



**BC-1200/1400**

**Bill & Coin Changer  
with Fast Pay System**

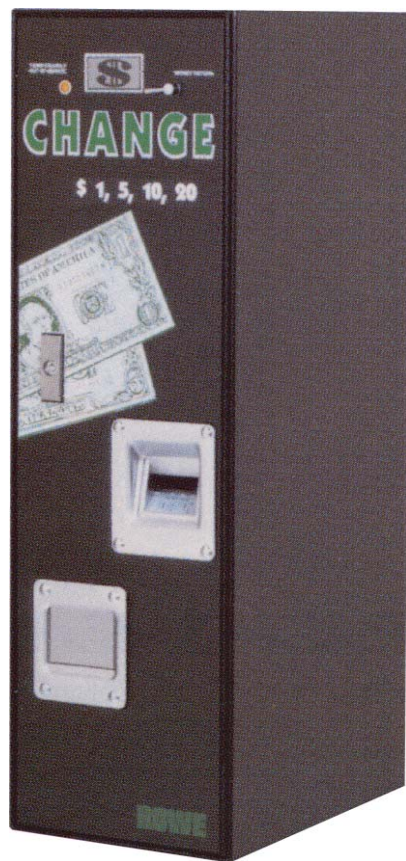
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**Field Service Manual  
and  
Parts Catalog**

# BC-1200/1400

## Bill and Coin Changer

Field Service Manual  
and  
Parts Catalog



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Printed in USA

## Preface

This service manual is divided into six sections:

**Section 1 System Description**—Introduces you to the BC-1200 and BC-1400, their features, and their major components, principles of operation, and capacities.

**Section 2 Installation and Programming**—Guides you through step-by-step installation instructions and detailed setup (programming) procedures.

**Section 3 Routine Service**—Provides routine service instructions for general maintenance and preventive maintenance. This section provides information for routine service and identified problems. Refer to *Section 4: Troubleshooting* for procedures and techniques to identify a malfunction or reject problem.

**Section 4 Troubleshooting**—Provides troubleshooting charts, detailed error message descriptions, troubleshooting procedures, a block diagram, schematics, circuit board layouts, and components lists. This section also contains a detailed sequence of operation.

**Section 5 Miscellaneous**—Contains a harness color code list and other miscellaneous information.

**Section 6 The Parts Catalog**—Lists and illustrates all replaceable modules in the BC-1200 and BC-1400.

This manual is intended for owners, route operators, and technicians. It provides all field and shop related service and maintenance material. Accessories and their installation and service are discussed in the corresponding accessory instructions (or manuals).

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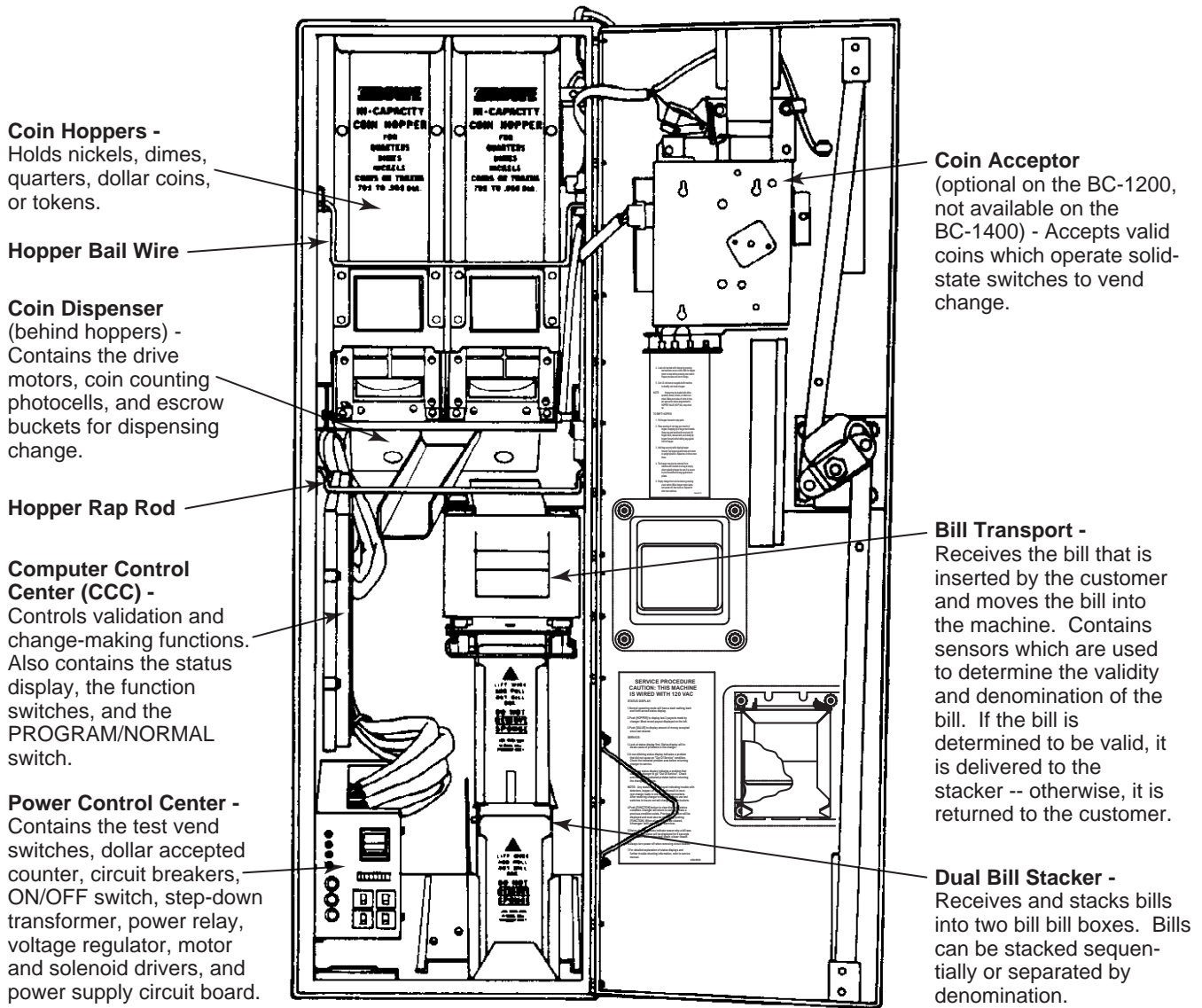


Figure 1-1. BC-1200 Major Components

# Section 1: System Description

## INTRODUCTION

The Rowe BC-1200 Bill and BC-1400 Bill and Coin Changers are our medium capacity money changers that use the latest computer and money changer technology which combines Rowe quality and reliability with maximum flexibility and ease of installation and service.

The BC-1200 accepts and dispenses change for combinations of quarters, half-dollars, and Susan B. Anthony coins as well as 1, 2, 5, 10, and 20 dollar bills of United States currency.

The BC-1400 accepts 1, 2, 5, 10, and 20 dollar bills of United States currency. The coin acceptor option is not available on the BC-1400.

Both machines are designed so that denominations can be programmed to be accepted in many combinations, as can the choice of coins payed out.

- A high security cabinet provides theft protection.
- A microcomputer in the Computer Control Center (CCC) selectively discriminates between denominations, provides protection against bogus bills, and controls the change dispensing functions.
- Plug-in circuits and assemblies are featured for fast field substitution.
- Coin combinations and acceptable denomination programming is easily changed using the FUNCTION, UP, DOWN, VALUE, and HOPPER buttons on the computer control center.
- Removable coin hoppers permit rapid bulk loading of coins.
- During setup, a special payout check feature ensures that the payout amount selected matches the denomination accepted, unless tokens are being dispensed.

Refer to *Figure 1-1* for the locations of the major BC-1200 components.

## GENERAL OPERATION

The entire validation and payout sequence is controlled by a microcomputer to ensure the maximum security against bogus currency and jackpotting. Refer to the *Detailed Computer Board Operation* in *Section 4* for a complete explanation of how the machine works.

### Changing a Bill

Inserting a dollar bill in the transport starts a motor which moves the bill along the acceptor track. While in motion, the bill is examined to determine whether or not it is valid. (During this time, the message "VALIDATING" will appear on the computer's display.)

If the bill is valid, a vend signal is transmitted to the dispenser and the bill drops into the bill stacker where it is stacked flat against other valid bills. At this time, the message "PAY\$1" (for example) for a \$1 bill will appear on the display.

The one dollar change bucket opens, and the dollar's worth of change drops into the coin cup.

The coin hopper motors then operate, loading the correct number of coins from the left, and right coin hoppers into the change bucket for the next payout.

If the bill is not valid, the bill transport motor reverses, returning the bill to the customer.

## Changing Coins

Quarters, half-dollars, and dollar coins pass through the coin acceptor if the changer is so equipped. Solid-state coin sensors start the payout cycle for these coins (BC-1200 only).

## FUNCTIONAL DESCRIPTION

This functional description can be used to gain an overall understanding of the BC-1200/1400 and their operation.

### Bill Transport

The bill transport (*see Figures 1-2 and 1-3*) receives a bill as it is inserted by the customer. The bill is transported through the transporter on a belt system, carefully examined and, if the bill is determined to be valid, is delivered to the bill stacker.

If the bill fails any of the validation tests, the transport reverses and returns the bill to the customer. The bill will hang in the transport inlet for a period of three seconds during which time the control computer will display a message explaining the cause for the rejection. If the bill is not removed during this these three seconds, the computer will display "PURGING ACCEPTOR" and a self-purging routine will begin. If the bill is removed in the three-second period, the cause of the rejection will remain on the display for 30 seconds.

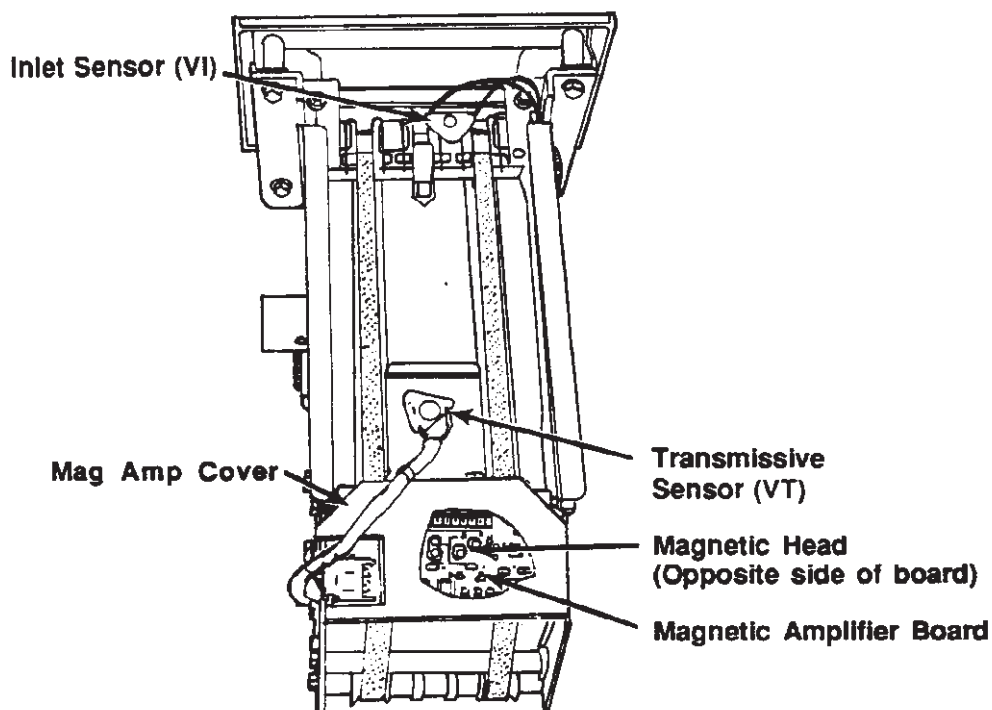


Figure 1-2. Bill Transport (Top View)

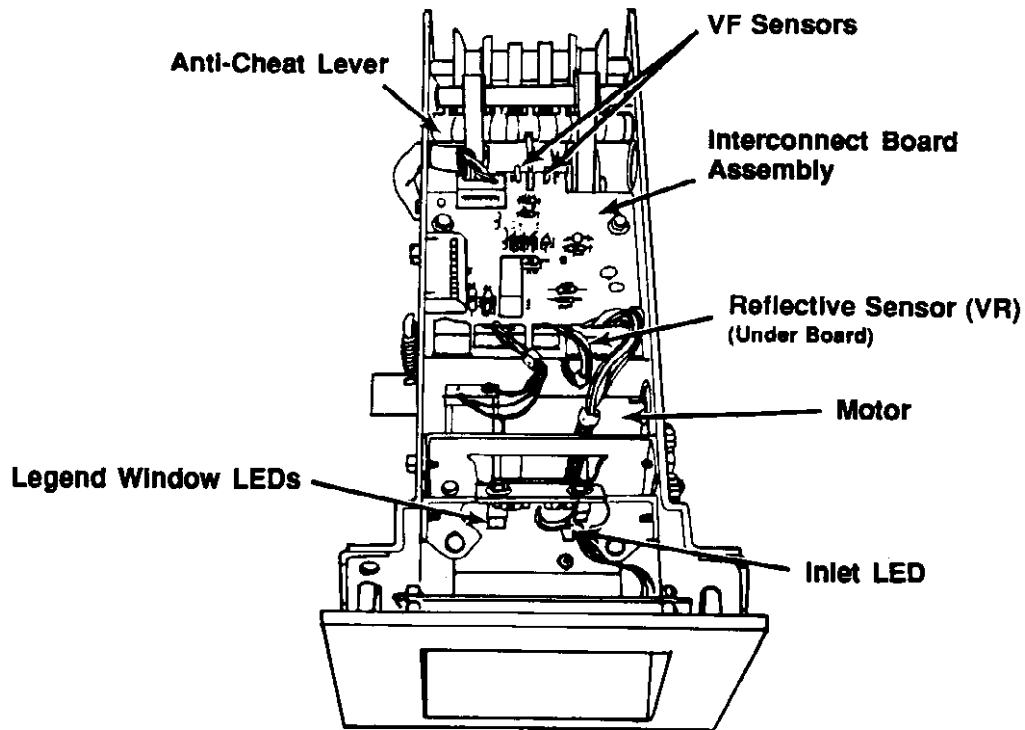


Figure 1-3. Bill Transport (Bottom View)

## Dual Bill Stacker

The dual bill stacker in *Figure 1-4* has the capability of stacking bills in two separate bill boxes. This feature allows the bill changer to alternate between the two bill boxes or to separate bills by denomination. This function is controlled by the CCC, which activates a solenoid-driven lever in the stacker. When this lever is in its rest position, it acts as a stop to position the falling bill in line with the upper bill box. When energized, this lever drops out of the way and allows the bill to fall to the lower bill box position. Once the bill is positioned properly, a signal from the CCC activates a triac drive circuit in the stacker. As the stacker leaves home position, a single cam switch closes and performs two functions:

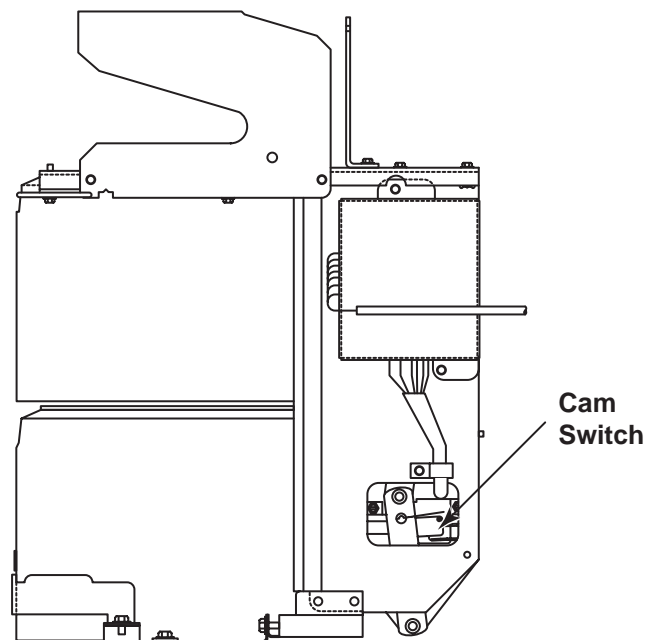


Figure 1-4. Dual Bill Stacker

- It holds the triac drive circuit ON and also activates the stacker monitor line to the CCC.
- When the stacker completes its cycle, the cam switch opens, stopping the stacker motor and deactivating the monitor line to signal the CCC that it is ready for the next cycle.

## Coin Acceptor (Optional on BC-1200; Not available on BC-1400)

The coin acceptor checks the coins for which it was designed to determine their validity. Each coin is checked for thickness, diameter, weight, and metallic content. If the coin is deformed or invalid, it is directed through the coin acceptor to the coin return cup. Genuine coins are directed through the coin acceptor and actuate either of the two solid-state coin switches located on the rear bottom of the slug rejector frame.

Jammed coins or slugs are cleared from the coin acceptor by a wiper arm on the coin acceptor, which is actuated by the MONEY RETURN button. The coin inlet and chute deters cheating and jamming. Various coin acceptors are available as order options. Use Table 1-1 that follows as a guide:

**Table 1-1. Coin Acceptor Options (BC-1200)**

Coin Accepted	Coin Acceptor	Bracket & Harness	Instruction Panel	Coin Block
None	-----	-----	25211713	-----
25¢	40861402	35026111	25211706	27027206
\$1*	27063801	30998802 Holder 35028216 Harness	25211710	None
\$1**	27064001	30998802 Holder 35028211 Harness	25211710	None

\* Electric Coin Validation via Mars ME330

\*\* Electric Coin Validation via Nri G13



### NOTE:

Accepting certain combinations of coins may reduce the number of bill combinations that can be accepted. (See Section 2 for details.)

## Solid-State Coin Switches

As a coin passes through a slot in the coin switch assembly with any mechanical coin acceptor, it momentarily interrupts an infrared light beam, causing a solid-state optical detector to send an electric pulse to the CCC. The duration of this pulse is then checked by the computer to determine its validity. Valid coins will initiate the dispense cycle. A separate infrared LED and optical sensor and photo-transistor pair is provided for each of the two possible coin denominations accepted.

## Dispenser

The dispenser (*see Figure 1-5*) contains the necessary components to handle the coins. The upper coin chute from the coin detectors to the bucket, the escrow buckets, solenoid assemblies, and the dispenser chute to the coin cup are located on this assembly.

The coin detectors, each consisting of an LED and a photo-transistor, detect the coins as they exit from their respective hoppers and fall into the upper coin chute.

The upper coin chute directs the change to the escrow buckets.

The drive for the hoppers consists of two AC motors, which are also on the dispenser. These motors, as well as the solenoids which open the bottom door of the escrow buckets, are controlled by signals from the CCC.

You can access the rear of the dispenser assembly by removing the two screws in the upper corners, grasping the dispenser at the arrow, and tilting the entire assembly forward on its lower pivots.

When you replace the dispenser, be sure that you tighten down the two top screws securely. If these screws are not tightened down, the entire dispenser assembly may tilt forward when the hoppers are unloaded or removed.

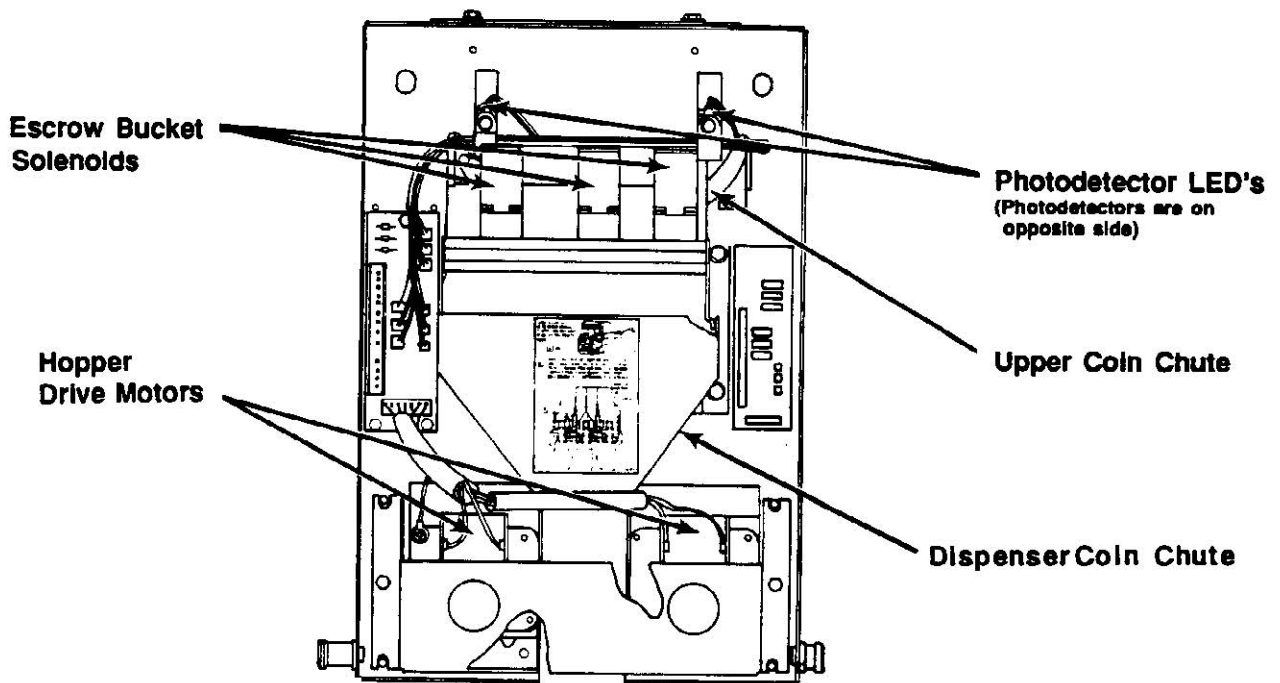


Figure 1-5. Coin Dispenser (Rear View)

## Hoppers

The bill changer contains two coin hoppers (see Figure 1-6) which mount on the front surface of the dispenser assembly and pivot forward from the bottom for loading, unloading, and removal (see Table 1-2 for required hopper types and capacities).

The hopper transports coins to the detectors and coin chutes by means of a chain conveyor, which is driven from below by a sprocket. The chain follows a serpentine path, so that excess coins fall back into the hopper ensuring only one coin per pin enters the coin counting area.

The chain picks up coins from the bottom of the hopper and carries them up to the top, where they fall through the upper chain guide ring and interrupt a light beam to a photodetector, which is mounted on the dispenser. The required number of coins for a desired change combination are counted in this manner as the coins then fall through a closed chute to the escrow bucket.

An agitator, which is mounted on the drive shaft of each hopper, agitates the coin load to minimize coin jams in the hopper and ensure efficient coin pick up.

To reduce jams and minimize the need for cleaning, the hoppers also have Teflon-coated coin tracks.



### NOTE:

The hoppers do not have an “Empty Sensor”. Empty hoppers are indicated by a failure to count the required number of coins in a specified period of time (approximately three minutes), however, if the changer shuts down frequently with an error relating to empty hoppers when they are not, then the “serpentine coin path” should be cleaned as shown in Section 3.

## HOPPER CAPACITIES

Hopper	Popular Coin Capacities
65027608 (High-Capacity) Small Coin .705 to .955 inch diameter	Dimes - 8,000 Nickels - 4,000 Quarters - 3,400
65027609 (High-Capacity) Large Coin/Token .937 to 1.125 inch diameter	Quarters - 3,200 Dollars - 2,200 .984 inch Tokens - 3,000

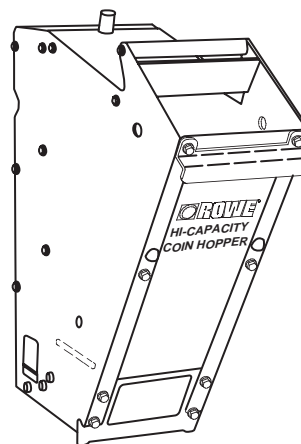


Figure 1-6. Coin Hopper

## MACHINE CAPACITIES

### Bill Stacker

**Separate Mode** - 1000 bills in the upper bill box plus 1000 bills in the lower bill box - however, since it is unlikely that the machine will take in the same number of bills in both bill boxes, the capacity may be limited to something less (the stacker is filled when either bill box reaches 1000 bills).

**Alternate Mode** - 1000 bills in the upper bill box plus 1000 bills in the lower. Bills are not separated, in order to fill both boxes to maximum capacity.

### Coin Box

500 Quarters

**NOTE:** For escrow bucket capacities, see *Table 2-1*.

## Money Return Lever (BC-1200) / Money Return Switch (BC-1400)

When the MONEY RETURN lever on the BC-1200 (see *Figure 1-7*) or the MONEY RETURN switch on the BC-1400 is depressed, a switch closes and sends a signal to the CCC. The coin lockout coil in the (optional) coin acceptor is released and the transport motor rotates in the reverse direction. If the switch is held (ON) for more than 10 seconds, the transport will turn OFF automatically to prevent excess wear and overheating. If it is held ON longer than 10 seconds, the message CHK BILL RETRN will be displayed, and the switch will be ignored until the FUNCTION button is pressed.

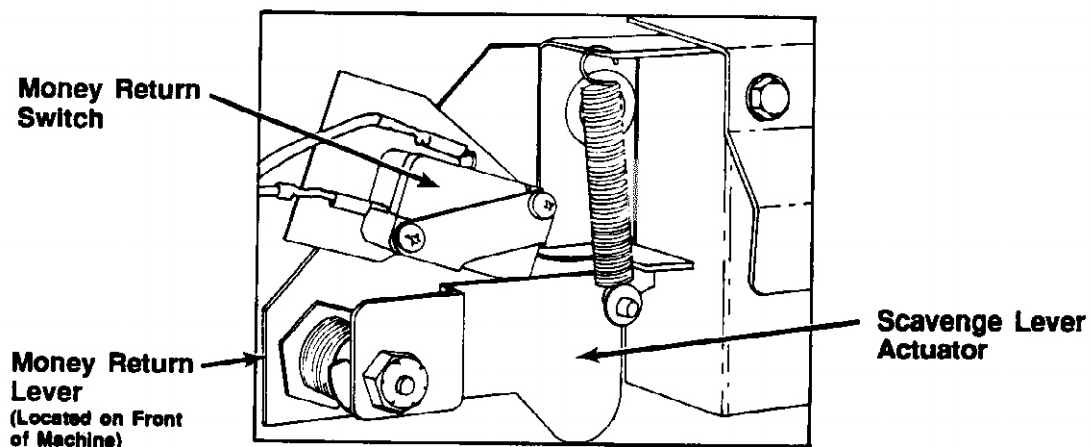


Figure 1-7. BC-1200 Bill Return Switch



## Temporarily Out of Service Lamp

This lamp lights whenever the machine is empty of change or shutdown due to some malfunction. In addition, the 40 VDC LED will normally go out if the out of service lamp is lit. Press the FUNCTION button on the CCC to turn the OUT OF SERVICE light off after the machine has been reloaded or if the malfunction has been repaired.

The temporarily OUT OF SERVICE lamp also lights during all transport errors. These errors include recoverable errors. The OUT OF SERVICE lamp will turn OFF if a recoverable error condition clears by itself.

The changer will shut down for reasons other than being empty; specifically if a fault or malfunction of the machine occurs. When the changer shuts down, a message will appear on the display located on the computer board. This message will greatly aid the service person in quickly determining the malfunction or faulty part (*see Section 4: Troubleshooting*).

## EMI Filter

The ElectroMagnetic Interference filter removes undesirable electronic noise from the incoming power line. It is located in the junction box just to the right of the right hopper.

## Power Control Center

All power supply components and associated circuitry are located in this single subassembly for easy diagnosis and repair. The power control center (*see Figure 1-8*) is located below the dispenser assembly and contains the dollars accepted counter, TEST VEND switches, power transformer, power supply circuit board, circuit breakers, and ON/OFF switch.

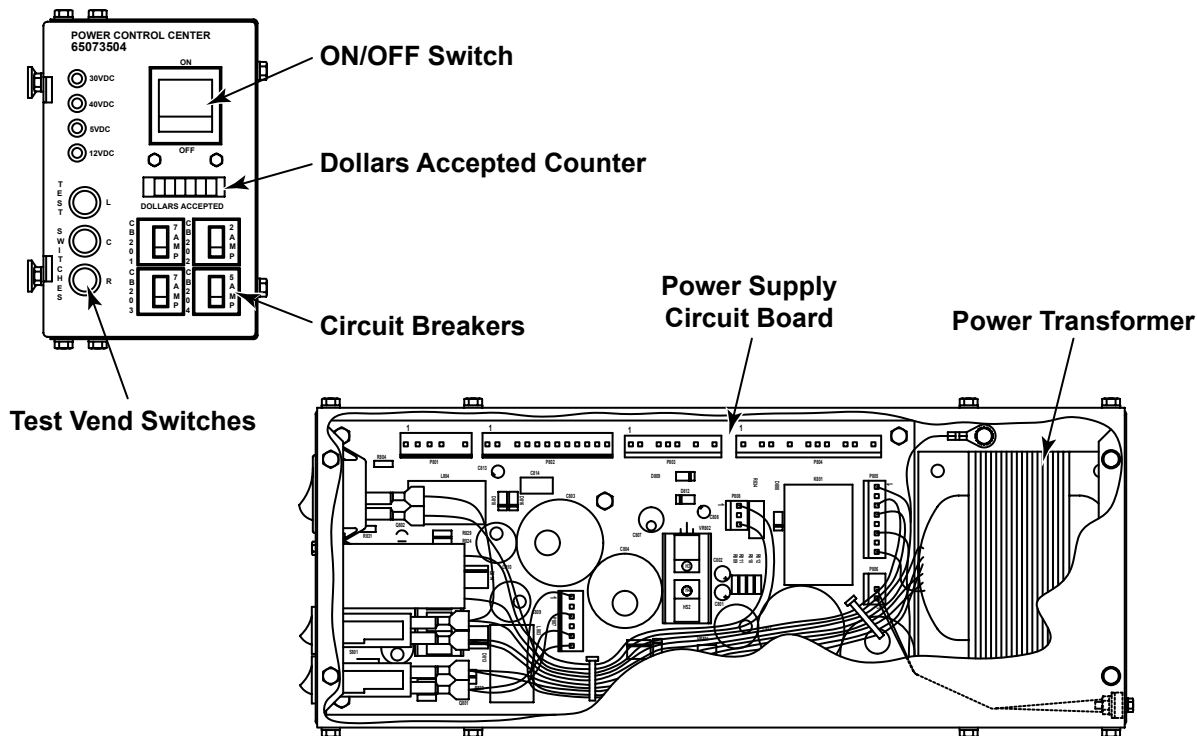


Figure 1-8. Power Control Center

## **DOLLARS ACCEPTED COUNTER**

The dollars accepted counter registers the number of dollars accepted by the machine. The counter increments once for each dollar. (For example: A \$5 bill will make the counter increment five times.) This counter is not resettable.

## **POWER SUPPLY**

The ON/OFF switch controls power to the machine.

A 7-amp circuit breaker is in the power line to the bill changer. The power transformer is protected by a 2-amp circuit breaker in the primary winding. A 7-amp and a 5-amp circuit breaker protect the secondary windings.

The power supply circuit board rectifies and filters the 36 VAC and 22 VAC to provide 40 VDC, 30 VDC (current limited), 12 VDC, 8 VDC, and 5 VDC to the rest of the system. It contains indicator LED's for the 40 VDC, 30 VDC, 12 VDC, and 5 VDC supplies. Note that the 12 VDC actually runs at about 14.6 V – this is normal.

## **TEST SWITCHES**

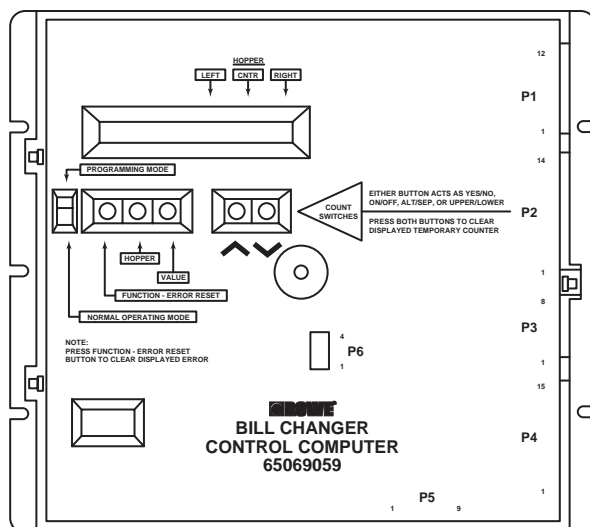
The three TEST switches are used to manually initiate a change dispense cycle for each of the machine's escrow buckets. The computer will not recognize a TEST switch closure if the machine is in the process of validating a bill, dispensing change, or in SHUTDOWN. Pushing a TEST switch will also cause the stacker to cycle.

## **POWER CONTROL RELAY**

The power control relay switches the 40 VDC, 30 VDC, and 120 VAC supplies to the machine and 5 VDC to the OUT OF SERVICE lamp. This relay is controlled by the CCC and is energized under normal operating conditions. Under OUT OF SERVICE conditions, the CCC de-energizes the relay to disconnect the previously mentioned voltages from the rest of the system and shut down the machine. In this condition, the +40 VDC LED on the power supply board will be OFF, while the other three remain ON.

## Computer Control Center

The computer control center (referred to as the “CCC” and *shown in Figure 1-9*) directs all of the operations of the bill changer including both validation and change dispensing functions. It contains a microcomputer which controls all of the major functions of the bill changer. It also contains the following controls and displays:



**Figure 1-9. Computer Control Center**

### STATUS DISPLAY

The CCC contains many programming and self-diagnostic features which are described in the paragraphs that follow. All messages are shown on a 16-character vacuum fluorescent display. In some cases, the message is short enough so that the word(s) can be spelled out; in other cases the word(s) are abbreviated. The abbreviations are clear and logical and each message is described in *Section 4* of this manual.

### SERVICE AND CONTROL SWITCHES

The Changer’s service features and programming options are controlled by six switches. The descriptions that follow are introductory; *follow the detailed procedures and instructions in Section 2* for specific operating and programming information.

#### Programming/Normal

Select either the NORMAL operating mode or the PROGRAMMING mode.

#### NORMAL POSITION

In the NORMAL mode position, the changer operates in a normal manner. The CCC monitors all systems for faults or customer input.

The VALUE and HOPPER buttons provide unique features while the machine is in the NORMAL mode.

### Value Button

Pressing the VALUE button will cause the display to show the total dollar amount accepted since the temporary audit value was cleared. Thus, if you clear this audit counter (*see Section 2*) each time you load the hoppers, you can quickly see how much change has been paid out and thus determine whether or not the bill changer needs to be loaded again.

### Hopper Button

Pressing the HOPPER button will cause the display to show the last three denominations accepted. The most recent denomination is displayed on the left side, the bill before that is displayed on the right side. If a test vend is included in this list, the display will show: “TVL”, “TVC”, or “TVR” (depending on which TEST VEND switch was pressed) in its proper position on the display. If a coin was accepted, the display will show “25”, “50”, or “\$1C” on the display in its proper sequential position (left, center, or right position).

When the PROGRAMMING/NORMAL switch is moved from PROGRAMMING to the NORMAL position, the message “STORING NEW DATA” will be displayed.

### PROGRAMMING POSITION

Setting the PROGRAMMING/NORMAL switch to the PROGRAMMING position allows you to inspect and/or change the audit and setup information. This information is displayed on the status display and is selected and changed by using the five pushbuttons that are described in the following paragraphs (*see Section 2: Changing Payout Programming Also*):

### Function Button

Advances from the current set of options to the next set. The following list shows the sequence of options that will be displayed as the FUNCTION button is pressed repeatedly:

- |                  |                         |
|------------------|-------------------------|
| 1. TEMP COUNTERS | 6. ACCEPT               |
| 2. PERM COUNTERS | 7. PAYOUT               |
| 3. PROGRAMMING   | 8. STACKER MODE ALT/SEP |
| 4. MC PAYOUT     | 9. BILL B CHECK         |
| 5. HOP VAL       | 10. BILL TEST           |

If the FUNCTION button is pressed while BILL TEST is showing, the “TEMP COUNTERS” display will reappear.

### Hopper Button

In the PROGRAMMING mode, this button advances the display to the next hopper if the display includes hopper information.

### Value Button

During the PROGRAMMING mode, this button is used to move between various values: i.e., the value of coins in the hoppers, denominations to be accepted, etc.

### **Up ^ and v Down Buttons**

Increment or decrement the displayed option value. Options that have only two possibilities, such as ON and OFF, are toggled between the two options using either of these buttons.

## **DENOMINATIONS ACCEPTED**

### **BC-1200**

The BC-1200, if so configured, can accept quarters and dollar coins as well as 1, 2, 5, 10, and 20 dollar bills of United States currency. All of these denominations can be selected in combination with other denominations.

### **BC-1400**

The BC-1400 has all the functions and capability of the BC-1200 (in the previous paragraph), except that it does not accept coins.

## Section 2: Installation & Programming

### INSTALLATION

Installing the BC-1200/1400 Bill and Coin Changer requires some instruction. For all types of installation, be sure that a power source is convenient and that the changer is mounted level. ***Always use a grounded (3-prong) outlet.***



#### NOTE:

For both security and safety reasons, Rowe strongly recommends that this bill changer be securely anchored to the floor and/or wall. Please check the instructions that follow:

### INSTALLING A BC-1200

#### Wall Mounting

The following illustrations and procedures should be used for wall mounting. For concrete or masonry wall mounting, use lag screws and lead anchors. For wood frame wall mounting, use lag screws attached directly into the wall studs. If the wall is not flat, you may need to add spacer washers between the wall and the mounting plate.

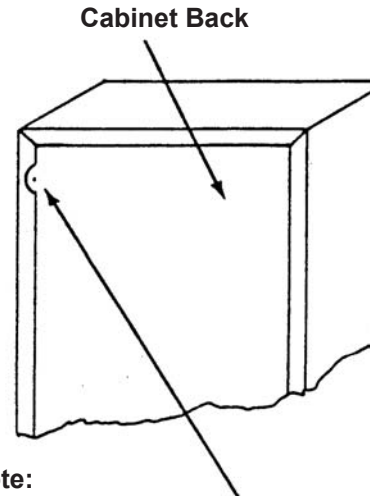
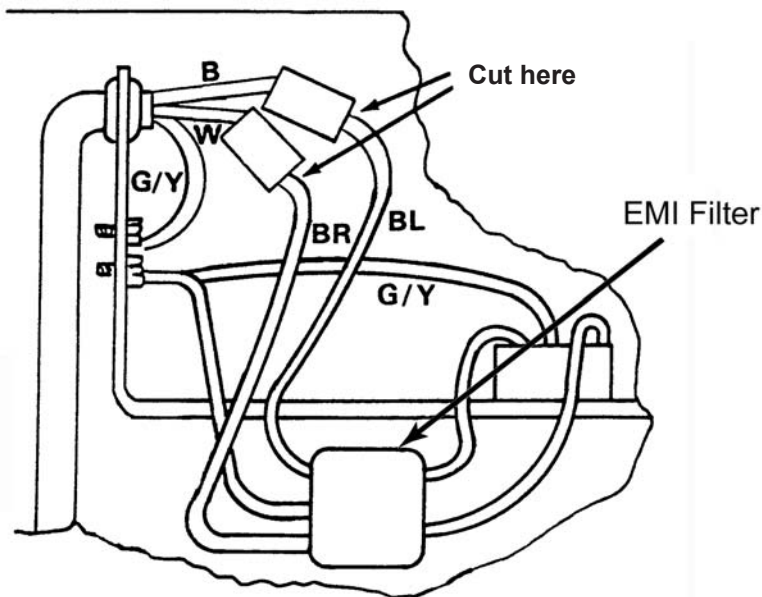
If the changer is rigidly mounted to the wall, make the power input connection through rigid conduit into the changer to meet U.L. requirements (*see Figure 2-1*).

For convenience, the back of the cabinet has four holes. You may choose to use these for the placement of mounting bolts; if so, they will accommodate a 3/8-inch bolt (*see Figure 2-2*).



#### NOTE:

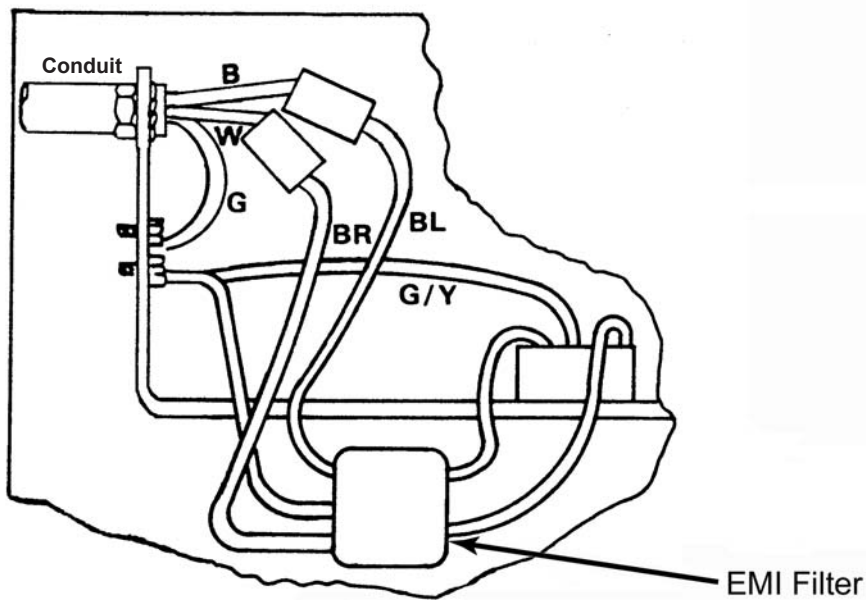
If you drill other holes into the cabinet, be careful not to drill into any internal components. Be sure to remove all metal filings before putting the changer into service.



Note:

Drill or use a chassis punch to enlarge the hole to 7/8" diameter in the cabinet back. Route the conduit through the opening into the bracket as shown.

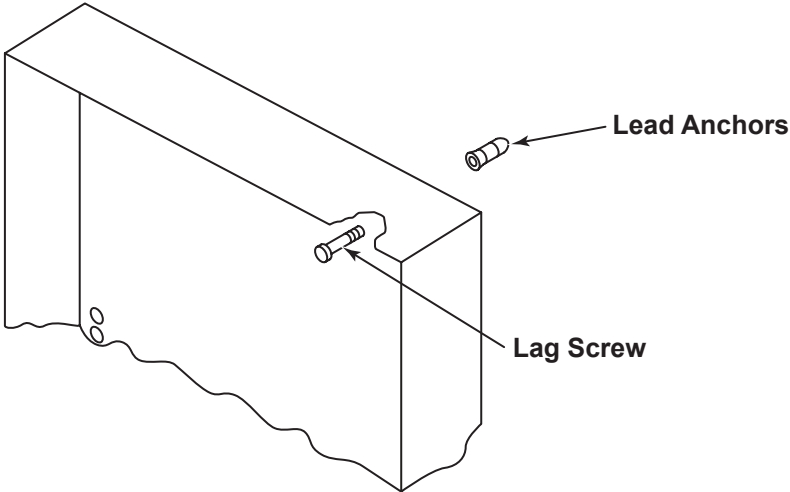
Remove the hoppers and cover of the junction box located on the right side of the changer. Then, cut the existing Power Cord as shown.



