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17" Video Gaming Device
Service Manual (A-005044)

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Chapter 1. Setup

About the Procedure
This chapter details a procedure to perform when the new gaming device (GD) arrives. The chapter also describes how to inspect the new machine.

When WMS ships a GD, the GD may contain Diagnostic Software. This software enables you to test the machine. But Diagnostic Software doesn't include games. Install Game EPROMs (game software) at the retail site. Follow instructions in Chapter 3, CPU Board, Software and Game Denomination Changes. Instructions for testing the GD with Diagnostic Software appear in Chapter 2, Diagnostic Software.

Procedure
You'll need these tools...

- Electrical Outlet Tester
- #2 Phillips Screwdriver
- 7/16" Nut Driver
- 11/32" Nut Driver
- Voltmeter
- 7/8" Wrench (for lock installation)

1. Inspect the cabinet exterior for damage. If you find damage, file a claim with your carrier. Remove and set aside everything from the shipping container.

2. The ADMINISTRATOR KEY SWITCH provides access to auditing, diagnostic and adjustment functions. It is located on the outside of the cabinet near the Main Door Latch.

3. Open the Main Door.

4. Inside this door, the Power Distribution Unit (PDU) is on the bottom-right rear. The card cage is on the bottom-left. The hopper is at the bottom-front, left and center.

5. Check major components for damage or improper mounting...
   - Cashbox
   - Coin Acceptor/Coin Comparator
   - Bill Validator
   - Hopper
   - Marquee Lamp and Glass
   - Monitor
   - Power Supply
   - Printer
   - Speaker

6. To open the logic door, the coin tray and hopper must be temporarily removed.

7. Raise and remove the coin tray.

CAUTION
Never move or tilt the GD by the topbox. Moving the GD this way can damage both the GD and the topbox.

NOTICE
The 55X game should come with a 2.4 in. toroid (P/N 5556-005782-00) that is attached to the line cord by looping the cord three times through the hole in the toroid at the PDU plug end.
WARNING

Avoid electrical shocks! The optional player tracking device (PTD) must be a CSA/NRTL/C or CSA/US/C listed type which plugs into a wall receptacle or the service receptacle of the PDU (Power Distribution Unit). Alternate-ly, an unapproved PTD may operate from a CSA/NRTL/C or CSA/US/C listed AC adapter.

- **Holes in GD.** To protect cables, grommet PTD mounting holes in the GD.
- **External PTD.** PTD mounting holes in the GD must not allow access to live parts.
- **Power.** PTD power consumption must not exceed the rating of the receptacle.
- **PTD Mounted Inside the GD.** A line voltage-powered PTD must have a separate enclosure.

8. Slide the hopper toward you.
9. Remove the hopper from the cabinet. Sensors and power unplug from the blind mating connector as you slide the hopper out.
10. Remove the video cable from the CPU Board's Video Port.
11. Unlock and open the Card Cage (Logic) Door. Be sure that circuit boards mount securely to the Backplane. (The Backplane Board is behind the Card Cage.)
12. Close and lock the Logic Door.
13. Reconnect the video cable to the CPU Board's Video Port.
14. Use a voltmeter to measure your line voltage at the outlet. Verify that the line voltage is either 120 or 220 VAC (depending upon what is nominal for your jurisdiction).
15. A switch on the connector side of the PDU selects the line voltage range. The range options are 100 to 120 volts, and 220 to 240 volts. The gaming device accepts a line frequency of 50 to 60 Hz. Plugging your GD into an improper line voltage source creates fire and electrical shock hazards. An improper line voltage or frequency can also cause GD damage or malfunctions.
16. Use an outlet tester to check for properly implemented ground, hot and neutral outlet wiring. Only use a grounded AC outlet.
17. Locate the Power Distribution Unit. Switch off GD power at the PDU. Fish the AC power cord through the right, left or back floor channel. (These channels are under the cabinet.) Then plug the female end of the line cord into the Power Distribution Unit. Don't plug the cord into an outlet yet!
18. The hopper has a rotary type line frequency switch. Never adjust
Hopper Probe Level Coin Max Amounts (Aprox.)

<table>
<thead>
<tr>
<th>Hopper Type</th>
<th>Probe Hole</th>
<th>U.S. $1</th>
<th>25c</th>
<th>5c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>3rd</td>
<td>500</td>
<td>2,000</td>
<td>2,700</td>
</tr>
<tr>
<td></td>
<td>2nd</td>
<td>400</td>
<td>1,500</td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td>1st</td>
<td>300</td>
<td>1,200</td>
<td>1,500</td>
</tr>
<tr>
<td>Two-Tier</td>
<td>3rd</td>
<td>600</td>
<td>2,200</td>
<td>2,600</td>
</tr>
<tr>
<td></td>
<td>2nd</td>
<td>500</td>
<td>1,800</td>
<td>2,300</td>
</tr>
<tr>
<td></td>
<td>1st</td>
<td>400</td>
<td>1,300</td>
<td>1,800</td>
</tr>
</tbody>
</table>

This switch with the line cord plugged in. Check this switch's setting to see that the factory setting matches the local line frequency. If not, set the switch to match the local power line frequency. You'll find the switch on the Hopper Control Board. Look at the Hopper Control Board through the window, beneath and beside the hopper bowl. Notice the arrow on the switch face. This arrow points to either "110" or "220." (These switch labels have nothing to do with line voltage.)

- In 60 Hz areas, the arrow should point to "110."
- In 50 Hz areas, the arrow should point to "220."

To adjust the switch, insert a small screwdriver in the slot atop the switch. Turn the screwdriver to select the hopper line frequency.

- **CAUTION**

Switch off power before unplugging or plugging in the hopper. Otherwise, you will damage the hopper.

19. Attach the drop door connection to the drop door switch in the stand.

20. Plug the female end of the line cord into the slot machine's Power Distribution Unit. You'll find the Power Distribution Unit on the lower left, inside cabinet wall. Drop the line cord through the base and out the lower hole.

21. Check the GD for loose or missing hardware. Missing hardware may have fallen into the hopper. Clean it out there before the hopper jams!

22. Also, before filling the hopper with coins, remove dust, dirt, loose hardware and other foreign matter.

23. See the table Hopper Probe Level. Adjust the hopper coin-level probe. Move the probe to a higher hole if the hopper will hold more
24. Slide the hopper into the cabinet. Sensors and power reengage at
the blind mating connector as you slide the hopper in.

25. Plug in the GD. Turn on the GD at the Power Distribution Unit (PDU)
on/off switch. During a normal startup, these events occur...
- The monitor and lamps come on
- The bill acceptor whines as it undergoes a self test
- The machine bongs once, indicating a nominal initialization
If the lamps don't light and you don't hear the bong: Did you plug the
GD into an active, unswitched AC outlet? If you hear more than one
bong, refer to Chapter 3, of 550 Manual, Section 2, Troubleshooting.

26. Switch off GD power at the PDU.

Machines with a Locking Removable Cassette Bill Validator...

27. Check the Locking Removable Cassette (LRC) Bill Validator (BV)
(JCM World Bill Acceptor® -WBA). The BV is on the right-front side
of the cabinet. To access the BV, unlock the belly glass door
(kayswitch on right side of the player panel), pull out the belly glass
door release, and lower the belly glass door. This door provides
access to the bill acceptor. Unlock bill acceptor door. Check inside
of the BV: Is there a bill stacker cassette inside? If not, insert one.
To remove the cassette, depress the thumb release latch on the
right side of the BV and pull up and out on handle. Slide the
cassette back into the acceptor until it is latched in place. Close and
lock BV door and belly glass door.

28. Check the monitor. Be sure that the molex minifit connector is
properly connected to the monitor. The connector is beneath the
monitor on the left front. The monitor is mounted to the shelf by a
7/16 " flange grip nut located under the monitor shelf at the front
center.

29. Switch on GD power and check the hopper. Hopper works: Replace
the coin tray. Hopper doesn't work: Double-check cable connections
and the hopper.

30. Close and lock the main door.

31. Switch off GD power at the PDU.

32. If your machine has a coin comparator, grasp the coin mechanism
under the coin entry. Lift the coin mechanism up and out. Install a
typical coin of the proper denomination in the comparator. Return
the coin mechanism to the GD. Be careful to keep the coin
mechanism cable clear of moving parts.

33. Check to see that cables plug securely into the PDU and Backplane.
34. Exit Administration Mode to the Play Mode.

Machines with a Host System...

35. Install host communication cables according to recommendations of the communications system provider. Connect the communication cables to the backplane.

All Model 550 Machines...

36. Switch on GD power at the PDU.

37. Adjust the game play sound volume. See Section 1, Chapter 3, Auditing, Diagnostic and Adjustment Software.

38. Close and lock the GD's Logic Door and Cashbox Door.

39. Enter Administration Mode to select the machine protocol address (if necessary). (Choose Protocol Options is part of the Supervisor Menu System. See Chapter 3, Auditing, Diagnostic and Adjustment Software.) One of three protocols can be chosen (ACP, SAS or SDS). SAS is the only one requiring a terminal address.

40. Run a diagnostic check of the software and hardware. Use diagnostic software described in Section 1, Chapter 2, Diagnostic Code.

41. Verify that Logic Door is closed and locked.

42. Record starting cumulative totals: Copy them off the mechanical meters next to monitor.

43. Close and lock the GD's Main Door.
55x Gaming Device Base Dimensions

ALL PILOT HOLES ARE 1/8" DIA. (32 cm)
LARGE SHADED HOLES ARE 2-1/2" DIA. (6.35 cm)
SMALL SHADED HOLES ARE 3/8" DIA. (3.75 cm)
THE OVERALL CABINET DIMENSIONS ARE BOXED

WMS GAMING
17" UPRIGHT
DRILL FIXTURE

Measurements are in inches and centimeters.
Metric equivalents are in parentheses.
17" VIDEO UPRIGHT - MODEL 550

<table>
<thead>
<tr>
<th>PART DESCRIPTION</th>
<th>TOPBOX HEIGHT</th>
<th>OVERALL HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>9&quot; TOPBOX</td>
<td>9.63</td>
<td>15.20</td>
</tr>
<tr>
<td>9&quot; TOPBOX W/ CARDREADER</td>
<td>12.26</td>
<td>17.91</td>
</tr>
<tr>
<td>16&quot; TOPBOX</td>
<td>15.88</td>
<td>20.34</td>
</tr>
<tr>
<td>16&quot; TOPBOX W/ CARDREADER</td>
<td>18.45</td>
<td>22.91</td>
</tr>
<tr>
<td>16&quot; ROUND TOPBOX</td>
<td>15.88</td>
<td>21.76</td>
</tr>
<tr>
<td>16&quot; ROUND TOPBOX W/ CARDREADER</td>
<td>18.45</td>
<td>24.35</td>
</tr>
</tbody>
</table>

Measurements are in inches
17" VIDEO UPRIGHT - MODEL 550
WITH MONOPOLY TOP BOX

Measurements are in inches
Chapter 2. Diagnostic Software

The GD should contain one or two EPROMs for initial inspection. WMS issues game EPROMs separately. During inspection, the GD runs diagnostic software. This software helps you to verify that the GD functions properly. Use this chapter as a guide to diagnostic software. After the GD passes diagnostics, replace the diagnostic EPROMs with game EPROMs.

After you switch on the power, Administration Mode appears on the GD screen. Administration Mode contains four windows...

- **Services** Enables you to confirm the software level or set the date and time
- **Tests** Enables you to check GD functions
- **I/O** Enables you to examine performance of I/O peripherals
- **History** Enables you to review events that raised error flags

### Services

The Services Window has three buttons...
- **REVISION**
- **SET DATE**
- **SET TIME**

#### Revision

To display the diagnostic software version, release date and time, touch REVISION.

#### Set Date

Use the arrows to position the cursor in the date display. Use the onscreen keypad to enter the correct date (MMDDYY). Then touch the OK button. The window closes.

#### Set Time

Use the arrows to position the cursor in the time of day display. Use the onscreen keyboard to enter the time in 24-hour form. Then touch the OK button. The window closes.

### Tests

#### Automatic Test

Automatic Test Mode allows you to continuously test GD hardware. Touching AUTOMATIC TEST opens a window on the screen. Inside the window are these buttons...
- **OUTPUT TESTS**
- **SOUND TESTS**
- **VDEK TESTS**

NOTICE

This manual covers Version 2.39 diagnostic EPROMs XU3 and XU27.
**Diagnostic Code**

**NOTICE**
Turning the ADMINISTRATOR KEY won't allow you to exit Automatic Tests Mode.

Touch the desired tests. Then touch GO! to start the tests. The GD repeats these tests until you touch EXIT. If the tests identify problems, the screen displays error messages.

**Output Tests**
Touch OUTPUT TESTS. A window lists tests by device name. Devices include the printer, lamps and solenoids. As Automatic Tests Mode proceeds, the button for the test device turns on. After the test, the button turns OFF. Each test lasts one second.

**Sound Tests**
Touch SOUND TESTS. A window displays four sound buttons...
- Low Tone
- Warning Tone
- High Tone
- Noise Tone

Buttons turn on sequentially for a second, as the speaker emits corresponding tones. (Set volume at the Sound Window described later in this chapter.) An additional button entitled SOUND CALL, is reserved for future development.

**Video Tests**
Touch VIDEO TESTS. The monitor displays the color palette, crosshatch pattern and purity screens (red, green, blue, white).

---

**CAUTION**
Always print several receipts before closing the main door. Be sure that the printer doesn’t jam!

**NOTICE**
Monitor adjustment knobs are on the top edge of the monitor. The exact adjustment knob location depends on the type of monitor provided with the VGD.

**Printer (for GDs with the printer option)**
Touch PRINTER. A new button, PRINT 1 TICKET, appears...

**Print 1 Ticket**
Touch PRINT 1 TICKET to print a test ticket. This ticket should contain the alphabet in large and small capitals, and other symbols. These symbols include the WMS Gaming logo. If the printer doesn’t work, be sure that you configured your printer correctly. Then check or swap the cable between the printer and CPU Board.

**Video**
The three VIDEO options assist you with monitor adjustments. (For more on these adjustments, consult your monitor manual.)

**Palette (Color Bars)**
The PALETTE color bars screen simplifies color gun adjustments.

**Convergence (Crosshatch Pattern)**
The CONVERGENCE option displays a crosshatch pattern. Use this pattern during convergence and raster positioning. The crosshatch pattern will also help during raster height and width adjustments.

**Red, Green, Blue, White (Purity Screens)**
The buttons marked RED, GREEN, BLUE and WHITE open solid color screens. These screens help during purity adjustments, relative gun output tests, degaussing and rejuvenation. Use the white screen for color temperature testing.
Touch Screen

Touch TOUCH SCREEN to adjust or verify screen calibration. TOUCH SCREEN opens a window with two buttons: TOUCH CAL and TOUCH TEST.

Is calibration so poor that you can't activate the Touch Screen Test from the screen? Press the CHANGE button and simultaneously turn the ADMINISTRATOR KEY switch. The GD automatically enters the Touch Cal Option Mode.

Touch Cal
Touch TOUCH CAL to open its window. TOUCH CAL matches cursor position to touch position. Touch the number 1 in the window's bottom left corner. A new window replaces the first. Touch the number 2 in the window's top right corner. The screen calibrates to your touch. Then the Tests Window returns.

Touch Test
Touch TOUCH TEST to open its window. TOUCH TEST reveals how well the cursor tracks finger movement. Touch several screen locations. Notice the "Down" and "Lift" coordinates in the window's bottom left corner. These report where your finger touched and rose off the screen. The "Drag" coordinates define where your finger currently rests on the screen.

Hopper Tests (for GDs with the hopper option)

Touch HOPPER TESTS to open the Hopper Test Window. Put at least 30 coins in the hopper for this test. During the test, the monitor counts coins paid out. The Hopper Test checks the...

- HOPPER DRIVE CIRCUITRY
- HOPPER MOTOR
- MOTOR BRAKE
- COIN-OUT PROXIMITY SENSOR

The I/O Board enables the hopper driver, a solid state relay (SSR). The SSR switches on the hopper motor and releases the brake.

Touch ONE COIN or 10 COINS to test the hopper's ability to dispense coins. The hopper responds by dispensing a coin or coins. A coin-out sensor detects each coin leaving the hopper. The sensor transmits this information back to the CPU Board.

Touch SHUT OFF HOPPER to disable the hopper motor and engage the brake. The CPU responds by deactivating the SSR. The SSR switches off the hopper motor and applies the brake.

Touch EXIT to leave the Hopper Test Window.

Sound

Dead Touch Screen?

To move the cursor-10-button game:
- DEAL/DRAW (or PLAY) button moves the cursor down. When the cursor reaches the screen's bottom edge, the cursor wraps around.
- CHANGE (or BET ONE) button moves the cursor horizontally, toward your right. When the cursor reaches the right screen edge, the cursor wraps around.

To move the cursor-12-button game:
- 3-LINES button moves the cursor down. When the cursor reaches the screen's bottom edge, the cursor wraps around.

- CHANGE or 5-LINES button moves the cursor horizontally, toward your right. When the cursor reaches the right screen edge, the cursor wraps around.

To make a selection (both games):
- Turn the ADMINISTRATOR KEY to enter Administration Mode.
- Bring the cursor onto the pad that you want to select with DEAL/DRAW and CHANGE buttons.
- Simultaneously press both buttons.

To test or calibrate a touch screen:
- Select TOUCH SCREEN on the Diagnostic Menu. See Touch Screen, in this chapter.
Diagnostic Code

NOTICE
Your GD's sound call addresses may vary from the address examples that appear below.

Sound Call Examples

<table>
<thead>
<tr>
<th>Sound</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert, Diagnostic</td>
<td>980</td>
</tr>
<tr>
<td>Bang, End</td>
<td>121</td>
</tr>
<tr>
<td>Bang, Start</td>
<td>122</td>
</tr>
<tr>
<td>Beep 1</td>
<td>985</td>
</tr>
<tr>
<td>Beep 2</td>
<td>986</td>
</tr>
<tr>
<td>Bet, Credit</td>
<td>110</td>
</tr>
<tr>
<td>Bet, Max</td>
<td>112</td>
</tr>
<tr>
<td>Credit Bill-In</td>
<td>103</td>
</tr>
<tr>
<td>Button, Toggle On</td>
<td>119</td>
</tr>
<tr>
<td>Button, Toggle Off</td>
<td>120</td>
</tr>
<tr>
<td>Chime, Call Attendant</td>
<td>115</td>
</tr>
<tr>
<td>Click, Button</td>
<td>160</td>
</tr>
<tr>
<td>Coin-In</td>
<td>101</td>
</tr>
<tr>
<td>Coin-Out, Bonus</td>
<td>109</td>
</tr>
<tr>
<td>Credit, Reached Max</td>
<td>111</td>
</tr>
<tr>
<td>Entry, Game</td>
<td>154</td>
</tr>
<tr>
<td>Entry, Help</td>
<td>150</td>
</tr>
<tr>
<td>Escape</td>
<td>983</td>
</tr>
<tr>
<td>Exit, Game</td>
<td>151</td>
</tr>
<tr>
<td>Exit, Help</td>
<td>152</td>
</tr>
<tr>
<td>Help, More</td>
<td>153</td>
</tr>
<tr>
<td>Play</td>
<td>118</td>
</tr>
<tr>
<td>Reject, Coin</td>
<td>117</td>
</tr>
<tr>
<td>Speed, Game 1</td>
<td>161</td>
</tr>
<tr>
<td>Speed, Game 2</td>
<td>162</td>
</tr>
<tr>
<td>Speed, Game 3</td>
<td>163</td>
</tr>
<tr>
<td>Spin, Reel</td>
<td>104</td>
</tr>
<tr>
<td>Tilt</td>
<td>118</td>
</tr>
<tr>
<td>Warning</td>
<td>984</td>
</tr>
</tbody>
</table>

Touch SOUND to display the Sound Window. This window enables you to adjust GD sound volume and test the sound hardware.

Sound Samples
The Sound Window contains four sound sample buttons...

- Low Tone
- Warning Tone
- High Tone
- Noise Tone

Touch LOW TONE, WARNING TONE or HIGH TONE for a test sound. The LOW TONE, WARNING TONE and HIGH TONE buttons each test one audio frequency band. The system should reproduce all sounds at about the same volume. Listen for volume changes, distortion, missing sounds or intermittent sounds.

Touch NOISE TONE, and the GD outputs noise across all audio bands. Listen for an absence or unusual emphasis of high, low or midrange sound.

Volume
Notice the two-pointed "MASTER VOLUME" arrow below the sound sample buttons. Between the arrows is a slider box. Use the arrows and slider to set the GD's non-award sound volume. You can move the slider through the volume range of zero to 255...

- Touch the right arrowhead to raise the level in small steps.
- Touch the left arrowhead to reduce the level in small steps.
- Touch the arrow body beside the slider to change the volume in large steps.
- Drag the slider right to smoothly increase sound volume.
- Drag the slider left to smoothly reduce sound volume.

Award Volume
Touching Award Volume adds two sliders to the Volume Window...

- Large Award Volume
- Top Award Volume

The MASTER VOLUME slide control that we described above continues to function the same way. The other two sliders operate in the same manner as the MASTER VOLUME slider. Use the other two sliders to raise or reduce the sound volume during awards.

Sound Call
Touch SOUND CALL to display a numeric keypad. This keypad allows you to test sounds at various EFROM locations by entering
addresses. Typical addresses appear in the table Sound Call Test. Depending on which sound EPROMs it uses, your machine may include sounds at these addresses. As you may have guessed, sound calls are primarily factory tests. Yet you can use sound calls to check volume settings and audio hardware performance. Touch keypad keys to enter each digit of an address in decimal notation. Touch the arrow to advance to the next digit of the address.

Secure Memory
Touch SECURE MEMORY to display a window with the status of the GD's secure memory. The window indicates secure memory status by the words "PASS" or "FAIL." A secure memory failure requires troubleshooting. Touch EXIT button to leave the SECURE Memory Window and proceed with other tests.

Comm Status
Touching COMM STATUS opens the Comm Status Window. This window contains a read-only section and a loopback test.

Read-Only Section
The Comm Status Window read-only section announces your GD's communication rate and protocol. For example, "Comm = 9600, 8, N, 1." The rate in our example is 9,600 bits per second (bps). The protocol is eight bits, no parity and one stop bit. This rate and protocol report depends on results from the most recent loopback test.

Loopback Test
The LOOPBACK TEST checks the GD's communication port on the Backplane Board. This test requires some hardware preparation. Follow this procedure...

1. Find the GD's serial port on the Backplane Board inside the Main Door. The serial port uses a DB9 connector.
2. Connect GD serial port pins 2 and 3 together. Or connect the GD to a terminal (or a PC running a terminal program).
3. Touch LOOPBACK TEST to initiate the test. If you have a printer machine, the GD prints alphanumeric characters. The GD screen reports the message "Comm = 2400, 8, N, 1."
4. Touch EXIT to quit the test.

I/O
I/O Test options allow you to test GD switches. This submenu includes these I/O (Input/Output) tests...

Currency

NOTICE
WHERE IS THE MAIN DOOR?
Diagnostic messages refer to the "Main Door."
In Slant Top Video machines, the Main Door is the Electronics Door.
In upright machines, the Main Door is the Front Door.
NOTICE  
The GD identifies US coins as "A."  
Canadian coins are "B.

- CC16 and CC40 mechanisms accept US coins.
- NRI mechanisms accept Canadian coins.
- Mars validators accept U.S. bills.
- You can set JCM validators to accept either US or Canadian currency.

The CURRENCY Test checks coin and bill validators. Initiate this test by touching the CURRENCY screen button. Now select the type of coin and bill acceptors installed in your GD...

- CC16
- CC40
- NRI

A new window opens. An example of the fields in this window appears below...

<table>
<thead>
<tr>
<th>COIN TYPE A BILL</th>
<th>OPTO pulse width 1</th>
<th>OPTO pulse width 2</th>
<th>OPTO pulse width 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
</tr>
</tbody>
</table>

The BILL field indicates the accepted bill's denomination. The COIN field increments as the VGD accepts a coin. When a player deposits a coin, the PULSE WIDTH field indicates the coin acceptor coin deposit signal.

Insert a valid dollar bill. The window should indicate the bill denomination: "ONE." Insert a valid five-dollar bill. The window should display "FIVE."

Input

Touching INPUT opens a window that lists the GD's input switches and opto detectors. Test a switch by closing it. If the input works, the screen highlights the input's name.

Output

Touching OUTPUT opens a window with a button array. Test an output by touching that output's touch screen button. For example, suppose that you touch the screen button for TOWER. The GD's top lamp should light. It should remain ON until you turn off its screen button.

Example of the OUTPUT window. Real switch names, such as "PLAY" or "BET 1" will appear on screen buttons. These names tend to vary from model to model.
Door Test

Touching DOOR opens a window that indicates door switch status (open or closed). Check door switches by pushing and releasing each switch. As you open a door, the screen highlights the corresponding door name. Touch LATCHES (on the screen) to maintain an "on" condition across any closed switch.

Mechanical Meters

Touching MECHANICAL METERS opens a new window. The window has two buttons: NORMAL +10 and FORCE +1.

NORMAL +10

Touch NORMAL +10 if you desire to increment mechanical meters by 10 (as in Game Mode). A meter-selection window opens. Use buttons in this window to select which meters that you want to test. Then press EXIT. This is the NORMAL +10 sequence...
1. The "METER OK" signal measures high.
2. The GD applies current to the meter.
3. The "METER OK" signal drops low.
4. The GD interrupts current to the meter.

FORCE +1

Touch FORCE +1 if you desire to increment meters by 1. FORCE +1 doesn't test the "METER OK" signal. Instead, FORCE +1 applies a current pulse to the meter. A meter-selection window opens. Use buttons in this window to select which meters that you want to test. Then press EXIT. If FORCE +1 works and NORMAL +10 doesn't, then the "METER OK" signal is faulty.

History

Touching HISTORY opens an event log window. This window records event messages. Here are some conditions that invoke event messages...

- TOUCH SCREEN MALFUNCTION
- POWER ON RESET
- CORRUPT MEMORY
- DOOR ACCESS
- CASH OUT

Touch HISTORY to review these events. The program also provides event dates and times. Touch EXIT to return to the main window.

