

# ST-215 COIN WIZARD

## USER MANUAL



Full color manual can be downloaded at [www.bellatrix.com](http://www.bellatrix.com)

# CONTENTS

<b>ST-215 Features .....</b>	<b>2</b>
<b>ST-215 Installation .....</b>	<b>3</b>
Tools.....	3
Installing the Door Tongue .....	3
Mounting the Backplate.....	4
Testing .....	4
<b>ST-215 Coin Wizard Maintenance.....</b>	<b>5</b>
Cleaning .....	5
Battery.....	5
Storage.....	5
<b>Troubleshooting.....</b>	<b>6</b>
LED .....	6
Reset Button.....	6
Testing.....	6
<b>Changing Prices.....</b>	<b>10</b>
Wizard Price Set Wand .....	10
Programmable Price Set Wand .....	11
<b>Technical Notes .....</b>	<b>13</b>
<b>Parts Diagram.....</b>	<b>15</b>
<b>Parts List.....</b>	<b>16</b>

Updated versions of this manual may be found at the Bellatrix Web site <http://www.bellatrix.com/>

# ST-215 FEATURES

## **Coin Totalizing**

The ST-215 Coin Wizard will accept any combination of coins inserted in any sequence.

Pennies and half dollars are not accepted.

## **Slug and Ferrous Coin Rejection**

The ST-215 Coin Wizard can be ordered with ferrous coin/slug detection. This is indicated by a magnet snapped into the pocket on the center of the spreader lid.

Slug detect can be enabled or disabled.

## **Card-Trak Compatible**

The ST-215 Coin Wizard works with the Card-Trak System to accept Visa, MasterCard, Discover and American Express credit cards.

## **Price Changes**

Either an electronic Keyswitch or a ComLink is used to make daily price changes. The ST-215 Coin Wizard comes equipped with either a three tier keyswitch or ComLink as standard equipment. Price changes are made by turning the key in the keyswitch or by docking a Route Wizard Wand to the ComLink. This manual is intended for use with an ST-215 with keyswitch. For ST-215s with Comlinks, see the ST-215 Route Wizard Manual.

## **Automatic Paper Door Unlocking**

The paper door is unlocked for loading when the key is turned in the keyswitch, eliminating the need for slugs or a second key for access. If the driver turns the key ONLY to open the door, he must remember to turn it back to the correct price position before removing the key.

## **Automatic Coin Path Clearing**

The ST-215 Coin Wizard coin path is designed to open each time the coin return button is pushed to assist in clearing coin jams or debris.

## **Electronic Price Increases/Additions**

New prices can be programmed into an ST-215 Coin Wizard without removing it from the rack. The ST-215 can be reprogrammed using a Wizard Price Set Wand. Price Set Wands are available for purchase or rental.

## **Upgrading to Data Collection (Single-Trak)**

The ST-215 COIN WIZARD can be upgraded to full data collection capability for use with the SINGLE-TRAK Data Acquisition and Management System. ST-215 Coin Wizards can be upgraded in the field by newspaper personnel.