Connect the power supply wires to the internal machine wires per the wiring diagram, using standard U.L. listed insulated pressure cable connectors (wire nuts etc.).

Do not splice the earth ground wire. Fasten it to the bracket with the green screw and cup washer as shown.

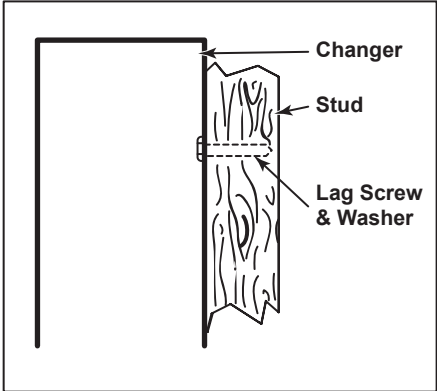
Figure 2-1. Installing a 1/2-Inch Conduit



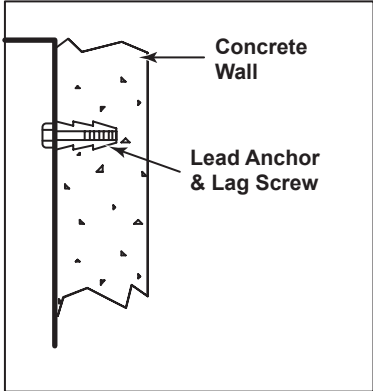
**NOTE:**

Be sure that the lag screws used for attachment are at least 3/8" diameter and, for wood frame walls, are attached directly to the wall studs.

**Mounting Detail - Wood Frame Wall**



**Mounting Detail - Masonry Wall**



**Figure 2-2. Attaching the BC-1200 to a Wall**



## INSTALLING A BC-1400

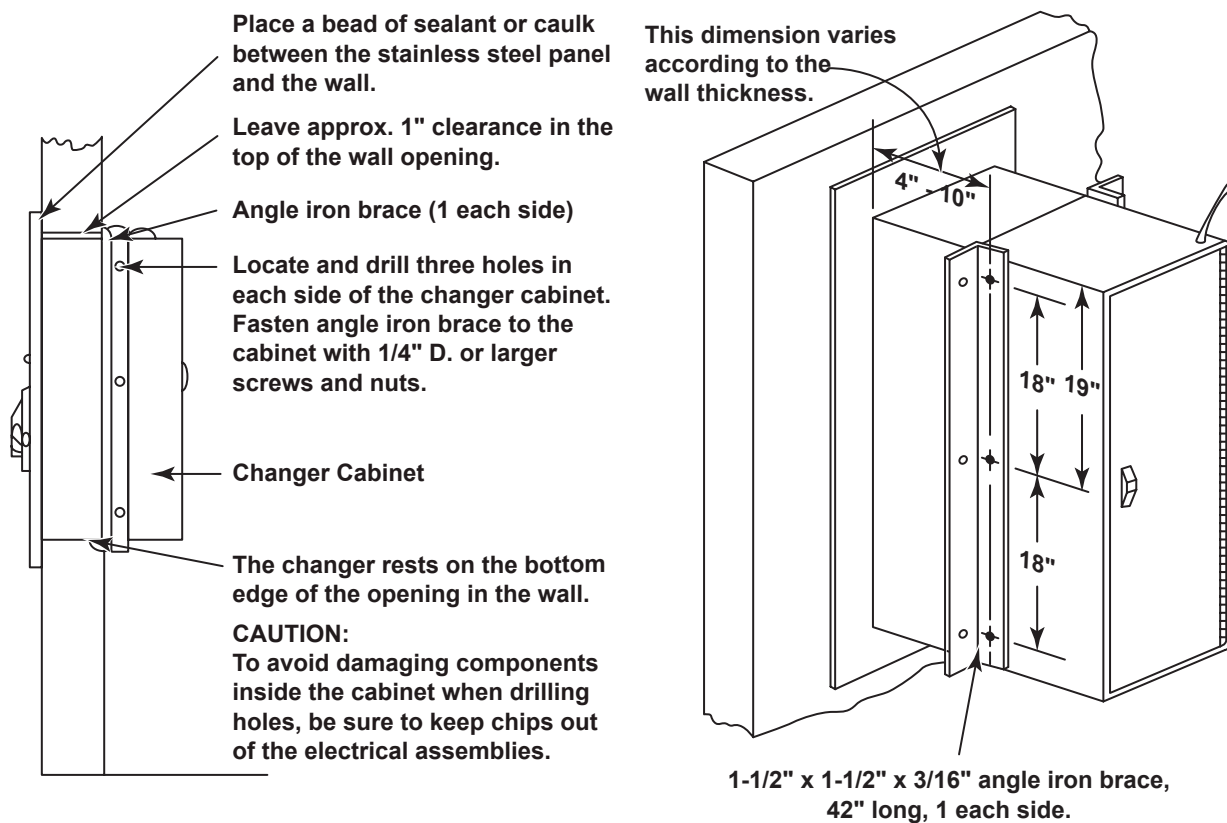
### General

For all methods of installation, locate a convenient power source, and be sure that the bill changer is mounted level.

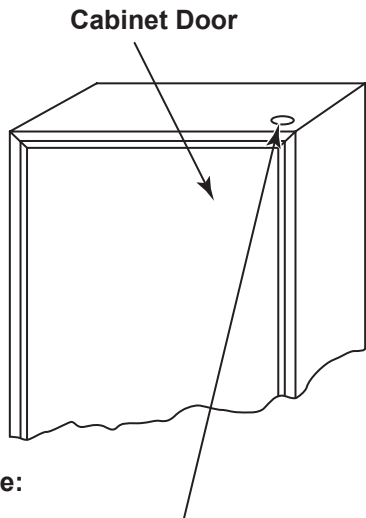
The BC-1400 is primarily designed to be flush mounted on a wall with the cabinet itself protruding through a hole (or cutout) in the wall. The cutout should be a minimum of 39 1/2 inches high by 12 1/2 inches wide. The stainless steel panel attached to the cabinet is mounted tight (or flush) against the outside surface of the wall and secured with two angle braces (one on each side of the bill changer). See *Figure 2-3* for an illustration of this mounting technique. The wall should be flat and vertical, so that when the changer is mounted to the wall, no gap exists between the wall and the stainless steel panel. If the changer is mounted on an outside wall, apply a liberal bead of sealant or caulking to the back side of the panel near the four outside edges to ensure a good weather seal and discourage prying.

### Typical Wall Mounting

1. Refer to *Figure 2-3* and then make an opening in the wall just large enough for the changer cabinet. (Determine the bill changer mounting height before you start cutting into the wall.)
2. Depending on the wall thickness, locate and drill three 1/4-inch diameter (or larger) holes in each side of the cabinet as shown in *Figure 2-3*. Drill the holes in the angle-iron to match the holes in the cabinet.
3. Set the bill changer in the opening in the wall and apply a bead of sealant or caulking to the back side of the stainless steel panel. Position the panel tight against the wall and fasten the angle braces to the sides of the bill changer with 1/4-inch diameter screws (or screws that match the holes drilled in *Step 2*). Make sure that the stainless steel panel is tight against the wall.

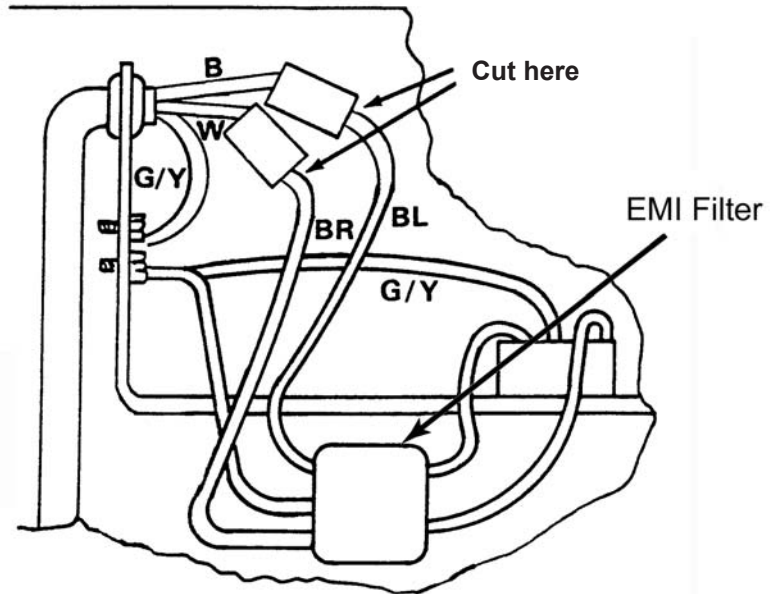


**Figure 2-3. Mounting the BC-1400 to a Wall**

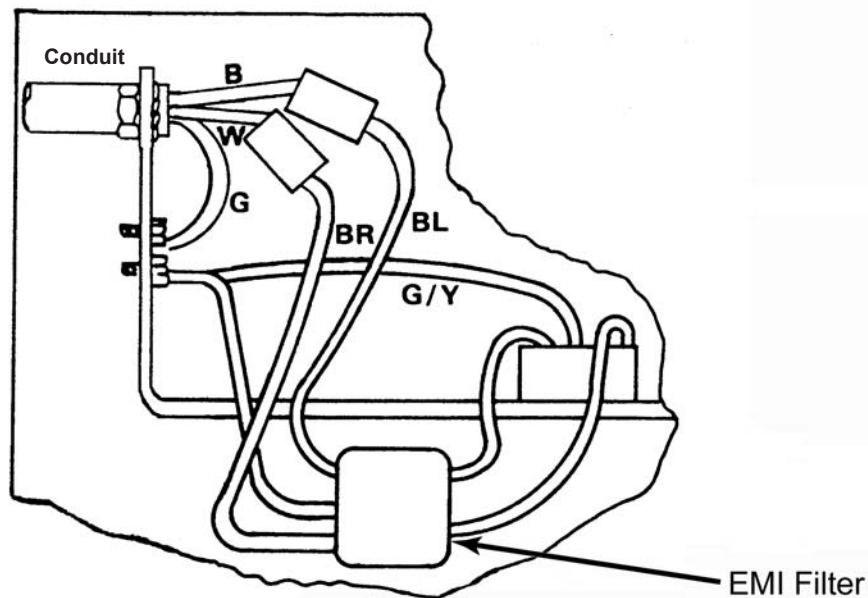


Drill or use a chassis punch to enlarge the hole to 7/8" diameter in the cabinet top and route the conduit through the opening into the bracket as shown.

Cut off and strip the wires at this point and remove the supply cord.



Connect the power supply wires to the internal machine wires per the wiring diagram. Use standard U.L. listed insulated pressure cable connectors, such as wire nuts.



**Do not splice the earth ground wire.** Fasten it to the bracket with the green screw and cup washer as shown.

Figure 2-4. Installing 1/2-Inch Coinduit (BC-1400)

## CHANGE PAYOUT PROGRAMMING

Many different change combinations can be dispensed for the various denominations of money accepted. Change payout programming is accomplished using the five buttons on the CCC. As mentioned earlier, there are mechanical limitations which must be considered. The changer has three escrow buckets which will be preloaded with three different payout values.

The CCC will automatically assign the highest payout to the right escrow bucket, the next highest denomination to the left escrow bucket, and the smallest denomination to the center bucket. Even though the computer reassigns the escrow bucket values automatically, you must be aware of and obey the capacity limitations of each of the escrow buckets in order to maintain reliable operation. *Table 2-1* shows the capacities of the three escrow buckets. You must limit your payout combinations such that the total volume of coins in any escrow bucket does not exceed the guidelines shown in the following table:

**Table 2-1. Maximum Escrow Bucket Capabilities**

Coins or Tokens	Escrow Bucket		
	Left	Center	Right
Dimes (.705" Dia.)	55	40	85
Nickels (.835" Dia.)	40	22	65
Quarters (.955" Dia.)	32	20	65
Tokens (.984" Dia.)	25	15	60
Dollar Coins (1.04" Dia.)	16	12	45
Tokens (1-1/8" Dia.)	8	6	25

In order to pay out for more than three denominations, the computer will, under certain circumstances, vend an escrow bucket and hold that bucket door open while the remainder of the required payout is issued directly from the hoppers to the coin cup. (Of course, after the entire amount has been paid, the escrow bucket door will be closed and replenished under the computer's direction.) One further rule is that the right bucket shall never exceed the escrow value of the \$10 bills.

As an example of how this works, consider the case where the denominations accepted are \$1, \$2, \$5, \$10, and \$20. The computer will assign the right bucket the escrow of the \$10 bill; a \$20 bill will then be an immediate \$10 issue followed by \$10 of direct payout. The \$5 payout will be assigned in the left escrow bucket and the \$1 will be assigned to the center – with a \$2 payout being an immediate \$1 issue followed by \$1 of direct payout. If you now enable 25¢ coin acceptance, the escrow amounts would be reassigned: the 25¢ would be assigned to the center bucket, the \$1 to the left bucket, and the \$5 to the right bucket. A \$10 would be paid as an immediate \$5 issue followed by \$5 of direct payout; the \$20 would be an immediate \$5 followed by \$15 of direct payout. This new feature is available with CCC P/N 65069059.

There are very few payout combinations which cannot be allowed. If you review them briefly, you will easily understand why they cannot be used. *Table 2-2* lists those combinations:

**Table 2-2. Acceptance Combinations Which Are Not Allowed**

\$20	\$10	\$5	\$2	\$1 <sup>1</sup>	50¢ <sup>2</sup>	25¢
OFF	OFF	OFF	OFF	OFF	OFF	OFF
OFF	OFF	OFF	OFF	OFF	OFF	ON
OFF	OFF	OFF	OFF	OFF	ON	OFF
OFF	OFF	OFF	OFF	OFF	ON	ON
ON	OFF	ON	OFF	ON	OFF	ON
ON	OFF	ON	OFF	ON	ON	OFF
ON	OFF	ON	OFF	ON	ON	ON
ON	OFF	ON	ON	OFF	OFF	ON
ON	OFF	ON	ON	OFF	ON	OFF
ON	OFF	ON	ON	ON	ON	ON
ON	OFF	ON	ON	ON	OFF	ON
ON	OFF	ON	ON	ON	ON	OFF
ON	OFF	ON	ON	ON	ON	ON
ON	ON	ON	OFF	ON	ON	OFF
ON	ON	ON	OFF	ON	ON	ON
ON	ON	ON	ON	OFF	OFF	ON
ON	ON	ON	ON	OFF	ON	OFF
ON	ON	ON	ON	OFF	ON	ON
ON	ON	ON	ON	ON	ON	OFF

Using the rules of operations shown previously, it will be very simple for you to determine the escrow bucket values for any allowable combination. This understanding is only important when using the TEST VEND switches as they only vend and replenish each of the buckets once. As an example, there is no \$20 test vend.

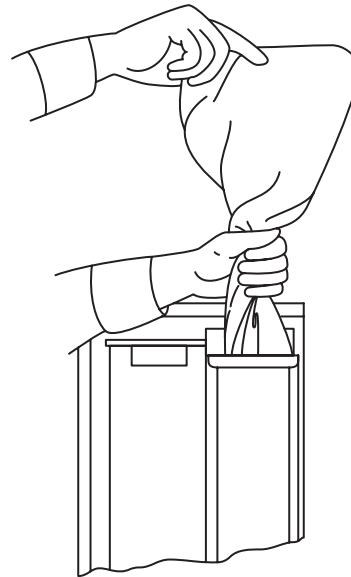
<sup>1</sup>\$1 bills and coins are treated as the same for these purposes.

<sup>2</sup>Quarters accumulated (25A) are treated exactly as 50¢ pieces for these purposes.

## LOADING THE HOPPERS

Review *Figure 2-5* before you begin.

1. Pull the hopper forward to its stop point.
2. Twist the top of a full coin bag one full turn. Grasp the twisted top with one hand and hold the bottom of the bag with the other. Invert the bag and insert the top into the mouth of the hopper.
3. Slowly release the twist as the bag empties. Avoid spilling coins into the changer. Empty the bag by grasping it at the bottom and shaking it to dislodge coins in folds of the bag. Push the hopper back into place.
4. Load the change escrow buckets with change by pressing each of the three TEST VEND switches one at a time. Repeat this process for each test switch and verify that the change that was dispensed is correct.
5. Coin I.D. stickers are supplied with the machine to identify the coin denominations in each hopper. Attach one of these stickers on each hopper so that the coin denomination can easily be identified.



**Figure 2-5. Loading the Hoppers**



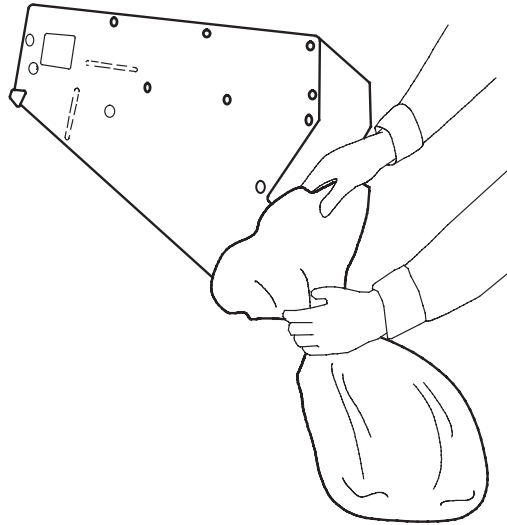
### NOTE:

Hoppers may be loaded with either dollar coins, quarters, dimes, nickels, or tokens unmixed depending on the type of hopper used. Make sure that the value of coins loaded into the hopper agrees with the values programmed into the computer during the HOPPER VALUE (HOP VAL) step of the setup.

## UNLOADING THE HOPPERS

Refer to *Figure 2-5* and unload the hoppers as follows:

1. Remove the hopper bail wire. (*See Figure 1-1A.*)
2. Pull the hopper forward to its stop point.
3. Place the opening of the coin bag over the mouth of the hopper, wrapping the lip of the bag around the handle. Grasp the bag and handle with one hand, tilt the hopper back, release the latch, and slowly tip the hopper forward while holding the bag against the front of the hopper.



**Figure 2-4. Unloading the Hoppers**

4. Hold the bag securely while you tip the hopper forward. Tap the hopper against the rap rod and return it to the upright position. Repeat two or three more times to ensure that the hopper is completely empty.
4. Hoppers may also be removed from the machine and inverted over the bag to empty. When replacing the hopper, be sure it is sitting securely in the pivot brackets and snug against the back plate.
5. Empty the change from each of the change escrow buckets by pressing a TEST VEND switch. When the hopper motors start, turn the bill changer power OFF then ON. Repeat for each of the three TEST VEND switches. This will completely empty the changer of all coins.

## OPERATIONAL INFORMATION

The bill and coin changer uses several visual indicators and controls. The location of these controls and indicators are as follows:

<b>ON-OFF Switch</b>	Located on the front of the power control center
<b>Circuit Breakers</b>	Located on the front of the power control center (four total)
<b>Dollars Accepted Counter</b>	Located on the front of the power control center
<b>Test Switches</b>	Located on the front of the power control center (three total)
<b>Voltage LED's</b>	+5 VDC, +12 VDC, +30 VDC, and +40 VDC are located on the front of the power control center
<b>SERVICE/PROGRAMMING Switches</b>	Located on the computer control board
<b>Status Display</b>	Located on the computer control board
<b>MONEY RETURN Switch</b>	Located behind the MONEY RETURN lever on the front of the machine (BC-1200) Located behind the faceplate (BC-1400)

## SETTING UP THE BC-1200 OR BC-1400

These steps should be followed to set up the changer to your requirements. If you do not follow these steps, the changer will remain all or partially programmed to the factory settings.

### Quick Setup for Dispensing Quarters Only

1. Place the programming switch (next to the display on the central control computer) in the up position (programming mode). The display will show “TEMP COUNTERS”.
2. Press the FUNCTION button until the display reads “MCPAYOUT” either “ON” or “OFF”.
3. Press either of the two far right buttons (∧ or ∨) until the display shows “MCPAYOUT ON”.
4. Press the FUNCTION button once and the display will show “HOPVAL” along with three of the following: “- -”, “T1”, “T2”, “T3”, “5”, “10”, “25”, “50”, “\$1”.
5. Press the VALUE button until the display shows “HOPVAL 25 -- 25”.
6. Press the FUNCTION button once and the display will show “ACCEPT \$1” with either a “YES” or a “NO”.
7. Use either the ∧ or ∨ button to turn the \$1 acceptance to “YES” or “NO”. (YES to accept \$1 bills. NO to not accept \$1 bills.)
8. Next press the VALUE button to go through all other denominations you wish to have the changer accept or not accept, and use either the ∧ or ∨ button to turn each one to “YES” or “NO”. (You will return to the “ACCEPT \$1” statement when you have gone through all denominations.)
9. Press the FUNCTION button once and the display will show the lowest denominations set to “YES” in *Step 8*, and “PAYS \_\_ MC MC”.
10. Press either the ∧ or ∨ button until the display shows “PAYS (XX) MC MC”, where “XX” equals the number to equal the denomination shown (i.e., 4 for a \$1, 20 for a \$5, etc.). Press the VALUE button to step through each denomination you have set to “YES” for acceptance, and set the proper payout for each. **NOTE:** \$10 or \$20 may show 2X some number which will equal the correct amount.  
  
**NOTE:** Make sure each denomination set to “YES” for acceptance has the correct payout amount or the message “INCORRECT PAYOUT” will be displayed.
11. Press the FUNCTION button once and the display will show “STACKER MODE SEP” or “ALT” (SEParate or ALTerNate).
12. Push either the ∧ or ∨ button to set the stacker to the mode you desire. If set to “ALT”, the changer will alternately stack each bill accepted to the upper bill box first, and then to the lower bill box regardless of the denomination accepted. If set to “SEP”, each denomination accepted can be assigned to be stacked in either the upper or lower bill box.

13. Perform this step only if you set the stacker mode to “SEP” in the above step. To assign the bills to the upper or lower bill box, press the VALUE button to go through each denomination you have set to “YES” for acceptance, and push either the  $\wedge$  or  $\vee$  button to stack these bills in either the “UPPER” or “LOWER” bill boxes.
14. Press the FUNCTION button once and the display will show “BILL B CHECK ON” or “OFF”. Use the  $\wedge$  or  $\vee$  button to select either ON or OFF. This is a security check made during the bill validation process. Rowe recommends the “ON” setting for all but the most extreme circumstances where a very high percentage of bills are rejected with Code “B” (see Section 4).
15. Press the FUNCTION button once and the display will show “BILL TEST OFF”. Use the  $\wedge$  or  $\vee$  button to select OFF.
16. Setup is complete! Place the PROGRAMMING switch back down to the “NORMAL” mode. The display will show “STORING NEW DATA”, and then the “walking dash” will appear. Fill the hoppers with quarters, do a test vend from each of the test switches: left, center, and right (located on the power control center), and the job is completed.

## Normal Setup

This procedure follows the “beginning-to-end” setup sequence. You should follow this procedure and use it until you are familiar with the ten groups of setup options. Once you are familiar with these options, you can easily skip over the options that you do not wish to change or display.

## Key Information

In the step-by-step procedure that follows, key setup information follows many of the numbered steps. This information will be very helpful, but it can be skipped. Key information paragraphs are indicated by a small  to the left of the key paragraph.

## Turning the Power On

1. Be sure the PROGRAMMING/NORMAL switch on the CCC is in the NORMAL position, then turn the power switch ON. Three of the four voltage LED’s on the power control center should now be ON. The +40 VDC LED will be OFF. The OUT OF SERVICE light will be lit.
2. The message “ROWE FAST PAY” will be followed by “VERSION XX” on the display. XX is the version number and should match the version number on the EPROM label, which is visible through the cover of the CCC.
3. The message “CHECKSUM XXXX” will briefly appear on the display. XXXX is the 16-bit EPROM checksum.
4. Next, the “RAM TEST PASSED” (or “FAILED”) message will briefly display. If the word FAILED appears, the changer will remain in the OUT OF SERVICE mode.
5. When the “RAM TEST PASSED” message disappears, the CHECKING SYSTEM/SYSTEM CHECK OK “walking dash” will appear. The +40 VDC LED will light and the OUT OF SERVICE light will turn OFF.



## Switching to the Programming Mode

*Steps 1 and 2* display “audit” information. To enter the PROGRAMMING mode:

1. Move the slide switch on the CCC to the PROGRAMMING mode position.

The display will change from the “walking dash” to “TEMPCOUNTERS”. This display will indicate the quantity of each denomination that has been accepted since the numbers were last set to 0. Pressing the VALUE button will cause the display to switch to “TOTAL 25 XXXX”. The XXXX will be the total number of quarters accepted since the counter was reset. The denominations are displayed in the following order: 25 (quarters), 50 (half-dollars), \$1C (dollar coins), then \$1, \$2, \$5, \$10, and \$20. The next item displayed is the “AMOUNT \$XXX-XX” as described in *Section 1*. If you have set the machine to pay tokens with the MC mode enabled, the “AMOUNT” display will be followed by “TOKENS OUT XXXX”. The XXXX will be the total number of tokens dispensed to the customer since the counter was last reset. Pressing the VALUE button again will cause the display to start through the sequence again at the quarter count. Remember that the denomination counts are actually the number of items accepted – the only time a value is shown is at the AMOUNT display.

The counts previously listed can be reset individually by pressing both of the arrow buttons (▲ and ▼) at the same time. The counts can all be cleared simultaneously by pressing the HOPPER button and the up arrow (▲) button at the same time. The computer will respond with the message “TOTALS CLEARED”.

2. Press the FUNCTION button and the display will change to “PERM COUNTERS”.

This display indicated the quantity of each denomination that has been accepted since the machine was built. To use these for periodic audits, you must know the started count and current count and subtract. These quantities **cannot** be reset. If you press the VALUE button, the display will show the denomination and quantity of each denomination accepted.


3. Press the FUNCTION button and the display will change to “PROGRAMMING ----”.

This is the display for entering the four-digit access code. Initially, the BC-1200/1400 access code is set to 0000. This is a special access code in that no further entries are required to reach the setup functions described below – simply press the FUNCTION button to advance to the setup functions. If any other code has been entered into the computer, however, access to the setup functions will be denied unless the correct code is entered.

### IF NO ACCESS CODE HAS BEEN ESTABLISHED

4. Press the FUNCTION button and the display will change to “MC PAYOUT OFF”. Go directly to *Step 5*.

## IF AN ACCESS CODE HAS BEEN ESTABLISHED

- A. The left two digits of the access code will be blinking. (This is the BC-1200/1400's way of indicating which information will be changed if you make a change.) Press the  $\wedge$  or  $\vee$  button to change the left two digits of the four-digit access code.
-  The  $\wedge$  and  $\vee$  buttons will allow the numbers 00 through 99 to appear in each of the two halves of the four-digit security code.
- B. When the display shows the correct two left-hand digits of the access code, press the VALUE button.
- C. The right two digits of the access code will be blinking at this time. Press the  $\wedge$  or  $\vee$  button until the right two digits of the four-digit access code are correct.
- D. When the display shows the correct two right-hand digits of the access code, press the VALUE button and "LEVEL 1 ACCESS" will be displayed. ("LEVEL 0 ACCESS" will be displayed if the incorrect access code is used, and you will be prompted to re-enter the access code.) You can now advance to the setup functions that follow.

## TO PROGRAM A DIFFERENT ACCESS CODE

- A. If the access code is presently 0000, go directly to Step C which follows.
- B. If a non-zero access code is currently in the computer, you must first enter that code as described in the previous paragraphs. Then, using the FUNCTION button, advance through each of the setup and audit functions until "PROGRAMMING ----" is again shown on the display.
- C. Enter the desired access code using the  $\wedge$ ,  $\vee$ , and VALUE buttons as described in Step C and Step D of the previous procedure. With the desired four-digit code showing on the display\*, press and hold the HOPPER button for about three seconds until the message "NEW CODE STORED" appears. The new code has now been stored in the computer's memory and will be the required access code the next time the programming mode is entered.

\* NOTE: DO NOT USE ANY CODES BEGINNING WITH 11XX – THESE ARE USED FOR SPECIAL PURPOSES.

- 5. Turn ON and OFF Maximum Capacity (MC) payout by pressing either the up ( $\wedge$ ) or down ( $\vee$ ) button. No other buttons are needed to change the MC mode. The Maximum Capacity mode of operation has three big advantages and one requirement. The requirement is that both coin hoppers **must** be loaded with the same value coin or token. The advantages are:
  - A. The time required to vend and replenish is typically only 1/3 of that required in the NON-MC mode.
  - B. All three hoppers will be emptied equally and the machine will not "go empty" until all three have been found to have no coins available.
  - C. In the event of a hopper failure (jam, motor failure, etc.), the machine will continue to operate using the other two hoppers.

- Operation in the MC mode can be described simply as follows:

The computer will get the total required number of coins from any hopper or hoppers that it can. If both hoppers are operational, it will divide the required payout amount (say, 20 quarters for a \$5 bill for example) by two and replenish ten coins from each hoppers for the count of 20.

Should a hopper go empty, the computer will simply begin using the other hoppers. If only one hopper remains as “good”, the computer assumes the machine is nearly empty and will attempt on successive vends to obtain coins from both hoppers again – hoping to find that the changer has been filled. If it has, the computer will simply continue using both hoppers again – if it has not, it will run on the last operational hopper until it is empty, and at that time the machine would go into the OUT OF SERVICE (or SHUTDOWN) mode.

Operation in the NON-MC mode:

This mode must be used if the hoppers are loaded with coins or tokens of different values. The count required from each individual hopper must be satisfied during each replenish cycle, or the machine will go into the OUT OF SERVICE (or SHUTDOWN) mode.

6. Press the FUNCTION button and the display will change to “HOP VAL - - - -”.

- The HOPper VALue option allows you to select the denomination of the coins or tokens that will be dispensed from each hopper (*see Table 2-3 for the list of denominations*). If a hopper value is set to dashes (- -), that hopper will not dispense any coins at any time.

The computer must know the value of coins used for one important reason. The changer supports a “correct payout feature” – the computer simply will not allow you to program a payout that does not total the amount taken in unless you set at least one hopper value to tokens. The correct payout feature prevents programming errors and the resulting over or underpayment.

7. The left two dashes will be blinking. Press the VALUE button to step through the possible hopper denominations. If in the MC mode (*see Step 5 of this procedure*), both values will change simultaneously. When the correct hopper value is displayed, press the HOPPER button to advance to the right hopper options if in the NON-MC mode; or press the FUNCTION button to advance to the ACCEPT function if in the MC mode (skip ahead to *Step 9*).
8. The right two dashes will be blinking. Since there is no center hopper, two dashes will remain on in the center position. Press the VALUE button to step through the possible hopper denominations. Stop when the correct hopper denomination is displayed.

Use the coin value stickers supplied in the accessories bag to label the hoppers as a reminder of which coins are to be loaded in each hopper.

**Table 2-3. Hopper Value Codes**

Display Symbol	Money Type
5	Nickel
10	Dime
25	Quarter
\$1C	Dollar
T1	Token Type 1
T2	Token Type 2
T3	Token Type 3

9. Press the FUNCTION button and the display will change to “ACCEPT \$1 YES” (or “NO”).
10. Press either the  $\wedge$  or  $\vee$  button to select (turn ON) or deselect (turn OFF) each denomination. Press VALUE to step through the list of denominations that can be accepted (*see Table 2-4 for the list of denominations*).

**Table 2-4. Acceptance**

Display Symbol	Money Type
25	Quarter
25A	Two Quarters
50	Half Dollars
1C	Susan B. Anthony Dollar
1	One Dollar Bill
2	Two Dollar Bill
5	Five Dollar Bill
10	Ten Dollar Bill
20	Twenty Dollar Bill

Select only the denominations that you want to have the changer accept. If you try to select a denomination that would result in a combination which cannot be used, the computer will display the message “NOT ALLOWED” briefly. The combinations which are not allowed are discussed in *Change Payout Programming* in this section (*also refer to Table 2-2*). Should this occur, you must step through each of the denominations by pressing the VALUE button and review the denominations currently accepted (set to YES).

To accept a new denomination which was previously not allowed, you may first have to deselect a currently accepted denomination and then step to the new denomination (using the VALUE button) and selecting it by using the  $\wedge$  or  $\vee$  button.

One selection shown in *Table 2-4* deserves explanation. The 25A option is a “quarter accumulator” feature. If this option is selected, the insertion of a first quarter will cause no payout activity from the bill changer and the coin will appear to be “stolen”. However, when a second quarter is inserted, a normal vend and replenish cycle will occur. This allows you to program the bill changer to accept two quarters and payout five dimes, for example.

11. After you have programmed the denominations you wish to accept, press the FUNCTION button to move on to the PAYOUT function.
12. The display will show:

XXX PAY -- -- --. The XXX will be the lowest bill denomination set to ON.

The left digits will be blinking. If in the MC mode, the center and right pairs of digits will simply show MC, and pressing the HOPPER button as described in the following paragraph will have no effect. If in the MC mode and tokens have been selected for the hopper values, see *Dispensing MC Tokens* at the end of this section.

13. Press the  $\wedge$  or  $\vee$  button to increase or decrease the coin count for the selected hopper. Press the HOPPER button to move from one hopper to the next.

Once you have the counts set as you want for the displayed denomination, press the VALUE button to advance to the next denomination you chose to accept. If you have made an error and the payout value is not equal to the displayed denomination, the display will briefly show “INCORRECT PAYOUT” and then return to the same denomination – refusing to advance. This is true unless you have set one or more of the hopper values to one of the token values. You will not be able to leave this display, even if you put the PROGRAMMING/NORMAL switch in the NORMAL position. (Upon returning the switch to the PROGRAMMING mode, the display will show “TEMP COUNTERS”).

When the VALUE button is pressed and held for more than two seconds, the display will show “XXX PAYS ---:”. The XXX represents the current denomination. The --- will show TOKENS if tokens are loaded into any hopper; or if only coins are used, the display will show the total dollar value of the coins to be paid out. Once you have programmed the payout for all the denominations being accepted, press the FUNCTION button to advance to the STACKER mode selection.

14. The display will show “STACKER MODE ALT” (or “SEP”). Press either the  $\wedge$  or  $\vee$  button to switch between ALternate and SEParate.

If you choose ALternate, the bill stacker will stack one bill in the top bill box and the next bill in the bottom bill box regardless of the bill denomination. No further explanation is needed, go directly to *Step 15* in this procedure.

If you choose SEParate, the changer will separate the bills by denomination. Press the VALUE button to select the desired bill box for each denomination selected:

When the VALUE button is pressed, the display will show “STACK”, the lowest bill denomination enabled (usually \$1), and the word UPPER or LOWER. Pressing either the  $\wedge$  or  $\vee$  button will cause the display to change between the two options and, of course, the stacker operations will be as displayed.

Press the VALUE button to step through all of the accepted bill denominations. Set each one to the bill box of your choice.

15. Press the FUNCTION button to advance to the BILL B CHECK ON/OFF mode selection. Press either the  $\wedge$  or  $\vee$  button to switch between the ON and OFF mode.

The normal position for standard validation (BILL B CHECK ON) provides maximum security against bogus bills. This is the factory setting and Rowe strongly recommends its use for all but the most severe environments.

The BILL B CHECK OFF position improves acceptance of bills which are contaminated with metal chips or dust, but also reduces protection against bogus bills.

16. Press the FUNCTION button to advance to the BILL TEST ON/OFF mode selection. Press either the  $\wedge$  or  $\vee$  button to switch between ON and OFF.

The BILL TEST mode will allow you to test bill acceptance without disturbing any of the other machine functions.

If the BILL TEST is not desired, leave the mode set to OFF and go on to *Step 17*.

To operate under the BILL TEST mode, leave the option ON then move the slide switch to the normal position. The display will show "STORING NEW DATA", then "BILL TEST MODE". At this time, any bills inserted into the transport will be validated normally. If the bill is accepted, it will be stacked in the bill stacker and the display will show "GOOD \$X", where X is the denomination just accepted. The machine will not payout change, will not advance the dollars accepted counter, and will not advance the audit totals while in the BILL TEST mode.

If a bill is rejected, the display will show the normal reject message. See *Section 4* for an explanation of the reject messages.

There are three ways to leave the BILL TEST mode: You can go back into the PROGRAMMING mode and set the BILL TEST mode to OFF, or you can simply turn the POWER switch OFF then back ON. The third way is a safety feature where the machine will automatically return to the NORMAL mode two minutes after the last test bill was inserted (remains "IDLE" for 2 minutes).

17. Pressing the FUNCTION button will send the computer back to the beginning of the entire programming sequence ("TEMP COUNTERS" will show on the display) and you may review your setup by stepping through each function again.

To return the bill changer to normal operation, move the slide switch from the PROGRAMMING position to the NORMAL position. The display will show "STORING NEW DATA" and then the "walking dash" again.

## SELF-DIAGNOSTICS

### Diagnostic Check

The self-diagnostic check features of the BC-1200/1400 are centered around the 16-character status display. The message displayed may be on all the time (STEADY STATUS MESSAGE), or it may blink on and off (FLASHING FAULT MESSAGE).

### Fault Message Check

1. Remove the right hopper from the machine. Block the right coin detector on the dispenser with an opaque object – a coin, for example. The machine will go out of service. The status display will flash the message “CK R COIN DETCTR” and the TEMPORARILY OUT OF SERVICE light on the top door will light.
2. Restore the machine to service by removing the object that is blocking the detector and pressing the FUNCTION button.
3. The CCC will remove the fault message and the machine will return to service.
4. Replace the hopper.

For detailed explanations of the various fault messages, refer to *Section 4: Troubleshooting*.

### Status Messages

When a message is on the status display and it is not flashing, either a fault or malfunction occurred that was not serious enough to cause a shutdown or the message is a guide to solving bill acceptance problems.

### NON-SHUTDOWN FAULTS

If a malfunction is detected with the coin switches, TEST switches, or the BILL RETURN switch, a message will be displayed but the machine will not go out of service.

### BILL ACCEPTANCE MESSAGES

A bill may be rejected for a number of reasons. The status display will indicate the reason why a bill failed to be accepted. A number of cell sequence rejects and bill validation rejects exist. These messages will be displayed for approximately thirty seconds before they are erased by the walking dash. For more information on the reject messages, refer to *Section 4: Troubleshooting*.

### TRANSPORT SELF-CLEAR CHECK

If a bill becomes jammed in the transport, the CCC automatically tries to clear it out. To check out this feature:

1. Insert a bill into the transport upside down. The bill will be rejected and the status display should show “REJECT-BILL (A)”.

2. Hold the bill in the transport. Do not uncover the VI cell. Wait five seconds for the transport to start to cycle reverse-forward-reverse-forward-reverse. The transport will do this three times if the VI cell is kept covered. During the self-clear operation, the status display will show the message “PURGING ACCEPTOR”.
3. The motor will stop and the status message will change to “CK TRANSPORT VI”. (If the VI cell is uncovered any time during the self-clear cycle, the machine will automatically go back into operation.)
4. Restore the machine to service by removing the bill.

## ACCEPTANCE CHECK

To aid in checking acceptance, set the BILL TEST mode to ON. This will allow checking out the validation portion of the system without paying out coins.



### NOTE:

The bill acceptor may reject bills if a bright light source shines into the transport. Close the top door of the changer to prevent this problem.

1. Make certain that the bill is programmed to be accepted.
2. Insert a dollar bill upside down. The bill should reject and the display should show “REJECT-BILL (A)”.
3. Insert the dollar bill correct side up, but backwards. The bill should reject a message “REJECT-BILL (B)”. (Be sure BILL B CHECK is ON.)

Now insert the dollar correctly. It should accept and the stacker should operate.

Also, as the bill moves through the bill acceptor, check to ensure that the following messages are shown on the status display:

1. “VALIDATING” will appear as the bill is inserted and while the transport is running.
2. “GOOD \$1” will appear when the bill is validated and stacked.
3. If bills in good condition are rejected frequently, note the reject message on the status display and refer to *Section 4* for troubleshooting information.
4. If the machine is set up to accept other bills, the previous checks should also be performed with all other denominations.

When the other denominations are accepted, the display will show “GOOD \$XX”, where XX represents the denomination.



## DISPENSING TOKENS

A unique situation exists when dispensing tokens while in the MC mode. The ability to payout a progressive bonus is allowed, even if payout is normally an extended vend of a lower denomination.

Normally, in the NON-MC mode or when paying out coins, some denominations require an extended dispense–direct payout–replenish cycle. In each of these cases, the larger denomination is paid out at exactly two times a lower denomination. While this is correct for dispensing coins, it may not be desired when dispensing tokens.

For ease of discussion, an example will be presented below that will explain the setup and operation for progressive bonus payouts of tokens.

In the following example, the denominations listed will be accepted and the number of tokens listed will be dispensed:

Denomination	Base Tokens	Bonus Tokens	Total Tokens
\$1	4	0	4
\$2	8	1	9
\$5	20	5	25
\$10	40	15	55
\$20	80	40	120

Following the payout programming rules discussed earlier in this section, the right escrow bucket will hold the \$10 load of 55 tokens, the left escrow bucket will hold the \$5 load of 25 tokens, and the \$1 load of 4 tokens will be held by the center escrow bucket.

Be sure MC PAYOUT is set to ON and the HOPper VALue for the hoppers is set to one of the three token values: T1, T2, T3. Set \$1, \$2, \$5, \$10, and \$20 to YES in the ACCEPT mode. All coin denominations except \$1 coins must be set to NO.

Press the FUNCTION button to move to the PAY mode with the display showing “\$ PAY XX MC MC”. Use the up and down arrow buttons to set the payout to 4. Push the VALUE button to display the \$2 payout. The display will show “\$2=8+XBONUS”. Push the up and down arrow buttons to set the X to the value of 1. This display indicates that a \$2 will payout 8 (which is twice the \$1 payout) plus one bonus token.

Push the VALUE button to display the \$5 payout. Use the up and down arrows until the display indicated 25 tokens.

Push the VALUE button to display the \$10 payout. Use the up and down arrows until the display indicated 55 tokens.

Push the VALUE button to display the \$20 payout. The display will show “\$20=110+XBONUS”. Use the arrow buttons to change the value to 10. This indicates that \$20 will pay 110 (twice the \$10 payout of 55 tokens) plus 10 more bonus tokens for a total of 120.

Because the \$2 and \$20 payouts are extended vends of lesser amounts, the first vend will contain the number of tokens set for the lesser amount. The direct payout amount will contain the tokens for the lesser amount plus the bonus tokens. These are then followed by a replenish cycle for the lesser amount.

**Bonus payouts for double vend amounts are only allowed in the MC mode with tokens loaded in the hoppers.**

## Token Control

When dispensing tokens using the bonus payout, it is difficult to maintain token count control. The amount of money changed does not directly indicate the number of tokens dispensed. In the MC mode, a special token counter is used. This counter counts the number of tokens dispensed. To view the count, push the VALUE button while the changer is in STANDBY (walking dash). The display will show “AMOUNT\$XX”.

Push the VALUE button again and the display will show “TOKENS OUT XXXX”, where the XXXX is the number of tokens actually paid out. TOKENS OUT will increase to a maximum of 65,535 and will then “roll over” to 0.

The token counter is also available in the PROGRAMMING mode under TEMP COUNTERS. Push the VALUE button and step through all counters until “TOKENS OUT XXXX” is displayed. At this time, the count may be cleared by pushing the two arrow buttons simultaneously.