NOTICE

CASH DOOR constantly appears closed on the Door Test. Current hardware has no application for this switch. The Door Test includes CASH/DOOR solely for expansion purposes. VGDs with a bill acceptor require a CASH/DOOR switch.
Chapter 3. Auditing, Diagnostic and Adjustment Software

Your GD's game software audits game play statistics and diagnoses GD problems. This software also helps you to adjust game features and performance. You can access GD auditing, diagnostic and adjustment functions from the Administration Mode. There are two Administration Mode menu systems...

- **Attendant Menu System**—for use by retailers
- **Technician Menu System**—for use by authorized personnel

Except for the Config/Test Menu, the Technician Menu System is identical to the Attendant Menu System. Accessing the Attendant Menu System involves lower security, and requires fewer steps. We discuss the Attendant Menu System later in this chapter.

**Technician Menu System**

To access the Technician Menu System, open the GD's Main Door. (The Main Door is the Electronics Door on Slant Tops. On upright machines, the Main Door is the Front Door.) Press the white DIAGNOSTIC button inside the door. (STATE LOTTERY MACHINES: Access the Technician menu system by turning the Technician Key.)

The screen displays the Administration Window, which includes five menu buttons.

![Diagram of Administration Menu System]

The Technician Menu System has five parts. To activate a menu selection, touch the selection on the screen. Notice the Config/Test option in the illustration...

Each button opens submenus. When the Administration Window appears, you can activate any submenu in two ways...

- Touch the submenu's screen button (menu pad).
- If the touch screen doesn't operate, use player panel buttons to move the cursor. See "Dead Touch Screen?" on page 3-3.

**NOTICE**

WINDOW PRIORITY. When you open a window, you activate its buttons and deactivate all the others. To close the window, touch its EXIT, CANCEL or OK button. Then the previous window activates. If a window doesn't have these buttons, close it by touching the previous window.

STATE LOTTERY MACHINES: ADMINISTRATOR AND TECHNICIAN KEYS function similarly. For simplicity, this manual usually specifies the ADMINISTRATOR KEY.

KEY PRIVILEGES. You can access ADMINISTRATOR KEY functions with either the ADMINISTRATOR KEY or the TECHNICIAN KEY. The ADMINISTRATOR KEY additionally allows changes to the Configuration/Test Features.
NOTICE
Touch EXIT to close a window and save your setting(s).

NOTICE
Some Config/Test options are theme specific and may or may not be available in your game.

Config/Test Menu

Game Options

Background Colors
Touch BACKGROUND COLORS to open its window. This window contains buttons for all games, and controls for red, green and blue levels. To set a game's background screen color, follow these steps...

1. Touch a game-name button (for example, JACKS OR BETTER).
2. Touch the DEFAULT button. The CURRENT indicator changes to the color of the DEFAULT screen background.
3. To specify a custom color background, move the R, G and B sliders as desired. (R stands for red, B for blue, G for green.) You can move each slider in various ways...
   a. Touch the right arrowhead to increase color saturation in small steps.
   b. Touch the left arrowhead to reduce color saturation in small steps.
   c. Touch the arrow body beside the slider to change color saturation in large steps.
   d. Drag the slider right to smoothly increase color saturation.
   e. Drag the slider left to smoothly reduce color saturation.
4. Look at the BACKGROUND COLOR indicator box to see the effect of your changes. (The game name of the current game also appears in this box.)
5. If you want to adjust other game color backgrounds, proceed.
6. Touch EXIT to save your settings and exit to the Config/Test Menu.

NOTICE
Some Menu Options may not apply to your game.

NOTICE
Jurisdiction regulations determine which menu options appear.

Example of the BACKGROUND COLORS window. Real game names, such as "BLACKJACK" will appear on screen buttons. These names tend to vary from model to model.
Game Selection
Touch GAME SELECTION. A window opens. This window allows you to enable or disable any of the machine's games. (The feature only applies to multi-game machines.) Touch EXIT to close the window and save your setting.

Choose Double-Ups
Touch CHOOSE DOUBLE UPS. A window opens. This window allows you to enable or disable the double-up feature. Touch EXIT to close the window and save your setting.

Game Percentage
(This feature may not apply to your GD.) Touch GAME PERCENTAGE. A window opens. This window allows you to view or change the winning percentage. Until you insert a special chip into the CPU Board, this window operates in Read-Only Mode. Read-Only Mode enables this window's buttons. Touch EXIT to close the window.

To set the game percentage, follow this procedure...
- 1. Switch off the gaming device at the PDU.
- 2. Insert the game percentage chip in socket XU27.
- 3. Switch on GD power at the PDU. The GAME PERCENTAGE window opens.
- 4. Press the onscreen button to increase the percentage. Or repeatedly press the button to loop through percentages. (The new percentage appears on your monitor.)
- 5. The Game Percentage Window has no EXIT button. Turn off the GD at the PDU to save your setting.
- 6. Remove the percentage chip from socket XU27.
- 7. Switch on GD power at the PDU.
- 8. The tilt "Secure Memory Options Updated" appears. Clear it by turning the ADMINISTRATOR KEY.
- 9. Review your changes.
- 10. Close and lock the Card Cage and Electronics Door.

Max Bet
Touch GAME SELECTION. A window opens. This window allows you to view or set the Max Credit Bet per line. Touch EXIT to close the window.

General Toggle Options
Banner/Credits (Multi Game Only)
Touch ON to enable the BANNER/CREDITS feature, or OFF to disable it. Enable BANNER/CREDITS to display the banner that you entered in the Services Menu. Disable this feature to hide the banner. With the banner disabled, the GD alternately displays standard message headers: "Insert Credits" or "Select Game."

Dead Touch Screen?

To move the cursor-10-button game:
- DEAL/PLAY (or PLAY) button moves the cursor down. When the cursor reaches the screen's bottom edge, the cursor wraps around.
- CHANGE (or BET ONE) button moves the cursor horizontally, toward your right. When the cursor reaches the right screen edge, the cursor wraps around.

To move the cursor-12-button game:
- 3-LINES button moves the cursor down. When the cursor reaches the screen's bottom edge, the cursor wraps around.
- CHANGE or 5-LINES button moves the cursor horizontally, toward your right. When the cursor reaches the right screen edge, the cursor wraps around.

To make a selection (both games):
- Turn the ADMINISTRATOR KEY to enter Administration Mode.
- Bring the cursor onto the pad that you want to select with DEAL/PLAY and CHANGE buttons.
- Simultaneously press both buttons.

To test or calibrate a touch screen:
- Select TOUCH SCREEN on the Diagnostic Menu. See Touch Screen, in this chapter.
Force Credit Mode
Touch ON to enable the FORCE CREDIT MODE feature, or OFF to disable it. Enabled: Wins go to the Credit Meter. Disabled: The CASH/CREDIT button toggles between Cash Mode and Credit Mode. Cash Mode pays wins from the hopper. Credit Mode credits wins on the Credit Meter.

Casino Rebet
Touch ON to enable the CASINO REBET feature, or OFF to disable it. CASINO REBET allows the PLAY or DEAL button to enable or disable the rebet feature. Enabled: Players continue betting by pressing PLAY or DEAL. Disabled: Players must set the bet amount before playing.

• Touch EXIT to close the General Toggles Window and save your settings.

Blackjack Toggle Options
(Only on some GDs.) Enable or disable play features.

Limit Options

Credit Limit (Credits)
Touch CREDIT LIMIT. A numeric keypad appears on the screen. The keypad is used to vary the credit limit amount.

CREDIT LIMIT selects the maximum credits that the player may have on the GD's credit meter. The player can store a credit amount that can exceed the HOPPER LIMIT setting. The player is able to continue game play from the credit meter without having a hopper payout after each winning occurrence.

Jackpot Limit (Credits)
Touch JACKPOT LIMIT. A numeric keypad appears on the screen. The keypad is used to vary the credit limit amount.

JACKPOT LIMIT allows the player to store a large credit win value to the credit meter. This limit must be always less than or equal to the CREDIT LIMIT. Any jackpot win lower than the JACKPOT LIMIT but will cause the credit meter to exceed the CREDIT LIMIT, will result in a jackpot handpay situation.

Hopper Limit (Coins)
Touch HOPPER LIMIT. A numeric keypad appears on the screen. The keypad is used to vary the jackpot limit amount.

HOPPER LIMIT selects the maximum number of coins/tokens that the hopper can dispense whenever the the player wants to cash out credits. The credits over the HOPPER LIMIT result in a handpay situation. HOPPER LIMIT doesn't affect the number of coins paid out for the top award.
A jackpot win that equals or exceeds the JACKPOT LIMIT triggers a hand-pay event. (An attendant must pay this amount.) The hand pay equals the difference between the win and the JACKPOT PARTIAL PAY amount.

**Jackpot Partial Pay (Credits)**
Touch JACKPOT PARTIAL PAY. A numeric keypad appears on the screen. The keypad is used to vary the JACKPOT PARTIAL PAY amount.

JACKPOT PARTIAL PAY selects how much is credited to the credit meter during a jackpot. The remaining portion of the jackpot is handpaid by an attendant. The monitor indicates the amount credited and the amount to be handpaid.

- Select “0000” to *permit no partial payout*. Your choice appears on the monitor.
- Touch EXIT to *close the Jackpot Partial Pay Window and save your setting*.

**Bill Validator Options**
Touch BILL VALIDATOR. A window with the names of seven bill types opens.

- Touch ACCEPT beside each bill name that you want the GD to accept.
- Touch REJECT beside each bill name that you want the GD to reject.
- Touch EXIT to *close the window and save your settings*.

**Play Speed Options**
Touch PLAY SPEED. A window with five buttons opens. Three buttons affect game speed (*slow, medium or fast*). Touch a button to select card-dealing speed in card games. The buttons also affect the reel-spinning speed in reel games.

- Touch PLAYER ADJUSTABLE to *permit players to choose game play speed*.
- Touch EXIT to *close the window and save your setting*. 
Poker Toggle Options
Touch POKER TOGLES to adjust poker game play. A window with two buttons opens...

Hold/Discard
A player touches a card after the initial deal: Shall the GD hold or discard the card? Touch HOLD to enable the GD to hold the card. Touch DISCARD to enable the GD to discard the card.

Auto Hold
The GD can suggest cards that the player should hold after the deal. The word "HOLD" appears above suggested hold cards. Also, a border outlines these cards. AUTO HOLD enables or disables the card-holding suggestion. Touch ON to enable, or OFF to disable the AUTO HOLD function. (Your GD may not support this feature.)

Highlight Intermediate Pays
Touch ON to highlight, or OFF to remove highlights from, the payable's intermediate payout listings. (The machine highlights the pay listing by outlining it.)

• Touch EXIT to close the POKER TOGGLE OPTIONS window and save settings.

Hopper Test Options (only on Hopper GDs)
Touch HOPPER to open the Hopper Test Window. Put at least 40 coins in the hopper for this test. During the test, the monitor counts coins paid out. The Hopper Test checks the...

• HOPPER DRIVE CIRCUITRY
• MOTOR BRAKE
• HOPPER MOTOR
• COIN-OUT PROXIMITY SENSOR

The I/O Board enables the hopper driver, a solid state relay (SSR). The SSR switches on the hopper motor and releases the brake.

• Touch ONE COIN or 10 COINS to test the hopper's ability to dispense coins. The hopper responds by dispensing a coin or coins. A coin-out sensor detects each coin leaving the hopper. The sensor transmits this information back to the CPU Board. If the hopper fails to dispense coins, the hopper stops.

• Touch SHUT OFF HOPPER to disable the hopper motor and engage the brake. The CPU responds by deactivating the SSR. The SSR switches off the hopper motor and applies the brake.

• If the hopper fails to dispense coins, the hopper stops.

• Touch EXIT to leave the Hopper Test Window.

NOTICE
You must set protocol options before you can set the terminal address.

Choose Protocol Options
Touch CHOOSE PROTOCOL OPTIONS. A window opens. Touch one of the buttons inside this window to set your machine's communications protocol. Your machine uses this protocol for GD-to-host...
communication. The host must employ the same protocol that you’ve set for your GD. To close the window and save your setting, touch EXIT.

Terminal Address Options
Touch TERMINAL ADDRESS to display a window with a numeric keypad. Touch keypad keys to enter each digit of an address in decimal notation. Your machine uses this three-digit, SAS plus address during GD-to-host communication. Touch the arrow to advance to the next digit of the address. Allowable addresses range between zero and 127. You must set protocol options before you can set the terminal address. To close the window and save your setting, touch EXIT.

Sound Volume
Touch SOUND to display the Sound Window. This window enables you to adjust GD sound volume and test the sound hardware.

Diagnostics
The SOUND window contains four sound sample buttons...
- LOW TONE
- WARNING TONE
- HIGH TONE
- NOISE TONE

Touch LOW TONE, WARNING TONE or HIGH TONE for a test sound. The LOW TONE, WARNING TONE and HIGH TONE buttons each test one audio frequency band. The system should reproduce all sounds at about the same volume. Listen for volume changes, distortion, missing sounds or intermittent sounds.

Touch NOISE TONE, and the GD outputs noise across all audio bands. Listen for an absence or unusual emphasis of high, low or midrange sound.

Master Volume
Notice the two-pointed, “MASTER VOLUME” arrow below the sound sample buttons. Between the arrows is a slider box. Use the arrows and slider to set the GD’s non-award sound volume. You can move the slider through the volume range of zero to 255...
- TOUCH THE RIGHT ARROWHEAD TO RAISE THE LEVEL IN SMALL STEPS.
- TOUCH THE LEFT ARROWHEAD TO REDUCE THE LEVEL IN SMALL STEPS.
- TOUCH THE ARROW BODY Beside THE SLIDER TO CHANGE THE VOLUME IN LARGE STEPS.
- DRAG THE SLIDER RIGHT TO SMOOTHLY INCREASE SOUND VOLUME.
- DRAG THE SLIDER LEFT TO SMOOTHLY REDUCE SOUND VOLUME.

Sound Call
Touch SOUND CALL to display a numeric keypad. This keypad allows you to test sounds at various EPROM locations by entering addresses. Typical addresses appear in the table Sound Call Test. Depending on which sound EPROMs it uses, your machine may include sounds at these addresses. As you may have guessed, sound calls are primarily factory tests. Yet you can use sound calls to check volume settings and audio hardware performance. Touch keypad keys to enter each digit of an address in decimal notation. Touch the arrow to advance to the next digit of the address.
A Sound Volume Slider from the Sound Window

Award Volume
Touching Award Volume adds two sliders to the VOLUME window...
  • LARGE AWARD VOLUME  • TOP AWARD VOLUME

The MASTER VOLUME slide control that we described above continues to function the same way. The other two sliders operate in the same manner as the MASTER VOLUME slider. Use the other two sliders to raise or reduce the sound volume during awards.

Disable Machine
Touch DISABLE MACHINE to disable the GD. The GD enters Out-of-Service Mode. The screen displays an out-of-service banner. To exit, press the white DIAGNOSTIC button.

Meter Lamp Activation
(Only on some upright GDs.) Touch METER LAMP ACTIVATION to open this feature's window. The GD can use various methods to toggle or disable the meter lamp. This feature selects one such method. Touch on-screen Exit button to return to Config/Test menu.

Printer Options
Touch PRINTER OPTIONS to choose the desired printer (such as the Ithaca Model 750 thermal printer or the Ithaca Model 70 dot matrix printer). Touch on-screen Exit button to return to Config/Test menu.

Paper Options
Touch PAPER OPTIONS to choose the desired paper (short size 120mm or bill size 155mm). Touch on-screen Exit button to return to Config/Test menu.
Ticket Options

Touch TICKET OPTIONS then the CHOOSE PROTOCOL button to select the appropriate central system protocol that the game will use. To configure the printer ticket verification protocol, select CONFIGURE PROTOCOL (see diagram below) from TICKET OPTIONS. Enter your information into the appropriate locations. Touch on-screen Exit button to return to Config/Test menu.

Exit

Press DIAGNOSTIC button to save settings and close Config/Test window.

Services Menu

Automatic Test

Touch AUTOMATIC TEST to sequence the GD through several tests. Automatic Test Mode enables you to continuously test GD hardware. Select tests. Then touch GO! The GD sequences through the tests you've chosen...

- **Output Tests**: The GD lights lamps and checks switch status.
- **Sound Tests**: The GD produces sounds to test audio hardware.
- **Video Tests**: *(Refer to your monitor manual)*...
  - Palette *(color bars)* helps you assess gun adjustment.
  - Convergence: Crosshatch pattern helps you assess alignment, convergence.
  - Purity screens...
    - Red
    - Green
    - Blue
    - White
- **Printer Test**: *(Only on printer machines)* The GD prints a test ticket with symbols and a logo. The GD repeats Auto Cycle Mode *tests until you touch EXIT*. If the tests identify problems, the screen displays error messages. Touch EXIT to return to the Services Window.
Revision
Touch REVISION to display the software version. REVISION also displays the GD's terminal number.

Set Clock
The SET CLOCK button allows you to change the system date and time. Touch SET CLOCK.

Date
Use the arrows to position the cursor in the date display. Use the onscreen keypad to enter the correct date (MMDDYY). Then touch the OK button. The window closes.

Time
Use the arrows to position the cursor in the time display. Use the onscreen keypad to enter the time in 24-hour form. Then touch the OK button. The window closes.

Banner (Multi Game Only)
Touch BANNER to enter the banner phrase for the GD to display. Enter the message by touching keys on the alphanumeric keypad screen. Then press OK or CANCEL.

Exit
Press DIAGNOSTIC button to save settings and close Services window.

Tests Menu

I/O
Touch I/O to open the I/O Test Window. I/O Test options allow you to test GD switches. The I/O Test Submenu includes four I/O (Input/Output) tests...

- Currency
- Input
- Output
- Door Test

<table>
<thead>
<tr>
<th>COIN TYPE A BILL</th>
<th>0000</th>
<th>OPTO pulse width 1</th>
<th>OPTO pulse width 2</th>
<th>0000 ms</th>
<th>0000 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Coin Type A&quot;: 25c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Bill&quot;: $1, $5, $10, $20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The COIN field increments as the VDD accepts a coin. When a player deposits currency, the PULSE WIDTH field indicates the coin acceptor signal.
If a test fails, troubleshoot the indicated switch circuit. Identify and repair the problem.

**Currency Test**
Touch CURRENCY TEST for coin acceptor tests. A new window opens. An example of the fields in this window appears below... Insert a valid coin into the coin slot. The window should increment the coin count. The window should also record the pulse width of the acceptor coin deposit signal.

**Bill Validator (BV) Test**
Touch DBV TEST for bill validator tests. A new window opens. Insert a $1, $2, $5, $10, $20, $50 or $100 bill into the BV slot. The GD displays the bill denomination.

**Input**
Touching INPUT opens a window that lists the GD’s input switches and opto detectors. Test a switch by closing it. If the input works, the screen highlights the input’s name.

![Outputs Diagram]

*Example of the OUTPUT window. Real switch names, such as “PLAY” or “BET 1” will appear on screen buttons. These names tend to vary from model to model.*

**Output**
Touching OUTPUT opens a window with a button array. Test an output by touching that output’s touch screen button. By touching its button, you can turn an output on or off. Touch ALL ON to toggle all switches on. Touch ALL OFF to toggle them off again. Touch SHOW ALL to view the lamp matrix layout. (In the matrix layout, “R” stands for lamp row, and “C,” for lamp column).

**Door Test**
Touch DOOR for a door status display (open or closed). Check door switches by pushing and releasing each switch. As you open a door, the screen highlights the corresponding door name. Touch LATCHES (on the screen) to maintain an “on” condition across any closed switch.
CAUTION

Print several receipts before closing the main door. Otherwise receipts may jam later.

NOTICE

MONITOR ADJUSTMENT KNOBS.
The exact adjustment knob location depends on the type of monitor provided with the GD.

Printer (Optional on some GDs)

Touch PRINTER to open the Printer Test Window. This window enables you to print tickets with a bar code and test characters. To print one ticket, touch PRINT 1 TICKET. To print 20 test tickets, touch PRINT 20 TICKETS. To print continuously, touch PRINT CONTINUOUS. To stop continuous printing, touch EXIT.

If the printer doesn’t work, check or swap the printer-to-CPU Board cable.

Video

Touch VIDEO for assistance with monitor adjustments. (For more on these adjustments, consult your monitor manual.) VIDEO includes these options...

Palette (Color Bars)
Touch PALETTE to display a color bars screen. This screen simplifies color gun adjustments.

Convergence (Crosshatch Pattern)
Touch CONVERGENCE to display a crosshatch pattern. Use this pattern during convergence and raster positioning. The crosshatch pattern also helps during raster height and width adjustments.

Purity Screens
Touch RED, GREEN, BLUE or WHITE to display a solid-color purity screen. Purity screens help during purity magnet adjustments, relative gun output tests, degaussing and rejuvenation. Use the white screen for color temperature testing.

Touch Screen

Touch TOUCH SCREEN to adjust or verify screen calibration. TOUCH SCREEN opens a window with two buttons: TOUCH CAL and TOUCH TEST.

Is calibration so poor that you can’t activate the Touch Screen Test from the screen? Press and hold the CHANGE button. Simultaneously turn the ADMINISTRATOR KEY switch. The GD automatically enters the TOUCH CAL option.

Touch Cal
Touch TOUCH CAL to open its window. TOUCH CAL matches cursor position to touch position. Touch the number 1 in the window’s bottom left corner. A new window replaces the first. Touch the number 2 in the window’s top right corner. The screen calibrates to your touch. Then the Tests Menu returns.
**Touch Test**

Touch TOUCH TEST to open its window. TOUCH TEST reveals how well the cursor tracks finger movement. Touch several screen locations. Notice the "Down" and "Lift" coordinates in the window's bottom left corner. These report where your finger touched and rose off the screen. The "Drag" coordinates define where your finger currently rests on the screen.

**Sound**

Touch SOUND to display the Sound Window. This window enables you to adjust GD sound volume and test the sound hardware.

**Diagnostics**

The SOUND window contains four sound sample buttons...

- **Low Tone**
- **High Tone**
- **Warning Tone**
- **Noise Tone**

Touch LOW TONE, WARNING TONE or HIGH TONE for a test sound. The LOW TONE, WARNING TONE and HIGH TONE buttons each test one audio frequency band. The system should reproduce all sounds at about the same volume. Listen for volume changes, distortion, missing sounds or intermittent sounds.

Touch NOISE TONE, and the GD outputs noise across all audio bands. Listen for an absence or unusual emphasis of high, low or midrange sound.

**Sound Call**

Touch SOUND CALL to display a numeric keypad. This keypad allows you to test sounds at various EPROM locations by entering addresses. Typical addresses appear in the table Sound Call Test. Depending on which sound EPROMs it uses, your machine may include sounds at these addresses. As you may have guessed, sound calls are primarily factory tests. Yet you can use sound calls to check volume settings and audio hardware performance. Touch keypad keys to enter each digit of an address in decimal notation. Touch the arrow to advance to the next digit of the address.

**Comm. Status**

Comm. Status provides a real-time display of communications between the host system and GD. (The feature only applies to state lottery gaming devices and diagnostic software.)

**Exit**

Press DIAGNOSTIC button to save settings and close Tests window.
Auditing Menu

Master and Period

Touch MASTER to view or print game play data from your GD's soft meters. (To print data, your machine must contain a printer.) Software meters statistically document GD operation...  
  • Communication Faults  • Coin Meter Counts  • Open Door Counts  • Tilts  • Etc.

Touch PERIOD to view, print or reset this game play data. Except for the additional RESET buttons, PERIOD windows are identical to MASTER windows. For the sake of brevity, this book details only the MASTER windows.

Use Master and Period to View Soft Meters

To view, print or reset "soft" meters in Services Mode...

- 1. Turn the ADMINISTRATOR KEY.
- 2. Touch AUDITING.
- 3. Touch MASTER to view or print game play data from your GD's soft meters. Touch PERIOD to view, print or reset this game play data.
- 4. Touch MAIN, or touch the game meter name of your choice.
- 5. Printer Machines: To print the meters, touch PRINT.
- 6. To reset game meters, touch RESET. (You can only reset meters by first touching PERIOD, and then MAIN.)
- 7. Touch CONFIRM.
- 8. To save settings and close Auditing window, touch EXIT and press DIAGNOSTIC button or turn the ADMINISTRATOR KEY.

History Menu

Touch HISTORY to open a window with four buttons...

Play History

Touch PLAY HISTORY. A window opens. The window logs final game play screens from previous games. Use the log to verify winnings. The software classifies play histories by game.

Touch a button to recall the desired play history. You may choose histories by game name, or you may choose the ALL GAMES button. Each game-name button opens a window for the corresponding game. This window tracks the past five bets for its subject game. The ALL GAMES window details all games over the past five bets.
Term. Events

Touch TERM. EVENTS to obtain a report of any situation that raises an error flag. Here are some events that raise error flags...

- BILL RECALL
- CASH OUT
- CORRUPT MEMORY
- DOOR ACCESS
- POWER ON RESET
- TOUCH SCREEN MALFUNCTION

TERM. EVENTS also provides event dates and times. To scroll the screen data, touch the LATER or EARLIER button.

Printer GDs: You can touch PRINT for a hard copy of Term. Events data.

Bill Log

Touch BILL LOG. A window opens to a Bill Log Listing that shows the type of event, such as “Bill Stacked”, and the date, time, and type of bills.

EFT Log

Touch EFT LOG. A window opens to an EFT Log Listing which logs EFT (Electronic Funds Transfer) event transactions and lists value, type, time and date.

Exit

Press DIAGNOSTIC button to save settings and close History window.
Attendant Menu System

Except that it lacks the Config/Test Menu, the Attendant Menu System is identical to the Technician Menu System. To activate the Attendant Menu System, turn the ADMINISTRATOR KEY switch. You’ll find this switch on the side of the cabinet.

The screen displays the Services Window, which includes four menu buttons.

The Attendant Menu System has four parts. Each part includes one or more submenus. When the Services Window appears, you can activate any submenu in two ways...
- Touch the submenu's screen button (menu pad).
- If the touch screen doesn’t operate, use player panel buttons to move the cursor. See Dead Touch Screen? elsewhere in this chapter.