# ST-215 INSTALLATION

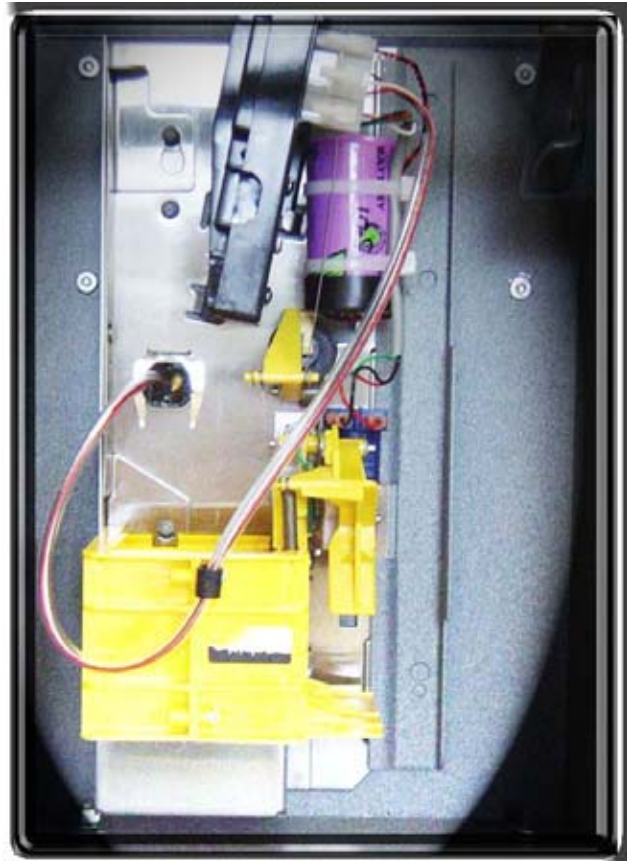
## Recommended Installation Tools

Medium size pliers  
Nut driver, size 3/8-inch

The ST-215 COIN WIZARD fits into newsracks on the same mounting system as older ST-210's and other mechanical totalizer units.

## Removal of Existing Coin Mechanism

1. Open the rack head.
2. Remove the coin tray to prevent damage during installation.
3. Open the newsrack paper door and lock it open.
4. Unlatch the existing totalizer and remove it from the newsrack.



## Changing the Door Tongue

The ST-215 Coin Wizard uses a spring-loaded tongue that is largely self-adjusting. The existing door tongue will not work with the new ST-215 Coin Wizard and may damage it if not removed.

1. Remove the old door tongue using a 3/8-inch nut driver, saving the nuts and bolts to install the new tongue.
2. Mount the new door tongue assembly onto the door.
3. Position the tongue at the middle position of adjustment (See figure at right). Tighten the three nuts.



## Installing the ST-215

1. Install the new ST-215 Coin Wizard on the same mounts used by the old coin mechanism.
2. The locking latch is on the upper left corner of the backplate. Slowly close the newsrack door and check that the tongue slides under the metal trip lever housing and snaps up to lock the door. Raise or lower the tongue if needed.
3. Pull on the newsrack door a few times to make sure that it catches properly.
4. Check the solenoid and the reset control by pressing the blue reset button in the cutaway area on the coin reader assembly. The red LED will flash, the solenoid will fire, and the trip lever will fall and unlock the newsrack door.
5. Pull the front door to make sure that it unlocks each time the reset button is pushed. If the door will not open, the tongue may need to be raised or lowered.
6. Replace the coin tray inside the newsrack and close the rack head. Do not re-lock the head yet.
7. With the rack door and head closed, check the operation of the ST-215 Coin Wizard with coins.
8. Insert the key into the keyswitch and turn the key to the lowest price position (usually all of the way to the left.) Open and shut the door. Drop enough coins into the coin slot to **equal** the set price and verify that the rack opens. Open and shut the paper door.
9. Insert another coin (not a penny) that is **less** than the set price and pull on the door to verify that it does not unlock on less than the correct amount of money.
10. Press the coin return button to return the coin. Activating the coin return clears the current cash total.
11. Turn the key to the second and third price positions and repeat steps 8 –10.
12. Installation and testing are complete and the rack head can be locked.



13. When installing Card-Trak, connect the 8 pin connector from the Card-Trak unit to the header on the reader body. The connector is keyed to avoid improper installation.



**COIN RETURN BUTTONS:**  
Some racks may have a coin return button that is too long or an E-ring/C-clip that is too large. These can interfere with the coin return mechanics on the ST-215 Coin Wizard. Small E-rings/C-clips can be purchased from Bellatrix. For full color version of the ST-215 manual visit [www.bellatrix.com](http://www.bellatrix.com).

# ST-215 MAINTENANCE

Any electromechanical device that has moving parts is subject to interference from the buildup of dirt, grime, etc. ST-215 Coin Wizards have very few moving parts, but still require maintenance. It is helpful to have a supply of spare parts on hand to make quick easy repairs.

## Preventive Maintenance

Cleaning the coin path and door assemblies' occasionally will prevent most problems. In most cases, cleaning with compressed air once or twice a year should be adequate. In very dusty, salty or windy climates, cleaning will be required more often.

Dirt buildup can cause additional friction as the coin slides through the coin path. This can cause coins to move too slowly through the coin path and be misread. Dirt and dust can also cover the lenses in the coin detect/read circuits and prevent coins from being read properly. To clean the coin path, open the coin reader and wipe out dirt with a clean cloth, Q-tip or small brush. Wipe the steel roller on the underside of the spreader lid. Make sure that the roller moves freely and rolls smoothly

### **CLEANING NOTE:**

*Do NOT use oils, lubricants or solvents when cleaning the ST-215 Coin Wizard. These products can cause damage or may leave a film that attracts dust and dirt that will cause malfunctions. These types of cleaners should always be avoided. Use Windex™ or a similar type of cleaner and a cloth, Q-tip or brush to clean the coin path.*

Check all springs on the ST-215 Coin Wizard. If springs are stretched or missing, the ST-215 Coin Wizard will not function properly.

