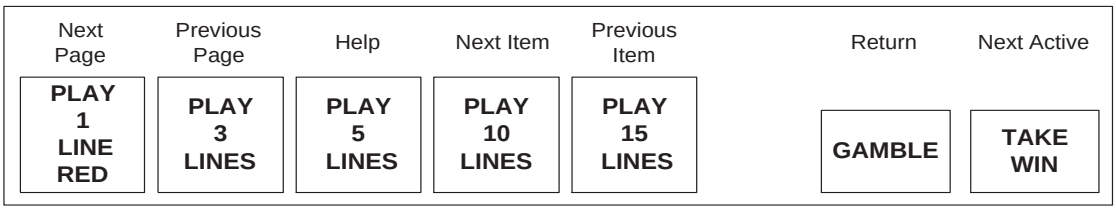

Figure 3-7 Typical Button Layout for Resolving Lockups

PLAY 1 LINE: Scrolls forward through each page of lockup items.

PLAY 3 LINES: Scrolls backwards through each page of lockup items.

PLAY 5 LINES: Provides help on resolving the current lockup.

PLAY 10 LINES: Scrolls to the next lockup item on the page.

PLAY 15 LINES: Scrolls to the previous lockup item on the page.

GAMBLE: Returns to the next highest menu.

TAKE WIN: Moves to the next active lockup.

3.5 Menu Screens

This section gives an explanation of the information given in each of the screens and sub-screens in operator mode, and provides a tabular display each sub-menu item.

3.5.1 Operator Mode

This screen replaces the game screen when the audit key is turned. The menu enables the user to enter each of the various inquiry modes by pressing the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons, and selecting an item by pressing the *'PLAY 5 LINES'* button when it is highlighted. All sub-menus return to this screen, and the user returns to the game screen by turning the audit key back to its rest position.

Table 3-1 Operator Mode

Conditions of entry:	None.	
Sub-menu	**Description**	**Use for:**
Audit Menu	Allows access to game meters, communications information, event, money, and lockup logs, and help to view and resolve lockups.	Game information
Reset Period Meters	Used to clear the meters of game and win statistics.	Game maintenance
Hopper Refill	Performs hopper refill adjustments and hopper refills to a specified amount.	Game set-up
Test Mode Menu	Used to test lights, buttons, sound, switches and sensors, coin-entry, hopper and banknote acceptor mechanisms, picture quality, and game combinations.	Test/Service
Machine ID Set-Up	Used to set the machine serial number, enable the banknote acceptor, set the maximum bet for each game (casino only), and set the number of lines per game.	Machine configuration
Game Option Set-up	Allows the user to view certain game and machine configuration parameters.	Inquiry

Table 3-1 Operator Mode (cont.)

Sub-menu	Description	Use for:
Configuration Set-Up	Used to set the clock, configure the cancel credit level and allowable banknote denominations, reset the hopper level, and change the background colour of the game screen.	Machine configuration
Statistics	The user can view a history of game and win details for the machine, including double-ups, credit and collect information.	Auditing
Power Save	This shuts down the machine to a state where all but the essential functions are switched off during idle periods.	Machine configuration

3.5.2 Audit Mode

The first selection in the operator mode menu is an inquiry screen only, and enables the operator to view the auditing results of the machine, the current configuration settings, game and transaction details, and the machine lockup history. The machine settings that appear are those that are manually configured in *Table 3-6 Machine ID Set-up*.

It may be necessary to satisfy certain conditions before entering a particular screen: this is done largely for security purposes and is built into the machine's software.

Table 3-2 Audit Mode

Conditions of entry:	None
Use for:	Game information
Description	
Recall Used to view the results of past games and the status of the various meters at the time of the game. Select a game to view and press the *'PLAY 5 LINES'* button. Scroll between game, meter display and double-up views using the *'PLAY 1 LINES'* and *'PLAY 3 LINES'* buttons, and exit using the *'GAMBLE'* button. A definition of each item is shown in *Subsection 7.1.1 Recalling Game Details*.	
Machine Identification View basic protocols and address information. Details can be printed out by pressing the *'PLAY 15 LINES'* button if a printer is attached, and also refer to *Subsection 7.1.2 Machine Identification Details* for details of each item on the screen. Exit to the Audit mode by pressing the *'GAMBLE'* button..	

Table 3-2 Audit Mode (cont.)

Description
Master/Period Meters These meters show the current game and cash collection status of the machine. Unless otherwise specified, all meter units displayed are in roubles and kopeks. Press the *'PLAY 1 LINE'* button to scroll between the master and period meters, the *'PLAY 15 LINES'* button to print a record and *'GAMBLE'* to exit to the Audit mode menu.
Banknote Acceptor Information Shows auditing information provided by the banknote master and period meters. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to scroll between screens, the *'PLAY 15 LINES'* button to print a record and *'GAMBLR'* to exit to the Audit mode menu.
Cash Ticket Log This screen is used to view the last 100 cash ticket transactions. The date and time of the transaction are recorded with a value, an identifier and a ticket number, and the value of money on the meter at the time. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to scroll between the screens, the *'PLAY 15 LINES'* button to print a record and *'GAMBLR'* to exit to the Audit mode menu.
Money Log Money transactions are recorded with a date/time reference. View the last 100 transactions, including the type of transaction and the value. The *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons scroll between the screens, the *'PLAY 15 LINES'* button prints a record and *'GAMBLR'* exits to the Audit mode menu.
Lockup Log Any lockups that occur in the machine are recorded and the information is available for review. This screen shows the date/time reference of the last 150 lockups, a code and a description of each lockup. The *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons scroll between the screens, the *'PLAY 15 LINES'* button prints a record and *'GAMBLR'* exits to the Audit mode menu.
Lockup Meters This screen lists all possible lockups and the frequency of occurrence. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons scroll between the pages, the *'PLAY 15 LINES'* button to print out details and *'GAMBLR'* to exit to the Audit mode menu.

Table 3-2 Audit Mode (cont.)

Description
Current Lockup A full list of possible lockups is listed, with current lockups shown in red. Scroll between pages with the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons and navigate to an item on a page with the *'PLAY 10 LINE'* and *'PLAY 15 LINES'* buttons. Move the cursor to a lockup and press the *'PLAY 5 LINES'* button for a help screen showing how to resolve the lockup. Selecting *'TAKE WIN'* moves to the next active lockup if there is one, and the user returns to the Audit mode menu by pressing the *'GAMBLE'* button.

3.5.3 Resetting the Period Meters

This screen allows the user to reset the banknote meters. This is usually done at the end of a period determined by the venue management.

Table 3-3 Resetting the Period Meters

Conditions of entry:	Credit must be zero.
Use for:	Game information.
Description	
To clear and reset the period (banknote) meters, press the *'PLAY 1 LINE'* and *'TAKE WIN'* buttons simultaneously, and exit to the Audit Mode menu using the *'GAMBLE'* button.	

3.5.4 Refilling the Hopper

When it becomes necessary to refill the hopper, either upon installation or when the hopper is emptied by paying out wins, use this function to refill the hopper with a specified number of coins.

Table 3-4 Refilling the Hopper

Conditions of entry:	The main door must be open and the machine must not be hopperless.
Description	
The hopper refill amount is set when the machine is first configured, using the configuration set-up (see *Table 3-8 Configuration Setup*). When the hopper is emptied during game play it must be refilled, and the operator uses this screen to configure the machine to recognise the refill. Press the *'PLAY 1 LINE'* and *'TAKE WIN'* buttons at the same time to refill the hopper to the amount specified by the hopper refill amount shown on the screen, then press *'GAMBLE'*. to exit to the operator mode menu.	

3.5.5 Testing the Machine

When the machine is serviced or is malfunctioning, this menu enables the technician to carry out tests to resolve problems. The screens are designed to be used interactively for any inquiry or testing purposes. Menu options highlighted in blue need to have certain conditions met before they can be selected with the *'PLAY 5 LINES'* button; the conditions are noted in red at the bottom of the screen among the full selection of messages relating to that module.

Table 3-5 The Test Menu

Conditions of Entry	For general testing, the machine must be in idle mode with zero credits and the main door open.
Use for	Service, testing, and troubleshooting
Description	
Touch Screen Enables testing of the touch screen when one is installed. For conventional screens, a message appears when the *'PLAY 3 LINES'* button is pressed, advising that the option is unavailable. Press the *'GAMBLE'* button to return to the main test mode menu.	
Switch Test This screen runs tests on the switches. Exit to the main test menu by pressing the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons at the same time.	
Lamp Test No buttons are lit in this screen, but pressing each button causes it to light up indicating that it is operating correctly. Exit to the main test menu by pressing the *'PLAY 1 LINE'* and *'PLAY 5 LINES'* buttons simultaneously.	
Coin Acceptor Test Checks the operation of the coin acceptor and diverter. The top section of the screen is used to change the status of each of the coin modules so that coins are either rejected or accepted and sent to the cashbox or the hopper. Inserting coins into the machine then enables the operator to see whether coins are being recorded properly. Use the *'PLAY 5 LINES'* button to change the 'accept' or 'reject' status of the coin validator. Insert coins in the slot and check that they feed correctly and are detected by the sensors. The test will not start if any lockups are present. Clear these lockups by resetting the machine with the *'TAKE WIN'* button (listed in this screen) are resolved before the test begins. Exit to the main test menu by pressing the *'GAMBLE'* button.	

Table 3-5 The Test Menu (cont.)

Description
Banknote Acceptor Test This screen is used to run tests on the banknote acceptor and validator. Use the *'PLAY 3 LINES'* button to change the validator state between 'enable' and 'disable', then insert a banknote. Press the *'PLAY 1 LINE'* button to reject the note or the *'PLAY 3 LINES'* button to send the note to the stacker; the meter values change as the test progresses. The *'TAKE WIN'* button is used to reset the machine before the test begins so that any lockup errors (listed) can be resolved. Exit to the main test menu by pressing the *'GAMBLE'* button. The signature of the banknote acceptor head can also be checked in this screen. Press the *'PLAY 1 LINE'* button to enter the signature screen, use the *'PLAY 3 LINES'* and *'PLAY 5 LINES'* buttons to enter the seed value, then press the *'TAKE WIN'* button to initiate the check. Return to the test mode menu by pressing the *'GAMBLE'* button.
Hopper Test This test checks that the hopper is operating correctly. Open, then close, the main door and press the *'PLAY 5 LINES'* button to pay out a preset number of coins (the default is 10). Insert the coins into the entry slot (all coins must be replaced for the machine to respond and to be able to exit the test). Rejected coins are not counted as being inserted. Exit to the main test menu by pressing the *'GAMBLE'* button.
Printer Test (if printer is attached) Runs tests on the printer.
Sound Test Allows the operator to adjust the sound volume and code used in the game. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to choose an item and the *'PLAY 5 LINES'* button to select it. The button menus then change so that new values can be inserted. The *'PLAY 5 LINES'* button replays the game sound at the current sound level setting, and the *'PLAY 10 LINES'* button stops the procedure. Save the new settings if desired, then press the *'GAMBLE'* button to exit to the main test menu.
Screen Test This checks the monitor colours, does a screen test and checks the display for consistency. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to scroll between menu items, and the *'PLAY 5 LINES'* button to select one. Exit the test pattern by pressing the *'PLAY 5 LINES'* or the *'GAMBLE'* button and exit to the main test menu by pressing the *'GAMBLE'* button.
Game Combination Test Checks the win combinations under actual game conditions. Use the *'PLAY 1 LINE'* button to select a reel to modify, the *'PLAY 3 LINES'* and *'PLAY 5 LINES'* buttons to move up and down on that reel, the *'PLAY 10 LINES'* and *'PLAY 15 LINES'* buttons to change the bet and line values, and the *'TAKE WIN'* button to change the game state. Use the *'GAMBLE'* button to exit to the main test menu.

3.5.6 Machine ID Set-up

This screen is used to view machine identification and basic game configuration parameters that were set up when the machine was commissioned. The items in the following table can be viewed after selecting *'Machine ID Set-up'* from operator mode.

Items shown in blue indicate they are for viewing only (this is done as a security precaution against accidental or unauthorised amendment); they are able to be changed during the commissioning procedure outlined in *Section 5.8 Commissioning the Machine*).

Table 3-6 Machine ID Set-up

Conditions of Entry	The security cage door must be open and RAM must be cleared.
Use for	Configuration and game set-up
Description	
GMID The gaming machine serial number.	
Venue The site at which the gaming machine is installed.	
Serial Number The identifying number of the machine.	
Banknote Acceptor Shows the model of banknote acceptor used in the machine.	
Coin Acceptor This shows the model of coin acceptor being used in the machine.	
Hopper Use Configures the hopper so that it is recognised by the machine.	
Ticket Printer (if printer is attached) Allows the machine to recognise the ticket printer.	
CCCE Use Activates this function, where available, to be recognised by the machine.	

3.5.7 Setting Game Options

This menu shows the settings of various game and user options, which are viewable for information purposes. These values are set in the configuration procedure when the machine is first commissioned (see *Section 5.8 Commissioning the Machine*).

Table 3-7 Game Option Set-up

Conditions of entry	The main door must be open
Use for	Viewing game parameters.
Description	
PRTP (theoretical percentage return to the player) Sets this value for the machine. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to scroll through the menu; the *'PLAY 5 LINES'* progressively changes the variation, which is usually set to 85% or higher.	
Base Credit Value This sets the monetary value of one credit. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to scroll through the menu, and the *'PLAY 5 LINES'* button to change the value.	
Max Play Lines This sets the number of lines that can be played in the game.	
Max Bet Set the maximum bet value for games that allow the 'Max Bet' to be modified. For games that do not allow this modification to be made, the setting is fixed. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to select menu items, and the *'PLAY 5 LINES'* button to change the value.	
Bet Per Line This shows the bets per line defined by the maximum bet value that has been set.	
Double-up Option This sets whether or not the machine will go to the double-up option in games. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to scroll through menu items, and the *'PLAY 5 LINES'* button to select the double-up status.	

3.5.8 Configuring the Machine

This menu shows the settings of various game and user options. It can be accessed at any time from operator mode. Items highlighted in blue indicate that a lockup condition must be resolved before the value can be changed.

Table 3-8 Configuration Setup

Conditions of entry	The main door must be open
Use for	Machine configuration
Description	
To navigate the main menu items use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons, and the *'PLAY 5 LINES'* button to make a selection; the options are *'Machine Options'*, *'RTC Set-up'* and *'Reset Hopper Level'*.	
House Number This function allows management to produce venue-specific text messages from the printer (if a printer is attached).	
Cancel Credit Level Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to increase or decrease the setting to the desired value; the *'PLAY 5 LINES'* button selects the next digit to change. Setting this value to 0 roubles makes the machine 'hopperless'. Exit to the 'Machine Options' menu by pressing *'GAMBLE'*. **Hopper Refill Amount** This sets the number of coins for refilling the hopper. The *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons increase or decrease the setting to the desired value; the *'PLAY 5 LINES'* button selects the next digit to change. Save the settings and exit to the menu using the *'GAMBLE'* button. **Cancel Cancel Credit** Shows the setting for this value, which is used to enable the player to cancel game credits. **Enable Ticket Printer** Enable the ticket printer by pressing the *''PLAY 1 LINE'* or *'PLAY 3 LINES'* buttons, and exit to the menu using the *'GAMBLE'* button (not available in all jurisdictions). **Offline Attendant Ticket** Not currently used. **Enable Banknote Acceptor** Enable the banknote acceptor by pressing the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons, and exit to the menu using the *'GAMBLE'* button. **Configuring Banknote Denominations** This shows the banknote denominations that the machine is set up to recognise.	
RTC Set-up This sets the internal real-time clock in the machine. After selecting this option, use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to increase or decrease the setting to the desired value; the *'PLAY 5 LINES'* button selects the next digit to change. Press *'GAMBLE'* to save the new settings and exit.	

Table 3-9 Configuration Set-up (cont.)

Description
Reset Hopper Level This is used to reset the hopper level. Press the *'PLAY 1 LINE'* button, and a message appears advising the hopper has been reset. Press the *'GAMBLE'* button to return to the previous menu. When setting the clock and resetting the hopper, pressing the *'GAMBLE'* button a second time upon exiting prompts the user to save the new settings. Press *'PLAY 5 LINES'* to keep the same settings or select *'TAKE WIN'* to use the new configuration. Press *'GAMBLE'* to ignore any changes made and return to the previous menu.

3.5.9 Viewing Game Statistics

This screen enables the operator to view certain game statistics that are recorded in the machine's memory.

Table 3-9 Viewing Game Statistics

Conditions of entry	Credit must be zero and lockups must be cleared. The machine must be in idle mode.
Description	
Bet/Line Statistics Shows the credit and money won for each bet and line combination. The *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons scroll between the screens and the *'PLAY 15 LINES'* button prints a copy of the screen. Press the *'GAMBLE'* button to exit to the previous screen.	
Gamble Statistics Provides details of the double-up results that have occurred on the machine, for selected bands of money bet and for each of the red and black outcomes. Press the *'PLAY 15 LINES'* button to print a copy of the screen, and the *'GAMBLE'* button to exit to the previous screen.	
Collect Statistics Shows the frequency, for a range of money values, of players choosing to collect and leave the game. Press the *'PLAY 15 LINES'* button to print a copy of the screen, and the *'GAMBLE'* button to exit to the previous screen.	

4 Modular Components

4.1 Introduction

NOTE
This is a Class A product according to AS/NZS 3548. In a domestic environment it may cause radio interference, in which case the user may be required to take adequate measures.

WARNING
Only qualified persons should service this machine. Exercise extreme care when performing general maintenance.

This chapter outlines the procedures necessary to maintain and service the modular components of the Endeavour Series video gaming machine in the field. It covers the installation, removal, maintenance, adjustment, troubleshooting and assessment of the following components and assemblies:

- *Section 4.2 Machine Cabinet*
- *Section 4.3 Main Door*
- *Section 4.4 Buttons*
- *Section 4.5 Coin Validator and Diverter*
- *Section 4.6 Security Cage*
- *Section 4.7 Power Supply*
- *Section 4.8 The Communications Interface*
- *Section 4.9 The Top Box*
- *Section 4.10 The Monitor*
- *Section 4.11 Hopper*
- *Section 4.12 Banknote Acceptor*

4.2 Machine Cabinet

The cabinet of the machine (see *Figure 4-1 Structure of the Endeavour Series Upright Gaming Machine*) offers a high level of security and is available in a range of colours and trim. Sub-assembly attachments and other externally-attached components

enable machines to be configured for use in a wide range of venues and jurisdictions.

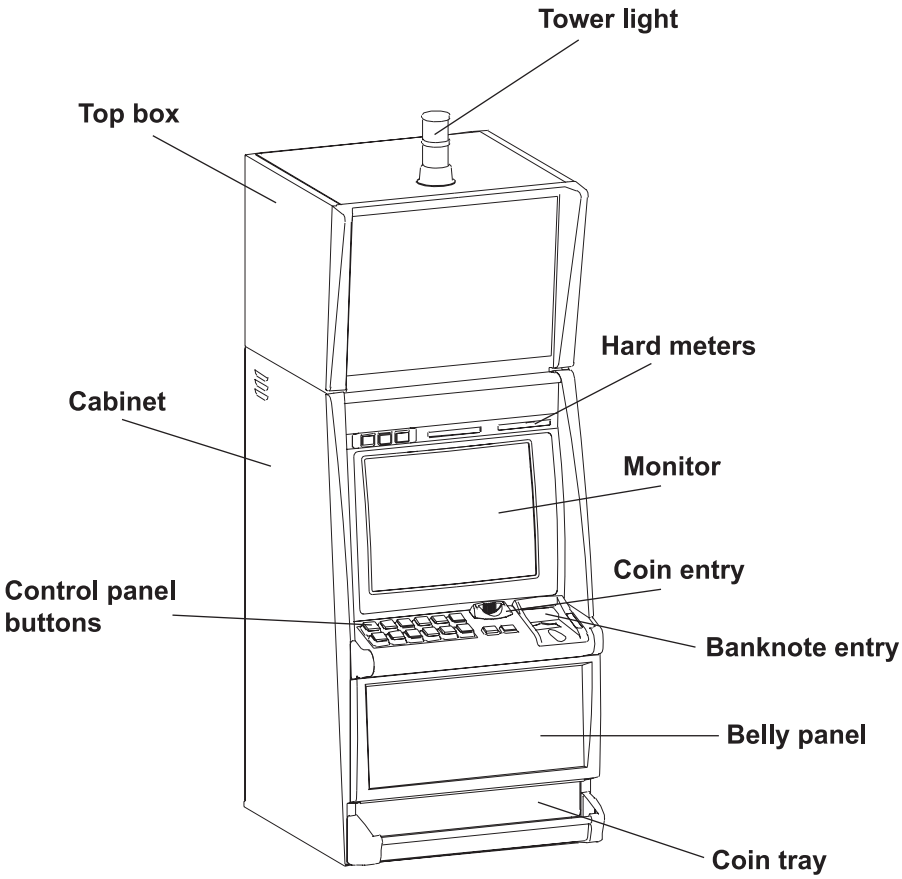

Figure 4-1 Structure of the Endeavour Series Upright Gaming Machine

The cabinet houses the game software and player modules (see *Figure 4-2 Components in the Endeavour Series Upright Gaming Machine*, and *Figure 4-3 Components in the ES500 Series Machine*) and needs no maintenance apart from keeping the exterior clean.

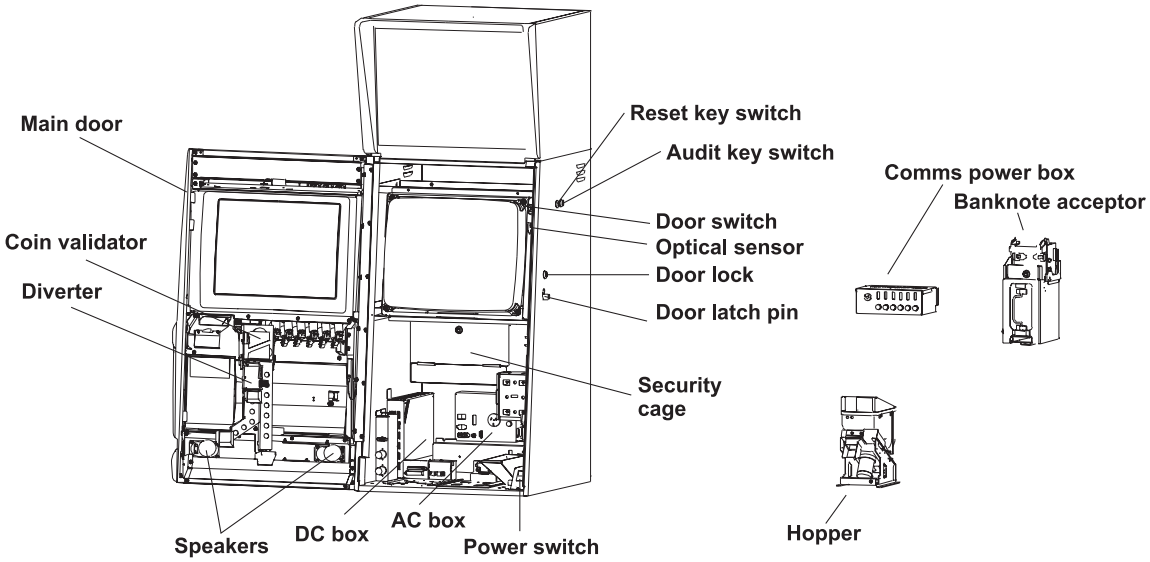

Figure 4-2 Components in the Endeavour Series Upright Gaming Machine

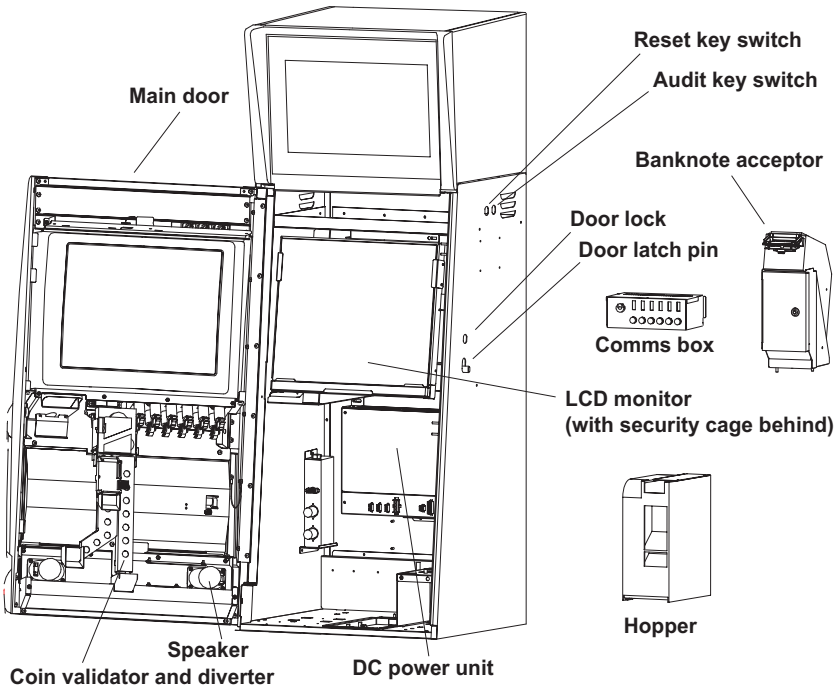

Figure 4-3 Components in the ES500 Series Machine

4.2.1 Optical Door-Open Sensor

The main door of the machine is monitored by a mechanical switch and an optical sensor, both of which are connected to the main control unit located in the security cage. The *'Main Door Open'* and *'Main Door Mismatch'* messages are displayed on the monitor if the door is not closed correctly. The first message

disappears when the main door is properly secured; the other remains on the screen until the next game begins.

NOTE
The optic monitor will not work if the light emitter (for the door) and the light receiver (for the cabinet) are reversed, so check the optics wiring harness assembly part numbers (see *Chapter 5 Maintenance, Troubleshooting & Parts List*) prior to installation.

The emitter is located on the door and the receiver is attached to the cabinet near the locking bar on the right hand side of the upright machine; on the slant-top the receiver is on the left of the front bracket at the front of the machine.

INSPECTION

Ensure that all wiring harnesses are connected securely and that the light-emitting and -receiving optics are clean.

PERFORMANCE CHECK

Turn on the power switch in the machine and open the main door to display the *'Main Door Open'* message on the monitor. Shut and lock the main door and ensure that the *'Door Closed – Main'* message is displayed on the screen; this message clears when the next game begins.

TROUBLESHOOTING

If the *'Main Door Open'* or *'Door Closed – Main'* message does not clear, close the main door and check the locking-plate and the latch to make sure that they are in place. Check the optics components for any damage, displacement, indentation, or damage to the lenses.

Check all wires for damage and, if the warning message persists or displays immediately, replace the main control unit.

CLEANING

Wipe the optics clean with denatured alcohol or weak glass cleaner as necessary.