Exit
Turn the ADMINISTRATOR KEY to leave the menu system and return to Game Play Mode. To reenter the menu system, use the ADMINISTRATOR KEY again.
Chapter 1. Periodic Maintenance

Collection and Supply

Regular Gaming Device (GD) collection and supply procedures include...
- Collecting bills from the Bill Validator (BV)
- Collecting coins from the cashbox
- Filling the hopper
- Reading electromechanical meters

• **Collecting Bills from the Bill Validator**
  1. Unlock and open the belly door. Notice the BV door at the lower right. Open the BV lock with your key.
  2. Open the BV door.
  3. Use the stacker box release lever (upper right) to free the stacker box and then pull the box out of acceptor by its handle.
  4. Unlock stacker box with key and remove bills.

• **Reassembly**
  1. Slide an empty, locked stacker box into the BV. Take care not to install the box upside-down. The empty box’s bill access must face upward.
  2. Tug on stacker box handle to see that it is fully seated.
  3. Close and lock BV door.
  4. Close and lock belly door.

• **Collecting Coins**
  1. Open the pedestal door with your key.
  2. Slide out the cashbox.
  3. Empty the cashbox.
  4. Replace the cashbox.
  5. Lock the pedestal door.

• **Filling the Hopper**
  1. Unlock and open the Main Door.
  2. As necessary, add coins to the hopper. Be careful not to spill coins into the GD cabinet.
  3. Close and lock the Main Door.

• **Reading Electromechanical Meters**
  The GD includes up to six non-resettable, electromechanical meters. (The number of meters and meter labels may differ between jurisdictions.) The illustration depicts the meters and provides typical labels. You’ll find the electromechanical meters to the right of the monitor. You can read these meters from outside the machine, through an access window to the right of the monitor screen. Follow procedures and regulations set up by your jurisdiction.

Electronic (soft) meters are different than electromechanical meters.
Special game software creates and maintains electronic meters. For information on electronic meters, see Model 55X Book 1, Chapter 3, Auditing, Diagnostic and Adjustment Software.

Coin Comparator

The CC-16D-INHIBIT coin comparator electronically compares the incoming coin to a sample coin retained by the comparator. The incoming coin passes through a magnetic field, creating a characteristic signal. The sample coin also produces a characteristic signal.

The comparator electronically contrasts the incoming coin signal with the sample coin signal. If the two signals differ, the internal lockout solenoid remains inactive. The incoming coin diverts to the "reject" track. Like signals energize the lockout solenoid. The solenoid allows the incoming coin to enter the "accept" track.

- Installing the Sample Coin
  1. Unlock and open the Front Door.
  2. Turn off the GD at the Power Distribution Unit (PDU) behind BV.
  3. Without removing the coin comparator, slide the sample coin retainer toward the right side of the comparator with your thumb (looking at inside of door). The illustration shows where to place the sample coin.
  4. Slip a circulated coin of the proper denomination into the sample coin retainer. Gently release the retainer. The sample coin retainer should tightly secure the sample coin. (Make sure the coin is straight up and down and positioned properly in the retainer.)
  5. Turn on the GD at the PDU.
  6. Close and lock the Front Door.

Coin Comparator Specs for CC-16D

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lockout Enable</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>&quot;Coin In&quot; Output Signal</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Not Connected</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Not Connected</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>+12 VDC</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ground</td>
<td></td>
</tr>
</tbody>
</table>

**Coin Diameter Range**
- Min: 0.705" (17.9mm)
- Max: 0.755" (19.7mm)

**Max. Coin Thickness**
- Min: 0.100" (2.54mm)

**NOTES**
1. Comparator requires regulated power supply for 12VDC operation. Current: Idle, 40 mA; peak, 140 mA.
2. For coin diameters of 1.205 through 1.575" (22.01 through 40mm), use plug spacer.
3. Oversize protection beyond 0.040" (1.02mm) for sample coin requires coin entry slot control.
• Checking Comparator Performance
  1. Insert the correct coin in the coin slot (See "Installing the Sample Coin."). The coin comparator should accept the coin. Be sure that the unit functions consistently! Repeat this step several times. (You may also want to run the Coin Mech Test. See Chapter 3, Book 1.)

• Adjusting the Comparator Potentiometer
  The factory adjusts coin comparators for excellent discrimination against slugs. However, some units may still accept high quality slugs. To enable a unit to reject these slugs, you have to fine tune the comparator...
  1. Unlock and open the Front Door.
  2. Turn on the GD at the PDU (behind BV).
  3. Adjust the fine tuning potentiometer (on front of coin comparator) counterclockwise by 1/8 turn. Use a #2 flatblade screwdriver.
  4. Close the Front Door.
  5. Insert a high quality slug in the coin slot. The coin comparator should reject the slug. If not, repeat steps 3, 4 and 5.
  6. Insert a coin of the correct denomination. If the coin comparator rejects the valid coin, advance the fine tuning potentiometer. Turn pot slightly clockwise. Try the coin again. Repeat this step until the coin passes. Repeat steps 3 through 6, as necessary.

<table>
<thead>
<tr>
<th>Coin or Token</th>
<th>Dia Range</th>
<th>Weight Range (G)</th>
<th>Thickness Range</th>
<th>Comparator Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 5c, US 25c</td>
<td>0.705-1.250</td>
<td>4.4-6.8</td>
<td>0.05 - 0.066</td>
<td>09-42000-1</td>
</tr>
<tr>
<td>US 50c, Can $1-E</td>
<td>0.705-1.250</td>
<td>6.9-19.6</td>
<td>0.05 - 0.086</td>
<td>09-42000-3</td>
</tr>
<tr>
<td>Can $2-E, SA $1R</td>
<td>1.250-1.575</td>
<td>19.7 +</td>
<td>0.075 - 0.115</td>
<td>09-42000-2</td>
</tr>
</tbody>
</table>

Canadian-E = Commemorative or Loonie Coins

• Removing the Coin Comparator
  1. Unlock and open the Front Door.
  2. Turn off the GD at the PDU (behind BV).
  3. Remove the cable that connects the comparator and Hex Opto Board: Grasp the plug and pull it off the jack.
  4. Remove the coin comparator: Raise the coin comparator slightly. Pull the bottom out of bracket. Then pull the coin comparator down and out of the machine. Set it aside for reassembly.
Reassembly

1. Mount the comparator: Slide the top comparator studs upward, against the bracket. Engage the top comparator studs with the top bracket notches. Pivot and lower the comparator base until the comparator engages the lower notch(s). Check to see that the comparator seats properly.

2. Replace the cable that connects the comparator and Hex Opto Board.

3. Turn on GD power at the PDU.

4. Close and lock the Front Door.

Changing the Coin Comparator Denomination

1. With your thumb, slide the coin retainer toward the right side of the comparator and remove the sample coin.

2. Look at the front of the comparator. Above the sample coin retainer, you'll find a thumbscrew. This thumbscrew is the coin counterweight. Unscrew and remove it. Save the counterweight for other conversions.

3. Turn the coin comparator upside down. Look at the coin exit, near the white cable connector. At the corner of this exit is a #4 Phillips screw. This screw is the wedge fastener screw and fastens the plastic coin wedge in place. Remove the screw.

4. Use a small, flatblade screwdriver to remove the plastic wedge from the coin exit. Save the wedge for other conversions.

### Wedge and Weight Table

<table>
<thead>
<tr>
<th>Part</th>
<th>Game Denom</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wedge</td>
<td>5c/25c</td>
<td>03-9140</td>
</tr>
<tr>
<td>Weight</td>
<td>5c/25c</td>
<td>20-10032-01</td>
</tr>
<tr>
<td></td>
<td>$1</td>
<td>20-10032-02</td>
</tr>
</tbody>
</table>

Reassembly

1. Be sure that you have the proper coin wedge for your denomination. (See the Wedge and Weight Table in this procedure.) Turn the coin comparator upside down. Look at the back of the comparator (side with the spring). Position the wedge in the side of the coin chute nearest the cable connector. Before you slide in the wedge, locate its mounting screw hole. You'll find the hole at the connector edge of the comparator's spring face. Slide the new plastic wedge into place.

2. Insert a #4 Phillips screw into the mounting screw hole. Fasten the plastic coin wedge in place by tightening the screw.

3. Look at the front of the comparator. Above the sample coin retainer, you'll find a thumbscrew socket. Insert the coin counterweight thumbscrew and screw it in.

4. Slip a circulated coin of the proper denomination into the sample coin retainer. Gently release the retainer. The sample coin retainer should tightly secure the sample coin. Now you can use the comparator in a GD programmed for the comparator's new denomination. Changing the denomination of a GD requires additional steps. You must...

- Change the comparator denomination
- Change GD's denomination decals
- Change the topbox glass
- Clear the RAM with a RAM Clear Chip for the new denomination: See Changing the VGD Denomination in Chapter 2.
• Coin Diverter Adjustment
  1. Unlock and open the Front Door.
  2. Turn off the GD at the PDU On/Off switch (behind BV).
  3. Remove the cable that connects the comparator and Hex Opto Board. Grasp the plug and pull it off the jack.
  4. Remove the coin comparator: Raise the coin comparator slightly. Pull the bottom out of bracket. Then pull the coin comparator down and out of the machine. Set it aside for reassembly.
  5. The diverter is a two-position, solenoid-driven metal coin guide surface. When the diverter solenoid rests, the diverter guides coins into the hopper. When the diverter solenoid energizes, the diverter permits coins to fall into the coinbox. Look down into the coin chute and visually check the diverter. With a finger, move the diverter flapper and solenoid plunger and verify that they travel freely.
  6. Perform Diverter Test. (See Chapter 3, Book 1, Tests Menu/Output/Diverter button.)
  7. Check that when the touch screen diverter button is pressed, the diverter solenoid energizes causing the flapper to move to the upright position, allowing the coins to drop into the coinbox.
  8. If this does not occur, you must loosen the two solenoid adjustment Phillips screws on the side of the coin chute.
  9. Move the solenoid/plunger so that the diverter is in this energized position.
 10. Tighten the Phillips screws.
 11. Repeat steps 6 and 7.
 12. At its travel extremes, the diverter must stop beyond the coin chute's outside edges. Misadjustment causes difficult-to-diagnose coin jams. With coin comparator removed, shine a penlight down the coin entry and into the coin chute. Again, using the Diverter Test, energize the solenoid. When energized or at rest, the diverter must clear the edges of the coin chute. Watch as the solenoid energizes: You should see the diverter disappear beyond one edge of the coin chute. As the diverter solenoid rests, the diverter should disappear beyond the coin chute's other edge. If the diverter doesn't disappear at either travel extreme, then you must adjust it further.
 13. Close the Main Door.
 14. Test diverter by placing several coins into the coin entry and then check to see that they fall into the coinbox. Also check to see that when the solenoid is deenergized, input coins fall into the hopper. Adjust solenoid position as necessary.
 15. When you're satisfied with diverter performance and adjustment screws are tightened, replace the coin mechanism and reconnect cable to Hex Opto Board.
 16. Switch on GD power at the PDU.
 17. Close and lock the Main Door.
 18. Run several coins through the chute and confirm proper diverter operation.
CAUTION

- Never use an organic solvent such as thinner to clean the bill validator unit.
- Never use compressed air to clean the bill validator unit!

CAUTION

JCM Bill Validator DIP Switch Settings. Your JCM bill validator has one DIP switch bank that has eight switches. The factory setting for these DIP switches is all switches off. Don’t change these settings! Changes can cause the bill validator to malfunction.

Bill Validator

With proper handling and routine preventive maintenance, you can eliminate most bill validator malfunctions. The following procedures assure top performance from your JCM World Bill Acceptor® (WBA) Bill Validator (BV).

- **Bill Validator LEDs**
  Lit LEDs indicate that the bill validator is normal. If the LEDs go out, the GD has probably shut down the bill validator. (Otherwise, all LEDs have burned out. This situation is quite unlikely.) Routinely check the LEDs to see if they remain lit. If not, then service the validator.

- **Cleaning**
  MAG SENSOR PARTS. Regular cleaning is imperative. Sometimes iron filings adhere to the magnetic head and head roller. Filings can prevent your bill validator from receiving bills.

  LENSES. To function properly, the BV must have clean sensor lenses and optical reflectors. Periodically cleaning of the BV interior can prevent bill jams. If your validator takes in fewer than 4,000 bills a week, clean it once a month.

  What if the validator takes in over 4,000 bills per week? Clean the unit twice a month.

- **Cleaning Procedure**
  1. Pull the release levers on both sides of the BV toward you to open the acceptor head.
  2. Open the head.
  3. Pull the transfer unit release lever to open the top cover.
  4. Open the top cover.
  5. The reader and its internal sensor may be dirty. A dirty reader can cause jams or reduce bill validation accuracy. Regularly
clean the inside of the validator. Use a soft, lint-free cloth or swab to clean sensor lenses. Soak the cloth or swab with ordinary head cleaner or isopropyl alcohol. Do not use an organic solvent such as thinner. Clean oil smudges and fingerprints off the optical reflector disc.

- Simple Repairs

**OBserve Operation.** To determine the cause of malfunctions and detect defective parts, routinely observe validator operation. Before replacing parts, check the connectors: Do they engage properly? If the harness appears worn or damaged, replace it.

- If the Validator Jams...

Follow the steps at Cleaning Procedure to open the BV. Remove the jammed bill. (Refer to the three Removing Bill drawings.) When a bill is jammed near the inlet of the stacker box, pull the release lever of the stacker box by its handle and remove the jammed bill. Remember, when replacing the stacker box, the notch on the handle goes up.

**Glass and Lamps**

- Removing Buttons and Replacing Bulbs
  1. Unlock and open the Main Door.
  2. Switch off GD power at the PDU.
  3. You can easily access a button switch from under the Player Panel inside the door.
  4. Grasp the lamp bracket just behind the plastic nut. Firmly rock the lamp bracket back and forth until it disengages from the button housing. Then pull the lamp bracket away from the button housing. *(Take care not to bend switch leads.)*
  5. If you want to remove the button housing, start by unscrewing the notched, plastic nut.
  6. If you're removing the button housing, the nut support will also come off. Lift the button housing off the Player Panel.
  7. Grasp and pull the old bulb straight out.

**Reassembly**

1. Replace the bulb. Use a type CM86 or equivalent bulb (WMS part 24-8829).
2. If you removed the button housing, replace it through the button hole. Make sure that the letters read right-side up. Replace the nut support from the button housing.
3. If you removed the button housing, secure it with the plastic nut. *(The serrated edge of the plastic nut should face the player panel.)*
4. Hold down the button and snap the lamp bracket back on. Test the button to be sure that the bracket seats properly.
5. Switch on GD power.
6. Close and lock the Main Door.

- Removing the Topbox Glass
  1. Unlock and open the Main Door.
2. Switch off GD power at the PDU.
3. Lift notched mounting brackets on Card Reader Face Plate out of rectangular holes in cabinet. Lift by Face Plate's bottom tab. Remove Face Plate and set aside.
4. Lift the topbox glass off of its two bottom support brackets. Gently pull the glass away from the machine until you can see inside the topbox.
5. If a electrical cable connects to the back of the glass, unplug the cable. Remove the glass. Be particularly careful of fragile shadowboxes that may be glued or taped to the glass. Set the glass aside in a safe place.

**Reassembly**
1. Replace the glass. If an electrical cable connects to the back of the glass, plug in the cable.
2. Replace Card Reader Face Plate.
3. Switch on GD power at the PDU behind BV.
4. Close and lock the Main Door.

**Removing the Topbox Fluorescent Tube**
1. Unlock and open the Main Door.
2. Switch off GD power at PDU On/Off switch (behind BV).
3. Perform **Removing the Topbox Glass procedures**.
4. Carefully grasp the tube. Twist the tube in either direction 1/4 turn (two clicks) until the tube pins come free of the sockets.
5. Remove the tube.

**Reassembly**
1. Slide a new tube into the tube sockets. (Tube type and part number depend on your GD's topbox model. Most machines have an 15W, 18-inch tube: Use WMS part 24-8809.)
2. Twist the tube either way 1/4 turn.
3. Replace the glass. If an electrical cable connects to the back of the glass, plug in the cable.
4. Replace Card Reader Face Plate.
5. Switch on GD power at the PDU's On/Off switch.
6. Close and lock the Main Door.

**Replacing The Topbox Starter**
1. Unlock and open the Main Door.
2. Turn off GD power at the PDU.
3. Perform **Removing the Topbox Glass procedures**.
4. The starter is above the tube on the right. Twist the starter counterclockwise until it pops free.
5. Remove the starter.

**Reassembly**
1. Place the new starter (WMS part 20-9850) in its socket.
2. Twist the starter clockwise until it locks in.
3. Replace the glass. If an electrical cable connects to the back of the glass, plug in the cable.
4. Replace Card Reader Face Plate.
5. Turn on GD power at the PDU.
6. Close and lock the Main Door.

- Replacing the Tower Light Bulb
  1. Unlock and open the Main Door.
  2. Switch off GD power at PDU On/Off switch (behind BV).
  3. With an 11/32 nut driver, remove the top nut from the tower light.
  4. Remove the tower light dome.
  5. Grasp and turn the bayonet bulb counter-clockwise. When the bulb disengages, it pops out.

Reassembly
  1. Insert the new bulb in the socket. Only replace the lamp with a type 1888 bulb! Other types may cause damage. Press the bulb down in its socket. Turn the bulb clockwise until it locks in place.
  2. Replace the dome and top nut.
  3. Tighten the nut with an 11/32 nut driver.
  4. Switch on GD power at the PDU.
  5. Close and lock the Main Door.

Hopper

- Filling the Hopper, Setting the Probe Level and Installing Hopper
  1. Unlock and open the Main Door.
  2. Switch off GD power at PDU On/Off switch (behind BV).
  3. Lift and remove the coin tray.
  4. Remove coins from the hopper.
  5. Slide the hopper toward you, and out of the cabinet. Sensors and power unplug from the blind mating connector as you slide the hopper out.
  6. Check the GD for loose or missing hardware. Missing hardware may have fallen into the hopper. (Clean it out of there before running the hopper to prevent jams!)
  7. Inspect the hopper: Before filling the hopper with coins, remove dust, dirt, loose hardware and other foreign matter.
  8. See the table Hopper Probe Level. Adjust the hopper coin-level probe. Move the probe to a higher hole if the hopper will hold more coins. (Hole 6 is not presently used.) Move the probe to a lower hole if the hopper will hold fewer coins.
  9. Fill the hopper with coins of the proper denomination. See the Hopper Probe Level table to find the optimum number of coins for each coin-level probe hole.
  10. Slide the hopper into the cabinet. Sensors and power are reengaged to the blind mating connector as you slide the hopper in.
  11. Check that the hopper's mounting base firmly engages both rails of the track.
  12. Replace the coin tray.
Periodic Maint

Hopper Probe Level Coin Max Amounts (Aprox.)

<table>
<thead>
<tr>
<th>Short Hopper</th>
<th>Probe Hole</th>
<th>U.S. $1</th>
<th>25¢</th>
<th>5¢</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd</td>
<td>500</td>
<td>2,000</td>
<td>2,700</td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>400</td>
<td>1,500</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>1st</td>
<td>300</td>
<td>1,200</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>Two-Tier Hopper</td>
<td>Probe Hole</td>
<td>U.S. $1</td>
<td>25¢</td>
<td>5¢</td>
</tr>
<tr>
<td>3rd</td>
<td>600</td>
<td>2,200</td>
<td>2,600</td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>500</td>
<td>1,800</td>
<td>2,300</td>
<td></td>
</tr>
<tr>
<td>1st</td>
<td>400</td>
<td>1,300</td>
<td>1,800</td>
<td></td>
</tr>
</tbody>
</table>

- Switch on GD power and check the hopper. Hopper works: Close and lock the Main Door. Hopper doesn't work: Double-check cable connections and the hopper.
- Test the Hopper. GD software includes a hopper test in the Config/Test Submenu of Administration Mode (Technician Menu System). If the hopper contains coins, this test dispenses 1 or 10 coins. (See Chapter 3 of Book 1, 55X SM.)

Vertically Aligning the Hopper Coin-Out Sensor

1. Unlock and open the Main Door.
2. Switch off GD power at PDU On/Off switch (behind BV).
3. Lift up, disengage and remove the coin tray.
4. Remove coins from the hopper.
5. Slide the hopper out. Sensors and power unplug from the blind mating connector as you slide the unit out.
6. Set the hopper on a table.
7. Find the motor lock lever on the motor. Release the lever by pushing it down. Spin the hopper shaft.
8. Stop the hopper when a coin reaches top dead center on the counting lever roller.
9. The hopper coin-out sensor is a capacitive proximity sensor. Find the black, proximity sensor fork that resides between the circuit board and the motor. This sensor fork straddles the coin counting flag. Two screws allow you to adjust the fork sideways, for best fork-to-flag fit. This first set of screws is above the fork. Two other screws allow you to adjust the fork up and down on
the flag. This second set of screws is below the fork. Loosen the second set of screws. By moving the sensor fork, align bottom edges of the coin counting flag and fork.

☐ 10. Tighten the screws.

**Reassembly**

☐ 1. Slide the hopper back into position. Sensors and power reengage at the blind mating connector as you slide the unit in.
☐ 2. Replace hopper coins.
☐ 3. Replace the coin tray.
☐ 4. Switch on GD power at PDU.

**Main Power Fuse**

![Diagram of Main Power Fuse]

**Power On/Off Switch**

PDU Panel Box

☐ 5. Close and lock the Main Door.
☐ 6. Test the hopper. *(See Chapter 3 of Book 1, 55X SM.)*

**WARNING**

Electric shock hazard! Unplug the gaming device before working on the PDU or power transformer.

**Monitor**

**Removing the Monitor**

☐ 1. Switch off GD power at PDU.
☐ 2. Loosen but do not remove the 7/16 flange grip nut located at the front of the monitor shelf, centered under the monitor.
☐ 3. Pull straight down to disconnect molex minilift connector located under the left front side of the monitor shelf.
☐ 4. Slide monitor forward till flange grip nut stops its forward progress *(over the wide part of the keyhole slot.)*
☐ 5. Lift monitor up and out of the gaming device.

**Reassembly**

☐ 1. Place the monitor on the monitor shelf and slide it back until the flange grip nut comes up through the keyslot. Do not tighten nut!
☐ 2. Finger tighten nut.
☐ 3. Slide monitor to its forward most position on the shelf.
2. Close and latch main door. This aligns the monitor’s position.
3. Carefully open the main door. Do not move the monitor.
4. Tighten flange grip nut.
5. Reconnect the molex mini-fit connector through the monitor shelf opening to the monitor.
6. Switch on GD power at the PDU.
7. Close and lock the Main Door.

Power Distribution Unit (PDU)
- Replacing the Power Distribution Unit Fuse
  1. Unlock and open the Main Door.
  2. Switch off GD power at the On/Off switch of the PDU. The main power fuse, as shown above, is mounted on the GD’s PDU panel box.
  3. Unscrew the plastic fuse knob.

Reassembly
  1. Replace the fuse. (In 120-volt areas, use a 4ASB, 250V fuse. In 220 to 240-volt areas, use a 2ASB, 250V fuse.)
  2. Return the fuse knob to its position on the PDU front panel.
  3. Twist the plastic fuse knob until it reengages.
  4. Switch on GD power at the PDU panel box.
  5. Close and lock the Main Door.

Printer (Optional)
- Changing Paper on the Ithaca Printer
  (Change the paper when you see the pink stripe on the receipt paper.)

Remove Takeup and Supply Rolls
(The Takeup Roll will not be present on all printers.)
  1. Pull out the journal takeup roll.
  2. Tear the yellow journal paper off against the shear plate.
  3. Unscrew the flange on the spindle’s left side. Set the spindle and flange aside.
  4. Hold down the printer break.
  5. Pull the used supply roll and paper out of the printer. Set the spindle aside.

Put In the New Supply Roll
  6. Squarely tear off the edge of the new supply roll. Use a table edge, etc.
  7. Put the spindle in the new supply roll.
  8. Put the supply roll in the lower set of snaps.
  9. Hold down the printer break.
  10. Push the paper up through the throat until paper emerges past the printhead.

Thread the Paper
  11. Turn the thumbwheel gear to advance six inches of paper past the printhead.
12. Tear off the white paper.
13. Thread the yellow journal paper down the slot behind the shear plate. Make sure that the white paper goes through the cutter.
14. Advance the white paper with the thumbscrew. Simultaneously hold up the printer beak lever (below left side of beak).

Replace the Takeup Roll
15. Screw the flange back onto the spindle. (The smooth side of the flange must face the paper.)
16. Fold the free edge of the journal paper back about a half inch.
17. Insert the fold into the takeup spindle groove. The gear should face right.
18. Return the takeup spindle and rotate it on the upper set of snaps.
19. Run a test print from the Printer Test window.

• Changing the Ribbon Cassette
Change the ribbon cassette when the print becomes faded. If you leave the ribbon cassette in too long, the ribbon may tear.

Remove the Used Cassette
1. Unlock and open the the Main Door.
2. Switch off GD power at the PDU.
3. Push and hold down the printer beak during this entire step. Tilt the bottom of the ribbon cassette out and free. Slide the cassette down. Remove the ribbon cassette from the printer.

Put in the New Cassette
1. Prepare the ribbon cassette by turning its cassette knob clockwise.
2. Push and hold down the printer beak during this entire step. Slide the top of the ribbon cassette into place. Engage the bottom of the cartridge.
3. Switch on GD power at the PDU.
4. Close and lock the Main Door.

• Cleaning the Printer
Periodically use a vacuum cleaner or air compressor to remove paper dust. Don’t use alcohol or petroleum-based chemicals to clean the printer. These cleaners damage plastic parts. The carriage rack is particularly sensitive. These chemicals will ruin it. Take care not to get the cleaner on electronic components.