The coin box assembly doors should open freely when you press the return button or move the accept arm. Do NOT test the coin return door by pushing down on it. This can cause the lower return spring to become stretched.

## Lithium Battery

A 3.6 Volt Lithium D-Cell Battery powers the ST-215. This battery is rated non-hazardous. Bellatrix warrants the battery for 6 years. Actual life will depend on use. To test the battery, press the reset button on the reader. If the LED flashes, the battery is still working and does not need to be replaced. However, if the LED does not flash, it does not necessarily mean that the battery is dead. Other circuit board problems could also cause the LED not to light. To replace, unplug the battery from the circuit board and cut the cable ties. Take care not to cut into the battery wires or battery case. Firmly strap the new battery into place with two new cable ties. Pay particular attention to the placement of the battery and solenoid wires. Plug in the battery and press the reset button to reinitialize the electronics.

## ST-215 Coin Wizard Storage

The ST-215 Coin Wizard can be stored on a shelf with the battery unplugged. The ST-215 Coin Wizard will retain price information even when not powered. However, it is not necessary to unplug the battery.

# TROUBLESHOOTING

## LED

The red LED (Light Emitting Diode) is located inside the cutaway section on the black plastic coin reader assembly.

The LED will flash when a valid coin is read and when the reset button is pressed. The LED will not flash for invalid sized coins or ferrous slugs when slug detect is enabled. If the LED does not flash when the coins are dropped, try cleaning the coin path. If this doesn't help, press the reset button. If the LED does not flash when the reset button is pressed, check the battery connection and try again. If the LED still does not flash, try replacing the battery. If it still fails to flash return the ST-215 Coin Wizard to Bellatrix for repair.

## Reset Button

The reset button is positioned just below the LED.

Pressing the reset button re-initializes the micro controller on the ST-215 circuit board. Reset the ST-215 Coin Wizard when reprogramming, when the battery has been unplugged, or when the Coin Wizard is otherwise operating abnormally. Resetting the ST-215 Coin Wizard will not cause it to lose the group ID, Mech ID, or price settings.

## Testing the ST-215 Coin Wizard Out of the Rack

If a rack or test head is not available for testing the ST-215, it can be held in the hand. When testing the ST-215 out of a rack, make sure that the accept arm is lifted UP in the approximate position it would be in were the rack door closed. The ST-215 will not read coins or perform other functions with the accept arm in the DOWN position, simulating an open door. When lifting the accept arm UP, do not overextend it or the extension spring may become stretched. The spring should not be stretched more than an inch.