There may be an occasion when the hopper became empty during the direct payout cycle of an extended vend. When this happens, the token counter will actually count only the number of tokens issued on the initial escrow dump (i.e., for the lower value). The changer will enter an OUT OF SERVICE condition with the display showing “HOPPERS EMPTY”. After that error has been cleared (by pressing the FUNCTION button), the message “AMOUNT DUE XY Z” will be displayed: X = the number of coins/tokens due the last customer from the left hopper (or all hoppers if using MC mode), Y = the number of coins/tokens short from the center hopper, and Z is likewise for the right hopper.

## FAST-FEED SHUTDOWN

The Fast-Feed Shutdown feature of the bill changer allows an operator to limit the number of payments made by the changer within a given amount of time. This can be used to discourage non-customers from using the changer as their bank. If you suspect that someone is draining your changer for purposes other than to purchase your products, you can use this feature to limit such activity.

The changer monitors the bills as they are accepted. If the Fast-Feed feature is enabled and bills are being fed faster than the rate you’ve established, the changer will go OUT OF SERVICE for a period of time that you have chosen and will then resume normal operation. The settings are made by individual denomination and there is also a setting for all denominations combined.

You can visualize these settings this way: If the changer accepts more than X bills in Y minutes, then go OUT OF SERVICE for Z minutes. There is also a setting which will put the changer OUT OF SERVICE permanently.

When a bill is inserted that causes your settings to be exceeded, it will be rejected with the display showing “REJECT-FAST FEED”, and then the changer will enter the OUT OF SERVICE mode displaying “FFden dhh=mm AGO”: where den = the offending denomination or ALL, d = the number of days, hh = the number of hours, and mm = the number of minutes that have passed since the changer went OUT OF SERVICE for this reason. This time will continue to increment and will be displayed even after the temporary shutdown condition expires and the changer goes back into normal service – it can only be cleared by pressing the FUNCTION button. (When you clear this timer, the display will briefly show “FSFD TIMER CLR'D”.)

Note that the Fast-Feed information is maintained in memory until it is manually cleared by using the FUNCTION button. This applies even if another OUT OF SERVICE condition occurs. As an example, if the Fast-Feed Shutdown condition is entered at 11PM on Saturday and the changer returns to service 10 minutes later and continues to operate until 3PM on Sunday when it runs out of coins, the display will be flashing “HOPPEREMPTY” on Monday morning at 9AM. When the FUNCTION button is pressed to clear the empty error, the display will revert to “FF\$20 1D10=00 AGO”, which allows you to determine that a Fast-Feed shutdown occurred because the \$20 bill count was exceeded at 11PM Saturday (1 day and 10 hours ago).

## Accessing the FAST-FEED Menu

1. Move the PROGRAMMING/NORMAL switch on the bill changer from the NORMAL operation mode to the PROGRAMMING position.
2. Press the FUNCTION-ERROR RESET button twice. The display should show “PROGRAMMING ----”.
3. Press the  $\wedge$  button until the display shows “PROGRAMMING 11--”, the press the VALUE button once.
4. Press the  $\wedge$  button until the display shows “PROGRAMMING 1129”.
5. Press the VALUE button once. The FAST-FEED menu is now active.

## Navigating the FAST-FEED Menu

1. When entering the FAST-FEED menu, the display will show “\$1 OFF”. The OFF should be flashing. If not, press the  $\vee$  button until the OFF appears. This means that no limit has been placed on any specific number of \$1 bills.
2. Pressing the  $\wedge$  button will cause the display to show “\$1 X, Y, Z”. The X should be flashing. *Table 2-5* illustrates the possible values for X, Y, and Z.

**Table 2-5. XYZ Table**

Variable Name	Represents	Range
X	The number of bills accepted before any action is taken.	“OFF” or 1 - 15 bills
Y	The number of minutes within which no more than “X” bills can be accepted without action.	1 - 15 minutes
Z	The number of minutes that the bill changer will be kept OUT OF SERVICE if more than “X” bills are accepted within “Y” minutes.	1 - 15 minutes or “INFINITE”

3. Use the  $\wedge$  and  $\vee$  buttons to establish the maximum number of bills to accept (“X”), then press the HOPPER button and “Y” will begin flashing. Use the  $\wedge$  and  $\vee$  buttons to set the time lime (in minutes) for the changer to accept “X” bills. Pressing the HOPPER button again will cause “Z” to begin flashing. Use the  $\wedge$  and  $\vee$  buttons to select the number of minutes for the changer to remain shutdown should the limits be exceeded. Note that choosing the INF setting will require you to open the changer and press the FUNCTION button in order to restore the changer to service.
4. Pressing the VALUE button will cause the next enabled denomination to be shown. Repeat *Step 3* for each of these denominations.
5. Pressing the VALUE button after you’ve established the limits for the highest denomination enabled will cause the display to show “ALL OFF”. Using the  $\wedge$  and  $\vee$  buttons as before, you can establish limits for all accepted bills regardless of denomination.
6. Press the VALUE button to step back through your settings. When you have everything set as you like, slide the PROGRAMMING/NORMAL switch to the NORMAL position

## ANTI-PULLBACK SYSTEM

Certain Changers may be repeatedly exposed to vandals attempting to cheat the machine by inserting a bill and then, after collecting the change, attempting to retrieve that bill by pulling it back out of the stacker using an attached string. The changer provides several mechanical and electrical systems to prevent anyone from being successful in these attempts, but such activities could lead to jams in the transport and the attendant service calls.

As an added deterrent the changer allows you to set up a special temporary OUT OF SERVICE condition if the computer detects that the transport motor has moved during a time when it was turned off.

If this feature is enabled, the computer monitors the encoder signal of the transport motor during periods when the motor should not be turning. The action of pulling a previously accepted bill from the machine will invariably cause the motor to be turned. Even a very slight movement will be detected, and when it does the Control Computer takes the following action:

The motor is instantly turned ON in the reverse direction. This will assist in keeping the transport free of jams. The Display will “freeze” and the motor will continue to run in reverse for about 3 seconds. At this time the changer will go OUT OF SERVICE with the display showing “PLBK dDhh=mm AGO”, where dD = the number of days, hh = the number of hours, and mm = the number of minutes that have passed since the changer went OUT OF SERVICE for this reason. This time will continue to increment and will be displayed even after the temporary shutdown condition expires and the changer goes back into normal service – it can only be cleared by pressing the FUNCTION button. (When you clear this timer, the display will briefly show “PLBK TIMER CLR’D”.)



### CAUTION!

When this feature is enabled, do not attempt to turn the transport motor drive gear manually with the transported connected and the Power ON. As described above, the motor will start instantly when motor movement is detected.

## Accessing the ANTI-PULLBACK Menu

1. Move the PROGRAMMING/NORMAL switch on the bill changer from the NORMAL operation mode to the PROGRAMMING position.
2. Press the FUNCTION-ERROR RESET button twice. The display should show “PROGRAMMING —”.
3. Press the ^ button until the display shows “PROGRAMMING 11—”, then press the VALUE button once.
4. Press the ^ button until the display shows “PROGRAMMING 1130”.
5. Press the VALUE button once. The ANTI-PULLBACK menu is now active.

## Navigating the ANTI-PULLBACK Menu

1. When first entering the ANTI-PULLBACK menu, the display will show “PULLBK SHTDN OFF”. This means that the computer is not monitoring the transport motor for unexpected movement.
2. Pressing the ^ button will cause the display to show “PULLBK SHTDN 1”. This means that the computer will now be watching for unexpected transport motor movement, and will take the changer OUT OF SERVICE for 1 minute should any such activity occur.
3. Using the ^ and v buttons, set the number of minutes of shutdown time desired. The maximum number of minutes can be set at 98; if you increment once more using the ^ button, “INF” will be displayed indicating that if an incident is detected, the changer will stay OUT OF SERVICE until it is manually reset with the FUNCTION-ERROR RESET button.

## MISCELLANEOUS

The BC-1200/1400 were designed to be simple and easy to troubleshoot. Please take time to study the operation of the machine and to study the explanations of the various status messages.

The following is a list of incidental characteristics that may be of interest to the operator and service person:

1. Both the coin acceptor and the bill acceptor are blocked out during the dispense and replenish cycle. Also, the coin acceptor is locked out during the bill validation cycle as soon as the VI cell is covered. The coin acceptor is locked out whenever no coins are programmed to be accepted.
2. The +5 VDC voltage from the power supply does not control the CCC board. It is used to provide voltage to LED's (dispenser, transport, OUT OF SERVICE light), and the solid-state coin switch assembly. The computer board is powered primarily by the +8 VDC voltage from the power supply. It has its own +5 VDC regulator.
3. The BILL RETURN switch is disabled during the latter portion of the validation cycle and the entire dispense and replenish cycles.

4. If power is disrupted during a dispense or replenish cycle, the machine will immediately reset upon power turn on. There will be an incorrect change load in one of the buckets. This is the same as all previous Rowe changers.
5. If the changer runs empty while paying for a large bill directly from the hoppers, the display will be flashing the appropriate message. Upon clearing the SHUTDOWN CODE for this empty condition the display will show “AMT DUE X Y Z” with X, Y, and Z being the number of coins or tokens that the customer was shorted from the left, center, and right hoppers respectively.
6. Blocking the coin photodetectors with your fingers or with foreign objects during the replenish cycle may result in wrong counts. If the detectors are blocked too long, the machine will shut down with a flashing error message indicating which detector was blocked. If the wrong count is entered, the display may show a flashing message “EXTRA COIN”. Either condition will put the machine in a shutdown mode.
7. Always turn the power OFF when removing circuit boards. Avoid touching the connectors when handling these assemblies.

**WARNING:**

When the machine is turned on, there is 120 VAC voltage on the computer control board. If, for any reason, this board is plugged in without its cover on, BE CAREFUL!

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## Section 3: Routine Service

### INTRODUCTION

In order to maintain control over money used for change dispensing, each changer should be loaded with a predetermined amount of cash. The inventory should be checked monthly as a precaution against malfunction and theft. Inventory control is most easily accomplished by using the replacement method of servicing. Using this method, all bills and coins are removed by the route man and the empty hoppers are refilled with a predetermined amount of change. The money removed is returned and all cash is counted against the charged inventory. Any discrepancy is easily detected at this time.

Service frequency on the changer is directly related to the inventory of change maintained and customer usage. Check changer usage daily and schedule service as required.

### REMOVING THE BILL ACCEPTOR FROM A BC-1400

1. Unlock and open the door to the changer.
2. Remove the two bill boxes (*item 1*).
3. Push the center test vend pushbutton (*item 2*) (to cycle the stacker), and when the stacker is in the OUT position, turn the power to the changer off (*OFF/ON switch - item 3*).
4. Loosen and remove the two knurled thumbscrews (*item 4*).
5. Unplug the transport harness (*item 5*) and the stacker harness (*item 6*).
6. While grasping the transport bracket and the stacker assembly, slide the entire assembly straight back until the unit is removed.
7. The bill acceptor can now be removed by sliding it out through the front.
8. Reinstall by following the above steps in reverse, with the exception of pushing the test vend pushbutton.



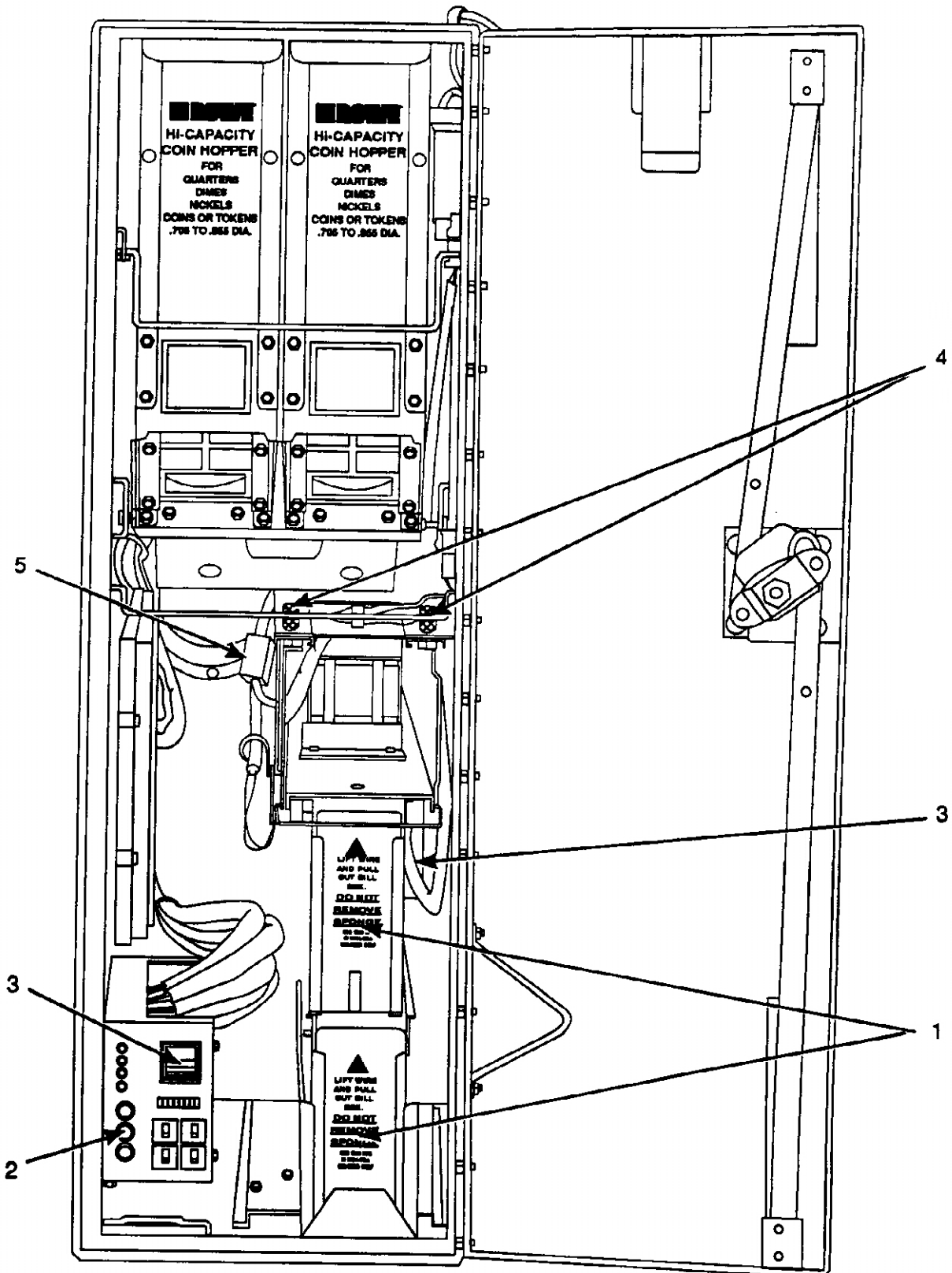


Figure 3-1. BC-1400 Internal View

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## REMOVING A JAMMED BILL FROM THE BILL ACCEPTOR (BC-1200 ONLY)

Jammed bills can be easily removed in the following manner:

1. Unlock and open the top door. Turn the power OFF.
2. Slide the bill acceptor out until it stops.
3. Remove the jammed object from the acceptor.

### BILL JAMMING CHECK LIST

If bills jam frequently, perform the following checks and corrective procedures (*see Figure 3-2*):

1. Make sure that all belts stay centered on all rollers when the transport is running in either the forward or the reverse direction.
2. Check to see that both timing belts are snug (not too loose or too tight).
3. Make sure that the rubber drive rollers are not loose or worn.
4. Exit flipper must work freely.
5. Be sure that the inlet Nylon idler roller rotates freely and moves up and down freely in its slot. The retaining springs must also slide without bind in the guide slots and exert adequate force on the idler roller.
6. Bottom track bill surfaces must be free of dirt, moisture, burrs, projections, rough spots, etc., which might drag or hang up on the surface of bill.
7. The magnetic head must have a bevelled edge on both front and back to keep both bill edges from becoming caught in forward or reverse.
8. The rubber rollers opposite the magnetic head assembly must rotate freely. No dirt, moisture, burrs, projections, or rough spots can be on the magnetic heads or magnetic head holder.

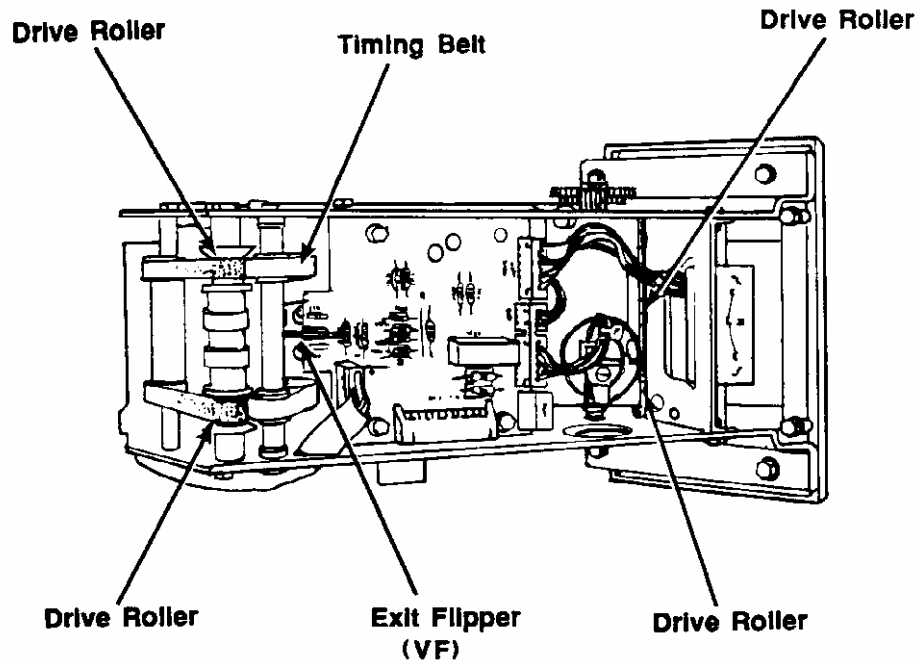


Figure 3-2. Transport Check Points

## FILLING AND EMPTYING THE BC-1200/1400

The dispensing mechanism operates on an escrow principle. Change for a vend must be in the escrow buckets when the customer inserts a bill. After change is dispensed, the buckets must immediately refill for the next customer. Because of this, certain steps must be followed when filling or emptying the changer, or when resetting the changer if it has shut down.

### FILLING THE CHANGER

When filling a changer that is empty, the coin buckets must be filled with their proper load of coins before the machine can be put into operation. After the hoppers have been loaded and are in place:

1. Turn the power switch ON and depress the LEFT TEST SWITCH once. This will start the hoppers and load the left coin bucket with the proper coins.
2. Wait until the hopper motors have all stopped and press the LEFT TEST SWITCH again. Proper change should be dispensed and hopper motors will start to refill the bucket again.
3. Repeat steps 1 and 2 for the CENTER TEST SWITCH and RIGHT TEST SWITCH. The machine should now be ready for operation.

### EMPTYING THE CHANGER

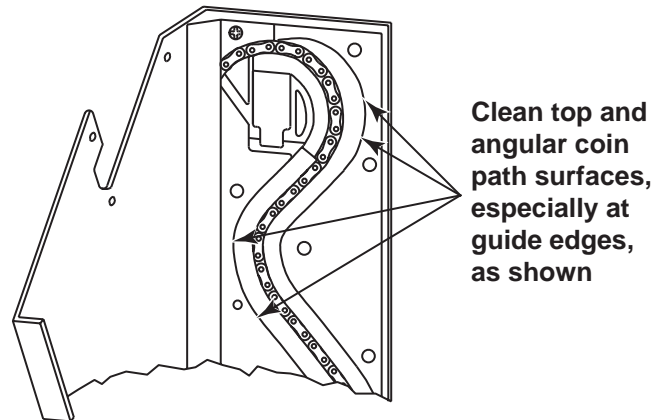
To empty the changer of all coins, first empty both hoppers according to instructions on the label on the door. When the hoppers are emptied, some coins will remain in the change buckets. Press the test switches, one at a time, to release these remaining coins. Turn the power switch OFF and then ON between each test switch operation.

## CLEANING THE HOPPER COIN PATH

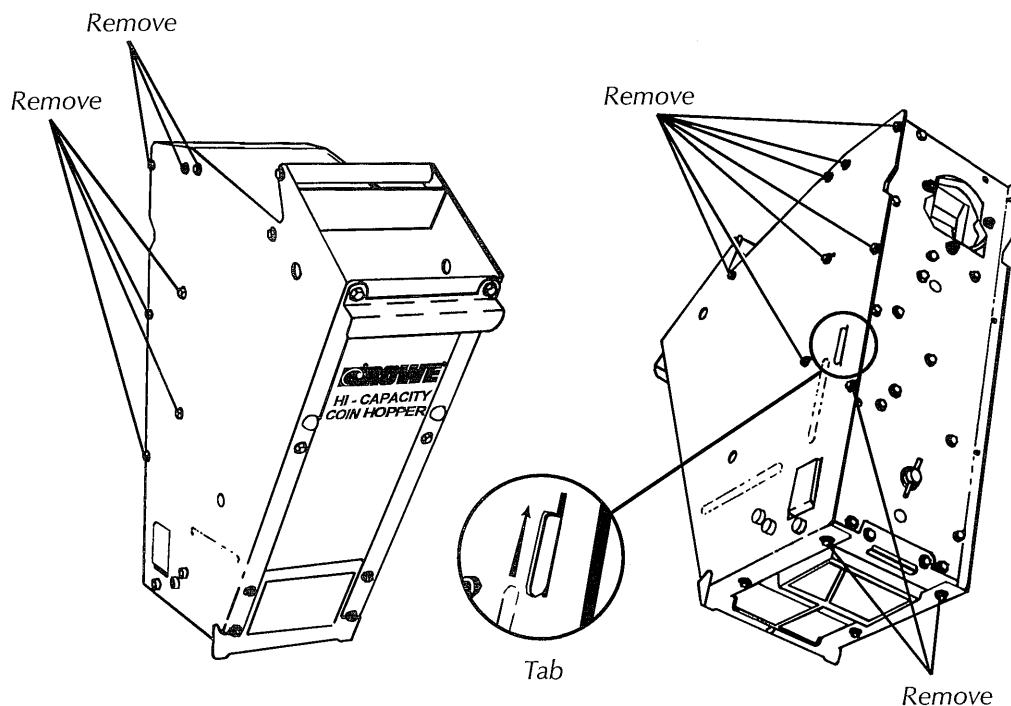
The coin tracks are Teflon-coated to minimize dirt buildup. It may still be necessary to clean them at regular intervals, as dictated by the number of vends and the environment, to prevent dirt accumulation in the coin path.

Failure to keep the coin path clean may result in coins sliding out of the track, indicating an empty condition even though the hopper contains sufficient coins. Clean the hoppers as follows:

1. Remove the hopper from the bill changer and place it on a working surface.
2. Remove all the screws pointed out in *Figure 3-3B*, and lift the back chain plate assembly up so that the tab (enlarged below) can be pulled through the right hand side plate of the hopper assembly. Pull the chain plate assembly straight back out and you will now be able to access the coin path more easily for cleaning.



**Figure 3-3A. Cleaning the Hopper Coin Path**



**Figure 3-3B**

**WARNING:**

Chain lubrication is not normally required or recommended. Do not use detergents to clean the hopper. The hopper has been factory lubricated and detergent cleaners may destroy this lubrication.

3. Using the Nylon hopper cleaning brush supplied with each machine, remove all dirt from the angular sides and flat surfaces of the serpentine coin path as shown in *Figure 3-3A*.
4. Reassemble the hopper (when finished cleaning) by replacing the back chain plate assembly and starting all screws removed. Once all screws have been started, they may then be tightened. The screws must be tightened in sequence as shown in *Figure 3-3C*.
5. Install the hopper in the bill changer and make a test vend to check for proper hopper operation.

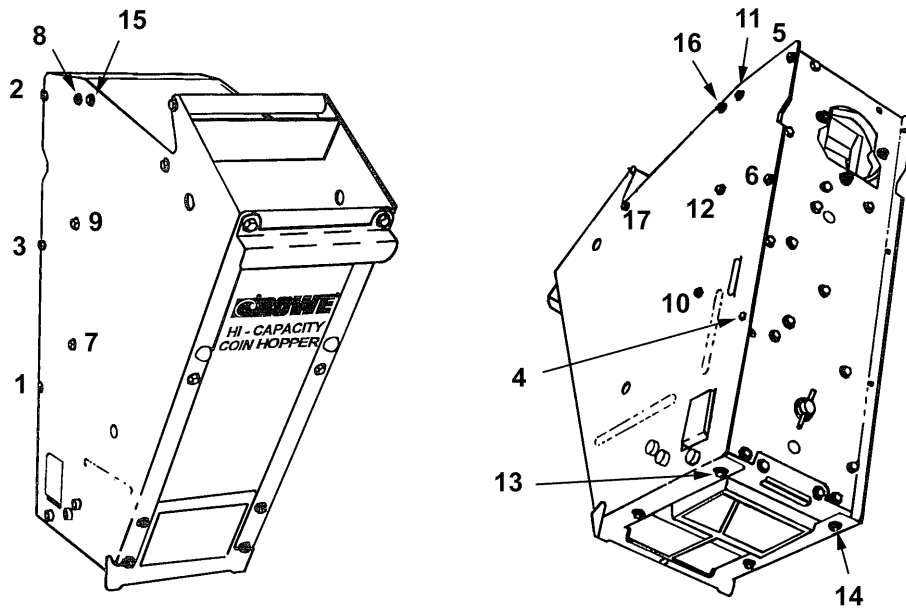


Figure 3-3C

## CHANGE BUCKET LUBRICATION

The coin dispenser change bucket door pivots, links, hubs and bell cranks are factory lubricated with light machine oil. Rowe specification Number 00137900 oil or 3-in-1 Electric Motor Oil can be used. If change bucket is worn beyond repair, order and install one of the kits listed at the end of the Parts Catalog in this manual.

For the most reliable performance, the lubrication should be renewed annually by applying one drop of oil at the points shown in *Figure 3-4*.

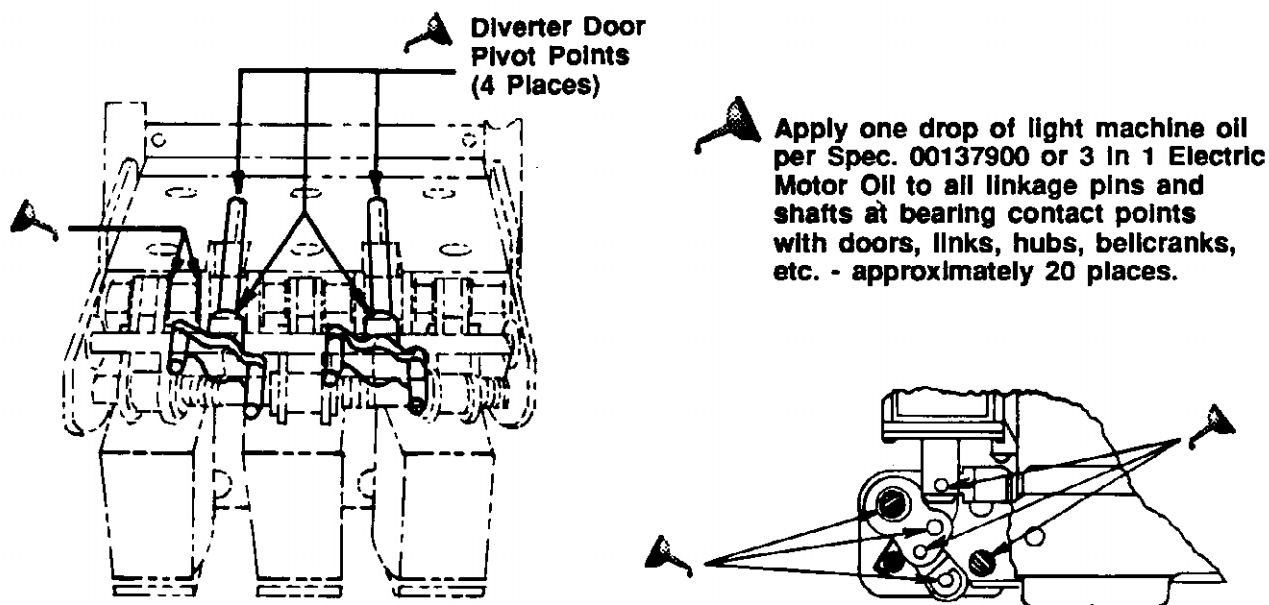


Figure 3-4. Change Bucket Lubrication

## TEST PROCEDURES

### Checking a Bucket Solenoid

A solenoid that looks discolored or burned should be checked. Unplug the solenoid from the circuit before taking any measurements. A good solenoid should measure approximately 8.5 ohms.

### Transport Motor Speed Check

The transport motor speed and direction are computer controlled. No adjustments can be made, however the encoder on the back of the motor can be checked. The computer detects pulses from this encoder for speed control.

1. **Be sure that the Anti-Pullback feature is disabled before performing this check!**
2. Remove the transport from the machine, but keep it plugged in and keep the bill changer power ON.

3. Turn the transport over and connect the Common lead of a voltmeter to P701, Pin 10. Connect the other lead to P701, Pin 9. Turn the transport motor drive shaft very slowly by hand. The meter should alternately read voltages below 0.7 VDC then above 3.8 VDC.
4. One rotation of the motor drive shaft will produce 100 pulses.
5. If you were using the Anti-Pullback feature, be sure to re-enable it.

## Testing BC-1200-1400 Transport Photocells

The transport photocells are automatically checked each time the transport is turned on. Each photocell and light combination goes through a short test and brightness adjustment process. This process continues as long as the transport receives power. No adjustments can be made; however, a bad photocell can be detected with a voltmeter. The following measurements are all made with the Common lead of the voltmeter connected to P701, Pin 10 on the transport (the voltmeter should have a 10 megohm impedance).

Photocell	Action	Voltage Expected
<b>VI - Transport Inlet</b>	No Action - Leave the inlet open  Block the light path by inserting paper or a bill into the transport opening	P701, Pin 7 should be between 0.2 VDC and 1.9 VDC  P701, Pin 7 should increase at least 0.5 volts from the reading taken with the inlet open. The transport motor should start running forward. Hold the bill in place until you finish the reading, then remove the bill and let the transport finish cycling.
<b>VF - Flipper Cell</b>	No Action - Leave flipper in rest position  Block the light path with the flipper	P701, Pin 5 should be less than 1.0 VDC  P701, Pin 5 should be greater than 2.8 VDC
<b>VT - Transmissive Cell</b>	No Action - Leave the light path open  Block the light path by inserting paper or a bill between the transmissive cell and the transmissive/reflective LED in the middle of the transport	P701, Pin 4 should be 0.74 VDC to 1.25 VDC  P701, Pin 4 should increase by at least 0.75 VDC from the reading taken with the light path open
<b>VR - Reflective Cell</b>	No Action - Leave the light path open  Insert a white piece of paper between the transmissive cell and the transmissive/reflective LED in the middle of the transport	P701, Pin 6 should be between 0.8 VDC and 2.0 VDC  P701, Pin 6 should increase by at least 0.25 VDC from the reading taken without white paper inserted.

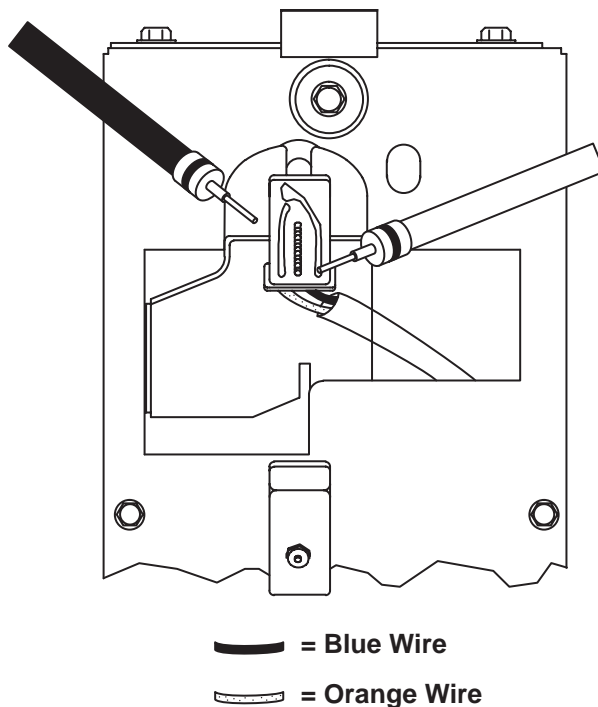
## Coin Counting Phototransistor (Detector) Check

1. Turn the bill changer POWER switch OFF.
2. Remove the black plastic cover from the phototransistor and connect the Common meter lead to the metal dispenser backing plate as shown in *Figure 3-5A*.
3. Connect the + meter lead to the blue wire. (See *Figure 3-5A*.)
4. Turn the POWER switch ON and check that the LED's are lit. The meter should indicate between 4.7 and 5.2 volts DC.

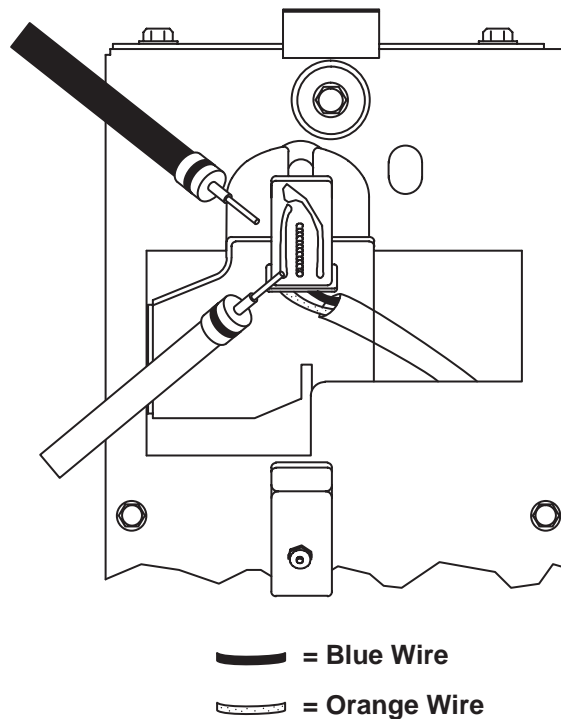
If the meter indication is not correct, the voltage regulator VR801 on the power supply board (Part Number 70036501) may need replacement.

5. If the meter indication in Step 4 is correct, continue this procedure. If the voltage was not between 4.7 and 5.2 volts, repair the malfunction before you continue.
6. Move the + meter lead to the orange wire on the phototransistor as shown in *Figure 3-5B*. The meter should indicate between 3.5 and 5.0 volts DC.

If the voltage is less than 3.5 volts, replace the phototransistor board assembly with Part Number 25175702.



**Figure 3-5A. Sensor Check**

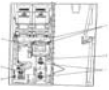


**Figure 3-5B. Sensor Check**



## ADJUSTMENTS

### Hopper Chain Adjustment



#### NOTE:

Make sure the hopper is empty of all coins before you adjust the chain tension.

1. Loosen the three screws at the top back of the hopper, which will allow the black plastic upper chain guide ring to move diagonally upwards, as shown in *Figure 3-6*.
2. Pull the upper chain guide ring up as shown in *Figure 3-6*, while you rotate the drive pin clockwise until the slack is removed from the chain but no binding is evident.
3. Tighten the three screws making sure the lower screw is tightened last. If a torque wrench is available, adjust the chain so that the torque input at the drive pin is one to four inch pounds.

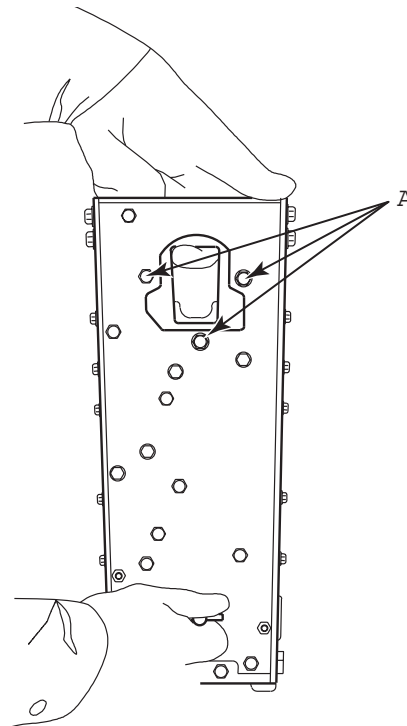


Figure 3-6. Hopper Chain Adjustment

## Bill Stacker

### NOTE:



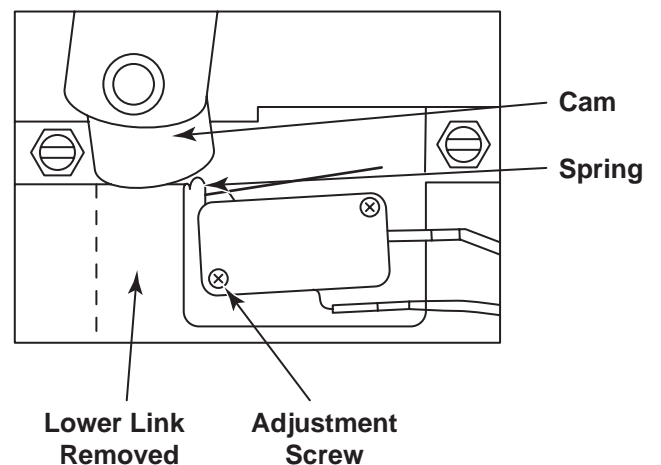
#### BC-1400

To remove the stacker from the BC-1400, it is necessary to get into an OFF HOME condition. To do this, press one of the TEST VEND switches and as the stacker push plate reaches its maximum travel, turn the power off.

### HOME SWITCH ADJUSTMENT

A stacker cycle will start each time a TEST switch is pressed. Adjust the stacker HOME switch as follows:

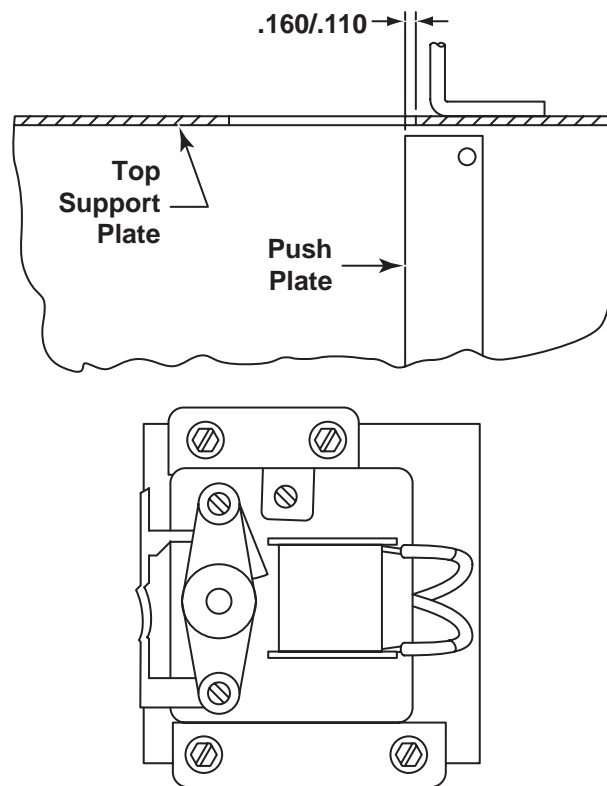
1. Turn the power OFF and remove the bill stacker from the bill changer.
2. Hold the motor brake IN (disengaged) and manually rotate the motor shaft until the stacker is in the HOME position (the stacker push plate is at its inner most position).
3. Disconnect the lower link and move it to the side.
4. Adjust the cam switch by loosening the adjustment screw and rotating the switch until the cam pushes the spring against the switch body as shown in *Figure 3-7*.
5. Tighten the adjustment screw, reconnect the lower link and install the bill stacker in the bill changer.
6. Turn the power ON and check stacker operation.



**Figure 3-7. Stacker Switch Adjustment**

## Adjusting the Stacker Pusher Plate

1. Turn the power OFF and remove the stacker from the changer.
2. Loosen the four mounting screws holding the motor plate as shown in *Figure 3-8*.
3. Hold the motor brake IN (disengaged) and manually rotate the motor shaft until the cam activates the stacker switch.
4. Lay the bill stacker on its side with motor on top. Turn the motor shaft until the pusher plate is all the way back.
5. Move the pusher plate out by prying on the top end of the pusher plate with a small screw driver until it is approximately 1/8 inch past the hole in the top support plate as shown in *Figure 3-8*.
6. Tighten the four motor mounting screws and install the stacker in the bill changer.
7. Turn the power ON and check stacker operation.



**Figure 3-8. Pusher Plate Adjustment**

## Adjusting the Bill Acceptor Rails

### BC-1200 ONLY

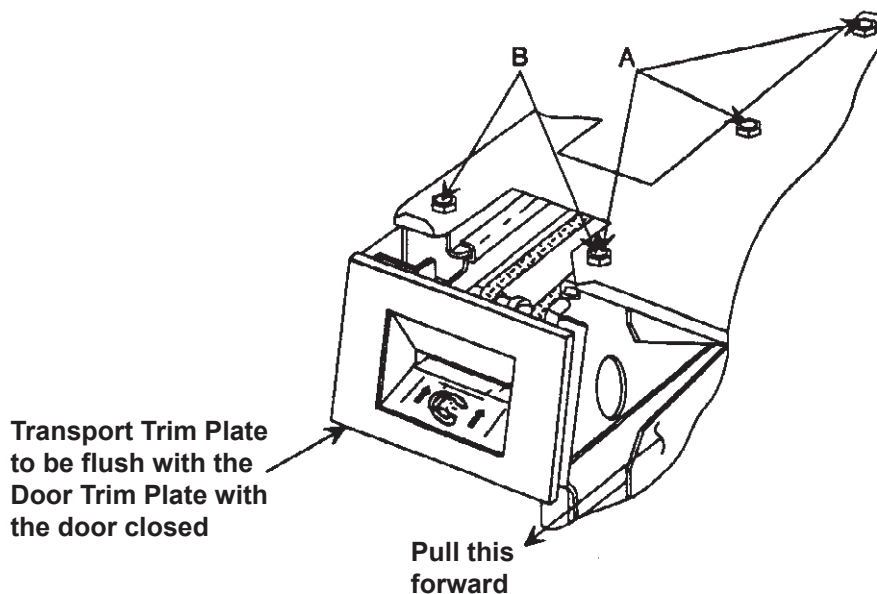
The bill acceptor mounting rails must be spaced correctly as shown in *Figure 3-9A*. The bill acceptor should slide in and out without binding, but not be sloppy in the rails.

1. Adjust the rail spacing by loosening the three screws (*A*) which hold the right-hand rail and move the rail sideways.
2. Retighten the screws.