4.2.2 Main Door Switch and Cash Box Switch (if installed)

This is a spring-loaded mechanical switch located directly above the 'door-open' optic sensor. It connects to the main door, and functions as an additional door-monitoring device.

Replace the door switch by removing the two nuts and the electrical harness connected to the switch. After replacing the switch, test it by opening the main

door (or the cash box door) to ensure that no error message is displayed.

Regulations in some jurisdictions require that a switch be installed to alert venue staff when the cash-box door is opened. In this event, the game halts and the *'Drop Door Open'* message appears, requiring it to be cleared by the attendant.

4.3 Main Door

The main door unlocks at the key switch on the right side of the machine, and swings open after raising the latch pin on the door. On the slant-top model, unlock the catch located underneath the control panel and pull the main door upwards to reveal the components inside the machine.

REMOVAL AND INSTALLATION – UPRIGHT MODEL

1. Open the main door and turn off the power switch in the machine.
2. Disconnect all wire harnesses crossing the main door hinge, and remove the harnesses at the meter end. Also remove the braided grounding strap after loosening the securing nut.
3. Remove the screw securing the control panel cable to the main door, and remove the cable used to restrict the opening angle of the main door.
4. Hold the main door open at an angle of approximately 90° and remove the six screws on the main door hinge on the left side of the cabinet. The hinge is located above the metal flange protruding along the front left wall of the cabinet.
5. Support the main door and hinge securely and remove them from the cabinet.

Installation of the main door is the reverse of the above procedure. Once it's installed, adjust the door to ensure it is aligned correctly.

4.3.1 Speakers

To remove a speaker, open the main door and turn off the power to the machine, slide the two connectors from the speaker terminal, and remove the four screws securing the speaker. Installation is the reverse of the above.

PERFORMANCE CHECK

After installing the speaker, or if the sound level is low or inaudible when the machine is running, use the procedure shown in *Table 3-5 The Test Menu* to determine the cause of the problem. If the problem persists, repair or replace the speaker.

TROUBLESHOOTING

If the volume is low or absent, sequentially check: the sound volume in operator mode, that the wiring harness and connector are in place, and the condition of the interface unit board; if the IFU2 board is faulty, replace it. Check the resistance of the speaker using an ohmmeter: if the value varies from 4 ohms, replace it.

4.3.2 Coin Tray

The coin tray is attached to the main door, and catches coins paid out by the hopper or paid back to the player by the coin-in assembly.

To install or remove the coin tray, turn off the power switch in the machine. From the inside of the machine, unscrew the four retaining screws and nuts attaching the coin tray to the main door, and remove the tray.

INSPECTION

Ensure the tray is securely attached to the door, and is clean: spilt drinks and other rubbish may collect there, so it must be checked and cleaned regularly.

CLEANING

Spray the entire tray surface with a weak non-ammonia cleaner and wipe off with a soft cloth.

4.3.3 Hard Meters

All machines have eight 'hard' meters which provide cumulative data for the life of the machine, for day-to-day auditing information for the venue. The meters are at the top right of the main door on the upright machine, next to the player assistance buttons (see *Figure 4-4 The Hard Meters*), and above the screen towards the back of the lid on the slant-top model. The meaning of the meter descriptions is given in *Table 7-3 The Hard Meters Display* in this manual.

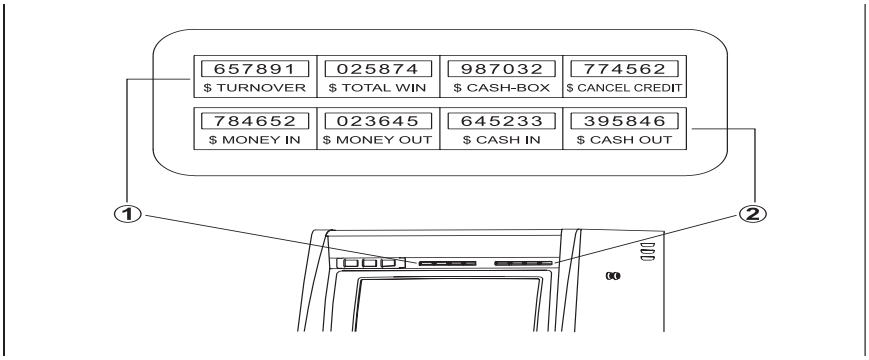

Figure 4-4 The Hard Meters

The seven-digit meters increment in one-rouble units, regardless of the monetary unit of the machine. For example if the monetary unit of the machine is 20 kopeks, betting this amount credits will increment the turnover meter value by one unit i.e. values less than one rouble are stored in the program and the meter increments when a rouble in value is reached.

REMOVAL AND INSTALLATION

The hard meters can be accessed by opening the main door and removing the screws that support the module.

NOTES
Check all related laws and regulations before removing or disconnecting the hard meters

1. Open the main door and turn off the power switch in the machine.
2. Remove the two screws that hold the hard meter assembly in place, and the metal seal if one is fitted.
3. Grip the meter assembly firmly and disconnect the wire harness.

Installation is the reverse of the above procedure.

INSPECTION

Check the meter window to see that the meters are functioning correctly and are not damaged.

PERFORMANCE CHECK

To test the meters play a game and check that each meter operates correctly. Repair or replace any that are malfunctioning.

TROUBLESHOOTING

If a meter isn't working, carry out the following check:

1. Check the wiring harness and connector.
2. Replace the interface unit board (IFU2) and re-check.
3. Check that the supplied voltage is 12V: if it isn't, check the harness.

If none of the above fix the problem, replace the meter.

4.3.4 Control Panel

The control panel holds the play and bet buttons, the coin/banknote entry module and the backlight circuit board, and is in the centre of the machine below the screen.

The control panel should only be removed or installed by qualified technicians. To do this use the following procedure and refer to *Figure 4-5 Removing the Control Panel*:

REMOVAL AND INSTALLATION

1. Open the main door and turn off the power switch in the machine.
2. Remove the wire harness connector on the left wall of the machine, between the control panel and the button switches.

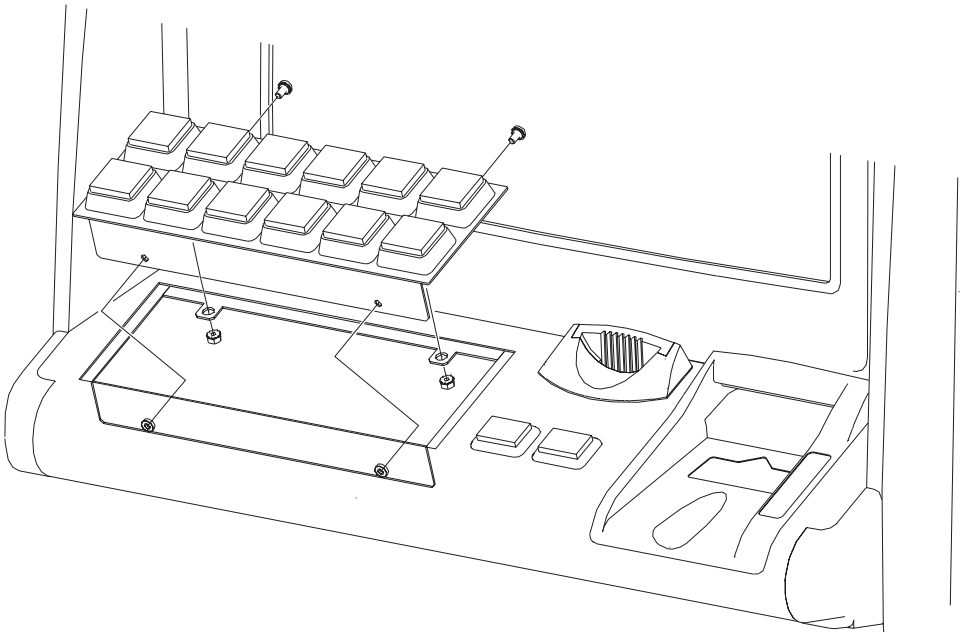

Figure 4-5 Removing the Control Panel

3. Remove the nuts and screws attaching the panel to the main door, and pull the control panel from the outside of the door to remove it. The control panel on the ES500 uses four nuts on screws fixed to the control panel and these are removed in the same way (see *Figure 4-6 Removing the Control Panel on the ES500 Model*).

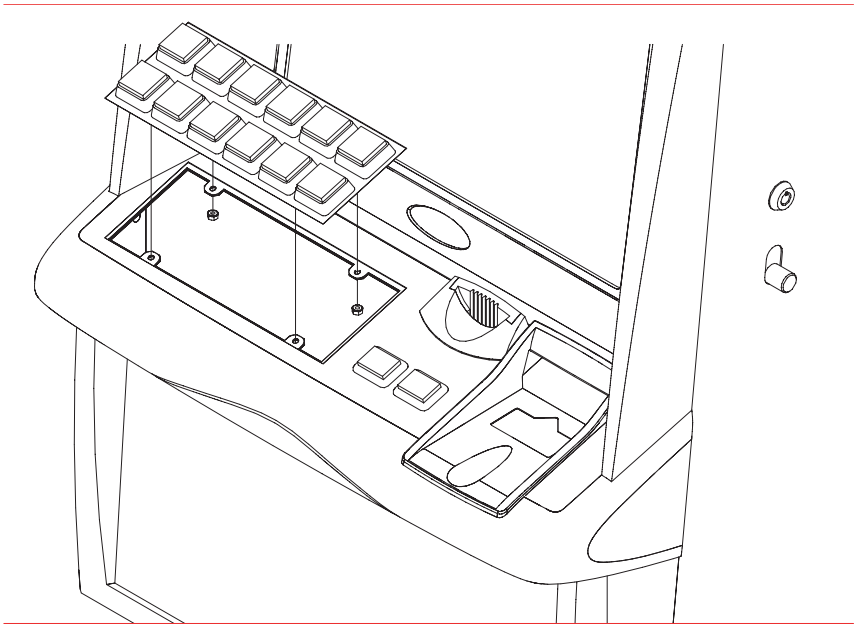

Figure 4-6 Removing the Control Panel on the ES500 Model

Installation is the reverse of the above procedure.

4.3.5 Replacing Fluorescent Lamps

CAUTION
Fluorescent lamps should be maintained and serviced only by qualified service personnel.

The pay table and belly panel (the translucent display panel located below the control panel) are illuminated by fluorescent lamps. If a fluorescent bulb does not come on or blink when the machine is turned on and operating, it needs to be replaced.

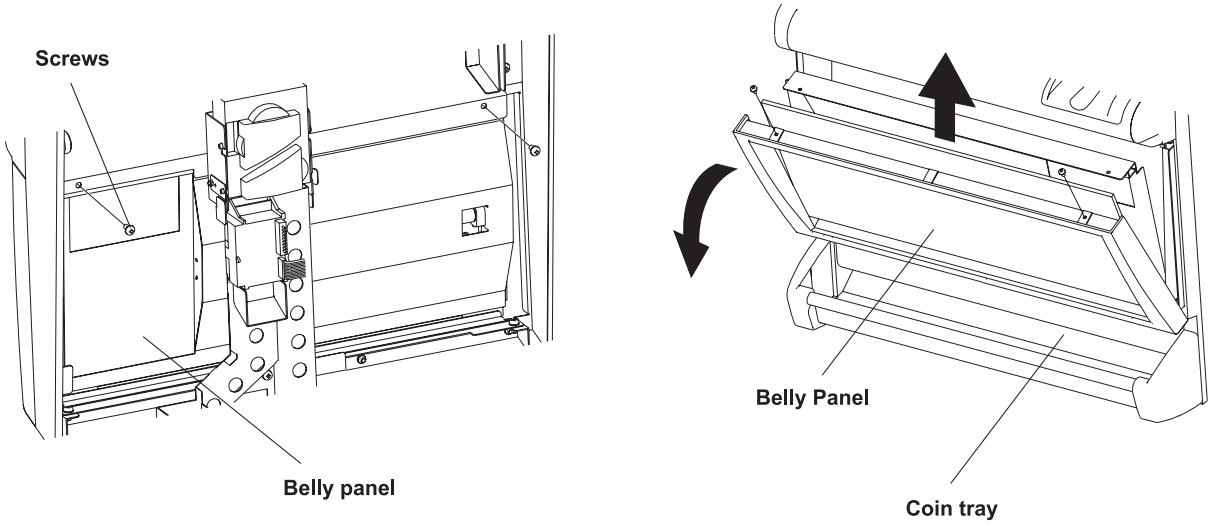

Figure 4-7 Removing the Belly Panel of the Endeavour Series Machine

A 6W and an 8W lamp are located inside the reflector box behind the belly panel, which must be removed to service or replace the lamps. The lamps are each attached by a stationary plate mounted on the reflector box, and are visible once the belly panel is removed (see *Figure 4-7 Removing the Belly Panel of the Endeavour Series Machine*.)

The ES500 machine utilises two 6W lamps located behind the belly panel (see *Figure 4-9 Removing Fluorescent Lamps in the ES500 Machine*. Lamps are replaced in the same manner in both types of Endeavour Series machines, but this procedure should only be carried out by qualified technicians.)

REMOVING THE BELLY PANEL TO REPLACE A FLUORESCENT LAMP

WARNING
The ballast gets very hot in normal use: before replacing the fluorescent tube, turn off the power and wait for it to cool.

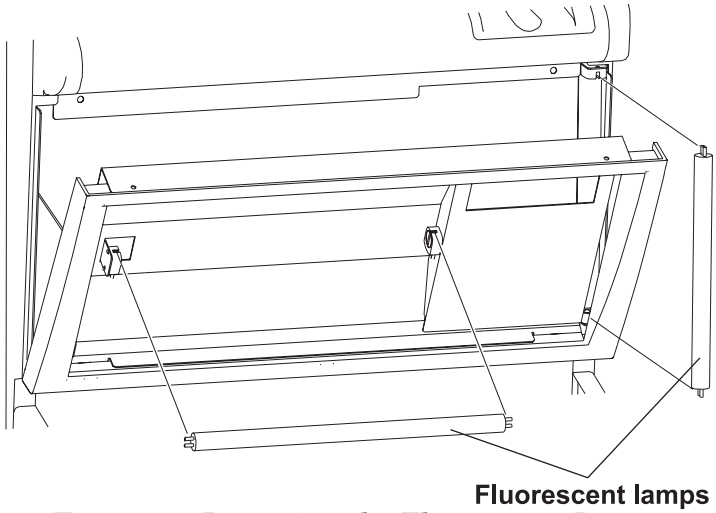

Figure 4-8 Removing the Fluorescent Lamps

1. Open the main door and turn off the power switch in the machine.
2. Remove the screw fastening the stationary plate (located above the left hole of the reflector box, as seen from inside the door), and slide the stationary plate to the left.
3. Slide the belly panel up and, when it disconnects from the door, pull the panel out and down to remove it.

NOTE
Handle the belly panel carefully – its sharp edges could break the fluorescent lamp bulb and cause injury if handled carelessly. Handle fluorescent lamp bulbs carefully as they are extremely fragile.

4. Using cutters, remove the band fastening the fluorescent lamp, then pull the lamp out from its socket (see *Figure 4-8 Removing the Fluorescent Lamps*).
5. Replacing a lamp is the reverse of the above procedure. Ensure that the belly panel is free of cracks and damage, and wipe it over using mild anti-static glass cleaner and a soft, lint-free cloth.

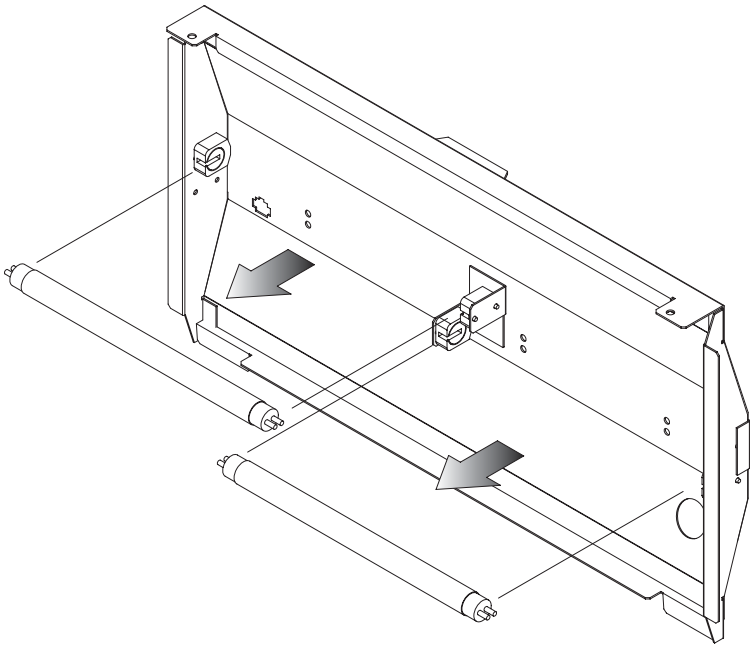

Figure 4-9 Removing Fluorescent Lamps in the ES500 Machine

TROUBLESHOOTING

If a fluorescent lamp doesn't work even after it's been replaced, replace the starter and, if necessary, the ballast. Check that the voltage in the lamp-connector is approximately 240V, and check the connections in the harness.

4.3.6 Monitor Mask

The monitor mask supports a foam strip which seals around the monitor when the main door is shut. The mask protects the machine from tampering and prevents damage to the internal components from spilled beverages and dust, and is attached by four screws located on the inside of the main door.

REMOVAL AND INSTALLATION

1. Open the main door and remove the seven screws attaching the mask to the door, including the door-strap screw.
2. Remove the top support bar.
3. Grasp the mask and carefully work it free from the door frame.
4. Remove the old tape from the monitor mask and clean off any tape residue.
5. Apply the new tape carefully from the top of the mask in one continuous, smooth motion.
6. Replace the mask, close the main door and ensure that the perimeter of the monitor is completely sealed by the mask.
7. Adjust the position of the mask, if necessary, to form the closest possible seal with the monitor.

4.4 Buttons

The buttons are electromechanical switches used to pass information between the player and the I/O circuit board. They light up during game play and in the Test Menu when functioning correctly. *Figure 4-10 Standard Button Components* shows the construction and assembly details of a typical button

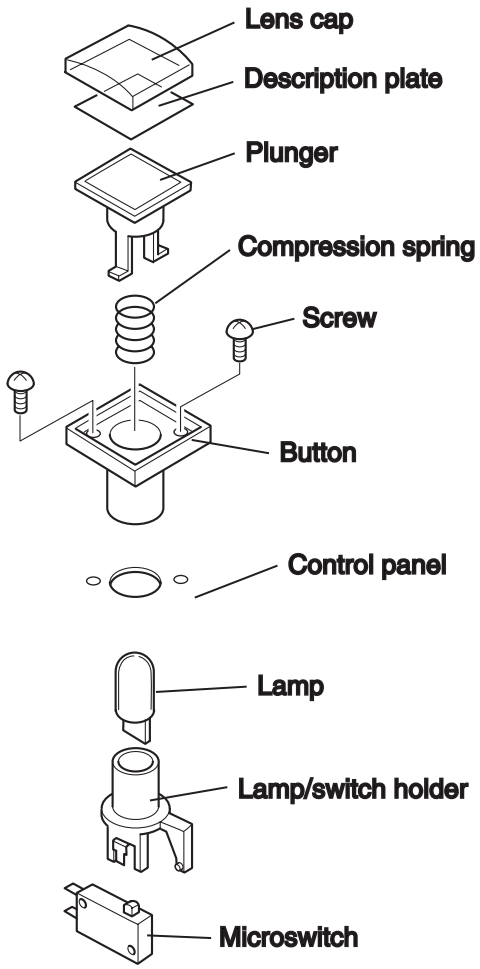

Figure 4-10 Standard Button Components

REMOVAL AND INSTALLATION

1. Open the main door and turn off the power switch in the machine.
2. Remove the leads from the base of the button, noting the colours and connection position of the wires.
3. Pull the lamp switch assembly out from the button shaft. Spread the securing tabs on the lamp switch-holder, and remove the microswitch from the holder.

4. Push the plunger tabs inwards and slide the plunger and spring combination up through the central shaft on the control panel.
5. To remove the entire button, remove the two screws securing the button to the control panel.

Installation is the reverse of the above procedure. Inspect buttons periodically to check they are clean and move freely; ensure the lock-nut is not too tight.

4.4.1 Maintenance

WARNING
Be sure to wear goggles when working with strong cleaning solvents.

NOTES
Note: 1. Do not use cleaning fluids or solvents containing chemicals such as acetone that can dissolve or cloud plastic. **Note: 2.** High voltage is generated when using this equipment: before any cleaning procedures, turn off the power to prevent electric shock. **Note: 3.** Install buttons by hand – do not use tools: buttons are difficult to remove if lock nuts are tightened with excessive force.

Periodic maintenance is essential to keep the switches operating correctly. Use these procedures as a guide, and read the following maintenance information:

Table 4-1 Button Cleaning and Maintenance

Description	Cleaning Method
Lens cap	Wipe the surface of each lens cap with a cloth soaked in a mild glass or plastic cleaning solution, and dry with a lint-free cloth.
Plunger spring **Microswitch terminal and actuator** **Internal and external lamp contact**	Clean using a short, stiff-bristled brush and alcohol. To keep the internal switch contact clean, always brush away from the switch. If the internal switch contact is closed or dirty, replace it. Rinse each part with clean water and dry thoroughly.

Description	Cleaning Method
Plunger sides and tabs **Lens cap** **Description plates** **Button interior/exterior**	Clean using warm soapy water and a brush with short, stiff bristles. Rinse each part with clean water and dry thoroughly.

4.4.2 Performance Check

For information about the following diagnostic options, refer to the Operator Mode instructions (see *Table 3-5 The Test Menu*):

- **Switch Test** – checks to see if the microswitches operate normally.
- **Lamp Test** – checks to see if the switch lamps operate normally.

In the event of any electrical problems, contact the service provider.

4.4.3 Troubleshooting

It is essential that buttons are kept in good physical condition and working order. Use the following procedure to maintain and service buttons or when fault-finding:

1. Check the button's operation using the Switch Test option in the Test Menu of the operator program (see *Table 3-5 The Test Menu*). If the button does not work, turn off the power switch in the machine.
2. Check all connectors and wires connected to the microswitch for abnormalities. Ensure that all connections are in place at the connector board. If a pin is damaged or bent, replace the connector board (CNB2).
3. Turn on the power switch in the machine and measure the voltage at both ends of the button. The voltage should be about 5 VDC in the 'rest' position, and 0 VDC when the button is pressed.
4. If the rest reading is 0 VDC, disconnect the N.O. (Normal Open) terminal and measure the voltage again. If the voltage changes to 5 VDC, the button is faulty and needs to be replaced.

If the meter still records no voltage, it may be caused by the following:

1. The wire connected to the button is either open between the IFU2 unit and the button, or short-circuited to the ground or some other line;
2. The IFU2 unit inside the security cage is faulty.

Replace any faulty parts and, if this does not solve the problem, contact Konami Australia.

4.5 Coin Validator and Diverter

The coin validator (see *Figure 4-11 Coin-In Assembly*) checks coins electronically and then rejects or accepts them into the machine. It is a two-part module consisting of a validation (upper) unit and a separator (lower) unit, and is housed on the inside of the main door of the machine.

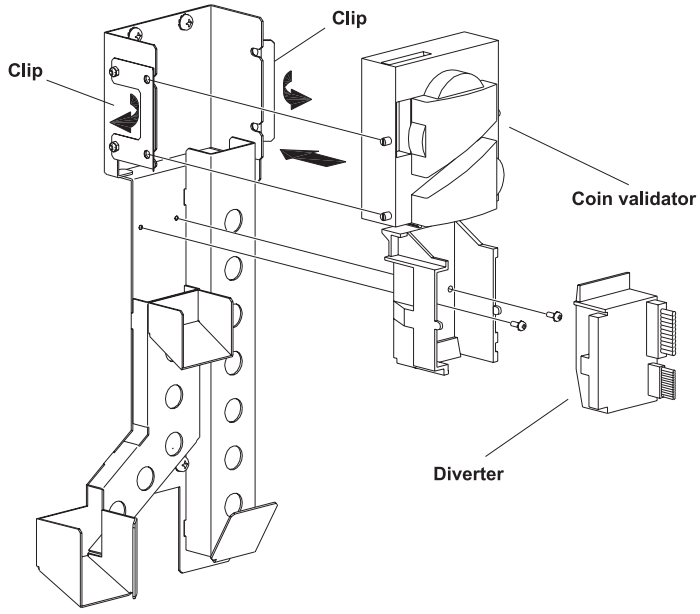

Figure 4-11 Coin-In Assembly

When a coin is inserted through the slot, it passes to the coin validator where it is electronically compared with sample data. Coins that fail the comparison are rejected and return to the coin tray via the reject chute. Valid coins are passed to the hopper or cashbox and the corresponding number of credits are added to the credit meter. The meter does not register if warped or damaged coins become jammed in the coin or diverter.

The machine is fitted with either a Microcoin QL or Condor Plus coin validator module. Installation and connection procedures are identical for each, as are the maintenance and troubleshooting instructions shown in the following procedures.

NOTES
Note: 1. Do not pull the cables to disconnect the coin validator from the main harness, as this may damage the wiring.
Note: 2. Do not pull the diverter when removing the coin validator and the diverter, as this may damage the mounting channel on the diverter.
Note: 3. Apart from clearing coin jams, the coin validator and diverter cannot be repaired on-site. If it fails, replace the unit and return it to Konami Australia for servicing.

REMOVING THE COIN VALIDATOR/DIVERTER TO CLEAR COIN JAMS

1. Turn off the power switch in the machine and determine whether the jammed coin is in the coin validator or the diverter.
2. Disconnect the wiring harness and push the side clips open.
3. Pull the coin validator away from the machine.
4. On the upright model, disconnect the wiring harness and push the side clips open.
5. Extract any jammed coins from the module.

Use the reverse of the above procedure to re-install the coin validator.

ADJUSTMENT AND MAINTENANCE

No lubrication of the coin-in assembly is needed, but check components for loose parts, damage, and symptoms of fatigue to ensure that the module operates properly. Check and clean the coin path and chutes. Statistical information is collected under 'Master Meters' in the Operator Program.

The coin validator operates only when the game is in coin-in mode and the main door is closed. It stops accepting coins when the coin-in credit reaches the maximum value.

4.5.1 Performance Check

Use the 'Coin Entry' menu item in *Table 3-5 The Test Menu* of the operator mode to check the operation of the coin validator and diverter and the diverter inputs and outputs on the module.

4.5.2 Troubleshooting

Check all wire harness connections and wires, and ensure that the coin validator is properly seated in the machine.

If an error message displays on the monitor look at the troubleshooting guidelines in *Chapter 5 Maintenance, Troubleshooting & Parts List* to determine the coin-in error status. If there is no message, replace the module.

4.6 Security Cage

The security cage is a key-locked box located directly underneath the monitor on the Endeavour Series machine, and directly behind the monitor on the ES500 model. Remove the hopper to gain access to the security cage.