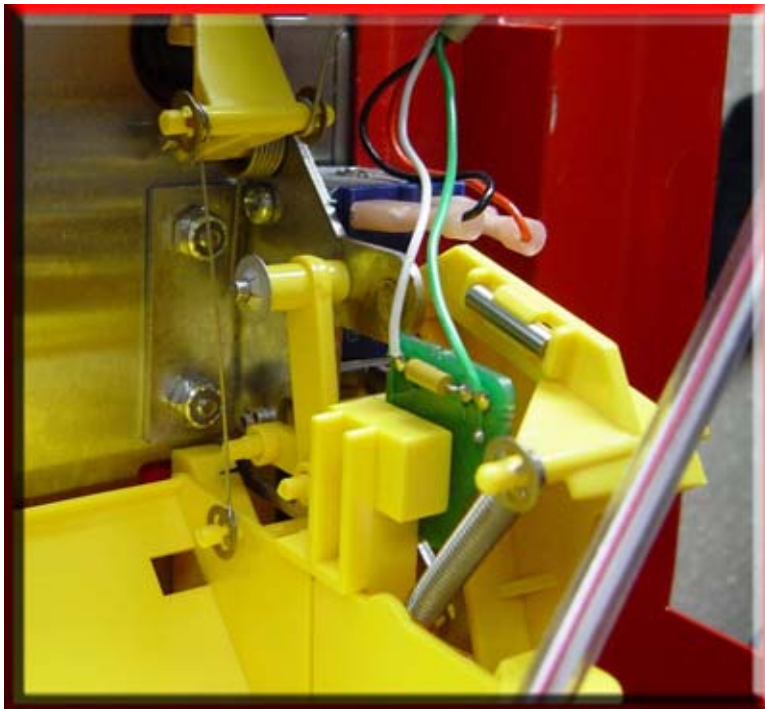


## Problem: Rack Door Opens with Any Coin

### Solution:

If an ST-215 is opening on every coin, it is probable that the microprocessor did not detect the door opening after the last sale. Each time a coin is dropped into the ST-215, the value of that coin is added to the current sales cash and compared to the current sale price. When a cash amount that is equal to or greater than the current sale price is reached, the solenoid is fired, releasing the trip lever, which allows the door to be opened. When the door is opened, the magnet on the accept arm activates the reed switch on the accept reed switch circuit board. This signals the micro controller that the door has been opened and resets the current sales cash to zero. If the magnet is missing in the accept arm or if the reed switch is broken or if the magnet is not close enough to the switch to close it, the ST-215 will not recognize the door opening and will not clear the cash. Now, each time a coin is dropped through, it is added to the current total and compared again. Since the cash was not cleared, it is still equal to or greater than the sale price and the solenoid will fire with each subsequent coin until it detects the door opening. This problem is fairly common with older light green rectangular reed switch boards but rare with the dark green triangular boards.

- Make sure that the magnet is in place on the accept arm. If the magnet needs to be replaced use standard magnet (P/N 317-0004).



- Verify that the accept arm swings all of the way down, making contact with the trip lever housing assembly, when the rack door is opened. If the coin accept door does not swing freely, check and clean the pivot pins and holes. Make sure that the spring does not catch on the coin box.
- Ensure that the reed switch board assembly wires are intact and that the cable is plugged into the reader assembly. Replace the accept reed switch board assembly if damaged.
- Check the cash door to make sure that it swings freely. If the cash door sticks, move the cash door spring away from the push-on nut until it moves freely.
- Check the reed switch with a Reed Switch Tester if available (Part # 100-0077). Otherwise replace with a new reed switch board (Part # 060-0057.) When replacing the rectangular board with the triangular board, a diagonal cutter may be needed to snip the plastic stop from the coin door in order to position the green board properly.
- If the problem persists, return the ST-215 Coin Wizard to Bellatrix for repair.

## **Problem: Rack Door Opens with Coins, but not with Keyswitch**

### **Solution:**

- Check the keyswitch and cable for damage.
- Check that the keyswitch cable is securely attached to the connector on the reader assembly.
- If the keyswitch is not visibly damaged and is properly connected, the fault may be internal to the keyswitch. Replace with a new keyswitch assembly and re-test.
- If the previous steps do not solve the problem, the circuit board is likely at fault. Change out the circuit board or return the ST-215 Coin Wizard to Bellatrix for repair.

## **Problem: Coins Do Not Fall Through the Coin Path**

### **Solution:**

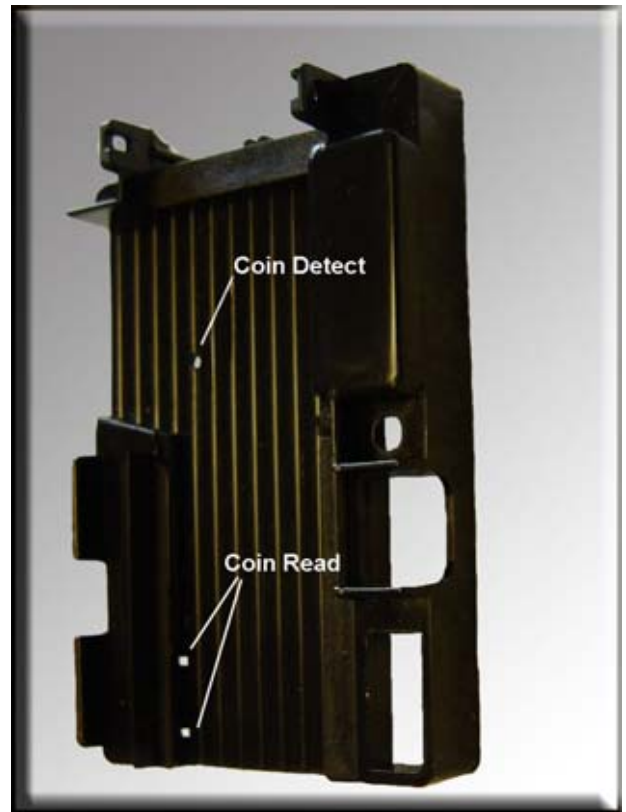
If coins don't fall through the coin path, the most likely cause is an obstruction. Clearing the obstruction will often solve the problem.

