Maintaining your Bally Slot Machine

This slot machine, known as the E2000 series electro-mechanical slot, was originally placed in a casino, and has many hours of use on it. Built in 1983, it is over 25 years old and is fully legal for personal, home use. It has been reconditioned and brought back to its original specifications, and will provide hours of entertainment in your home. Old slot machines have a certain mystique about them. Your guests will enjoy inserting coins, pulling the handle, and hearing the winning coins hit the coin tray. Current-day slot machines no longer use the handle, and have gotten away from coin use, which makes these older machines more fun to play. Typically, the payout rate is around 85-90% of coins played and the big jackpot can hit at any time.

Normal use (as with any mechanical device) requires occasional maintenance, mostly keeping the machine clean and the mechanisms oiled. The following will outline some of the usual maintenance, and will define “error codes” that help diagnose conditions that may affect the operation of the machine. The error codes are displayed on the Win Meter, the red LED display on the right side of the machine. Every payout will display the quantity of coins won on the Win Meter. There is a soldered-in battery on the Microprocessor Unit (MPU) board that maintains the last win on the meter, even when the machine is shut off. This battery will last for years, but eventually will need to be replaced. A common replacement battery is an inexpensive, 3.6 volt NiMH cordless phone battery which can be soldered directly to the MPU circuit board.

Here is a typical 3-line, 3 coin machine (E2224 shown). Turning the door lock key allows the front door to be swung open on its hinges, revealing the interior of the machine and all its workings. You can then access the coins in the coin hopper, remove the reel assembly, check for coin jams in the coin path, and have complete access to the internal parts of the machine. The section directly under the reel symbols will light up to tell you one of three things; Tilt, Coin Accepted and Insert Coin. When you first start the machine, you should see the “Insert Coin” panel illuminated. Once you insert your
coin or coins, the “Coin Accepted” panel lights up, and when you have reached the maximum number of coins to be played, the Coin Accepted light goes out. If there is a coin jam or other error, the “Tilt” panel lights up and you will need to correct the fault, and then press the Reset button on the coin hopper mechanism. The Insert Coin light will then illuminate, allowing you to play the machine.

Let’s discuss the basic operation of a slot machine. When the coin enters the coin slot, it travels thru a chute to a device called a *coin comparitor*, which determines that the coin you inserted is the proper coin. The comparitor has a spring-loaded clamping mechanism on it, and holds a sample of the coin you are using; in the image below, you can see the US quarter in its holder. The comparitor looks at each coin that is played, and compares it to the coin in the holder. If it’s the same, the coin played is then routed thru a switch, and into the coin hopper. The machine then registers a coin played when it contacts the Coin In switch, and each coin played will light a payout line on the front of the machine. If an incorrect or different coin or token is played, the comparitor rejects it and sends it into the coin tray instead of the *Coin Hopper*. Note that a wrong size coin in the hopper could cause a coin-feed jam and should be avoided.

The coin hopper fills up with coins played, and is the “bank” that stores the coins for future payouts. In a casino environment, once the hopper fills completely, a switch on the hopper mechanism senses the weight of the coins and causes any played coins to be diverted to a chute that sends the coins into the cabinet base which the machine sits on.
The coins collected in the machine base are the earnings for the casino. Since your home-use machine wouldn’t ever see large quantities of coins, and you will re-use any coins or tokens you are playing with, the coin-to-base diverter has been disabled. Basically, you fill the machine with maybe 300-500 coins and occasionally open the front door to recycle the coins from the hopper bowl to be played again. Most home use machine owners keep several coins in the coin tray, or in a cup outside of the machine. These are the coins you and your guests will use to play the machine. Note that if you remove the hopper, you must then return it to its fully inserted position. There is a floating electrical connector on the rear of the hopper that connects the electronics to the rest of the machine, and must be fully engaged.

Looking at the reel assembly, maintenance lubrication can be performed easily by removing the entire assembly. There are two release latches as shown. Pivot these two latches downward so that they are perpendicular to the assembly, and pull partially out of the machine. Note the two electrical connectors, one white and one red, which need to be released from their connections by pressing the latches inward, and pulling the connectors from their mating receptacle. The reel assembly can then be removed from the machine. Below is a guide for lubrication of moving parts.
Game Malfunction Codes

This slot machine is built for reliability and consistent use. It has been in operation for thousands of hours and because it was designed to be a profit maker for the casino in which it was installed, so its design must be rugged and dependable. Home use, however, sees much less day-to-day use, and oddly, when the machine sits unused, sometimes errors start to happen. For example, the battery on the MPU circuit board will eventually discharge and cause data loss. This happens because the battery is normally constantly trickle-charging when the machine is powered up. When it’s unplugged, however, the battery slowly discharges. Leaving the machine on for hours will keep the battery fully charged.