Touch Screen

• Cleaning the Touch Screen
Use a 99 percent alcohol cleaning solution to clean the Touch Screen. This type of cleaning liquid evaporates rapidly and doesn’t drip. You can use other alcohol-based cleaners, but never spray them directly on the screen. Instead, spray a cloth and wipe the screen with it. Never use abrasive cleaners or ammonia-based cleaners on the Touch Screen.
Chapter 2. Software/Game Denomination Changes

Software Changes
Game software replacement isn't particularly difficult. Yet replacing software involves more than casual board or chip swapping. Before proceeding, you must understand some basics about the CPU Board and its security system. This chapter presents this information in a quick capsule form.

Denomination Changes
The procedure for changing your GD’s denomination appears later in this chapter.

Card Cage Components
The CPU Board and I/O Board reside in the card cage. The card cage is inside the Main Door. At the back of the card cage is a blind mating backplane. This backplane attaches peripherals to the card cage circuit boards. For security purposes, the card cage door locks. A door security switch also monitors door openings and closures.

Backplane and CPU EEPROMs
A security EEPROM resides on the CPU Board. (Some machines have two CPU EEPROMs.) Another EEPROM resides on the Backplane. These chips contain EPROM identifier data that the GD uses to reinforce its security.

Backplane and CPU EEPROM Security
A CPU Board EEPROM contains error detection data. The CPU monitors this data during access to the EEPROM. Corrupt data or a bad EEPROM causes a tilt to appear on the monitor...

- “TILT: SECURE MEMORY CRC CORRUPT” indicates a CPU Board EEPROM XU27 data error.

Press DIAGNOSTIC to clear these tilt messages. An error won’t clear unless

![Diagram of CPU Board Version 1.5]
CAUTION
Avoid equipment damage when using the RAM Clear Chip! Take these precautions...

- Turn the power OFF before removing or inserting logic boards.
- Turn the power OFF before removing or inserting EPROMs.
- Observe proper static prevention safeguards.
- Before you power up the unit, verify that circuit boards seat securely.
- Properly align EPROMs with socket pins. Otherwise you can severely damage the chips.

NOTICE
Some gaming devices do not use all of the EPROM locations.

Software Changes

the device under test functions correctly. If the DIAGNOSTIC button doesn't clear the tilts, try again. What if the DIAGNOSTIC button still doesn't clear tilts? Then replace the CPU Board or bad EEPROM chip XU27. (XU27 mounts in a socket.) After board replacement, press the DIAGNOSTIC button again.

Software Installation

1. Unlock and open the Main Door.
2. Turn power off at the PDU switch.
3. Slant Tops Only: Disengage the coin chute.
4. Remove the video cable from the CPU Board's Video Port (CPU Version 1.5+).
5. Unlock and open the card cage.
6. Disengage the CPU Board by pulling the white board ejector tabs toward you. Remove the board. If your GD came with diagnostic software, remove EPROM XU3. Save the Diagnostic chip for later use.
7. Obtain the RAM Clear Chip for the proper denomination. Use this chip to clear the RAM and set the GD denomination. See Clearing the CPU Board RAM in this chapter.
8. Track the software change in your official logbook. Install EPROMs at these CPU Board locations...
   - Game EPROMs at XU2 and XU3
   - Sound EPROMs at XU17, XU18, XU30 and XU31 (Some GDs don't use all these EPROMs.)
9. Return the CPU Board to the card cage. Engage the board by pushing its white board ejector tabs toward the cage.
10. Close and lock the Card Cage Door.
11. Reconnect the video cable.
12. Slant Tops Only: Reengage the coin chute.
13. Turn on the power at the PDU switch. Run a complete diagnostic check to assure that your GD functions nominally.
14. Close and lock the Main Door.

Clearing the CPU Board RAM

When to Clear the RAM
Clear the RAM...
- If you want to change the GD denomination
- Before you change a game ROM
- If the GD alerts you of a RAM error

The RAM-clearing procedure requires a special RAM Clear Chip. Before you can clear the RAM, you must install this chip in the GD. The RAM Clear Chip...
- Sets the GD denomination.
- Clears out the GD's RAM (soft meters included)
Software Changes

CPU Board Version 1.5

You have to temporarily install the RAM Clear Chip in your GD. After you power up the chip, The RAM Clear initializes the GD denomination. The new denomination value appears on the monitor. The monitor also displays the message “MEMORY CLEARED,” indicating the normal completion of initialization. For each denomination, you'll need a different RAM Clear Chip. (WMS can provide RAM Clear Chips for nickels, quarters, dollars and other denominations.)

The RAM Clear Chip also initializes the RAM signature variable. After you reinstall the game EPROM, it checks the RAM signature. This signature signals the game EPROM that...
- You cleared the RAM
- You changed the denomination
- You must reinitialize the game

Required Equipment
- RAM Clear Kit for appropriate denomination
  - Chip extraction tool
  - Antistatic wrist strap

RAM Clear Chip Procedure

- **Remove the CPU Board**
  1. Unlock and open the Main Door.
  2. Turn power off at the PDU switch.
  3. Slant Tops Only: Disengage the coin chute.
  4. Remove the video cable from the CPU Board Video Port.
  5. Unlock and open the card cage.
  6. Disengage the CPU Board by pulling its white board ejector tabs toward you. Remove the board.
  7. Remove Game EPROM XU3 from its socket.

- **Install and Use the RAM Clear Chip**
  8. Install the RAM Clear Chip in EPROM socket XU3.
  9. Return the CPU Board to the card cage. Engage the board by pushing its white board ejector tabs toward the cage.

CAUTION

Clearing the RAM erases stored information. Don't clear the RAM unless host system personnel authorize you to proceed.

Failure to observe static protection procedures can damage computer components and void your warranty.

CAUTION

When inserting EPROMs, match EPROM notches to the notches on chip sockets. White markings on the board also indicate proper chip notch position. Improperly inserting a chip can destroy it.
Software Changes

10. Reconnect the video cable.
11. Turn GD power ON. Verify that the proper denomination appears on the monitor.
12. Turn GD power OFF.
13. Remove the video cable from the CPU Board.
14. Disengage the CPU Board by pulling its white board ejector tabs toward you. Remove the board.
15. Remove the RAM Clear Chip.

- Install the Game Chip
  16. Reinsert the Game EPROM in socket XU3.
  17. Return the CPU Board to the card cage. Engage the board by pushing its white board ejector tabs toward the cage.
  18. Close and lock the card cage.
  19. Reconnect the video cable to the CPU Board's Video Port.
  20. Slant Tops Only: Reengage the coin chute.
  21. Turn GD power ON. The message "CLEAR" should appear on the monitor. This message indicates proper clearing of the RAM.
  22. Lock the card cage.

- Reinitialize the System
  23. Push DIAGNOSTIC. The machine reboots. If you cleared the machine properly, the machine displays "TILT: MEMORY CLEARED." Push DIAGNOSTIC to acknowledge this message.
  24. Close and lock the Main Door.

Changing the GD Denomination

1. Unlock and open the Main Door.
2. Turn power off at the PDU switch.
3. Disengage the coin chute.
4. Remove the video cable from the CPU Board's Video Port.
5. Change the denomination decals on the GD's monitor hatch.
6. Change the coin denomination of the coin comparator. (Or change the coin comparator.)
7. Change the front of the coin entry.
8. Hopper Machines: Change the hopper.
9. Clear the RAM with the proper RAM Clear Chip. See the procedure above.
Chapter 3. Troubleshooting

Candle Codes
The two-stage candle on top of the machine indicates VGD status. The VGD employs both levels of the candle to convey information about its operation. See the Candle Codes table at right.

Tilt Codes
When the machine enters Tilt Mode, a mnemonic tilt code appears on the monitor. See the Tilt Codes table. (More detailed tables later in this chapter cover all these tilts.) There are several types of tilt codes...

<table>
<thead>
<tr>
<th>BV/Coin Mech Tilts</th>
<th></th>
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<thead>
<tr>
<th>CPU Board EEPROMs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Board EEPROMs indicate data errors in the CPU Board’s Security EEPROM chip. To clear CPU Board tilts, press the DIAGNOSTIC Button.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPU EPROM Tilts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>This machine only has one EPROM tilt. The screen message “ROM Checksum Error” implies a bad CPU Board EPROM. To clear CPU EPROM tilts, replace the board or the chip. Then do a hard RAM clear.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Door Access Tilts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Door access tilts provide information on the Stacker, Logic Door, Drop Door, Bill Door, Monitor Hatch, Main Door, and Printer/Hopper Door. An open door/hatch or missing stacker produces a tilt. To clear door access tilts, close the open door.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hand Pay Situation Tilts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The tilts “HAND PAY xxxxx CREDITS” and “PLEASE WAIT FOR ATTENDANT” announce a hand-pay situation. (The attendant must pay the player.) This tilt can be hopper or player initiated. To clear hand pay situation tilts, turn the ADMINISTRATOR KEY.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hard Meter Tilts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard meter tilts describe improper operation of hard meters on the side of the game. These sturdy, electromechanical meters report important game statistics. Electromechanical meters offer a degree of data security, because you can’t reset them. Yet despite their ruggedness, hard meters occasionally fail. Hard meter tilts log such hard meter failures. To clear hard meter tilts, turn the ADMINISTRATOR KEY.</td>
<td></td>
</tr>
</tbody>
</table>
**NOTICE**
WHERE IS THE DIAGNOSTIC BUTTON? Many of these tilt descriptions refer to the DIAGNOSTIC Button.

- **19" Slant Top GDs:** You'll find the white, DIAGNOSTIC Button behind the hinge side of the Electronics Door. Look near the coin drop chute.

- **19" Upright GDs:** You'll find the white, DIAGNOSTIC Button on the lower-left side of the card cage.

- **17" Upright GDs:** You'll find the white, DIAGNOSTIC Button under the monitor and near the bill validator.

- **14" Bartop GDs:** You'll find the white, DIAGNOSTIC Button under the hard meters and behind the Main Door.

**Hopper Tilts**
Hopper tilts report hopper maladies. These maladies can involve either electronic or mechanical problems, and hopper tilts cover both possibilities. To clear hopper tilts, turn the ADMINISTRATOR KEY or press DIAGNOSTIC Button.

**Printer Tilts**
Printer tilts communicate printer problems. For instance, a printer tilt might occur if the printer runs out of paper. If printer-to-CPU communications fail, you might also see a tilt message. To clear printer tilts, switch the gaming device off and on.

**Programmable Gate Array (PGA) Tilts**
PGA (Programmable Gate Array) tilts alert you to failures of the Xilinx® PGA chip. The PGA chip is a unique, dynamically programmable communications chip. It resides on the I/O Board. Notice that PGA chip XU41 primarily handles peripheral switch inputs. To clear PGA tilts, turn the ADMINISTRATOR KEY or press DIAGNOSTIC Button.

**Static RAM Tilts**
Static RAM tilts signal errors in data stored in the VGD computer's CMOS static RAM chips. To clear static RAM tilts, do hard RAM clear.

**Touch Screen Tilts**
Touch Screen tilts occur when communications between the Touch Screen Controller and I/O Board fail. Communications breakdowns may result from bad cables, or from connectors or chips on circuit boards. Signals between the Touch Screen and the I/O Board also pass through the Backplane Board. To clear Touch Screen tilts, turn the ADMINISTRATOR KEY or press DIAGNOSTIC Button.

**Top Box, LCD. Communication Tilts.**
These tilts can occur when communication between the Top Box and the game breaks down. Video memory and ROM corruption faults are examples of this type of tilt.

**Top Box, Monopoly Board Tilts**
These tilts pertain to the communication faults that occur between the Monopoly Board in the Top Box and the game. Faults such as Dice Not Detected, Memory Corrupt, and Noise In Communication are typical examples.
# Troubleshooting

## Bill Validator and Coin Mechanism Tilt Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| "Bill Stacker Missing" appears on monitor         | 1. No stacker  
2. Bent STACKER switch mounting bracket  
3. Bad stacker cable  
4. Bad STACKER switch  
5. Bad STACKER switch input on I/O Board          | 1. Replace stacker in bill validator.  
2. Bend back the bracket.  
3. Repair or replace cable.  
4. Replace switch.  
5. Service input or replace I/O Board             |
| "Bill Validator Communication Fault" appears on monitor screen  
• External (green) bill validator LEDs are out    | 1. Faulty cable from BV to I/O Board  
2. I/O Board communication failure  
3. Bill validator failure                         | 1. Check or replace BV data cable.  
2. Replace faulty I/O Board, or service  
3. Replace bill validator. Check new BV  
by running the Currency Test.                  |
| "Bill Validator (BV) won't accept currency"  
• "Invalid Bill" appears on monitor screen         | 1. Bad bill  
2. Bad or disabled BV  
3. Loose BV power connections  
4. Duet and det  
5. Wrong DIP switch settings  
6. Bad data cable  
2a. Machine accepts coins: Does BV take bill in and then spit it out? Yes: Bill may put machine over hopper payout limit. No: Replace BV.  
2b. Machine doesn't accept coins:  
Lookout machine, open door or tilt,  
Clear tilt and shut door.  
3. Check for 120 VAC at power cable,  
or for loose connections.  
4. Clean BV with BV cleaning pad.  
5. Check DIP switch settings.  
6. Repair or replace bad cable.  
7. Replace I/O Board.                           |
| "Bill Validator Jam" appears on monitor screen  
• External (green) bill validator LEDs are out    | 1. Full bill validator (BV) stacker  
2. Jammed bill validator (BV)                     | 1. Collect stacker cassette and replace it with an empty one.  
2. Clear the jam and test the BV in  
Administration Mode.                            |
| Coins don't drop                                   | 1. Coin jam in coin chute  
2. Someone inserted coin that was too large  
3. Misaligned coin mech                           | 1. Find jam location by looking through  
coin chute slits.  
2. Carefully dislodge coin.  
3. Remount coin mech.                            |
| "Coin Jam" appears on monitor screen              | 1. Coin jam  
2. Dirty or faulty Opto Board                     | 1. Clean coin jam.  
2a. Can't clear tilt by cycling power? Opto Board may be faulty. Use Input  
Test to check for proper switching. Display should read "0" with no coins in  
chute.  
2b. Opto Board fails test? Clean or replace board. |
| Coins jam comparator  
• VGD doesn't give credits                        | 1. No sample coin in coin comparator's sample coin retainer  
2. Bad comparator                                 | 1. Insert nominal coin in sample coin  
retainer. Coin should be new.  
2. Replace comparator.                           |
| Comparator won't accept coins                     | 1. No power to comparator (LED is off)  
2. Bad sample coin  
3. Maladjusted comparator accept/reject potentiometer  
4. Bad comparator                                 | 1. Check power cable. If cable's open or shorted, replace it.  
2. Replace sample coin.  
3. Adjust accept/reject selectivity on  
comparator potentiometer.  
4. Replace comparator.                           |
| "Long Coin" appears on monitor                    | Long Coin (Coin took too long between  
detector options.)                              | Player tried strong coin.                                                 |
| VGD doesn't give credits                          | 1. Bad harness between comparator and opto  
2. Bad Opto Board  
2. Repair or replace Opto Board.  
3. Repair or replace I/O Board.                   |
| "Reversed Coin" appears on monitor                | Reversed coin                                  | Player tried to remove a coin with string  
or similar device.                                                       |
| "Bill Validator Currency Type"  
• Denomination Miismatch Monitor Tilt              | An incorrect BV or RAM clear is installed      | Install correct BV or RAM clear.  
Repeat RAM clear.                                  |
| "Bill Validator Failure" appears on monitor       | Bill Validator has reported failure or  
2. Reset BV by removing and replacing  
Bill Stacker.                                      |
| "Bill Validator Cheated" appears on monitor       | Bill Validator has been cheated (BV did not  
2. Reset BV by removing and replacing  
Bill Stacker.                                      |
| "Bill Validator Stacker Full" appears on monitor  | Bill Validator stacker is full.                | 1. Check stacker cassette, switch,  
switch harness, and I/O board.  
2. Empty stacker and place back in G0.            |
# Troubleshooting

## Button and Switch Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| Button: A Player Panel button doesn’t operate                          | 1. Loose cable connection at top of Backplane Board  
2. Bad player panel wiring  
3. Bad switch  
4. Bad switch wiring  
5. Bad Faston® connector  
2. Repair or replace player panel cable.  
3. Replace switch.  
4. Rewire switch.  
5. Replace connector at button.  
6. Service input or replace I/O Board. |
| Button and Switch: Opening and closing any door or pressing DIAGNOSTIC Button fails to clear error messages | 1. System halt  
2. Loose connection at switch | 1. Turn power off and wait three seconds. Then turn power on.  
2. Repair connection. |
| Button Lamp: A Player Panel button lamp doesn’t light                  | 1. Bad bulb  
2. Loose cable connection at top of Backplane Board  
3. Bad player panel wiring  
4. Bad Faston® connector  
5. Bad switch wiring  
2. Repair or replace player panel cable.  
3. Replace connector at button.  
4. Rewire switch.  
6. Service output or replace I/O Board. |
| Switch: ADMINISTRATOR KEY switch doesn’t operate                       | 1. Bad switch  
2. Bad cable harness  
3. Bad Faston® connector  
2. Repair or replace harness.  
3. Replace connector at Backplane Board or I/O Board.  
4. Service input or replace I/O Board. |
| Switch: Door switch doesn’t operate                                     | 1. Bad switch  
2. Bad switch cable  
3. Bent, maladjusted or missing actuator bracket!  
4. Bad switch wiring  
5. Bad switch input on I/O Board | 1. Replace switch.  
2. Repair or replace switch cable.  
3. Straighten, adjust or replace bracket.  
4. Rewire switch.  
5. Service input or replace I/O Board. |

## Communication Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| No Communication | 1. Wrong protocol setting.  
2. Bad power line to slot machine.  
3. Blown main PDU fuse (4ASB on 120V GDs; 2ASB on 240V GDs).  
4. Bad communication cables.  
5. Bad external communication power supply.  
6. Bad I/O Board. | 1. Enter Administration Mode and set GD communications to proper protocol.  
2. Make sure that slot machine is on live circuit.  
3. If fuse is bad, replace it.  
4. If cables are bad, repair or replace them.  
5. If your GD has external communication power supply, replace it.  
6. Replace I/O Board and rerun test. |

**NOTICE**
Report error codes to central communication site for evaluation and processing. Codes enable use of advanced diagnostic facilities.
## Troubleshooting

### CPU Board 7-Segment Display Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| CPU Board display is blank     | 1. Constantly ("8" never appears): Logic isn’t receiving power  
2. After "8" clears (after power-up): Game OK | 1. Check LEDs on I/O Board to see which power supply voltage is absent. Then see Power Troubleshooting Guide.  
2. Return game to operation. |
| CPU Board displays "8"        | • Briefly, at power-up: Game OK  
• "8" remains on: Dead CPU Board | 1. Constant "8": Remove and reset CPU and IO Boards. Rerun test.  
3. After test, "8" appears and remains on: Dead CPU. Original EPROMs are good. Swap CPU Board. Rerun test. |
# Troubleshooting

## CPU Board EEPROM Tilt Guide

<table>
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<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| "Secure Memory CRC Corrupt" appears on monitor | Bad CPU Secure EEPROM                                | 1. Check each EEPROM by substituting good part.  
2. Replace bad EEPROM. |
| "Illegal Secure Memory Device" appears on monitor | CPU EEPROM not correct                               | 1. Check each EEPROM by substituting good part.  
2. Replace bad EEPROM. |
| "Secure Memory Incorrect Password" appears on monitor | 1. Someone changed EEPROM or CPU Board  
2. Bad CPU EEPROM | 1. Return original chip or CPU Board to card cage, or press DIAGNOSTIC.  
2. Check or replace suspect EEPROM.          |
| "Secure Memory Options Updated" appears on monitor | Someone accessed restricted options with a secure device (EEPROM). | To clear the message, turn the ADMINISTRATOR KEY or press DIAGNOSTIC. |
| "Secure Memory Failure" appears on monitor   | Bad CPU EEPROM                                       | 1. Check each EEPROM by substituting good part.  
2. Replace bad EEPROM. |
| "Secure Memory Game Busy" appears on monitor  | Game was busy when percentage key was inserted.    | To clear the message, turn the ADMINISTRATOR KEY or press DIAGNOSTIC. |
| "Secure Memory EFT Key Error" appears on monitor | Game doesn't support EFT or wrong key. EFT key is inserted after Hard RAM Clear instead of during. | Remove EFT key & apply power cycle.  
Do Hard RAM Clear. |
| "Backplane Serial Number Mismatch" appears on monitor | CPU serial number doesn't match backplane value. | Replace original CPU board.  
Do Hard RAM Clear. |
| "Missing or Bad Delaware ID" appears on monitor | VLC terminal ID part is bad or missing              | For DE and NM overlapping functionality |
| "Missing or Bad Secure ID (XU27)" appears on monitor | Secure ID part is bad or missing.                  | Replace bad EEPROM. (Refers to lottery games only.) |
CPU EPROM Tilt Guide

<table>
<thead>
<tr>
<th>Symptom Message</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| "ROM Checksum Error" appears on monitor. | 1. Bad CPU Board EPROM XU2  
2. Bad CPU Board EPROM XU3  
3. Bad data bus bits on CPU Board  
4. Bad buffer, etc. on CPU Board data bus | 1. Replace EPROM XU2. Clear RAM and restart machine. Look for repeat of "ROM" diagnostic message. No message: Problem solved!  
3. Message repeats: Replace CPU Board or bench test bus.  

"ROM Table Display Index Error" appears on monitor. Game payable lookup error (only in 3-reel video products)  
1. Apply Power Cycle.  
2. Do Hard Ram Clear.

"Reel Stop Position Error" appears on monitor. Reel game specific game error (only in reel games)  
1. Apply Power Cycle.  
2. Do Hard Ram Clear.

"ROM Table Lookup Error" appears on monitor. Game payable lookup error (only in 3-reel video products)  
1. Apply Power Cycle.  
2. Do Hard Ram Clear.

"ROM Table Product Range Error" appears on monitor. Game payable lookup error (only in 3-reel video products)  
1. Apply Power Cycle.  
2. Do Hard Ram Clear.

"ROM Signature Mismatch-Please Perform RAM Clear" appears on monitor. ROMs changed without a RAM clear  
1. Apply Power Cycle.  
2. Do Hard Ram Clear.

CPU Startup Sounds Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| No startup bong | 1. Disconnected speaker  
2. Replace the I/O Board. |
| 1 startup bong | Normal system | Proceed with next test. |
| 2 startup bongs | Bad CPU Board EPROM XU30 | 1. Replace XU30, clear RAM, retest game.  
2. Check verify sound jumper is set correctly. |
| 3 startup bongs | Bad CPU Board EPROM XU31 | Replace XU31, clear RAM, retest game. |
| 4 startup bongs | Bad CPU Board EPROM XU17 | Replace XU17, clear RAM, retest game. |
| 5 startup bongs | Bad CPU Board EPROM XU18 | Replace XU18, clear RAM, retest game. |
| 6 to 9 startup bongs | Not used | Recount number of bongs. |
| 10 startup bongs | Bad Sound RAM U38, U39 or U40, or DSP chip XU37; All chips are on CPU Board | 1. Replace bad chip, clear RAM and retest machine.  
2. Run Sound Test. |

CPU Jumper Guide

<table>
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<tr>
<th>CPU 1.5 Jumper J2 Position (A-17677-03)</th>
<th>Explanation</th>
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</thead>
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<tr>
<td>From &quot;P7&quot; to &quot;P7 OUT&quot;</td>
<td>CPU Board contains 8 meg sound EPROMs.</td>
</tr>
<tr>
<td>From &quot;P7 OUT&quot; to &quot;+5&quot;</td>
<td>CPU Board contains 4 meg sound EPROMs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPU 1.5+ Jumper Position (A-004765-03)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP2 jumper from P1 to P2</td>
<td>Whenever a 4M EPROM or smaller is used (XU2 through XU5)</td>
</tr>
<tr>
<td>JP2 jumper from P2 to P3</td>
<td>Whenever an 8M EPROM is used (XU2 through XU5)</td>
</tr>
<tr>
<td>JP3 jumper from P1 to P2</td>
<td>Whenever a 4M EPROM or smaller is used (XU17, XU18, XU30, XU31)</td>
</tr>
<tr>
<td>JP3 jumper from P2 to P3</td>
<td>Whenever an 8M EPROM is used (XU17, XU18, XU30, XU31)</td>
</tr>
</tbody>
</table>
# Troubleshooting

## Door Tilt Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| "Bill Door Open" appears on monitor | 1. Open Bill Door  
2. Maladjusted EV OPEN switch  
3. Bent switch mounting bracket  
4. Bad BILL DOOR switch  
5. Bad BILL DOOR switch wiring  
6. Bad BILL DOOR switch cable  
2. Adjust switch.  
3. Straighten or replace bracket.  
4. Replace switch.  
5. Repair or replace wiring.  
6. Repair or replace switch cable.  
7. Service input or replace board. |
| "Drop Door Open" appears on monitor | 1. Open Drop Door  
2. Bad DROP DOOR switch  
3. Bad DROP DOOR switch wiring  
4. Bad DROP DOOR switch cable  
5. Bad DROP DOOR switch input on I/O Board | 1. Close and lock Drop Door.  
2. Replace switch.  
3. Rewire switch.  
4. Repair or replace switch cable.  
5. Service input or replace I/O Board. |
| "Bill Jam Service Door Open" appears on monitor | 1. Maladjusted switch  
2. Open Bill Jam Service Door  
3. Bad BILL JAM SERVICE switch  
4. Bent BILL JAM SERVICE switch mounting bracket  
5. Bad BILL JAM SERVICE switch wiring  
6. Bad BILL JAM SERVICE switch cable  
2. Close and lock door.  
3. Replace switch.  
4. Bend back bracket.  
5. Rewire switch.  
6. Repair or replace switch cable.  
7. Service input or replace I/O Board. |
| "Logic Door Open" appears on monitor | 1. Open Logic Door (Card Cage Door)  
2. Bad CAGE DOOR switch  
3. Bad CAGE DOOR switch wiring  
4. Bad CAGE DOOR switch cable  
2. Replace switch.  
3. Rewire switch.  
4. Repair or replace switch cable.  
5. Service input or replace I/O Board. |
| "Main Door Open" appears on monitor | 1. Open Main Door or Printer/Hopper Door  
2. Bad door switch (Main Door or Printer/Hopper Door)  
3. Bad door switch wiring  
4. Bad door switch cable  
5. Bad door switch input on I/O Board | 1. Close and lock Main Door and Printer/Hopper Door.  
2. Replace switch.  
3. Repair or replace wiring.  
4. Repair or replace cable.  
5. Service input or or replace board. |
| "Monitor Hatch Door Open" appears on monitor | 1. Open Monitor Hatch  
2. Bad HATCH switch  
3. Bent HATCH switch mounting bracket  
5. Bad HATCH switch wiring  
6. Bad HATCH switch cable  
2. Replace HATCH switch.  
3. Straighten or replace bracket.  
4. Replace bracket.  
5. Repair or replace wiring.  
6. Repair or replace cable.  
7. Service input or or replace board. |
| "Reserved Door Open" appears on monitor | The Reserved Door is open | Close Reserved Door. Check door switch and cable |
### Hand Pay Situation Tilt Guide