- Try to clear debris by pushing the coin return button a few times. If the coin path does not clear, open the rack head to check for debris inside the coin path while pressing the coin return button. Do not use sharp objects or abrasive materials to clean or clear the coin path. These types of materials can scratch the coin path causing coins to jam further. See cleaning note on page 5.
- Check the roller inside the reader lid. It should not have any dents or flat spots. If the roller does not roll smoothly, coins can hang up in the coin path.

## **Problem: ST-215 Coin Wizard Does Not Read Coins**

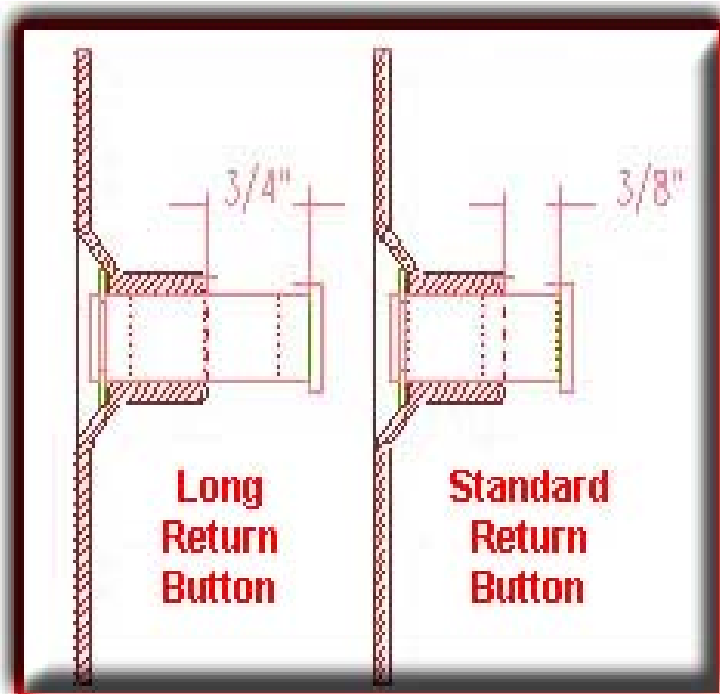
## Solution:

- The LED on the ST-215 will flash each time a **valid** coin is read. Drop coins into the ST-215 Coin Wizard and observe the LED on the reader. If the LED does not flash, the coin is not recognized as valid or the coin is not detected.
- ST-215s with “CrossDetect” sense coins by projecting the infrared light from the spreader lid to the circuit board. (Top Hole.) Dirt or other materials can build up in these holes, preventing the infrared light from reaching the detectors. Clear plastic lenses beneath the holes protect the circuit board from the dirt but the lenses may become scratched or dirty. Try cleaning the coin path with a small soft brush, compressed air or a Q-Tip and Windex. Thoroughly clean both sides of the coin path. If necessary, disassemble the reader assembly, remove the lenses and clean them. Reset and test the ST-215 Coin Wizard again.



## Problem: Coin Return Button Does Not Return Coins or Jams

### Solution:



- Make sure that the upper return spring has a small amount of play. If the spring is bent or jammed it will effect the operation of the coin reader.
- Check the coin return button E-ring. Large size E-rings can easily get caught on the return torsion spring or the bell crank, causing the coin return to be stuck open. Small E-rings are available from Bellatrix.
- Replace the lower return spring when it becomes stretched. A stretched lower return spring can cause the coin return door to sag, allowing coins to fall through into the coin return. A stretched lower

return spring can also cause the return catch to hit on the post and prevent the trip lever from falling. This will keep the paper door from opening.

- Some TK newsracks are equipped with a long coin return button. In many cases, this button is too long for the ST-215 and should not extend more than 1/2" beyond the front of the rack. A button that is too long can jam the return bell crank if it is pushed in too far. Use of standard length buttons is recommended. Conversely, it should not extend too far inside the rack. Typically, the E-ring that secures the button is about 3/16 inches from the tip that presses against the ST-215 Coin Wizard. The button should spin freely when turned.
- The coin return will not operate and the coin return door will not open unless the trip lever is in the UP position.