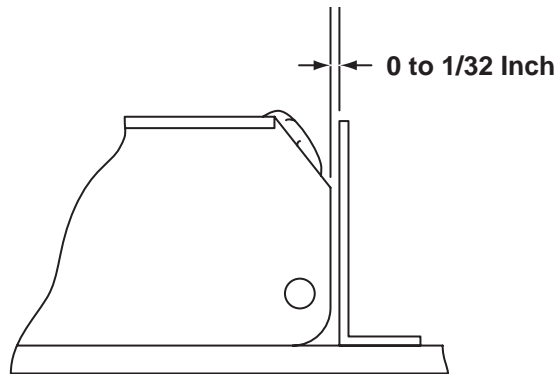
## Adjusting the Bill Transport to Stacker Alignment

### BC-1200 ONLY

Loosen the two screws (*B*) as shown in *Figure 3-9A*. Pull the bill staker as far forward as possible. Slowly close the front door of the changer so that it will push the transport/stacker combination back into the changer yet leave the transport trim plate in contact with the door trim when the door is closed. After tightening the screws, make sure that the rear of the transport side plates and the bill acceptor stop plate on the staker are flush to within 1/32 inch as shown in *Figure 3-9B*.



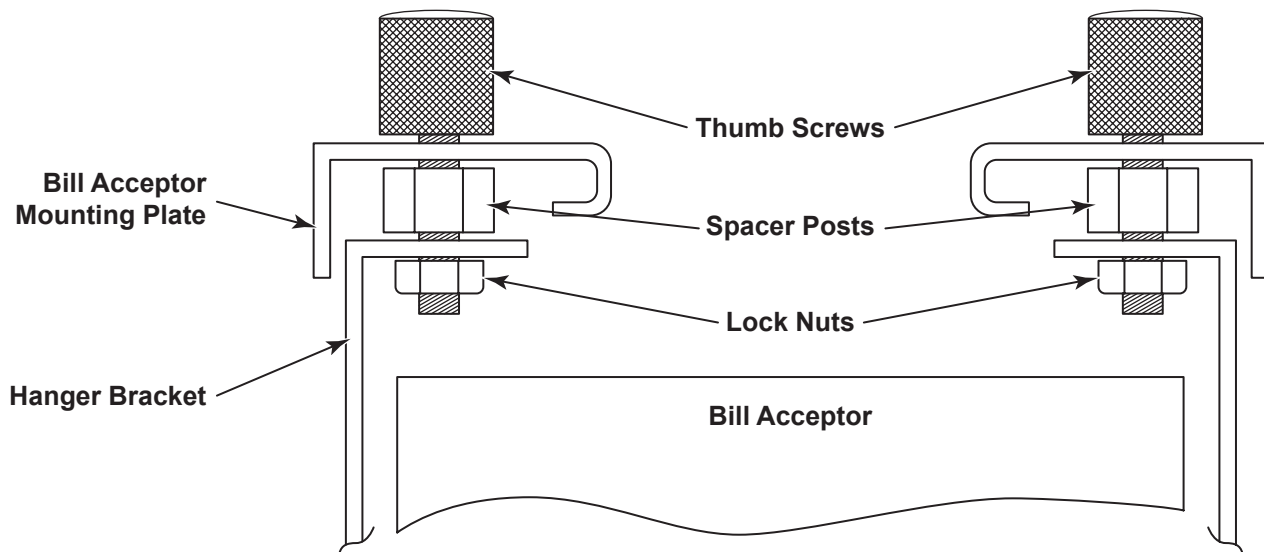
**Figure 3-9A. Bill Transport to Bill Stacker Adjustment**



**Figure 3-9B. Bill Transport to Stacker Adjustment**

**BC-1400 ONLY**

Refer to *Figure 3-10*. Loosen the lock nuts on each stacker bracket. With the thumb screws removed, slide the transport and stacker into the mounting rails. Tighten the thumb screws securely. Press forward on the stacker hanger brackets until the transport trim plate is flush with the trim on the faceplate of the changer and be sure that the stop bracket is flush to 1/32 of an inch from the rear of the transport side plates as shown in *Figure 3-9B*. Tighten the lock nuts securely.

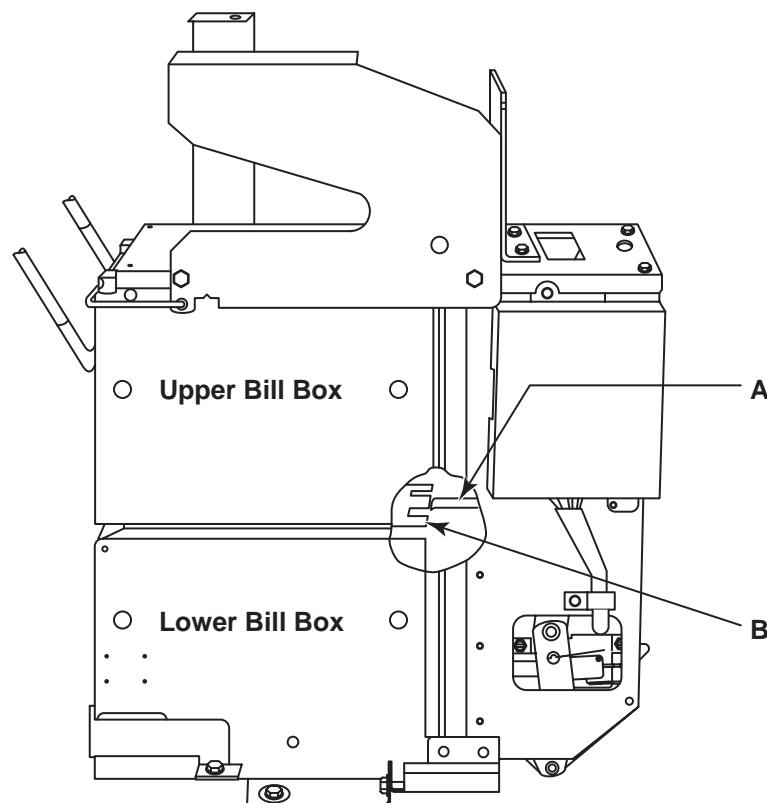


**Figure 3-10. BC-1400 Stacker Adjustment**

## Adjusting the Upper Bill Box

Refer to *Figure 3-11* as you do the following four steps.

1. Make sure that the upper bill box (C) is tight against chute guides (A). If it is not, do the following procedure:
2. Loosen the two #8-32 screws (B) on each of the two support brackets (D). Push the upper bill box (C) tight against chute guides.
3. Push the support brackets until the bill box catch wire (E) is horizontal and tight against the bill box.
4. Tighten the four #8-32 screws (the bill box catch wire must fall over the bill box, and the bill box must not move during stacking cycle).

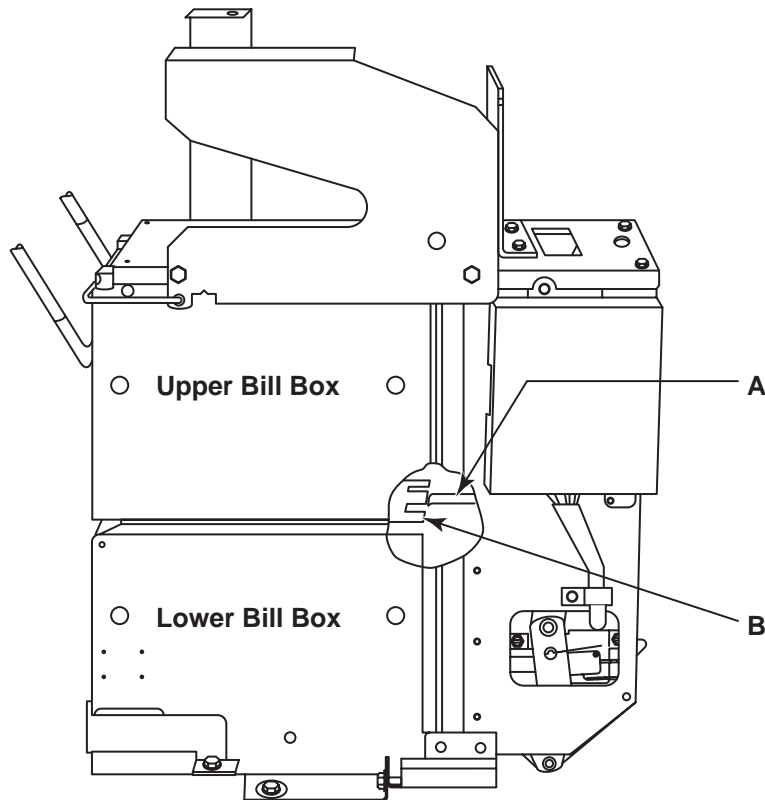


**Figure 3-11. Upper Bill Box Adjustment**

## Bill Stop Flipper Check

Refer to *Figure 3-12* as an aid in doing this service check.

1. The bill stop flipper (*A*) must touch the tab (*B*) on the upper bill box.
2. With the lower bill box removed, slide the upper bill box into the stacker. The flipper should move downward approximately 1/32 to 1/16 inch when the upper bill box is inserted completely into the stacker.
3. If the flipper does not move downward the correct distance (1/32 to 1/16 inch), perform the following procedure:

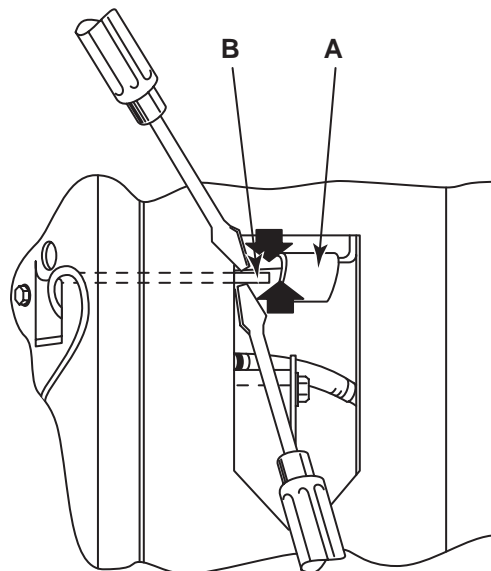


**Figure 3-12. Bill Stop Flipper Check**

## Adjusting the Bill Stop Flipper

Refer to *Figure 3-13* while you are doing this procedure.

1. The position of the bill stop flipper (*A*), can be adjusted by prying against the solenoid plunger stop tab (*B*) through the flipper opening in the pusher plate with a screwdriver (Service tip: Pry up on the stop tab (*B*) to lower the flipper; pry down on the stop tab to raise the flipper).



**Figure 3-13. Bill Stop Flipper Adjustment**

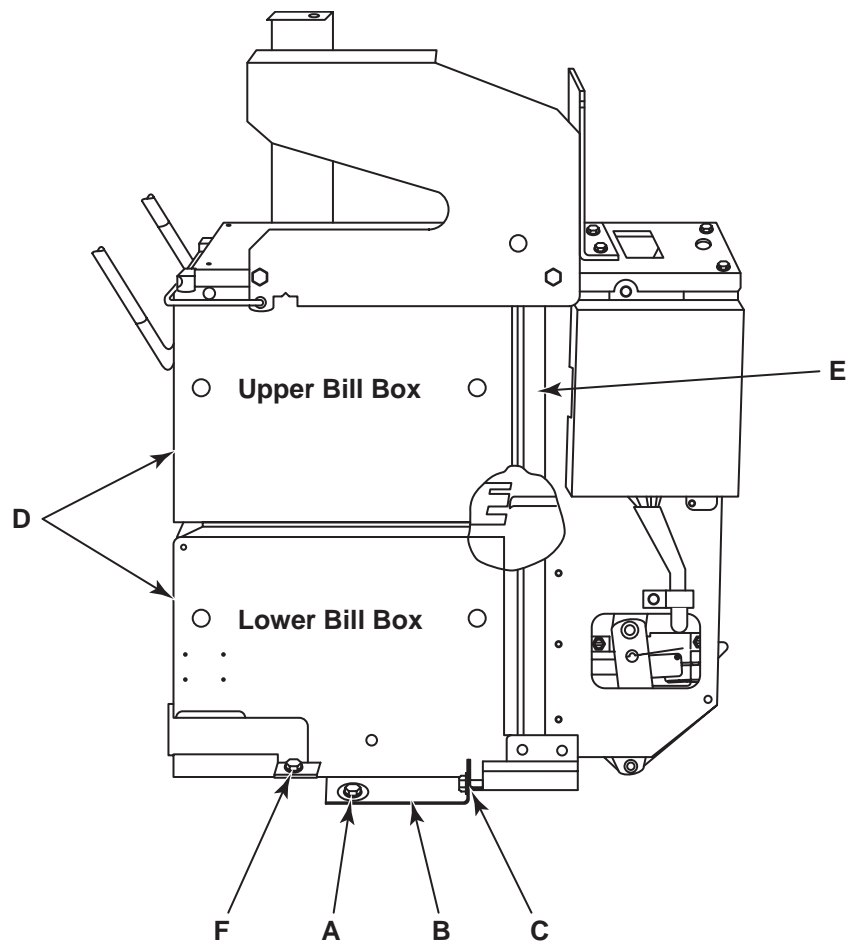
## Installing a New or Replacement Bill Stacker

### BC-1200 ONLY

Refer to *Figure 3-14* and adjust the lower bill box stop bracket and mounting plate so that the bottom bill box is aligned with the upper bill box and chute guides in the following manner:

1. Perform the bill transport-to-stacker alignment procedure as described earlier in this section.
2. Adjust the lower bill box stop bracket and mounting plate so that the stacker hangs straight up and down by:
  - A. Loosening the two 8-32 screws (*A*) holding the mounting plate to the changer bottom panel.
  - B. Loosening the two screws (*C*) holding the mounting plate (*B*).
  - C. Moving the mounting plate around until proper alignment is obtained.
  - D. Tightening all four screws.
3. Refer to *Figure 3-14* and make sure that the bill boxes (*D*) are tight against the chute guides (*E*) to get proper stacking.
4. Refer to *Figure 3-14* and loosen the two #8-32 screws (*F*) in the lower bill box stop bracket. Push the lower box tight against the chute guides. Push the lower bill box stop bracket tight against the bill box and tighten the two #8-32 screws.





**Figure 3-14. Mounting Plate Adjustment**

### BC-1200 AND BC-1400

5. Check that the spring wire on the door is properly positioned by leaving the upper bill box unlatched (let the bill box stick out approximately 2 ½ inches). Slowly close the door and verify that the spring wire (*B*) pushes the upper bill box into the latched position (*see Figure 3-15*).
6. If the upper bill box does not push into the latched position, bend the spring wire out far enough to ensure that the spring wire pushes the upper bill box in far enough to allow the bail wire to fall and latch the bill box in place when the door is closed (the bail wire *C* falls to the position shown in *Figure 3-15*).

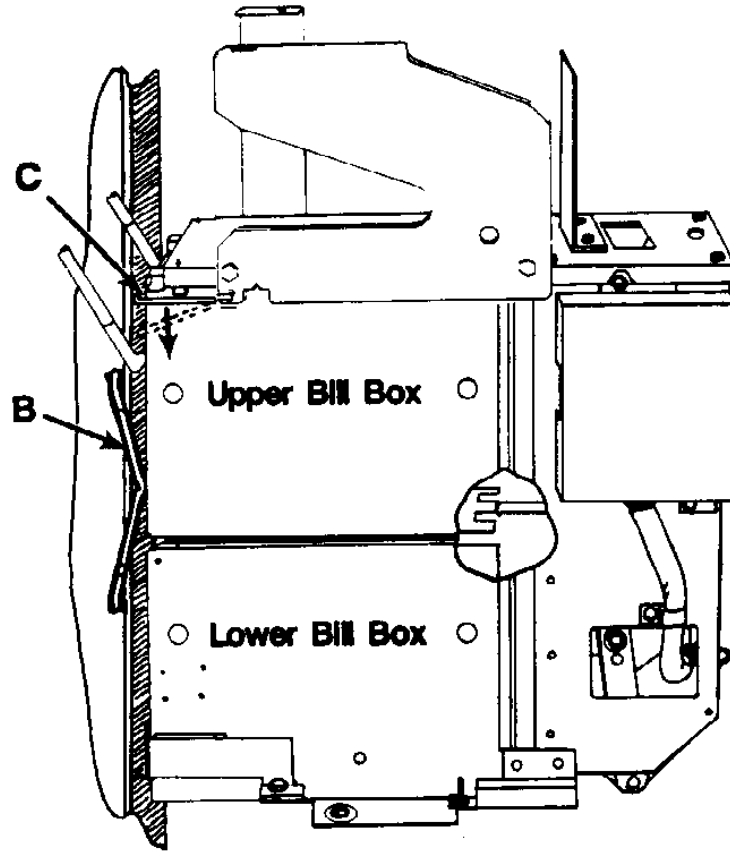
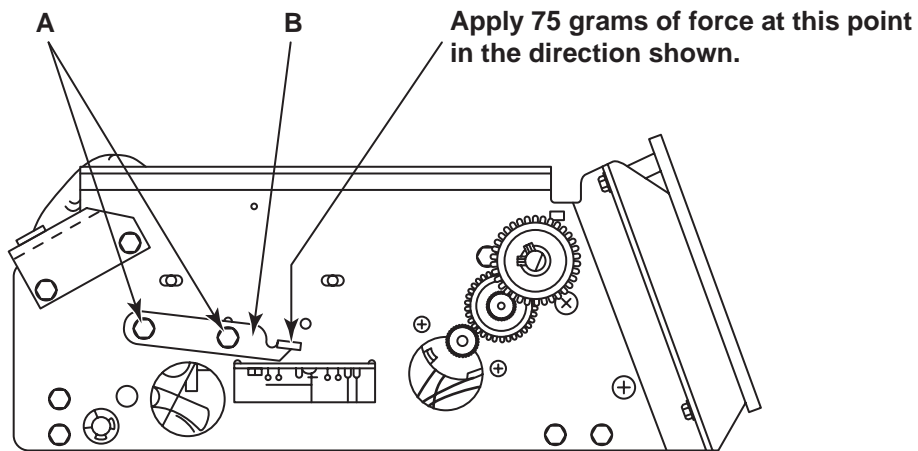


Figure 3-15. Lower Bill Box Stop Bracket Adjustment (BC-1200 Only)

## Timing Belt Tension

Refer to *Figure 3-16* for this adjustment procedure.

1. Loosen the two screws (*A*) holding the belt tension adjustment levers (*B*) on both sides of the bill acceptor transport.
2. Make sure that the adjustment levers, adjusting roller, and shaft move freely.
3. Each belt should be adjusted such that it is as loose as possible, but tight enough that it will not “jump” the drive pulleys when the transport is under a heavy load such as reversing a badly wrinkled bill. If a more precise adjustment is desired, perform the following step:
  - A. Apply 75 grams of perpendicular force to both belt tension adjustment levers at the same time and then tighten all four screws.



**Figure 3-16. Timing Belt Tension Adjustment**

## Section 4: Troubleshooting

### INTRODUCTION

The BC-1200 and BC-1400 incorporates major assemblies and components as field replaceable plug-in units. There are several onboard diagnostic indicators on these assemblies. The information in this section takes full advantage of this design by isolating possible malfunctions to one or more of these basic plug-in units. This method saves time and requires little training in electronics.

The most significant troubleshooting aids for the BC-1200/1400 are the power control center LED's, and the status display on the computer control center.

### POWER UP DIAGNOSTICS

As power is applied to the bill changer, a series of power up checks are performed by the control computer before the machine is put into service. The 16-character alphanumeric status display on the control computer is the primary diagnostic indicator. A secondary indicator is provided by the green reflective/transmissive LED in the bill transport.

The following sequence describes the power up sequence along with what is shown on the status display. The condition of the secondary indicator is also described.

Action - Turn the Power Switch to the ON position.

Sequence	Status Display	Transport LED
1	Display shows "ROWE FAST PAY"	LED flickers ON briefly
2	Display shows "VERSION XX"	LED OFF
3	Display shows "CHECKSUM=XXXX"	LED turns ON for about ½ second then turns OFF
4	Display shows "RAM TEST PASSED"	LED turns ON for about ½ second then turns OFF
5	Display shows "CHECKING SYSTEM"	LED ON
6	Display shows "SYSTEM CHECK OK"	LED ON
7	Display clears then a walking dash appears	LED OFF

## Sequence Descriptions

1. During *sequences 1 and 2* the control computer is performing internal tests on itself. Several things may indicate trouble. If the LED in the transport comes ON and stays ON and the display stays blank, there is a problem with the microprocessor on the control computer board. If the LED in the transport continues with the power up sequence but the status display stays blank, there is a problem with the display and its associated circuits on the computer control board.

The XX on the display represents a software version number that will be displayed there.

Example: Version 1.0 software will be displayed as VERSION 10. The version number displayed will match the version number visible through the hole in the lower left corner of the control computer assembly.

2. During *sequence 3*, the control computer is checking the integrity of its own program.
3. During *sequence 4*, the control computer is testing the Random Access Memory (RAM). If the RAM test does not pass, the message on the status display will say “RAMTEST FAILED”. The machine will not continue the power up sequence and the LED in the transport will remain ON.
4. During *sequences 5 and 6*, the control computer is checking the machine configuration. If the configuration is the same as when the machine was turned OFF, it will go to normal standby operation. If the machine code does not match (a CCC board from a BC-3500 installed in a BC-1200), the display will show “MACHINE CODE ERR”. If the configuration changed due to low battery voltage or some other reason effecting the RAM, the display will show “SET UP REQUIRED”. In either case, the machine will require reprogramming.
5. *Sequence 7* is the stand by condition. A dash walks back and forth across the status display and the LED in the transport is ON.

## MACHINE STATUS

The status of the machine is shown on the status display of the CCC during all phases of operation. The following section will describe the status messages displayed.

### Standby Mode

The STANDBY mode is the normal, waiting to accept money, mode. All four voltage LED's on the power control center are lit. All three LED's on the dispenser are lit. Then the inlet LED (VI) in the transport is lit. There is a dash walking back and forth across the display. All motors and bucket solenoids are OFF. The transport motor is OFF. The coin lockout solenoid is either on or off depending on whether coins are enabled or not. The out of service lamp is off.

In the STANDBY mode, the HOPPER and VALUE buttons on the CCC have special functions. When the VALUE button is pressed, the status display will show “AMOUNT\$XX-XX”, where XX-XX is the amount of money that has been accepted since this amount was last cleared. When the HOPPER button is pressed, the status display will show “LAST XXXXXXXX”, where the XXX indicates the last three denominations paid out. The denomination on the left is the most recent, the denomination in the center paid before the one on the left and the denomination on the right paid before the center denomination.

---

## Accept, Payout, and Replenish Modes

During normal operation, the display will reflect each state the machine goes through as it happens. When a bill is moving in the transport, the message “VALIDATING” will appear. After validation, during the stack and vend cycles, the display will show the message “XX PAYS ---”. The XX indicates the denomination just accepted and the -’s represent the number of coins from the left, center and right hoppers needed to refill the bucket. During replenish, as coins pass through the detectors, the displayed coin counts will be reduced until all three reach zero. The machine will then return to the STANDBY mode.

## Reject Mode

While the machine is validating a bill, several things may cause the bill to be rejected. When a bill is rejected, the transport will reverse returning the bill and the status display will show a reason for the reject. This reject message will stay on the display for about thirty seconds, then the walking dash will erase it.

## Out of Service Mode

If a condition exists that will prevent proper operation, the changer will enter the OUT OF SERVICE (or SHUTDOWN) mode. The most common cause of this condition is that the changer is out of coins or tokens, but other malfunctions will lead to this state.

When the control computer detects such a condition, it immediately de-energizes the power control relay and coin lockout solenoid. This causes the 120VAC, 40VDC, and 30VDC to be switched off to all components and the OUT OF SERVICE lamp to come on. The display will begin to flash an error message.

The next pages will provide explanations of and troubleshooting hints for all of the reject and shutdown messages.

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<sup>1</sup> These conditions are not shown as a message on the display.

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## VALIDATION REJECTS

### Cell Sequence Rejects

## REJECT - SHORT VI

### Symptom:

The inlet cell was covered for too short of a time.

This is a reject message.

The bill was rejected because the VI cell was not covered long enough. The bill may have been torn on the right side, torn, or folded over at the trailing edge of the bill. If bills are rejected frequently with this code, the VI cell may be giving an intermittent signal.

### Corrective Action:

1. Check the VI cell for proper switching.
2. If the cell is OK, check the wiring from the VI cell to the CCC for a possible short to the chassis, or an open to the CCC (P4 - Pin 14).
3. The +5 VDC supply to the LEDs may be below 4.5 VDC; check the voltage. If it is low, replace regulator VR802 on the power control center (*see the components list for the power supply circuit board*).
4. If all of preceding checks are OK, replace the CCC.

If the bill is left in the transport for five seconds, the machine will go into SELF-CLEAR.

---

## REJECT - SHORT VF

### Symptom:

Flipper cell covered for too short a time.

This is a reject message.

The bill was rejected because the flipper cell was uncovered too soon and the CCC recognized this as a non-valid validation sequence. If bills are rejected frequently with this message:

### Corrective Action:

1. Check for small pieces of paper or other foreign objects in the track.
2. The flipper may be binding or hanging-up on the back rollers. Check for flash or burrs on the flipper and back rollers.
3. The flipper cell may be giving an intermittent signal. Check the cell for proper switching. If the cell is OK, check the wiring from the transport to the CCC for a possible ground to the chassis or an open to the CCC (P4 - Pin 7).
4. If all of the preceding checks are OK, replace the CCC.

If the bill is left in the transport for five seconds, the machine will go into SELF-CLEAR.

## **REJECT - VI AGAIN**

### **Symptom:**

A second bill was inserted while validating the first bill.

This is a reject message.

A bill was rejected because the VI cell was covered while the changer was in the process of validating a bill.

Wait until the changer completes the cycle before you insert the next bill.

If bills are rejected frequently with this code, the VI cell may be giving an intermittent signal.

### **Corrective Action:**

1. Check the VI cell for proper switching. If the cell is OK, check the wiring from the VI cell to the CCC (P4 - Pin 14) for an intermittent open connection.
2. If both of the preceding checks are OK, replace the CCC.

If the bill is left in the transport for five seconds, the bill changer will go into SELF-CLEAR.

---

## REJECT - TIMEOUT

### Symptom:

Inlet cell was never uncovered.

This is a reject message.

The bill was rejected because the VI cell never uncovered. The CCC recognized this as a non-valid validation sequence. Take the following corrective action if bills are rejected frequently with this code.

### Corrective Action:

1. Check for small pieces of paper or other foreign objects in the track.
2. The VI cell may be giving an intermittent signal. Check the VI cell for proper switching.
3. If the cell is OK, check the wiring from the VI cell to the CCC (P4 - Pin 14) for a possible short to the chassis.
4. The +5VDC supply to the LEDs may be low; check the voltage. If it is low, replace the VR801 regulator on the power supply board, which is inside the power control center.
5. If all of the preceding checks are OK, replace the CCC.

If a bill is left in the transport for five seconds, the bill changer will go into SELF-CLEAR.

## REJECT - LONG VI

### Symptom:

The inlet cell was covered for too long a time.

This is a reject message.

The bill was rejected because the VF cell was covered too soon, or the VI cell was covered too long.

The CCC recognized this as a non-valid validation sequence.

If bills are rejected frequently with this code, take the following corrective action:

### Corrective Action:

1. Check for small pieces of paper or other foreign objects in the track.
2. The VF flipper may be binding or hanging-up on back rollers.
3. Check for flash or burrs on flipper and back rollers.
4. The VF or VI cell may be giving an intermittent signal. Check the cells for proper switching. If the cells are OK, check the wiring from the VF cell to the CCC (P4 - Pin 7) for a possible ground to the chassis and VI cell to the CCC (P4 - Pin 16).
5. If all of previous checks are OK, replace the CCC.

If a bill is left in the transport for five seconds, the bill changer will go into SELF-CLEAR.

---

## REJECT - LONG VF

### Symptom:

The flipper cell was blocked for too long a time.

This is a reject message.

The bill was rejected because the VF cell was covered too long.

If this message appears often with good bills, check for tight VF flipper operation, incorrect transport to stacker alignment, or a nonoperating stacker.

If a bill is left in the transport for five seconds, the bill changer will go into SELF-CLEAR.

---

## REJECT - VT AGAIN

### Symptom:

The transmissive cell was covered.

This is a reject message.

A bill was rejected because the VT cell recovered while the bill changer was in the process of validating a bill.

If bills are rejected frequently with this message, check for a piece of paper or other material in the transport.

The VT cell may be giving an intermittent signal.

### Corrective Action:

1. Check the VT cell for proper switching. If the cell is OK, check the wiring from the VT cell to the CCC (P4 - Pin 10) for an intermittent open connection.
2. If all of the preceding checks are OK, replace the CCC.

If the bill is left in the transport for more than five seconds, the bill changer will go into SELF-CLEAR.

## REJECT - NO MAG

### Symptom:

Not enough magnetic signal from the Mag. Amp.

This is a reject message.

The bill was rejected because no signals came from the Mag. Amp.

The bill may have been inserted upside down.

If bills are frequently rejected for this message:

### Corrective Action:

1. Check for intermittent connections in the Mag. Amp. harness or the White/Brown, White/Green wires from the transport to the CCC (P4 - Pins 2 and 5).
2. Check the bill pressure rollers in the transport for proper spring pressure.
3. Check the surface of the Mag. head for dirt buildup or foreign material.
4. If all of the preceding checks are OK, replace the Mag. Amp.
5. If the problem still exists, replace the CCC.

If a bill is left in the transport for five seconds, the bill changer will go into SELF-CLEAR.

---

## REJECT - LATE VF

### Symptom:

The flipper cell did not cover.

This is a reject message.

The bill was rejected because the VF cell was not covered soon enough after the VT cell was covered.

The bill is possibly torn at its leading edge.

An object is possibly hung-up or jammed in the track.

If bills are frequently rejected with this message:

### Corrective Action:

1. Check for tight, binding, or sticky flipper operation.
2. Check for an intermittent open circuit in the wiring to the VF cell from the CCC (P4 - Pin 7).
3. Check the rear portion of the transport track for any condition that would cause a bill to slow down or hang up (soft drink residue, catsup, burrs in the track, etc.).
4. The drive belts of the transport may be broken or slipping. Check them and replace the drive belts if necessary.
5. If none of the preceding steps find the problem, replace the CCC.

If a bill is left in the transport for five seconds, the bill changer will go into SELF-CLEAR.



## REJECT - SPEED

### Symptom:

The transport motor speed is not correct.

This is a reject message.

The bill was rejected because the transport motor did not run at a constant speed during validation.

### Corrective Action:

1. An object is possibly hung-up or jammed in the track.
2. If bills are frequently rejected for this message, check for tight, binding, or sticky rollers, belts, or flipper.
3. Check that the timing belt tension is not too tight.
4. Check that the +12 VDC supply in the power control center is correct.
5. Check for an intermittent connection in the wiring for the +12 VDC supply, the Red, Black, and Shield wires, or the White/Black encoder signal wire.
6. Check the motor and timing gear backlash.
7. If all of the preceding checks are OK, replace the transport.
8. If the problem still exists, replace the CCC.
9. Replace the power control center if replacing the CCC does not correct the problem.

If a bill is left in the transport for more than five seconds, the bill changer will go into SELF-CLEAR.

---

## REJECT - LOST TACH

### Symptom:

The tach signal from the transport was lost.

This is a reject message.

The bill was rejected because the CCC cannot control the transport motor speed without a tach. signal.

### Corrective Action:

1. An object is possibly hung-up or jammed in the track.
  2. Check for a tach. signal as outlined in *Test Procedures* in *Section 3*. Replace the transport if the tach. is bad.
  3. Check for intermittent connections in the wiring from the transport to the CCC (P4 - Pin 9).
  4. If all of the preceding checks are OK, replace the CCC.
- 

## REJECT - VF OPEN

### Symptom:

The flipper cell opened too soon.

This is a reject message.

The bill was rejected because the VF cell opened during validation.

The bill is possibly torn, or it may have a hole in it.

An object is possibly hung-up or jammed in the track near the flipper.

If bills are frequently rejected for this message, take the following corrective action:

### Corrective Action:

1. Check for tight, binding, or sticky flipper operation.
2. Check for an intermittent open circuit in the wiring to the VF cell from CCC (P4 - pin 7).
3. If the preceding checks do not find the problem, replace the CCC.

If a bill is left in the transport for five seconds, the bill changer will go into SELF-CLEAR.

## **BILL PARAMETER REJECTS**

Take corrective action only if all bills or a significant number of bills reject for the same reason. Be sure to try different bills and bills of different denominations. If they accept, the bill being rejected has some property the CCC finds abnormal.

### **REJECT - BILL (A)**

**Symptom:**

The bill failed validation because of a lack of a magnetic signal.

**Corrective Action:**

1. Replace the Mag. amp/transport
  2. Replace the CCC.
- 

### **REJECT - BILL (B)**

**Symptom:**

The bill failed validation.

**Corrective Action:**

1. Replace the Mag. amp/transport
  2. Check/clean the two bill pressure rollers under the magnetic head(s) - (may have metal particle contamination).
  3. Replace the CCC.
- 

### **REJECT - BILL (C)**

**Symptom:**

The bill failed validation.

**Corrective Action:**

1. Replace the Mag. amp/transport
2. Check for good spring tension on the two bill pressure rollers under the magnetic head(s).
3. Replace the CCC.

---

## REJECT - BILL (D)

### Symptom:

The bill failed validation.

### Corrective Action:

1. Replace the Mag. amp/transport
  2. Replace the CCC.
- 

## REJECT - BILL (E)

### Symptom:

The bill failed validation.

### Corrective Action:

1. Check the VR/VT cells for proper voltages and switching (*refer to Section 3*).
  2. Replace the VR cell, VT cell, VR/VT LED or transport.
  3. Replace the CCC.
- 

## REJECT - BILL (F)

### Symptom:

The bill failed validation because there is far too much magnetic signal. Refer to REJECT-BILL (B).

---

## REJECT - BILL (G)

### Symptom:

The bill failed validation.

### Corrective Action:

1. Check the VR/VT cells for proper voltages and switching (*refer to Section 3*).
2. Replace the VR cell, VT cell, VR/VT LED or transport.
3. Replace the CCC.

## REJECT - BILL (H)

### Symptom:

The bill failed validation because the information from Mag Head 2 was incorrect.

### Corrective Action:

1. Check the White/Green wire from the transport for an Open/Short to the CCC (P4 - Pin 5).
  2. Replace the mag amp/transport.
  3. Replace the CCC.
- 

## REJECT - BILL (I, J, K, M, or S)

### Symptom:

Bills rejected with any of these codes are failing a number of interrelated magnetic tests.

### Corrective Action:

1. Replace the transport
  2. Replace the CCC.
- 

## REJECT - BILL (L)

### Symptom:

The bill failed validation because there was insufficient mag signal from certain points on the bill.

### Corrective Action:

1. Replace the transport
  2. Replace the CCC.
- 

## REJECT - BILL (P)

### Symptom:

The bill failed validation due to incorrect mag information from either mag head.

1. Replace the Mag. amp/transport
2. Replace the CCC.

---

## REJECT - NO DENOM

### Symptom:

Bills are rejected with this code when the validation tests cannot accurately determine the bill's denomination.

### Corrective Action:

1. Replace the transport.
  2. Replace the CCC.
- 

## REJECT - FAST FEED

### Symptom:

The bill is being rejected because its acceptance would exceed the limits established for the Fast-Feed Shutdown feature. (See Section 2.) The changer will enter the Fast-Feed Shutdown mode as soon as the bill is cleared from the transport.

---

## REJECT - RETURN SW

### Symptom:

The bill return switch was pushed during validation.

### Corrective Action:

1. Do not push BILL RETURN switch during validation. Check for loose or shorted wires or a shorted switch.
  2. If the switch and wires are OK, replace the CCC.
- 

## REJECT - ACCPT OFF

### Symptom:

Bill denomination payout was not turned ON.

### Corrective Action:

Set the bill changer to accept the rejected denomination.

## Transport Errors

Transport errors are considered to be recoverable errors. That is, if the source of the error goes away, the machine will return to the normal STANDBY mode all by itself. Transport errors are shown on the status display while they are present. Occasionally after resetting a shutdown error or on power up, a transport error will briefly appear. This is normal and should not be a concern. A list of transport errors follows with an explanation for each and hints on where to look for trouble.

### CLEARING ERRORS

Transport errors are self-clearing. When the trouble has been repaired, the error will go away on its own.

Bill changer errors are stored in the CCC and must be cleared. To clear an error displayed on the readout, push the FUNCTION button on the CCC while the CCC is in the NORMAL mode. If the situation that caused the error is repaired, the error will be cleared. Multiple errors will be stored in the CCC. Press the FUNCTION button to clear each error as it is displayed on the CCC readout (referred to as the “display”). When all errors are cleared, the changer will return to STANDBY.

---

## CK TRANSPORT MAG

### Symptom:

The Mag. amp output idle voltage is not within limits (0.24 to 1.60 volts).

### Corrective Action:

1. Check the wires and connectors in the Mag. amp and transport harness.
  2. Replace the Mag. amp circuit board.
  3. Replace the transport.
  4. Replace the CCC.
- 

## CK TRANSPORT VI

### Symptom:

The transport inlet cell voltage is not within limits (0 to 4.10 volts).

### Corrective Action:

1. Check the Yellow wire and connectors in the transport harness for an open/short back to the CCC P4 pin 14.
2. Check the VI cell for proper voltage and switching (*refer to Section 3*).
3. Replace the inlet cell.
4. Replace the transport.
5. Replace the CCC.

---

## CK TRANSPORT VF

### Symptom:

The transport flipper cell voltage is not within limits (0 to 2.00 volts).

### Corrective Action:

1. Check the Brown wire and connectors in the transport harness for an open/short back to the CCC (P4 Pin 7).
  2. Check the VF cell for proper voltages and switching (*refer to Section 3*).
  3. Replace the transport interconnect board.
  4. Replace the transport.
  5. Replace the CCC.
- 

## CK TRANSPORT VT

### Symptom:

The transport transmissive cell voltage cannot be adjusted into the range of from 0.50 to 3.60 volts DC.

### Corrective Action:

1. Check the White wire and connectors in the transport for an open/short back to the CCC (P4 Pin 10).
  2. Clean the transmissive cell and the LED below it.
  3. Replace the transport transmissive cell and/or the transmissive/reflective LED.
  4. Replace the transport.
  5. Replace the CCC.
- 

## CK TRANSPORT VR

### Symptom:

The transport reflective cell voltage is not within limits (0.20 to 4.90 volts).

### Corrective Action:

1. Check the Orange wire and connectors in the transport harness for an open short back to the CCC (P4 Pin 13).
2. Clean the reflective cell and LED.
3. Replace the transport reflective cell and/or the transmissive/reflective LED.
4. Replace the transport.
5. Replace the CCC.



## Machine Errors

There are two types of machine errors — SHUTDOWN and NON-SHUTDOWN. Shutdown errors are errors which could cause damage to the machine or incorrect payouts. NON-SHUTDOWN errors are errors involving coin switches, test switches and the bill return switch.

When a NON-SHUTDOWN error occurs, the switch or switches involved will be locked out of operation. Bill acceptance will not be affected. All machine errors are stored in the CCC and displayed on the status display during STANDBY. NON-SHUTDOWN errors are displayed steady without blinking. All SHUTDOWN errors are displayed as blinking messages with the out of service lamp lit. The CCC can remember up to five errors, however, there will never be more than one shutdown error, as this will cause the machine to go out of service. All faults or malfunctions that cause errors must be repaired and the errors cleared from the CCC before the machine can go back to service.

## Clearing Machine Errors

Clearing machine errors is done by simply pushing the FUNCTION button while the error is displayed. As each error is cleared, any previous errors will be displayed on the CCC. Press the FUNCTION button to clear each error. After all errors are cleared and no faults or malfunctions are left in the machine, it will return to the STANDBY state.

## Changer Errors (Non-Shutdown)

None of these errors cause the bill changer to shut down. While the bill changer is in STANDBY, the last error will remain on the display.

---

## CK LEFT TEST SW

### Symptom:

The left TEST switch was closed longer than three seconds.

### Corrective Action:

The LEFT TEST switch input is (or was) showing an incorrect signal.

In order to prevent spurious payouts, the CCC immediately locks out all TEST switch inputs if it receives an incorrect signal from one of the TEST switches. Thereafter, the bill changer will still accept bills but will not respond to the TEST switches.

Press the FUNCTION button. If the message does not reappear, check the wiring to the TEST switches for intermittent short to Ground. If the wiring is OK, the problem may be an intermittent condition in the CCC.

For a more complete troubleshooting sequence, *refer to Troubleshooting Chart 010 at the end of the TEST SWITCH troubleshooting.*

---

## CK CTR TEST SW

### Symptom:

The center TEST switch was closed longer than three seconds.

### Corrective Action:

The CENTER TEST switch input is (or was) showing an incorrect signal.

In order to prevent spurious payouts, the CCC immediately locks out all TEST switch inputs if it receives an incorrect signal from one of the TEST switches. Thereafter, the bill changer will still accept bills but will not respond to the TEST switches.

Press the FUNCTION button. If the message does not reappear, check the wiring to the TEST switches for intermittent short to Ground. If the wiring is OK, the problem may be an intermittent condition in the CCC.

For a more complete troubleshooting sequence, *refer to Troubleshooting Chart 010 at the end of the TEST SWITCH troubleshooting.*

---

## CK RIGHT TEST SW

### Symptom:

The right TEST switch was closed longer than three seconds.

### Corrective Action:

The RIGHT TEST switch input is (or was) showing an incorrect signal.

In order to prevent spurious payouts, the CCC immediately locks out all TEST switch inputs if it receives an incorrect signal from one of the TEST switches. Thereafter, the bill changer will still accept bills but will not respond to the TEST switches.

Press the FUNCTION button. If the message does not reappear, check the wiring to the TEST switches for intermittent short to Ground. If the wiring is OK, the problem may be an intermittent condition in the CCC.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 010 at the end of the TEST SWITCH troubleshooting.*

## CK TEST SWITCHES

### Symptom:

More than one TEST switch was closed at the same time.

### Corrective Action:

More than one TEST switch input is (or was) showing an incorrect signal.

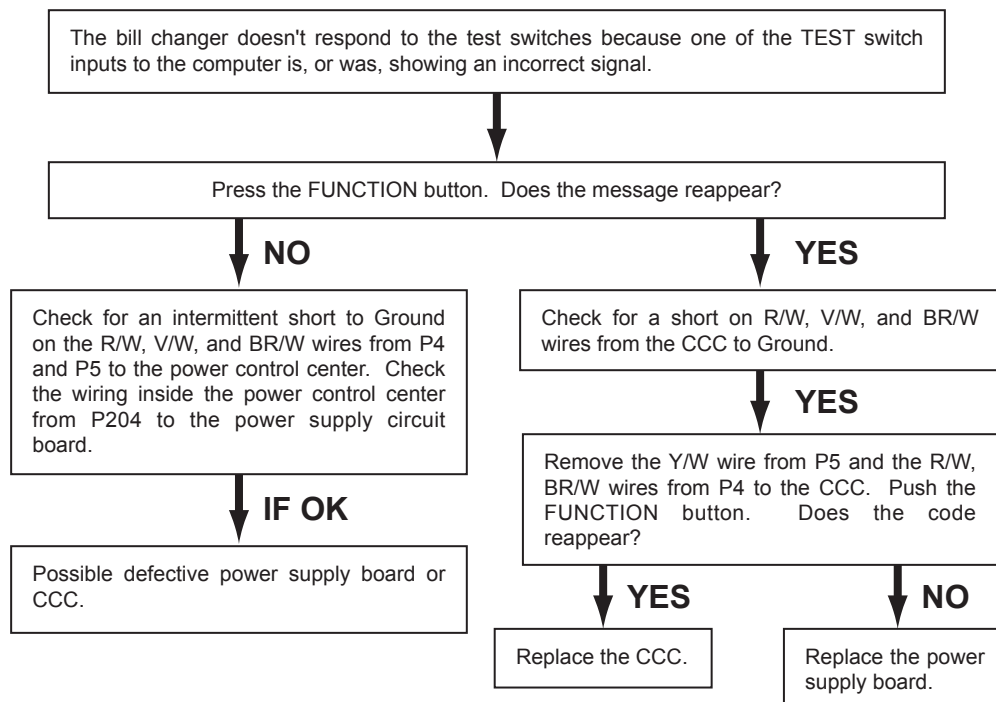
In order to prevent spurious payouts, the CCC immediately locks out all TEST switch inputs if it receives an incorrect signal from the TEST switches. Thereafter, the bill changer will still accept bills but will not respond to the TEST switches.