*ATTENDANT* appears on display

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;HAND PAY xxxx CREDITS&quot; and &quot;PLEASE WAIT FOR ATTENDANT&quot; alternately appear on the monitor display</td>
<td>Hopper can't pay this amount (this amount exceeds Maximum Hopper Payout Limit). These banners have a green background. If payout is player initiated, the same messages appear but with a blue background.</td>
<td>Attendant must pay player xxxx credits.</td>
</tr>
</tbody>
</table>

### Hard Meter Tilt Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| All hard meters fail to increment | 1. Bad Meter Board cable  
2. Bad Meter Board  
3. Bad I/O Board or CPU Board | 1. Check these DC voltages at Meter Board end of 12-pin Meter Board cable...  
• +12V, pin 11  
• +5V, pin 2  
Missing voltage or voltage reads low: Repair or replace cable.  
2. Voltage checks OK; Replace Meter Board.  
3. Replace faulty PC board. |
| "Mechanical Meter #%d Failure" appears on display  
#%d =number of meter | Bad connection to meter...  
• 10° Slant and Upright, Bartop: Meter numbers proceed from left to right and top to bottom. Top meters: 1, 2, 3. Bottom meters: 4, 5, 6.  
• 17° Upright: Meter numbers proceed from top to bottom. | 1. With power off, perform a continuity test between I/O Board, Meter Board and meter.  
2. Tighten loose connections.  
3. Repair or replace bad cable.  
Locate the bad meter and replace it. (Refer to jurisdiction rules about meter replacement.) |
| • One or more hard meters doesn't increment-No tilt message appears | Bad meter | |
# Troubleshooting

## Hopper Tilt Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Hopper Empty&quot; appears on display, indicating empty hopper.</td>
<td>1. Empty or low hopper: Check it, and refill it if necessary.</td>
<td>1. Refill hopper.</td>
</tr>
<tr>
<td></td>
<td>2. Coin jam</td>
<td>2. Clear jam. Clear tilt by turning ADMINISTRATOR KEY or pressing DIAGNOSTIC button. Run Hopper Test. Watch hopper for bent or malfunctioning parts. Replace bad parts.</td>
</tr>
<tr>
<td></td>
<td>4. Coin-out sensor harness continuity</td>
<td>4. Test hopper probes by swapping them with known-good ones.</td>
</tr>
<tr>
<td>&quot;Hopper Extra Coin Paid&quot; appears on display</td>
<td>Hopper dispensed extra coin (appears after hopper dispenses 10 extra coins per 5,000 dispensed coins)</td>
<td>1. Clear tilt by turning ADMINISTRATOR KEY or pressing DIAGNOSTIC button. Run Hopper Test. Check hopper's electromechanical brake.</td>
</tr>
<tr>
<td></td>
<td>1. Hopper brake, motor, etc.</td>
<td>2. Adjust coin-out (proximity) sensor.</td>
</tr>
<tr>
<td></td>
<td>2. Coin-out sensor harness continuity</td>
<td>3. Hopper's not jammed: Check or swap hopper power and coin-out sensor cables. Clear tilt and rerun Hopper Test.</td>
</tr>
<tr>
<td>&quot;Hopper Jam&quot; appears on display, indicating hopper jam.</td>
<td>1. Hopper brake, motor, etc.</td>
<td>1. Clear jam. Clear tilt by turning ADMINISTRATOR KEY or pressing DIAGNOSTIC button. Run Hopper Test. Watch hopper for bent or malfunctioning parts. Replace bad parts.</td>
</tr>
<tr>
<td></td>
<td>2. Coin-out sensor harness continuity</td>
<td>2. Hopper's not jammed: Check or swap hopper power and coin-out sensor cables. Clear tilt and rerun Hopper Test.</td>
</tr>
<tr>
<td>&quot;Hopper Runaway&quot; appears on display, indicating runaway hopper</td>
<td>1. Coin-out sensor</td>
<td>1. Adjust coin-out (proximity) sensor. Clear tilt by turning ADMINISTRATOR KEY or pressing DIAGNOSTIC button. Run Hopper Test. If problem persists, replace sensor.</td>
</tr>
<tr>
<td></td>
<td>2. Faulty hopper data cable</td>
<td>2. Repair or replace cable.</td>
</tr>
<tr>
<td></td>
<td>3. Faulty hopper communication link</td>
<td>3. Service communication link.</td>
</tr>
<tr>
<td></td>
<td>5. Faulty Hopper Driver Board</td>
<td>5. Repair or replace Hopper Driver Board: Test hopper SSR for leakage.</td>
</tr>
<tr>
<td></td>
<td>6. Faulty I/O Board</td>
<td>Bad SSR? Replace it.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Replace faulty I/O Board.</td>
</tr>
</tbody>
</table>
# Troubleshooting

## Lamp Matrix Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| One entire column of lamps doesn't work     | 1. Bad column driver darlington  
2. Bad cable  
3. Failure in column drive electronics before darlington | 1. Replace bad driver  
2. Repair or replace lamp cable  
3. Troubleshoot and repair column drive circuit. See nearby theory drawing. |
| One entire row of lamps doesn't work        | 1. Bad row driver darlington  
2. Bad cable or connector  
3. Failure in row drive electronics before darlington | 1. Replace bad driver  
2. Repair cable or connector  
3. Troubleshoot and repair row drive circuit. See nearby theory drawing. |
| More than one lamp comes on at once          | Shorted lamp matrix diode                                                    | Check diodes in same row and column as lamp that shouldn't be lighting. Each lamp has diode in series with it. |
| One lamp doesn't come on                    | 1. Burned out bulb  
2. Open lamp diode  
3. Bad PC board trace  
4. Bad cable or connector | 1. Replace bulb.  
2. Replace diode.  
3. Repair trace.  
4. Repair or replace lamp cable. |

## Lamp Matrix

<table>
<thead>
<tr>
<th>ROW</th>
<th>COL</th>
<th>0 Whit-Blk Q5</th>
<th>1 Whit-Brn Q4</th>
<th>2 Whit-Red Q7</th>
<th>3 Whit-Orn Q8</th>
<th>4 Whit-Yel Q11</th>
<th>5 Whit-Grn Q12</th>
<th>6 Whit-Blu Q15</th>
<th>7 Whit-Vio Q16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blu-Blk Q1</td>
<td>0</td>
<td>1</td>
<td>9</td>
<td>17</td>
<td>25</td>
<td>33</td>
<td>41</td>
<td>49</td>
<td>57</td>
</tr>
<tr>
<td>Blu-Brn Q2</td>
<td>1</td>
<td>2</td>
<td>10</td>
<td>18</td>
<td>26</td>
<td>34</td>
<td>42</td>
<td>50</td>
<td>58</td>
</tr>
<tr>
<td>Blu-Red Q5</td>
<td>2</td>
<td>3</td>
<td>11</td>
<td>19</td>
<td>27</td>
<td>35</td>
<td>43</td>
<td>51</td>
<td>59</td>
</tr>
<tr>
<td>Blu-Orn Q6</td>
<td>3</td>
<td>4</td>
<td>12</td>
<td>20</td>
<td>28</td>
<td>36</td>
<td>44</td>
<td>52</td>
<td>60</td>
</tr>
<tr>
<td>Blu-Yel Q8</td>
<td>4</td>
<td>5</td>
<td>13</td>
<td>21</td>
<td>29</td>
<td>37</td>
<td>45</td>
<td>53</td>
<td>61</td>
</tr>
<tr>
<td>Blu-Grn Q10</td>
<td>5</td>
<td>6</td>
<td>14</td>
<td>22</td>
<td>30</td>
<td>38</td>
<td>46</td>
<td>DBV LED 2</td>
<td>DBV LED 3</td>
</tr>
<tr>
<td>Trace Q13</td>
<td>6</td>
<td>7</td>
<td>15</td>
<td>23</td>
<td>31</td>
<td>39</td>
<td>DBV LED 12</td>
<td>Tower Lamp, Bottom</td>
<td>Tower Lamp, Midle</td>
</tr>
<tr>
<td>Blu-Vio Q14</td>
<td>7</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>Collect</td>
<td>32</td>
<td>40</td>
<td>48</td>
<td>56</td>
</tr>
</tbody>
</table>

*Used on 12-button player panel.

**NOTICE**

The lamp matrix of some gaming devices may include fewer or additional lamps.
## Troubleshooting

### Monitor Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| Dark screen (No picture or raster)           | 1. Misaligned blind mating connector  
  2. Wrong brightness or contrast settings.  
  3. No power to monitor  
  4. No video signal to monitor  
  5. Bad monitor power supply  
  6. Bad horizontal output transistor or damper diode  
  7. Overvoltage condition at flyback transformer activated shutdown circuit  
  2. Correct brightness and contrast control settings.  
  3. No output on power chassis for 120 VAC. Replace power chassis.  
  4. Check for bad or loose video cable. Repair or replace bad cable. Secure loose cable.  
  5. Replace power supply or monitor.  
  6. Replace transistor. Test damper diode, retrace tuning capacitors and associated components before restarting monitor.  
  7. With variac, test monitor at reduced input voltage. Replace out-of-spec components in horizontal circuit.  
  8. Test monitor with alternate power supply. Then repair startup circuit. |

#### WARNING
ONLY QUALIFIED PERSONNEL SHOULD PERFORM ADJUSTMENTS WHILE THE MONITOR IS UNDER POWER.

| Missing color (Red, green or blue)            | 1. Misaligned blind mating connector  
  2. Improper color adjustment  
  3. Open color gun driver transistor  
  4. Broken cable to neck board.  
  5. Fault in monitor's video preamp.  
  6. Low emission from one color gun. | 1. Align connector plug and jack.  
  2. Display color bars in Administration Modes. Adjust chassis and neck board color controls.  
  3. Replace transistor or monitor.  
  4. Repair or replace cable or neck board.  
  5. Replace preamp (an IC in most monitor models) or monitor.  
  6. Rejuvenate CRT. (Computer service bureau can do that.) |

#### NOTICE
Consult monitor manual for specifics.

| Picture is far too short to fill screen  
| Screen displays horizontal line, but no picture | 1. Improper vertical size setting  
  2. Bad vertical power amp in monitor  
  2. Replace vertical power transistors or IC.  
  3. Replace vertical deflection IC. (In many monitors, deflection and power stages are part of same IC.) |

#### NOTICE
Consult monitor manual for specifics.

| Keystoned raster | Shorted turns in monitor yoke | Replace yoke or monitor. |

| Screen only displays raster | 1. Misaligned blind mating connector  
  2. Incorrectly inserted EPROMs  
  3. Disconnected video cable  
  4. Bad Video Daughtor Card  
  5. Bad EPROMs or CPU Board  
  6. Broken wires inside video cable connector  
  7. Dead video preamp power supply in monitor  
  2. With power OFF, inspect U2 and U3 on the CPU Board. Make sure chips aren't reversed (according to labels on board). Reposition improperly inserted chips.  
  3. Check video cable to make sure it's properly seated. Make sure pins aren't bent.  
  4. Replace Video Card.  
  5. Check EPROMs. If they're OK, replace CPU Board.  
  6. Repair or replace video cable.  
  7. Replace power supply components or monitor.  
  8. Replace IC or monitor. |

#### Solid colors seem to be contaminated with shades of wrong color.

#### WARNING
ONLY QUALIFIED PERSONNEL SHOULD PERFORM THIS PROCEDURE! THIS PROCEDURE REQUIRES ADJUSTMENTS WHILE THE MONITOR IS UNDER POWER.

| Monitor's purity or static convergence magnets are out of alignment | 1. Enter Administration Mode. Display each purity (solid color) screen.  
  2. For each screen, rotate purity magnets around CRT neck until color is as pure as possible.  
  3. Check your work by displaying the crosshatch pattern. Grid lines should be white. Readjust magnets until at least center lines are white. Lines at extreme edges may display some slight color contamination.  
  1. Use external degaussing coil to degauss monitor. (Built-in coil probably isn't powerful enough to restore picture fidelity.)  
  2. Test monitor with purity (solid color) and color bars screens in Administration Mode. |

| Spots or spots of color in picture | Picture tube picked up magnetic charge | 1. Enter Administration Mode. Display each purity (solid color) screen.  
  2. For each screen, rotate purity magnets around CRT neck until color is as pure as possible.  
  3. Check your work by displaying the crosshatch pattern. Grid lines should be white. Readjust magnets until at least center lines are white. Lines at extreme edges may display some slight color contamination.  
  1. Use external degaussing coil to degauss monitor. (Built-in coil probably isn't powerful enough to restore picture fidelity.)  
  2. Test monitor with purity (solid color) and color bars screens in Administration Mode. |
# Troubleshooting

## Power Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>All I/O Board LEDs light</td>
<td>Bad or loose CPU Board or I/O Board</td>
<td>1. Turn off VGD power. Reseat boards in the Backplane Board. 2. Retest VGD. 3. VGD seems normal now: Proceed with next test. Same symptom: Test each board by substitution. Replace bad boards.</td>
</tr>
<tr>
<td>No I/O Board LEDs light</td>
<td>Blown PDU fuses</td>
<td>1. With VOM, check fuses for continuity. 2. Replace bad fuses.</td>
</tr>
<tr>
<td>• On I/O Board, &quot;DS1&quot; LED is on. • Another I/O Board LED is off.</td>
<td>Bad power supply</td>
<td>Replace bad supply.</td>
</tr>
<tr>
<td>Partial Power Failure... • Monitor is black, but seems to have high voltage (Screen attracts hair; may flicker occasionally) • Bill validator initializes normally</td>
<td>1. Missing card cage power; With VGD on, check I/O Board LEDs (Left to right): +5VI&quot;, +12V, +12V, +5V, +18V. 2. PDU failure: Check voltages at PDU’s DC power connector... • Pin 13 = PFD (Power Fail Detect) • Pin 16 = +5VI&quot; • Pin 14 = +12V • Pin 15 = +12V • Pin 17 = GND(I) • Pins 18, 19 = Approx 22VDC, no load • Pins 20-22 = +5V • Pins 1-12, 23, 24 = GND (NOTE: These voltages have +/- tolerances.) 3. Improperly inserted EPROMs 4. Bad CPU or I/O Board</td>
<td></td>
</tr>
<tr>
<td>Total Power Failure... • No hopper action • No sound • Dead monitor • Logic doesn’t start up</td>
<td>1. Fuse on PDU 2. AC power line in 3. Bad PDU output 4. Faulty line cord</td>
<td>1. Replace fuse. 2. Turn on circuit breaker or service electrical outlet. 3. Check all PDU outputs with a digital voltmeter. Repair or replace Power Distribution Unit (PDU). 4. Replace line cord.</td>
</tr>
</tbody>
</table>

*NOTES:*  
• +5VI" refers to the isolated +5-volt switcher in the PDU. (Other +5V supply isn’t isolated.)  
• +18V supply is only linear supply. Its LED remains on for few seconds after you shut off power. Other supplies are switchers.
# Troubleshooting

## Printer Tilt Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| Printer Malfunction  
• Tilt condition:  
  1. "PRINTER ERROR"  
  2. Printer is printing "garbage" | 1. Several possible causes...  
• Printer switch is turned off.  
• Unplugged or damaged power cord  
• Unplugged or damaged flat cable.  
• Paper jams inside printer.  
  2. Printer buffer contains unusable data | 1. Solutions to "PRINTER JAM" tilt...  
• Make sure that printer switch is on.  
• Reconnect unplugged cable.  
  Repair or replace bad cable.  
• Clear paper jams. If message persists, clear error message from internal memory.  
  2. Cycle VGD power off and on.  
  Perform printer test. |

(NOTE: When handling printer, never lift printer by printer bezel. If you adjust printer, you may need to realign printer bezel with printer bezel.)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| Printer Malfunction  
• Uneven type density | 1. Bad ribbon cartridge.  
  2. Uneven from left to right: Maladjusted Platen Gap.  
  3. Uneven from top to bottom: Maladjusted Printhead Angle. | 1. Replace cartridge.  
  3. Adjust Printhead Angle. |
| Printer Malfunction  
• Type is too light | 1. Bad ribbon cartridge.  
| Printer Malfunction  
• Ribbon tears  
• Printhead jams  
• Tickets smudge | Printhead angle is wrong for paper type you use. | Adjust Printhead Angle Lever. |

## Programmable Gate Array (PGA) Tilt Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;XILINX PGA FAILURE&quot; appears on display</td>
<td>PGA chip failure</td>
<td>Replace I/O Board chip XU41, or replace I/O Board.</td>
</tr>
</tbody>
</table>
Sound Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| No sound, but rest of slot machine operates | 1. Bad or disconnected speaker cable  
2. Missing or improperly positioned CPU Board Jumper JP2  
3. Bad protection diode on I/O Board (Speaker may click when you turn on slot machine.)  
4. Bad capacitor on I/O Board  
5. Bad audio power amp on I/O Board (Unlikely) | 1. Reconnect disconnected speaker cable. Repair or replace bad cable.  
2. If CPU Board has 4-MB EPROMs, jumper pins 1 and 2. If CPU Board has 8-MB EPROMs, jumper pins 2 and 3.  
3. Check for shorted D8 or D9. Replace bad part.  
4. Check C53, C51 or C60. Replace bad part.  
5. Check U35 (audio IC in large heatsink). Replace bad part. |
| Some sounds missing or distorted | Bad sound EPROM on CPU Board | 1. Run Sound Tests in Administration Mode.  
2. If one of these EPROMs is bad, replace it: XU17, XU18, XU30, XU31. (Some slot machines may not have all four chips.) |
| All sounds distorted | 1. Bad -12V power supply  
2. Bad protection diode on I/O Board  
3. Bad capacitor on I/O Board  
4. Bad audio power amp on I/O Board (Unlikely) | 1. Check I/O Board -12V LED: If it's out, power supply may be bad.  
2. Check for shorted D8 or D9. Replace bad part.  
3. Check C57, C58 or C66. Replace bad part.  
5. Recheck the audio by running Sound Tests in Administration Mode. |

---

![Diagram of TDA2030A Sound Amp Chip and components](image)

## Troubleshooting

### Static RAM Tilt Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| "Battery Fail" appears on display            | Failure of static RAM backup battery | 1. Replace the battery.  
2. Use the proper RAM Clear Chip to replace data lost due to the battery failure. |
| "Video Memory Heap Corrupt" on display      | Video memory error                   | Bad card or software error, change card.                                  |
| "Insufficient Video Memory"                  | Video memory is full.                | Verify you have 2M chip installed. If you do and symptom still exists, change board. |
| "Memory Cleared" appears on display. Top of candle flashes slowly. | You just cleared the static RAM.    | Press DIAGNOSTIC button.                                                  |
| One of these messages appears on display...  |                                      | Static RAM procedure:  
1. Clear the static RAM.  
2. Save gameplay, pricing and other location-programmed information to the central system (or write it down).  
3. Shut off power, remove CPU Board and replace battery today.  
4. Some symptoms repeat: Check backup battery voltage: Less than 3.6V? Replace battery and re-clear static RAM. More than 3.6V? Check or replace MAX791 chip (WMS part 5880-13649-00).  
5. Rerun startup tests.  
6. If error messages still appear, the static RAM may be bad. Try replacing it and retest machine. |
<p>| • &quot;CRC Corrupt&quot;                              | • OS data corrupt                    |                                                                          |
| • &quot;Heap Corrupt&quot;                             | • Corrupt heap mem. area             |                                                                          |
| • &quot;Heap Full&quot;                                | • Full heap mem area                 |                                                                          |
| • &quot;Deck Corrupt&quot;                             | • Bad deck of cards                  |                                                                          |
| • &quot;Recoverable Game Log Data Corruption&quot;     | • Game Log Data is corrupt. Game will soft RAM clear and erase game log. |                                                                          |
| • &quot;RAM Signature Corruption&quot;                 | • Critical RAM signature data is corrupt. Game must be RAM cleared. |                                                                          |
| • &quot;RAM Signature Corruption (Main and Aux)&quot;  | • Game Log Data is corrupt. Game will soft RAM clear and erase game log. |                                                                          |
| • &quot;Auxiliary RAM Signature Corruption&quot;       | • Aux copy of RAM signature data is corrupt. Game will attempt to restore from Main copy. |                                                                          |
| • &quot;Main Meter Corruption&quot;                    | • &quot;Main Meter data copy corrupt. Game will try to restore from Aux copy. |                                                                          |
| • &quot;Main Meter Corruption (Data Lost)&quot;        | • &quot;Critical Main Meter data is corrupt. Game must be RAM cleared. |                                                                          |
| • &quot;Unrecoverable Game Meter Corruption&quot;      | • &quot;Unrecoverable Game Meter Corruption&quot; |                                                                          |
| • &quot;Auxiliary Main Meter Corruption&quot;          | • Aux copy of Main Meter data is corrupt. Game will attempt to restore from Main copy. |                                                                          |
| • &quot;Jurisdictional Jumper Changed!&quot;           | • Jurisdictional Jumper has been changed; RAM clear the game. |                                                                          |
| • &quot;Illegal Denomination Set&quot;                 | • Game denomination is incorrect or invalid; RAM clear the game. |                                                                          |
| Top of candle flashes slowly.                |                                      |                                                                          |</p>
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Configuration Data Corruption (Main and Aux)&quot;</td>
<td>Critical configuration data is corrupt. Game will attempt to restore from backup in Soft RAM Clear.</td>
<td>See Solutions column on preceding table.</td>
</tr>
<tr>
<td>&quot;Configuration Data Corruption&quot;</td>
<td>Main copy of critical configuration data is corrupt. Game will attempt to restore from Aux copy.</td>
<td></td>
</tr>
<tr>
<td>&quot;Auxiliary Configuration Data Corruption&quot;</td>
<td>Aux copy of critical configuration data is corrupt. Game will attempt to restore from Main copy.</td>
<td></td>
</tr>
<tr>
<td>&quot;Operating System Data Corruption (Data Lost)&quot;</td>
<td>Critical system data is corrupt. Game must be RAM Cleared.</td>
<td></td>
</tr>
<tr>
<td>&quot;Operating System Data Corruption&quot;</td>
<td>Main copy of critical system data is corrupt. Game will attempt to restore from Aux copy.</td>
<td></td>
</tr>
<tr>
<td>&quot;Auxiliary Operating System Data Corruption&quot;</td>
<td>Aux copy of critical system data is corrupt. Game will attempt to restore from Main copy.</td>
<td></td>
</tr>
<tr>
<td>&quot;Card Deck Data Corruption (Data Lost)&quot;</td>
<td>Card deck data is corrupt. Game must be RAM Cleared.</td>
<td></td>
</tr>
<tr>
<td>&quot;Card Deck Data Corruption&quot;</td>
<td>Main copy of card deck data is corrupt. Game will attempt to restore from Aux copy.</td>
<td></td>
</tr>
<tr>
<td>&quot;Auxiliary Card Deck Data Corruption&quot;</td>
<td>Aux copy of card deck data is corrupt. Game will attempt to restore from Main copy.</td>
<td></td>
</tr>
<tr>
<td>&quot;Event Log Data Corruption (Data Lost)&quot;</td>
<td>Event log data is corrupt. Game will attempt to restore from Main copy.</td>
<td></td>
</tr>
<tr>
<td>&quot;Event Log Data Corruption&quot;</td>
<td>Main copy of event log data is corrupt. Game will attempt to restore from Aux copy.</td>
<td></td>
</tr>
<tr>
<td>&quot;Auxiliary Event Log Data Corruption&quot;</td>
<td>Aux copy of event log data is corrupt. Game will attempt to restore from Main copy.</td>
<td></td>
</tr>
<tr>
<td>&quot;Touchscreen to Confirm Soft RAM Clear&quot;</td>
<td>Game memory corrupted and soft RAM clear required.</td>
<td></td>
</tr>
<tr>
<td>&quot;Press Diag. Button to Exit Soft RAM Clear (Data Lost)&quot;</td>
<td>Soft RAM clear complete but data has been lost.</td>
<td></td>
</tr>
<tr>
<td>&quot;Press Diag. Button to Exit Soft RAM Clear (Data Restored)&quot;</td>
<td>Soft RAM clear complete, data restored from backup storage.</td>
<td></td>
</tr>
<tr>
<td>&quot;Keno Range Error&quot;</td>
<td>Keno specific game error (only occurs in Keno games)</td>
<td></td>
</tr>
<tr>
<td>&quot;Invalid Card Value&quot;</td>
<td>Illegal card drawn (occurs in games that use card class)</td>
<td></td>
</tr>
</tbody>
</table>

Top of candle flashes slowly.
# Troubleshooting

## Touch Screen Tilt Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| * Touching screen results in no response or erroneous behavior* | 1. Improperly adjusted blind mating connector  
2. Bad or loose Touch Screen interface cable  
3. Bad or loose monitor/Touch Screen cable  
4. Touch Screen is badly out of calibration  
5. Bad Touch Screen Board  
6. Bad Touch Screen  
7. Locked up Touch Screen (You removed and replaced monitor with power on)  
8. No power  
2. Loose interface cable: Reconnect it securely. Broken cable: Repair or replace it.  
3. Loose monitor cable: Reconnect it securely. Broken cable: Repair or replace it.  
4. Recalibrate Touch Screen: Press CHANGE button and simultaneously turn key switch.  
5. Replace Touch Screen Board.  
6. Replace monitor.  
7. Turn VGD off and on. Then recalibrate Touch Screen.  
8. Check for proper voltages on Touch Screen Board at P2:  
   1=+5V, 2=gnd, 3=–12V, 4=+12V  
   Voltages are absent: Replace power cable. Voltages are present: Replace Touch Screen Board.  
9. Replace I/O Board. |
| * "No Touch Screen Response" appears on monitor screen* | **Touch Screen Communications Fault** appears on monitor screen | **Touch Screen Communications Fault** appears on monitor screen |
| Touch Screen won't calibrate or stays in calibration | 1. Improperly adjusted blind mating connector  
2. Bad or loose Touch Screen interface cable  
3. Bad or loose monitor/Touch Screen cable  
4. Bad Touch Screen Board  
5. Bad Touch Screen Board  
2. Loose interface cable: Reconnect it securely. Broken cable: Repair or replace it.  
3. Loose monitor cable: Reconnect it securely. Broken cable: Repair or replace it.  
4. Replace Touch Screen Board.  
5. Replace I/O Board. |

## Touch Screen Fail? Use Player Panel Buttons

If the touch screen malfunctions, you can use two buttons to perform touch screen functions.