The security cage contains the main control unit (MCU2), the flash memory unit (FMU2), the interface unit (IFU2), connector board (CNB2), and the DC power unit. This section contains information on the following:

- *Subsection 4.6.1 Functions of Each Circuit Board*
- *Subsection 4.6.2 Removing Circuit Boards*
- *Subsection 4.6.3 Replacing the IC Chips*
- *Subsection 4.6.4 Installing Circuit Boards*
- *Subsection 4.6.5 Wiring Connections*
- *Subsection 4.6.6 Removing and Mounting the Fan Unit*
- *Subsection 4.6.7 Security Cage Door Switch*
- *Subsection 4.6.8 Connector Board (CNB2)*
- *Subsection 4.6.9 Troubleshooting Logic Boards*

4.6.1 Functions of Each Circuit Board

The circuit boards in the machine control the game program and all of the communications between the machine and the host. They represent an essential part of the machine components and must be in perfect order if the game and the machine are to operate correctly.

MAIN CONTROL UNIT (MCU2)

The main control unit is the core of the game program, and includes the game control processor, the EPROMs for the program, the battery-backed data memory, the EEPROM for configuration data storage, and other circuits used to control games.

FLASH MEMORY UNIT (FMU2)

This board is attached to the MCU2 board and contains the video and sound memory components of the game.

INTERFACE UNIT (IFU2)

This board holds the processor for communicating with the host system, the EPROM for the program and the driver circuit for electronically interfacing with peripheral devices.

COMMS BOARD

This board holds the driver circuit that provides the electrical interface for communicating with the host system.

CONNECTOR BOARD (CNB2)

This motherboard connects each circuit board with the power supply and also holds interface connectors to peripheral devices other than the security cage.

Figure 4-12 Circuit Board Locations shows the location of the circuit boards installed in the security cage.

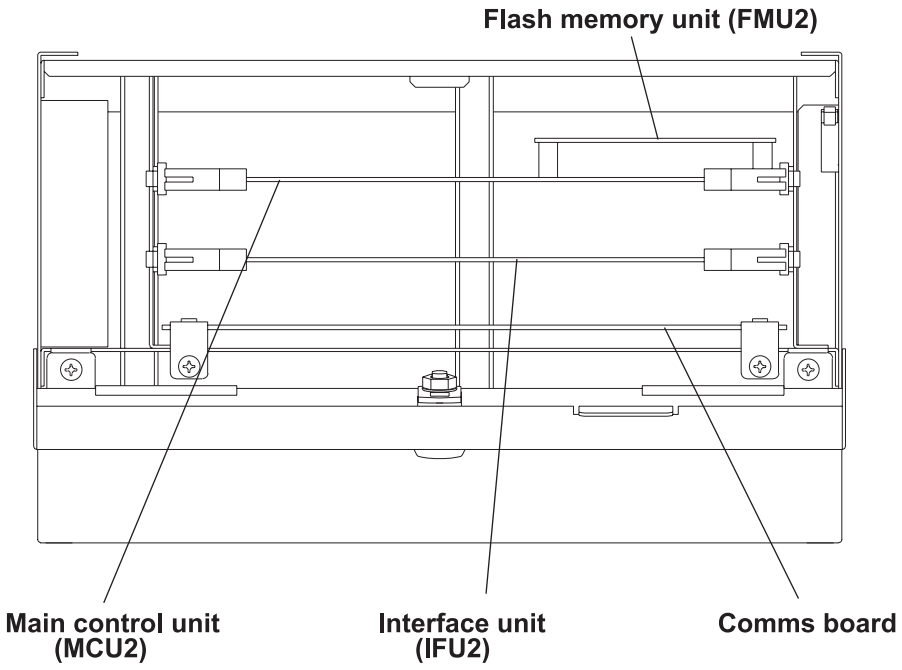

Figure 4-12 Circuit Board Locations

4.6.2 Removing Circuit Boards

NOTE
When working with circuit boards, always observe electrostatic discharge (ESD) precautions to prevent damage to the electronic components.

Occasionally, it may be necessary to remove a faulty board. Handle new boards carefully, taking care not to bend, scratch or drop them during installation.

MAIN CONTROL UNIT AND INTERFACE UNIT

1. Open the main door and turn off the power switch in the machine.
2. Remove the hopper from the machine and unlock the security cage door.
3. Pull the ejectors on both sides of the circuit board to remove it (see *Figure 4-13 Removing the Main Control Unit*.

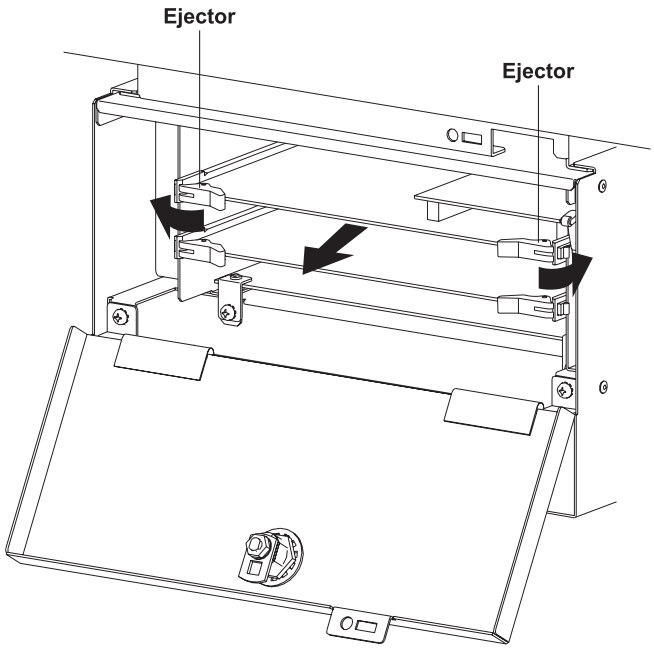

Figure 4-13 Removing the Main Control Unit

4. Remove the FMU2 board from the MCU2 board by carefully lifting it away from the main control unit.

If an error message appears on the screen warning that the batteries located on the MCU2 are low, replace them with fresh ones.

CAUTION
There is danger of explosion if a battery is replaced incorrectly. Use only identical or equivalent types recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

COMMS BOARD

1. Open the main door and turn off the power switch in the machine.
2. Remove the two screws at the front of the board connecting it to the security cage (see *Figure 4-14 Removing the Comms Board*)).
3. Pull the board carefully from the security cage, then reach in behind it and disconnect the harness attached to the back of the board.

Installation is the reverse of this procedure.

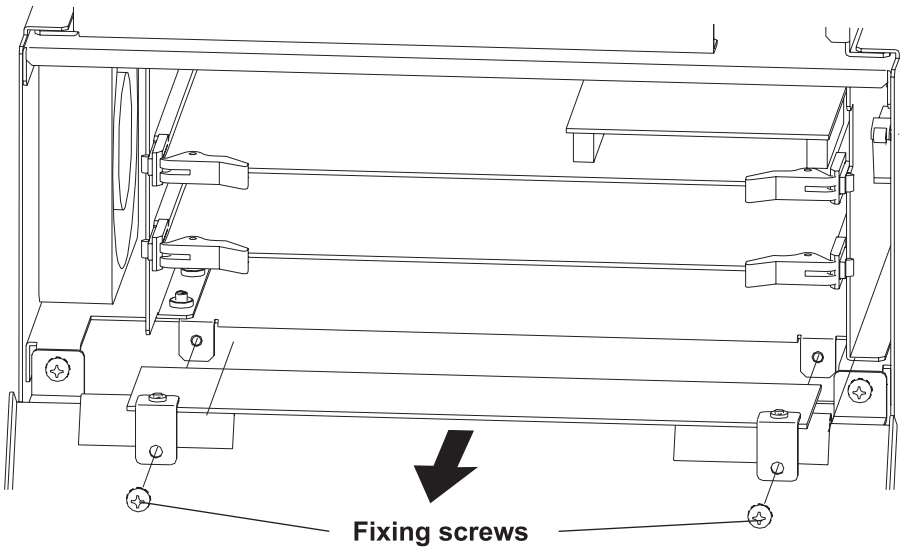

Figure 4-14 Removing the Comms Board

4.6.3 Replacing the IC Chips

NOTE
Remove and mount chips with care to avoid damaging the individual program chips and substrates. Be sure to observe ESD discharge precautions before handling circuit board components.

The only memory devices that can be replaced on-site are the two EPROMs on the main control unit (see *Figure 4-15 EPROM Positions on the Main Control Unit*), the FMU2 sound and memory components board (see *Figure 4-16 EPROM Positions on the Flash Memory Unit* and the single EPROM on the interface unit (shown in *Figure 4-17 EPROM Position on the Interface Unit*).

Use the following procedures to remove or install the IC (integrated circuit) boards on the main control unit and the interface unit:

REMOVAL PROCEDURE

Open the main door and turn off the power switch in the machine. Unlock and open the security cage door, and remove the board. Place the circuit board on a level surface to carry out work on it.

NOTE
Do not pry chips with sharp objects when removing them, to prevent damage to the track below the IC socket.

1. Locate the faulty chip and remove it with care using a chip remover. (Observe electrostatic discharge (ESD) precautions when doing this.)
2. To remove the FMU2 from the MCU2, grip the FMU2 board and carefully pull it upwards.

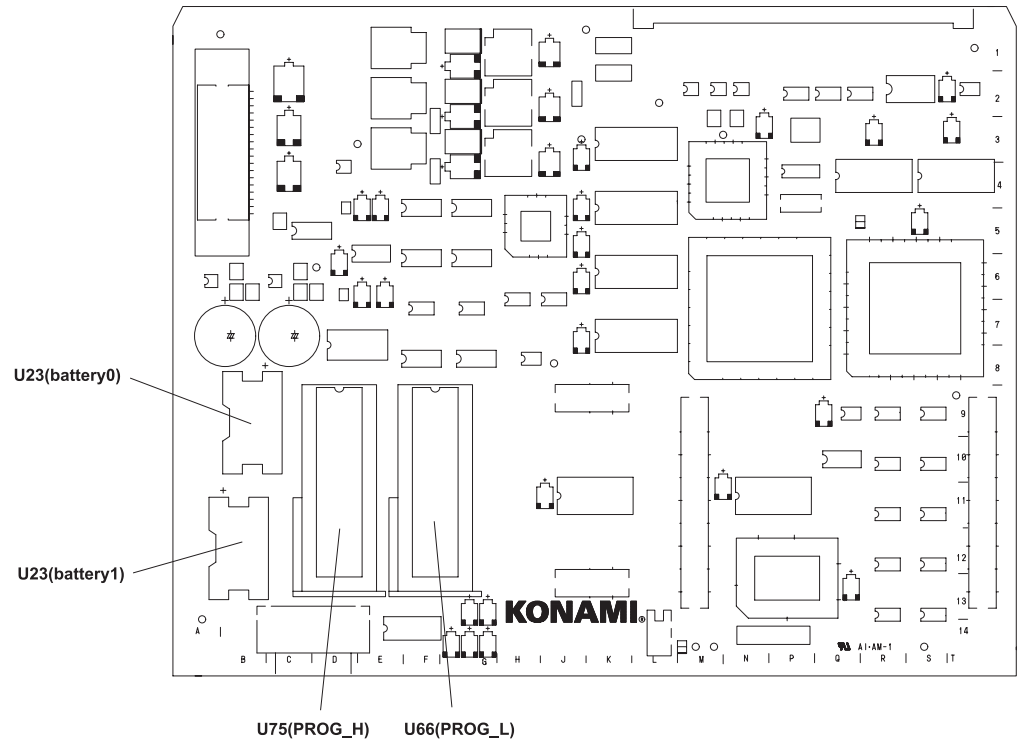

Figure 4-15 EPROM Positions on the Main Control Unit

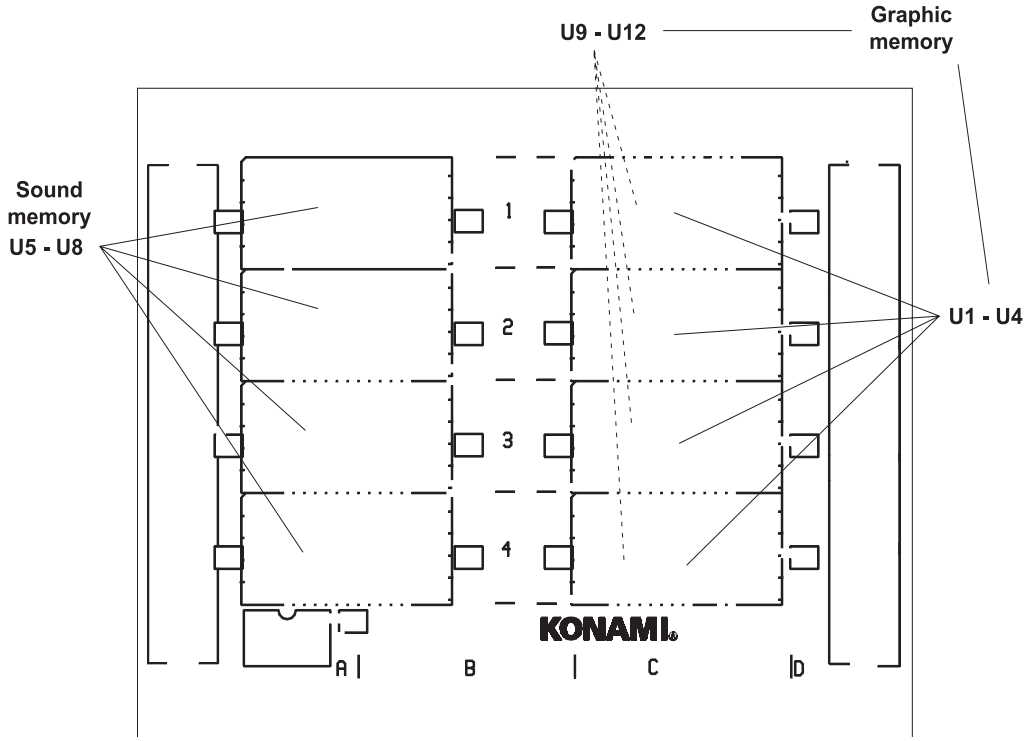

Figure 4-16 EPROM Positions on the Flash Memory Unit

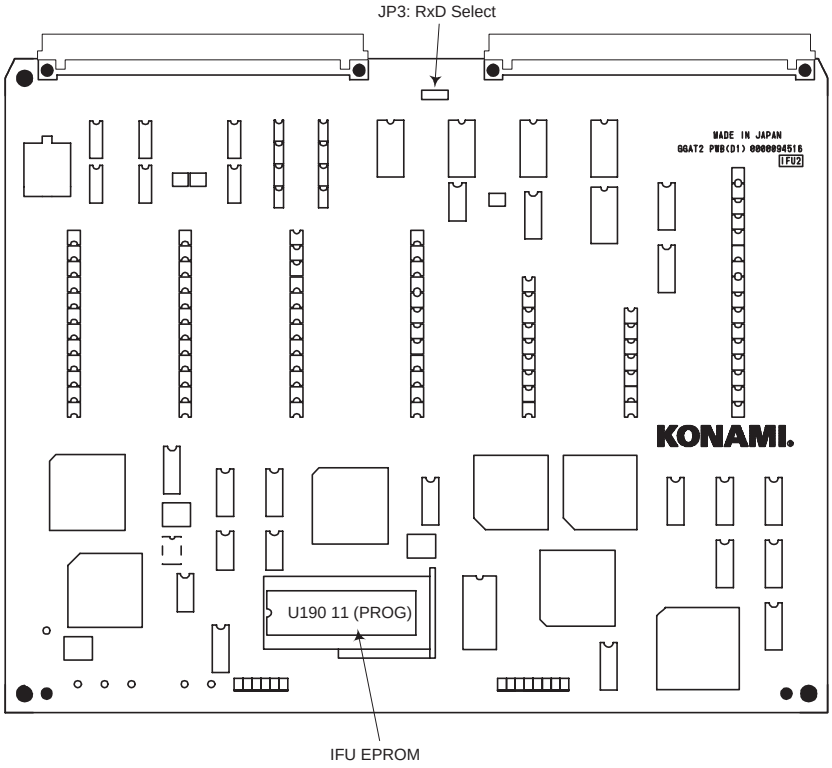

Figure 4-17 EPROM Position on the Interface Unit

INSTALLATION PROCEDURE:

CAUTION
If an IC chip is inserted facing the wrong way or if any of the 'legs' of the pins are not properly seated, it will be permanently damaged when the machine is switched on.

1. Hold IC chips by the edges. Line them up visually, and align the notch on one end of the chip with the notch outline on the processor substrate.
2. Typically, the rows of 'legs' on each computer chip are slightly wider than the socket holes. If these legs do not fit the socket due to their width, adjust the width using an appropriate chip installation tool. Otherwise, lay the chip on its side on a level surface and carefully turn it to bend the legs on both sides slightly inward to adjust their width.
3. When the chip is aligned, position it by hand into the socket, checking both sides of the chip to be sure that all legs are in place. Then press the chip all the way into the socket.

4.6.4 Installing Circuit Boards

To relace a faulty board, use the following procedure. Always handle new boards carefully, taking care not to bend, scratch or drop them during installation.

MAIN CONTROL UNIT AND THE INTERFACE UNIT

1. Align both sides of the board with the guide rails (see *Figure 4-18 Installing the MCU2 or IFU2 Circuit Boards*) in the security cage to insert the board.
2. Depress the left and right ejectors with both hands and push the circuit board forward until it clicks into place. If the board does not go in correctly, repeat steps 1 and 2 until it is properly seated.

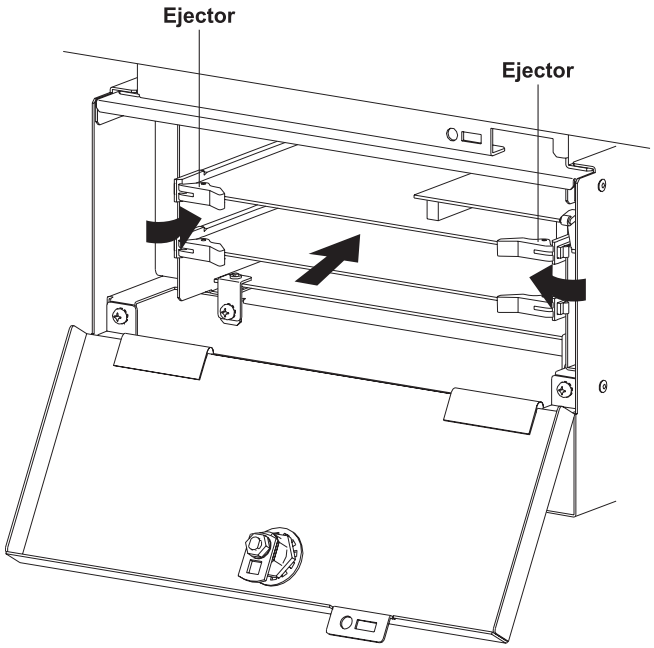

Figure 4-18 Installing the MCU2 or IFU2 Circuit Boards

3. After installing all circuit boards, lock the security cage and attach a new security seal, if required.
4. Turn on the power switch in the machine. Check that the game is operating correctly by using the Combination Test in *Table 3-5 The Test Menu*.
5. Close and lock the main door.

COMMS BOARD

1. Align both sides of the board with the guide rails (see *Figure 4-14 Removing the Comms Board*) in the security cage.
2. Press the left and right metal fixtures with both hands and press the circuit board all the way until it is fully in; repeat the process if it does not go in completely.

3. Fasten screws through the metal fixtures on both sides of the circuit board.
4. Connect the COM Data cable to the circuit board (EXT PORT).
5. Lock the security cage door after installing all circuit boards.
6. Turn on the power switch in the machine. Check game operation by using the 'Combination' test in *Table 3-5 The Test Menu*.
7. Close and lock the main door.

4.6.5 Wiring Connections

The signal cables connect to various connectors in the signal cable connection area.

REMOVING THE FRONT PANEL OF THE SECURITY CAGE

1. Open the main door of the machine and turn off the power switch.
2. Remove the screws on the left and right sides of the front panel (see *Figure 4-19 Removing the Front Panel of the Security Cage*).

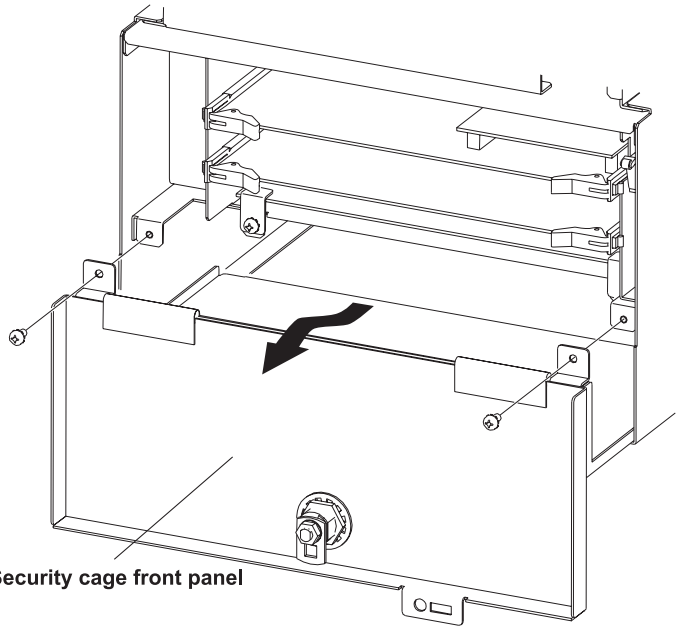

Figure 4-19 Removing the Front Panel of the Security Cage

3. Place your hand toward the back of the machine until the partitioning plate can be lifted up slightly. Remove the hook, and then pull out the front panel.

Installation is the reverse of this procedure.

DISCONNECTING THE SIGNAL CABLES

1. Open the main door and switch off the power to the machine.
2. Using a socket wrench (5.5 mm), remove the nuts on the cover plates in the signal cable connection area (see *Figure 4-20 Removing the Cover Plate*).

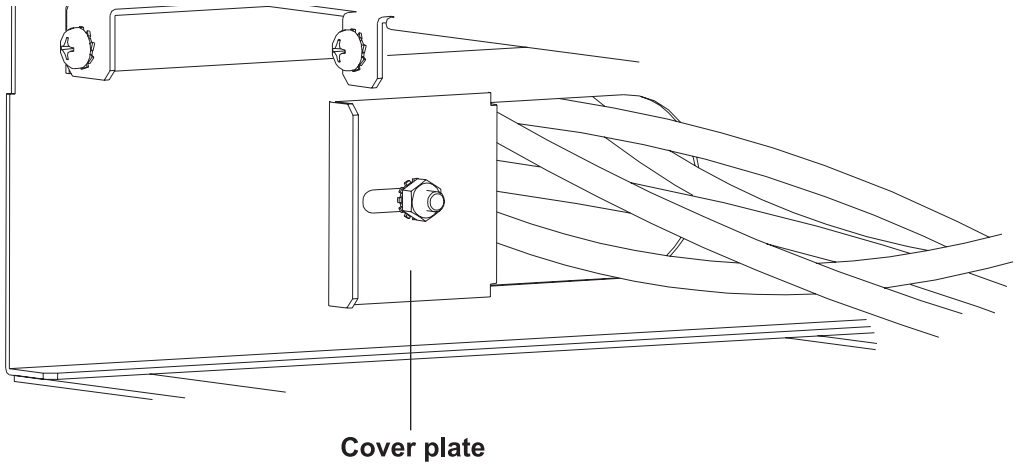

Figure 4-20 Removing the Cover Plate

3. Remove the left and right cover plates.
4. Remove each connector from the connector board (see *Figure 4-21 Connector Positions on the Connector Board* and refer to *Table 4-2 Module Positions on the Connector Board* when reconnecting cables).

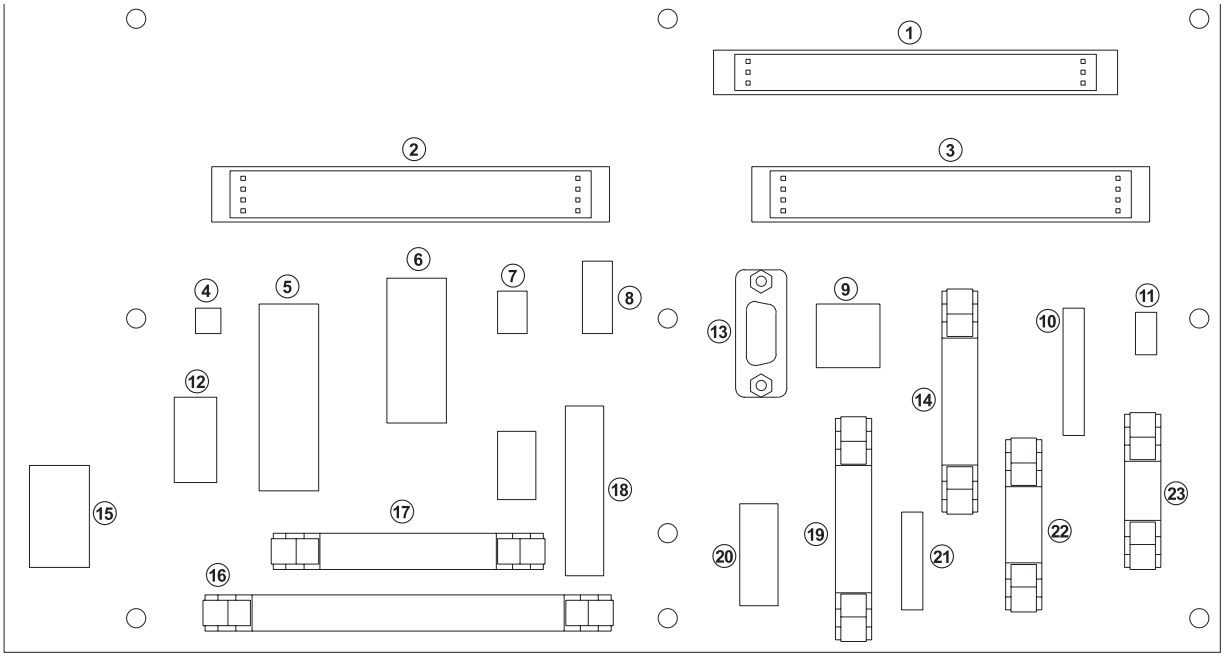

Figure 4-21 Connector Positions on the Connector Board

Table 4-2 Module Positions on the Connector Board

Posn. No.	Module	Posn. No.	Module
1	MCU2	13	Monitor
2, 3	IFU2	14	Banknote validator
4	Fan	16	Play button harness
5	Coin validator	17	Cabinet
6	Hard meters	18	Hopper
7	Power save input	19	JXU (NSW)
8	AC fail monitor	20	Speaker
9	ATU-1	21	External monitor
10	Touch screen	22	Printer (if attached)
11	Security cage door switch	23	ATU-0
12	Vic comms power input		

4.6.6 Removing and Mounting the Fan Unit

The internal fan provides cooling for the working parts of the machine. Use the following procedures to install the unit and the reverse to replace it.