1. Press the FUNCTION button. If the message does not reappear, check the wiring to the TEST switches for intermittent short to Ground. If the wiring is OK, the problem may be an intermittent condition in the CCC.
2. If the message reappears after pressing the FUNCTION button, unplug P204 at the back of the power control center and try again. If this message reappears, replace the CCC. If it doesn't reappear, replace the power control center.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 010 at the end of this TEST SWITCH troubleshooting.*

## Chart 010 — No Test Switch Response

Display shows: **CK LEFT TEST SW** – OR – **CK CTR TEST SW**  
 – OR – **CK RIGHT TEST SW** – OR – **CK TEST SWITCHES**



## Changer Errors (Non-Shutdown)

*(Continued)*

### COIN SWITCH ERRORS (BC-1200 ONLY)

---

## CK 25 COIN SWITCH

### Symptom:

The 25¢ coin switch was closed too long.

### Corrective Action:

The 25¢ coin switch input is (or was) showing an incorrect signal.

In order to prevent spurious payouts, the CCC immediately locks out all coin switch inputs if it receives an incorrect signal from the coin switches. Thereafter, the bill changer will still accept bills, but it will no longer take coins.

1. Press the FUNCTION button. If this message does not reappear, check the wiring to the coin switch circuit for an intermittent short to Ground. If the wiring is OK, the problem may be in the CCC or coin switch circuit board.
2. If this message reappears after resetting, unplug the coin switch circuit board from the main harness and try again. If this message reappears, replace the CCC. If it doesn't, replace the coin switch circuit board.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 020 at the end of this COIN SWITCH troubleshooting.*

---

## CK 50 COIN SWITCH

### Symptom:

The 50¢/\$1.00 coin switch was closed too long.

### Corrective Action:

The 50¢ coin switch input is (or was) showing an incorrect signal.

In order to prevent spurious payouts, the CCC immediately locks out all coin switch inputs if it receives an incorrect signal from the coin switches. Thereafter, the bill changer will still accept bills, but it will no longer take coins.

1. Press the FUNCTION button. If this message does not reappear, check the wiring to the coin switch circuit board for an intermittent short to Ground. If the wiring is OK, the problem may be in the CCC or coin switch circuit board.
2. If this message reappears after resetting, unplug the coin switch circuit board from the main harness and try again. If this message reappears, replace the CCC. If it doesn't, replace the coin switch circuit board.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 020 at the end of this COIN SWITCH troubleshooting.*

---

## CK COIN SWITCHES

### Symptom:

Both coin switches closed at the same time.

### Corrective Action:

Both of the coin switch inputs are (or were) showing an incorrect signal.

In order to prevent spurious payouts, the CCC immediately locks out all coin switch inputs if it receives an incorrect signal from the coin switches. Thereafter, the bill changer will still accept bills, but it will no longer take coins.

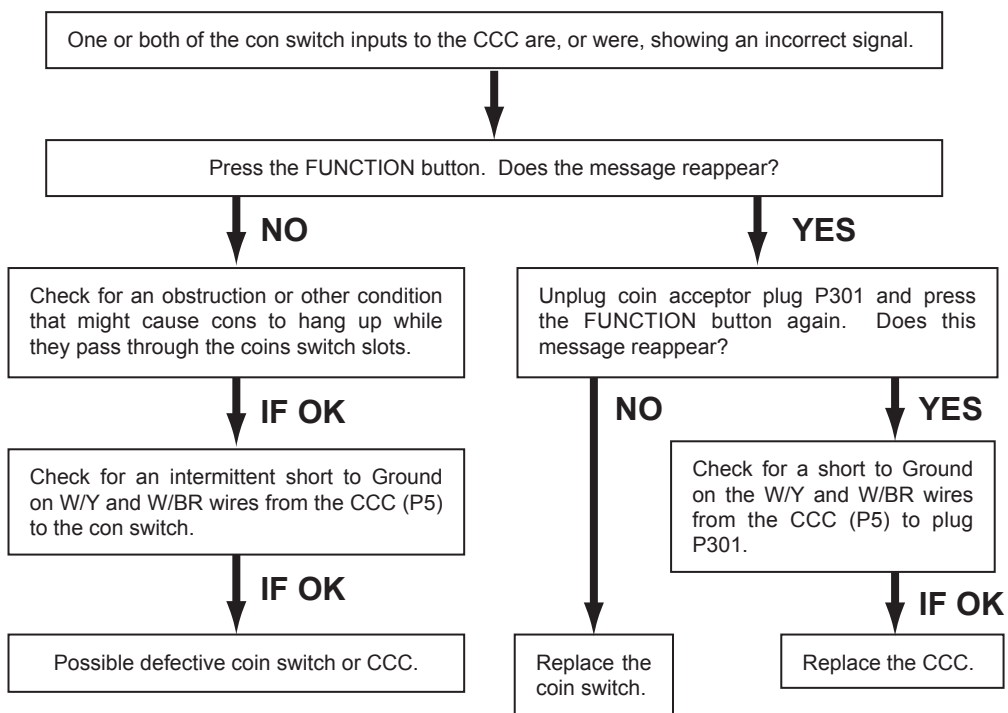
1. Press the FUNCTION button. If this message does not reappear, check the wiring to the coin switch circuit board for an intermittent short to Ground. If the wiring is OK, the problem may be in the CCC or coin switch circuit board.
2. If this message reappears after resetting, unplug the coin switch circuit board from the main harness and try again. If this message reappears, replace the CCC. If it doesn't, replace the coin switch circuit board.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 020 at the end of this COIN SWITCH troubleshooting.*

# Chart 020 - Bill Changer Doesn't Accept Coins - Works OK With Bills

BC-1200 Only

Display shows: **CK 25 COIN SW – OR – CK 50/100 COIN SW – OR – CK COIN SWITCHES**



---

## CK BILL RETRN SW

### Symptom:

The bill return switch was closed longer than 10 seconds. This error will disable the bill return function. All other changer functions continue to operate.

### Corrective Action:

1. Remove the bind or jam in the bill return linkage.
  2. Check the R/G wire from the bill return to CCC (P5 Pin 9) for a short to ground.
  3. Check the bill return switch. If it is defective, replace it. If it is not defective, replace the CCC.
- 

## Bill Changer Errors (Shutdown)

Only one of these errors will exist at a time. The display will flash the error code indicating a SHUTDOWN. One of these errors may also exist with up to three NON-SHUTDOWN errors.

### COIN DETECTOR ERRORS WHILE IN THE STANDBY MODE

## CK L COIN DETCTR

### Symptom:

The left coin detector was blocked while the bill changer was in the STANDBY state. One of the buckets may have an incorrect change load.

### Corrective Action:

The left coin photodetector input is, or was, giving an incorrect signal / or the left hopper may have been running in standby mode.

1. The left LED on the dispenser may have burned out. If the LED is still out, check the wiring to that LED. Check the LED and replace it if it is defective.
2. If all LEDs are not lit, check the +5VDC LED on the power control center. If it is not lit, check the power supply. If it is lit, check +5V power distribution lines in the harness (Blue wires).
3. Press the FUNCTION button. If the message reappears, check for dirt on the left detector and LED. If they are clean, check the coin photodetector (per *Section 3*). If it is OK, check the wiring from the photodetector to the CCC for an open connection or short to Ground. If no problems are found, replace the CCC.



4. If this message does not reappear after resetting the bill changer, check the wiring to the hopper motors and coin detectors. If no problems are found, replace the CCC. To restore the bill changer to operation, press the FUNCTION button after correcting the problem.



**NOTE:**

This error code may be the result of a leaky output to the left hopper drive motor from the CCC. If this is the case, replace the CCC.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 030 at the end of this COIN DETECTOR troubleshooting.*

---

## **CK R COIN DETCTR**

**Symptom:**

The right coin detector was blocked while the bill changer was in the STANDBY state. One of the buckets may have an incorrect change load.

**Corrective Action:**

The right coin photodetector input is, or was, giving an incorrect signal / one of the hopper motors may have been running in standby mode.

1. The center LED on the dispenser may have burned out. If the LED is still OFF, check the wiring to that LED. Check the LED and replace it if it is defective.
2. If all LEDs are not lit, check the +5VDC LED on the power control center. If it is not lit, check the power supply. If it is lit, check +5V power distribution lines in the harness (Blue wires).
3. Press the FUNCTION button. If the message reappears, check for dirt on the right detectors and LED. If they are clean, check the coin photodetector (per *Section 3*). If they are OK, check the wiring from the photodetectors to the CCC for an open connection or a short to Ground. If no problems are found, replace the CCC.
4. If this message does not reappear after resetting the bill changer, check the wiring to the hopper motors and coin detectors. If no problems are found, replace the CCC. To restore the bill changer to operation, press the FUNCTION button after correcting the problem.

**NOTE:**

This error code may be the result of a leaky output to the left hopper drive motor from the CCC. If this is the case, replace the CCC.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 030 at the end of this COIN DETECTOR troubleshooting.*

## CK COIN DETECTORS

### Symptom:

More than one coin detector was blocked while the bill changer was in STANDBY. One of the buckets may have an incorrect change load, or one of the hopper motors may have been running in standby mode.

### Corrective Action:

More than one of the coin photodetector inputs is, or was, giving an incorrect signal.

1. One of the LEDs on the dispenser may have burned out. If any LEDs are out, check the wiring to that LED. Check the LEDs and replace any defective LEDs.
2. If all LEDs are not lit, check the +5VDC LED on the power control center. If it is not lit, check the power supply. If it is lit, check +5V power distribution lines in the harness (Blue wires).
3. Press the FUNCTION button. If the message reappears, check for dirt on the detectors and LEDs. If they are clean, check the coin photodetectors (per *Section 3*). If they are OK, check the wiring from the photodetectors to the CCC for open connections or shorts to Ground. If no problems are found, replace the CCC.
4. If this message does not reappear after resetting the bill changer, check the wiring to the hopper motors and coin detectors. If no problems are found, replace the CCC. To restore the bill changer to operation, press the FUNCTION button after correcting the problem.

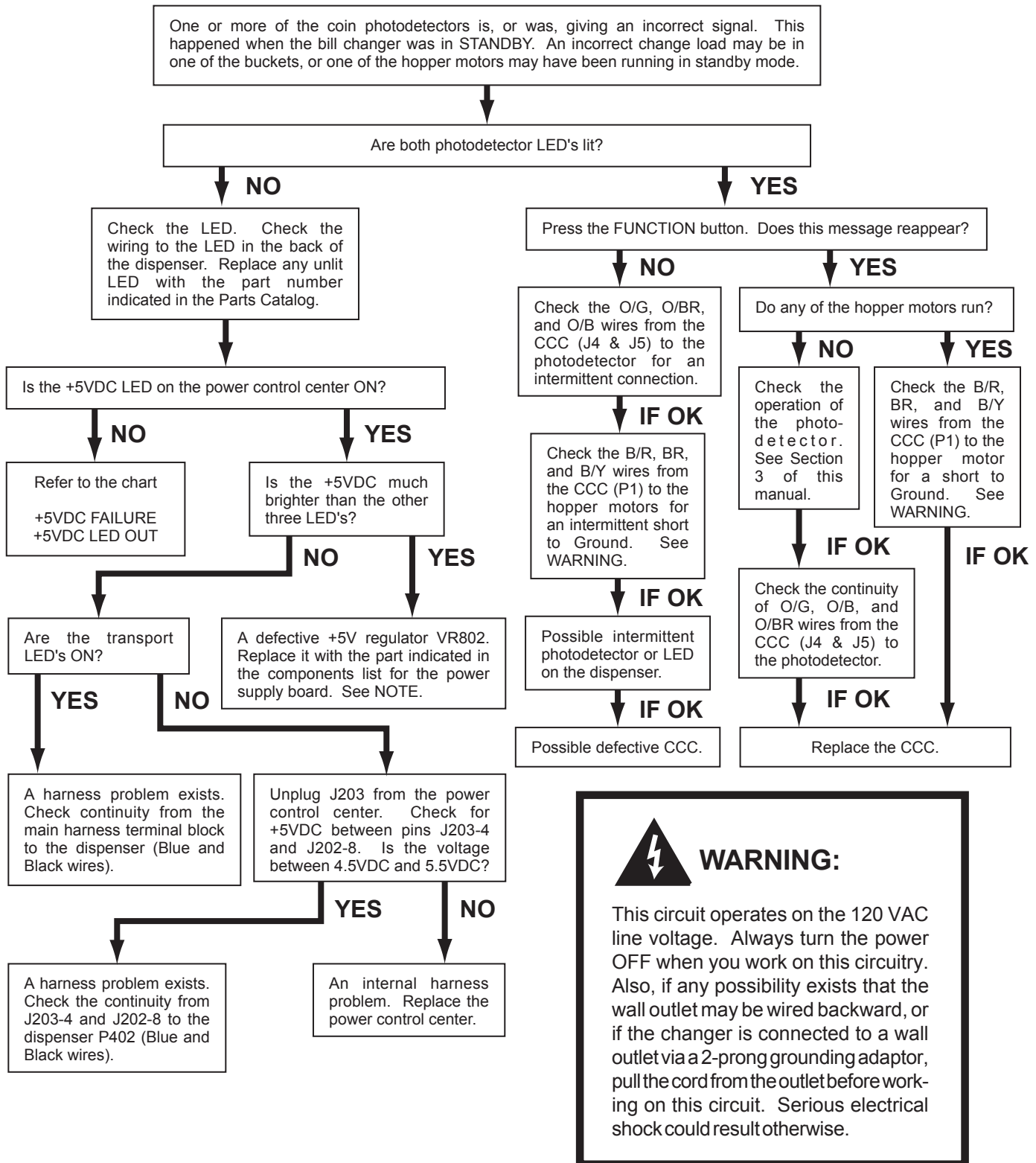
**NOTE:**

This error code may be the result of a leaky output to the left hopper drive motor from the CCC. If this is the case, replace the CCC.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 030 at the end of this COIN DETECTOR troubleshooting.*

# Chart 030 - Shutdown – Out Of Service Lamp Lit

Display shows: **CK L COIN DETCTR – OR – CK R COIN DETCTR – OR – CK COIN DETCTRS**



**NOTE:**

If the +5 VDC LED is much brighter than the others, due to VR802 being defective, the transport cell LEDs, display LEDs, and photodetector LEDs could be burned out.

---

## L DETCTR ON LONG

### Symptom:

While replenishing, the left detector was blocked too long.

### Corrective Action:

During the last replenish cycle, the system detected a coin pulse from the dispenser that was much longer than normal. Most likely, an incorrect change load has been deposited into one of the change buckets.

1. A detector LED could have burned out during the replenish cycle. If the LEDs are lit, reset the bill changer and see if it goes back into SHUTDOWN. If so, refer to new status message that will appear.
2. If the bill changer stays in service, then check the left photo detector (per *Section 3*) and wiring.
3. Also, check the upper coin chute for anything that would hold a coin up and block the detector.
4. If everything looks OK, replace the CCC.
5. To restore the bill changer to service, press the FUNCTION button after correcting the problem.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 040 at the end of this DETECTOR troubleshooting.*

## R DETCTR ON LONG

### Symptom:

While replenishing, the right detector was blocked too long.

### Corrective Action:

During the last replenish cycle, the system detected a coin pulse from the dispenser that was much longer than normal. Most likely, an incorrect change load has been deposited into one of the change buckets.

1. A detector LED could have burned out during the replenish cycle. If the LEDs are lit, reset the bill changer and see if it goes back into SHUTDOWN. If so, refer to new status message that will appear.
2. If the bill changer stays in service, then check the right photo detector (per *Section 3*) and wiring.
3. Also, check the upper coin chute for anything that would hold a coin up and block the detector.
4. If everything looks OK, replace the CCC.
5. To restore the bill changer to service, press the FUNCTION button after correcting the problem.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 040 at the end of this DETECTOR troubleshooting.*

---

## DECTRS ON LONG

### Symptom:

While replenishing, more than one detector was blocked too long.

### Corrective Action:

During the last replenish cycle, the system detected a coin pulse from the dispenser that was much longer than normal. Most likely, an incorrect change load has been deposited into one of the change buckets.

1. A detector LED could have burned out during the replenish cycle. If the LEDs are lit, reset the bill changer and see if it goes back into SHUTDOWN. If so, refer to new status message that will appear.
2. If the bill changer stays in service, then check the photo detectors (per *Section 3*) and wiring.
3. If all three LEDs are not lit, check the +5 VDC LED on the power supply. If the +5 VDC LED is OFF, check the power supply. If the +5 VDC LED is ON, check the harness.
4. Also, check the upper coin chute for anything that would hold a coin up and block the detectors.
5. If everything looks OK, replace the CCC.
6. To restore the bill changer to service, press the FUNCTION button after correcting the problem.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 040 at the end of this DETECTOR troubleshooting.*

## **CANNOT PAYOUT VALUE**

### **Symptom:**

Unable to pay out inserted combination.

### **Corrective Action:**

Check to make sure the coin mechanism is wired correctly. Reset by pressing the FUNCTION button.

---

## **ERROR ??**

### **Symptom:**

Unknown error code xxx.

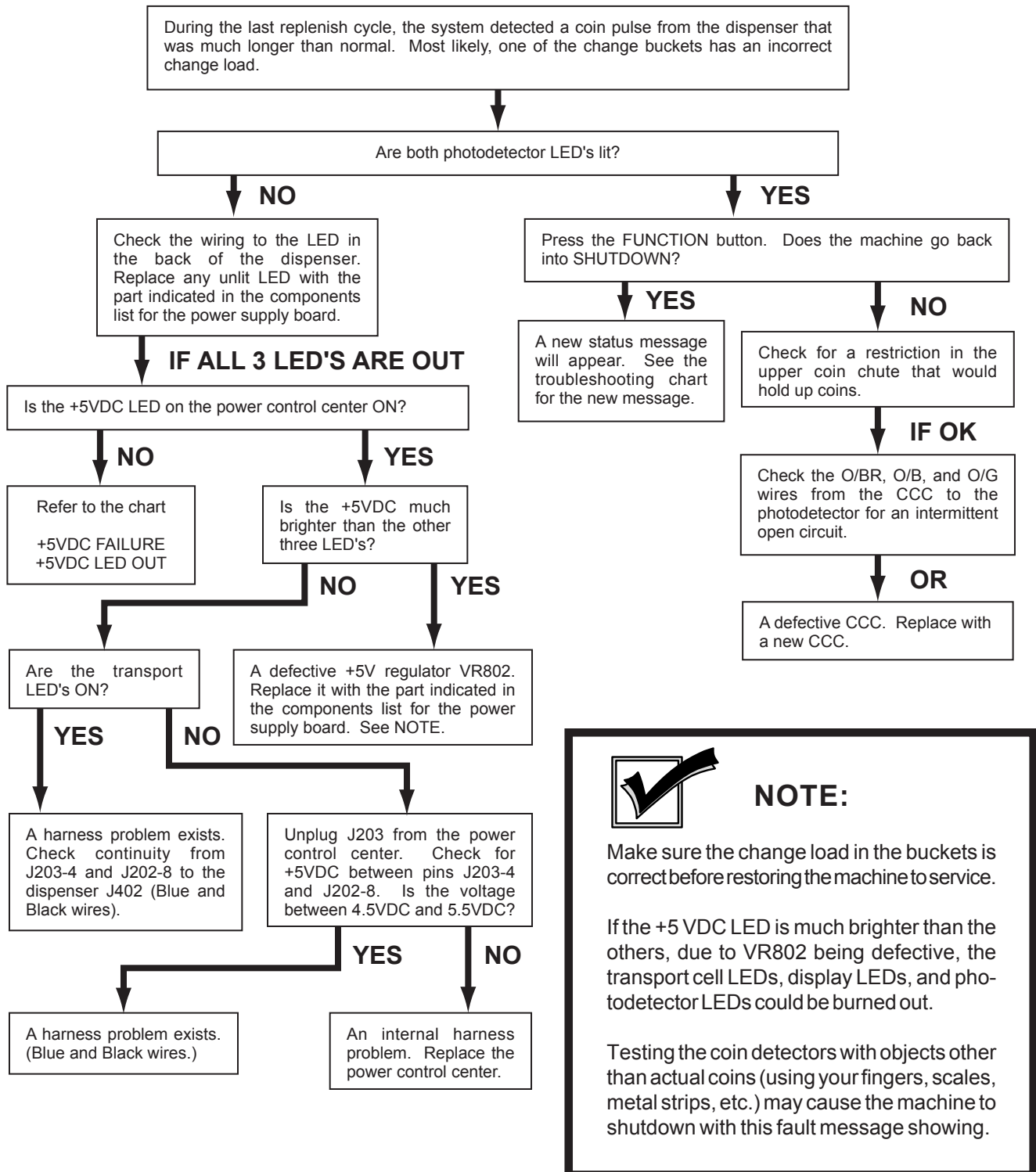
### **Corrective Action:**

The changer detected an unknown error.

1. Press the FUNCTION button to reset the bill changer.
2. Run a few test vend.
3. If the error returns, replace the CCC.
4. If OK, put the changer back in service and watch for recurrence of the error.

# Chart 040 - Shutdown - Out Of Service Lamp Lit

Display shows: **L DETCTR ON LONG** – OR – **R DETCTR ON LONG**





## EXTRA COIN - L HOP

### Symptom:

More than one extra coin was detected passing through the left detector.

### Corrective Action:

Since last time bill changer was reset, the bill changer may have dispensed two more coins than it should have during the replenish cycle. One of the buckets could have an incorrect change load.

1. Most likely, the problem is not electrical. Probable causes are: Faulty hopper motor brakes, or worn parts on hopper motors.
2. Also, the possible cause could be intermittent connections to the coin detectors, detector LEDs, or wiring.
3. To restore the bill changer to operation, press the FUNCTION button after correcting the problem.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 050 at the end of this EXTRA COIN troubleshooting.*

---

## EXTRA COIN - R HOP

### Symptom:

More than one extra coin was detected passing through the right detector.

### Corrective Action:

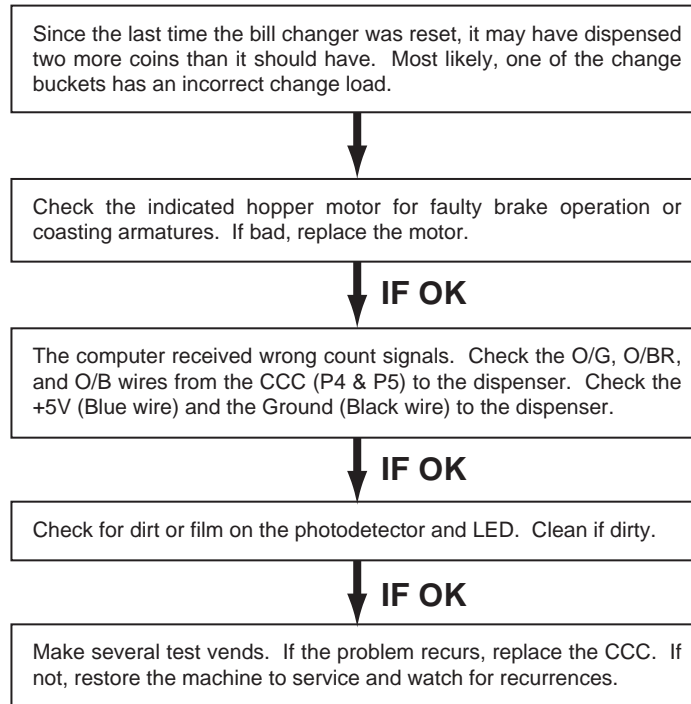
Since last time bill changer was reset, the bill changer may have dispensed two more coins than it should have during the replenish cycle. One of the buckets could have an incorrect change load.

1. Most likely, the problem is not electrical. Probable causes are: Faulty hopper motor brakes, or worn parts on hopper motors.
2. Also, the possible cause could be intermittent connections to the coin detectors, detector LEDs, or wiring.
3. To restore the bill changer to operation, press the FUNCTION button after correcting the problem.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 050 at the end of this EXTRA COIN troubleshooting.*

## Chart 050 - Shutdown - Out Of Service Lamp Lit

Display shows: **EXTRA COIN L HOP** – OR – **EXTRA COIN R HOP**



### NOTE:

Make sure change load in buckets is correct before restoring machine to service.

Testing the detectors with objects other than actual coins (using your fingers, scales, metal strips, etc.) may cause the machine to shutdown with this fault message showing.

## L HOPPER EMPTY

### Symptom:

The left hopper is empty.

### Corrective Action:

The bill changer was shutdown because the count from the left-hand hopper was not satisfied within 180 seconds.

One change bucket will have an incorrect change load from the left hopper.

1. Check the left-hand hopper. If not empty or low on coins, check for dirt buildup on the coin path or a jammed hopper.
2. If the hopper looks OK, check the change buckets to see if one is overloaded with coins from the left-hand hopper.
3. If it is overloaded, check the left coin detector or the wiring to the detector. If these check OK, replace the CCC.
4. If the buckets are not overloaded, reset the bill changer and TEST VEND to see if the left-hand hopper runs. If the motor does not run, check the motor and wiring to it. If OK, replace the CCC.
5. To restore the bill changer to operation, press the FUNCTION button after correcting the problem.



### NOTE:

If a customer has been "shortchanged" on a \$10 or \$20 bill when this fault occurred, after resetting the changer to normal operation the display will show "AMT DUE X Y Z" with X, Y, and Z being the number of coins or tokens the customer is owed from the left, center, and right hoppers respectively.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 060 at the end of this HOPPER EMPTY troubleshooting.*

## R HOPPER EMPTY

### Symptom:

The right hopper is empty.

### Corrective Action:

The bill changer was shutdown because the count from the right-hand hopper was not satisfied within 180 seconds.

One change bucket will have an incorrect change load from the right-hand hopper.

1. Check the right-hand hopper.
2. If it is not empty or low on coins, check for dirt buildup on the coin path or a jammed hopper.
3. If the hopper looks OK, check the change buckets to see if one is overloaded with coins from the right-hand hopper.
4. If it is overloaded, check the right-hand coin detector or the wiring to the detector. If these check OK, replace the CCC.
5. If the buckets are not overloaded, reset the bill changer and TESTVEND to see if the right-hand hopper runs. If the motor does not run, check the motor and the wiring to it. If it is OK, replace the CCC.
6. To restore the bill changer to operation, press the FUNCTION button after correcting the problem.



### NOTE:

If a customer has been "shortchanged" on a \$10 or \$20 bill when this fault occurred, after resetting the changer to normal operation the display will show "AMT DUE X Y Z" with X, Y, and Z being the number of coins or tokens the customer is owed from the left, center, and right hoppers respectively.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 060 at the end of this HOPPER EMPTY troubleshooting.*

# HOPPERS EMPTY

## Symptom:

Both hoppers are empty (MC mode message).

## Corrective Action:

1. Refill all the hoppers.
2. The changer shut down because the count could not be satisfied using either of the hoppers.
3. One change bucket will have an incorrect load.
4. If any of the hoppers are not empty, check for dirt buildup on the coin path or a jammed hopper.
5. Reset the bill changer by pushing the FUNCTION button then TEST VEND to see if all the hopper motors start running. If one or more motors fail to run, check the motors and associated wiring. If they are OK, replace the CCC.
6. When the problem is corrected, press the FUNCTION button to return the changer to service.



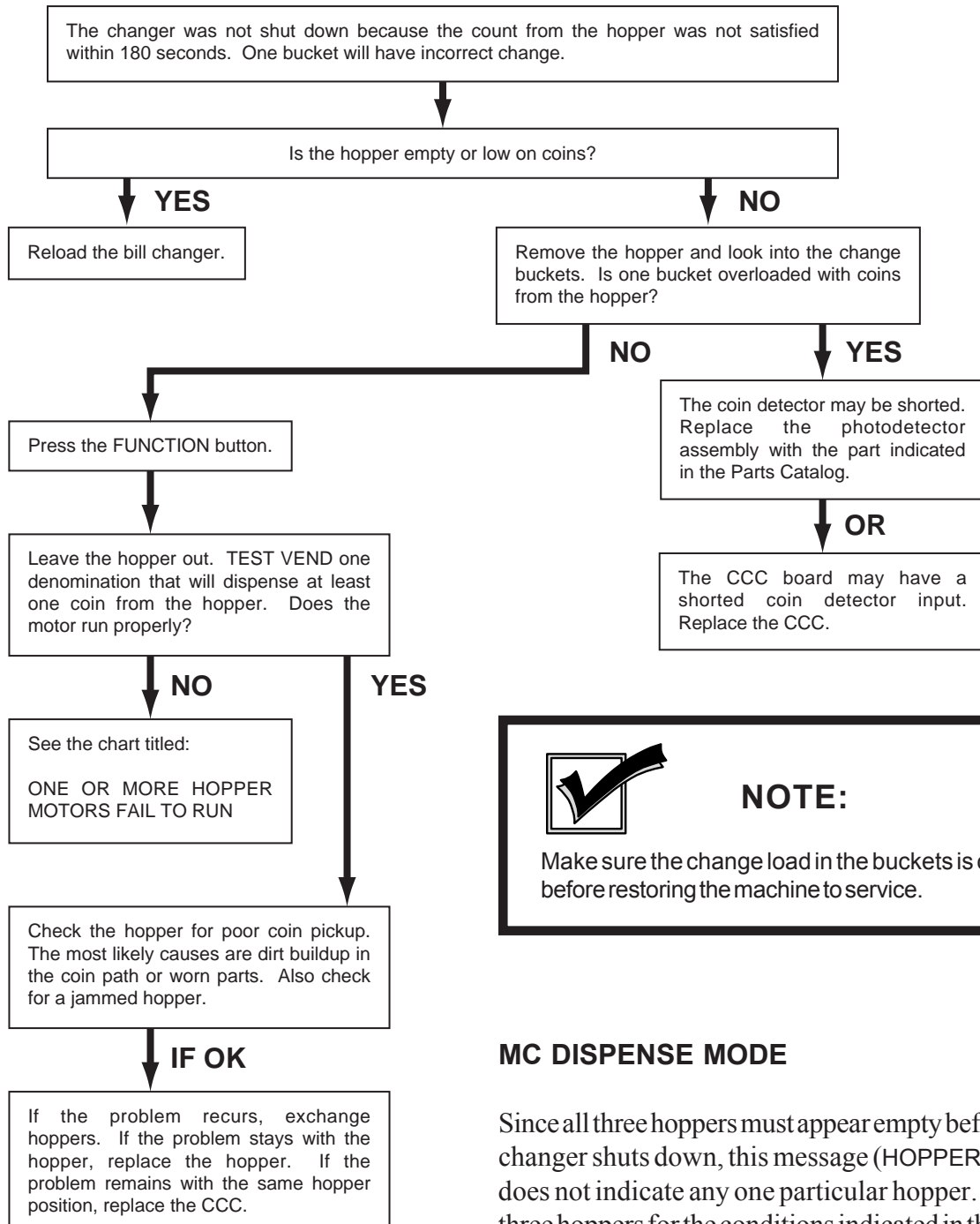
### NOTE:

If a customer has been "shortchanged" on a \$10 or \$20 bill when this fault occurred, after resetting the changer to normal operation the display will show "AMT DUE X Y Z" with X, Y, and Z being the number of coins or tokens the customer is owed from the left, center, and right hoppers respectively.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 060 at the end of this HOPPER EMPTY troubleshooting.*

# Chart 060 - Shutdown - Out Of Service Lamp Lit

Display shows: **L HOPPER EMPTY**  
 – OR – **R HOPPER EMPTY** – OR – **HOPPERS EMPTY**



## CK STACKER

### Symptom:

The stacker did not return to the HOME position.

**If the machine is in SHUTDOWN and this message is showing, the bill stacker monitor input is active.**

1. Leave the power ON. Disconnect the main harness at the bill stacker. Press the FUNCTION button.
2. If the message disappears, replace the bill stacker. If the message reappears, replace the computer control center.
3. If the message still exists, check the stacker monitor line (Green/White wire) from the stacker plug to the CCC for a short to the chassis.
4. The stacker cam switch may be out of adjustment, the stacker relay may be stuck, the stacker motor brake may be stuck, or the motor itself may be defective.
5. To restore the machine to operation, press the FUNCTION button after correcting the problem.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 070.*

---

## CK STACKER NL

### Symptom:

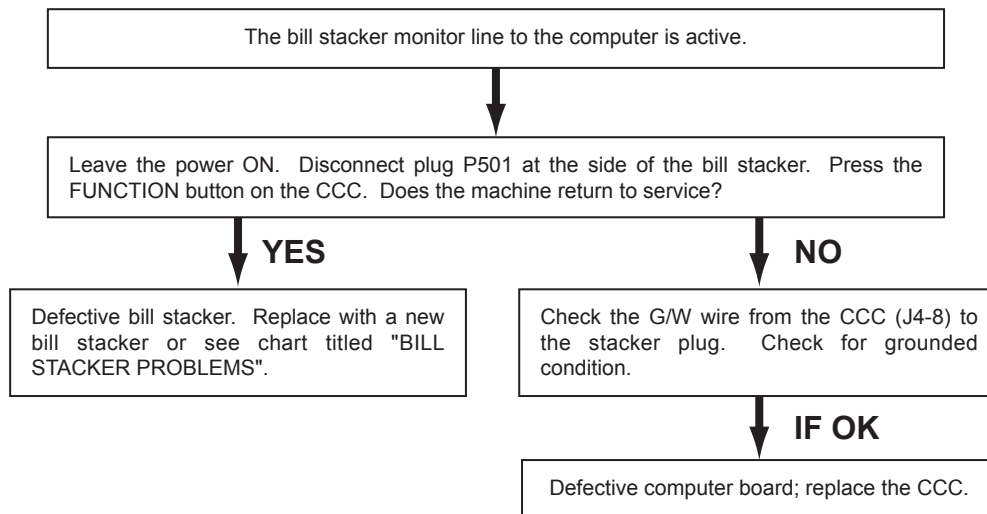
The stacker engages, but does not leave the HOME position.

1. Leave the power ON. Disconnect the main harness at the bill stacker. Press the FUNCTION button.
2. If the message disappears, replace the bill stacker. If the message reappears, replace the computer control center.
3. If the message still exists, check the stacker monitor line (Green/White wire) from the stacker plug to the CCC for a short to the chassis.
4. The stacker cam switch may be out of adjustment, the stacker relay may be stuck, the stacker motor brake may be stuck, or the motor itself may be defective.
5. To restore the machine to operation, press the FUNCTION button after correcting the problem.

*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 070.*

## Chart 070 - Shutdown - Out Of Service Lamp Lit

Display shows: **CK STACKER**



### NOTE:

The machine can be returned to service by turning the power OFF and correcting the problem. (In some cases, the FUNCTION button may have to be pressed.)



## BUCKET PWR FLT

### Symptom:

One of the bucket coils was detected active when it should not be.

### Corrective Action:

Machine has been shut down because one or more of the bucket solenoids were energized during standby. Most likely, one of the buckets has an incorrect change load.

1. Check R813 on the power supply assembly for possible shorts to the chassis.
2. Check C816 on the power supply circuit board for excess leakage.
3. Check for a faulty CCC or a short in the wiring to the buckets.
4. Also check for a faulty suppression diode on the dispenser.
5. Check the diodes.
6. To restore the machine to service, press the FUNCTION button after correcting the problem.

Use a volt-ohmmeter in accordance with the troubleshooting chart for this error to establish whether or not it is safe to install a replacement CCC<sup>1</sup>.

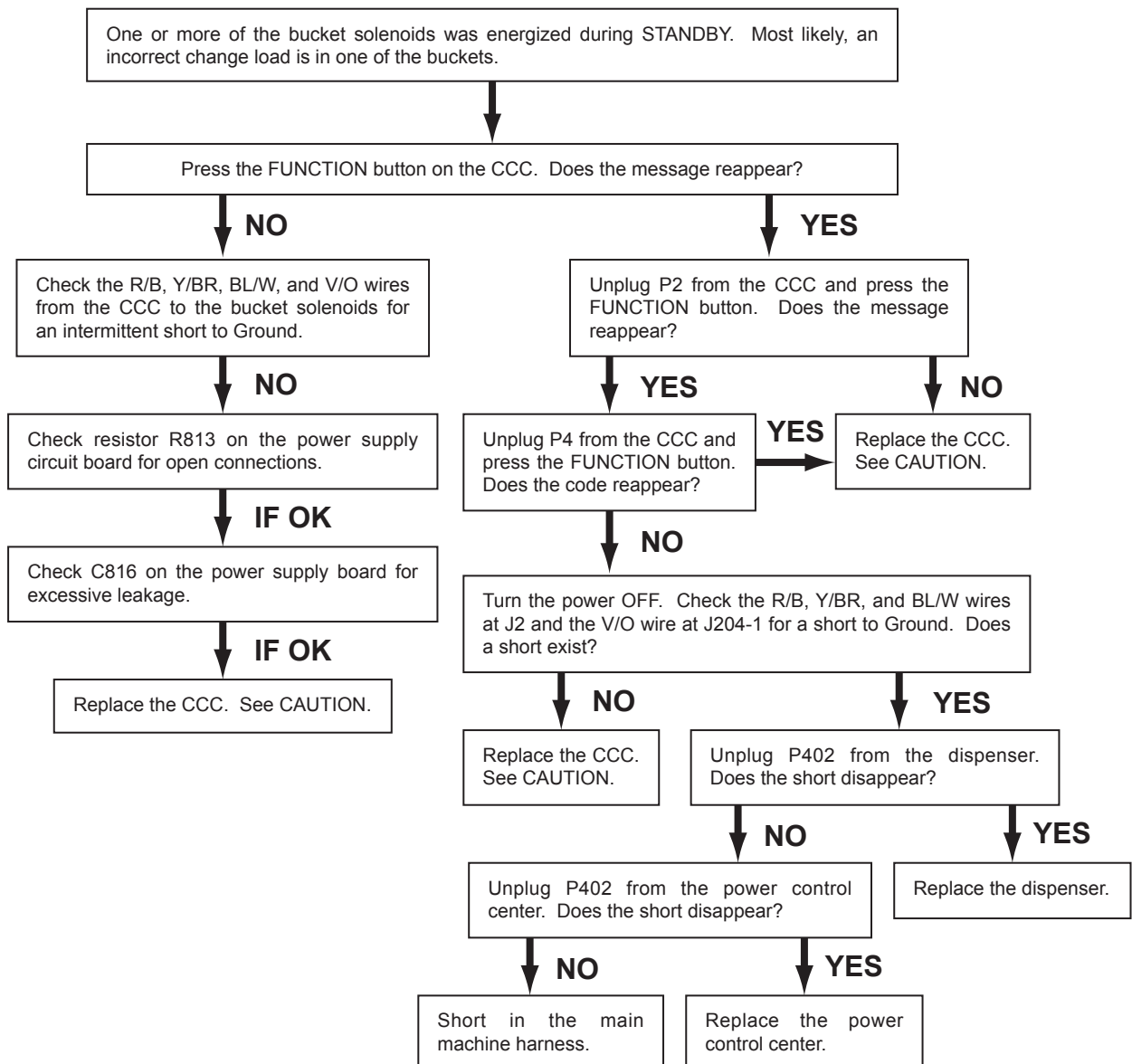
*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 080 on the next page.*

---

<sup>1</sup>Installing a replacement CCC in the machine without determining the cause of the original failure may destroy the replacement CCC.

# Chart 080 - Shutdown - Out Of Service Lamp Lit

Display shows: **BUCKET PWR FLT**



## CAUTION:

Installing a new CCC without determining the cause of the failure may destroy the new board. Use an ohmmeter to determine if it is safe to install a new CCC. If you use an ohmmeter, check for shorts (less than seven ohms) between the V/O wire, Y/BR, and BL/W or Ground.

## BUCKET NOT OPEN

### Symptom:

A bucket coil did not draw current when it was energized.

This is a fault code.

The machine has been shut down because one of the bucket solenoids failed to energize properly for a normal vend. An incorrect change load may be in one of the buckets.

### Corrective Action:

1. The most likely cause is a faulty computer control center or open connection in the wiring to the bucket.
2. Check R813 on the power supply assembly for possible open circuit conditions.
3. Possible defective drive transistor on the CCC – replace the CCC<sup>1</sup>.
4. To restore the machine to service, press the FUNCTION button after correcting the problem.

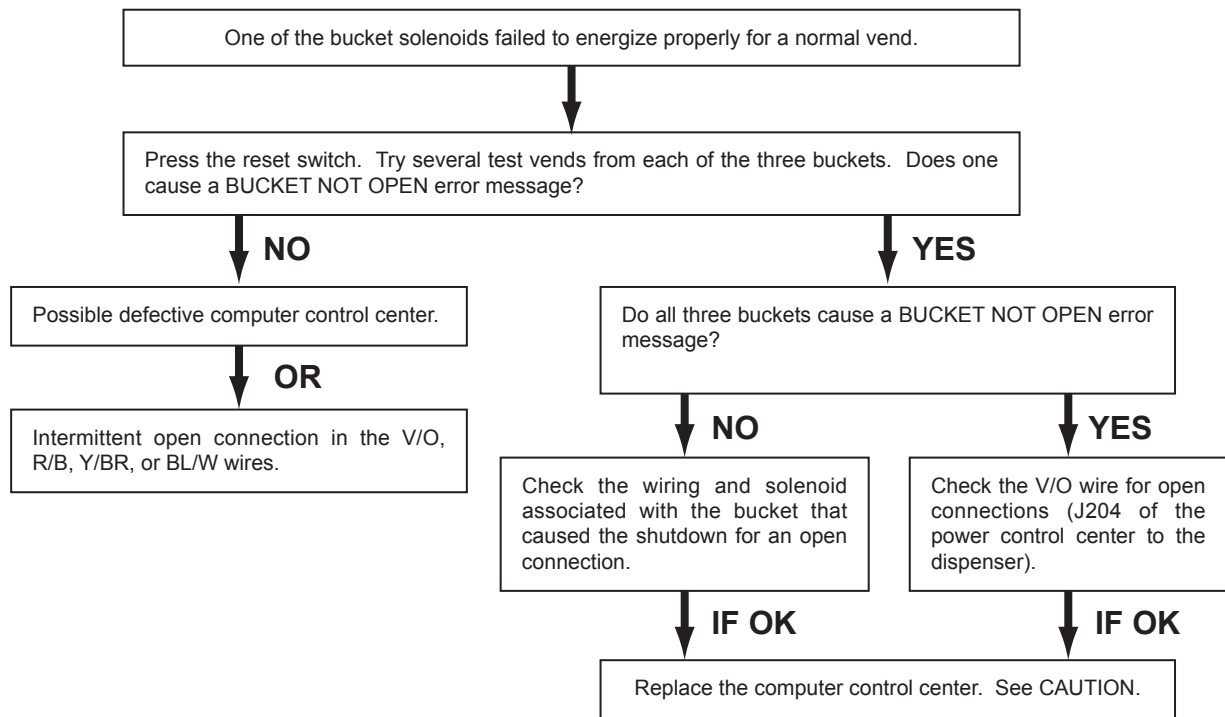
*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 090 on the next page.*

---

<sup>1</sup>Use a volt-ohmmeter in accordance with the troubleshooting chart for this error to establish whether or not it is safe to install a replacement board. Installing a replacement CCC in the machine without determining the cause of the original failure may destroy the replacement

# Chart 090 - Shutdown - Out Of Service Lamp Lit

Display shows: **BUCKET NOT OPEN**



## CAUTION:

Installing a new CCC without determining the cause of the failure may destroy the new board. Use an ohmmeter to determine if it is safe to install a new CCC. If you use an ohmmeter, check for shorts (less than seven ohms) between the V/O wire, Y/BR, and BL/W or Ground.