- **PLAY** (or **DEAL/DRAW**) moves the cursor downward. After the cursor reaches the screen's bottom edge, the cursor wraps around.

- **CHANGE** (or **BET ONE**) moves the cursor horizontally, toward your right. After the cursor reaches the right edge of the screen, the cursor wraps around.

**To make a selection...**

- 1. Turn the Attendant Key switch to enter Administration Mode.
- 2. Use **PLAY** and **CHANGE** (**DEAL/DRAW** and **BET ONE**) to move the cursor. Set the cursor atop the screen button that you want to select.
- 3. Simultaneously press both buttons to enter your selection.
## Top Box Monopoly Board Communication Tilt Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;NO TOP BOX RESPONSE!!&quot;</td>
<td>Topbox not detected.</td>
<td>Check connection and reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX System Version Error&quot;</td>
<td>Game requires a different OS (XU3) version in the topbox.</td>
<td>Check version and reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX XU10 Checksum Error&quot;</td>
<td>Incorrect version (XU10).</td>
<td>Check version and reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX XU3 Checksum Error&quot;</td>
<td>Incorrect version (XU3).</td>
<td>Check version and reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX XU4 Checksum Error&quot;</td>
<td>Incorrect version (XU4).</td>
<td>Check version and reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX HEAP CORRUPT&quot;</td>
<td>Memory is corrupt.</td>
<td>Reset the machine, if tilt continues, replace the topbox CPU board.</td>
</tr>
<tr>
<td>&quot;TOP BOX OUT OF MEMORY&quot;</td>
<td>Memory is corrupt.</td>
<td>Reset the machine, if tilt continues, replace the topbox CPU board.</td>
</tr>
<tr>
<td>&quot;TOP BOX BAD PACKET&quot;</td>
<td>Noise in communication.</td>
<td>Check cables and reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX DEBUG ERROR&quot;</td>
<td>Internal topbox error.</td>
<td>Reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX BAD PACKET TYPE&quot;</td>
<td>Incorrect game version or polling issue.</td>
<td>Check version and reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX BAD DIE SPECIFIED&quot;</td>
<td>Dice not detected.</td>
<td>Check connections and reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX BAD LAMP INFO&quot;</td>
<td>Incorrect lamp configuration.</td>
<td>Check version and reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX BUFFER OVERFLOW&quot;</td>
<td>Internal VLT communication error.</td>
<td>Reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX DIE MECH FAILURE&quot;</td>
<td>Dice not detected.</td>
<td>Check connections and reset.</td>
</tr>
<tr>
<td>&quot;TOP BOX DIE STOP OUT OF RANGE&quot;</td>
<td>Internal VLT communication error or software compatibility issue.</td>
<td>Check topbox and game versions and reset.</td>
</tr>
</tbody>
</table>
# Troubleshooting

## Top Box LCD Communication Tilt Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD-box System Version Error</td>
<td>Game requires a different LCD OS (XU3) version in the topbox.</td>
<td>Check versions and reset.</td>
</tr>
<tr>
<td>LCD-box Image Version Error</td>
<td>Art ROMs (XU2, 4, 5) in topbox do not correspond to the bottom game.</td>
<td>Check versions and reset.</td>
</tr>
<tr>
<td>LCD-box Communication failed</td>
<td>Communication is failing.</td>
<td>Check versions and reset.</td>
</tr>
<tr>
<td>LCD-box CRC corrupt</td>
<td>Noise in communication.</td>
<td>Reset the machine, if tilt continues, replace the topbox CPU board.</td>
</tr>
<tr>
<td>LCD-box heap corrupt</td>
<td>Video memory is corrupt.</td>
<td>Reset the machine, if tilt continues, replace the topbox CPU board.</td>
</tr>
<tr>
<td>LCD-box heap full</td>
<td>Full 'heap' memory area.</td>
<td></td>
</tr>
<tr>
<td>LCD-box insufficient video-memory</td>
<td>Art ROMs (XU2, 4, 5) in topbox do not correspond to the bottom game.</td>
<td>Check versions and reset.</td>
</tr>
<tr>
<td>LCD-box VRAM Image too Big</td>
<td>Art ROMs (XU2, 4, 5) in topbox do not correspond to the bottom game.</td>
<td>Check versions and reset.</td>
</tr>
<tr>
<td>LCD-box VRAM Image not Loaded</td>
<td>Art ROMs (XU2, 4, 5) in topbox do not correspond to the bottom game.</td>
<td>Check versions and reset.</td>
</tr>
<tr>
<td>LCD-box Video Memory Heap Corruption</td>
<td>Video memory is corrupt.</td>
<td>Reset the machine, if tilt continues, replace the topbox CPU board.</td>
</tr>
<tr>
<td>LCD-box ROM Checksum Error</td>
<td>ROMs are corrupt.</td>
<td>Replace these ROMs.</td>
</tr>
<tr>
<td>LCD-box Image ROM and OS mismatch</td>
<td>Art ROMs (XU2, 4, 5) in topbox do not correspond to the bottom game.</td>
<td>Check versions and reset.</td>
</tr>
<tr>
<td>LCD-box Image ROM misplaced</td>
<td>One of the art ROMs (XU2, 4, 5) is placed in the wrong socket.</td>
<td>Check these ROMs and reset.</td>
</tr>
<tr>
<td>LCD-box received unknown packet-type</td>
<td>Art ROMs (XU2, 4, 5) in topbox do not correspond to the bottom game.</td>
<td>Check versions and reset.</td>
</tr>
<tr>
<td>LCD-box received corrupt packet</td>
<td>Noise in communication.</td>
<td>Check cables and reset.</td>
</tr>
<tr>
<td>LCD-box received unknown packet command</td>
<td>Game OS version not compatible with LCD OS version.</td>
<td>Check versions and reset.</td>
</tr>
<tr>
<td>LCD-box internal buffer overflow</td>
<td>Art ROMs (XU2, 4, 5) in topbox do not correspond to the bottom game.</td>
<td>Check versions and reset.</td>
</tr>
</tbody>
</table>

**NOTICE**

Reset by applying power cycle and/or performing a Hard RAM Clear
Chapter 1. Parts, Electronic

• Boards, Circuit
  Board, 17-in., Three-PCB Backplane ............................................. A-000632-01
  Board, Button Diode ........................................................................ A-001815-00
  Board, CPU and Video Daughter Card ................................................... A-000051-31
  (includes both CPU Board A-17677-03 and Video Card A-16402-33)
  Board, CPU 1.5 ................................................................................ A-17677-03
  Board, CPU 1.5 Plus .......................................................................... A-004275-03
  Board, CPU 1.5 Plus, no EE ................................................................. A-004275-04
  Board, Dotmation Plus Control .............................................................. A-003875-02**
  Board, EPROM Extender ....................................................................... A-003498-01
  Board, Hex Opto (coin-in optics w/cables) .............................................. A-18097-01
  Board, Hopper Control ........................................................................ A-17118-02
  Board, I/O ......................................................................................... A-18886-01
  Board, Meter Driver ............................................................................. A-002464-00
  Board, RS232 to Current Loop, WBA BFD ............................................. A-004307-02*
  Board, RS485 Serial Communications .................................................. A-17669-01
  Board, Video Daughter Card (2-Meg VGA) ........................................... A-18402-33

• Cables
  Cable, AC Extension, Top Box ............................................................... H-002340-01
  Cable, AC Extension, Belly Lamp ......................................................... H-002343-00
  Cable, Belly, Interface ......................................................................... 5797-000993-00
  Cable, Bill Validator/PDU/Backplane .................................................... H-005564-00
  Cable, Bridge Rectifier Assembly ......................................................... A-000881-00
  Cable, CC-16 and IDX Coin Comparators ............................................. 5797-14014-00
  Cable, CBS Interface ............................................................................ 5797-001800-00
  Cable, Coin Comparator, Condor .......................................................... 5797-004090-00
  Cable, Coin Validator/Chute ................................................................. H-003523-00
  Cable, Coin Validator/Chute, Multi-Channel ......................................... H-003590-00
  Cable, Comm Intfc, Dual Host ............................................................... H-005746-01
  Cable, DC Power, PDU/Backplane ....................................................... H-17965-00
  Cable, Door and Lock Switch ............................................................... H-002335-00
  Cable, Door Switch Extension ............................................................... H-004730-00
  Cable, EDT, Interface .......................................................................... H-003596-00
  Cable, Fiber Optic Board ...................................................................... 5797-13315-00
  Cable, Hopper, Male BMI .................................................................... H-18096-00
  Cable, Hopper Full Sense ..................................................................... H-18095-00

 NOTICE
 Electronic component parts are contained in schematic manual A-005101 (System 1.5 Drawing Set).

 NOTICE
 *If your game's bill validator has a JCM RS232 board, the replacement is WMS RS232 board A-004307-02.
 This board requires mounting bracket 01-005308.

 NOTICE
 **Used Only For Monopoly Top Box.

 NOTICE
 Indented parts make up the parts that are above, and closer to the left margin.
 For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

 Parts Example
 Item A
   Item B
     Item C

Video Card Cage Components
**Electronic Parts**

**NOTICE**

Indented parts make up the parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

**Example Parts**
- Item A
  - Item B
  - Item C

**NOTICE**

Electronic component parts are contained in schematic manual A-005101 (System 1.5 Drawing Set).

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- **Cables, continued**

  Cable, Hopper Interface Power ...........................................H-002341-00
  Cable, JCM WBA BV BM Adapter (10/11/20/21 Only)..................5797-002337-00
  Cable, JCM WBA BV Interface ..........................................H-002333-00
  Cable, Lamp, 18-Inch Fluorescent, 16" Topbox .....................H-002339-00
  Cable, Lamp, 18-Inch Fluorescent Belly ................................H-002338-00
  Cable, Meter Interface .................................................H-002334-00
  Cable, Monitor, 17", PDU/CPU/Backplane .............................5797-002475-00
  Cable, PDU, AC Distribution Univ. ....................................H-19408-01
  Cable, PDU, DC Power Univ. ............................................H-19409-01
  Cable, PDU, IEC (Earth Ground) .......................................5797-14243-00
  Cable, PDU, Power Supply/AC Outlet ...................................H-19407-01
  Cable, PDU, Service Outlet Assy (Nor. Amer.-110V)...............H-19452-00
  Cable, Player Panel, 2-Button ........................................H-003130-00
  Cable, Player Panel, 3-Button ........................................H-003131-00
  Cable, Player Panel, 5-Button (Shielded) ............................H-003320-01
  Cable, Player Panel, 10-Button .......................................H-003522-01
  Cable, Player Panel, 12-Button .......................................H-003433-01
  Cable, Printer (Dot Matrix Only), Serial, Ithaca .................5797-002474-00
  Cable, Speaker, Audio ..................................................H-19429-01
  Cable, Thermal Printer, Comm Power (Ithaca Only) ...............5797-005718-01
  Cable, Topbox Tower Lamp ..............................................H-002342-01
  Cable, Umbilical Service, 24P 1:1, Monitor ........................H-003445-00
  Cable, Umbilical Service, Hopper ....................................5797-13694-00
  Cord, Line 110V (North America) ....................................5650-13344-00
  Cord, Line, 250V (North America) ..................................5650-000992-00
  Cord, Line, 250V (Continental Europe) .............................5650-13272-00
  Cord, Line, 250V (British) ..........................................5650-13273-00
  Jumper, 1/2" Ground Braid, 8" Long ..................................5797-002377-00
  Toroid, Line Cord, 2.4 Dia. (Used with line cord) ............5556-005782-00

- **Monitor**

  PController, t/s mt autobaudESD w/cse ................................5901-004956-01
  Monitor, Kristel, 6-Cntrls, Complete with 17" Tch Scrn ..........A-003910-01
  Monitor, Wells, 6-Cntrls, Complete with 17" Tch Scrn ..........A-003910-02
  Monitor, Kristel, 6-Cntrls, w/Taped Tch Scrn .....................A-003910-04
  Monitor, Wells, 6-Cntrls, w/Taped Tch Scrn ......................A-003910-05
  Monitor, Tatung, 6-Cntrls, w/Taped Tch Scrn ....................A-003910-07

- **Parts-General, Replacement Electronic (All Boards)**

  **BAG, SPARE PARTS**

  Bag, Spare Parts ..........................................................A-19460
  Bulb, #86, 6.3V/0.2A (inside player panel btns) .................24-8829
  Bulb, #555, 6.3V/250mA (display) ....................................24-6768
  Bulb, #1888, 7V/500mA bayonet (candle) .....................24-8832
  Fuse, 4ASB, 250V ......................................................5731-06314-00
**Top Box, Monopoly**

- Ballast, Universal Input, 15W: 5610-004995-00
- Board, Dotmation Plus: A-003875-02
- Bulb, Fluorescent 15W, 18: 24-8809
- Cable, DC power Dot Plus T/B: H-003966-00
- Fan Assy, 115Vac 50/60Hz: A-004154
- Fan Assy, 230Vac 50/60Hz: A-004592
- Fan Assy, 24Vdc: A-004134
- Fuse, SB 2A 250V: 5731-08665-00
- Fuse, SB 4A 250V: 5731-06314-00
- Power Supply, 24V, 225W: 20-004115
- Rope, 24V 1/2 dia x 72: 24-004127

**Top Box, LCD Style**

- Ballast, Universal Input, 15W: 5610-004995-00
- Board, CPU 1.5 Plus: A-004275-03
- Bulb, Fluorescent 15W 18: 24-8809
- Fan Assy, 12V dc, 60x60x20: A-005185-00
- Fan Assy, 115V 50/60Hz: A-004154
- Lamp, Compact Fluorescent 9W, PLS 3500: 24-002490-00
- Monitor, LCD 15 Flat Panel: 5901-004993-00
- Power Supply, 110W, Triple Output: 20-9965
- Socket, Fluorescent Lamp: 20-9848
- Socket, Lamp, PLS Style Bulb: 20-001677

**Unit, Power Distribution (PDU)**

- Board, +5/+18VDC, Linear Power Supply: A-18938-03
- Fuse, Triple Output PS, 5 x 20mm 4A FB 250V: 5730-005825-00
- Supply, 110W, +5/+12VDC, Triple Output Pwr: 20-9965
- Supply, Monopoly Top Box power: 20-004115**

**NOTICE**
Electronic component parts are contained in schematic manual A-005101 (System 1.5 Drawing Set).

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**NOTICE**
**Used Only For Monopoly Top Box.**
**Electronic Parts**

**NOTICE**
Electronic component parts are contained in schematic manual A-005101 (System 1.5 Drawing Set).

- **Top Box, LCD Style, continued**

  **PDU, EXCLUSIVE PARTS FOR NORTH AMERICAN, 110 VAC**
  PDU, 110V, NA, 16 pin .................................................. A-002912-04
  Fuse, 4A, 250V ............................................................... 5731-06314-00
  Housing, PDU Sw/fuse/rcpt ........................................... 01-003088-01
  Cabie, Service Outlet .................................................. H-19452-00
  Label, PDU 4A fuse ....................................................... 16-000070-02
  Label, PDU non-sw Rcpt ................................................. 16-000070-04
  Receptacle, Single Outlet ............................................ 5851-13203-00

  **PDU, EXCLUSIVE PARTS FOR EUROPEAN (HUXLEY), 222 VAC**
  PDU, 222V, 50 Hz, 16 pin ............................................... A-002912-05
  Fuse, 5 x 20mm-2A slow blow ...................................... 5735-13853-00
  Housing, PDU Sw/fuse/rcpt, blank ................................ 01-003088-07
  Knob, Panel-Type Fuse Holder, 5 x 20mm, ...................... 5733-12869-01
  Label, PDU 2A fuse .................................................... 16-000070-01

  **PDU, EXCLUSIVE PARTS FOR NA OR EUROPEAN, 222 VAC**
  PDU, Europe or N. Amer., 50/60 Hz, 16 pin ...................... A-002912-06
  Fuse, 2A, 250V ............................................................. 5731-06665-00
  Housing, PDU Sw/fuse/rcpt, blank ................................ 01-003088-07
  Label, PDU 2A fuse .................................................... 16-000070-01
## Printed Circuit Board

<table>
<thead>
<tr>
<th>Printed Circuit Board</th>
<th>Bar Top Video</th>
<th>Upright 17&quot; Video</th>
<th>Upright 19&quot; Video</th>
<th>Slant Top 19&quot; Video</th>
<th>Slant Top Slot</th>
<th>Upright Slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backplane PCB, A-003622-00</td>
<td>✓</td>
<td>✓</td>
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<td>Backplane PCB, A-000632-01</td>
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<td>Backplane PCB, A-18905-03</td>
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<tr>
<td>Backplane PCB, A-17937-03</td>
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<tr>
<td>CPU 1.5 PCB with 2MB Video Card, A-000051-31; includes...</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>•CPU PCB, Sys 1.5, A-17677-03</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>•Daughter Card, 2MB Video, A-18402-33</td>
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<td>✓</td>
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<tr>
<td>CPU PCB, Sys 1.5 Plus, A-004275-04</td>
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<td>Hopper Control PCB, A-17118-02</td>
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<td>I/O PCB, A-18886-01</td>
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<td>I/O PCB, A-17686-03</td>
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<td>Lamp PCB, BV, A-19861-01</td>
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<td>Lamp PCB, BV, A-18088-01</td>
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<td>Lamp PCB, Payline, A-18087-00</td>
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<td>Meter Driver PCB, A-17951-01</td>
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<td>Opto PCB, Hex, A-18097-01</td>
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### NOTICE

Many models of GDs employ some CPU and I/O Boards. However, socketed EPROMS and PLDs on those boards are model or jurisdiction specific. You must install the appropriate EPROMS and PLDs before you can swap boards between models.

### NOTICE

Canadian upright slots require a special bill validator general illumination cable, part number H-002132.
Chapter 2. Parts, Mechanical

- Cabinet
  Cabinet-17" Upright, w/Wood Base ............................................ A-005097-ZZZ

BILL VALIDATOR
  WBA, Hsg, Assy w/Switches .......................................................... A-002981

PARTS, OTHER CABINET
  Plate, No Coin, Cover, Bill Only .................................................. 01-003294-ZZZ
  Plate, No Bill, Cover, Coin Only .................................................. 01-003293-ZZZ
  Plate, No Top Box (Various Colors) ............................................... 01-003373-ZZZ
  Sleeve, 3/8-Inch Slit Hose ............................................................. RM-27-03*
  Wood, Cabinet Bottom ...................................................................... 11-003535

- Cage, Card
  Clamp, Richco Wslt 1/4" x 1/2" ......................................................... 03-002136

- Documents, Instruction

LABEL
  Label, PDU 2A Fuse ........................................................................ 16-000070-01
  Label, PDU 4A Fuse ........................................................................ 16-000070-02
  Label, PDU Non-Switched Receptacle ............................................... 16-000070-04
  Label, PDU Switched Receptacle ..................................................... 16-000070-03
  Label, Meter, Nomenclature (Variable) ........................................... 16-003317-03
  Label, Grounding ........................................................................... 16-002750
  Label, On/Off Switch ...................................................................... 16-002749
  Label, PDU Caution, Eng/Fr/Ger ....................................................... 16-000070-05
  Label, "Caution" Verify 115/230V .................................................... 16-002040-00
  Label, Battery Disclaimer ............................................................... 16-002747
  Label, Diagnostic Switch .................................................................. 16-002557
  Label, Voltage Selection .................................................................. 16-002748

MANUAL, GAMING SAFETY
  Manual, Gaming Safety .................................................................. 16-001796-01

MANUAL, VGD HANDBOOK
  Manual, VGD, Pocket-Size Instruction ............................................. 16-003492

MANUAL, CPU SYSTEM 1.5 VIDEO SCHEMATIC DRAWING
  Manual, System 1.5 Video Schematic Dwg ........................................ A-005101

MANUAL, MODEL 55X 17" VIDEO SERVICE
  Manual, Model 55X Video Service .................................................... A-005044

NOTICE
  Indented parts make up parts that are above, and closer to the left margin.

  For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

Example Parts
  Item A
  Item B
  Item C

NOTICE
  To order parts with a "ZZ" or "ZZZ" part number suffix, specify part number and color.

NOTICE
  * Order these parts by length.
NOTICE

Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

Example Parts

Item A
  Item B
  Item C

NOTICE

To order parts with a "ZZ" or "ZZZ" part number suffix, specify part number and color.

• Hopper

Bowl Kit, 2 Tier, Plastic ...........................................20-004480
Bowl Kit, Small Bowl ..............................................A-005722

BOWL, ASAHI SEIKO USA® DH750, MODEL 54 SPARE PARTS

Dwg Ref  Asahi Seiko #  WMS Gaming #
Collet, Mcl $1 Spcr, Bowl ..........32 .......DH7001M107081 ..........20-001064-52
Insulator, Nylon, Inner Bowl ...8 ......DH7011M025152 ..........20-001064-54
Nut, Shoulder m5 ..........1 ........N5000SN99 ..........20-001064-47
Pin, Outer Bowl Probe ..........9 ......DH7011M025153 ..........20-001064-44
Screw, Bowl ..................13 .......DH7011M025047 ..........20-001064-49
Spring, Lower Bowl Screw ......15 ......DH7011M025049 ..........20-001064-51
Spring, Upper Bowl Screw ......14 ......DH7011M025048 ..........20-001064-50
Terminal, Bowl Probe ..........5 ......DH7011M025093 ..........20-001064-45
Washer, Flat 4X15X1.0 ..........25 ......W4015FW10 ..........20-001064-25
Washer, Nylon Out ...........2 ..........01M025150 ..........20-001064-55

HOPPER, ASAHI SEIKO USA® DH750, MODEL 54 SPARE PARTS

Dwg Ref  Asahi Seiko #  WMS Gaming #
Armature with Stop ............58 ......DH7001M025082 ..........20-01064-37
Base, Snap-In Wire Tie ..........2-10008
Bearing with Retainer ..........43 ......DH7001M025402 ..........20-001064-27
Bolt, M4 x 25SS ...............32 ......B4025HX55 ..........20-001064-68
Boss, Plastic ..................29 ......DH7001M025026 ..........20-001064-12

Asahi Seiko®
Model 54
Bowl Parts
## Hopper, continued

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<tr>
<th>Item</th>
<th>Description</th>
<th>Part Number</th>
<th>Suffix</th>
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<tr>
<td>Bowl</td>
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<td>Bracket, Motor</td>
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<td>Bearing, Roller Lever</td>
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<td>Bolt, M4 x 12</td>
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<td>21</td>
<td>B4012HX99</td>
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<td>Cover, Coin (5c/25c)</td>
<td>29</td>
<td>DH7001M025029</td>
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<td>Cover, Coin ($1 Token)</td>
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<td>Cover, 5c &amp; $1 Rbr Jump</td>
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<td>Disk, 50c Token</td>
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<td>Disk, $1 Token</td>
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<td>Disk, $1 Ontario Token</td>
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<td>Knife, 25c</td>
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<td>Lever, Pin Roller</td>
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<td>Lever, Roller, Steel</td>
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<td>Lever, Spring Roller</td>
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<td>Retainer, Separator $.50</td>
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<td>Ring, E</td>
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<td>W3000RSS</td>
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<td>S3004RHSW</td>
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<td>Screw, M4 x 8, IRG, Hard</td>
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<td>Separator, Rubber Coin</td>
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### NOTICE

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For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

#### Example Parts

- **Item A**
  - **Item B**
  - **Item C**

### NOTICE

To order parts with a "ZZ" or "ZZZZ" part number suffix, specify part number and color.
**Mechanical Parts**

**NOTICE**
The knife (25) should be adjusted to a distance of 0.2mm from the "pinwheel" (33), as measured by a feeler gauge.

**NOTICE**
Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

**Example Parts**
Item A
  Item B
  Item C

**NOTICE**
COMMON VS. SPECIFIC PARTS.
Major items in this section include "common parts" and "denomination-specific parts." All coin mechanisms in this section employ the same common parts. But each coin mechanism requires different denomination-specific parts.