REMOVING THE FAN UNIT

1. Open the main door and turn off the power switch in the machine.
2. Pull out the fan connector in the signal cable connection area.
3. Remove the main control unit, the interface unit, and the comms board (refer to *Subsection 4.6.2 Removing Circuit Boards*).
4. Unscrew and remove the fan (see *Figure 4-22 Removing the Fan Unit*).

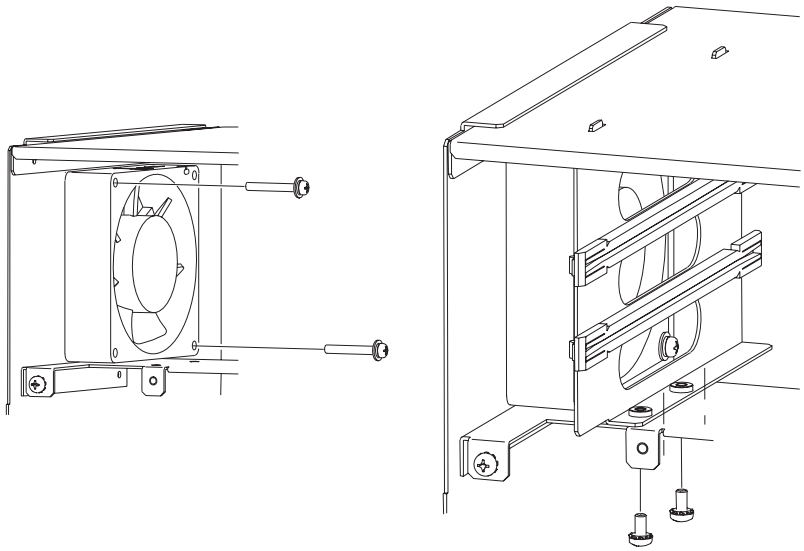

Figure 4-22 Removing the Fan Unit

4.6.7 Security Cage Door Switch

This switch monitors the status of the security cage door, and activates an alarm when the door is opened. If it needs to be removed:

1. Turn off the power switch in the machine.
2. Take out the main control unit and the interface unit.
3. Remove the comms board.
4. Pull out the door switch connector in the right rear of the circuit board mounting area and, using a 5.5 mm socket wrench, remove the two flange nuts attaching the cover to the door switch.
5. Remove the switch, taking care not to catch the cable on the machine body.

Installation is the reverse of the above procedure.

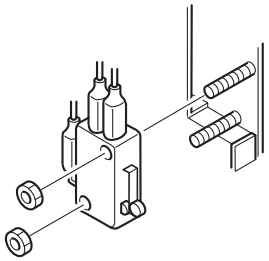

Figure 4-23 Removing the Security Cage Door Switch

4.6.8 Connector Board (CNB2)

The connector board is attached to the rear of the security cage. All of the circuit boards and the fan must be removed to replace or work on the connector board (see

The connector board is attached to the rear of the security cage. All of the circuit boards and the fan must be removed to replace or work on the connector board. See and

The connector board is attached to the rear of the security cage. All of the circuit boards and the fan must be removed to replace or work on the connector board. See and

The connector board is attached to the rear of the security cage. All of the circuit boards and the fan must be removed to replace or work on the connector board. See .

REMOVAL

1. Open the main door and turn off the power switch in the machine.
2. Remove the main control unit and the interface unit (see *Subsection 4.6.2 Removing Circuit Boards*

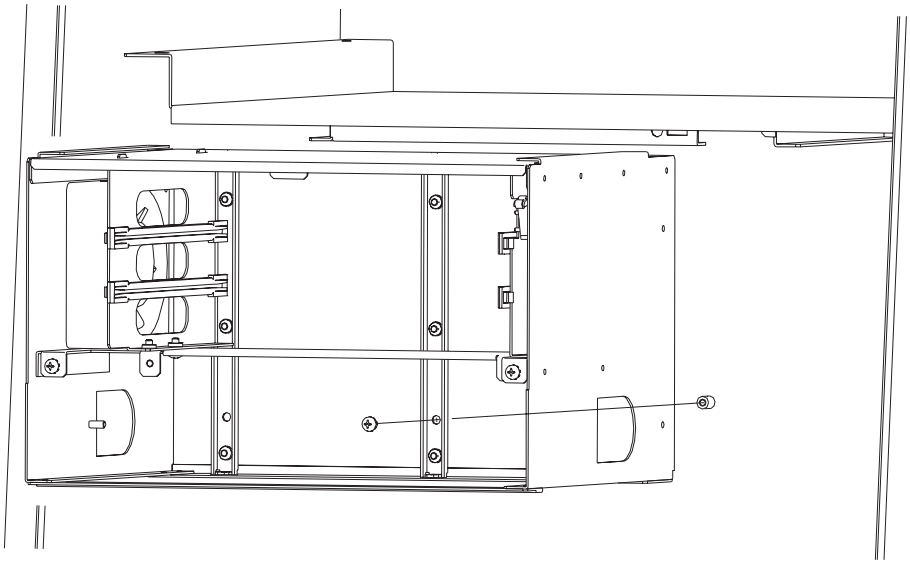

Figure 4-24 Removing the Security Cage

3. Take out the comms board.
4. Remove the key plate and nuts and remove the security cage from the cabinet (see *Figure 4-23 Removing the Security Cage Door Switch*).
5. Remove the fan unit and the security cage door switch.
6. Remove the screws attaching the connector board to the cover and remove the motherboard from the security cage (see *Figure 4-25 Removing the Connector Board*).

INSTALLATION

1. Position the circuit board at the rear the of the security cage and attach it with screws (nine locations).
2. Install the fan unit and the security cage door switch.
3. Position the security box inside the cabinet and secure it with screws at the three locations.
4. Connect all harnesses.
5. Insert the main control unit and the interface unit.

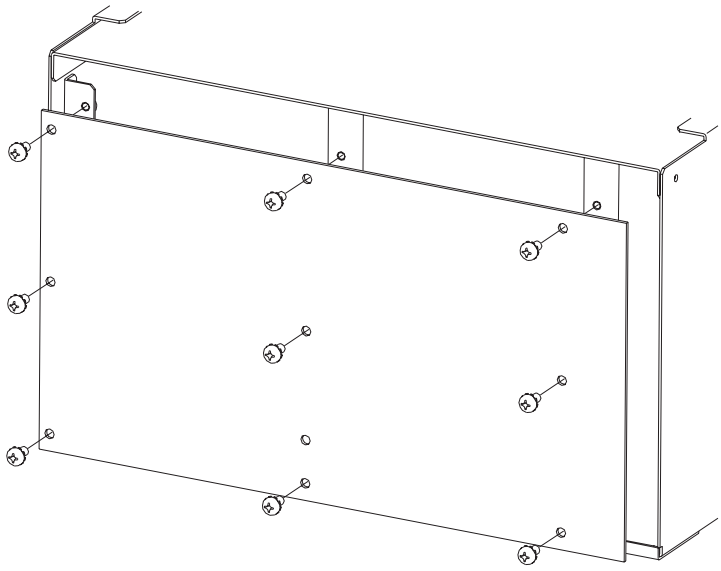

Figure 4-25 Removing the Connector Board

6. Install the comms board, then close and lock the security cage door.

4.6.9 Troubleshooting Logic Boards

Periodically, or in the event of a problem, check the logic boards as follows:

1. Turn off the power switch in the machine, and visually inspect the boards to check that they are correctly installed.
2. Check the pin assignment of the related connectors or faulty part, and replace the defective board, if necessary.

4.7 Power Supply

WARNING
This is a high voltage unit: before servicing, disconnect the machine's power supply cord.

The machine uses an AC power unit and a DC power unit, the functions of which are described in the following subsections.

In the Endeavour Series machine the DC power unit sits in the back left corner of the machine, behind the ballast unit, and the AC power unit is located at the back of the machine. In the ES500 machine the two units are located along the back wall of the machine, beneath the security cage; the ballast unit has the same location in both machines.

4.7.1 The AC Power Unit

This module provides a connection to the host's facilities to run the machine. The function of the various components of the module is shown in *Table 4-3 Components of the AC Power Unit* and pictorially in *Figure 4-26 The AC Power Unit*.

Table 4-3 Components of the AC Power Unit

Part	Description
Inlet FN329-6/05	The connection for the power cord (compatible with 240 VAC, 50 Hz).
Outlet 38A1	An outlet connector provided as the service GPO. It is compatible with a 240 VAC power supply up to 3A.
Main switch JW-L21RKK	This turns on the power to the main unit via a cable that runs inside the machine from the switch to the power unit.
Noise filter MXB-1206-33	Eliminates noise from the input power supply.
Surge protector RAV-781BWZ-4	Removes surges from the input power supply.
IOSSR, G3TA-1AZR02-US	Detects the disconnection of input AC power and notifies the main controller.
Fuse, Main	5A for the main power supply.
Fuse, GPO	3.15A for service GPO.

REMOVING THE AC POWER UNIT

1. Unplug the power cord from the power supply outlet.
2. Remove the interface box, the DC power unit and the cable to the connector board.
3. Using a socket wrench (7 mm) remove the two nuts attaching the power unit to the machine (see *Figure 4-27 Removing the AC Power Unit*).

Installation is the reverse of the above procedure. Once the unit is installed, check that the machine functions normally.

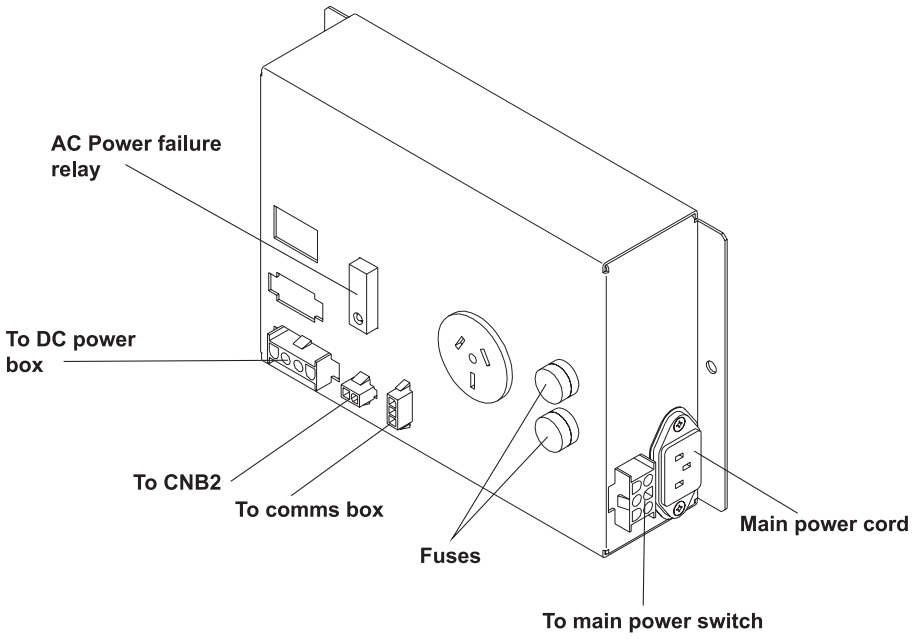

Figure 4-26 The AC Power Unit

INSPECTION

1. Ensure the power cord, connectors, and fuses are all securely connected.
2. Check the condition of all wires and fuses to ensure that no wires are crushed or damaged.

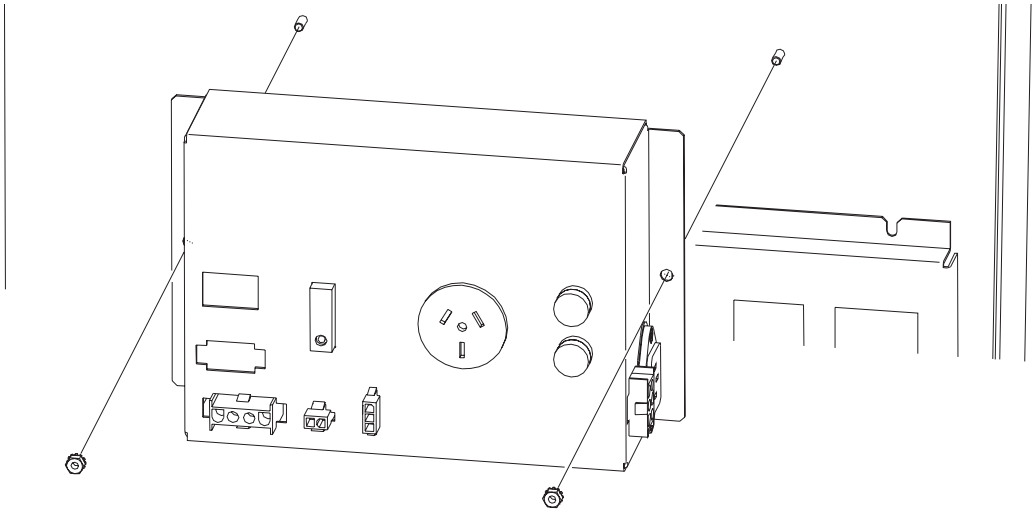

Figure 4-27 Removing the AC Power Unit

4.7.2 The DC Power Unit

Figure 4-28 The DC Power Unit illustrates the main components of the module, and they are also tabulated in *Table 4-4 Components of the DC Power Unit*:

Table 4-4 Components of the DC Power Unit

Part	Description
12 V switching power supply, ZWS100PF-12/J	The 12 V power supply used to control the peripherals.
24 V switching power supply, ZS120PPF-24	The 24 V power supply used to control the peripherals.
SSR, SF5DYZ-H1-5	The relay used for power saving.

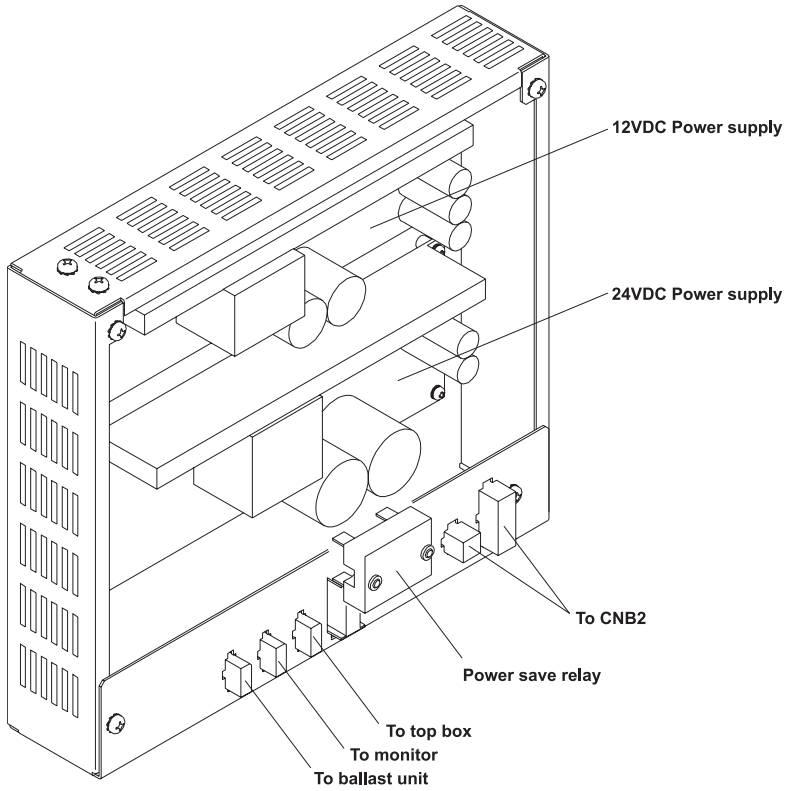

Figure 4-28 The DC Power Unit

REMOVAL AND INSTALLATION

1. Open the main door and turn off the power switch in the machine.
2. Take out the ballast unit after removing the supporting screw attaching the ballast to the machine wall.
3. Disconnect all cables attached to the power unit.
4. Remove the screw on the top of the DC power unit and remove the unit from the machine (see *Figure 4-29 Removing the DC Power Unit*.

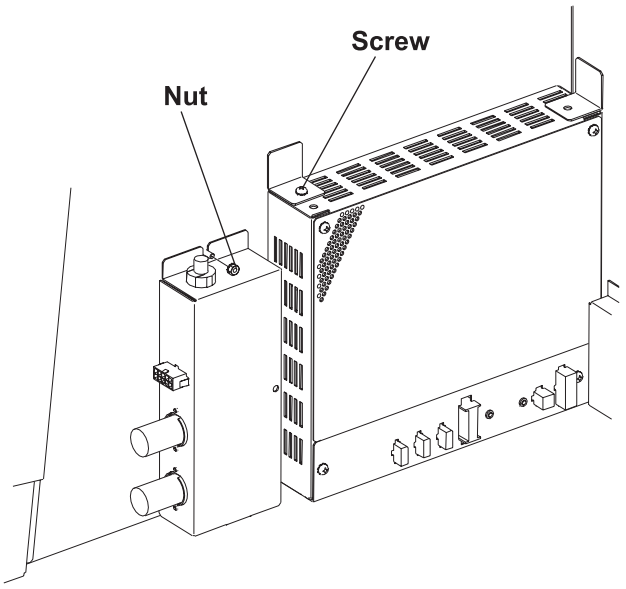

Figure 4-29 Removing the DC Power Unit

Installation is the reverse of this process.

In the ES500 machine the AC and DC power units are located side by side along the back wall of the machine, underneath the security cage (see *Figure 4-30 Removing the AC and DC Power Units in the ES500 Machine*).

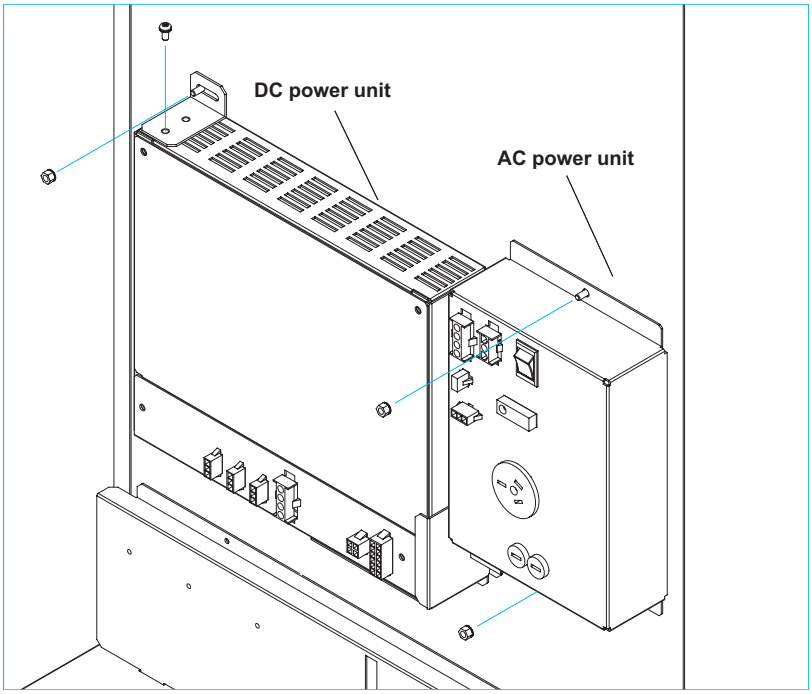

Figure 4-30 Removing the AC and DC Power Units in the ES500 Machine

TROUBLESHOOTING

Check that all connectors and harnesses are properly mated.

4.8 The Communications Interface

WARNING
This is a high voltage unit. Before servicing, disconnect the power-cord at the wall-socket.

The comms box (see) contains a switching regulator and provides the +12VDC power for the communication interface board. It is found in the centre of the back wall of the machine, near the bottom of the cabinet.

The following components constitute the comms box:

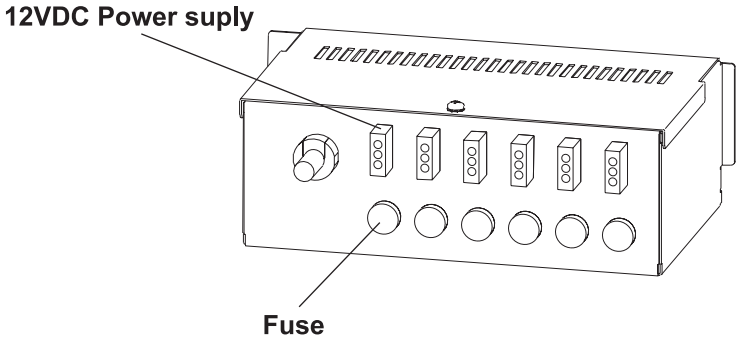

Figure 4-31 The Comms Power Box

- Transformer, switching regulator SWS50PF-12/J, to supply 12VDC power.
- Fuses – one Bussman 504 series, 0.5A anti-surge type, is provided for each of the six channels.

REMOVAL AND INSTALLATION

1. Turn off the main power switch in the machine.
2. Disconnect the input power supply connector from the unit.
3. Remove the screw attaching the left side of the comms box to the machine cabinet (see *Figure 4-32 Removing the Comms Power Box*).

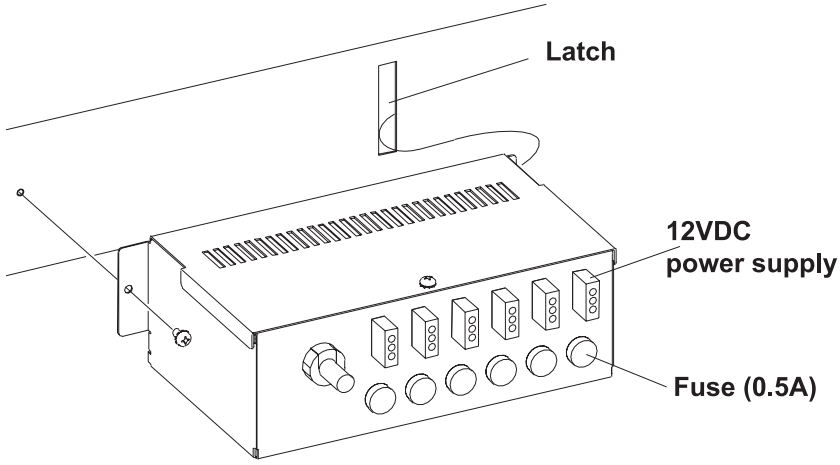

Figure 4-32 Removing the Comms Power Box

4. Unlatch the catch at the right of the box and remove it from the machine.

Installation is the reverse of the above procedure.

TROUBLESHOOTING

Check that all connectors and harnesses are secure.

4.9 The Top Box

The top box houses a translucent acrylic display panel, the pay-table, which is backlit by two fluorescent lamps (only one lamp in the casino model) and provides game information for the player.

REMOVING THE PAY TABLE PANEL

1. Unlock and open the main door.
2. Grip the top box frame at both sides and lift it clear of the machine.
3. Lift the pay-table up, pull it outwards from the machine at the bottom, then lower the panel to disengage it from the supporting tabs on the machine frame.

NOTE
Take care not to scratch the artwork or acrylic resin. Close the top box slide before closing the main door, to avoid damage to the main door.

Be careful when handling fluorescent lamps as they may explode or crack. The ballast emits high temperature in use, so wait until the ballast temperature falls close to room temperature before replacing the fluorescent tube.

REPLACING THE LAMP

CAUTION
Fluorescent lamps are to be maintained and serviced only by qualified service personnel.

The top box fluorescent lamp is attached to a bracket in the centre of the top box (see *Figure 4-33 Top Box Assembly – High Top* and *Figure 4-34 Top Box Assembly – Casino Top*). To replace a lamp:

1. Turn off the power switch in the machine and allow the lamp to cool.
2. Remove the top box panel and, holding the fluorescent lamp at both ends, rotate it through 90° (in either direction) and pull the lamp downwards from its socket.
3. Fit the new lamp and return the top box to its position. If the lamp doesn't work when the machine is switched on, rotate the starter anti-clockwise to remove it and replace it.
4. If the lamp still won't work, it may be necessary to replace the ballast assembly. To do this, remove the fluorescent lamp assembly and loosen the slot screws in the ballast at the rear of the fluorescent lamp-bracket assembly.
5. Remove all wires connected to the ballast, then the screws fastening the ballast to the lamp-bracket.

Reverse the above procedure when installing a fluorescent lamp.

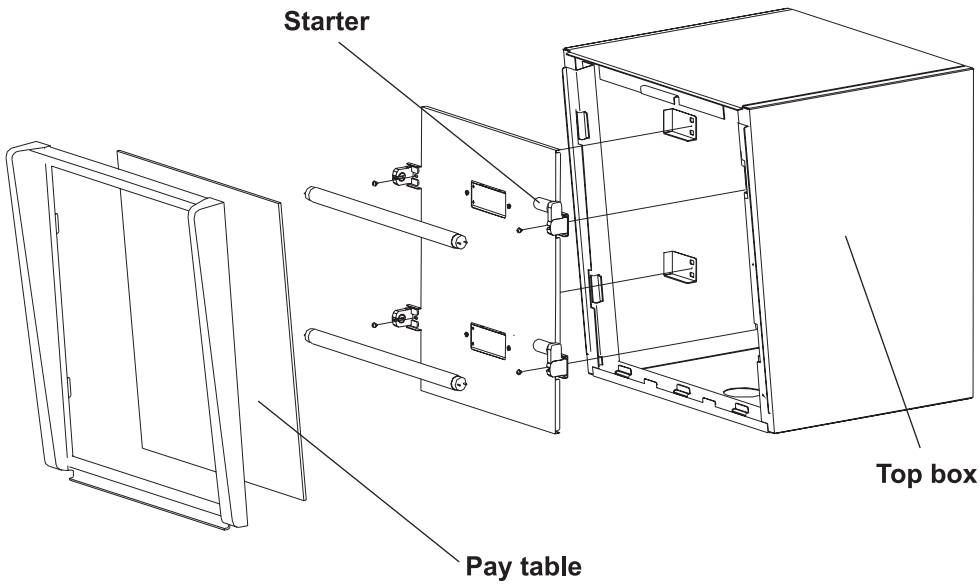

Figure 4-33 Top Box Assembly – High Top

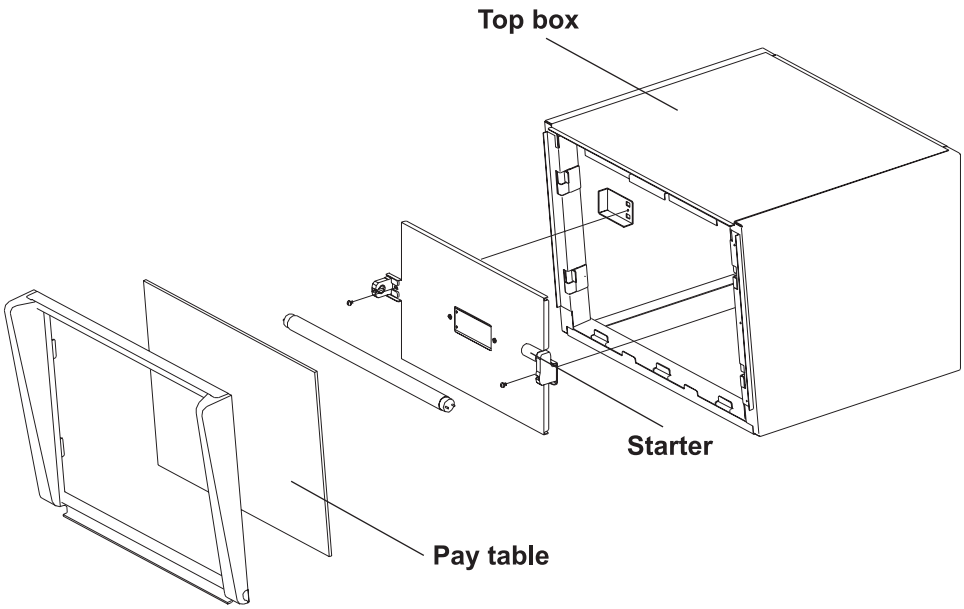

Figure 4-34 Top Box Assembly – Casino Top

TROUBLESHOOTING

The fluorescent lamp lights when the power to the machine is turned on. If it blinks or doesn't light up, see *Table 5-2 In-Port Troubleshooting* in *Chapter 5 Maintenance, Troubleshooting & Parts List.*

4.10 The Monitor

This section covers the following items relating to the monitor:

- *Subsection 4.10.1 Description*
- *Subsection 4.10.2 De-gaussing the CRT Monitor*
- *Subsection 4.10.3 Removing the Monitor*
- *Subsection 4.10.4 Inspection*
- *Subsection 4.10.5 Cleaning*
- *Subsection 4.10.6 Adjusting the Monitor Display*
- *Subsection 4.10.7 Adjusting the Monitor Display on the ES500 Machine*
- *Subsection 4.10.8 Troubleshooting the CRT Monitor*
- *Subsection 4.10.9 Troubleshooting the LCD Monitor (ES500 only)*
- *Subsection 4.10.10 Performance Check*

4.10.1 Description

The Endeavour Series upright and slant-top machines are equipped with a 20-inch CRT colour monitor, while the ES500 has a 17-inch LCD monitor.