### **Problem: Solenoid Does Not Fire**

#### **Solution:**

- Reset the ST-215 Coin Wizard while watching the solenoid and trip lever. The solenoid should fire and the trip lever fall.
- If the solenoid does not fire or fires weakly check for burrs, dirt, spider webs etc. on or around the solenoid plunger and trip lever area. Use compressed air and/or a Q-Tip with Windex or electronics cleaner to clean the solenoid plunger and surrounding area. **Never** use any type of lubricant or cleaner that leaves a residue on the solenoid plunger or any other part of the ST-215 Coin Wizard!
- A leaky capacitor, broken capacitor lead or dead battery will also prevent the solenoid from firing.

**CHANGING PRICES**

## Overview

Paper prices are stored electronically in the ST-215 Coin Wizard reader. New prices can be programmed into the ST-215 Coin Wizard by using a Wizard Price Set Wand or Programmable Wizard Price Set Wand. The Wizard Price Set Wand pictured below comes preprogrammed with customer prices from the factory. The Programmable Wizard Price Set Wand allows the customer to set and change prices as desired. Either wand may be rented or purchased from Bellatrix.

**Rental or purchase orders should be placed at least 4 weeks before required.**

### SETTING PRICES WITH A WIZARD PRICE SET WAND

1. With the ST-215 in an upright position, and rack door closed, unplug the keyswitch cable from the 6-pin connector on the coin reader.
2. Plug the cable from the WIZARD Price Set Wand into the 6-pin connector on the ST-215 Coin Wizard. The connector is keyed so you cannot put it in upside down.
3. Press the reset button on the ST-215 Coin Wizard.
4. Press and hold the Program button on the WIZARD Price Set Wand.
5. When the Program button is pushed, the green LED on the wand will light. The wand will emit a long beep and the green LED will turn off. If these three things occur, the new prices have been successfully programmed into the ST-215 Coin Wizard.
6. If the wand emits a continuous series of short beeps and the green light does not come on, programming was NOT successful. Recheck the cable connections, press the reset button on the ST-215 and try again. If ST-215 will not program, return it to Bellatrix for repair or call Technical Support.
7. Disconnect the WIZARD Price Set Wand cable from the coin reader.
8. Reconnect the keyswitch cable.
9. Reset the ST-215. The ST-215 Coin Wizard should be reset each time it is reprogrammed with new prices.



## SETTING PRICES WITH A PROGRAMMABLE PRICE SET WAND



The Programmable Wizard Price Set Wand sets prices in the ST-215 Coin Wizard according to the dipswitch settings on the front of the wand. Three dipswitches allow 3 different price tiers to be set, ranging from \$0.05 to \$6.30. However, the maximum price that a ST-215 Coin Wizard will accept is \$5.10. Do not exceed this price when setting the switches. Each of the three dipswitches has 7 ON/OFF toggle switches. The value of each switch that is toggled ON is summed to produce the total price. If ALL switches are toggled OFF or ON the default price is set to 25¢. The values of the switches begin with 5¢ and double as they progress. The last switch value is \$3.20. A switch is toggled ON when

pushed to the left and OFF when pushed to the right.

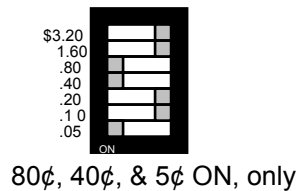
1. With the ST-215 in an upright position and rack door closed, unplug the keyswitch cable from the 6-pin connector on the coin reader.
2. Plug the cable from the Programmable Price Set Wand into the 6-pin connector on the ST-215 Coin Wizard. The connector is keyed so you cannot put it in upside down.
3. Press the reset button on the ST-215 Coin Wizard.
4. Set the dipswitches to the prices you want and press the Program button.
5. When the Program button is pushed, the green LED on the wand will light. The wand will emit a long beep and the green LED will turn off. If these three things occur, the new prices have been successfully programmed into the ST-215 Coin Wizard.
6. If the wand emits a continuous series of short beeps and the green light does not come on, programming was NOT successful. Recheck the cable connections, press the reset button on the ST-215 and try again. If ST-215 will not program, return it to Bellatrix for repair or call Technical Support.
7. Disconnect the Programmable Price Set Wand cable from the coin reader.
8. Reconnect the keyswitch cable.
9. Reset the ST-215. The ST-215 Coin Wizard should be reset each time it is reprogrammed with new prices.
10. Coin test the prices to be sure that the ST-215 Coin Wizard was set properly.