**Hopper, continued**

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<th>Dwg Ref</th>
<th>Asahi Seiko #</th>
<th>WMS Gaming #</th>
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<td>Spring, Brake..................................................60...DH7001M025084...20-001064-28</td>
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<td>Spring, Cover Holder......................................36...DH7001M025036...20-001064-23</td>
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<td>Spring, Cover Mounting...............................35...DH7001M025035...20-001064-22</td>
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<td>Standoff, PCE 3/16............................................20-9658-03</td>
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<td>Stop, Brake.....................................................61...DH7001M025082...20-001064-46</td>
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<td>Washer, M4 x 15 x 1.0........................................38...W4015FW10...20-001064-25</td>
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<td>Washer, Holler Lever........................................45...DH7001M025040...20-001064-28</td>
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<td>Washer, M4 Spring............................................5...W40005SW09...20-001064-77</td>
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**HOPPER, COMPLETE P & P, 17"**

- 5c Coin....................................................A-004398-01
- 25c Coin...................................................A-004398-02
- 50c Coin...................................................A-004398-03
- $1 Token....................................................A-004398-04
- $50c Token................................................A-004398-05
- $1 Canadian...............................................A-004398-06
- 1 Rand Token.............................................A-004398-07
- 500L 5LL..................................................A-004398-08
- Empyrual....................................................A-004398-09
- 50c Windsor Coin........................................A-004398-10
- $1 Windsor Coin........................................A-004398-11
- 1 Rand Coin...............................................A-004398-12
- Sigma Token...............................................A-004398-13
- $2 Windsor Coin.......................................A-004398-14
- 5c Canadian..............................................A-004398-15
- 25c Canadian............................................A-004398-16
- $2 Ontario IDX........................................A-004398-17
- 500 Lira..................................................A-004398-18

**Kits**

**COMPLETE 10-BUTTON PLAYER PANEL KIT**

Kit, 10-Button Complete Player Panel 17U...........................A-003518-01-ZZZZ

- Link, Belly Door Loc 55C...................................01-002543
- Bracket, Belly Door Loc Rel 55C..............................01-002682
- Bar, Belly Door Loc 55C....................................01-003210
- Panel, 10-Button CN/BV 55C................................01-003262-10ZZZ
- Cam, Flt 1.13 Dual Mtg....................................01-12793-01
- Pin, Belly Door Loc Actr 55C................................02-002544
- Clamp, Cable 1/2"......................................03-7655-8
- Spring, .028 x .25 x 1.37-26.5..........................10-002555
Asahi Seiko
Model 54
Hopper Parts

See Model 54
Bowl Parts Drawing

The knife (25) should be adjusted to a distance of 0.2mm from the "pinwheel" (33), as measured by a feeler gauge.
**Mechanical Parts**

**NOTICE**

A-003518-02-ZZZ (not shown) is only used with 5 payline, 25 coin games.
A-003518-03-ZZZ is only used with themes V012 and V023.
A-003518-04-ZZZ (not shown) is only used with 40 coin Rhode Island games.
A-003518-05-ZZZ (not shown) is only used for Pick 5 Poker.

**NOTICE**

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For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C does not include any other parts. Order Item A to obtain Items B and C.

**Example Parts**

Item A

Item B

Item C

**Lamp, Top Box, Fluorescent**

**LAMP, TOPBOX, 5" ASSEMBLY**

Lamp, U/M EA 5" T/B 55C........A-003101

Ballast, 15W 120V 50/60 Hz........5610-14210-00

Bracket, Lamp 5" T/B 55C........01-003838

Bulb, Fluorescent 15W, 18"........24-8809

Socket, Fluorescent Lamp........20-9848

Socket, Starter..................20-9849

Starter, 4-22W w/Condenser...........20-002780

**LAMP, TOPBOX, 9" & 16" ASSEMBLY**

Lamp, U/M EA 9" T/B & 16" T/B, 55C........A-002591

Ballast, 15W 120V 50/60 Hz........5610-14210-00

Bracket, Lamp Mtg 9"&16" T/B, 55C..........01-004043

Bulb, Fluorescent 15W, 18"........24-8809

Socket, Fluorescent Lamp........20-9848

Socket, Starter..................20-9849

Starter, 4-22W w/Condenser...........20-002780

**Lamp, TOPBOX, 16" ROUND TOP**

Lamp, 16" Round Top T/B 55C........A-003690

Ballast, 15W 120V 50/60 Hz........5610-14210-00

Bracket, Lamp 16" Rnd T/B 55C........01-003646

Bulb, Fluorescent 15W, 18"........24-8809

Socket, Fluorescent Lamp........20-9848

Socket, Starter..................20-9849

Starter, 4-22W w/Condenser...........20-002780

**Kits, continued**

**COMPLETE 12-BUTTON PLAYER PANEL KIT**

Kit, 12-Button Complete Player Panel 17U........A-003518-03-ZZZ

Link, Belly Door Loc 55C........01-002543

Bracket, Belly Door Loc Rel 55C........01-002882

Bar, Belly Door Loc 55C........01-003210

Panel, 12-Button CN/BV 55C........01-003262-10ZZZ

Cam, Flt 1.13 Dual Mtg........01-12793-01

Pin, Belly Door Loc Acr 55C........02-002544

Clamp, Cable 1/2"........3-7655-8

Spring, .028 x .25 x 1.37-26.5........10-002555

**COIN CONVERSION KIT ($0.05)**

Kit, $.05 Conversion 17U........A-002996-01

Tce, Back, 50C, $.05........21-002576-01ZZZ

Plate, Tce Alignment 50C, $.05........01-002738-01

Insert, $.05 Denomination........31-003298-01

Kit, Asahi Seiko $.05 Conv........A-000700

**COIN CONVERSION KIT ($0.10)**

Kit, $.10 Token Conversion 17U........A-002996-02

Tce, Back, 50C, 500 LL........21-002576-13ZZZ

Plate, Tce Alignment 50C, 500LL........01-002738-11

Insert, $.10 Denomination........31-003298-08

Kit, Asahi Seiko $.10 Tkn Conv........A-004284

**NOTICE**

P&P stands for “plug and play.”

**NOTICE**

To order parts with a “ZZ” or “ZZZ” part number suffix, specify part number and color.
Lamp, Tower (Candle)

BULB
Bulb, #1888, 7V/500mA (Bayonet) ........................................... 24-8832

FILTER, BRASS-FINISH, TWO-TIER, SHORT
Filter, Tower Lamp, Blue and White, Short, Brass .................. 20-000846-11
Filter, Tower Lamp, Blue and Yellow, Short, Brass ............... 20-000846-26
Filter, Tower Lamp, Green and White, Short, Brass ............. 20-000846-14
Filter, Tower Lamp, Orange and White, Short, Brass ............ 20-000846-15
Filter, Tower Lamp, Red and White, Short, Brass ............... 20-000846-12
Filter, Tower Lamp, Red and Yellow, Short, Brass ............... 20-000846-22
Filter, Tower Lamp, White and Blue, Short, Brass ............... 20-000846-16
Filter, Tower Lamp, White and Green, Short, Brass .............. 20-000846-19
Filter, Tower Lamp, White and Orange, Short, Brass ............. 20-000846-10
Filter, Tower Lamp, White and Red, Short, Brass ................. 20-000846-17
Filter, Tower Lamp, White and Yellow, Short, Brass .............. 20-000846-18
Filter, Tower Lamp, Yellow and Red, Short, Brass ............... 20-000846-21
Filter, Tower Lamp, Yellow and White, Short, Brass ............. 20-000846-13

FILTER, BRASS-FINISH, TWO-TIER, TALL
Filter, Tower Lamp, Blue and White, Tall, Brass ................. 20-10057-11
Filter, Tower Lamp, Blue and Yellow, Tall, Brass ............... 20-10057-26
Filter, Tower Lamp, Green and White, Tall, Brass ............... 20-10057-14
Filter, Tower Lamp, Orange and White, Tall, Brass .......... .... 20-10057-15
Filter, Tower Lamp, Red and White, Tall, Brass ................. 20-10057-12
Filter, Tower Lamp, Red and Yellow, Tall, Brass ................. 20-10057-22
Filter, Tower Lamp, White and Blue, Tall, Brass ................. 20-10057-16
Filter, Tower Lamp, White and Green, Tall, Brass ............... 20-10057-19
Filter, Tower Lamp, White and Orange, Tall, Brass .............. 20-10057-10
Filter, Tower Lamp, White and Red, Tall, Brass ................. 20-10057-17
Filter, Tower Lamp, White and Yellow, Tall, Brass .............. 20-10057-18
Filter, Tower Lamp, Yellow and Red, Tall, Brass ................. 20-10057-21
Filter, Tower Lamp, Yellow and White, Tall, Brass .............. 20-10057-13

FILTER, CHROME-FINISH, TWO-TIER, SHORT
Filter, Tower Lamp, Blue and White, Short, Chrome .............. 20-000846-01
Filter, Tower Lamp, Blue and Yellow, Short, Chrome .......... .... 20-000846-25
Filter, Tower Lamp, Green and White, Short, Chrome ............ 20-000846-04
Filter, Tower Lamp, Orange and White, Short, Chrome ......... 20-000846-05
Filter, Tower Lamp, Red and White, Short, Chrome .............. 20-000846-02
Filter, Tower Lamp, Red and Yellow, Short, Chrome ............. 20-000846-24
Filter, Tower Lamp, White and Blue, Short, Chrome ............. 20-000846-06
Filter, Tower Lamp, White and Green, Short, Chrome .......... .... 20-000846-09
Filter, Tower Lamp, White and Orange, Short, Chrome ............ 20-000846-10
Filter, Tower Lamp, White and Red, Short, Chrome ............... 20-000846-07
Filter, Tower Lamp, White and Yellow, Short, Chrome .......... .... 20-000846-08
Filter, Tower Lamp, Yellow and Red, Short, Chrome .............. 20-000846-23
Filter, Tower Lamp, Yellow and White, Short, Chrome .......... .... 20-000846-03

FILTER, CHROME-FINISH, TWO-TIER, TALL
Filter, Tower Lamp, Blue and White, Tall, Chrome ............... 20-10057-01
Filter, Tower Lamp, Blue and Yellow, Tall, Chrome .............. 20-10057-25
Filter, Tower Lamp, Green and White, Tall, Chrome .............. 20-10057-04
Filter, Tower Lamp, Orange and White, Tall, Chrome .......... .... 20-10057-05

NOTICE
Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below. Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

Example Parts
Item A
  Item B
  Item C

NOTICE
To order parts with a "ZZ" or "ZZZ" part number suffix, specify part number and color.
NOTICE
Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

Example Parts
Item A
  Item B
  Item C

NOTICE
COMMON VS. SPECIFIC PARTS. Major items in this section include "common parts" and "coin-specific parts." All hoppers in this section employ the same common parts. But each hopper requires different coin-specific parts.

NOTICE
To order parts with a "ZZ" or "ZZZ" part number suffix, specify part number and color.

• Lamp, Tower (Candle), continued
  Filler, Tower Lamp, Red and White, Tall, Chrome ..........20-10057-02
  Filler, Tower Lamp, Red and Yellow, Tall, Chrome.........20-10057-24
  Filler, Tower Lamp, White and Blue, Tall, Chrome........20-10057-06
  Filler, Tower Lamp, White and Green, Tall, Chrome......20-10057-09
  Filler, Tower Lamp, White and Orange, Tall, Chrome.....20-10057-10
  Filler, Tower Lamp, White and Red, Tall, Chrome........20-10057-07
  Filler, Tower Lamp, White and Yellow, Tall, Chrome.....20-10057-06
  Filler, Tower Lamp, Yellow and Red, Tall, Chrome......20-10057-23
  Filler, Tower Lamp, Yellow and White, Tall, Chrome.....20-10057-03

TOWER, TWO TIER
  Lamp, Tall Clear and Clr, Brass Tower, Two-Tier ..........20-005220-10
  Lamp, Tall Clear and Clr, Chrome Tower, Two-Tier .......20-005220-20
  Lamp, Short Clr and Clr, Brass Twr, Two-Tier ..........20-005219-10
  Lamp, Short Clr and Clr, Chrome Twr, Two-Tier .........20-005219-20

TOWER, FOUR TIER
  Twr Lt, 4 Tier Wh/Yl/Gn/Yl/Yl ................................20-003943-01
  Twr Lt, 4 Tier Wh/Gn/Yl/Yl/Bl ................................20-003943-02
  Twr Lt, 4 Tier Wh/Gn/Yl/Yl/Bl ................................20-003943-03
  Twr Lt, 4 Tier Wh/Gn/Yl/Yl/Bl ................................20-003943-04
  Twr Lt, 4 Shrt Wh/Yl/Gn/Yl/Yl ................................20-004145-01
  Twr Lt, 4 Shrt Wh/Yl/Gn/Yl/Yl ................................20-004145-02

• Locks and Cams
  Cam, Flat, 1.13-Inch (28.7mm), Dual Mtg (Bill Access Door, Bill Door, Card Cage, Chassis, Hopper, Printer) .....01-12793-01
  Cam, WBA Cash Cassette .....................................20-003504-45
  Lock, No-Key Shipping .......................................20-001608
  Switch, Momentary Lock (Reset Switch) .................20-10059

SPECIFICATIONS FOR STANDARD SHIPPING LOCKS IN INCHES
Dimensions, Cam Mounting Hole: Diameter 0.280 x 0.220"

<table>
<thead>
<tr>
<th>Door</th>
<th>Barrel Length</th>
<th>Double D Hole Size</th>
<th>Rotation to Unlock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belly</td>
<td>5/8&quot;</td>
<td>0.755 x 0.635&quot;</td>
<td>CW or CCW</td>
</tr>
<tr>
<td>BV Cashbox</td>
<td>5/8&quot;</td>
<td>0.760 x 0.635&quot;</td>
<td>CW or CCW</td>
</tr>
<tr>
<td>Cassette</td>
<td>5/8&quot; or 1-1/8</td>
<td>0.760 x 0.635&quot;</td>
<td>LH hole CW</td>
</tr>
<tr>
<td>Logic</td>
<td>5/8&quot;</td>
<td>0.760 x 0.635&quot;</td>
<td>CW or CCW</td>
</tr>
<tr>
<td>Main</td>
<td>5/8&quot;</td>
<td>0.755 x 0.635&quot;</td>
<td>CCW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lock/Switch</th>
<th>Barrel Length</th>
<th>Double D Hole Size</th>
<th>Rotation to Unlock</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJ Extra Stacker Lk.</td>
<td>5/8&quot;</td>
<td>0.760 x 0.635&quot;</td>
<td>CW or CCW</td>
</tr>
<tr>
<td>NJ Extra Cass. Lk.</td>
<td>5/8&quot; or 1-1/8</td>
<td>0.760 x 0.640&quot;</td>
<td>RH hole CCW</td>
</tr>
<tr>
<td>Jackpot Key Sw.</td>
<td>&lt; 2.5&quot;</td>
<td>0.760 x 0.680&quot;</td>
<td>N/A</td>
</tr>
</tbody>
</table>
• Locks and Cams, continued

SPECIFICATIONS FOR STANDARD SHIPPING LOCKS IN mm
Dimensions, Cam Mounting Hole: Diameter 7.1 x 5.6 mm

<table>
<thead>
<tr>
<th>Door</th>
<th>Barrel Length</th>
<th>Double D Hole Size</th>
<th>Rotation to Unlock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belly</td>
<td>15.9 mm</td>
<td>19.2 x 16.1 mm</td>
<td>CW or CCW</td>
</tr>
<tr>
<td>BV Cashbox</td>
<td>15.9 mm</td>
<td>19.3 x 16.1 mm</td>
<td>CW or CC</td>
</tr>
<tr>
<td>Cassette</td>
<td>15.9 mm</td>
<td>19.3 x 16.1 mm</td>
<td>LH hole CW</td>
</tr>
<tr>
<td>Logic</td>
<td>15.9 mm</td>
<td>19.3 x 16.1 mm</td>
<td>CW or CCW</td>
</tr>
<tr>
<td>Main</td>
<td>15.9 mm</td>
<td>19.2 x 16.1 mm</td>
<td>CCW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lock/ Switch</th>
<th>Barrel Length</th>
<th>Double D Hole Size</th>
<th>Rotation to Unlock</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJ Extra Stacker Lk.</td>
<td>15.9 mm</td>
<td>19.3 x 16.1 mm</td>
<td>CW or CCW</td>
</tr>
<tr>
<td>NJ Extra Cass. Lk.</td>
<td>15.9* mm</td>
<td>19.3 x 16.2 mm</td>
<td>RH hole CW</td>
</tr>
<tr>
<td>Jackpot Key Sw.</td>
<td>&lt; 63.5 mm</td>
<td>19.3 x 17.3 mm</td>
<td>N/A</td>
</tr>
<tr>
<td>* Or 28.6 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTICE
Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

Example Parts
- Item A
  - Item B
    - Item C

NOTICE
COMMON VS. SPECIFIC PARTS. Major items in this section include "common parts" and "coin-specific parts." All hoppers in this section employ the same common parts. But each hopper requires different coin-specific parts.

NOTICE
To order parts with a "ZZ" or "ZZZ" part number suffix, specify part number and color.

NOTICE
* Order these parts by length.
### Mechanical Parts

**NOTICE**

Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C does not include any other parts. Order Item A to obtain Items B and C.

#### Example Parts

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

**NOTICE**

To order parts with a "ZZ" or "ZZZ" part number suffix, specify part number and color.

#### Pushbuttons, Player Panel

**PUSHBUTTON ASSEMBLIES**

<table>
<thead>
<tr>
<th>Model</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/rec 6.3V, HOLD/Cancel</td>
<td>20-002564-01</td>
</tr>
<tr>
<td>Sq 6.3V, a Dinero/Credito</td>
<td>20-002449-49</td>
</tr>
<tr>
<td>Sq 6.3V, a Trocar Dinero</td>
<td>20-002449-48</td>
</tr>
<tr>
<td>Bet 1/Bust</td>
<td>20-002449-44</td>
</tr>
<tr>
<td>Sq 6.3V, Jogar, 1 Por Lin</td>
<td>20-002449-55</td>
</tr>
<tr>
<td>Sq 6.3V Jogar, 2 Por Lin</td>
<td>20-002449-56</td>
</tr>
<tr>
<td>Sq 6.3V Jogar, 3 Por Lin</td>
<td>20-002449-57</td>
</tr>
<tr>
<td>Sq 6.3V Jogar, 4 Por Lin</td>
<td>20-002449-58</td>
</tr>
<tr>
<td>Sq 6.3V Jogar, Aposta Max</td>
<td>20-002449-59</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A 1 Line</td>
<td>20-002449-32</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A 2 Lines</td>
<td>20-002449-33</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A 3 Lines</td>
<td>20-002449-34</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A 4 Lines</td>
<td>20-002449-35</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A Play 1 Per.</td>
<td>20-002449-37</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A Play 2 Per.</td>
<td>20-002449-38</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A Play 3 Per.</td>
<td>20-002449-39</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A Play 4 Per.</td>
<td>20-002449-40</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A Play 5 Per.</td>
<td>20-002449-41</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A Play 7 Per.</td>
<td>20-002449-42</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, A Play 9 Per.</td>
<td>20-002449-43</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, a 1 Linha</td>
<td>20-002449-50</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, a 2 Linhas</td>
<td>20-002449-51</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, a 3 Linhas</td>
<td>20-002449-52</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, a 4 Linhas</td>
<td>20-002449-53</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, a 5 Linhas</td>
<td>20-002449-54</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, a 7 Lines</td>
<td>20-002449-63</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, a 9 Lines</td>
<td>20-002449-64</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, a Play 10p</td>
<td>20-002449-65</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, a Play 18p</td>
<td>20-002449-66</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, B Bet One</td>
<td>20-002449-18</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, BET ONE</td>
<td>20-002449-02</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, B Collect</td>
<td>20-002449-22</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, CALL ATT</td>
<td>20-002449-10</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, CASH/CREDIT</td>
<td>20-002449-07</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, CHANGE (Red)</td>
<td>20-002449-14</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, CLCT WNGS</td>
<td>20-002449-12</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, DEAL/DRAW</td>
<td>20-002449-09</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, MAX BET</td>
<td>20-002449-01</td>
</tr>
<tr>
<td>Sq 6.3V Lamp, SERVICE</td>
<td>20-002449-65</td>
</tr>
</tbody>
</table>

**PUSHBUTTON COMPONENTS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bezel Assy, Sq w/plngr &amp; spring</td>
<td>20-001886-01</td>
</tr>
<tr>
<td>Insert, Square 1 Linha</td>
<td>20-001885-55</td>
</tr>
</tbody>
</table>
• Pushbuttons, Player Panel, continued

| Insert, Square 2 Linhas            | 20-001986-56 |
| Insert, Square 3 Linhas            | 20-001986-57 |
| Insert, Square 4 Linhas            | 20-001986-58 |
| Insert, Square 5 Linhas            | 20-001986-59 |
| Insert, Square 6 Linhas            | 20-001986-60 |
| Insert, Square 7 Linhas            | 20-001986-61 |
| Insert, Square 8 Linhas            | 20-001986-62 |
| Insert, Square 9 Linhas            | 20-001986-63 |
| Insert, Square Bet/Stand            | 20-001986-11 |
| Insert, Square Bet Two              | 20-001986-34 |
| Insert, Square Cash Out             | 20-001986-17 |
| Insert, Square Change, Red/Wht Text | 20-001986-20 |
| Insert, Square Change, Wht/Blk      | 20-001986-19 |
| Insert, Square Collect              | 20-001986-14 |
| Insert, Square Collect Winnings     | 20-001986-18 |
| Insert, Square Deal                 | 20-001986-15 |
| Insert, Square Deal/Draw            | 20-001986-16 |
| Insert, Square Double Down          | 20-001986-12 |
| Insert, Square Max Bet              | 20-001986-10 |
| Insert, Square Quick Pick           | 20-001986-13 |
| Insert, Square Service Red/Wht Text | 20-001986-21 |
| Insert, Square Play 1 Per Line      | 20-001986-27 |
| Insert, Square Play 2 Per Line      | 20-001986-28 |
| Insert, Square Play 3 Per Line      | 20-001986-29 |
| Insert, Square Play 4 Per Line      | 20-001986-30 |
| Insert, Square Play 5 Per Line      | 20-001986-31 |
| Insert, Square Play 7 Per Line      | 20-001986-32 |
| Insert, Square Play 9 Per Line      | 20-001986-33 |
| Insert, M Rect B Bet One Credit     | 20-001986-94 |
| Insert, M Rect B Bet Pre Line       | 20-001986-97 |
| Insert, M Rect B Deal               | 20-001986-93 |
| Insert, M Rect B Double Down        | 20-001986-95 |
| Insert, M Rect B Erase              | 20-001986-88 |
| Insert, M Rect B Hold Cancel        | 20-001986-86 |
| Insert, M Rect B Max Bet            | 20-001986-91 |
| Insert, M Rect B Max Bet Spin       | 20-001986-87 |
| Insert, M Rect B Play 5 Credits     | 20-001986-92 |
| Insert, M Rect B Select Lines       | 20-001986-96 |
| Insert, M Rect B Spin Reels         | 20-001986-90 |
| Insert, M Rect B Start              | 20-001986-89 |
| Insert, M Rect Bet One Credit       | 20-001986-41 |
| Insert, M Rect Bet Fer Line         | 20-001986-47 |
| Insert, M Rect Deal                 | 20-001985-40 |
| Insert, M Rect Deal/Draw            | 20-001985-44 |
| Insert, M Rect Deal/Draw/Rebet      | 20-001985-45 |
| Insert, M Rect Double Down          | 20-001986-42 |
| Insert, M Rect Erase                | 20-001986-36 |
| Insert, M Rect Hold Cancel          | 20-001986-35 |
| Insert, M Rect Max Bet              | 20-001986-38 |
| Insert, M Rect Play 5 Credits       | 20-001986-39 |

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For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

**Example Parts**

Item A
  - Item B
  - Item C

**NOTICE**

To order parts with a "ZZ" or "ZZZ" part number suffix, specify part number and color.

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Additional 20-001986-ZZZ pushbutton insert part numbers are available through your Regional Field Service Office.
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Example Parts
Item A
  Item B
  Item C

NOTICE

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NOTICE

Additional 20-001986-ZZZ pushbutton insert part numbers are available through your Regional Field Service Office.