## BUCKET STAYS ON

### Symptom:

A bucket solenoid continued to draw current after it was de-energized.

This is a fault code.

The machine has been shut down because one of the bucket solenoids was energized too long during a normal vend. Most likely, one of the buckets has an incorrect change load.

### Corrective Action:

1. The most likely cause is a faulty computer control center or an intermittent short in the wiring to the buckets.
2. Also, check for a faulty suppression diode on the dispenser.
3. Check the diodes.
4. To restore the machine to service, press the FUNCTION button after correcting the problem.
5. Use a volt-ohmmeter in accordance with *Troubleshooting Chart 100* for this error to establish whether or not it is safe to install a replacement CCC<sup>1</sup>.

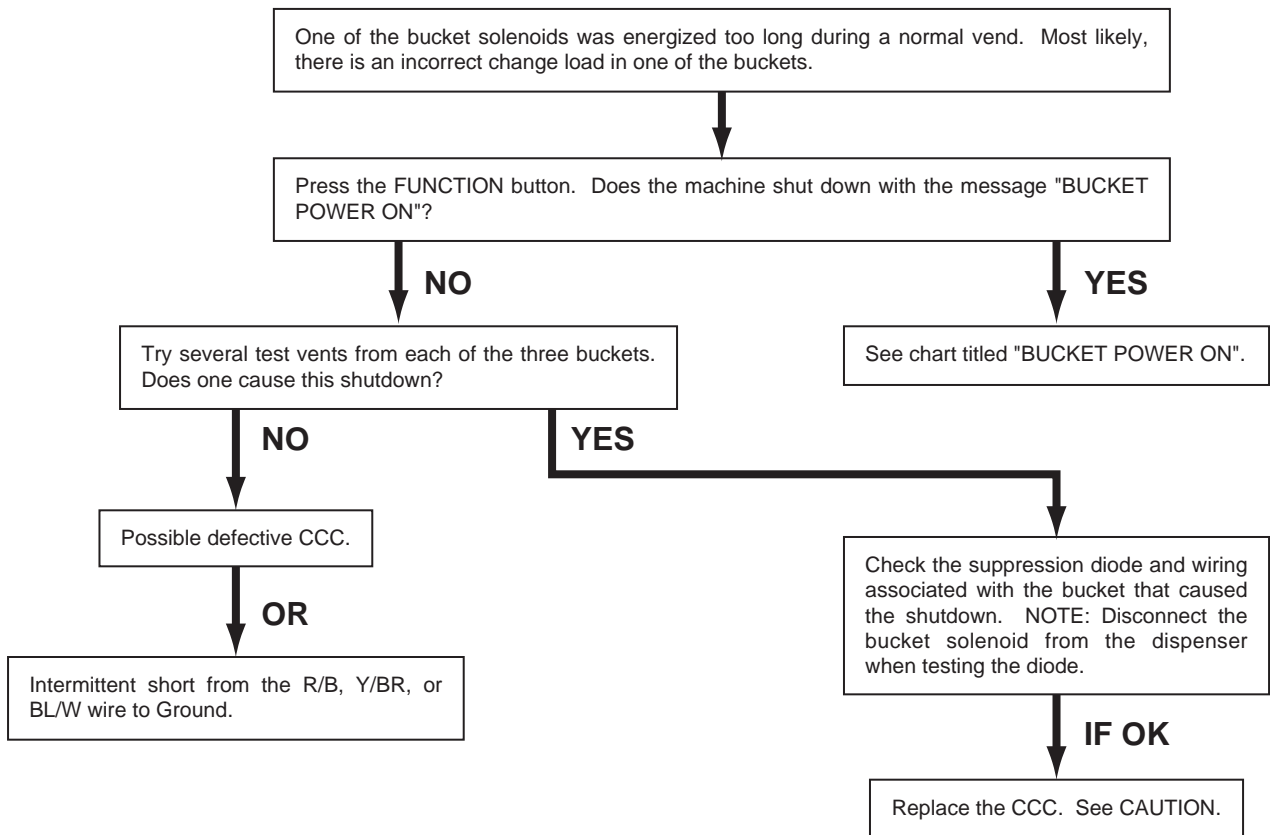
*For a more complete troubleshooting sequence, refer to Troubleshooting Chart 100 on the next page.*

---

<sup>1</sup>Installing a replacement CCC in the machine without determining the cause of the original failure may destroy the replacement CCC.

# Chart 100 - Shutdown - Out Of Service Lamp Lit

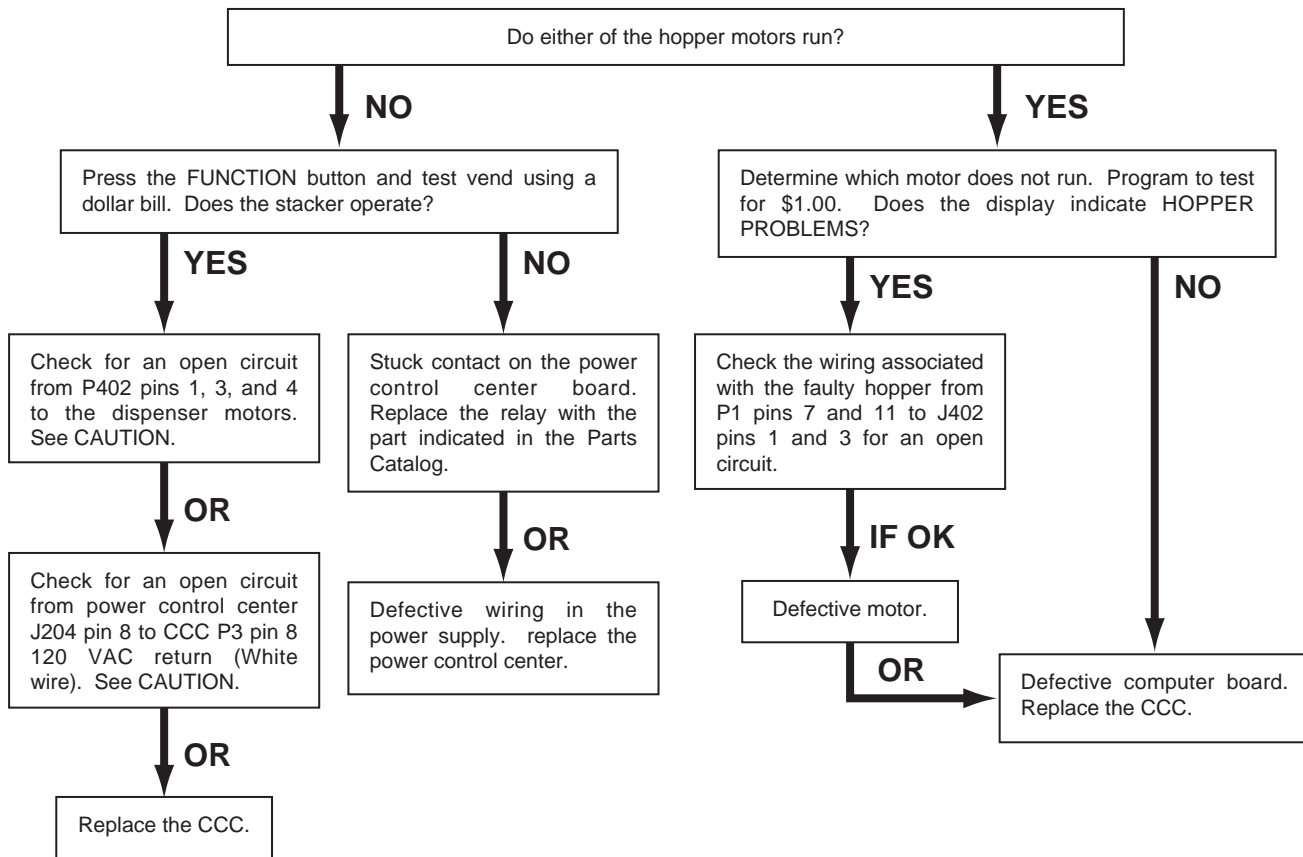
Display shows: **BUCKET STAYS ON**



## CAUTION:

Installing a new CCC without determining the cause of the failure may destroy the new board. Use an ohmmeter to determine if it is safe to install a new CCC. If you use an ohmmeter, check for shorts (less than seven ohms) between the V/O wire, Y/BR, and BL/W or Ground.

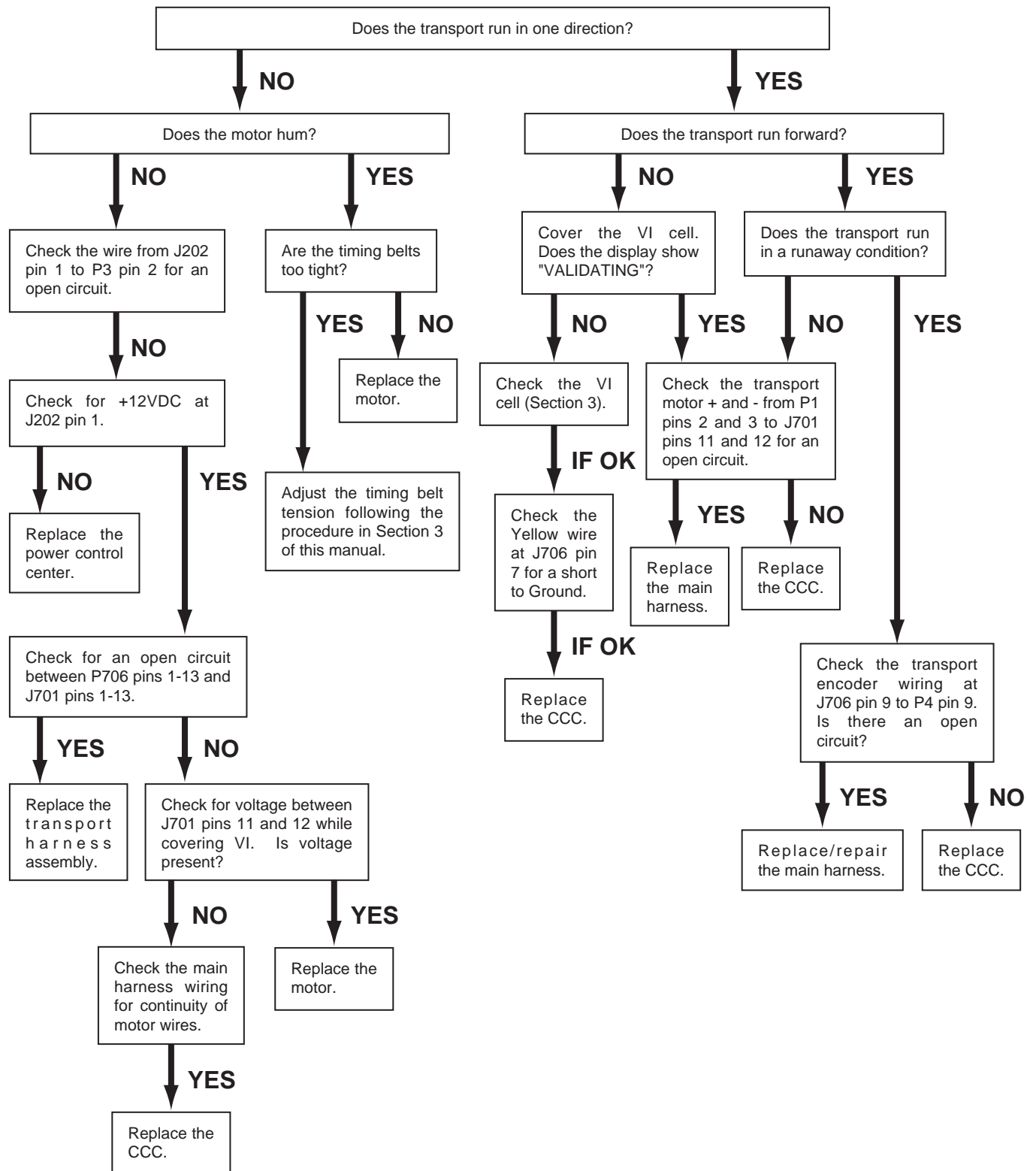
# One or Both Hopper Motors Fail to Run





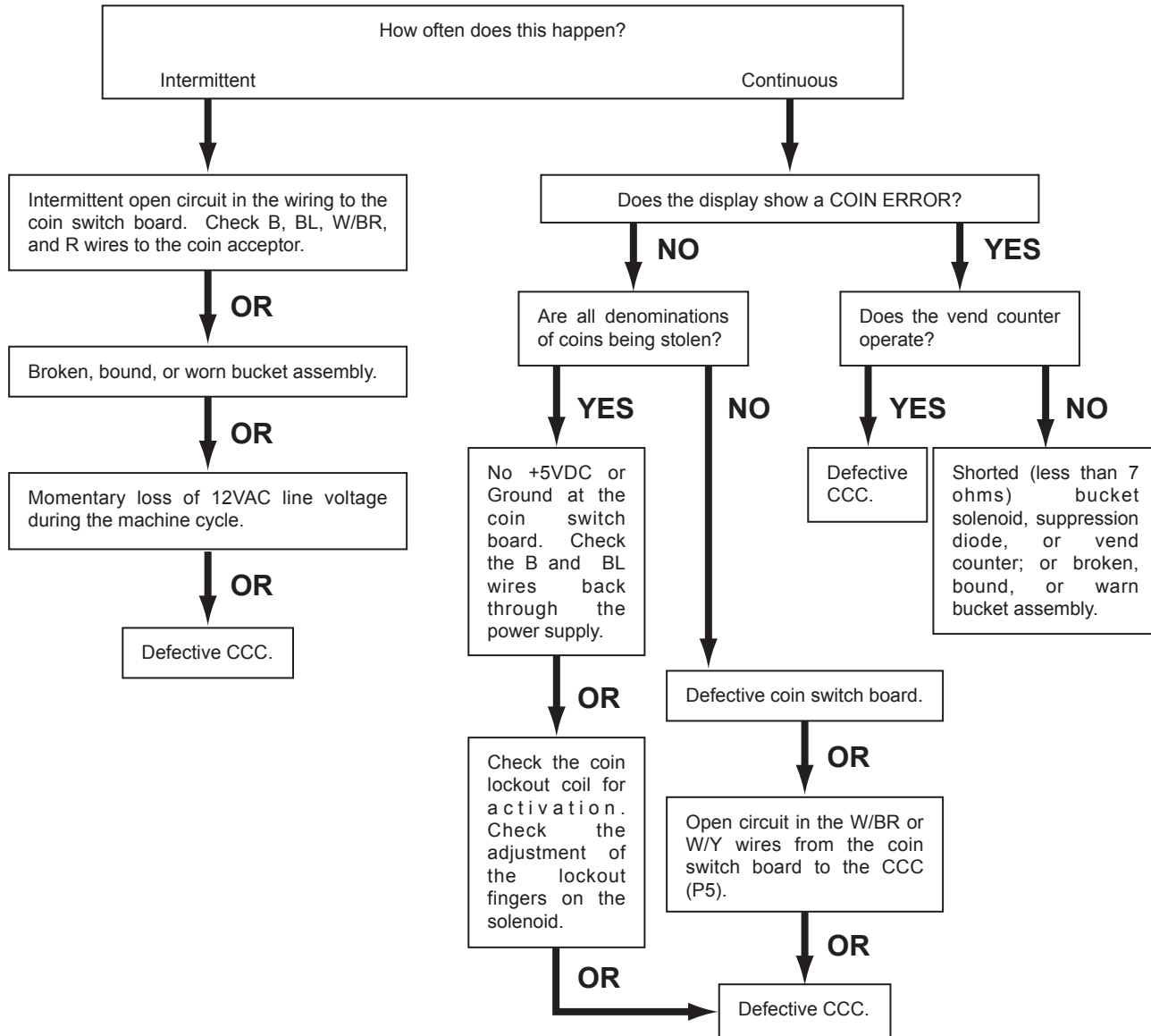
**WARNING:**  
120 VAC circuitry. Turn the power OFF and pull the plug from the wall before making this check.

## Bill Transport Fails to Run in One or Both Directions (Works OK for Coins and Test Switches)

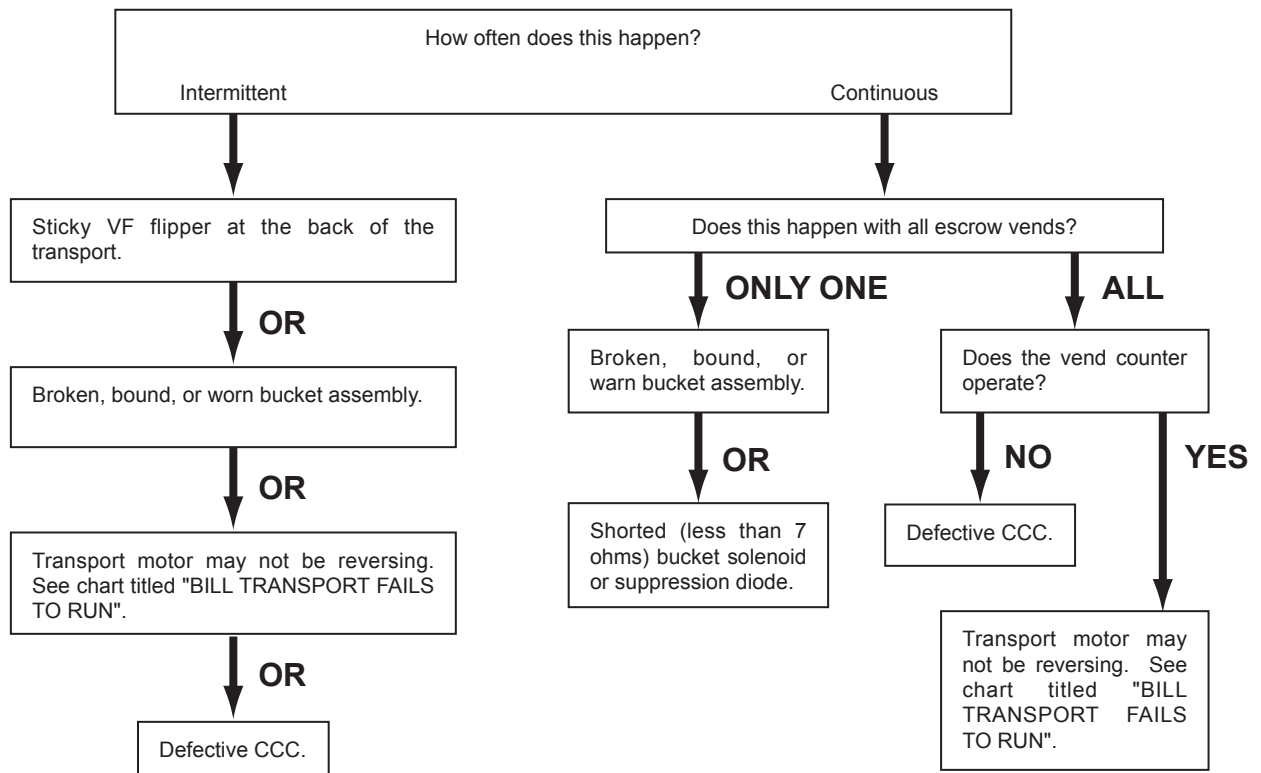




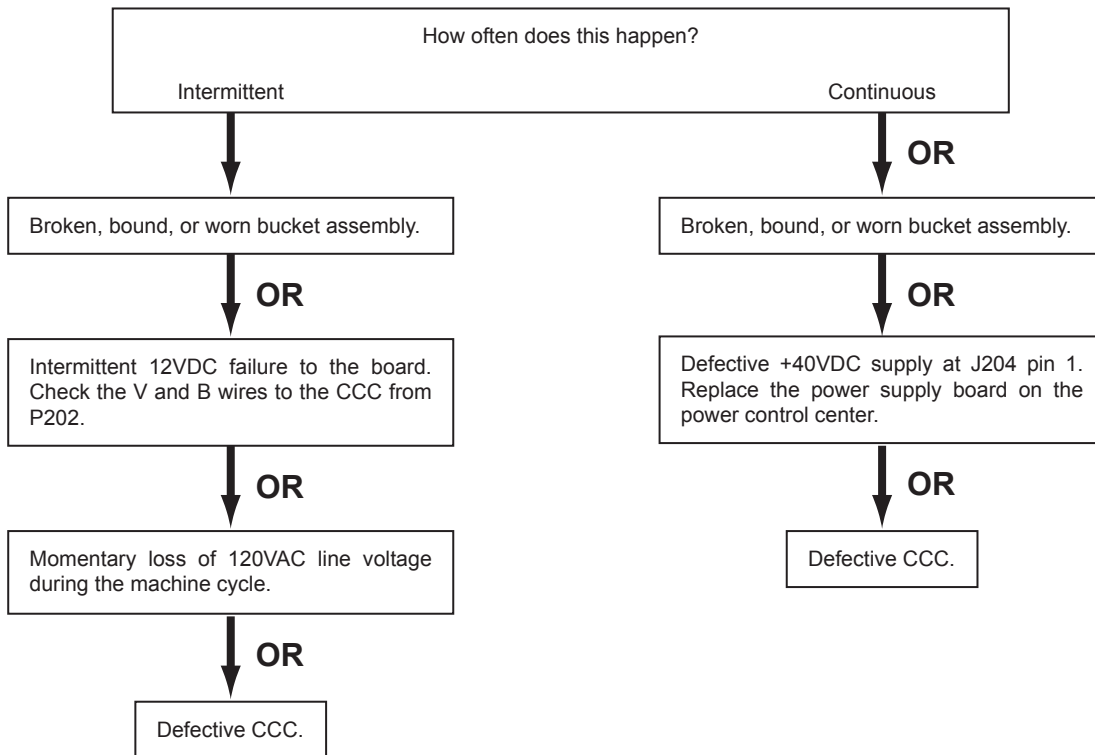
## Bill Changer Steals Coins - Works OK with Bills (BC-1200 only)



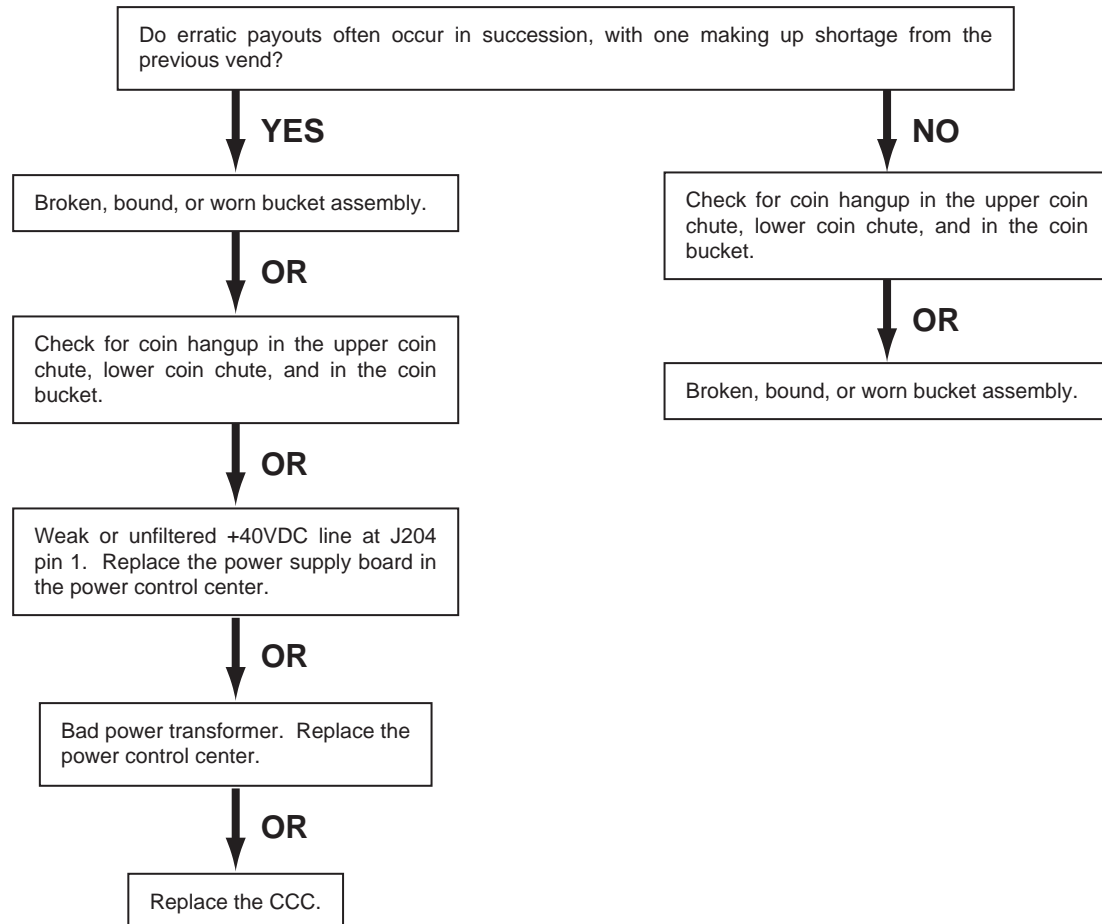
## Bill Changer Steals Bills - Works OK with Coins



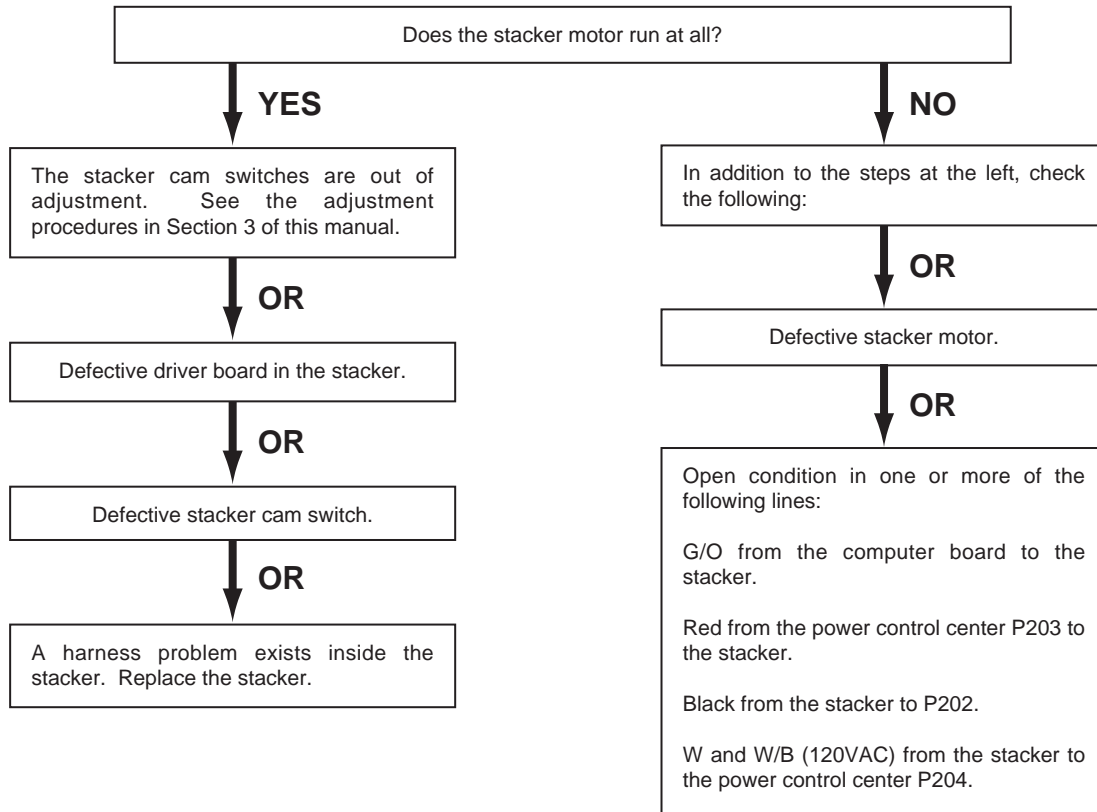
# Bill Changer Steals Bills and Coins (Gives No Change) (BC-1200 only)



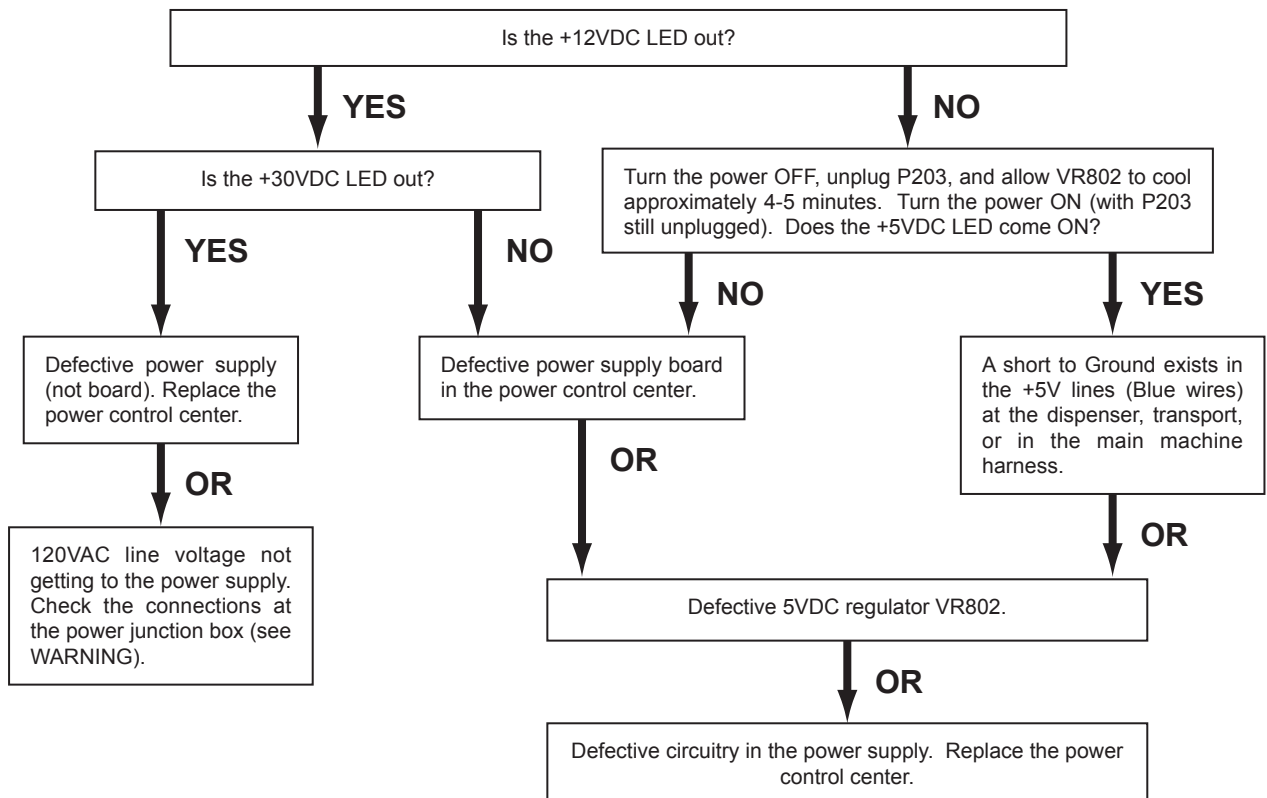
## Bill Changer Gives Erratic Payout for Bills and Coins (No Error Messages)



# Bill Stacker Problems



## +5 VDC Failure, +5 VDC LED Out



### WARNING:

120 VAC circuitry. Turn the power OFF and pull the plug from the wall before making this check.

## DETAILED CONTROL COMPUTER BOARD OPERATION

The following description is not intended for the casual repair person or the novice technician. It details the electronics found on the control computer board. No attempt should be made to repair this board unless you have had considerable experience troubleshooting and repairing complex, microprocessor-controlled electronic circuit boards. Rowe suggests that you send any defective CCC boards back to the factory for proper servicing.

*Figure 4-5* is a four-sheet schematic of the 65077458 Changer Control Computer board. Sheet 1 shows the microprocessor, memory, and address decoding circuits. Sheet 2 shows the 16-character alphanumeric display and its control circuits. Sheet 3 shows the output interface circuits. Sheet 4 shows the input interface circuits.

### Sheet 1: Control Computer

U20 is a 8097 microprocessor. It has eight channels of analog-to-digital conversion on it used to process analog signals coming from the transport. There are also a number of special high-speed input and output pins along with several I/O port pins. The CMOS version of the microprocessor (80C196) may be used in place of the NMOS 8097. When the CMOS version is used, the crystal frequency must change from 12 MHz to 3 MHz, and jumper J1 must be in the 1-2 position. J1 must be in the 2-3 position when the NMOS 8097 microprocessor is used.



#### CAUTION:

Damage to the microprocessor (V20) may result if the J1 jumper is installed wrong. Use position 1-2 for the CMOS 80C196 and position 2-3 for the NMOS 8097.

### RESET CIRCUIT

The reset circuit is based on the U21, which is a low-voltage detector circuit. Voltage is applied to Pin 2 from the 5-volt regulator VR1. When the input voltage on Pin 2 reaches the proper level, the Reset output on Pin 1 goes HIGH. When Reset goes HIGH, U20 Pin 16 also goes HIGH, taking the processor out of reset. Reset also goes to the base of Q18, which controls RAM selection, battery power, and the switched 12-volt source.

With U21 Pin 1 LOW (RESET active), Q18 is OFF. R74 will pull down the base of Q9, Q17, and Q20, keeping all three turned OFF.

With Q9 OFF, the RAM chip select from U12A Pin 3 is blocked from reaching the RAM, U10. R73 pulls the RAM chip select up and keeps it deselected.

With Q17 OFF, Q15 stays OFF, allowing the battery voltage to be applied to the RAM. U10 Pins 26 and 28 through R150. The battery voltage will allow the RAM to retain its memory during RESET and whenever there is no power applied to the board.

With Q18 OFF, Q20 is kept OFF by R107, which in turn keeps Q13 OFF, which leaves the switched 12-volt supply OFF.

When U21 Pin 1 goes HIGH (RESET not active), Q18 supplies +5 volts to the bases of Q9, Q17, and Q18, turning each of them ON.

With Q9 ON, the RAM chip select from U12A Pin 3 is allowed to pass through Q9 and be applied to the RAM U10 Pin 20. When Q9 is ON, it effectively becomes transparent.

With Q17 ON, the base of Q15 is pulled down, turning on Q15. When Q15 is ON, the +5-volt supply is applied to the RAM U10 Pins 26 and 28 through Q15, relieving the battery.

With Q18 ON, voltage is applied to R157, providing a pull up for Q20. In this case, U20 Pin 30 through Q19 is the controlling factor. When U20 Pin 30 is HIGH, Q19 is turned ON, which keeps Q20 OFF, which in turn keeps Q13 and the switched 12-volt supply OFF. When U20 Pin 30 is LOW, Q19 turns OFF, allowing Q20 to turn ON through the pull up R157. This turns ON Q13 and the switched 12-volt supply.

## I/O PORTS

U8 is an input buffer decoded by U13 at address C200 hex. This port reads the PROGRAMMING/NORMAL mode switch, all pushbutton switches, and the machine code information. When the processor reads memory locations C200, the information on the switches will be brought into the processor.

U19 is an input buffer decoded by U13 at address C600. This port reads the TEST switches, coin switches, and dispenser coin detectors. When the processor reads memory location C600, the information on these devices will be brought into the processor.

U5 is an output latch decoded by U13 at address C100 hex. U5 controls the hopper motors, the stacker, and coin lockout coil. The interface circuits for these functions are contained on sheet 3.

U16 is an RS485 interface chip allowing communication to test equipment and the Rowe BC programming aid.

U15 is an EPROM used to store information that must be kept, even if the battery voltage to the RAM dies. Original date of manufacture, programming information, and other things are stored in the EPROM.

## Sheet 2: Digital Display Driver

DS1 is the vacuum fluorescent display. It normally requires a negative supply voltage to operate. The bill changer does not provide a negative supply, so the display tube and the display driver chip U1 are both "floating", that is, they do not have a direct ground reference. This effectively simulates a negative supply.

R17 through R22 provide level shifting of the display clock, data, and reset control lines. Each pair of resistors sets up a voltage divider, allowing the digital input signals on U14 to be level shifted to the voltages needed by U1.

When investigating this area, verify the proper voltages developed by the zener diodes. Referencing all measurements to ground, U1 Pin 1 should be +30 VDC, U1 Pin 18 should be +14 VDC, DS1 Pin 1 should be +6.2 VDC, and DS1 Pin 34 should be +11.8 VDC. Voltages on U1 Pins 20, 21, and 22 should swing between +30 VDC and +20 VDC.



## Sheet 3: Output Circuits

All output circuits, except the transport transmissive/reflective LED driver circuit, are inactive when the switched +12 VDC supply is OFF. This keeps all the motors, solenoids, and coils in the machine from operating when the machine is turned ON and OFF, or whenever the RESET line from U21 is LOW.

### TRANSPORT MOTOR CONTROL

The transport motor drive comes in to U6B Pin 3. U6B buffers the signal and inverts it through U11C, applying it to the base of Q5. The transport motor is a DC motor that runs on +12 volts. Motor speed is controlled by switching Q5 ON and OFF based on the transport motor drive signal. The transport drive signal is not a constant DC voltage applied to the base of Q5 but a switching signal. If the motor is running too fast, Q5 is turned OFF; if the motor is running too slow, Q5 is turned back ON.

The transport motor direction is controlled through relay K1. When the relay is in the normal de-energized position, as shown on the schematic, the motor will run in reverse when Q5 is turned ON. The transport motor runs in the forward direction when relay K1 is energized. The transport motor direction comes from the processor on Sheet 1 into Pin 5 of U6. It is inverted through U7, then applied to relay K1. Diode D2 suppresses back EMF from K1's coil as it de-energizes. D6 and D7 do the same thing for the motor coils when the motor is turned OFF.

### HOPPER MOTOR CONTROL

All three hopper motor circuits operate in the same manner, so only the left motor circuit will be discussed.

A low at U11A Pin 1 causes Pin 16 to turn OFF. No current flows through the LED half of U4, so no gate current is provided to Q3. Without gate current, Q3 stays OFF, keeping the hopper motor OFF. When U11A Pin 1 goes HIGH, Pin 16 switches to ground, turning ON the LED in U4. Current flows in U4 Pins 4 and 6, supplying current to the base of Q3, turning Q3 ON. When Q3 is ON, the hopper motor will run.



#### **WARNING:**

The hopper motors run on 120 VAC and can cause severe electrical shock. Be very careful whenever you work with these circuits.

### LED DRIVE

The LED drive signal controls the intensity of the reflective-transmissive LED in the transport. The light is similar to the transport motor in that it is not driven from a constant DC voltage, but is pulsed. If you look at the LED in the transport, it looks like it is on constant, but it is not. It is pulsing. By changing the duty cycle of the pulse, the brightness of the LED can be controlled.

## OUT OF SERVICE LAMP

The OUT OF SERVICE lamp is controlled by the switched +12 VDC supply through U7G Pins 7 and 10. Whenever the switched +12 VDC supply is ON, the power control relay is energized and the OUT OF SERVICE lamp is OFF. Whenever the switched 12 VDC supply is turned OFF, the power control relay de-energizes and the OUT OF SERVICE lamp will be lit.

## STACKER DRIVE

The stacker drive signal through U12D and U14E is applied to the stacker control board in the stacker. The stacker drive signal is a 200 ms pulse, just long enough to start the stacker motor and move it off its HOME switch.

## DOLLAR COUNTER

The dollar counter is controlled by signals sent through U6D and U7F. A HIGH on U6D Pin 9 turns the counter ON while a LOW on U6D Pin 9 turns the counter OFF. The counter is pulsed 50 ms ON, 50 ms OFF when counting.

## BUCKET DRIVE

All three bucket drive circuits operate in the same manner, so only the left bucket drive circuit will be discussed.

When the bucket circuit is OFF, U11D Pin 4 is LOW, U11D Pin 13 is open, so R106 keeps Q12 OFF. With Q12 OFF, R106 keeps Q8 OFF. When U11D Pin 4 goes HIGH, U11D Pin 13 goes LOW, turning ON Q12. Q12 supplies base current to Q8, turning it ON, which turns ON the bucket coil.

## STACKER SOLENOID

When the stacker solenoid is OFF, U6F Pin 13 is LOW, Pin 12 will also be LOW, keeping Q4 OFF. When U6F Pin 13 goes HIGH, Pin 12 will open, allowing base current to Q4 through R83, turning Q4 ON, which turns ON the stacker solenoid in the stacker. The solenoid controls the flipper which determines whether the bill gets stacked in the upper or lower box.