## PRICE SET EXAMPLE

To set the first price to 25¢ either toggle all switches on the first dipswitch to the ON position, all to the OFF position, or set ONLY the 5¢ and 20¢ switch to the ON position. (See example below)



To set the second tier price to \$1.25, use the middle dipswitch. Toggle the 80¢, 40¢, and 5¢ switches to ON. (See example below: 80¢ + 40¢ + 5¢ = \$1.25)



The third price tier is set with third dipswitch.

All keyswitches sold by Bellatrix are 3-tier. In **3-tier pricing**, the first price position is fully counter-clockwise on the keyswitch; the second price is the center position; and the third price position is fully clockwise on the keyswitch.

For 2-tier keyswitches, the third price on the Price Set Wand will not be used. In **2-tier pricing**, the first price position is fully counter-clockwise and the second price position is fully clockwise on the keyswitch.

## LOW BATTERY LIGHT

If the Low Battery light is lit, replace the wand battery with a 9V alkaline battery. To replace the battery, remove the battery cover on the back of the wand. Replace the old battery with a new battery. Replace the battery cover.

# TECHNICAL NOTES

## **Coin Detect Circuit:**

The coin detect circuit is comprised of a one-shot, a photo transistor, an LED (light emitting diode), and a comparator. The one-shot acts as a high speed switch and strobes the LED on and off at a rate of 50 times per second. The photo transistor is turned on just before the LED is strobed, and turned off just after the strobe. A NAND gate is used to detect whether or not any light passes through the coin path. If light passes through the coin path, no coin is present. If no light gets through, a coin is in the coin path. When a coin is detected this circuit will cause the coin read circuit to be switched on.

## **Coin Read Circuit:**

The coin read circuit is actually two separate circuits like the coin detect circuit. When turned on, the circuits remain on until a coin passes, or a set amount of time passes with no interruption in the supply of light. The coin read circuits are exactly  $\frac{1}{2}$  inch apart and as the LED of each circuit is blocked, counters record the duration of blockage. The values stored in the counters are then entered into a mathematical equation which renders a relative diameter. This diameter is then compared to a pre-programmed table and based on that table, enters the value into the temporary register.

## **Slug Detect Circuit:**

The slug detect circuit is comprised of a magnet and a reed switch. (A reed switch is two pieces of wire, flattened on the ends, overlapped, and sealed in a glass case.) The reed switch is located on the main PCB and is marked S3. The magnet is located in a molded slot on the outside of the reader lid, about halfway down in the center. The reed switch is held closed by the magnetic force of the magnet. When a slug passes through the coin path the magnetic force is broken allowing the reed switch to open, which in turn causes the coin read circuit to be disabled and ignore the slug. Slug detect is an optional feature and is enabled at the factory. Coin Wizards without this feature will not have a magnet in the center of the reader lid. A slug is defined as a coin or token having ferrous content. If it can be picked up with a magnet, it is considered a slug.



### **Coin Accept Circuit:**

The coin accept circuit operates on the same principle as the slug detect circuit. The reed switch is located on its own PCB and labeled S2. The PCB is mounted on the right coin door box and held in place with one Phillips head screw. The magnet is located on the accept arm in a molded slot. When activated, it moves the cash from the temporary register to the cash register and adds a sale to the sales register.

### **Coin Return Circuit:**

The coin return circuit operates on the same principle as the slug detect circuit. The reed switch is located on the main PCB and labeled S1. The Magnet is located on the outside of the reader lid in the lower right corner. When activated, it clears the cash from the temporary register.