• Pushbuttons, Player Panel, continued

<table>
<thead>
<tr>
<th>Insert, M Rect Play</th>
<th>20-001986-43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insert, M Rect Select Lines</td>
<td>20-001986-46</td>
</tr>
<tr>
<td>Insert, M Rect Start</td>
<td>20-001986-37</td>
</tr>
<tr>
<td>Insert, M Rect Blank</td>
<td>20-001986-49</td>
</tr>
<tr>
<td>Insert, Square Bet 1/Bust</td>
<td>20-001986-50</td>
</tr>
<tr>
<td>Insert, Square Blank</td>
<td>20-001986-48</td>
</tr>
<tr>
<td>Insert, Square Deal/Hit</td>
<td>20-001986-52</td>
</tr>
<tr>
<td>Insert, Square Dinheiro/Credito</td>
<td>20-001986-54</td>
</tr>
<tr>
<td>Insert, Square Call Attendant Wht</td>
<td>20-001986-70</td>
</tr>
<tr>
<td>Insert, Square Hold Cancel</td>
<td>20-001986-67</td>
</tr>
<tr>
<td>Insert, Square Jogar 1 Por Linha</td>
<td>20-001986-60</td>
</tr>
<tr>
<td>Insert, Square Jogar 2 Por Linha</td>
<td>20-001986-61</td>
</tr>
<tr>
<td>Insert, Square Jogar 3 Por Linha</td>
<td>20-001986-62</td>
</tr>
<tr>
<td>Insert, Square Jogar 4 Por Linha</td>
<td>20-001986-63</td>
</tr>
<tr>
<td>Insert, Square Jogar Aposta Maxim</td>
<td>20-001986-64</td>
</tr>
<tr>
<td>Insert, Square Max Bet/Stand</td>
<td>20-001986-51</td>
</tr>
<tr>
<td>Insert, Square Play 10 Per Line</td>
<td>20-001986-65</td>
</tr>
<tr>
<td>Insert, Square Play 18 Per Line</td>
<td>20-001986-66</td>
</tr>
<tr>
<td>Insert, Square Trcrr Dinheiro</td>
<td>20-001986-53</td>
</tr>
<tr>
<td>Insert, Square B Bt One</td>
<td>20-001986-72</td>
</tr>
<tr>
<td>Insert, Square B Bet/Stand</td>
<td>20-001986-73</td>
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<tr>
<td>Insert, Square B Call Attendant</td>
<td>20-001986-80</td>
</tr>
<tr>
<td>Insert, Square B Cash/Credit</td>
<td>20-001986-77</td>
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<tr>
<td>Insert, Square B Cash Out</td>
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</tr>
<tr>
<td>Insert, Square B Change</td>
<td>20-001986-83</td>
</tr>
<tr>
<td>Insert, Square B Change Red/Wht</td>
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<td>Insert, Square B Collect</td>
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<td>Insert, Square B Collect Winning</td>
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<td>Insert, Square B Deal</td>
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<td>Insert, Square B Deal/Draw</td>
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<td>Insert, Square B Double Down</td>
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<td>Insert, Square B Max Bet</td>
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<td>Insert, Square B Quick Pick</td>
<td>20-001986-75</td>
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<td>Insert, Square B Service</td>
<td>20-001986-85</td>
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<td>Label, Sq Red w/CALL-ATTN VLT</td>
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<td>Label, Sq Wht w/BET-ONE VLT</td>
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<tr>
<td>Label, Sq Wht w/CASH-CREDIT VLT</td>
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<td>Lens, Sq Clear Bn VLT</td>
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• Readers, Card (Option)

  PANEL, BLANK CARD READER
  Plate, Blank Card-Reader Mounting                      .01-003145-00P06

  READER, CARD, ACRES BE2, 3X4 KEYPAD
  Plate, Cdr Acres BE2                                   .01-003145-17ZZZ
  Gutter, Acres BE2                                      .03-004612
  Rivet, Snap-Richco SR-2832                            .20-10011-01
• Reader, Card, continued

READER, CARD, ACRES BE2, 2X6 KEYPAD
Plate, Crdr, Acres BE2 2x6 Keypad .............................................. 01-003145-24ZZZ
Gutter, Acres BE2 ................................................................. 03-005837

READER, CARD, ACRE® LEGACY
Plate, Acre Card-Reader Mounting, Rec ..................................... 01-03145-01ZZZ
Spacer, 7/16" ........................................................................ 03-6047-9

READER, CARD, ACRES BE2, REDUCED HEIGHT TB
Plate, Crdr, Acres BE2 .............................................................. 01-005070-15ZZZ
Plate, Crdr, Acres BE2, 2x6 keypad ........................................ 01-005070-18ZZZ

READER, CARD ACSC/SMS®
Assy, Ground ACSC Card-Reader ........................................... A-003529
Bracket, ACSC Interface Mounting ........................................ 01-003917
Plate, ACSC Card-Reader Mounting, Rectangular ................. 01-003145-05ZZZ
Spacer, 3/8" ........................................................................ 03-6047-2

READER, CARD, CDS®, MAGNETIC AND OPTICAL
Bar, CDS Keypad Mtg ................................................................ 01-003665
Plate, CDS, Card-Reader Mounting ........................................ 01-003145-02ZZZ
Spacer, 3/8" ........................................................................ 03-6047-2

READER, CARD, CDS®, VFD® MAGNETIC
Plate, CDS VFD Card-Reader Mounting .................................... 01-003145-13ZZZ
Spacer, 5/16" ........................................................................ 03-6047-4

READER, CARD, CDS®, VFD® OPTICAL
Cover, CDS VFD ...................................................................... 01-004131
Plate, CDS VFD Card-Reader Mounting ................................ 01-003145-14ZZZ
Spacer, 5/16" ........................................................................ 03-6047-4

READER, CARD, EDT®, 5MM MAGNETIC
Plate, EDT 5mm, Card-Reader Mounting ................................. 01-003145-03ZZZ
Spacer, 3/8" ........................................................................ 03-6047-2

READER, CARD, EDT®, 5MM OPTICAL
Plate, EDT 5mm, Card-Reader Mounting ................................. 01-003145-03ZZZ
Plate, EDT Optical Card-Reader ............................................. 01-009244-ZZZ
Spacer, 3/8" ........................................................................ 03-6047-2

READER, CARD, EDT®, 9MM MAGNETIC
Plate, EDT 9mm, Card-Reader Mounting ................................. 01-003145-04ZZZ
Spacer, 3/8" ........................................................................ 03-6047-2

READER, CARD, EDT®, 9MM OPTICAL
Plate, EDT 9mm, Card-Reader Mounting ................................. 01-003145-04ZZZ
Plate, EDT Optical Card-Reader ............................................. 01-009244-ZZZ
Spacer, 3/8" ........................................................................ 03-6047-2

NOTICE
Indent parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

Example Parts
Item A
  Item B
  Item C

NOTICE
To order parts with a "ZZ" or "ZZZ" part number suffix, specify part number and color.

* Order these parts by length.
NOTICE
Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

Example Parts
Item A
  Item B
  Item C

NOTICE
* Order these parts by length.

• Reader, Card (Option)

  READER, CARD, GSI
  Plate, GSI Crdr .............................................................. 01-003145-18ZZZ

  READER, CARD, GRIPPS CRYSTAL
  Plate, Gripps Crystal Crdr .................................................. 01-003145-22ZZZ

  READER, CARD, GRIPPS®, RECTANGULAR
  Plate, Gripps, Rectangular Card-Reader Mounting .................... 01-003145-06ZZZ
  Terminal, 25' Quick Fit ..................................................... 5826-000643-00

  READER, CARD, IGS, 5" VFD DSPL
  Plate, Card Reader IGS VFD .................................................. 01-003145-15ZZZ
  Plate, IGS Keypad Cover .................................................... 01-004305-ZZZ

  READER, CARD, IVerson
  Plate, Iverson Card-Reader Mounting ..................................... 01-003145-16ZZZ
  Spacer, 5/16" ....................................................................... 03-6047-4

  READER, CARD, MGM GRAND
  Plate, Crdr MGM ................................................................... 01-003145-21ZZZ

  READER, CARD, MIKOHN®
  Plate, Mikohn Card-Reader Mounting ....................................... 01-003145-07ZZZ
  Spacer, 7/16" ....................................................................... 03-6047-9

  READER, CARD, PARADIGM
  Plate, Crdr, Paradigm ............................................................. 01-003145-23ZZZ
  Gutter, Acres BE2 ................................................................. 03-005837

  READER, CARD SDS®, EPI®
  Plate, SDS, EPI Card-Reader Mounting ..................................... 01-003145-12ZZZ

  READER, CARD, SDS®, RECTANGULAR KEYPAD
  Plate, SDS Card-Reader Mounting .......................................... 01-003145-08ZZZ
  Spacer, 5/16" ....................................................................... 03-6047-4

  READER, CARD, SDS®, SASY®, SQUARE KEYPAD
  Plate, SDS, SASY Card-Reader Mounting .................................. 01-003145-09ZZZ
  Spacer, 5/16" ....................................................................... 03-6047-4
  Gutter, SDS, SASY ................................................................. 03-003427
  Rivet, Snap-Richocc SR-2632 ............................................... 20-10011-01

• Topbox (Complete Replacement Assemblies)

  TOPBOX, 5" ASSEMBLY, W/O CARD READER
  Topbox, 5" w/o Crd Rdr (e.g.; Blk, Almond) ...................... 01-003567-01ZZZ
  Bracket, Glass Mtg, mat Blk .............................................. 01-002908-P06
  Bracket, 5" w/o Crd Rdr, t/o .............................................. 01-002918-D07
• Topbox, continued

Cover, Tower Light t/b ........................................... 01-002118-ZZZ
Crown, 5" w/o Crd Rdr ........................................ 01-004484-01ZZZ
 Foam, 1" x 3" .................................................. 20-002886
 Lamp, Assy, Fluorescent, t/b ................................ A-003101
 Plate, Crd Rdr ................................................ 01-003145-ZZZP06
 Reflector, Lamp 5" t/b ......................................... 01-003039

TOPBOX, 5" ASSEMBLY, WITH CARD READER
Topbox, 5" w/Crd Rdr (e.g.: Blk, Almond) ................. 01-003567-02ZZZ
Bracket, 5" w/Crd Rdr, LH-55C ................................. 01-002919-01D07
Bracket, 5" w/Crd Rdr, RH-55C ............................... 01-002919-02D07
Cover, Tower Light t/b ........................................ 01-002118-ZZZ
Crown, 5" w/Crd Rdr ........................................... 01-004484-02ZZZ
 Foam, 1" x 3" .................................................. 20-002886
 Lamp, Assy, Fluorescent, t/b ................................ A-003101
 Plate, Crd Rdr ................................................ 01-003145-ZZZP06
 Reflector, Lamp 5" t/b ......................................... 01-003039

TOPBOX, 9" ASSEMBLY, W/O CARD READER
Topbox, 9" w/o Crd Rdr (e.g.: Blk, Almond) ................. 01-003568-01ZZZ
Bracket, 9" w/o Dot/Crd Rdr, LH-55x ......................... 01-004331-01D07
Bracket, 9" w/o Dot/Crd Rdr, RH-55x ......................... 01-004331-02D07
Bracket, Glass Mtg ............................................ 01-002908-P06
 Cover, Twr Lt t/b ................................................ 01-002118-ZZZ
Crown, 9" w/o Crd Rdr ........................................ 01-004484-03ZZZ
 Foam, 1" x 3" .................................................. 20-002886
 Lamp, Assy, Fluorescent, t/b ................................ A-002591
 Plate, Crd Rdr ................................................ 01-003145-ZZZP06

TOPBOX, 9" ASSEMBLY, WITH CARD READER
Topbox, 9" w/Crd Rdr (e.g.: Blk, Almond) ................. 01-003568-02ZZZ
Bracket, 9" w/Crd Rdr, LH-55x ............................... 01-004332-01D07
Bracket, 9" w/Crd Rdr, RH-55x ............................... 01-004332-02D07
 Cover, Twr Lt t/b ................................................ 01-002118-ZZZ
Crown, 9" w/Crd Rdr .......................................... 01-004484-04ZZZ
 Foam, 1" x 3" .................................................. 20-002886
 Lamp, Assy, Fluorescent, t/b ................................ A-002591
 Plate, Crd Rdr ................................................ 01-003145-ZZZP06

TOPBOX, 16" FLAT TOP ASSEMBLY, W/O CARD READER
Topbox, 16" Assy w/o Crd (e.g.: Blk Wrk/l) ................ 01-003449-01ZZZ
Bracket, t/b 16" w/o Dot/Crd, RH-55x ....................... 01-004333-01D07
Bracket, t/b 16" w/o Dot/Crd, LH-55x ....................... 01-004333-02D07
Bracket, Glass mtg ............................................ 01-002908-ZZZ
 Crown, 16" w/o Crd Rdr ...................................... 01-004483-01ZZZ
 Foam, 1" x 3" .................................................. 20-002886
 Lamp, Assy, Fluorescent, t/b ................................ A-002591
 Pedestal, Twr Lt t/b 16" .................................. 03-003454-ZZZZZZ
 Plate, Crd Rdr ................................................ 01-003145-ZZZP06

NOTICE
Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

Example Parts
Item A
Item B
Item C

NOTICE
* Order these parts by length.

NOTICE
On round top assemblies, D04 crowns are used on D01 games.
**Mechanical Parts**

**NOTICE**

Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn’t include any other parts. Order Item A to obtain Items B and C.

**Example Parts**

<table>
<thead>
<tr>
<th>Item</th>
<th>Item A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Item B</td>
</tr>
<tr>
<td></td>
<td>Item C</td>
</tr>
</tbody>
</table>

**NOTICE**

* Order these parts by length.

**NOTICE**

On round top assemblies, D04 crowns are used on D01 games.

• **Topbox, continued**

**TOPBOX, 16″ FLAT TOP ASSEMBLY, WITH CARD READER**

Topbox, 16″ “Big” w/Crd Rdr (e.g.; Blk Wrrkl) …………………… 01-003449-02ZZZ
Bracket, t/b 16″-w/o Dot, Lh Crd Rdr ……………………………… 01-003433-02D07
Bracket, t/b 16″-gls stp, Rh Crd Rdr ……………………………… 01-003433-01D07
Crown, 16″ w/Crd Rdr ……………………………………………… 01-003448-02ZZZ
Foam, 1″ x 3″ ………………………………………………………… 20-003286
Lamp, Assy, Fluorescent, t/b ……………………………………….. A-002591
Pedestal, Twr Lt t/b 16″ ………………………………………… 03-003454-ZZZZZ
Plate, Crd Rdr…………………………………………………………… 01-003145-ZZP06

**TOPBOX, 16″ ROUND ASSEMBLY, W/O CARD READER & DOT**

Topbox, 16″ Round w/Crd Rdr (e.g.; Blk Wrrkl) …………………… 01-003858-01ZZZ
Bracket, t/b 16″ w/o Crd Rdr ………………………………………… 01-004303-01
Bracket, t/b 16″-gls crn, Rh Crd Rdr ……………………………… 01-004303-02
Clip, 16″ Round-55C ………………………………………………… 01-003686
Crown Round Top …………………………………………………… 01-003644-01ZZZ
Lamp, Assy, Fluorescent, t/b ……………………………………….. A-003699
Pedestal, Twr Lt t/b 16″ Round …………………………………… 03-003454-ZZZZZ
Plate, Crd Rdr…………………………………………………………… 01-003145-ZZP06

**TOPBOX, 16″ ROUND ASSEMBLY, WITH CARD READER**

Topbox, 16″ Round w/Crd Rdr (e.g.; Blk Wrrkl) …………………… 01-003858-02ZZZ
Bracket, t/b 16″-w/o Dot Mtg Lh Crd Rdr …………………………… 01-004335-01D07
Bracket, t/b 16″ w/o Dot Mtg, Rh Crd Rdr …………………………… 01-004335-02D07
Clip, 16″ Round-55C ………………………………………………… 01-003686
Crown Round Top …………………………………………………… 01-003644-02ZZZ
Lamp, Assy, Fluorescent, t/b ……………………………………….. A-003699
Pedestal, Twr Lt t/b 16″ Round …………………………………… 03-003454-ZZZZZ
Plate, Crd Rdr…………………………………………………………… 01-003145-ZZP06

• **Validators, Bill (WBA) and Bezels**

Bezel, WBA 66mm Blk 2/LED, US …………………………………… A-003326-01
Bezel, WBA 66mm Yel 2/LED, US …………………………………… A-003326-02
Bezel, WBA 71mm Blk 2/LED, Can, SlvK …………………………… A-003326-03
Bezel, WBA 71mm Yel 2/LED, Can, SlvK …………………………… A-003326-04
Bezel, WBA 77mm Blk 2/LED ………………………………………… A-003326-05
Bezel, WBA 77mm Yel 2/LED ………………………………………… A-003326-06
Bezel, WBA 81mm Blk 2/LED ………………………………………… A-003326-07
Bezel, WBA 81mm Yel 2/LED ………………………………………… A-003326-08
Holder, Cash CST, WBA 55C ……………………………………….. 20-002575
Tape, 3/8″ x 1/8″ SS ………………………………………………….. RM 22-27*
WBA, USA 10-ss-1m-flash ………………………………………….. 09-004782-00
WBA, USA 11-ss-1m-eprom …………………………………………. 09-004782-01
WBA, USA 12-ss-4m-flash ………………………………………….. 09-004782-02
WBA, USA 13-ss-4m-eprom …………………………………………. 09-004782-03
WBA, Canada 20-ss-1m-flash ……………………………………….. 09-004782-04

09-004782-ZZ is a family group of BVD part numbers. P/Ns -00 to -15 have an RS232 board installed. Part numbers -16 and higher do not have an RS232 board installed.

If a JCM RS232 board has to be replaced, use RS232 board A-004307-02 and required mounting bracket 01-005308.
Validator, Bill (WBA), continued

WBA, Canada 21-ss-1m-eprom ........................................... 09-004782-05
WBA, Canada 22-ss-4m-flash ........................................... 09-004782-06
WBA, Canada 23-ss-4m-eprom ........................................... 09-004782-07
WBA, SvK 20-ss-1m-flash ........................................... 09-004782-08
WBA, SvK 21-ss-1m-eprom ........................................... 09-004782-09
WBA, SvK-21-ss-1m-eprom ........................................... 09-004782-10
WBA, Ita-21-ss-1m-eprom ........................................... 09-004782-11
WBA, grb-20-ss-1m-flash ........................................... 09-004782-12
WBA, grb-21-ss-1m-eprom ........................................... 09-004782-13
WBA, brz-20-ss-1m-flash ........................................... 09-004782-14
WBA, brz-21-ss-1m-eprom ........................................... 09-004782-15
WBA, usa-10-ss-1m-f-no RS-232 ........................................... 09-004782-16
WBA, usa-11-ss-1m-e-no RS-232 ........................................... 09-004782-17
WBA, usa-12-ss-4m-f-no RS-232 ........................................... 09-004782-18
WBA, usa-13-ss-4m-e-no RS-232 ........................................... 09-004782-19
WBA, can-20-ss-1m-f-no RS-232 ........................................... 09-004782-20
WBA, can-21-ss-1m-3-no RS-232 ........................................... 09-004782-21
WBA, can-22-ss-4m-f-no RS-232 ........................................... 09-004782-22
WBA, can-23-ss-4m-e-no RS-232 ........................................... 09-004782-23
WBA, svK-20-ss-1m-f-no RS-232 ........................................... 09-004782-24
WBA, svK-21-ss-1m-e-no RS-232 ........................................... 09-004782-25
WBA, Ita-20-ss-1m-f-no RS-232 ........................................... 09-004782-26
WBA, Ita-21-ss-1m-e-no RS-232 ........................................... 09-004782-27
WBA, grb-20-ss-1m-f-no RS-232 ........................................... 09-004782-28
WBA, grb-21-ss-1m-e-no RS-232 ........................................... 09-004782-29
WBA, brz-20-ss-1m-f-no RS-232 ........................................... 09-004782-30
WBA, brz-21-ss-1m-e-no RS-232 ........................................... 09-004782-31
WBA, zaf-22-ss-4m-f-no RS-232 ........................................... 09-004782-32
WBA, zaf-23-ss-4m-e-no RS-232 ........................................... 09-004782-33
WBA, col-20-ss-1m-f-no RS-232 ........................................... 09-004782-34
WBA, col-21-ss-1m-e-no RS-232 ........................................... 09-004782-35
Topbox
## Chapter 3. Large Exploded Views

- **Topbox**

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### NOTICE

Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

**Example Parts**

- Item A
  - Item B
    - Item C
<table>
<thead>
<tr>
<th>Item Description</th>
<th>Dwg Ref</th>
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<td>Bracket, Door Switch Activator</td>
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<td>Bracket, Door Sw Mtg</td>
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<td>Cabinet, 55x, w/o Wood Base Painted</td>
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<td>Cabinet, 55x, with Wood Base Painted</td>
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<td>Endcap, Coin Tray-LH</td>
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<td>Fuse, 5x20mm, 2A Slow Blow</td>
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<td>.5733-12869-01</td>
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<td>Label, Diagnostic/Pwr</td>
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NOTICE
Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

Example Parts
Item A
  Item B
    Item C

NOTICE
To order parts with a "ZZ" or "ZZZ" part number suffix, specify part number and color.

NOTICE
*A-002912-ZZ PDU assemblies include Drawing Reference Numbers 35, 36 and 39.
Door, Main-Front
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NOTICE

Indented parts make up parts that are above, and closer to the left margin.

For instance, in the example below, Item A includes both Item B and Item C. Item B includes Item C, but not Item A. Item C doesn't include any other parts. Order Item A to obtain Items B and C.

Example Parts
Item A
  Item B
    Item C

NOTICE

To order parts with a "ZZ" or "ZZZ" part number suffix, specify part number and color.
IDX Coin Mech Legend

Vendor:
IDX, INCORPORATED
401 WEST MAIN STREET
EL DORADO, AR. 71730
WATTS: (800) 643-1100
FAX: (501) 597-91

Ordering Information:
- K = Standard
- L = Disable Manual Learn
- T = Disable Credit Test Button
- M = Disable Both

Diameter Spacers:
- 0 = No Spacers up to 1.475 Diameter Coin
- 1 = Up to 1.555 Diameter Coin
- 2 = Up to 1.595 Diameter Coin
- 3 = Up to 1.130 Diameter Coin
- 4 = Up to 1.003 Diameter Coin

 Thickness Spacers: Refers to the sliding adjustment with a detent that centers itself over one of the selected holes. The adjustment holes are located on the left side of the coin acceptor. Refer to Chart 1 for thickness dimensions.

Angle Code:
- 04 = 0°-60°
- 05 = 7°-45°
- 15 = 5°-90°
- 16 = 15°-90°
- 26 = 30°-90°

Interface:
- S = Serial Multicoin
- D = Digital Multicoin
- N = NET Plex

Board Revision:
- A = 1st Rev.
- B = 2nd Rev.
- C = 3rd Rev.

Model Number: X10
IDX Coin Mech Legend

VENDOR:
IDX, INCORPORATED
401 WEST MAIN STREET
EL DERRADO, AR 71730
WATTS: (800) 643-1109
FAX: (862-5978)

MANUFACTURER’S LABEL
X10 A - C 04 A 3 0 6

PERSONALITY PLUGS
WMS USES ONLY NO 5 (CC=16 RETROFIT)
0=STANDARD
1=DISABLE MANUAL LEARN
2=DISABLE CREDIT TEST BUTTON
3=DISABLE BOTH

DIAMETER SPACER
0=NO SPACER UP TO 1.475 DIAMETER COIN
1=UP TO 1.355 DIAMETER COIN
2=UP TO 1.255 DIAMETER COIN
3=UP TO 1.130 DIAMETER COIN
4=UP TO 1.003 DIAMETER COIN

THICKNESS SPACER REFERS TO THE SLIDING ADJUSTMENT WITH A DETENT
THAT CENTERS ITSELF OVER ONE OF THE SELECTED HOLES. THE ADJUSTMENT
HOLES ARE LOCATED ON THE LEFT SIDE OF THE COIN ACCEPTOR.
REFER TO CHART 1 FOR THICKNESS DIMENSIONS
04= 0°.60° 17=15°.105° 48=60°.120° 5A= 75°.150°
05= 0°.75° 27=30°.105° 39=45°.120° 6A= 90°.150°
15=15°.75° 37=45°.120° 59=75°.135° 5B=105°.165°
26=15°.90° 28=30°.135° 59=75°.135° 8B=105°.165°

ANGLE CODE
C=REQUIRES PERSONALITY PLUG (WMS)
S=SERIAL MULTICOID (SERIAL PORT)
D=DIGITAL MULTICOID
N=NET PLEX

INTERFACE
BOARD REVISION
A=1ST REV.
B=2ND REV.
C=3RD REV.

MODEL NUMBER: X10

CHART 1
A = .087
B = .092
C = .097
D = .103
E = .110
F = .116
G = .123
H = .130
• Door, Main-Rear

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*Replace the XX or XXX with the appropriate numbers for your coin mechanism.

Cover, Door Bottom c/b, Hpr/Pmr/None | 23 | .01-003544-XXXX |
Cover, Door Bottom b/o, Prn | 23 | .01-003544-04XXX |
Cover, Protector Opto Brd | 21 | .03-001612 |
Diverter, Solenoid w/Pin | 9 | A-16683 |
Door, Main Video-55C | 2 | .01-003542-ZZZ |
E Ring, 1/8 Shaft | 6 | .20-8712-12 |
Diverter, Coin | 3 | .01-002864 |
Hook, Main Door-55C | 27 | .01-002878 |
Panel, Door Barrier c/o Hopper p/out | 10 | .01-003543-02 |
Panel, Door Barrier c/b Printer p/out | 10 | .01-003543-01 |
Panel, Door Barrier c/o Hopper p/out | 10 | .01-003543-04 |
Panel, Door Barrier c/o Printer p/out | 10 | .01-003543-03 |
Panel, Door Barrier c/o Thermal Printer | 10 | .01-005735 |
PCB Assy, Hex Optos, Slot | 20 | A-18097-01 |
Pin, Diverter Act/Pvt-55C | 7 | .02-003231 |
Spring, 398 x 1.00-10T Comp | 8 | .10-473 |
Washer, Flat .130 x .281 x .032 Crs #4 | 19 | .4700-00002-00 |
• Cage, Card

Board Assy, CPU 1.5
Board, CPU System 1
Board, CPU System 1
Board, Video Daughter
Board, Video I/O.........
Cage, PCB 1.5-2.0 Ext
Cam, FLT 1.13 Dual M
Cover, CPU Cage Swi
Cover, CPU Video ........
Door, Card Cage ........
Lock, No Key, Shipping
Rail, Card Guide........
Switch, Pan Mnt Dbl P

Card Cage
• Cage, Card

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<td>20-9987-01</td>
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<td>Switch, Pan Mnt Dbl Pole, Moment</td>
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BILL VALIDATOR MAJOR PARTS

MAIN PARTS OF BILL VALIDATOR

- Head, WBA-10/11-USA (1M)
- Head, WBA-12/13-USA
- Head, WBA-21-Canadian (1M)
- Head, WBA-22/23-USA
- Acceptor Conveyor 11/21
- Acceptor Conveyor 12/22
- Acceptor Conveyor 13/23
- Cash Box
- Cable, WBA 10/11/21 RS232
- Cable, WBA12/13 RS232
- Cable, WBA12/13 E/D RS232
- Frame Unit

WBA BEZELS (NOT SHOWN)

- Bezel, WBA 66mm Blk 2/LED, US
- Bezel, WBA 66mm Yel 2/LED, US
- Bezel, WBA 71mm Blk 2/LED, CA
- Bezel, WBA 71mm Yel 2/LED, CA
- Bezel, WBA 77mm Blk 2/LED
- Bezel, WBA 77mm Yel 2/LED
- Bezel, WBA 81mm Blk 2/LED
- Bezel, WBA 81mm Yel 2/LED

BILL ACCEPTOR HEAD

- Belt, Timing
- Spring, VT R
- Spring, VT L
- Spring, TR
- Spring, VL
- Spring, TR 2
- Spring, HDR
- Spring, Ground Plate L
- Spring, Ground Plate R
## MAIN PARTS OF BILL VALIDATOR (Refer to following drawings.)

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## WBA BEZELS (NOT SHOWN)

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## BILL ACCEPTOR HEAD

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- A-003026-03
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- A-003026-08

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ACCEPTOR CONVEYOR, FIGURE 3

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FRAME UNIT

Spring, FG
Spring, BL
Spring, FL
FRAME UNIT

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WMS Gaming #

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CASHBOX CONVEYOR

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CASHBOX

Cam, Cassette
Spring, Receiver Plate
CASHBOX
Cam, Cassette
Spring, Receiver Plate

Dwg Ref  JCM #  WMS Gaming #
21   052505  20-003504-45
23   034859  20-003504-14

VMS Gaming #
0-003504-15
0-003504-16
0-003504-17
0-003504-18
0-003504-19
0-003504-20

CASHBOX CONVEYOR