Also, the grease and oil on the moving parts tend to dry out or run off, necessitating the need for fresh lubrication. And, dust, dirt, and even spider webs will collect in odd places, causing problems as well.

So Bally provided a means to troubleshoot a malfunctioning machine by way of the Coin Win Meter display, using it to spell out malfunction codes. It does this by presenting a two-digit code that corresponds to a specific error. Below is The Bally instruction set relative to those malfunction codes. You can diagnose the machine one step at a time, using the TEST button located on the hopper mechanism PC board.

### Step 2: GAME FUNCTIONAL TEST
Press TEST button eight times.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10118</td>
<td>ERRONEOUS SERIAL FORMAT ERROR (CIRCUIT BOARD BOARD;)</td>
</tr>
<tr>
<td>11118</td>
<td>DURING POWER UP</td>
</tr>
</tbody>
</table>

For approximately one second after button is released, then...

If Personality PROM (NO) is NOT installed, the display will fall into the sequence described on page 9.

**Example:** 82,080

- 0 indicates Test #9 mode.
- 2 is current coins in.
- The slot machine is in the game function test, allowing normal operation to be performed to simulate for testing and payoffs. The display will count up for testing and any payoffs that are made is displayed in the win meter but is not paid by the hopper and the winner paid lamp is not lit. Also, to simplify testing, the ‘3’ switch on the hopper is bypassed while in this test.

The game will remain in this test mode (decimal points on display until it is terminated by a door switch or test button closure.

At this point all electronics functions have been tested. After confirming mechanical inspection (stop rotation, proper lubrication of mechanical assemblies, proper gear shift and spin, etc.), the machine is ready to be placed on location.

**BEAUPRO**

---

**HOT TIP**

If there is a testable pin on a Beauplex, Mathes Controller or an Amp, plug, make sure the wire that is connected to the testable pin is an actual pin — if available.

**AMP PLUGS**

They are similar in construction and may be removed from the Mathes Controller (page 38). Due to their ability to handle low voltage circuits, Amp Plug replaced the Beauplex on many machines in the late 1980s and at times, 1990s. These connectors are located in pairs and the male side-frame. New Beauplex, Mathes Controllers and Amp Plugs, along with the necessary tools, may be purchased from the Wire Corporation (see page 123).

### NORMAL OPERATION

With the exception of the 2-digit numerical display, there is no appreciable difference in the operation of the ELECTRONIC SLOT when compared with the electromechanical slot from the player's viewpoint.

The lighting of lamps, spinning and indexing of reels, payout, etc., follow the same pattern in both types of machines.

With the door closed, under regular game play, the display board presents two vital statistics: total in and total out count per individual game. The second digit from the left in the display shows the total number of coins paid out. The first count is updated as the indexing of real slant one each game.

The digits in the 3rd, 4th, 5th and 6th columns of the display constitute the coins paid out during the last game. This count is reset on the display also at the indexing of real number one of each game. If the last game is won, the display shows the coins paid out during that game, and the coins paid out total is increased by one. If the last game is lost, the display shows the coins paid out during that game, and the coins paid out total is not increased. At the start of the next game, the coins paid out during the last won game is displayed and the coins paid out total is still displayed. Performing any manual test causes both IN and OUT values to be set to zero.

The following is an example of two games (handle pulls), showing the operation of the display:

<table>
<thead>
<tr>
<th>Game 1</th>
<th>Game 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>START</td>
<td>FIRST REEL COMPLETED</td>
</tr>
<tr>
<td>00000</td>
<td>00005</td>
</tr>
<tr>
<td>00000</td>
<td>00005</td>
</tr>
<tr>
<td>00000</td>
<td>00005</td>
</tr>
<tr>
<td>Coins in display when first reel paid out</td>
<td></td>
</tr>
<tr>
<td>100000</td>
<td></td>
</tr>
<tr>
<td>Coins out displayed when first reel paid out</td>
<td></td>
</tr>
<tr>
<td>100000</td>
<td></td>
</tr>
<tr>
<td>Coins out displayed when second reel paid out</td>
<td></td>
</tr>
<tr>
<td>100000</td>
<td></td>
</tr>
<tr>
<td>Coins out displayed when second reel paid out</td>
<td></td>
</tr>
<tr>
<td>100000</td>
<td></td>
</tr>
<tr>
<td>Coins out displayed when second reel paid out</td>
<td></td>
</tr>
<tr>
<td>100000</td>
<td></td>
</tr>
</tbody>
</table>
BOOKKEEPING METERS