Different brands of monitor may be used in each machine model and the service

and maintenance procedures detailed in the service manual may vary slightly according to the brand being used: if in doubt refer to the original manufacturer's recommendations.

A 'mask' installed on the inside of the main door seals around the monitor when the main door is closed, preventing dust and liquids penetrating to the inside of the cabinet.

Brightness, horizontal size, vertical size, and position are adjusted in the factory, but regular adjustment and cleaning are recommended for best display quality.

For the recommended maintenance schedule, see *Chapter 5 Maintenance, Troubleshooting & Parts List*.

4.10.2 De-gaussing the CRT Monitor

NOTES
This procedure is not necessary for the LCD monitor used in the ES500 machine

De-gaussing removes residual currents from the monitor prior to working on it to adjust settings. Image discoloration or fadeout are typical conditions requiring monitor adjustment, but the monitor should be de-gaussed before adjusting or servicing the monitor. Read this whole procedure thoroughly, and perform steps 3–5 within 30 seconds so that the de-gausser is not damaged.

1. Open the main door and turn on the power switch in the machine.
2. Wait for at least one minute for the monitor to warm up.
3. Connect the power plug of a CRT degausser to the proper AC voltage outlet.
4. With the CRT degausser about 8 cm away from the front of the video screen, turn the degausser on. If the degausser operates normally, the colour and image on the monitor will be distorted.
5. Move the degausser in a slow circle around the monitor.
6. Keep the degausser about 60 cm from the monitor surface. The distortion will decrease as the degausser moves away from the monitor.

Because it operates in a different electronic manner than a CRT monitor, the LCD monitor in the ES500 machine does not need to be de-gaussed.

4.10.3 Removing the Monitor

WARNING
1. Monitor repairs and maintenance should only be carried out by authorised personnel. To prevent electric shock when repairing the monitor use only one hand. Put the other hand behind the back or in a pocket to minimise the danger of electricity flowing through the body. Also, and if in doubt, touch components first with the back of the hand. If a short-circuit occurs, the muscle of the hand automatically contracts to pull the hand back from the electrified object, rather than acting to seize it. 2. Switch off the power at the mains before removing the monitor, because the monitor power connector is exposed once the monitor is removed. 3. Residual voltage may be present in the monitor assembly unit even if the power is turned off. Do not touch naked cable wiring or connectors when handling the monitor assembly.

The monitor should be removed to prevent damage when cleaning dust from the monitor chassis and when repairing adjacent components. It is not necessary to remove the monitor when adjusting it or to clean the screen.

REMOVING THE MONITOR – ENDEAVOUR SERIES

The banknote acceptor must first be removed to prevent damage to the monitor when removing it. Unlatch the banknote validator/bezel assembly and pull it forward (see *Figure 4-45 Banknote Acceptor Assembly (GPT)*). Disconnect the harness on the right side of the banknote acceptor, pull the banknote acceptor out from the machine, then lock it back into its normal position. To remove the monitor:

1. Turn off the power switch in the machine.
2. Remove the two chassis fixing screws at the front of the monitor and pull it out from the cabinet until the handles appear.
3. Using the handles, pull the monitor assembly smoothly from the cabinet.

REMOVING THE MONITOR – ES500 MODEL

1. Turn off the power switch in the machine.
2. Press the white locking pin (located behind the main door latch) to release the monitor, and swing the monitor out from the machine.

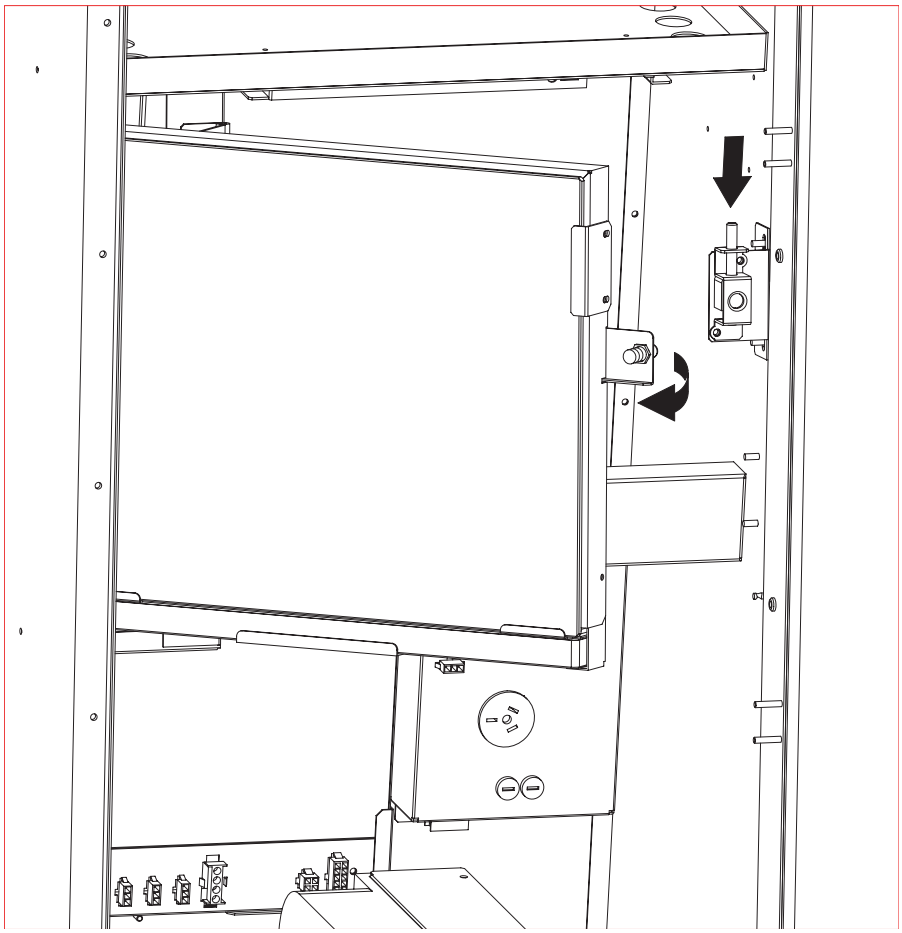

Figure 4-35 Removing the LCD Monitor

3. Disconnect the VGA cable and the black power cord leading to the monitor.
4. Remove the four screws attaching the monitor to the supporting bracket, and carefully remove the monitor from the machine.

Installation is the reverse of the removal procedures.

4.10.4 Inspection

After installation or maintenance, check the monitor display. With the main door closed and the power turned on, check that the displayed colours are correct. Look for any areas in the centre or edge of the screen where the colour has changed or is faded, and that the image is not 'burnt'. If colour adjustment is necessary, see *Subsection 4.10.2 De-gaussing the CRT Monitor* and *Subsection 4.10.6 Adjusting the Monitor Display*.

4.10.5 Cleaning

NOTES
Do not clean or adjust the monitor if it is damaged in any way. Have it serviced to determine the cause of the problem, or replace it.

See *Subsection 5.2.1 Monthly Maintenance* for maintaining the monitor in a clean condition.

Ensure that the spill-tray at the front of the monitor is kept clean and dry. Remove the tray periodically and wipe it clean with a cloth moistened in warm water.

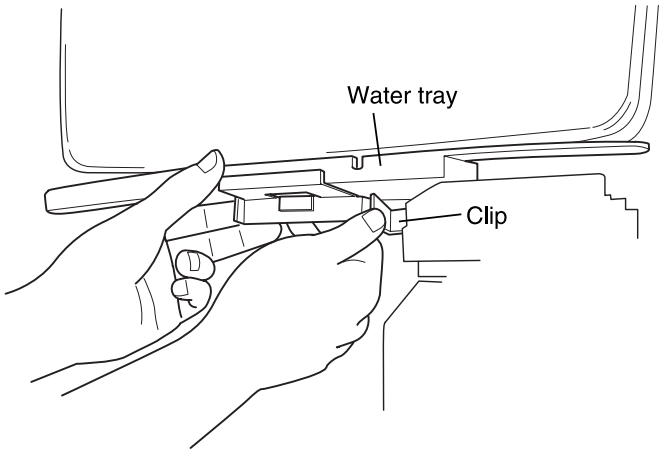

Figure 4-36 Removing the Water Tray

On the ES500 machine, remove the drip-tray by tilting it outwards from the bottom of its cradle, then carefully withdrawing it away from the machine. (see *Figure 4-37 Removing the Drip-tray in the ES500 Machine*)

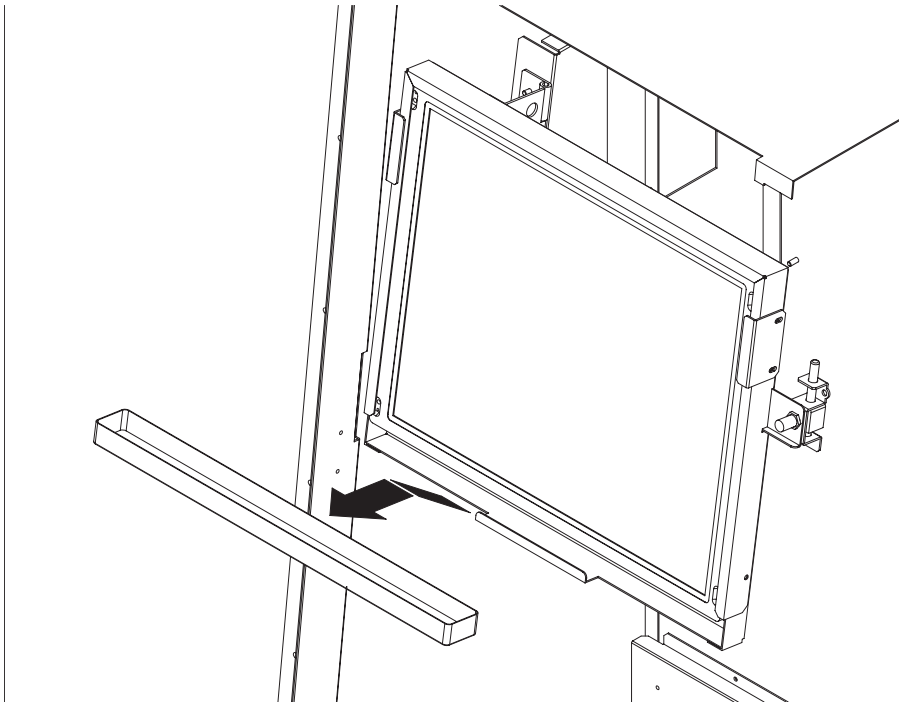

Figure 4-37 Removing the Drip-tray in the ES500 Machine

4.10.6 Adjusting the Monitor Display

It is important that the monitor is properly adjusted to display the game features correctly, especially after being installed or when maintenance has been performed.

Use the following procedure to adjust the monitor display in the Endeavour Series machine. To adjust the LCD monitor on the ES500 model refer to the manufacturer's instructions.

ADJUSTING THE MONITOR DISPLAY ON THE ENDEAVOUR SERIES MACHINE

1. Turn on the power switch in the machine and allow at least one minute for the monitor to warm up.
2. Remove the white water-tray by pulling it firmly from the securing clips on the monitor handle (see *Figure 4-36 Removing the Water Tray*). This exposes the monitor adjustment controls (found immediately underneath the screen (see *Figure 4-38 Monitor Adjustment Controls*) which are connected to the monitor's circuit board.
3. Rotate the adjustment controls using a screwdriver, until the monitor screen is displayed fully.

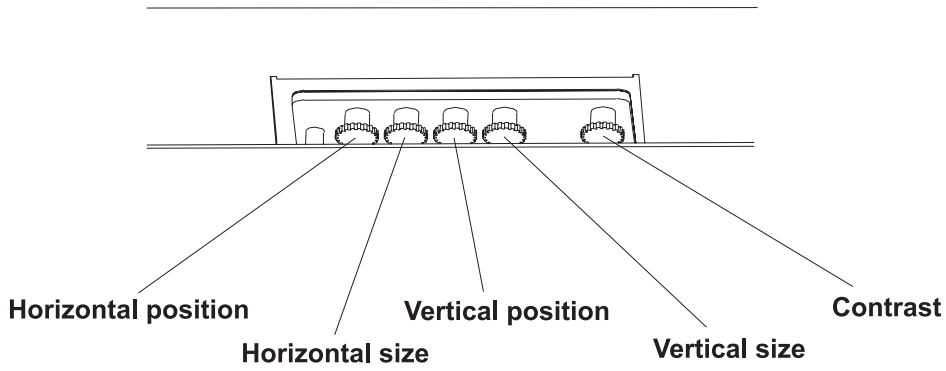

Figure 4-38 Monitor Adjustment Controls

4. Basic adjustments can be made as shown in *Table 4-5 Basic Monitor Control Adjustment*.

Table 4-5 Basic Monitor Control Adjustment

Adjustment	Result
RGB input gain adjustments	Increases the intensity of each of the corresponding colours (red, green, and blue).
Brightness adjustment (BRIGHT)	Increases and decreases the display brightness.
Vertical hold adjustment (V.HOLD)	Stops the image from scrolling up or down.
Horizontal hold adjustment (H.HOLD)	Stops the image from scrolling left or right.

The above basic adjustments are normally adequate to achieve a good display. For finer adjustments, refer to *Table 4-6 Fine Monitor Control Adjustment* and *Table 4-7 Monitor Image Adjustment*.

Table 4-6 Fine Monitor Control Adjustment

Adjustment	Result
Vertical display adjustment (V.POSITION)	Moves the image on the monitor screen up or down without affecting the image size
Horizontal display adjustment (H.POSITION)	Moves the image on the monitor screen to the left or right without affecting the image size

To adjust the image size:

Table 4-7 Monitor Image Adjustment

Adjustment	Result
Vertical height adjustment (V.HEIGHT)	Enlarges or reduces the size of the image on the screen without affecting the horizontal position of the screen image
Vertical linearity adjustment (V.LIN)	Adjusts the balance of the image spread between the top and bottom of the screen e.g. rotating the control clockwise stretches the image at the top of the screen and contracts it at the bottom.

4.10.7 Adjusting the Monitor Display on the ES500 Machine

Refer to the following procedure and tables to give the best possible display on the LCD monitor.

MONITOR ADJUSTMENT

1. Turn off the power switch in the machine.
2. Press the locking latch and swing the monitor outwards to access the button panel at the rear of the monitor.
3. Press the *'Menu'* button to bring up the on-screen display (OSD) menu.

Table 4-8 Adjusting the Monitor Display in the ES500 Machine

Button	Function
'Power'	Switches on the power to the monitor.
'LED'	This lamp is lit when the monitor is switched on.
'Source'	Synchronises the monitor's signal source.
'Increase'	When a sub-menu has been selected, use these two buttons to vary the attribute being adjusted.
'Decrease'	
'Down'	Moves the cursor to the next selection.
'Menu'	Opens the menu to begin the adjustment process.

4. Use the control panel buttons to select the various attributes in turn to adjust the monitor. The function of each button is described in *Table 4-8 Adjusting the Monitor Display in the ES500 Machine*.

4.10.8 Troubleshooting the CRT Monitor

The above basic adjustments are normally adequate to achieve good screen display. The following sections discuss some of the main problems that can occur with the monitor and how to resolve them:

THE SCREEN IS BLANK

If the machine is still playable, turn the audit key switch if the machine is in the power saving mode to return the machine to the operational mode. Check that the brightness control is adjusted properly (see *Subsection 4.10.6 Adjusting the Monitor Display*).

1. Turn on the power to the machine. If power is being supplied to the monitor, a high-pitched squeal can be heard from the monitor's flyback transformer.
2. If no sound can be heard, check that the monitor harness in the monitor unit is connected and is not defective.
3. If the monitor power harness is properly connected, measure the AC voltage in the connector plug. The AC voltage must be about 240 VAC.
4. If the measured voltage is correct, replace the monitor (See *Subsection 4.10.3 Removing the Monitor*).
5. If the voltage in the monitor is excessively low, measure the output voltage from the drawer connector.
6. If the measured voltage is correct, an open circuit exists in the AC wiring in the monitor harness.

ONLY THE BACKGROUND COLOUR IS DISPLAYED

If only background colour is displayed on the video screen, check that the wiring harness on the monitor is connected and is not defective.

Check that the game can be played, whether the game sounds can be heard and that the player panel switch lamp lights. If the game cannot be operated, replace either of the main control unit, video sub-board, or connector boards.

If the problem persists, replace the monitor.

SCREEN BRIGHTNESS, CENTRING, AND DISPLAY SIZE

If the video screen is too bright, the display is not centred in the screen, or the display size or shape is not correct, use the screen adjustment controls at the bottom of the monitor to fix the problem. (See *Subsection 4.10.6 Adjusting the Monitor Display*).

If the problem cannot be solved or recurs, replace the monitor. If the problem persists, sequentially test and, if necessary, replace the FMU2 board, the MCU2, and the connector board.

THE COLOUR DISPLAY OR HORIZONTAL AND VERTICAL BALANCE ARE ABNORMAL

When one or more colours are not displayed or any problem occurs with the horizontal or vertical control, check that the monitor harness is connected and the board is not defective.

If non-standard colours are displayed, transfer the VRAM character ROM and OBJ character ROM to another monitor and confirm that they function normally (see *Subsection 4.6.3 Replacing the IC Chips*).

If the problem persists or occurs again, check the FMU2, the MCU2, the monitor and the connector board in turn until the problem is resolved.

CHARACTER ERROR/CORRUPTED TEXT

When the game display and characters are corrupted or the characters are only partially displayed, check that the MCU2 board is properly installed.

If the problem persists, replace the FMU2 sub-board, or else the MCU2 board could be faulty and needs to be replaced.

4.10.9 Troubleshooting the LCD Monitor (ES500 only)

If the machine is still playable, turn the Audit key switch if the machine is in the power-saving modeto return to operation mode.

1. Turn on the power switch in the machine. If power is being supplied to the monitor the LED on the LCD controller PCB on the back of the monitor will light up. If it doesn't light up, check the 12V DC power to the LCD display.
2. If the measured voltage is correct but a problem persists, replace the monitor. If the 12V DC power is excessively low, change the AC power adaptor located on the back of the cabinet.
3. If 'noise' lines appear in the picture adjust the phase in the *'Picture'* sub-menu of the control panel until it is minimised.
4. If the picture does not extend the full width or height of the screen, or is off-centre, too large or too small, press the *'Source'* button on the control panel of the monitor to automatically synchronise the monitor signal source (see above).

4.10.10 Performance Check

Turn the power off then on again and check that all the colour and horizontal and vertical hold circuits are responding correctly.

If any adjustment control does not work or respond normally, refer to *Subsection 4.10.8 Troubleshooting the CRT Monitor*. If the problem persists, replace the monitor.

4.11 Hopper

The hopper holds coins inserted into the machine and pays them out again when a win occurs. The volume of coins held at any time is set when the machine is commissioned.

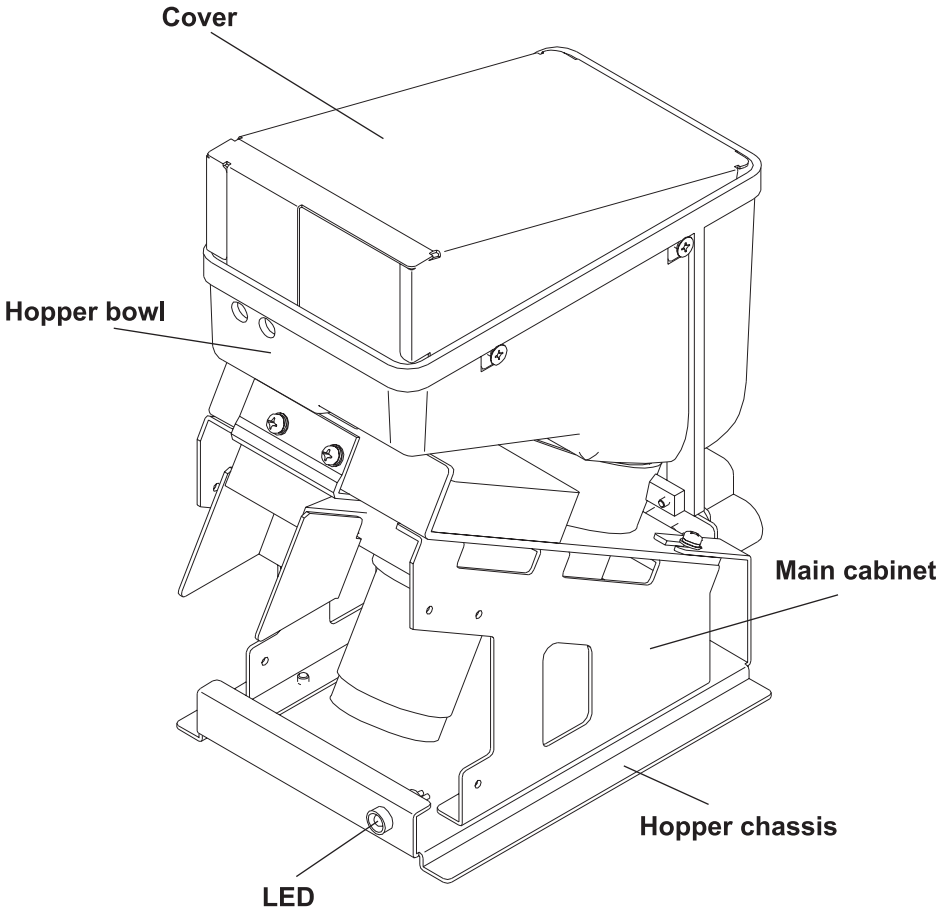

Figure 4-39 Hopper Assembly

The hopper consists of a 25V DC motor that delivers coins during a pay, two proximity sensors to detect paid coins, and an adjustable hopper probe to set the level of the coins to be held in the hopper bowl. The probe activates a microprocessor when the coins reach the level set (see *Figure 4-39 Hopper Assembly*) which, in turn, acts to divert excess coins to the cashbox rather than to the hopper.

The standard hopper in the Endeavour Series machine is an Asahi Seiko WH1, although a DH750 from the same manufacturer can be used for venues requiring a larger coin capacity. Both types slide into a fixed base on the floor of the machine and, apart from their size and shape, are identical in their mode of operation and service and maintenance requirements.

The ES500 machine uses a Mk4 Universal Hopper which operates in the same manner as those used in the other Endeavour Series machines (see *Figure 4-40 The Mk4 Universal Hopper used in the ES500 Machine*)

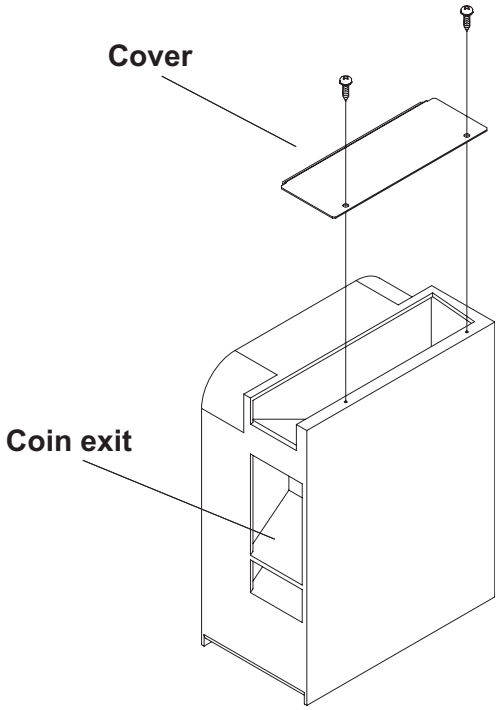

Figure 4-40 The Mk4 Universal Hopper used in the ES500 Machine

The hopper mechanism consists of a 25V DC motor that delivers coins during a pay, two proximity sensors to detect paid coins, and an adjustable hopper probe to set the level of coins to be held in the hopper bowl. The probe activates a microprocessor when the coins reach the level set (see *Figure 4-39 Hopper Assembly*), which in turn acts to divert excess coins to the cashbox rather than to the hopper.

4.11.1 Removal and Installation

Remove the hopper from the machine when inspecting and cleaning it, or when adjusting it. The hopper is located on the floor of the machine, and sits in metal guides attached to a base.

On the ES500 machine grip the hopper body at the top and the base and withdraw it from the machine (see *Figure 4-41 Removing the Mk4 Hopper from the ES500 Machine*).