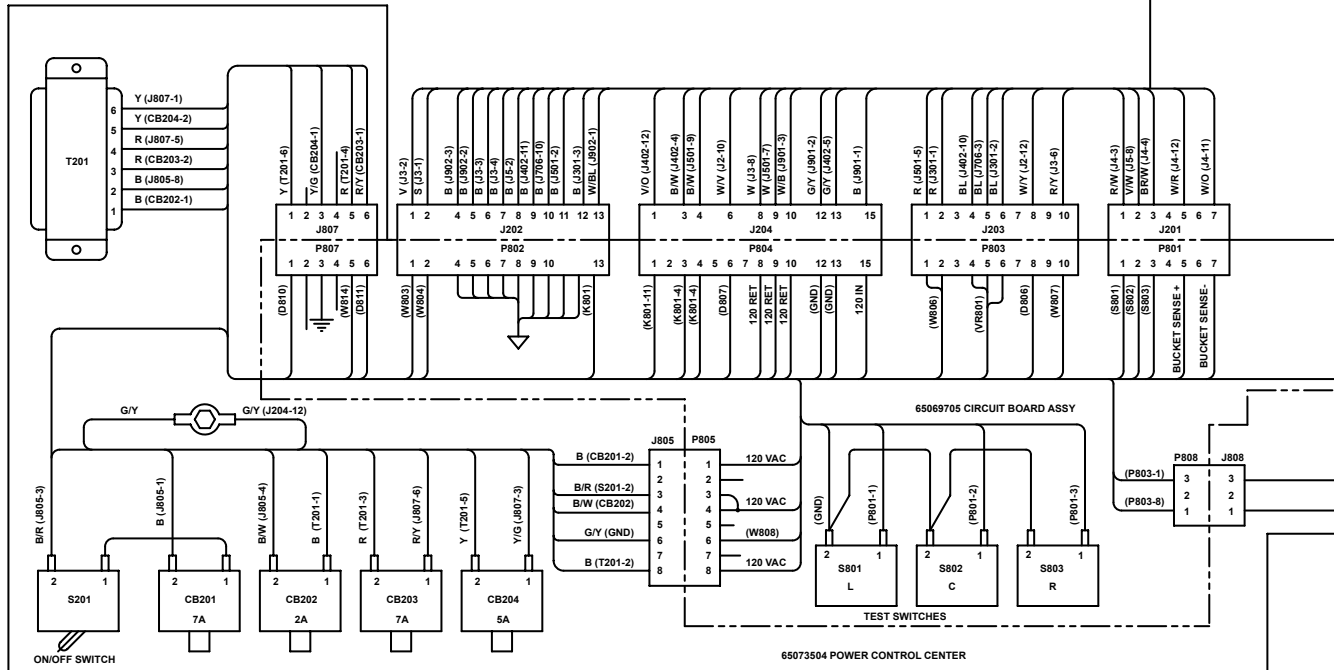
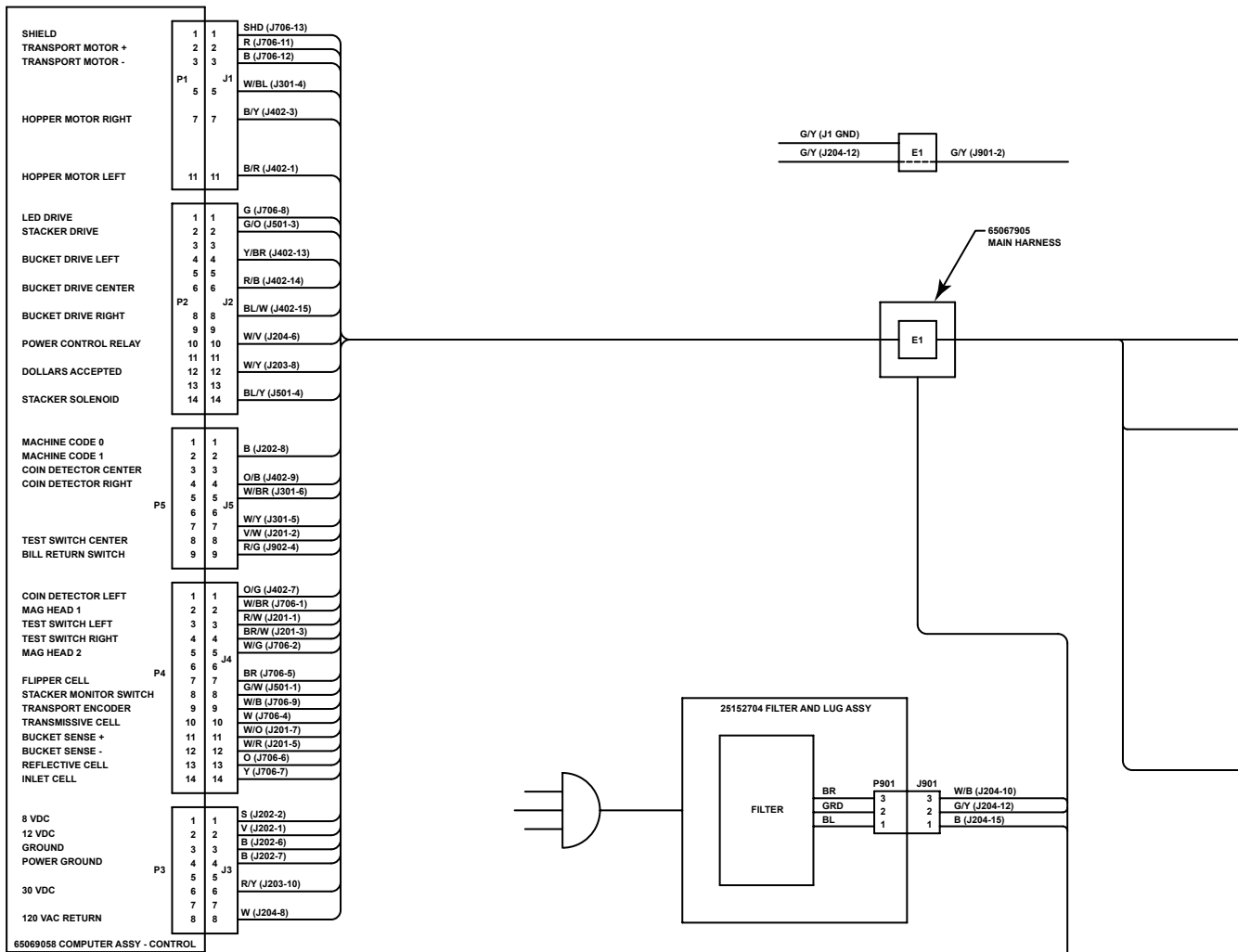
## COIN LOCKOUT

The coin lockout is controlled by signals sent through U6A and U7E. A HIGH on U6A Pin 1 turns the coin lockout ON, while a LOW on U6A Pin 1 turns the coin lockout OFF. When the coin lockout is ON, coins may pass through the coin acceptor to the coins switches.

## Sheet 4: Input Circuits

Most of the input circuits are straightforward. A series resistor, usually 100 ohms or 1 K-ohms, and either a .01 or .1 microfarad capacitor to ground provide a little noise filtering. Several inputs have pull up resistors.

Seven inputs from P4 are connected to A/D conversion inputs on the processor. All the other inputs are digital signals. The circuits involving U17A, U17B, Q14, and Q16 convert analog inputs to digital signals.



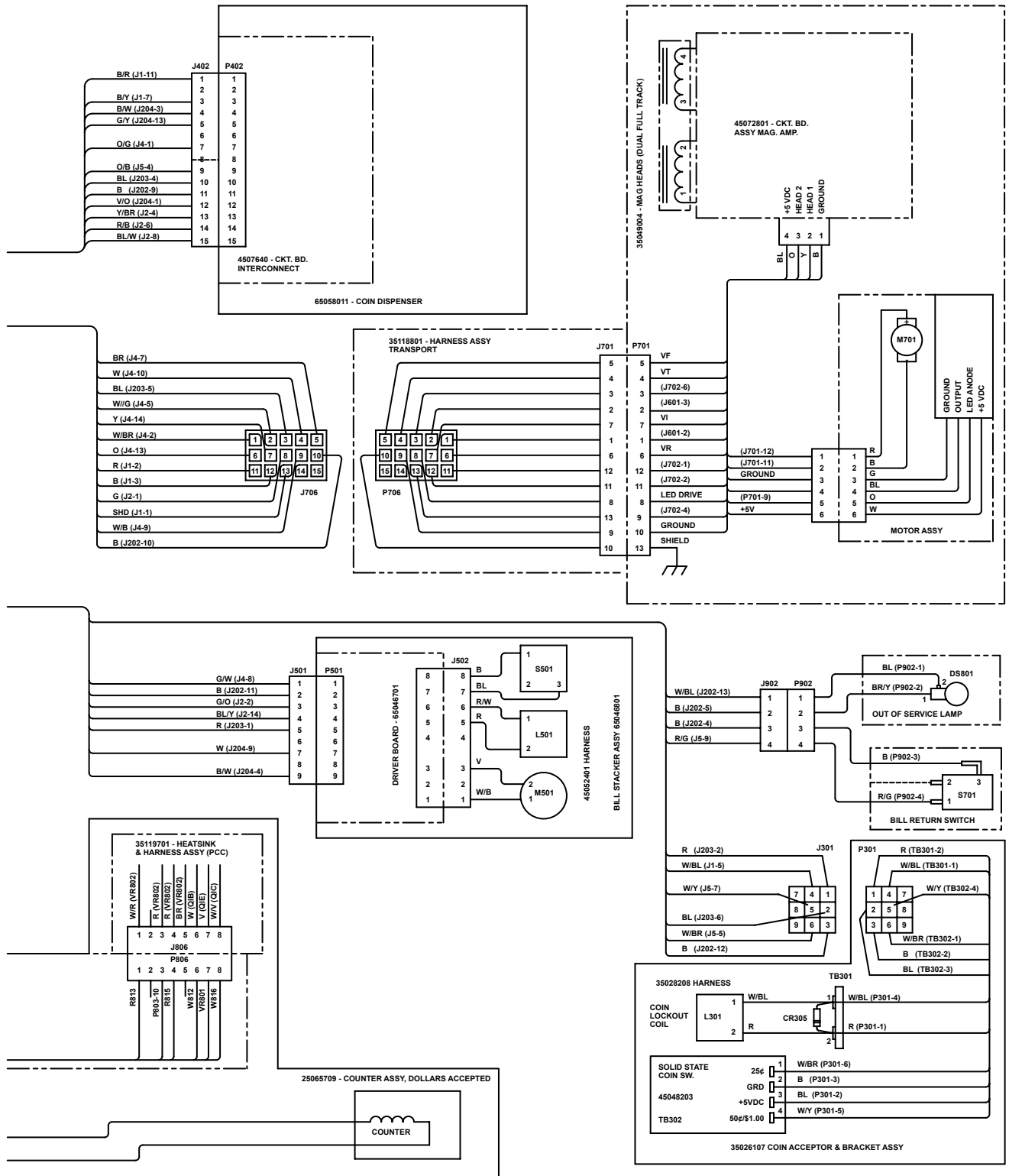
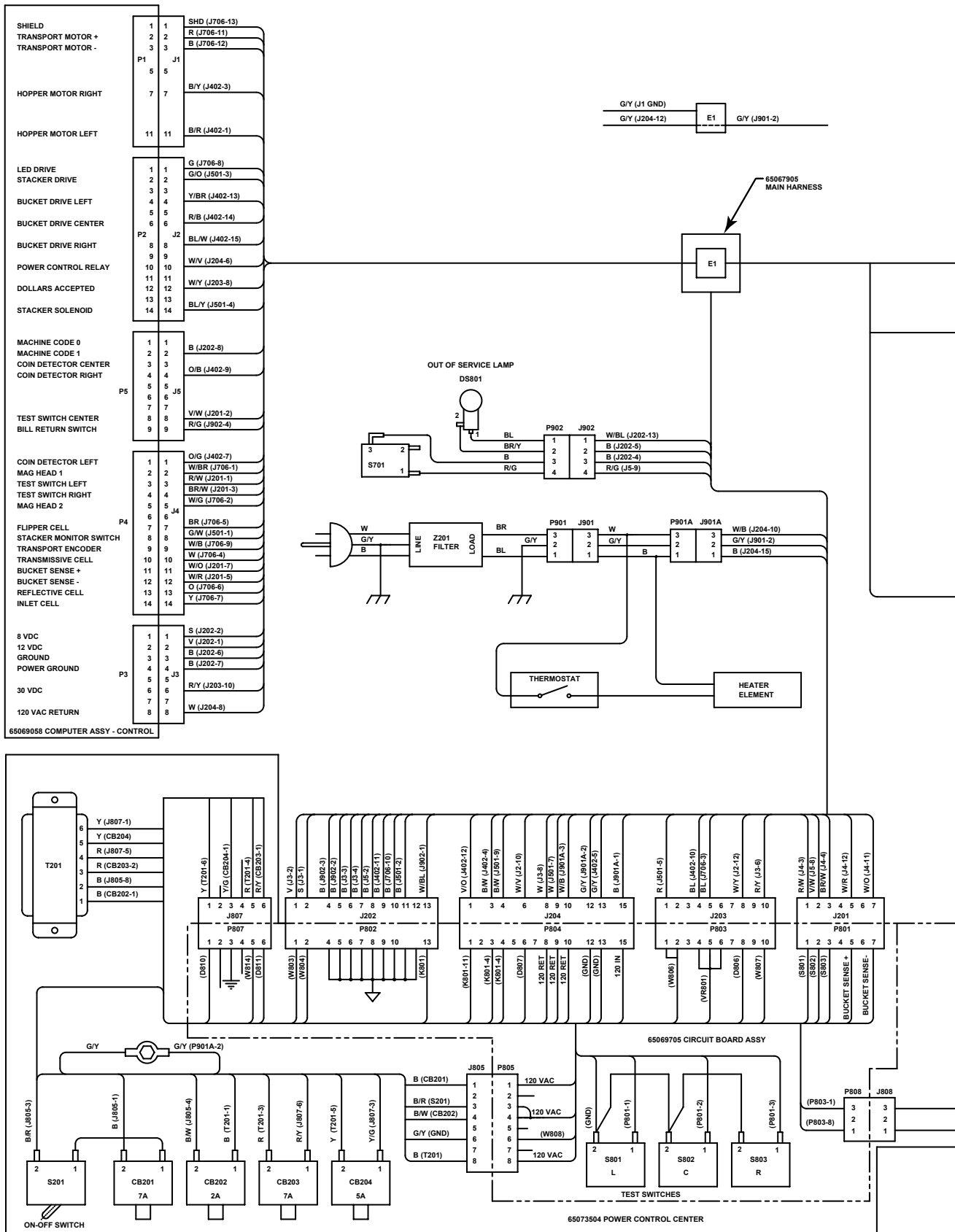
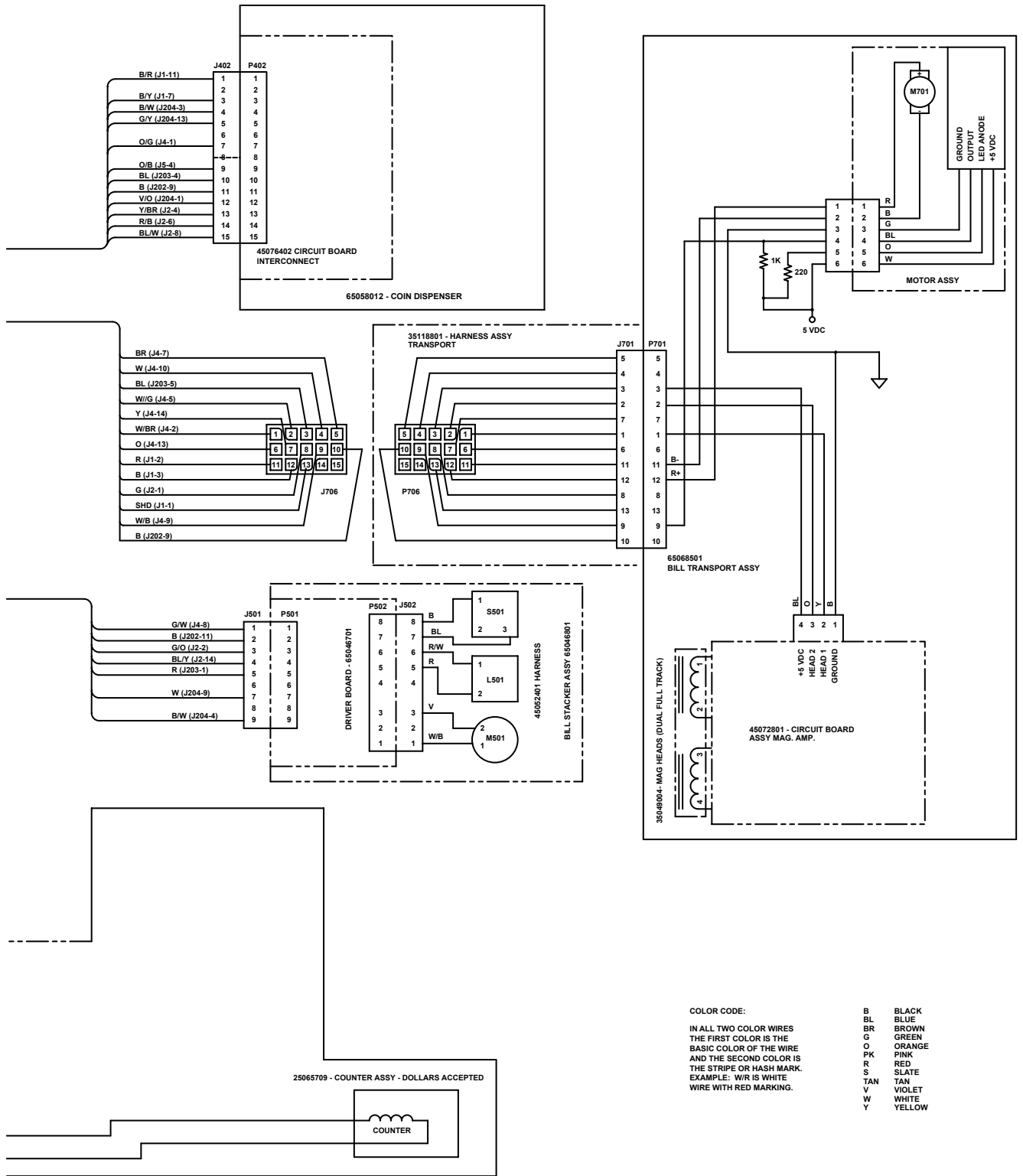


Figure 4-1. BC-1200 Wiring Diagram (Sheet 1)

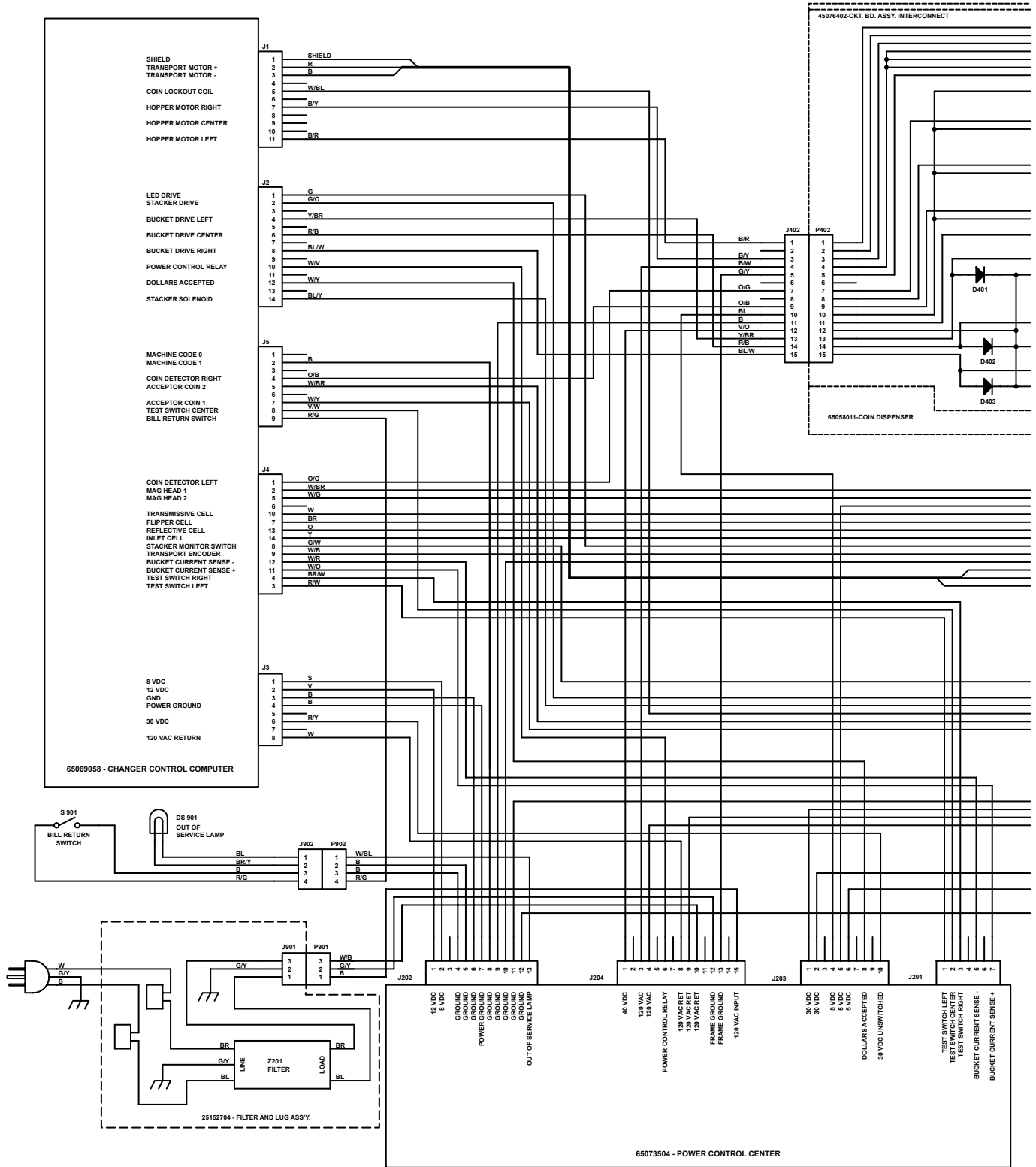




**COLOR CODE:**  
 IN ALL TWO COLOR WIRES  
 THE FIRST COLOR IS THE  
 BASIC COLOR OF THE WIRE  
 AND THE SECOND COLOR IS  
 THE STRIPE OR HASH MARK.  
 EXAMPLE: W/R IS WHITE  
 WIRE WITH RED MARKING.

B	BLACK
BL	BLUE
BR	BROWN
G	GREEN
O	ORANGE
PK	PINK
R	RED
S	SLATE
TAN	TAN
V	VIOLET
W	WHITE
Y	YELLOW

Figure 4-1. BC-1400 Wiring Diagram (Sheet 2)



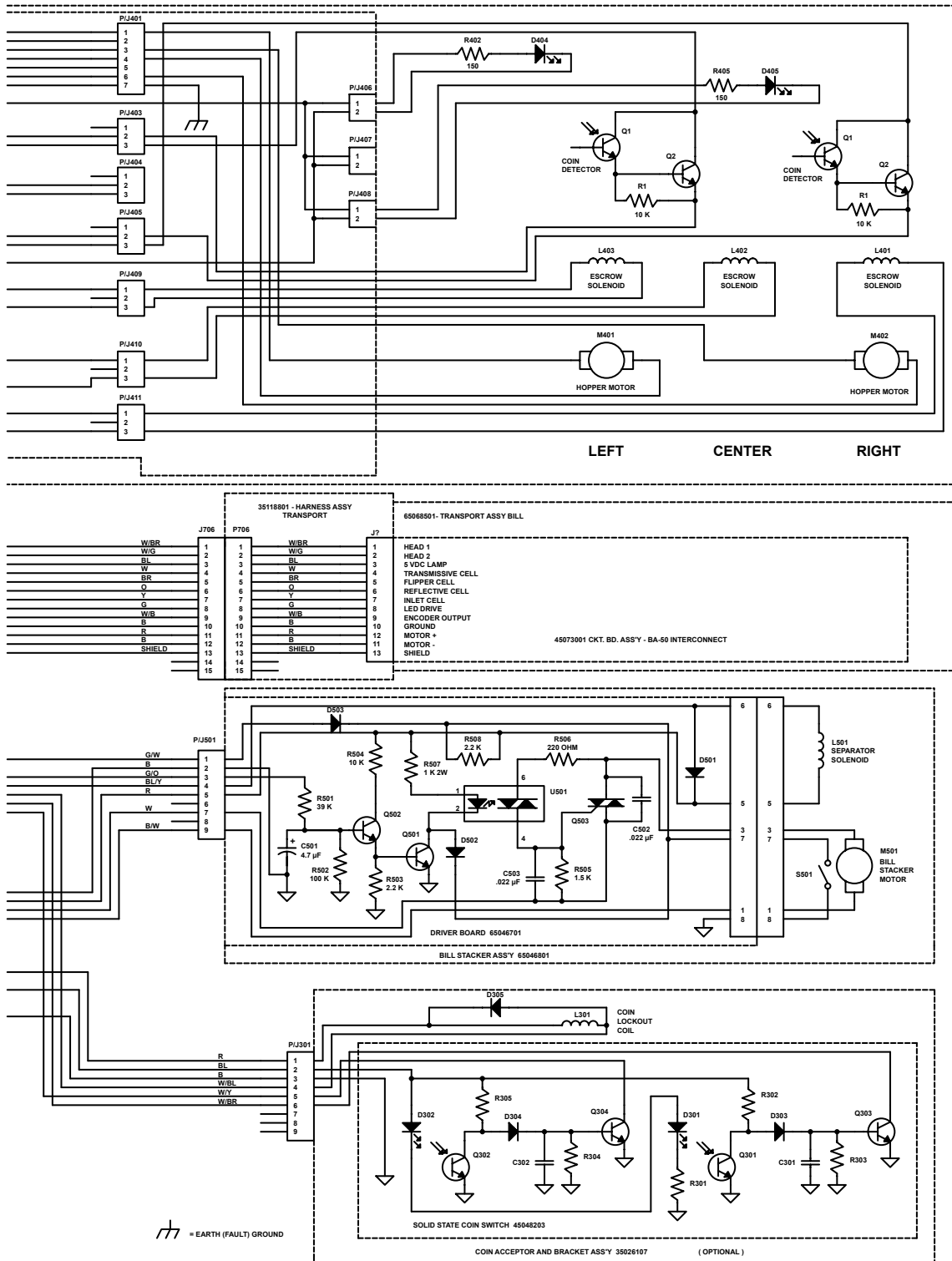
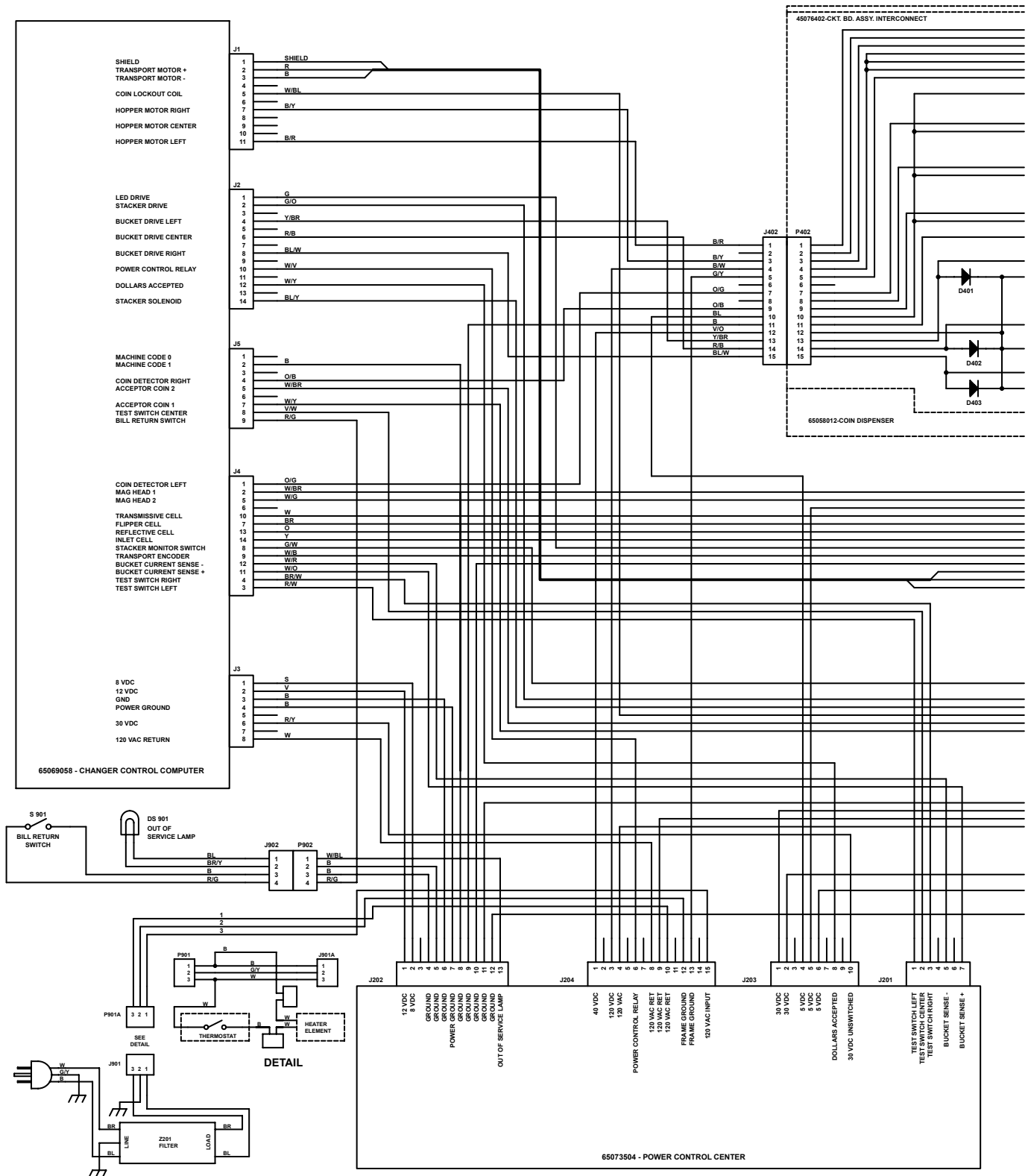
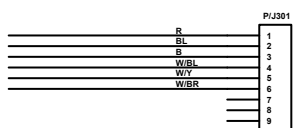
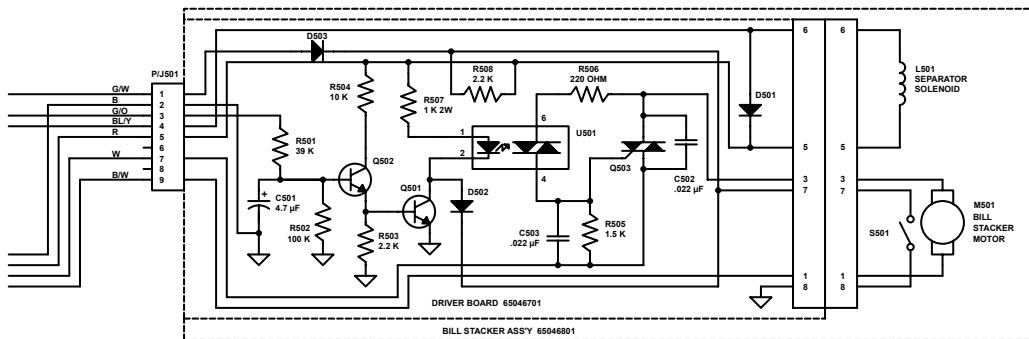
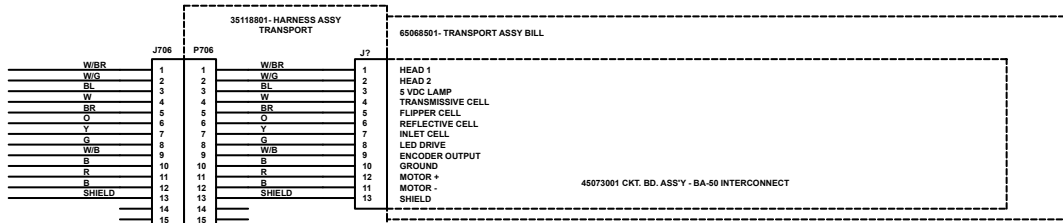
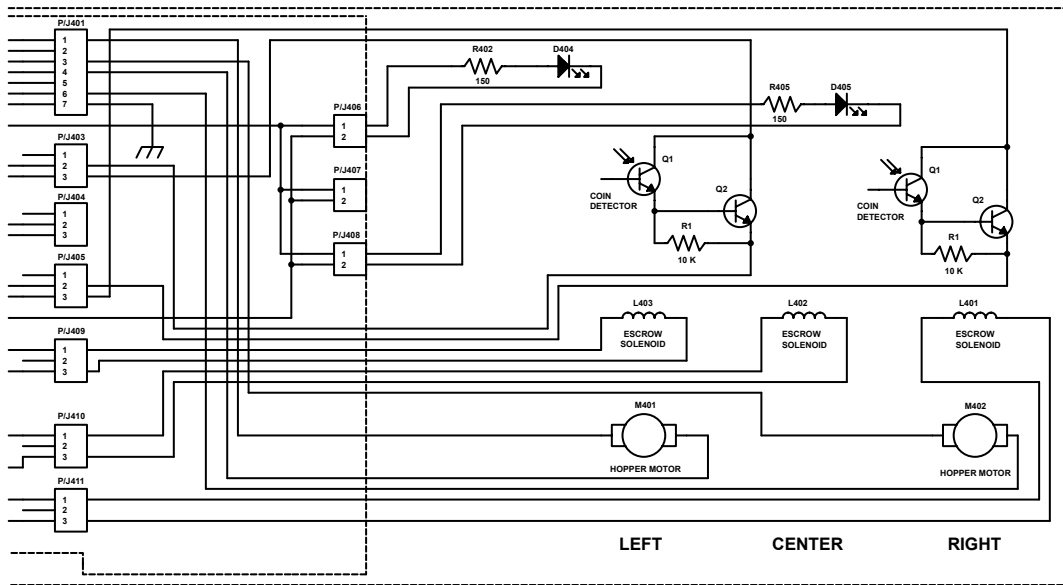


Figure 4-1. BC-1200 Schematic Diagram (Sheet 3)

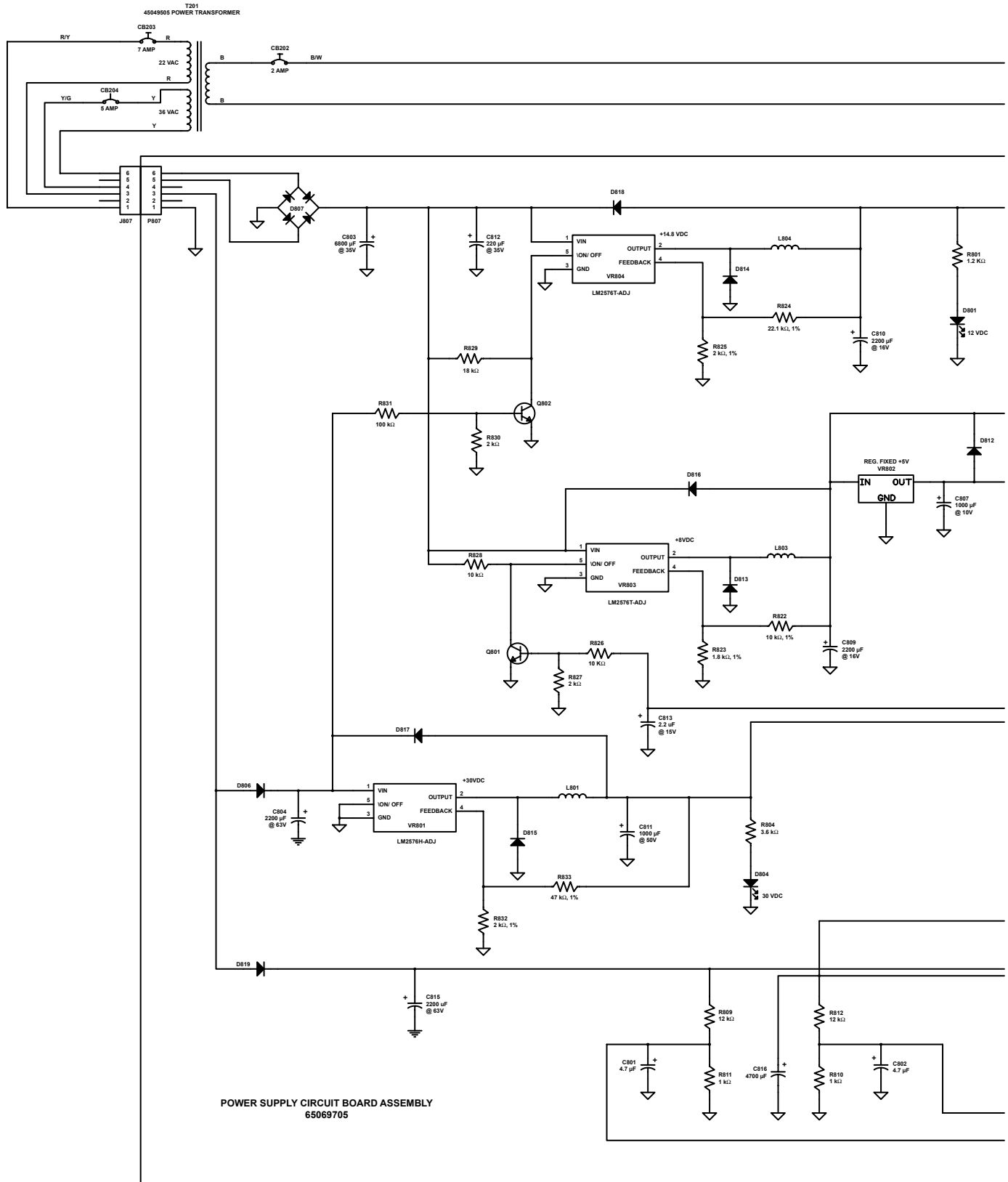






= EARTH (FAULT) GROUND

Figure 4-1. BC-1400 Schematic Diagram (Sheet 4)



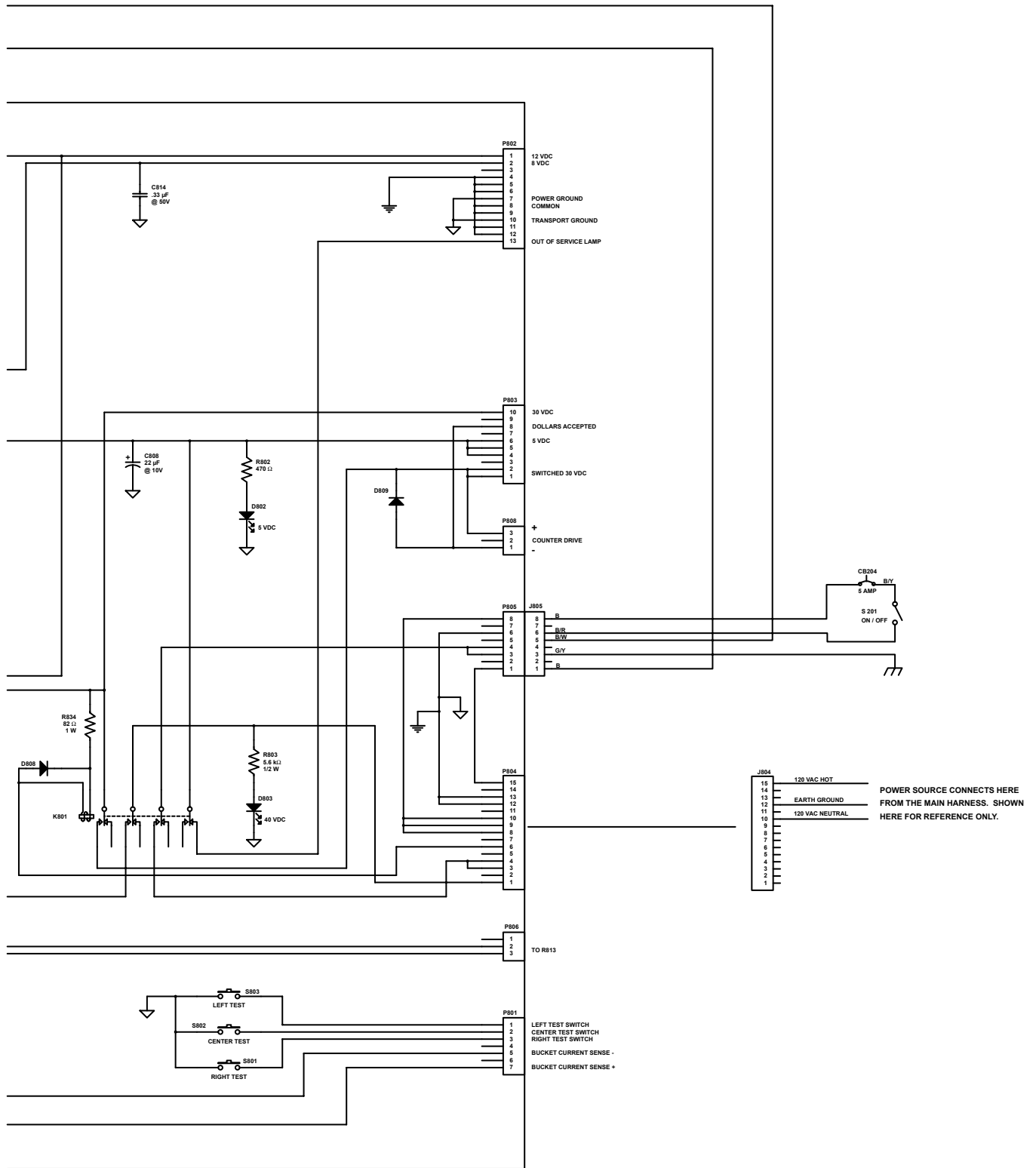


Figure 4-2. Schematic Diagram - Power Supply (BC-1200/1400)

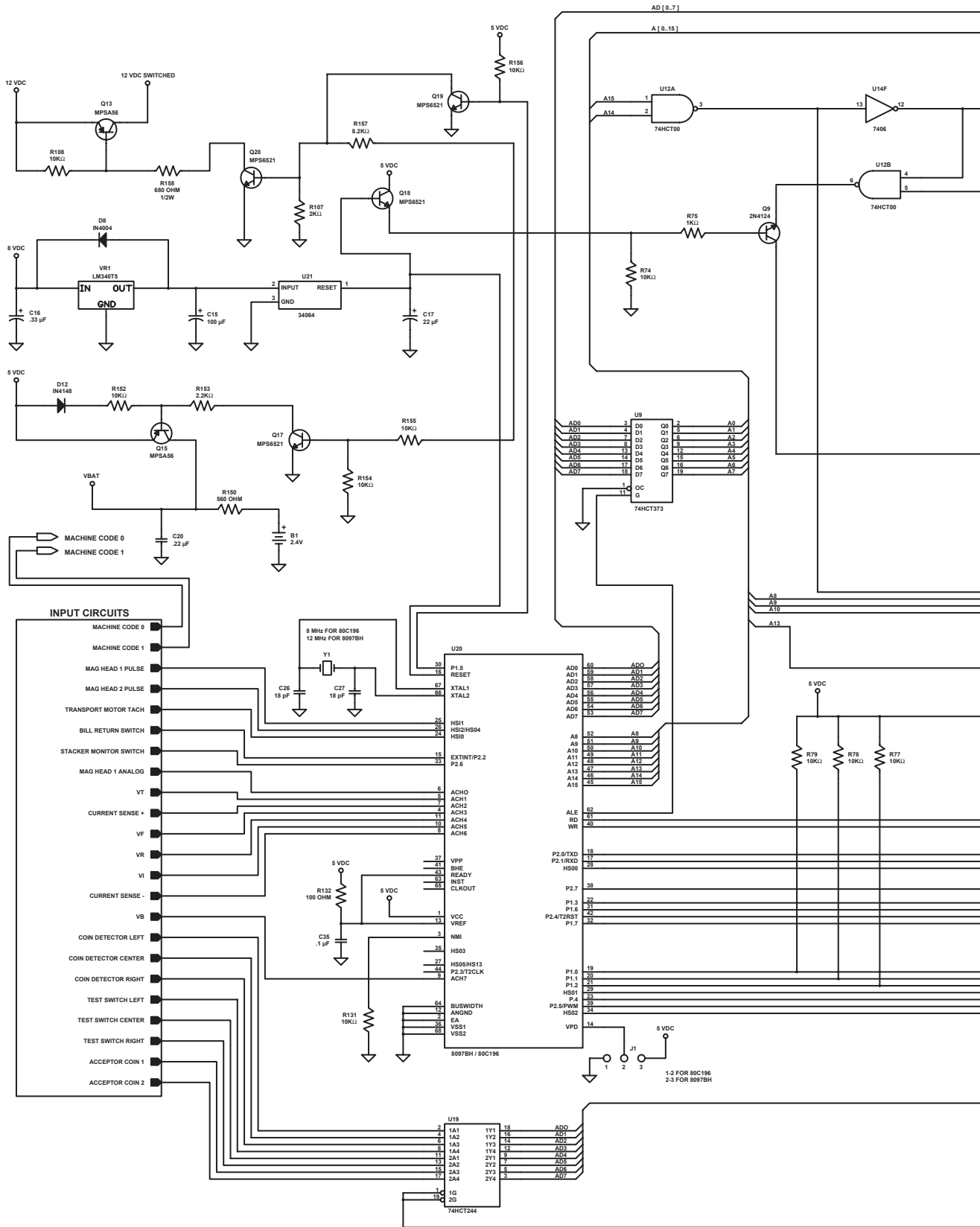
**Power Supply Circuit Board Assembly - 65069705 (Rev. A)**