The meter readings appear, one at a time, on the 4 digit display for about 6 seconds. Before each new value is displayed, the meter will increment or decrement to the next value. If the meter value is 9999, it will change to 0000, and vice versa. Overrun is displayed for approximately one second. Numbers are assigned to the meters as follows:

1. TOTAL IN
2. TOTAL OUT
3. CASH
4. TOTAL QUANT. PLAYED (HANDLES PULLS)

Meters one thru four are incremented according to their respective functions only with the door open or closed.

There are a total of 16 six digit meters available for display. The first four (five or six on models with attendant panel) are displayed with the door open or closed.

The remaining meters are displayed by simply turning the door key counter clockwise then evaluating the key switches. These meters may monitor any condition specified, typically number of 1 coin, 2 coins, 5 coins, 10 coins etc. Jackpot value that have occurred are as follows:

To determine which meters are used and the order in which they are displayed, refer to the PD-832-XXX form for the model in question.

The BOOKKEEPING METERs are displayed in the same manner as the MAINTENANCE METERs, described in section 11, step 7.

When the meter reading sequence is completed or if a reset occurs while reading meters, the reading sequence is terminated and the display is restored to the condition present before meter reading started, unless the door was opened while meters were being displayed. In this case, the door open code will replace coins in count.

Example:

If a reset occurs while reading meters, the reading sequence is interrupted and the display takes this form.

The reading sequence is as follows:

000000

Indicates that the specified time limit has elapsed without a coin being inserted. After detecting and correcting the cause, follow the same procedure as described above to complete payout.

3. HOPPER JAM - Play suspended, feature flashed, TILT lit.

Example:

This code appears when a reset occurs during payout. This may be caused by momentary power interruption, low line voltage, or static interference and which could cause the microprocessor to perform a faulty operation. Sometimes, the TILT MODE prevents potentially disarranges returns.

To complete the payout, follow the procedure described for a normal unattended game. After detecting and correcting the cause, press the RST button and close the door to complete the game in progress. If necessary, the game may be terminated by pressing the TILT button one time.

4. REEL HOLD OR CANNOT BE READ - Play suspended, feature flashed, TILT lit.

Example:

The 41 means the position reader on the 1st REEL has sensed one of the following conditions: the reel is not rotating, the 1st REEL is not rotating, or the 1st REEL is rotating but the microprocessor is not detecting the rotation. If the 41 is present, the reel has to be removed and reinserted. The 005 means the 3rd REEL is the 3nd REEL and the 1st REEL is the 4th REEL and the 5th REEL. The reels have been numbered 1 thru 5 from left to right. 005 is the number of coins paid out in previous game. After detecting and correcting the cause, press the RST button and close the door to complete the game in progress. If necessary, the game may be terminated by pressing the TILT button one time.

5. REEL JAM - Play suspended, feature flashed, TILT lit.

Example:

The 41 means the position reader on the 1st REEL has sensed one of the following conditions: the reel is not rotating, the 1st REEL is not rotating, or the 1st REEL is rotating but the microprocessor is not detecting the rotation. If the 41 is present, the reel has to be removed and reinserted. The 005 means the 3rd REEL is the 3nd REEL and the 1st REEL is the 4th REEL and the 5th REEL. The reels have been numbered 1 thru 5 from left to right. 005 is the number of coins paid out in previous game. After detecting and correcting the cause, press the RST button and close the door to complete the game in progress. If necessary, the game may be terminated by pressing the TILT button one time.

6. BLANKS - Play suspended, feature flashed, TILT lit.

Example:

The 000 means that there is no malfunction in the handle mechanism allowing the handle to be pulled with no coins played. This code also indicates that all possible combinations of this condition are mechanical and, therefore, repetitive in nature.

7. DOOR OPEN - 5 second BUZZER alarm. Door Open Lamp (in tower) lit.

Example:

The 50 indicates that the door has been opened.

The DOOR open alarm stays lit as long as the door is open. Closing the door while this state does not disturb the display. The 50 for the previous game when the handle is pulled.

Door opening is detected by the hinge switch or the lock switch. These switches are wired in series.

The BUZZER ALARM is activated for 5 seconds every minute while the door is open except during the time in which the machine is in manual TEST mode. Feature lamps flashing while this code is present means that some other malfunction exists. This code is sometimes assumed to display the other malfunction information for as long as the BUZZER switch is held.