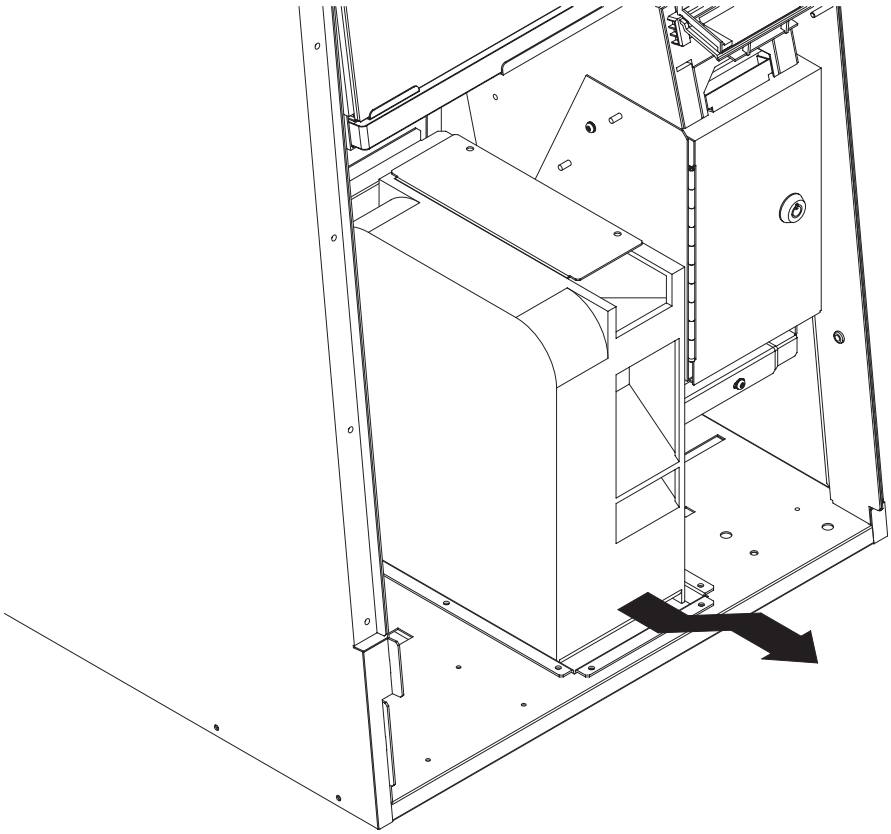

Figure 4-41 Removing the Mk4 Hopper from the ES500 Machine

To replace the hopper, position the base in the guide rails and slide it back as far as it will go, ensuring that it engages the electrical connector at the rear.

When the machine is switched on, check that the LED on the base of the hopper lights up, indicating the correct electrical connection has been made.

4.11.2 Hopper Chassis

The hopper has a 16-pin plug, a ball catch to secure the module in position, and an LED display. Install and remove the hopper chassis as follows, and refer to *Figure 4-42 The Hopper Chassis*

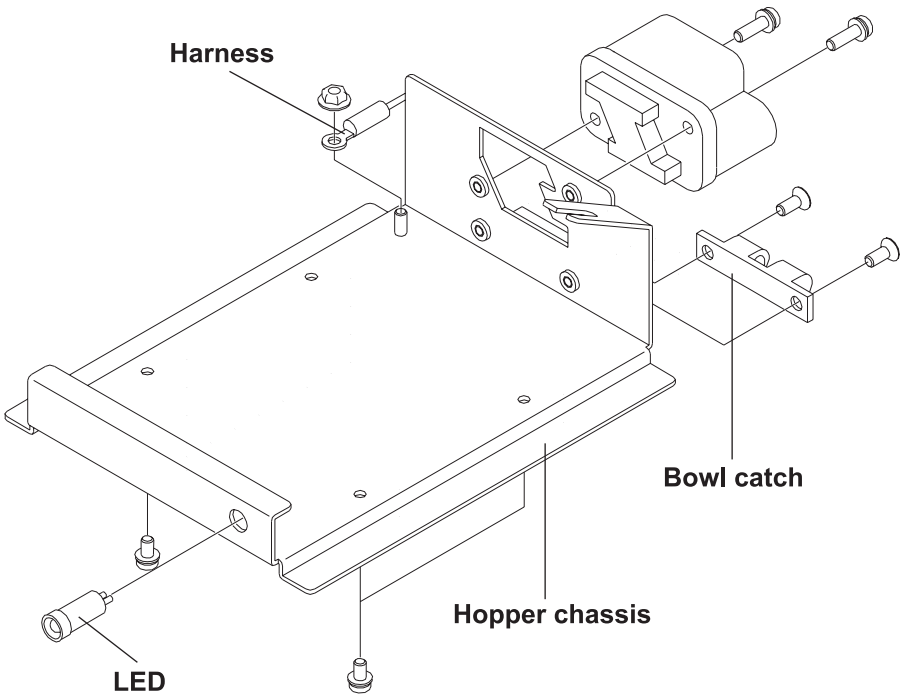

Figure 4-42 The Hopper Chassis

DISMANTLING

1. Remove the cover from the hopper, remove the hopper probe, then remove the probe harness from the rear of the hopper bowl.
2. Pull out the three connectors projecting from the 16-pin plug from the driver board and hopper body.
3. Unfasten the five screws and remove the hopper chassis from the hopper body.
4. Disconnect the tab terminal from the LED holder installed in the handle of the hopper chassis.
5. Disconnect the grounding harness from the hopper chassis.
6. Unscrew and remove the 16-pin plug attached to the hopper chassis.
7. Unscrew and remove the 1ball-catch from the hopper chassis.

4.11.3 Hopper Bowl

The hopper bowl consists of the bowl, hopper probe, and cover. Install and remove it according to the procedure below and refer to *Figure 4-43 The Hopper Bowl*.

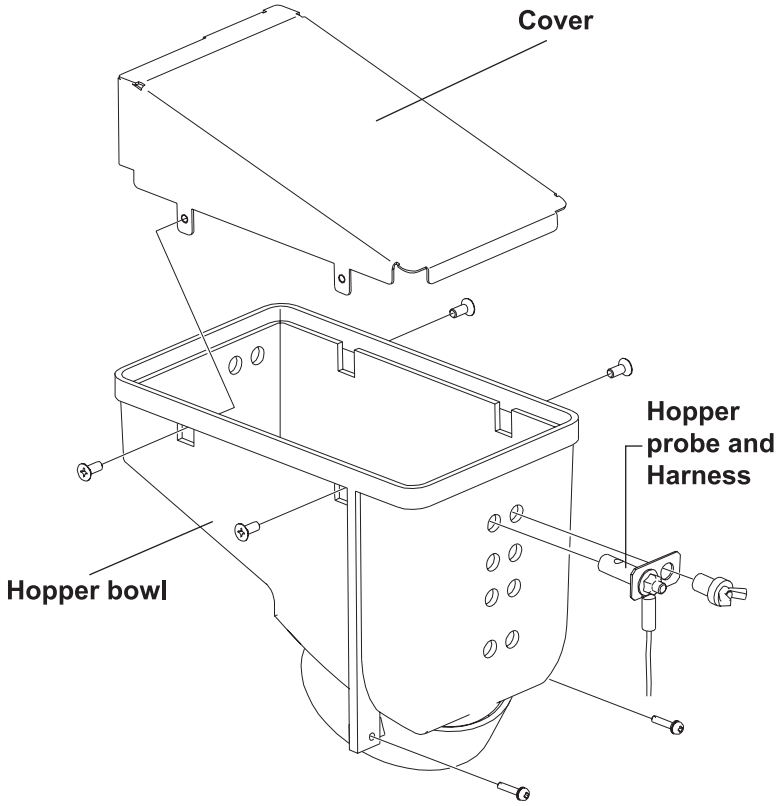

Figure 4-43 The Hopper Bowl

DISMANTLING

1. Remove the securing screws and take off the hopper cover.
2. Remove the hopper probe and harness from the inside of the hopper bowl.
3. Remove the three screws securing the bowl to the hopper mechanism.

4.11.4 Setting the Coin Level

The approximate coin level is reported to the microprocessor by the hopper probe on the hopper bowl. When the level of coins in the hopper reaches the probe, instructions are issued from the processor to the coin separator to divert all inserted coins to the cash box.

ENDEAVOUR SERIES MACHINES

Set the hopper probe on the hopper bowl according to the following procedure and refer to *Table 4-9 Hopper Probe Levels*.

1. Remove the cover from the hopper.
2. From the inside of the hopper bowl, remove the hopper probe.
3. Insert the hopper probe into the desired hole and fix it to the bowl, being careful not to over-tighten the screw..

Table 4-9 Hopper Probe Levels

Denomination	Probe Hole Location				
R1	1	2	3	4	5
	Approximate number of coins				
	100	200	300	400	500
	1 - Bottom hole (back)			4 - Top hole (back)	5 - At front of hopper

ES500 (UNIVERSAL HOPPER MK4)

Set the hopper probe on the hopper bowl according to the following procedure and refer to *Table 4-10 Setting the Coin Level on the ES500 Machine*:

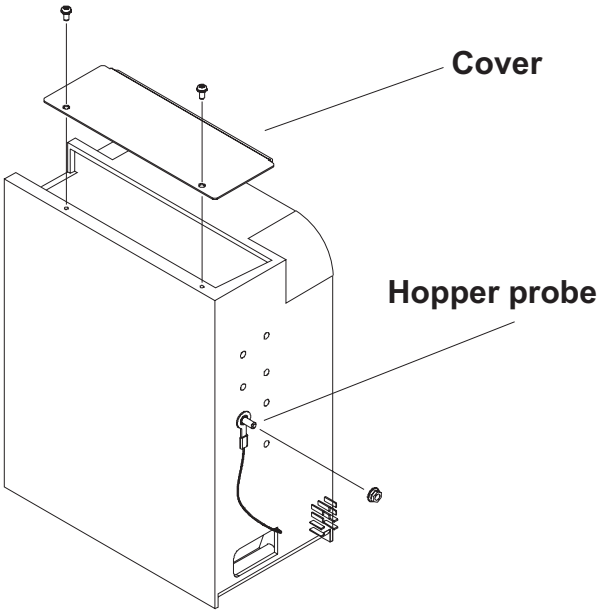

Figure 4-44 Adjusting the Hopper Probe on the ES500 Machine

1. Remove the cover from the hopper.
2. Remove the hopper probe from the inside of the hopper bowl.
3. Insert the hopper probe into the desired hole and fix it to the hopper bowl (Do no tighten the nut excessively).

Table 4-10 Setting the Coin Level on the ES500 Machine

Denomination	Hopper Probe Locations						
R1	1	2	3	4	5	6	7
	Approximate number of coins						
	300	400	500	600	700	800	900
	Bot-tom right	Bot-tom left				Top left	Top right

4.11.5 Inspection

After service, replacement or general maintenance, always check that the unit is operating correctly. In particular,

1. Check that the proximity sensors are not dirty or damaged, and that they are securely fixed.
2. Confirm that the hopper probe is secure and is straight.
3. Check that the hopper bowl is not damaged.

4.11.6 Performance Check

To confirm the hopper pay function, enter coins according to the hopper refill procedure and turn on the power switch in the machine. Close and lock the main door then perform the hopper refill and hopper sensor tests shown in *Table 3-4 Refilling the Hopper* and *Table 3-5 The Test Menu*.

4.11.7 Troubleshooting

In the event of a coin-jam, remove the hopper cover and all coins from the hopper. Turn the disk counter-clockwise to remove the jam, and re-tighten all screws. An on-screen error message relating to the hopper fault makes reference to the troubleshooting procedures shown in *Subsection 5.4.1 Screen Display Messages*.

4.11.8 Cleaning

Clean the sensor and hopper probe with cotton cloth moistened with isopropyl alcohol.

4.12 Banknote Acceptor

WARNING
Do not change any dip-switch settings as this will affect the operation of the banknote acceptor

NOTE
Delicate electronic parts are used in the banknote acceptor. To prevent damage to these parts, do not use torn, crumpled, or wet banknotes. Dust or dirt may deteriorate the sensitivity of the optical sensors, so do not put the unit in areas subject to excessive dust or dirt.

The banknote acceptor (see *Figure 4-45 Banknote Acceptor Assembly (GPT)*) is an automated module which accepts and validates banknotes and converts their value into credits on the credit meter. Up to 500 validated banknotes can be stored in the stacker which locks into the lower part of the banknote acceptor module.

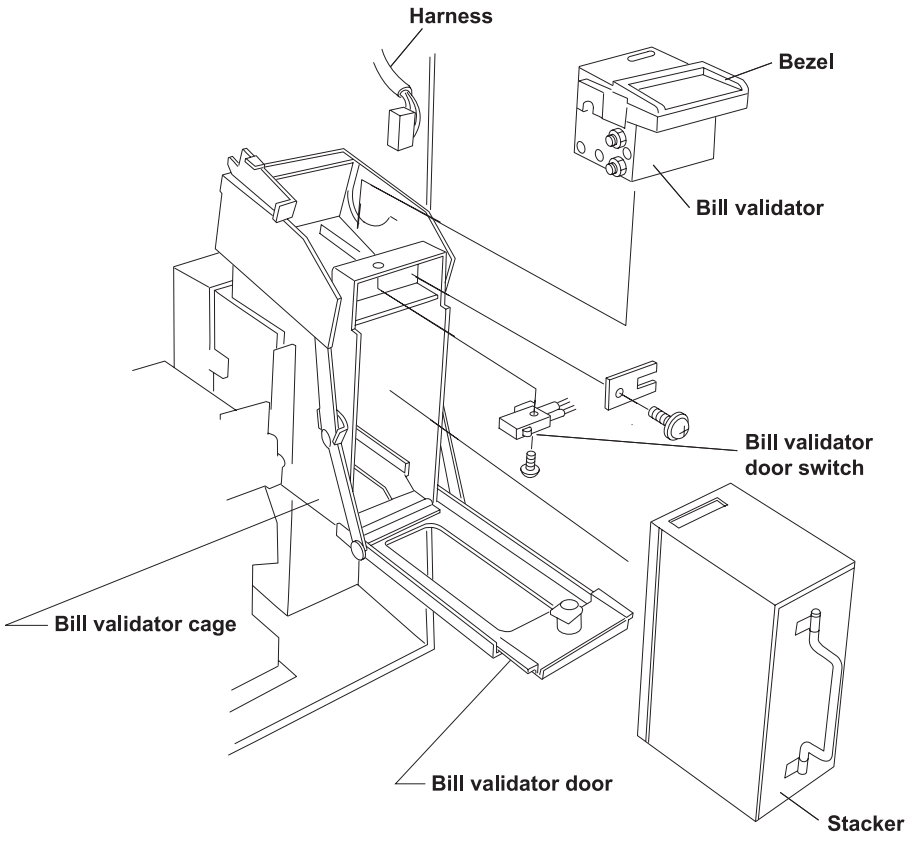

Figure 4-45 Banknote Acceptor Assembly (GPT)

The banknote validator accepts all valid banknotes and automatically rejects invalid banknotes, however confirmation from the main processor is required to store the banknotes in the stacker. The banknote acceptor can be disabled by selecting this option in *Table 3-6 Machine ID Set-up*.

The stacker is made of heavy-duty welded steel with single or double locks, and features a self-aligning electrical connector. When the stacker is full, a screen message advises the operator (see *Subsection 4.12.1 Removing the Stacker* for advice on how to remove the unit for service or to clear banknotes.

Endeavour Series machines can be configured with a variety of banknote acceptor module types, depending on the venue requirements. The standard module is the GPT Argus GIII and alternative configurations might incorporate the Mars ZT and JCM types.

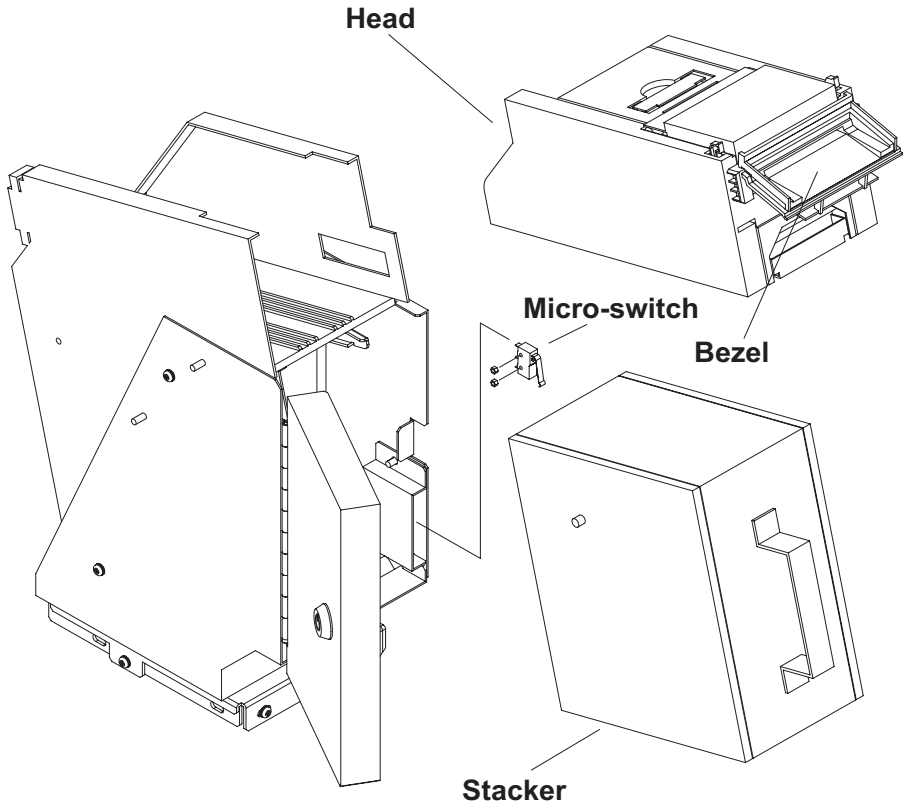

Figure 4-46 Banknote Acceptor Assembly (JCM)

4.12.1 Removing the Stacker

Unlock and open the main door of the machine and the banknote acceptor door, and pull the banknote stacker out of its cage. Unlock and open the stacker and remove the banknotes.

On the ES500 machine, unlock and open the main door of the machine, then unlock the stacker unit. Pull down the lever-arm to the right of the stacker and draw the unit out from the machine, checking to see that no banknotes are

caught behind it in the machine. Replace the module in the same manner, ensuring the proper electrical connection is made.

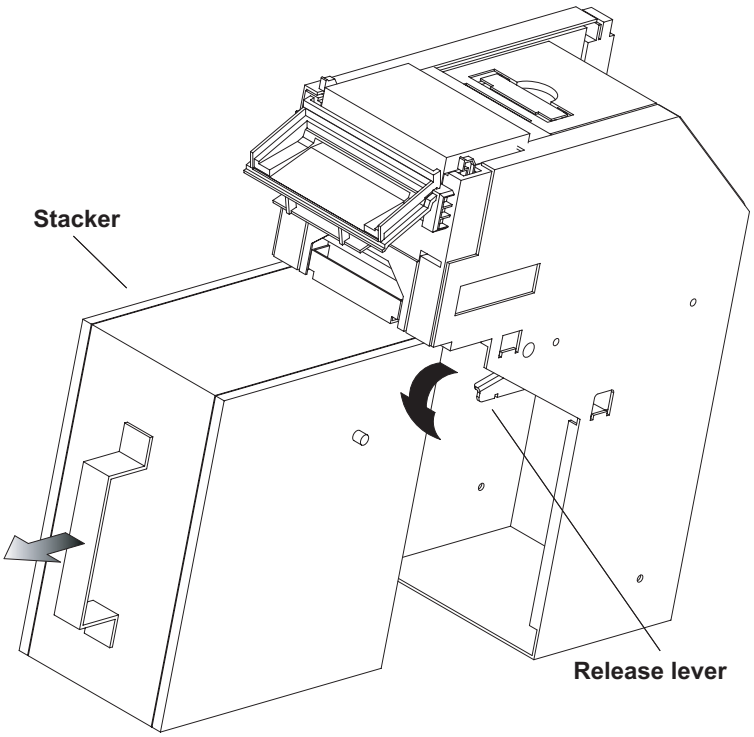

Figure 4-47 Removing the Stacker in the ES500 Machine

Installing each unit is the reverse of the above procedure. Carry out a performance check to ensure that the banknote acceptor receives notes in the proper manner, that the notes store correctly in the stacker, and that the banknote acceptor door switch displays the 'door closed' status correctly.

CAUTION
Located in the stacker is a battery-backed circuit board which assists accounting functions in some jurisdictions. There is danger of explosion if a battery is replaced incorrectly. Use only identical or equivalent types recommended by the manufacturer, and dispose of used batteries according to the manufacturer's instructions.

4.12.2 Security

The banknote acceptor door is provided with a lock mechanism. Access to the door is monitored whether the machine is switched on or off.

4.12.3 Escrowing

When the banknote acceptor has determined that a note is valid, and is configured to accept that denomination, the banknote is held in the banknote acceptor channel for a specified period of time. The controller commands the validator to accept the banknote and the banknote acceptor enters the stacking state. If the controller sends the 'Eject' command, the banknote acceptor returns the banknote through the bezel.

4.12.4 Power Recovery Operation

If the power is cut off while banknotes are passing through the banknote acceptor, any notes that have not passed through the lever sensor are returned when the power is recovered. If banknotes have passed through the lever sensor, a toggle signal enters the 'Wait' state and the banknotes received are stored in the stacker; a signal indicating the completion of operation is then sent.

If banknotes pass the sensor but no toggle signal is output within the specified time after the power is recovered, banknotes are stored in the stacker. The banknote acceptor then returns to the stand-by state and the message *'Banknote Stacking Error'* is shown. To activate the machine, reset the machine and the value of the credit is added to the credit meter and the message disappears.

4.12.5 Troubleshooting

An automatic recovery process is activated if banknotes become blocked or jammed. The banknote acceptor activates a motor to solve the banknote jamming, and repeats the process up to five times. If jamming persists, the banknote acceptor mechanism stops, otherwise normal operation resumes automatically when the jam is removed.

An error message displays when banknotes are jammed, the stacker is filled, or the banknote stacker cage is opened.

To clear jamming in the banknote acceptor unlock and open the main door and pull the bezel on the front of the banknote acceptor forward. Remove any jammed banknotes, then push the banknote acceptor bezel firmly back into position. Close and lock the main door.

To remove the banknote acceptor door switch, raise the banknote acceptor cage door, unfasten the screw and disconnect the switch from its electrical harness.

Table 4-11 Banknote Acceptor Bezel Troubleshooting provides general solutions to possible problems with different manfacturers' versions of the banknote acceptor module. For any specific problems and solutions refer to the manufacturer's service handbook for the particular unit.

Table 4-11 Banknote Acceptor Bezel Troubleshooting

Symptom	Possible cause	Remedy
Banknotes can't be tendered.	1.The banknote acceptor power is not turned on. 2. The banknote acceptor is faulty.	1. Check harness and connector. 2. Replace the banknote acceptor.
Banknotes rejected by banknote acceptor.	1. The banknote acceptor is dirty. 2. The banknote acceptor is faulty.	1. Clean the reader sensor of the banknote acceptor. 2. Replace the banknote acceptor.
Inserted banknotes cannot be removed.	The banknote acceptor is faulty.	Replace the banknote acceptor.
Banknotes are jammed in banknote acceptor.	The banknote acceptor is faulty.	Replace the banknote acceptor.
Banknotes are jammed in the stacker.	The stacker is faulty.	Replace the stacker.
Feed motor operates continuously.	The banknote acceptor is faulty.	Replace the banknote acceptor.
Stacker motor does not operate.	The stacker is faulty.	Replace the stacker.
Feed motor rotates ten times and stops.	1. The banknote acceptor is dirty. 2. The banknote acceptor is faulty.	1.Clean the sensor of the banknote acceptor. 2. Replace the banknote acceptor.
Banknote guide light of bezel does not light.	1. The harness or connector is defective. 2. Banknote guide light board is defective.	1. Check the connector or the harness. 2. Replace the banknote guide light board.
The *'Door Open'* message is cancelled even after the banknote acceptor door is closed.	1. Harness or connector is loose or defective. 2. Banknote acceptor door switch is faulty.	1. Check the connector or replace the harness. 2. Replace the banknote acceptor door switch.

4.12.6 Cleaning

NOTE
Do not use organic solvents such as acetone, as this may damage the banknote validator and void the warranty.

Dust, dirt, and stains (from banknotes) accumulate on the surface of the acceptor optics, pressure roller, and drive belt when the banknote acceptor is used continuously.

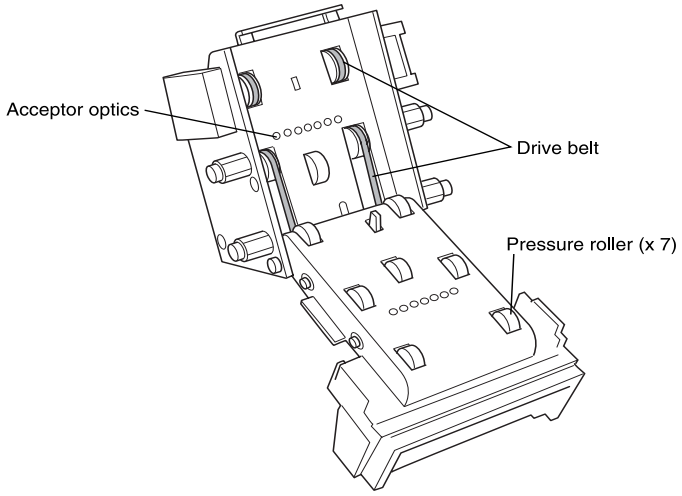

Figure 4-48 Banknote Acceptor Cleaning Points (GPT Model)

This may cause jamming in the banknote acceptor or otherwise affect normal operation. Clean the banknote acceptor periodically as follows:

1. Unlock and open the main door. Switch off the power to the machine, and disconnect the banknote acceptor harness.
2. Remove the banknote acceptor from its cage, remove the bezel, then open the banknote head as shown in *Subsection 4.12.1 Removing the Stacker*.
3. Clean the optic sensors, the pressure roller and drive belt in the banknote acceptor with a clean cloth moistened with a 90% isopropyl alcohol solution (see *Figure 4-48 Banknote Acceptor Cleaning Points (GPT Model)* and *Figure 4-49 Banknote Acceptor Cleaning Points (JCM Model)*).
4. Clean the optic sensors, the pressure roller and drive belt with a clean cloth moistened with a 90% isopropyl alcohol solution (see *Figure 4-48 Banknote Acceptor Cleaning Points (GPT Model)* and *Figure 4-49 Banknote Acceptor Cleaning Points (JCM Model)*.