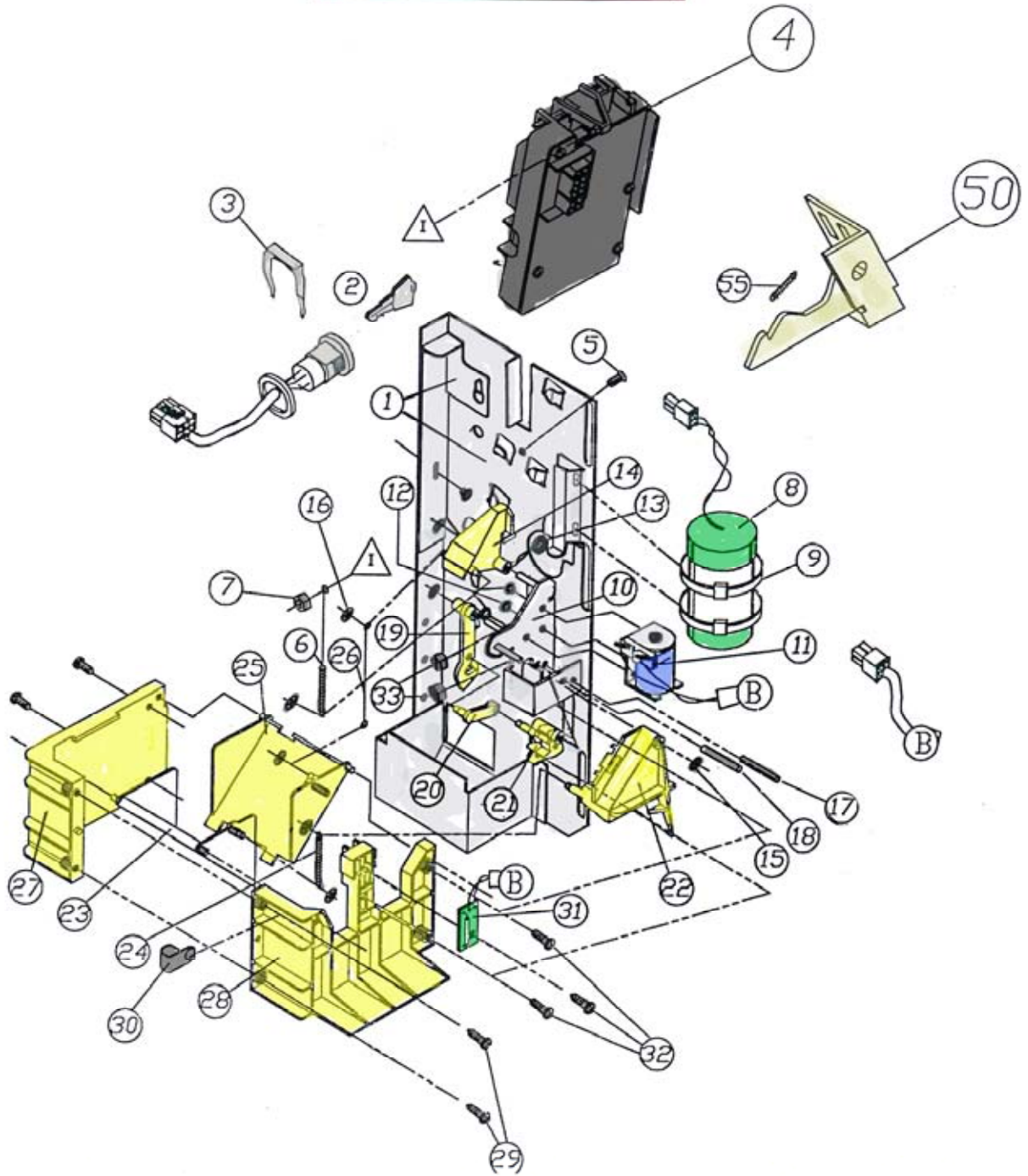
### **LED and Reset Switch:**

The LED and reset switch are located on the left side of the reader body, halfway down in a cutaway. The reset button, when pressed, will cause the LED to flash and the solenoid will fire, allowing the newsrack door to be opened. In addition to flashing when the reset button is pressed, the LED will flash every time a valid coin is read. (A valid coin is one in which the diameter is within the parameters set in the coin table.)

### **Door Tongue Assembly:**

The door tongue is a spring loaded two piece design. Rather than the locking mechanism on the Coin Wizard moving out of the way of the latch, the latch is now designed to move out of the way of the locking mechanism. This has virtually eliminated moving parts and drastically increased ease of installation.

**Bellatrix Systems, Inc.**  
**ST-215 COIN WIZARD®**  
Exploded Assembly



See <http://www.bellatrix.com/PartsAndRepair/ProductGrid/Default.aspx?id=38> for current parts price list.