8. HANDLE PULLED WITH NO COINS IN - Play suspended, feature flashed, TILT lit.

Example:

The 70 indicates there is a malfunction in the handle mechanism allowing the handle to be pulled with no coins played. This code also indicates that all possible combinations of this condition are mechanical and, therefore, repetitive in nature.

Flashed alternately with:

000

Example:

The 000 is the number of coins paid out since last game.

9. ILLEGAL PLAY - DOOR OPEN - Play suspended, feature flashed, TILT lit. DEEP switch must be actuated to see this code.

Example:

The 70 indicates play has been attempted with the door open after Neal is indexed. 000, no coins paid out.

Flashed alternately with:

Example:

000

10. CASH OUT - Play suspended, feature flashed, TILT lit.

Example:

The 3 indicates the number of coins played for this handle.

Note: This malfunction is sensed only when a jumper is installed from ground to JP1 Pin 8 of 74001 board. (See page 27 item 8)
10. REEL DID NOT INDEX - Play suspended, feature flashed, TILT lit.
Example: 7 1 0 0 0
The 71 means the position reader on the 1st reel is not able to obtain a consistent reading. 73 means 2nd reel is at fault. 75, 3rd reel, 77, 4th reel, and 79, 5th reel. if the proper index is engaged. The 0000 means 1st reel is not indexed. The 7100 means 2nd reel is not indexed. If the proper index is engaged. The 0000 means 3rd reel is not indexed. The 7100 means 4th reel is not indexed. The 0000 means 5th reel is not indexed. If the proper index is engaged. The 0000 means 5th reel is not indexed. If the proper index is engaged. Note: See Dump Selectable Options - Item D, on page 27.

11. POSITION ERRORS IN 2 OF LAST 5 SPINS - Play suspended, feature flashed, TILT lit.
Example: 0 1 0 0 0
The 01 means the 1st reel; 03 means 2nd reel; 05, 3rd reel; 07, 4th reel; 09, 5th reel. If this tilt indicates that during the last 5 spins there was a positional error during the spin of that reel in 2 of the 5 spins. Note: Displays for the previous Malfunction Codes: 8: Handle Pulled With No Coins in, 9: Illegal Play—Door Open, 10: Real Did Not Index, 11: Position Error in 2 of the Last 5 Spins; appear also on Strobe Outputs 100 LEDS that use Program Primes (M1, M2, M3) that are numbered 86 and above.

---

**GAME CONDITION — QUICK REFERENCE — MALFUNCTION CODES**

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESCRIPTION</th>
<th>CODE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Coin switch jam</td>
<td>71</td>
<td>Spinning after indexing - Reel #1</td>
</tr>
<tr>
<td>30</td>
<td>Too many coins dispensed</td>
<td>72</td>
<td>Spinning after indexing - Reel #2</td>
</tr>
<tr>
<td>31</td>
<td>Hopper jam (Roller arm up too long)</td>
<td>73</td>
<td>Spinning after indexing - Reel #3</td>
</tr>
<tr>
<td>32</td>
<td>Hopper empty (Roller arm down too long)</td>
<td>74</td>
<td>Spinning after indexing - Reel #4</td>
</tr>
<tr>
<td>33</td>
<td>Reset occurred during payout</td>
<td>75</td>
<td>Spinning after indexing - Reel #5</td>
</tr>
<tr>
<td>41</td>
<td>Improper spin (Reel held, etc.) - Reel #1</td>
<td>91</td>
<td>Position error (2 of last 8 spins) - Reel #1</td>
</tr>
<tr>
<td>42</td>
<td>Improper spin (Reel held, etc.) - Reel #2</td>
<td>92</td>
<td>Position error (2 of last 8 spins) - Reel #2</td>
</tr>
<tr>
<td>43</td>
<td>Improper spin (Reel held, etc.) - Reel #3</td>
<td>93</td>
<td>Position error (2 of last 8 spins) - Reel #3</td>
</tr>
<tr>
<td>44</td>
<td>Improper spin (Reel held, etc.) - Reel #4</td>
<td>94</td>
<td>Position error (2 of last 8 spins) - Reel #4</td>
</tr>
<tr>
<td>45</td>
<td>Improper spin (Reel held, etc.) - Reel #5</td>
<td>95</td>
<td>Position error (2 of last 8 spins) - Reel #5</td>
</tr>
<tr>
<td>50</td>
<td>Door has been opened</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Illegal handle pull (No coins played); or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>Illegal games (Coins played, door open)*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>