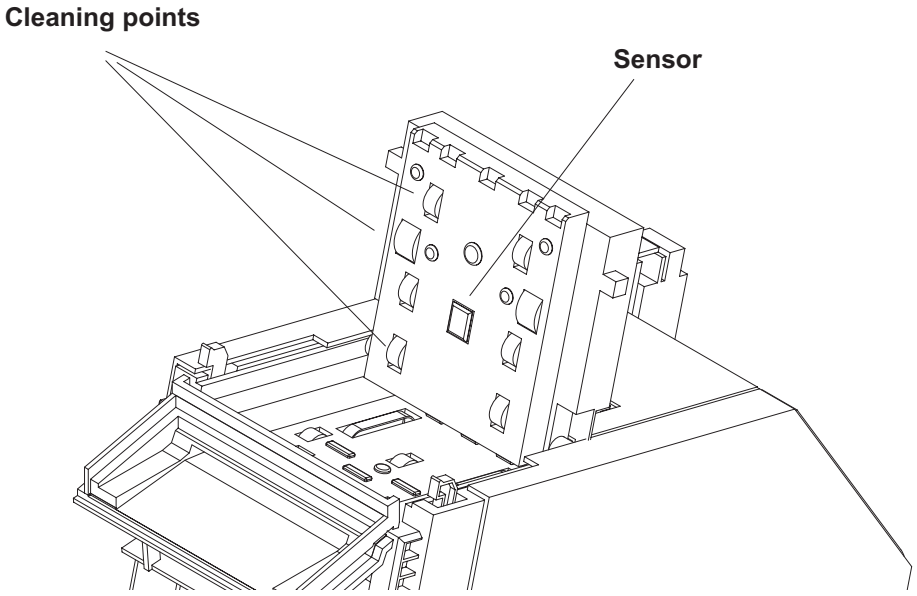

Figure 4-49 Banknote Acceptor Cleaning Points (JCM Model)

5. Slide the unit firmly back into position and lock it in.
6. Turn on the power switch in the machine, and close and lock the main door.

5 Maintenance, Troubleshooting & Parts List

5.1 Introduction

This chapter describes the general maintenance and troubleshooting of the Endeavour Series video gaming machine, to assist with resolving lockups and if mechanical problems affect the machine.

For this purpose, comprehensive lists of electrical and general parts are also included to minimise downtime due to mechanical malfunction.

An outline of the topics covered in this chapter is as follows:

- *Section 5.2 Maintenance* – describes the procedures necessary for periodic maintenance of the machine.
- *Section 5.3 Troubleshooting Chart* – provides help on problems, the possible cause, and the remedy.
- *Section 5.4 Error Messages* – describes the messages that can appear on the monitor and LED, and suggestions on how to clear them and return the machine to playing mode.
- *Section 5.5 Converting Games and Changing Coin Denomination* – describes the procedure, when it becomes necessary, for changing to a new game and setting the new coin-in requirements.
- *Section 5.6 Electrical Problems* – describes faults or failures related to the machine components or electrical parts, and how to resolve the problem. A simplified block diagram of the machine's electrical circuit is appended for reference.
- *Section 5.7 RAM Clear* – describes how to clear the machine data from RAM.
- *Section 5.8 Commissioning the Machine* – once the machine is installed at a venue, it has to be configured and set up for use. This section shows the procedure for doing this.
- *Section 5.9 Replacement Electrical Parts* – provides a list and description of the common electrical components to provide assistance when re-ordering.
- *Section 5.10 Spare Parts List* – this section provides a parts list of components for the Endeavour Series machine.

5.2 Maintenance

WARNING
Only qualified persons should service this machine. .Exercise extreme care when performing general maintenance.

Always check that the machine is operating correctly after removing or replacing components, and after servicing. Refer to the self-test procedures and statistical displays for this purpose in *Chapter 3 Operator Mode Instructions*.

Use the following procedures and *Table 5-1 Preventative Maintenance* to maintain the machine:

5.2.1 Monthly Maintenance

To keep the machine in a presentable condition:

- Wipe the inside of the coin tray with a moistened cloth.
- Wipe the outside glass (including the exposed monitor) with a lint-free cloth soaked in a non-abrasive anti-static glass cleaner.
- Check the top box for any cracks or scratches. Use a soft lint-free cloth moistened with a weak anti-static glass cleaning fluid to wipe the panel.
- Wipe the outside of the main door using a weak non-ammonia cleaner.

5.2.2 Periodic Maintenance

Periodically or as required:

- Clean the inside of the machine with a vacuum cleaner to remove dust and dirt in the coin chute.
- Wipe the coin entry assembly and door open sensor optics with a clean, lint-free cloth.
- Wipe the push buttons using a non-dissolving plastic cleaner.
- Confirm that the fluorescent lamp in the machine lights up properly. If the fluorescent lamp, ballast, or starter does not function normally (if the lamp blinks or is broken), replace the necessary parts.

5.2.3 Schedule of Preventative Maintenance

Table 5-1 Preventative Maintenance summarises the maintenance schedule for the machine. Adjust components as required, and replace or repair them if they are operating incorrectly.

Table 5-1 Preventative Maintenance

Maintenance item	Service Interval		
	One month	Three months	Six months
Outside of main door	Inspect/Clean		
Optical door-open sensor on the main door		Inspect/Clean	
Coin chute		Inspect/Clean	
Control panel button	Inspect/Clean		
Banknote Acceptor	Inspect/Clean	Refer OEM manual for video level (calibration) check.	
Coin validator	Inspect/Clean		Evaluation / adjustment
Coin entry assembly	Inspect/Clean		
Monitor	Inspect/Clean		
Monitor adjustment controls		Evaluation / adjustment	
Monitor mask	Inspect/Clean		
Printer (where fitted)	Inspect/Clean		
All panels	Inspect/Clean		
Fluorescent lamp	Inspect/Clean		
Cleaning the inside of machine using vacuum cleaner		Inspect/Clean	
Wiring harness and connector	Inspect/Clean		

5.3 Troubleshooting Chart

Use the following tables to track down and resolve specific performance problems with the machine:

- *Table 5-2 In-Port Troubleshooting*
- *Table 5-3 Out-Port Troubleshooting*
- *Table 5-4 Functional Troubleshooting*

Items marked with an asterisk (*) require action by a qualified service technician.

Table 5-2 In-Port Troubleshooting

Symptom	Possible Cause	Remedy
*PLAY button function on control panel is abnormal.	a. Microswitch defect	a. Replace microswitch
	b. Plunger of microswitch is caught.	b. Reinstall or replace plunger base if necessary.
	c. Harness broken or crimped contact is faulty	c. Repair or replace the harness.
	d. Harness connection is reversed.	d. Check harness connection.
Coins cannot be inserted or ejected.	a. Coins are jammed in the machine.	a. Check the inside of the coin validator and the connection with diverter.
	b. Coin jamming in coin entry.	b. Check the inside of the coin entry mechanism and replace if necessary.
	c. Power defect.	c. Replace fuse and check the voltage.
	d. Harness broken and crimping contact fault.	d. Repair and replace the harness.
	e. Coin validator defect.	e. Replace coin validator.
	f. The door is open.	f. Close the door.
	g. Main control unit fault.	g. Replace main control unit.
	h. Door sensor fault.	h. Adjust sensor position or replace.

Table 5-3 Out-Port Troubleshooting

Symptom	Possible Cause	Remedy
*Machine does not function at all.	a. Main control unit fault. B. Harness defect. C. The remote unit is faulty. D. The power cord is not connected. E. Connector defect. G. The fuse is faulty. H. The power unit is faulty.	A. Replace main control unit. B. Repair and replace the harness. C. Replace the remote unit. D. Connect power cord after voltage is confirmed. E. Ensure correct connection and crimping contact. G. Replace the fuse. H. Replace the power unit.
*Fluorescent lamp does not illuminate.	a. There is a fault in the AC power unit. b. There is a fault in the harness and connector. c. There is a fault in the fluorescent lamp. d. Starter fault. e. Fuse fault. f. Ballast fault.	a. Replace AC power unit. b. Repair and replace harness. c. Replace fluorescent lamp. d. Replace starter. e. Replace fuse. f. Replace ballast.

Table 5-3 Out-Port Troubleshooting (cont.)

Symptom	Possible Cause	Remedy
*The electromechanical meter is malfunctioning.	A. The electromechanical meter is defective. B. The fuse is defective. C. The harness and connector is defective. D. The interface unit is defective. E. The DC power unit is defective. F. The main control unit is defective.	A. Replace the electromechanical meter. B. Replace the fuse. C. Repair or replace the harness. D. Replace the interface unit. E. Replace the DC power unit. F. Replace the main control unit.
*There is no sound from the machine.	a. Harness and connector fault. b. Interface unit fault. c. Main control unit fault. d. Speaker fault.	a. Repair and replace harness. b. Replace interface unit. c. Replace main control unit. d. Replace speaker.
*Monitor display is abnormal.	Doubled, reduced size, excessively dark or partially-displayed screen or abnormal colours.	See *Subsection 4.10.6 Adjusting the Monitor Display*.

Table 5-4 Functional Troubleshooting

Symptom	Possible Cause	Remedy
Error message is displayed on monitor and LED.	See *Table 4-11 Banknote Acceptor Bezel Troubleshooting*.	See *Table 4-11 Banknote Acceptor Bezel Troubleshooting*.
*Operator mode cannot be accessed.	a. Audit key faulty. b. Harness and connector defect. c. Main control unit defect.	a. Replace the Audit key. b. Replace and repair the harness. c. Replace main control unit.

Table 5-4 Functional Troubleshooting (cont.)

Description		
*Game or function that is displayed or activated differs.	a. Main control unit defect. b. The video sub-board is faulty. c. The settings are incorrect. d. The ROM is incorrect. e. There is a ROM mounting fault.	a. Replace main control unit. b. Replace the video sub-board. c. Check and adjust the settings. d. Check each ROM label and specification. e. Check each ROM mounting.

5.4 Error Messages

The Endeavour Series machine provides the following alerts when an error occurs:

- **Screen display messages**
- **Communication system messages**
- **Tower light warning (optional)**
- **LED state messages on interface unit and main control unit boards**

5.4.1 Screen Display Messages

When the machine detects an error or exception it enters an error mode or lock-up state. *Table 5-5 Message Chart* shows the messages that may be displayed on the monitor in such cases. In many cases (see items marked with an asterisk in the table), a service technician or operator is needed to return the machine to a normal state.

Table 5-5 Message Chart

No.	Code	Message	Cause	Action to Clear
1	10	*'Main Door Open'*	The main door is open.	Close the main door.
2	12	*'Cashbox Door Open'*	The cash box door is open.	Close the cash box door.
3	14	* *'Logic Door Open'*	The security cage door is open.	Close the security cage door.

Table 5-5 Message Chart (cont.)

No.	Code	Symptom	Possible Cause	Action to Clear
4	16	*'Banknote Door Open'*	The banknote acceptor door is open.	Close the banknote acceptor door.
5	80	*'Cancel Credit'*	Player requested a cancel credit.	Complete book-pay and turn the Reset key.
6	82	*'Large Win'*	A large win has occurred.	Turn the Reset key or automatic reset by host.
7	83	*'MPWV Exceeded'*	A win has exceeded the maximum payable win value.	Do not perform a RAM Clear. Return the MCU2 board to service provider.
8	84	*'WIN/RAM Error'*	A fault in the win evaluation of a game has occurred.	Do not clear RAM. Return the MCU2 board to service provider.
9	100	*'Incorrect Path'*	Coins flow in a direction not specified by the diverter frequency (more than 5 times in last 100 coin in).	Turn the Reset key.
10	101	*'Coin In Jam'*	There are coins jammed in the machine.	Clear jammed coins then turn the Reset key.
11	102	*'Coin Validator Fault'*	The signal from the coin validator is incorrect.	Reset the machine or replace the coin validator.
12	103	*'Diverter Fault'*	Coins are jammed in the machine.	Clear jammed coins then turn the Reset key.
13	104	*'Coin In Yo Yo'*	Coins are moving in reverse.	Turn the Reset key.
14	106	*'Cashbox Coin To Hopper'*	Coins are going to the hopper instead of the cashbox.	Automatic reset.
15	107	*'Hopper Coin To Cashbox'*	Coins are going to the cashbox instead of to the hopper.	Automatic reset.
16	108	*'Coin In Mismatch'*	A comparison of coins going through the validator and the diverter is different.	Automatic reset.

Table 5-5 Message Chart (cont.)

No.	Code	Symptom	Possible Cause	Action to Clear
17	120	*'Hopper Empty'*	The hopper is empty.	Fill the hopper with the required number of coins.
18	121	*'Hopper Jam'*	Coins are jammed in the hopper.	Eliminate coin jamming and turn Reset key.
19	122	*'Hopper Excess Payout'*	Too many coins have been paid out from the hopper.	Turn the Reset key.
20	123	*'Hopper Runaway'*	A signal from the hopper sensor is faulty.	Turn the Reset key.
21	124	*'Hopper Disconnect'*	The hopper is disconnected.	Turn Reset key after checking the hopper connection.
22	130	*'Hard Meter Access'*	An electromechanical meter cover is open.	Close any open meter covers.
23	131	*'Hard Meters Disconnect'*	The electromechanical meter is disconnected.	Check the meter connections, then turn the Reset key.
24	132	*'Hard Meters Failure'*	An electromechanical meter has malfunctioned.	Check the connection or replace the electromechanical meter.
25	221	*'BNA Device Failure'*	There is a fault in the banknote acceptor.	Turn the Reset key, or replace the banknote acceptor.
26	222	*'Banknote Jam – Acceptor'*	Banknotes are jammed in the the banknote acceptor.	Eliminate the banknote jam and turn the Reset key.
27	223	*'Banknote Jam – Stacker'*	Banknotes are jammed in the stacker.	Remove excess banknotes and turn the Reset key.
28	224	*'Stacker Full'*	The stacker in the banknote acceptor is full.	Remove excess banknotes and turn the Reset key.
29	225	*'Stacker Removed'*	The stacker in the banknote acceptor is not installed.	Install the stacker.

Table 5-5 Message Chart (cont.)

No.	Code	Symptom	Possible Cause	Action to Clear
30	226	*'Stacker Not Ready'*	The stacker in the banknote acceptor is not ready.	Not applicable.
31	227	*'BNA Head Error'*	The head in the banknote acceptor is not mounted.	Install the head.
32	229	* *'BNA Comms Error'*	There has been a communication error with the banknote acceptor.	Check the connection or replace the banknote acceptor.
33	230	*'BNA Error – Yo Yo'*	Banknotes are moving in reverse in the banknote acceptor.	Reset the machine.
34	233	*'BNA Stacking Error'*	Power down or error during banknote stacking.	Turn the banknote acceptor on and turn the Reset key.
35	235	*'BNA Version Error'*	Program ROM on the banknote acceptor has been replaced.	Reset the machine with the security cage door open.
36	236	*'BNA Program Error'*	A fault has been detected in the ROM on the banknote acceptor.	Replace the ROM on the banknote acceptor.
37	234	*'BNA Excessive Rejects'*	A banknote has been rejected ten times consecutively in the banknote acceptor.	Turn the Reset key.
38	400	*'IFU2 Disconnected'*	The IFU2 board has been disconnected or has failed.	Turn off the machine and connect the IFU2 board.
39	401	*'IFU2 CPLD Error'*	The CPLD version on the IFU2 board is incorrect.	Install an IFU2 board with the correct CPLD version.
40	402	* *'DPRAM Error'*	A malfunction has been detected in the dual port RAM on the IFU2 board.	Check the connection of each circuit board or replace the IFU2 board.
41	403	* *'IFU2 Failure'*	Cannot detect the IFU2 board.	Check the connection of each circuit board or replace the IFU2 board.

Table 5-5 Message Chart (cont.)

No.	Code	Symptom	Possible Cause	Action to Clear
42	404	* *'IFU2 Data Error'*	Incorrect data has been received from the IFU2 board.	Check all board connections or replace the IFU2 board.
43	405	* *'IFU2 Version Mismatch'*	The firmware version on the IFU2 board is incorrect.	Replace the IFU2 EEPROM with the correct version.
45	407	* *'IFU2 RAM Error'*	A fault has been detected in the RAM on the IFU2 Board.	Replace the IFU2 board.
46	408	* *'IFU2 ROM Error'*	An IFU2 ROM error has occurred.	Replace the IFU2 EEPROM.
47 -52	420-425	*'Play Suspended P1/ P2/P3/P4/ P5/P6'*	Communication port P1 (or P2, P3, etc.) is disconnected.	Check the communication port connection.
53	700	*'Printer Disconnect'*	The printer (if fitted) is disconnected.	Check the printer connection, and turn the Reset key.
54	701	*'Printer Offline'*	The printer online switch is off (if fitted) .	Place the printer online, and turn the Reset key.
55	702	*'Printer Paper Out'*	The printer (if fitted) has run out of paper.	Place a new paper roll into the printer.
44	406	* *'IFU2 ROM Mismatch'*	A malfunction has been detected in the program ROM on the IFU2 board.	Replace the program ROM on the IFU2 board or replace the board.
56	703	*'Printer Jam'*	Paper has become jammed in the printer (if fitted) .	Remove any jammed paper in the printer, and turn the Reset key.
57	704	*'Printer Comms Down'*	There is a communication error with the printer (if fitted) .	Check the printer connection, or replace the printer.
58	705	*'Printer Comms Error'*	There is a communication error with the printer (if fitted) .	Check the printer connection, or replace the printer.
59	706	*'Printer Mech Error'*	The printer (if fitted) is malfunctioning.	Turn the Reset key or replace the printer.

Table 5-5 Message Chart (cont.)

No.	Code	Symptom	Possible Cause	Action to Clear
60	707	*'Printing Incomplete'*	A power disruption has occurred during printing (if printer fitted) .	The printer resets automatically when power is resumed.
61	810	*'ROM Version Error'*	A malfunction has been detected in a ROM other than the program ROM on the MCU2 board.	Check the order of the mounted ROMs and replace any faulty ones, or check and replace the MCU2 or IFU2 boards.
62	811	*'Game Program Mismatch'*	Program ROM on the MCU2 board has been modified.	Clear RAM or replace the circuit board.
63	820	* *'Backup RAM Error'*	A malfunction has been detected in backup RAM on the MCU2 board.	Perform a RAM clear or replace the MCU2 board.
64	821	* *'Backup Data Error'*	An abnormality has been detected in the backup RAM on the MCU2 board.	Perform a RAM clear or replace the MCU2 board.
65	830	* *'EEPROM Data Lost'*	A fault has been detected in the EEPROM on the MCU2 board.	Clear RAM or replace the MCU2 board.
66	831	* *'EEPROM Read Error'*	A fault has been detected in the EEPROM on the MCU2 board.	Perform a RAM clear or replace the MCU2 board. WARNING: all soft meter data will be set to 0
67	832	* *'EEPROM Write Error'*	A fault has been detected in the EEPROM on the MCU2 board.	Clear RAM or replace the MCU2 board. WARNING: all soft meter data will be set to 0!
68	850	* *'Self Audit Error'*	A self-audit check has failed.	Perform a RAM clear or replace the MCU2 board. WARNING: all soft meter data will be set to 0
69	881	* *'Batt. Low (RTC)'*	Low battery voltage on the RTC battery.	Replace the battery.

Table 5-5 Message Chart (cont.)

No.	Code	Symptom	Possible Cause	Action to Clear
70	881	* *'Batt. Low (NUMB0)'*	Low battery voltage on the MCU2 battery 0.	Replace the battery and turn the Reset key.
71	882	* *'Batt. Low (NUMB1)'*	Low battery voltage on the MCU2 battery 1.	Replace the battery and reset the machine.
72	890	* *'Game Memory Corrupted'*	The game memory is corrupted.	Perform a RAM clear or replace the MCU2 board. WARNING: all soft meter data will be set to 0
73	891	* *'System Memory Corrupted'*	The system memory is corrupted.	Perform a RAM clear or replace the MCU2 board. WARNING: all soft meter data will be set to 0
74	982	*'Logic Door Accessed'*	The logic door was opened when the power was off.	Turn the Reset key.

5.4.2 Communication System Messages

Communication system messages are displayed on the screen by the main communication system.

5.4.3 Warning by Tower Light (Optional)

This light blinks when an error state occurs.

5.4.4 LED Status Messages on the IFU2 and MCU2 boards

The LEDs mounted on the interface unit and main control unit board are arranged in order from LED1 on the left to LED14 on the right. The MCU2 board has only one LED. The status messages of each LED are described below.

Table 5-6 LEDs on the Interface Unit Board (IFU2)

LED Number	Functions
LED1	Dual port RAM interrupt (Blinks on and off when a dual port interrupt from MCU2 occurs).
LED2	MCU2 to IFU2 monitoring (Blinks on and off when communication between the two boards is normal).
LED3	CCCE received. Blinks on and off when a CCCE packet is received.
LED4	SDB, MDB transmitted on port 1. Blinks on and off when a SDB or MDB is transmitted on port 1.
LED5	SDB, MDB transmitted on port 2. Blinks on and off when a SDB or MDB is transmitted on port 2.
LED6	Reserved.
LED7	System operation. Blinks on and off when the IFU2 system is operating normally.
LED8	Reserved.
LED9	Reserved.
LED10	Reserved.
LED11	Port 1 UART receive.
LED12	Port 1 UART transmit.
LED13	Port 2 UART receive.
LED14	Port 2 UART transmit.

Table 5-7 LEDs on the MCU2 Board

LED No.	Function	
	During System Initialisation	During Ordinary Operation
LED1	System operation (blinks on and off when the system operates normally).	

5.5 Converting Games and Changing Coin Denomination

When it is necessary to replace an existing game, the following checklist needs to be followed:

INSTALLING A NEW GAME

1. Replace the belly panel and pay-table artwork at the front of the machine (see *Subsection 4.3.5 Replacing Fluorescent Lamps*).

2. Replace the button inserts and/or the control panel which define the bets per line and number of lines being played (see *Section 4.4 Buttons* and *Subsection 4.3.4 Control Panel*).
3. Replace both of the game EPROMs on the MCU2 board, and the FMU2 board (see *Subsection 4.6.3 Replacing the IC Chips*.)

CHANGING THE COIN DENOMINATION

1. Replace the coin-entry module.
2. Replace the coin validator.
3. Insert a hopper that is designated to accept the new denomination.
4. Clear RAM (see *Subsection 5.7.1 Performing RAM Clear*).
5. Set up the machine using machine ID set-up, defining the new coin denomination details, number of lines played, bets per line, etc.

5.6 Electrical Problems

This machine uses high voltages. Exercise extreme care when carrying out repair work with the power turned on.

An electrical system failure can be caused by a variety of reasons. For specific problems, refer to the troubleshooting sections shown in *Chapter 4 Modular Components* for each of the main modules.

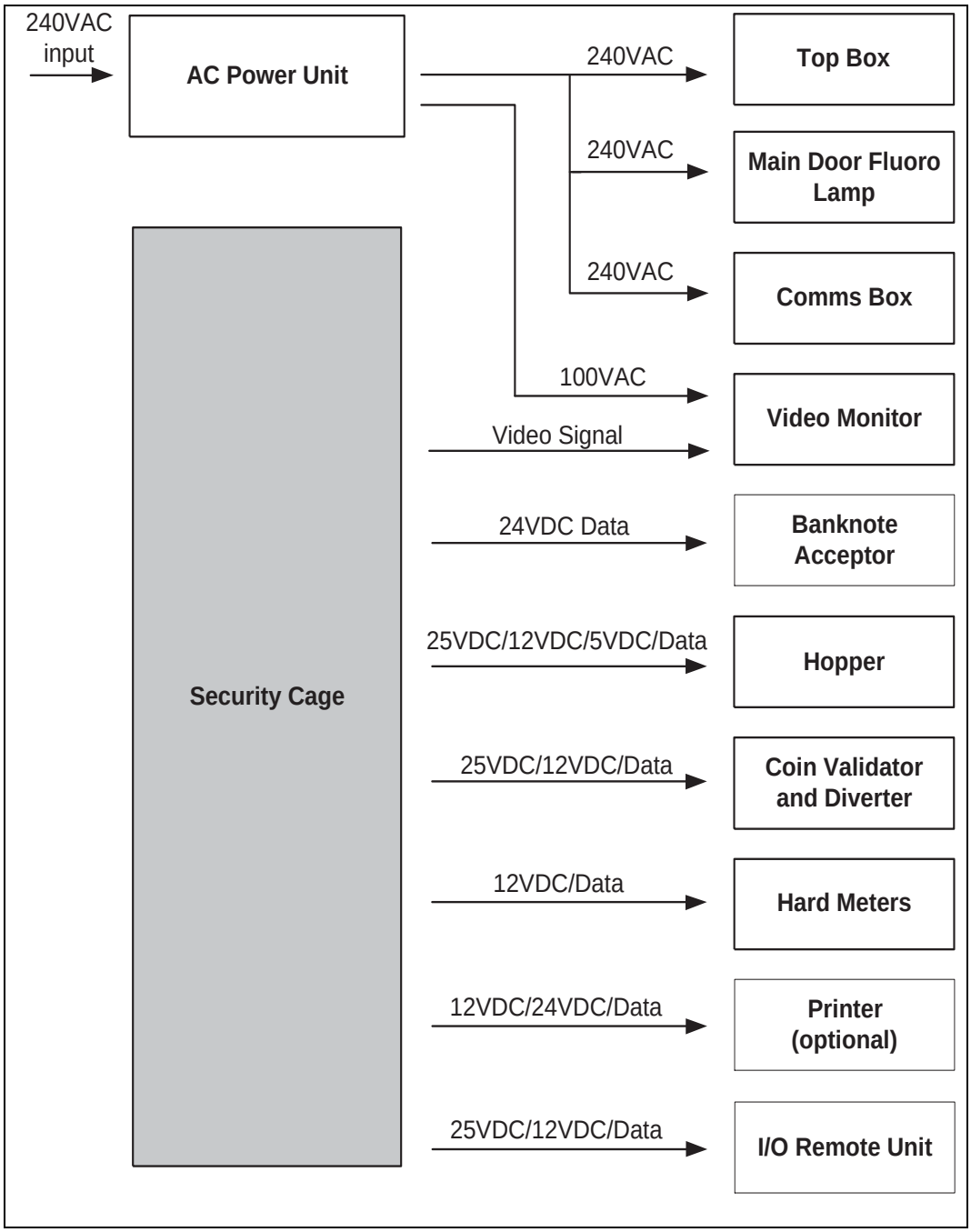

Figure 5-1 Block Diagram of Electric Circui

5.6.1 Block Diagram of Electric Circuit

The electrical flow into and out of the machine is shown in *Figure 5-1 Block*

Diagram of Electric Circui.

5.7 RAM Clear

Clearing RAM erases all game statistics information from the meters and can only be performed by authorised technicians.

Clearing RAM initialises the game and resets the meters in the machine (it clears the electronic memory banks in the processors). It is performed after a game conversion or software upgrade when certain messages appear (see *Section 5.7 RAM Clear*, and may be necessary as a prelude to setting-up and configuring the machine for use.

Once RAM is cleared, a stepwise commissioning process is carried out in the following order:

- Clear RAM.
- Check/set the internal clock in the machine.
- Check/set the values in the Machine ID Set-up.
- Check/set the values the game options details.
- Check/set the values in the Configuration Set-up.

The new values can be viewed in the operator mode sub-menus (see *Chapter 3 Operator Mode Instructions*).

5.7.1 Performing RAM Clear

To clear RAM proceed as follows:

RAM CLEAR PROCEDURE

1. Open the main door and turn off the power switch in the machine.
2. Switch on the power while pressing the RAM clear switch located on the front centre of the MCU2 board. After a successful RAM clear, the message *'All RAM is cleared. Please set up machine ID.'* is displayed.
3. Press *TAKE WIN'* to move to the set-up screens (see next section).

It will be necessary to clear RAM when any of the following error messages appear on screen:

ERROR MESSAGES NECESSITATING A RAM CLEAR

1. *'Call Attendant – WIN/RAM Error'*
2. *'Call Attendant – Backup RAM Error'*. This message is also displayed

when the power is turned on immediately after a new MCU2 board is installed.

3. *'Call Attendant – ROM Error'*
4. *'Call Attendant – WIN/EPROM Error'*
5. *'Call Attendant – Game Program Mismatch'*
6. *'Call Attendant – Self Audit Error'*

5.8 Commissioning the Machine

The machine is usually configured for a specific venue before leaving the factory, and usually needs nothing more upon delivery than connecting it to an electrical outlet, switching it on and enrolling it in the venue's monitoring system.

When setting these values for the first time or if a game conversion or software upgrade has been performed, clear RAM and press the *'TAKE WIN'* button to enter set-up mode. Broadly, data must now be input to a series of screens beginning with clock settings, followed by machine identification details, game options and the way the modules in the machine are configured.

SETTING UP THE MACHINE

1. Clear RAM and press the *TAKE WIN'* button to enter set-up mode, the first screen of which is used to update the current time and date values for the internal clock.
2. Press the *PLAY 5 LINES'* button to enter the editing mode.
3. Make the required changes.
4. Press the *'GAMBLE'* button to exit editing mode and return to the time/ date screen. At this stage further changes can be made by repeating steps 2–3.
5. Press *'GAMBLE'* again and the message *'Save changes to backup?'* appears.
6. Press *'GAMBLE'* to cancel the changes and return to the screen to make unforeseen changes; or press *'PLAY 5 LINES'* to ignore the changes and proceed to the next screen; or press *'TAKE WIN'* to accept the changes which the machine then takes a few seconds to save to memory.
7. The next screen enables machine identification details to be entered. Proceed as in steps 2–4 (above) which returns the user in this case to the machine identification screen.
8. Repeat steps 5–6.
9. The remaining screens allow the user to complete details for the game options and configuring the modules in the machine, in each case changing the values as required by using steps 2–4, and saving the changes to backup using steps 5–6.
10. After the last screen details have been entered, the machine takes a few

seconds to store the new settings in memory, additional game files are loaded and the operator mode screen appears if the Audit key had been turned when the machine was first switched on.

11. The new settings can be viewed by selecting the *Audit Mode – Machine Identification*, *Machine ID Set-up* and *Configuration Set-up* options in operator mode.

There is also an option to *'Change to default settings'* in these set-up screens. Choosing this option activates the machine's initial programmed settings but leaves the user in the current screen in case additional settings need to be made. After that the user proceeds with the set-up procedure as above.

5.9 Replacement Electrical Parts

Table 5-8 Electrical Parts List lists the major parts used in the Endeavour Series machine:

Table 5-8 Electrical Parts List

Part	Location	Type
15W Fluorescent tube	Top Box (if fitted)	FL15 Cool White
Fluorescent tube starter	Top Box (if fitted)	510 (4–65W)
Button lamp	Play buttons	28V, 40–60 mA, T10 wedge base
Tower light lamp	Tower light	30V, 3W, BA9S 10mm
Fluorescent tube socket ES	Main door.	6 and 8W
Fluorescent tube ES		6W
Fluorescent tube (ES only)		8W
Fuse (main)	AC Power Unit	5A, 250V, S506 Series, Anti-surge
Fuse (Sub)	AC Power Unit	3.15A, 250V, S506 Series, Anti-surge

5.10 Spare Parts List

Following is a full list of manufacturer's spare parts available for the Endeavour Series machine.

Table 5-9 Spare Parts List – Upright Model

Description	Konami Part No.
Paper Roll for Printer (where fitted)	1135002A
Wire, Door ES, RMCM024-A	3011020A
Monitor Assembly ES, (Non-touch screen)	3012
LCD Monitor Assembly, ES500	4012
Photosensor Cabinet OMT-01L, LM REC (CAB) – ES, 99294	3013002A
Main Switch Unit Assy – ES, RMAA015-A2-B	302
Ballast Unit Assy – ES, RMAA015-A2-C	303
Ballast 4/6/8 WATT ES, EC4/6/8	3033001A
AC Power Unit Assy – ES, RMAA080-A	304
NSW Comms Box Assy – ES, RMKM001-A	305
Switching Regulator NSW Comms, ZWS5012/J DC12V	3052001A
DC Power Unit Assy – ES, RMAA070-A	306
Switching Regulator 12V ES, DC Power, ZWS100PF-12/J	3062001A
Switching Regulator 24V ES, DC Power, ZWS120PPF-24	3062002A
SSR-Power Save ES, DC Power, 74111	3062003A
PCB -Connector Board ES, 94517	3072001A
PCB - MCU2 – ES, 93536	3072002A
PCB - IFU2 – ES, 94516	3072003A
PCB - FMU2 – ES, 94515	3072004A
PCB - JXU2 - N.S.W. Comms ES, 98587	3072005A
Micro Switch Logic Unit – ES, (Omron) SS-01GL2T	3073001A
Game Kit - ES, PCB'S & EPROMS, Flash Card	307B
B.V. Cage Assy. (GPT) – ES, RMAA050-A	308
B.V. Cage Assy, JCM, ES500	408
Banknote acceptor head - G3 ES, AU10E117 AUS Currency	3082001A
Banknote Acceptor Head, JCM (ES500)	501
Wire, Belly ES, RMCM025-A	3101019A
Speaker ES, 4ohm - 7 watt, 68539	3102001A
Coin Vald - QL Type (Nat.) ES, Programme AU002-A3, Q7120	3102002A

Description	Konami Part No.
2 Way Separator-QL ES, 7003032	3102003A
PCB - CTR (with diode)- ES, 7 Digit Meter - NSW 8 Meters, 30192	3102004A
Fl Tube 6W ES	3103004A
Fl Tube 8W ES	3103005A
Photo Sensor Door-OMT-01L 2P, 99293	3103006A
Monitor Mask, DR ES, RMCP004-A	3106001A
Monitor Mask, ES500, KECP004-A	4106001A
Belly Box Assy - ES	310B
Belly Box Assy (ES500)	410B
Door Unit Assy. Black – ES, RMAA020-A	310BLK
Coin Validator Assy – ES	310C
Coin Validator Assembly, (ES500)	410C
Note Ent, DR ES, RMDM001-A	3115001A
Note Entry DR (ES500), KEDM001-A	4115001A
Coin Ent (A), DR ES, RMDM002-A	3115002A
Coin Entry (A), DR (ES500), KEDM002-A	4115002A
Coin Ent (B), DR ES, Aus R1, RMDM003-A	3115003A
Coin Entry (B), DR (ES500), KEDM003-A	4115003A
Hopper WH1 Aus R1 ES, WH-1	3122003A
Hopper Aus R1 (ES500), Mk4 Universal	4122001A
Plate Top – ES, RMBM019-A	3131001A
Plate Top (ES500), KEBM019-A	4012
Panel Dacom ES NSW, Adel, Sky, RMMM002-2	3161001A
Panel EDT ES NSW, RMMM003-2	3161002A
Panel - Turbo, Comp/Game, Sentin	Various
Hopper DH-750 Aus R1 ES, DH-750	3122004A
Printer Assy – ES Series (where fitted)	301

6 Inspection and Installation

6.1 Introduction

WARNING
High voltage is used when operating this machine. Take extreme care when performing the procedures described in this chapter.

NOTES
This gaming machine should only be installed by a licensed technician who will check all connections, modules, components, machine functions and configure the correct set-up parameters.

This chapter describes the procedures for inspecting, installing, and checking the functions and operation of the Endeavour Series video gaming machine, including the following:

- *Section 6.2 Inspection* - Details inspection procedures for the outside and inside of the machine, prior to installation.
- *Section 6.3 Installation* - Describes how to install the machine, the electrical connection, and the locking mechanism.
- *Section 6.4 Performance Check* - Describes how to power up the machine, establish a communication system link, record the accounting data, and check the normal operation of the machine and communication system.

6.2 Inspection

Figure 6-1 Structure of the Endeavour Series Gaming Machine shows the main components of the machine.

After reading the installation procedure in this section thoroughly, see *Section 6.4 Performance Check* for more information.

Check the transport box for any damage then inspect the outside of the machine for damage such as broken glass and dents or cracks. Confirm that the model and serial numbers agree with those on the documentation (see *Section 6.3 Installation* and *Subsection 6.4.1 Power up*).

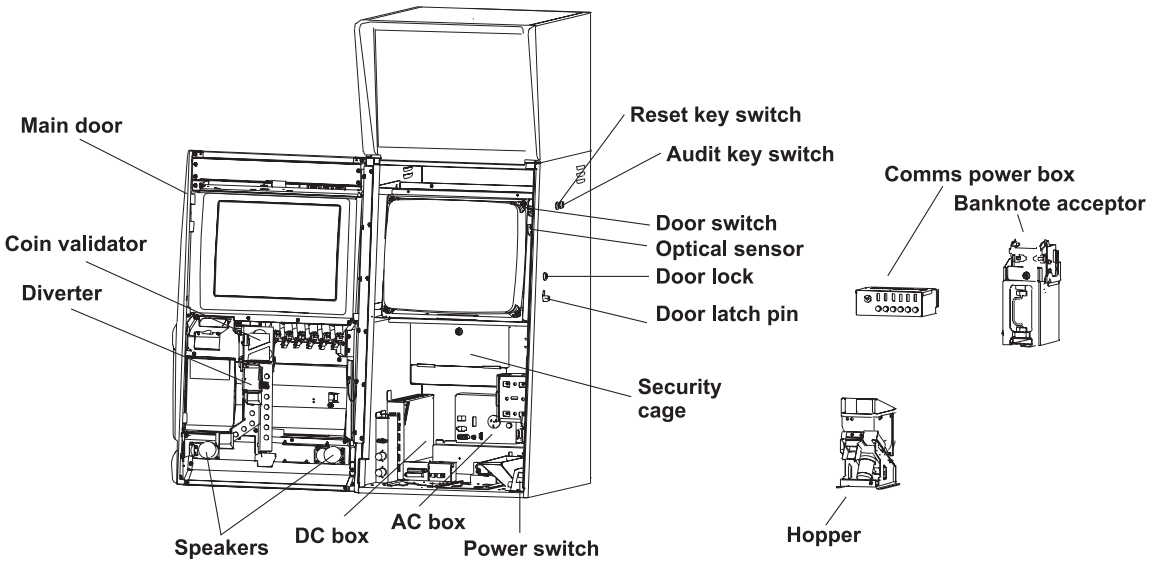

Figure 6-1 Structure of the Endeavour Series Gaming Machine

Unlock and open the main door of the machine. Look for any loose components or board brackets, and check the wiring harnesses to confirm that all connectors are mated, properly wired, and secured away from moving parts.

If any repair or technical support is required, contact Konami Australia Pty Ltd.

6.3 Installation

A shipping list and a specification are supplied with each machine. Ensure that all parts have been received and that the machine is located on a horizontal and stable base (see *Section 1.9 Electrical and Environmental Specifications*). Check that the game and function details and the machine configuration options are correct.

6.3.1 Installation Table

NOTE
Do not turn on the main switch yet.

Before carrying out the installation procedure, ensure that the machine, when installed, will have a clearance of 200 mm between adjacent machines and 100 mm between the rear panel of the machine and the wall. There should be close access to a power supply source.

The cabinet of the upright model is fixed on a lockable base (see *Figure 6-2 Machine Footprint*) which holds the cash-box. After doing this, chaeck that it is stable (see Konami Australia Pty Ltd if uncertain).

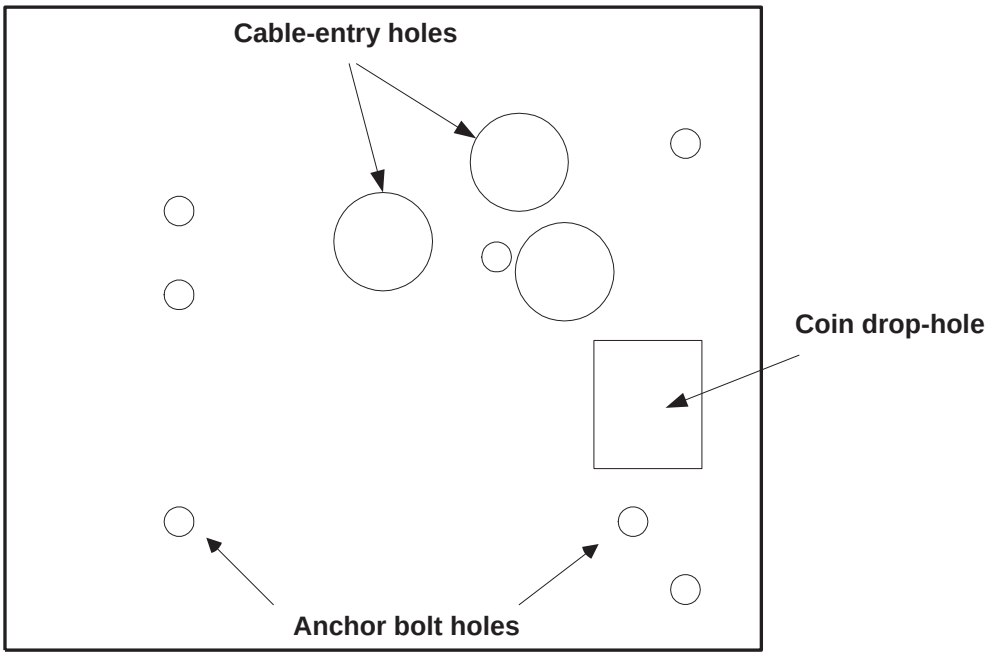

Figure 6-2 Machine Footprint

INSTALLATION PROCEDURE

1. Ensure that the machine is level and stable on the base.
2. Position the machine so that the screw holes, cable holes and the cash-box hole are aligned with the holes in the base of the machine.
3. Insert and secure the supplied nut, washer and bolt combinations from the inside of the cabinet.

6.3.2 Electrical Connection

Connect the machine to an easily-accessible power supply socket. The power lead consists of an IEC (International Electro-technical Commission) plug at the machine end and a conventional three-pin plug at the other end. Connect the lead as follows:

1. Remove the hopper from the machine, then connect the power-cord socket to the IEC power socket on the right of the power module in the machine.
2. Pass the unconnected power cord side through the hole at the rear of the machine cabinet, and secure the bush fixing plate with a screw. Connect the power cord to the power outlet. Alternatively, feed the power cord through the base of the machine. Do not switch on the power to the machine yet.
3. Install any optional equipment required (e.g. cash box door-open sensor), and connect all electrical harnesses.

6.3.3 Security Lock

Fit all venue-specific locks to the machine as per requirements. A security lock is required for the security cage door, cash box, banknote validator door, banknote stacker and main door. An additional lock assembly may be required depending on the model of top box used and the particular configuration of the machine.

6.4 Performance Check

Once the machine is installed, turn it on and check that the main functions are operating correctly.

6.4.1 Power up

Open the main door and turn on the power switch in the machine; the red LEDs on the front panel of the security cage light up. If they don't, identify the possible cause, referring to *Table 5-4 Functional Troubleshooting*.

Check that the video monitor is working correctly. If the screen does not display, find the possible cause by referring to *Table 5-4 Functional Troubleshooting*.

ABNORMAL START

If an abnormal start occurs when the machine is switched on, one of the error messages shown in *Section 5.7 RAM Clear* is displayed on the screen and stays until RAM data is cleared. To clear RAM, see *Subsection 5.7.1 Performing RAM Clear*. No credits can be accepted and no game play or communication functions operate until RAM data is cleared.

COMMUNICATIONS LINK (OPTIONAL)

Contact the jurisdiction concerned to register the machine for operation.

BRING MACHINE ON-LINE

Play several games to confirm that the machine is functioning normally. Close and lock the security cage door and cash box doors, then close and securely lock the main door. Turn the Audit key to return to the game.

7 Screen Message Information

7.1 Introduction

Important game and audit information is available for viewing on-screen in the operator mode. This chapter explains the terms and messages used in the various audit screens accessed in *Chapter 3 Operator Mode Instructions*. The information is grouped in the menu in which it appears while performing the various audit functions. Error messages that can appear during the game are listed in *Section 5.4 Error Messages* in *Chapter 5 Maintenance, Troubleshooting & Parts List*.

7.1.1 Recalling Game Details

If previous games need to be viewed in the event of disputes, the game recall function (an option within Audit mode, see *Subsection 3.5.2 Audit Mode*) is used. These screens give a snapshot of some of the current meter values when the game was completed. Use the buttons to scroll to a view of the game, which also includes any text messages that were showing at the time.

Table 7-1 Game Recall Display Screen

Item	Description
##th Last Game	Displays the sequence number of the current game.
CREDITS	The credit balance at the end of the game, shown in credit units and in roubles and kopeks.
## Credits Per Line	The number of credits per line for the game.
BET	The number of credits bet during the game.
WON	The final number of credits won in the game.
Date/Time	The current date and time, for reference purposes.
Game Type	The game name and software version code.
Result	The symbols on each reel shows the game result.
Game Completed Summary	Details the values of the master and game meters (see *Table 7-5 Banknote Acceptor Master/Period Meters Display Screen*), the hopper and coin-in status and the double-up value at the time the game was played.

7.1.2 Machine Identification Details

Basic machine configuration is done at the time of commissioning the machine (see *Table 3-6 Machine ID Set-up* and *Table 3-8 Configuration Setup*). The following settings can be viewed, but not altered, in the *Machine ID Setup* option of Audit Mode.

Table 7-2 Machine Identification

Item	Description
Machine Number	Konami's identification number of the machine, assigned at the time of manufacture.
Data Block Version Number	The version number of the communications protocol.
Manufacturer Identification	The identifying number assigned by the venue for each manufacturer's machines.
Firmware identification	The software ID code of the program EPROMs.
Base Credit Value	The monetary value of each unit.
Progressive Levels Supported	The number of progressive levels supported.
CCCE Transfer Limit	The maximum CCCE transfer value.
Hopper Limit	The maximum hopper payout value, or the 'cancel credit' level.
Multi-game Identification Number	Not used.
Theoretical PRTP	The theoretical percentage return to the player.
Maximum Possible Win Value (MPWV)	The theoretical maximum value that can be won from one play of the primary game.

7.1.3 Viewing the Meters

These screens are used to view details of games and money transfer since RAM was last cleared. It provides an accounting history for that machine for venue management.

Table 7-3 The Hard Meters Display

Item	Description
Turnover	The total turnover of all kopeks played.
Total Wins	The total of all winnings generated by the machine and transferred to the credit display. The meter increments at the end of a game cycle.
Cashbox	The cumulative total value of cash placed in the cash box.
Cancel Credit	The total value of credits paid out as 'hand' pay. The meter increments when an attendant performs a 'key-off' procedure.
Money In	The total value of money transferred to the machine by the Centralised Cash Control Equipment (CCCE). The meter increments for each rouble transferred, regardless of the machine's credit denomination.
Money Out	The total value of money transferred from the machine to the CCCE. The meter increments when a transaction between the machine and the CCCE is completed. At the same time, the displayed credit decrements and the CCCE is notified that the transaction was successful.
Cash In	The total value of cash (coins and notes) inserted into the machine. The meter only increments when valid cash is accepted.
Cash Out	The total value of coins paid out by the machine. The meter increments when the machine pays out a valid coin. It is not incremented when residual credit is paid out by a cancel credit.

7.1.4 Viewing Game Information from the Meters

Clearing RAM removes all data from the soft meters, and can only be performed by authorised technicians.

Game information and auditing statistics can be monitored and viewed using these screens. No settings can be changed, but the information enables venues to track the machine's game and takings details.

Table 7-4 Master/Period Meters

Item	Description
Turnover	The total turnover of all kopeks played.
Total Wins	Total wins added to the credit meter.
Cashbox	The cumulative total value of cash placed in the cash box.
Cancelled Credit	Money removed via 'hand' or 'book' pays or 'ticket pays' as cancelled credit.
Money In	The cumulative total value of money placed in the EGM. Includes coins, notes and cashless.
Money Out	The cumulative total value of money removed from the EGM. Includes coins, notes, cashless, ticket print and cancel credit.
Cash In	The cumulative total value of cash (coins and notes) inserted into the machine.
Cash Out	The cumulative total value of cash (coins) paid out by the machine.
Miscellaneous Accrual	Not used.
Credit	The current credit balance.
Occurrence Meter 1–4	Not used.
Power Up	The number of times the power has been turned on to the machine.
Games Played Since Last Power-Up	The number of games played since the last time the power was turned on to the machine.
Games Played Since Door Last Open	The number of games played since the last time the door was opened.
Games Played (Stroke)	The number of games played, not including free spins or free games (units).
Actual PRTP	The actual percentage return to the player up to this time.
Theoretical PRTP	The theoretical percentage return to the player.
Extra Coin Out	The number of coins paid out in excess of the credit meter value.

7.1.5 Viewing Details of the Banknote Acceptor

These screens are used to view the banknote movements in the module (see *Table 3-2 Audit Mode*). The viewer can switch between the master meters and the period meters.

Table 7-5 Banknote Acceptor Master/Period Meters Display Screen

Item	Description
Banknotes In	The cumulative total value of accepted banknotes.
Banknotes Count	The cumulative total number of accepted banknotes.
Banknote Rejects	The cumulative total number of rejectected banknotes.
Banknotes Count R10/ R50/R100/R500/R1000	The cumulative total number of R10/R50/R100/ R500/R1000 banknotes accepted by the machine.
Last Five Banknotes-Validated	The denomination, date and time of acceptance of the last five banknotes.
Banknote Acceptor Disable Limit	The upper credit limit of the banknotes acceptor for accepting banknotes.

7.1.6 Resolving Machine Lockups

The Endeavour Series gaming machine has built-in checking and fault-finding capabilities to enable the machine to be returned to playing mode when it locks up. This screen lists all of the possible lockups and their cause, with any current lockups shown in red. Entering this mode takes the user to a lockup screen showing the information shown below. Pressing the *'PLAY 3 LINES'* button displays a help screen on the condition, and pressing the *'TAKE WIN'* button takes the user to the next active lockup

Table 7-6 Current Lockup

Message	Description
Lockup Code	The specific code for the lockup.
Lockup Name	The description of the lockup.
Cause	The reason for the lockup occurring.
To Clear	Provides a method to clear the lockup.

7.1.7 Refilling the Hopper

When the hopper is emptied of coins it must be refilled (see *Subsection 3.5.4 Refilling the Hopper*). To refill the hopper, open the main door and press the *'PLAY 1 LINE'* and *'TAKE WIN'* buttons at the same time.

Table 7-7 Hopper Refill

Item	Description
Hopper Refill Amount	The number of coins to add to the hopper for a hopper refill.
Hopper Level	The current level of coins in the hopper as calculated by the EGM.
Refill	The cumulative total value of coins inserted into the hopper by performing hopper refills.

7.1.8 Testing the Coin Validator and Diverter

This screen is accessed via *Table 3-5 The Test Menu* and runs tests on the coin-in unit. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES* buttons to select the inhibitor and the diverter states, then insert coins into the entry slot to check whether coins are passing through the mechanism correctly. This test also checks the operation of the sensors that detect the passing coins. Any lockups must first be resolved before beginning the test, then press *'TAKE WIN'* button to reset the machine. At the end of the test, exit to the Audit mode menu by pressing the *'GAMBLE'* button.

Table 7-8 Coin Entry Test in Test Mode

Item	Description
Coin Control	This setting switches the coin validator between 'Accept' (which passes coins from the coin acceptor to the diverter) and 'Reject' (which sends the coins from the validator to the coin tray) using the *'PLAY 5 LINES'* button. Similarly, the coin diverter may be switched between 'To Coin Hopper' (which passes validated coins from the coin acceptor to the hopper) and 'To Cashbox' (which sends them to the cashbox) and is selected using the *'PLAY 5 LINES'* button. In both of the above cases, when a coin passes the sensors a response is seen in the sensor switch area of the screen as the switch changes value from 'off' to 'on'.
Coin Meters	These show values for the number of coins accepted during the test and the various warnings that can appear at stages through the test procedure.
Coin In Sensors	These monitor the sensor status during the test as coins are inserted and travel the various paths.
Coin In Errors	This shows the possible lockup conditions that can affect the operation of the coin validator, with any current lockups shown in red.

7.1.9 Testing the Banknote Acceptor

This test, described in *Table 3-5 The Test Menu*, runs tests on the banknote acceptor to check that it is operating correctly, and can also be used to check the signature of the ROM version.

Table 7-9 Banknote Acceptor Test

Item	Description
'ROM Version'	The program version of the banknote acceptor.
'Banknote Insert'	A switch to select one of two settings: 'Enable' (whereby inserted banknotes are sent to the stacker) and 'Disable' (which returns rejected banknotes back through the entry slot).

Table 7-9 Banknote Acceptor Test (cont.)

Item	Description
'Banknotes in Escrow'	The value of validated banknotes currently held in the banknote acceptor and which haven't been sent to the stacker.
'Total Banknotes'	The value of banknotes that have been stored in the stacker during the test.
'Banknote Reject Status'	The value of banknotes that have been rejected during the test.

7.1.10 Testing the Hopper

This selection allows the user to run tests on the hopper. Open the main door and select *TEST MODE* from the operator mode menu. The *Hopper Test* option is shown in blue so is not selectable. Current lockups relating to the hopper must first be resolved, and these are shown at the bottom of the screen. It is necessary that the door is first opened then closed before starting the test.

Once the hopper test option is selectable press the *'PLAY 5 LINES'* button to enter the test screen. Use the *'PLAY 1 LINE'* and *'PLAY 3 LINES'* buttons to set the number of coins to use in the test (the default number is 10).

Press the *'PLAY 5 LINES'* button to dispense the pre-set number of coins, then re-insert the coins in the coin-entry slot to complete the test. If any lockups occur relating only to the hopper during the test, press the *'TAKE WIN'* button to reset the machine.

The test cannot be exited until all the coins have been inserted, and opening the door before or during the test will result in the coins being rejected. Only one hopper test can be performed per door open–door close procedure.

Table 7-10 Hopper Test

Item	Description
'Coins Pay'	The number of coins inserted into the hopper for the test.
'Coins Paid'	The number of coins paid out by the hopper during the test.
'Coins Inserted'	The number of coins inserted into the hopper during the test.
'Total Paid'	The number of coins paid out by the hopper during the test.
'Over Paid'	The number of coins paid out by the hopper in excess of the 10 coins inserted for the test.

Table 7-10 Hopper Test (cont.)

Item	Description
'Runaway Paid'	The number of coins that have been paid out by the hopper in excess of the test value.
'Over Flow Sensor'	Advises the status (*'Full'* or *'Not Full'*) of the hopper.
'Coin Sensor #1'	Shows the response of the sensor as coins are passed through it during the test; the states are 'off' and "on'.