C801	Capacitor - Electrolytic 50 VDC	4.7 $\mu$ F	70023806
C802	Capacitor - Electrolytic 50 VDC	4.7 $\mu$ F	70023806
C803	Capacitor - Electrolytic 35 VDC	6800 $\mu$ F	70023601
C804	Capacitor - Electrolytic 63 VDC	2200 $\mu$ F	70023610
C807	Capacitor - Electrolytic 10 VDC	1000 $\mu$ F	70028117
C808	Capacitor - Tantalum 16 VDC	2200 $\mu$ F	70025104
C809	Capacitor - Electrolytic 16 VDC	2200 $\mu$ F	70028311
C810	Capacitor - Electrolytic 16 VDC	2200 $\mu$ F	70028311
C811	Capacitor - Electrolytic 50 VDC	1000 $\mu$ F	70028309
C812	Capacitor - Electrolytic 50 VDC	220 $\mu$ F	70028305
C813	Capacitor - Tantalum 20 VDC	2.2 $\mu$ F	70025107
C814	Capacitor - Mylar 100 VDC	.33 $\mu$ F	70021555
C815	Capacitor - Electrolytic 63 VDC	2200 $\mu$ F	70023610
C816	Capacitor - Electrolytic 50 VDC	4700 $\mu$ F	70023604
D801	Diode - Light Emitting (Red)	90°	70035201
D802	Diode - Light Emitting (Red)	90°	70035201
D803	Diode - Light Emitting (Red)	90°	70035201
D804	Diode - Light Emitting (Red)	90°	70035201
D806	Diode - Silicon	MR752	70035010
D807	Diode Bridge		21822506
D808	Diode - Silicon	1N4004	70035005
D809	Diode - Silicon	1N4004	70035005
D812	Diode - Silicon	1N4004	70035005
D813	Diode - Silicon	MR820	70035017
D814	Diode - Silicon	MR820	70035017
D815	Diode - Silicon	MR820	70035017
D816	Diode - Silicon	1N4004	70035005
D817	Diode - Silicon	1N4004	70035005
D818	Diode - Silicon	1N4004	70035005
D819	Diode - Silicon	MR752	70035010
K801	Relay - Power		35066802
L801	Inductor	200 $\mu$ H	21513502
L803	Inductor	200 $\mu$ H	21513502
L804	Inductor	200 $\mu$ H	21513502
P801	Header - Polarized	7 Circuit	70075007
P802	Header - Polarized	13 Circuit	70075013
P803	Header - Polarized	10 Circuit	70075010
P804	Header - Polarized	15 Circuit	70075015
P805	Header - Polarized	8 Circuit	70075008
P806	Header - Polarized	3 Circuit	70075003
P807	Header - Polarized	6 Circuit	70075006
P808	Header - Polarized	3 Circuit	70075003

Q801	Transistor - NPN	MPSA06	70030008
Q802	Transistor - NPN	MPSA06	70030008

**Note: All resistors are ¼ watt 5%, unless otherwise noted.**

R801	Resistor - Carbon Film	1.2 kΩ	79901122
R802	Resistor - Carbon Film	470 Ω	79901471
R803	Resistor - Carbon Film 1/2 W 5%	5.6 kΩ	79904562
R804	Resistor - Carbon Film	3.6 kΩ	79901362
R809	Resistor - Carbon Film	12 kΩ	79901123
R810	Resistor - Carbon Film	1 kΩ	79901102
R811	Resistor - Carbon Film	1 kΩ	79901102
R812	Resistor - Carbon Film	12 kΩ	79901123
R822	Resistor - Carbon Film 1/4 W 5%	10 kΩ	799121002
R823	Resistor - Carbon Film 1/4 W 5%	1.8 kΩ	799121801
R824	Resistor - Carbon Film 1/4 W 5%	22.1 kΩ	799122212
R825	Resistor - Carbon Film 1/4 W 5%	2 kΩ	799122001
R826	Resistor - Carbon Film	10 kΩ	79901103
R827	Resistor - Carbon Film	2 kΩ	79901202
R828	Resistor - Carbon Film	10 kΩ	79901103
R829	Resistor - Carbon Film	18 kΩ	79901183
R830	Resistor - Carbon Film	2 kΩ	79901202
R831	Resistor - Carbon Film	100 kΩ	79901104
R832	Resistor - Carbon Film 1/4 W 5%	2 kΩ	799122001
R833	Resistor - Carbon Film 1/4 W 5%	47 kΩ	799124702
R834	Resistor - Carbon Film 1 W	82 Ω	70010825
S801	Switch Pushbutton		21637902
S802	Switch Pushbutton		21637902
S803	Switch Pushbutton		21637902
VR801	I.C. - Voltage Regulator	LM2576T-ADJ (HV)	70036525
VR802	I.C. - Voltage Regulator	LM340T5	70036506
VR803	I.C. - Voltage Regulator	LM2576T-ADJ	70036520
VR804	I.C. - Voltage Regulator	LM2576T-ADJ	70036520



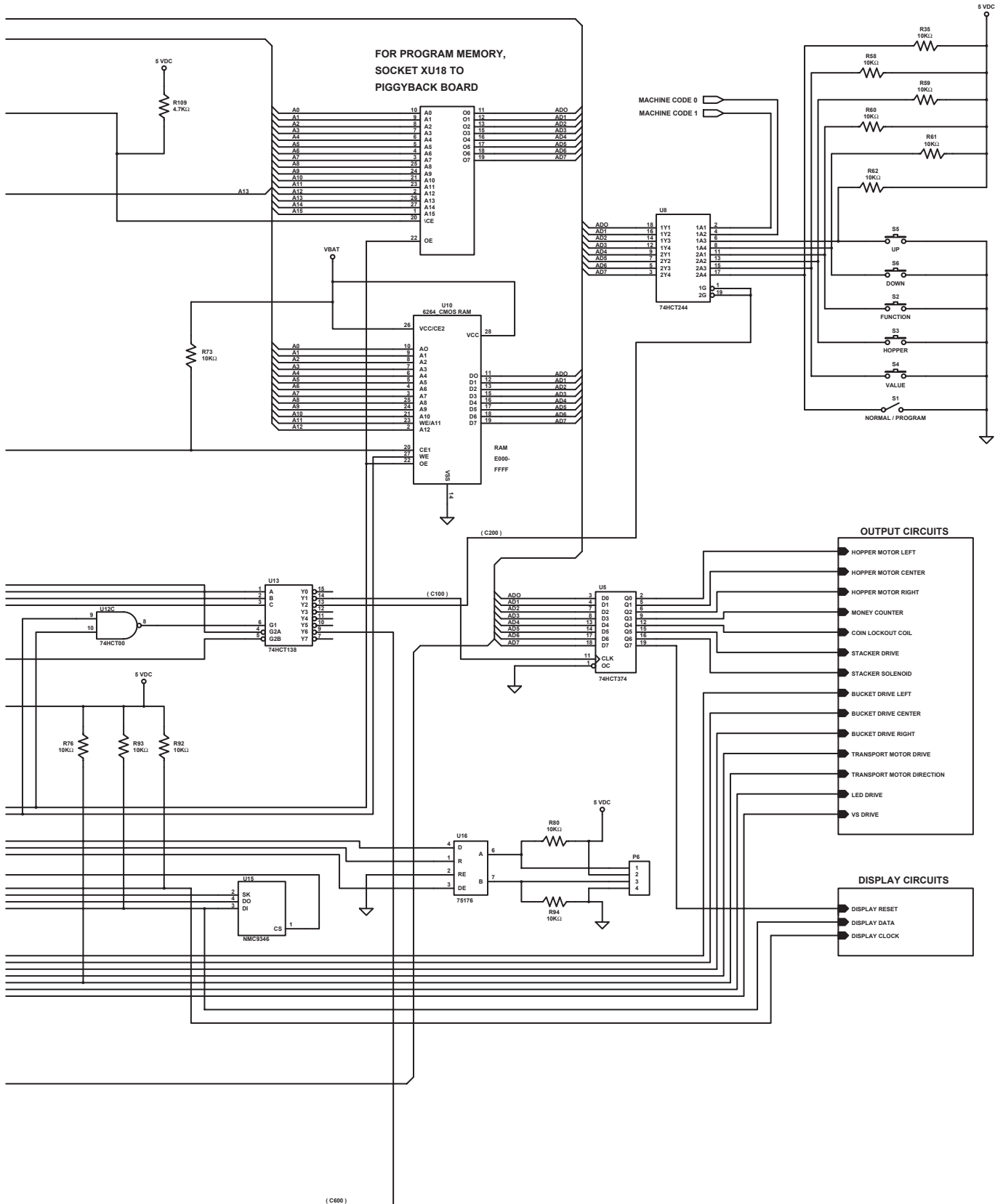
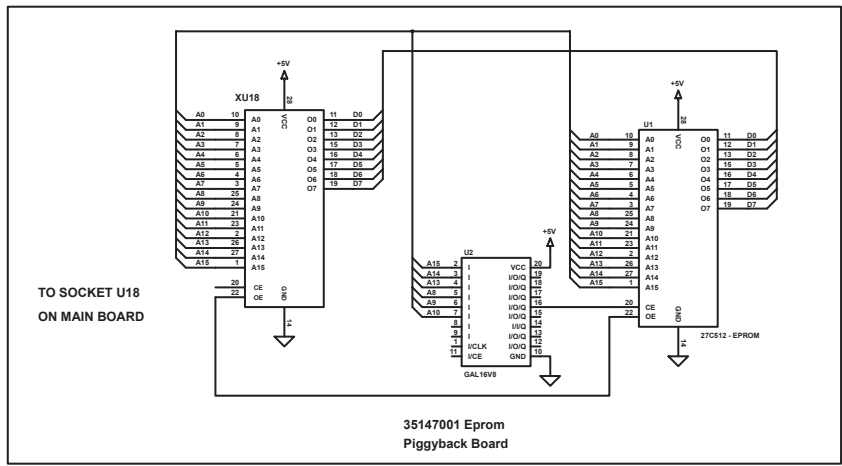
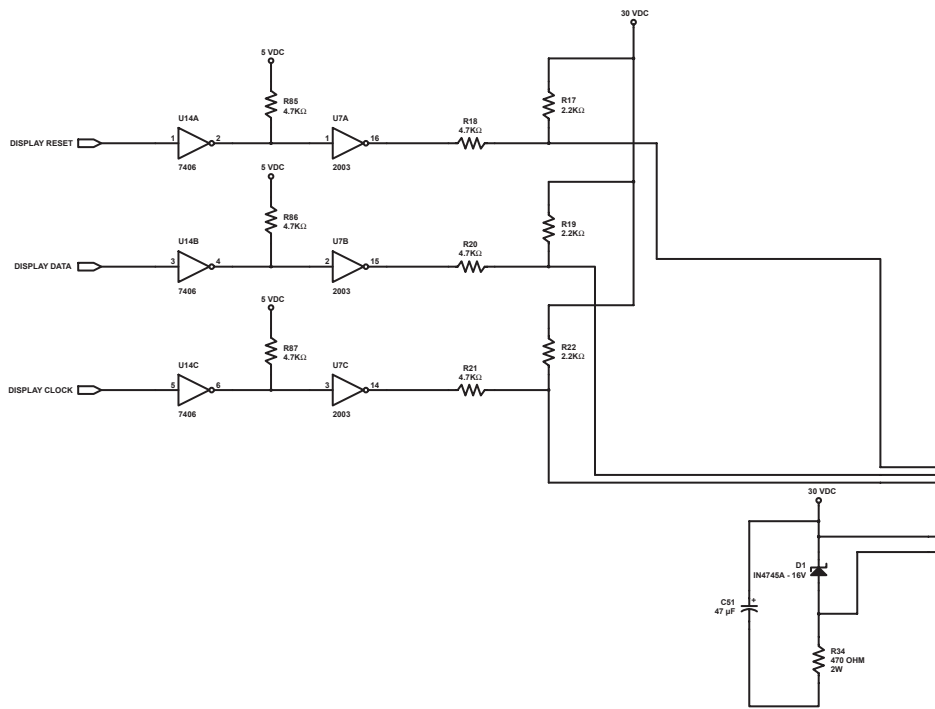


Figure 4-3. Schematic Diagram - Computer Control Board (Sheet 1)  
For Equivalent Engineering Drawing See 65077450Q2





DEVICE	+5 VDC	GND	PGND
U5	20	10	
U6	14	7	
U7		8	
U8	20	10	
U9	20	10	
U11			8
U12	14	7	
U13	16	8	
U14	14	7	
U15	8	5	
U16	8	5	
U17	14	7	
U18	1,28	14	
U19	20	10	

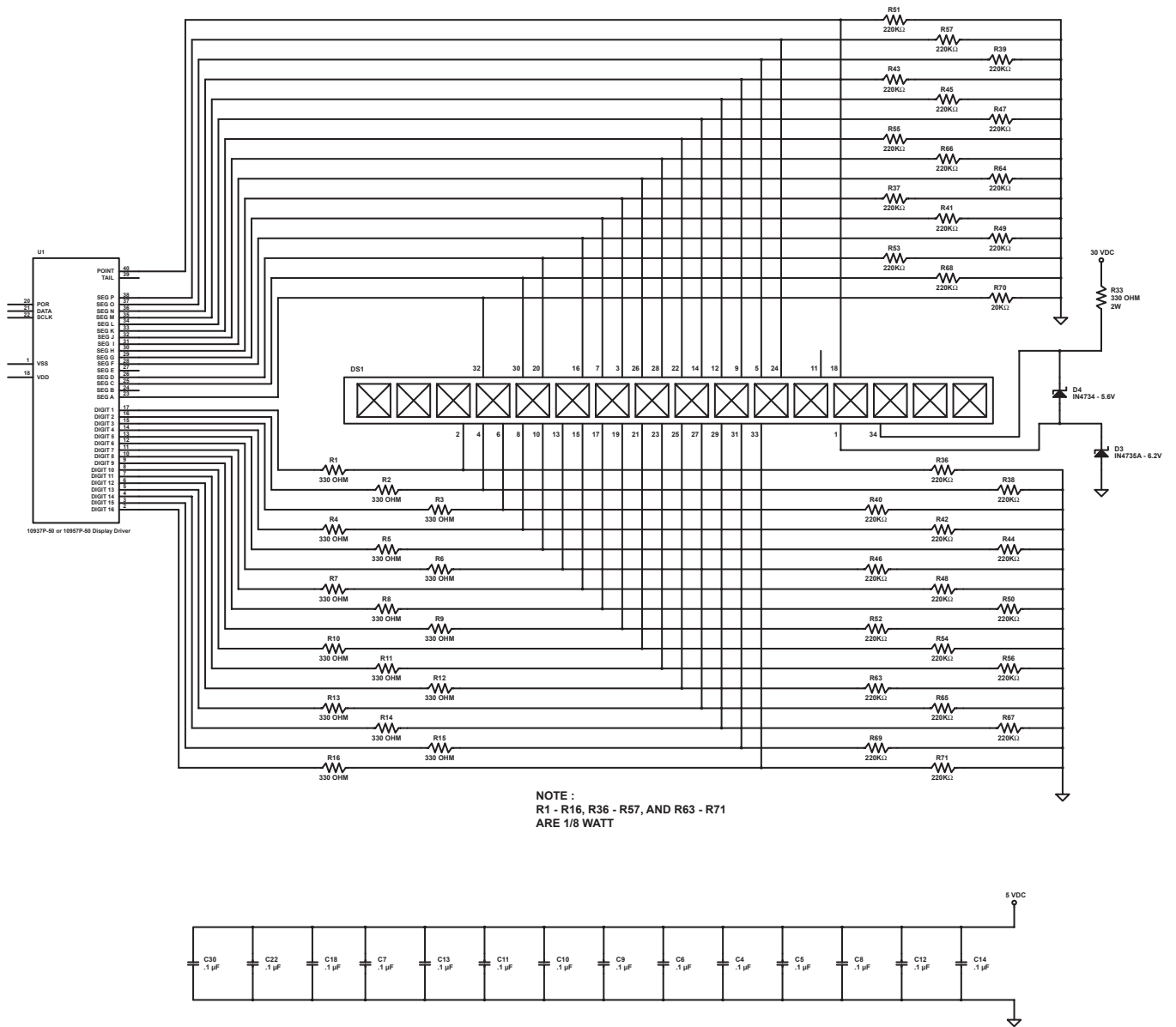
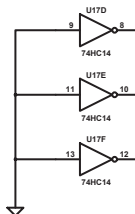
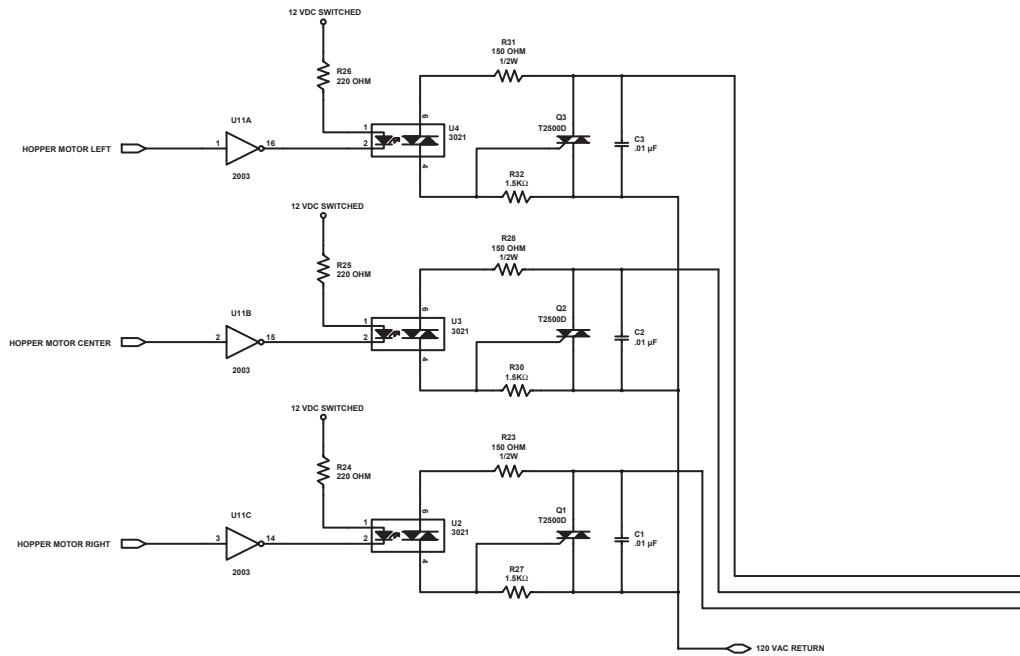
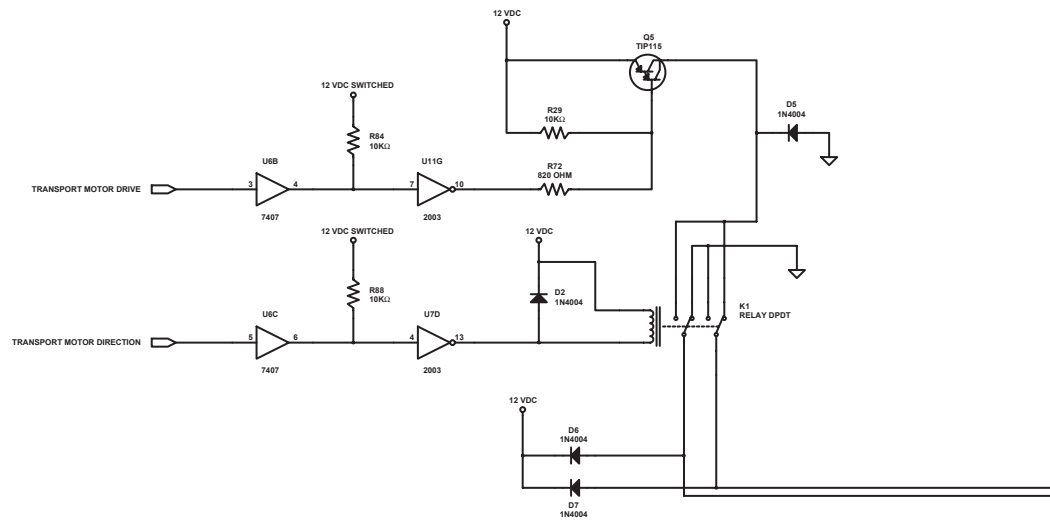


Figure 4-3. Schematic Diagram - Computer Control Board (Sheet 2)



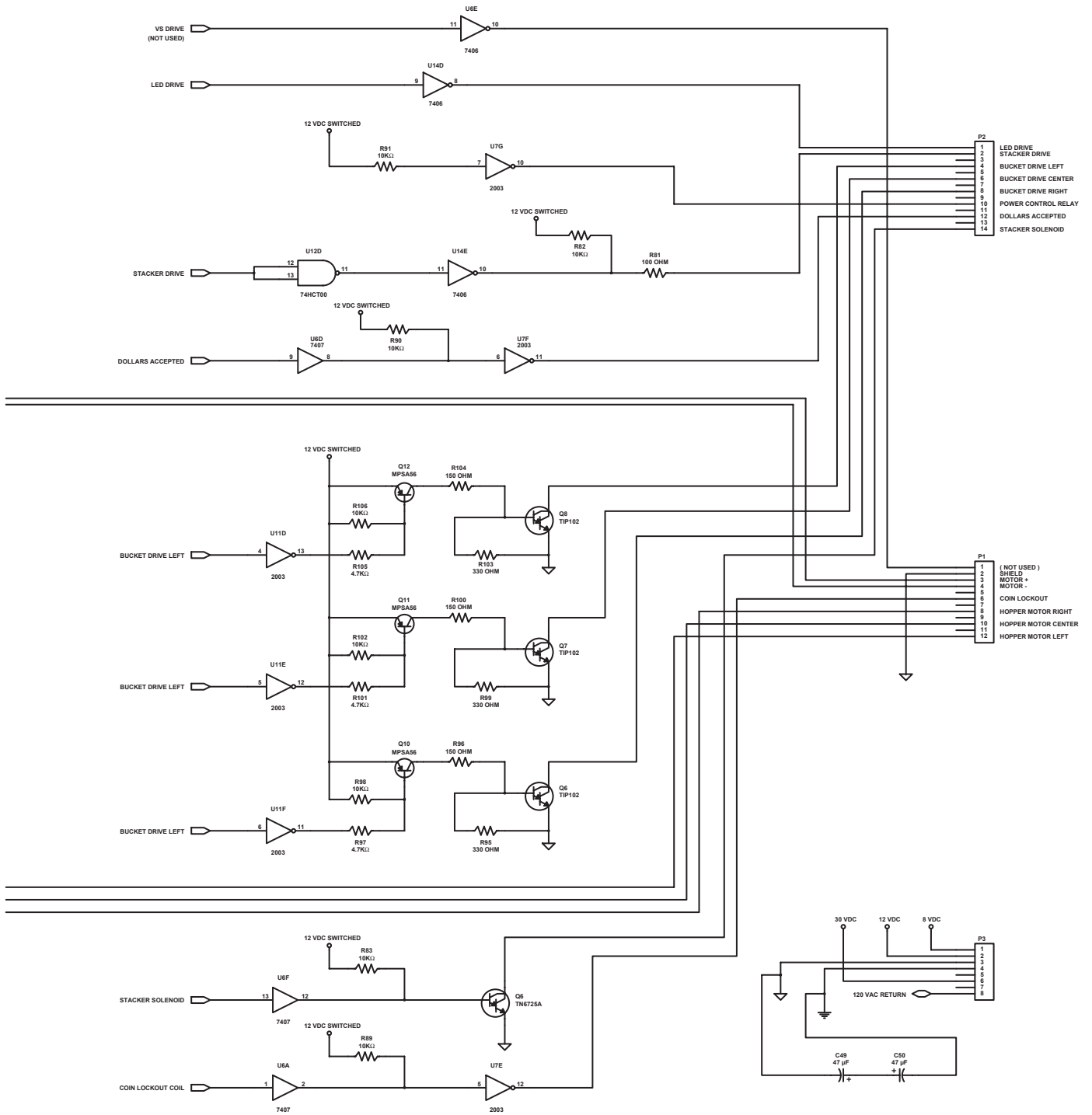
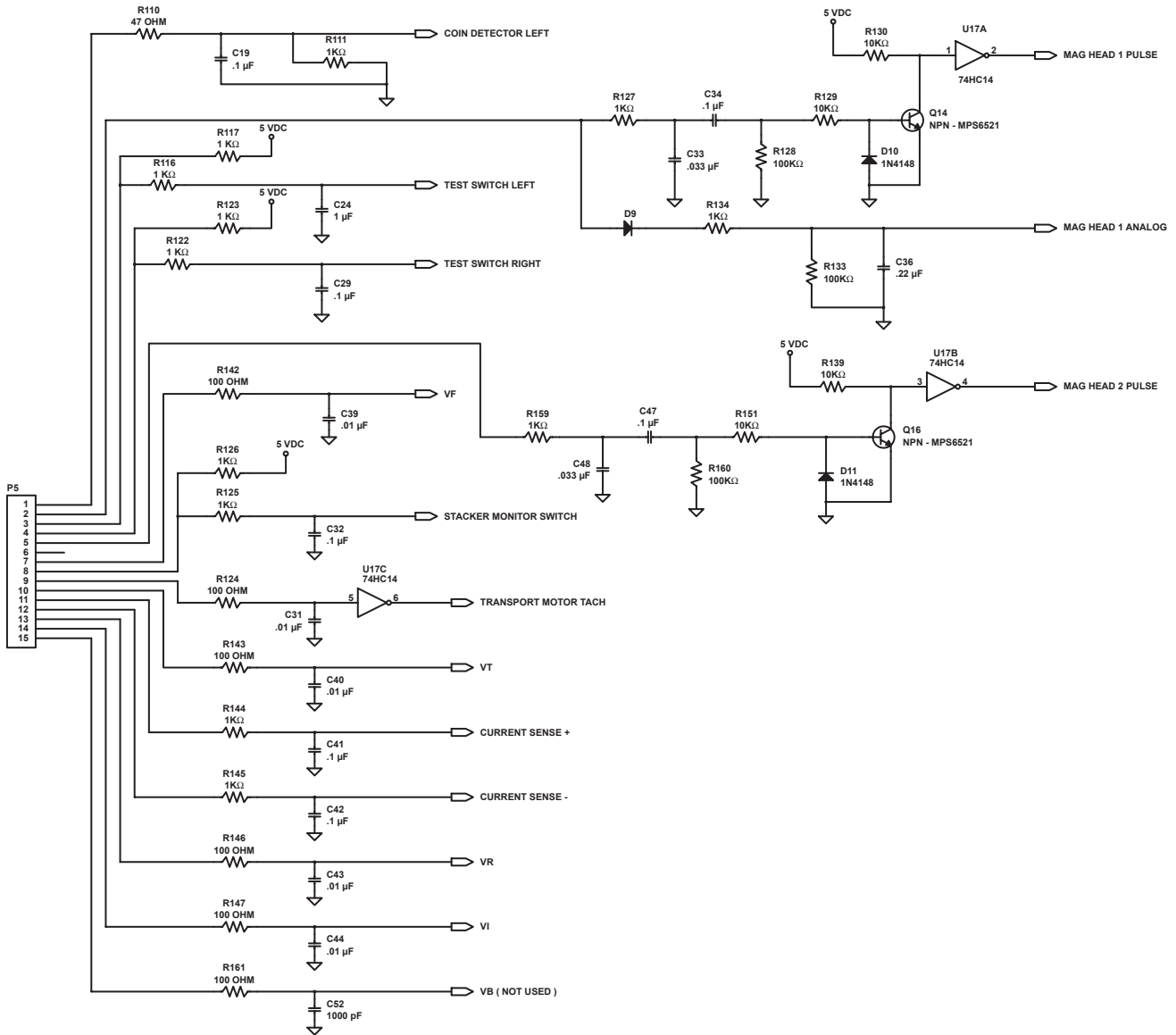


Figure 4-3. Schematic Diagram - Computer Control Board (Sheet 3)



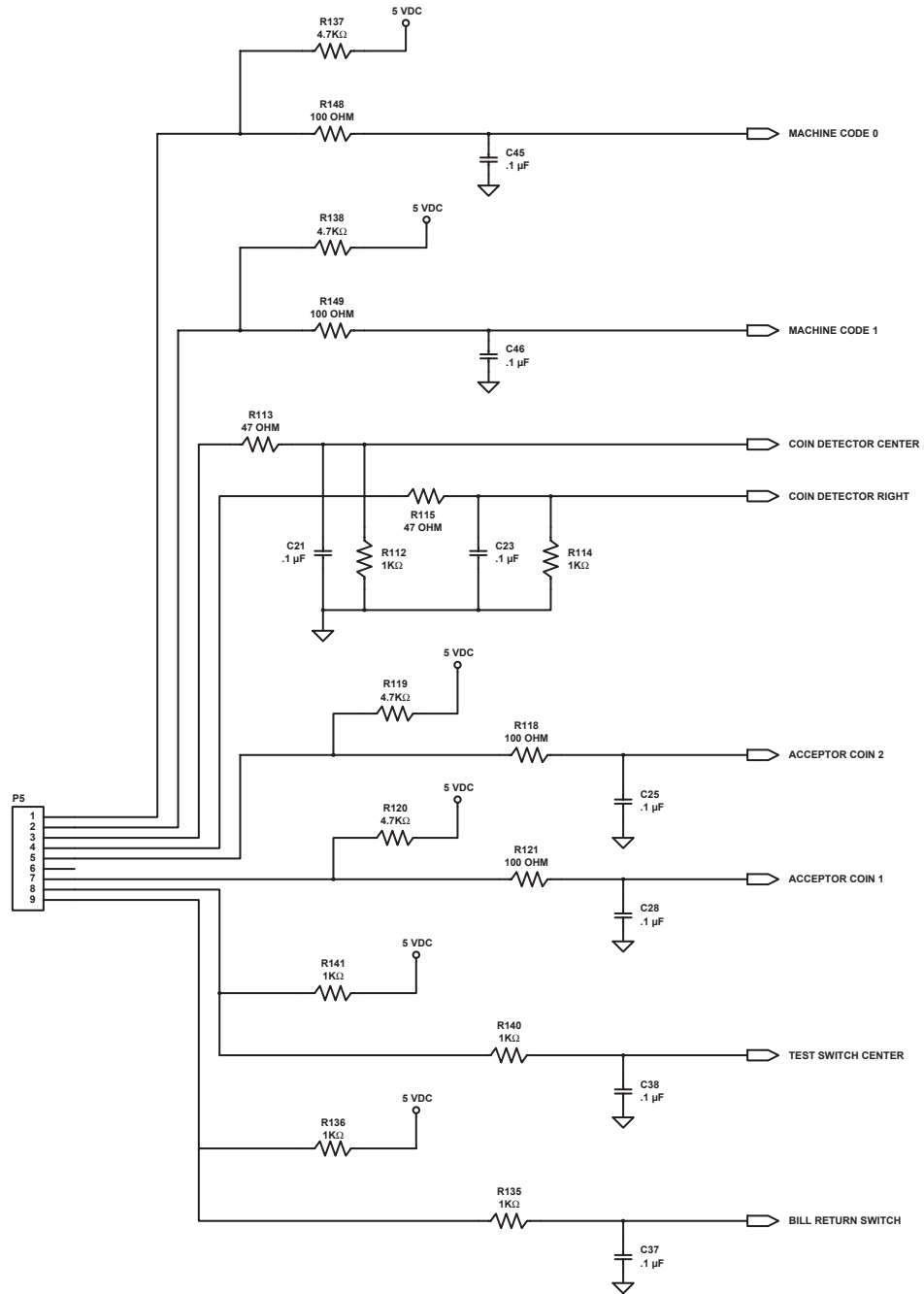


Figure 4-3. Schematic Diagram - Computer Control Board (Sheet 4)

**Computer Control Board 65077401 (Rev. C)**

B1	Battery - Rechargeable			30763103
C1	Capacitor - Ceramic Disc 1 kV 20%	.01 $\mu$ F		70022508
C2	Capacitor - Ceramic Disc 1 kV 20%	.01 $\mu$ F		70022508
C3	Capacitor - Ceramic Disc 1 kV 20%	.01 $\mu$ F		70022508
C4	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C5	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C6	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C7	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C8	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C9	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C10	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C11	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C12	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C13	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C14	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C15	Capacitor - Electrolytic 16 VDC 20%	100 $\mu$ F		70023814
C16	Capacitor - Tantalum 35 VDC 20%	.33 $\mu$ F		70025119
C17	Capacitor - Electrolytic 35 VDC 20%	22 $\mu$ F		70023810
C18	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C19	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C20	Capacitor - Monolithic Ceramic 20%	.22 $\mu$ F		70028510
C21	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C22	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C23	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C24	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C25	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C26	Capacitor - Monolithic Ceramic 10%	18 pF		70028704
C27	Capacitor - Monolithic Ceramic 10%	18 pF		70028704
C28	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C29	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C30	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C31	Capacitor - Monolithic Ceramic 20%	.01 $\mu$ F		70028501
C32	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C33	Capacitor - Monolithic Ceramic 20%	.033 $\mu$ F		70028506
C34	Capacitor - Monolithic Ceramic 20%	.1 $\mu$ F		70028514
C35	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C36	Capacitor - Mylar 10%	22 $\mu$ F		70021553
C37	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C38	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C39	Capacitor - Monolithic Ceramic 10%	.01 $\mu$ F		70028636
C40	Capacitor - Monolithic Ceramic 10%	.01 $\mu$ F		70028636
C41	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C42	Capacitor - Monolithic Ceramic	.1 $\mu$ F		70028511
C43	Capacitor - Monolithic Ceramic 10%	.01 $\mu$ F		70028636
C44	Capacitor - Monolithic Ceramic 10%	.01 $\mu$ F		70028636

C45	Capacitor - Monolithic Ceramic	.1 $\mu$ F	70028511
C46	Capacitor - Monolithic Ceramic	.1 $\mu$ F	70028511
C47	Capacitor - Monolithic Ceramic 20%	.1 $\mu$ F	70028514
C48	Capacitor - Monolithic Ceramic 20%	.033 $\mu$ F	70028506
C49	Capacitor - Tantalum	47 pF	70025102
C50	Capacitor - Tantalum	47 pF	70025102
C51	Capacitor - Electrolytic 35 VDC 20%	47 pF	70023812
C52	Capacitor - Monolithic Ceramic 20%	.1 $\mu$ F	70028514
D1	Diode - Zener 15V 1W 5%	1N4744A	70035531
D2	Diode - Silicon	1N4004	70035005
D3	Diode - Zener 6.2V 1W 5%	1N4735A	70035508
D4	Diode - Zener 5.6V 1W 5%	1N4734A	70035507
D5	Diode - Silicon	1N4004	70035005
D6	Diode - Silicon	1N4004	70035005
D7	Diode - Silicon	1N4004	70035005
D8	Diode - Silicon	1N4004	70035005
D9	Diode - Silicon	1N4148	70035012
D10	Diode - Silicon	1N4148	70035012
D11	Diode - Silicon	1N4148	70035012
D12	Diode - Silicon	1N4148	70035012
DS1	Display - Vacuum Fluorescent	16 Char.	30933202
J1	Jumper		00503200
K1	Relay - DPDT		70042405
P1	Header - Polarized .156RT Angle	12 Position	70076012
P2	Header - Polarized .156RT Angle	14 Position	70076014
P3	Header - Polarized .156RT Angle	8 Position	70076008
P4	Header - Polarized .156RT Angle	15 Position	70076015
P5	Header - Polarized .156RT Angle	9 Position	70076009
P6	Header - Polarized	4 Position	70075004
Q1	Thyristor - Triac	T2500D	70038102
Q2	Thyristor - Triac	T2500D	70038102
Q3	Thyristor - Triac	T2500D	70038102
Q4	Transistor - Silicon Darlington		See NOTE 4
Q5	Transistor - Silicon Darlington	TIP115	70030805
Q6	Transistor - Silicon Darlington	TIP102	70030808
Q7	Transistor - Silicon Darlington	TIP102	70030808
Q8	Transistor - Silicon Darlington	TIP102	70030808
Q9	Transistor - Switching NPN	2N4124	70031301
Q10	Transistor - Silicon PNP	MPSA56	70030104
Q11	Transistor - Silicon PNP	MPSA56	70030104



**Computer Control Board 65077450 (continued)**

Q12	Transistor - Silicon PNP	MPSA56	70030104
Q13	Transistor - Silicon PNP		See NOTE 3
Q14	Transistor - Silicon NPN	MPS6521	70030007
Q15	Transistor - Silicon PNP	MPSA56	70030104
Q16	Transistor - Silicon NPN	MPS6521	70030007
Q17	Transistor - Silicon NPN	MPS6521	70030007
Q18	Transistor - Silicon NPN	MPS6521	70030007
Q19	Transistor - Silicon NPN	MPS6521	70030007
Q20	Transistor - Silicon NPN	MPS6521	70030007
R1	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R2	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R3	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R4	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R5	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R6	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R7	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R8	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R9	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R10	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R11	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R12	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R13	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R14	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R15	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R16	Resistor - Carbon Film 1/8W 5%	330 $\Omega$	79905331
R17	Resistor - Carbon Film 1/4W 5%	2.2 k $\Omega$	79901222
R18	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R19	Resistor - Carbon Film 1/4W 5%	2.2 k $\Omega$	79901222
R20	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R21	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R22	Resistor - Carbon Film 1/4W 5%	2.2 k $\Omega$	79901222
R23	Resistor - Metal Film 1/2W 5%	150 $\Omega$	79904151
R24	Resistor - Carbon Film 1/4W 5%	220 $\Omega$	79901221
R25	Resistor - Carbon Film 1/4W 5%	220 $\Omega$	79901221
R26	Resistor - Carbon Film 1/4W 5%	220 $\Omega$	79901221
R27	Resistor - Carbon Film 1/4W 5%	1.5 k $\Omega$	79901152
R28	Resistor - Metal Film 1/2W 5%	150 $\Omega$	79904151
R29	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R30	Resistor - Carbon Film 1/4W 5%	1.5 k $\Omega$	79901152
R31	Resistor - Metal Film 1/2W 5%	150 $\Omega$	79904151
R32	Resistor - Carbon Film 1/4W 5%	1.5 k $\Omega$	79901152
R33	Resistor - Wirewound 2W 10%	330 $\Omega$	79920331
R34	Resistor - Wirewound 2W 10%	470 $\Omega$	79920471
R35	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R36	Resistor - Carbon Film 1/8W 5%	220 k $\Omega$	79905224

R37	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R38	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R39	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R40	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R41	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R42	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R43	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R44	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R45	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R46	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R47	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R48	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R49	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R50	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R51	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R52	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R53	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R54	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R55	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R56	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R57	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R58	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R59	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R60	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R61	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R62	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R63	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R64	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R65	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R66	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R67	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R68	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R69	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R70	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R71	Resistor - Carbon Film	1/8W	5%	220 k $\Omega$	79905224
R72	Resistor - Carbon Film	1/4W	5%	820 k $\Omega$	79901821
R73	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R74	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R75	Resistor - Carbon Film	1/4W	5%	1 k $\Omega$	79901102
R76	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R77	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R78	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R79	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R80	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103
R81	Resistor - Carbon Film	1/4W	5%	100 $\Omega$	79901101
R82	Resistor - Carbon Film	1/4W	5%	10 k $\Omega$	79901103

**Computer Control Board 65077450 (continued)**

R83	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R84	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R85	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R86	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R87	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R88	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R89	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R90	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R91	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R92	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R93	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R94	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R95	Resistor - Carbon Film 1/4W 5%	330 $\Omega$	79901331
R96	Resistor - Carbon Film 1/4W 5%	150 $\Omega$	79901151
R97	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R98	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R99	Resistor - Carbon Film 1/4W 5%	330 $\Omega$	79901331
R100	Resistor - Carbon Film 1/4W 5%	150 $\Omega$	79901151
R101	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R102	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R103	Resistor - Carbon Film 1/4W 5%	330 $\Omega$	79901331
R104	Resistor - Carbon Film 1/4W 5%	150 $\Omega$	79901151
R105	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R106	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R107	Resistor - Carbon Film 1/4W 5%	2 k $\Omega$	79901202
R108	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R109	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R110	Resistor - Carbon Film 1/4W 5%	47 k $\Omega$	79901470
R111	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R112	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R113	Resistor - Carbon Film 1/4W 5%	47 k $\Omega$	79901470
R114	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R115	Resistor - Carbon Film 1/4W 5%	47 k $\Omega$	79901470
R116	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R117	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R118	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
R119	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R120	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R121	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
R122	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R123	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R124	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
R125	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R126	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R127	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R128	Resistor - Carbon Film 1/4W 5%	100 k $\Omega$	79901104

R129	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R130	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R131	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R132	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
R133	Resistor - Carbon Film 1/4W 5%	100 k $\Omega$	79901104
R134	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R135	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R136	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R137	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R138	Resistor - Carbon Film 1/4W 5%	4.7 k $\Omega$	79901472
R139	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R140	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R141	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R142	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
R143	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
R144	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R145	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R146	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
R147	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
R148	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
R149	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
R150	Resistor - Carbon Film 1/4W 5%	560 $\Omega$	79901561
R151	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R152	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R153	Resistor - Carbon Film 1/4W 5%	2.2 k $\Omega$	79901222
R154	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R155	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R156	Resistor - Carbon Film 1/4W 5%	10 k $\Omega$	79901103
R157	Resistor - Carbon Film 1/4W 5%	8.2 k $\Omega$	79901822
R158	Resistor - Metal Film 1/2W 5%	680 $\Omega$	79904681
R159	Resistor - Carbon Film 1/4W 5%	1 k $\Omega$	79901102
R160	Resistor - Carbon Film 1/4W 5%	100 k $\Omega$	79901104
R161	Resistor - Carbon Film 1/4W 5%	100 $\Omega$	79901101
S1	Switch - Slide Micro Miniature		70045001
S2	Switch - Pushbutton		21773303
S3	Switch - Pushbutton		21773303
S4	Switch - Pushbutton		21773303
S5	Switch - Pushbutton		21773303
S6	Switch - Pushbutton		21773303
U1	I.C. - Display Driver	10937P-50	30800237
U2	Photocoupler - Opto-Triac	3021	70033705
U3	Photocoupler - Opto-Triac	3021	70033705
U4	Photocoupler - Opto-Triac	3021	70033705
U5	I.C. - Octal D Latch	74HCT374	79930374

**Computer Control Board 65077450 (continued)**

U6	I.C. - TTL Hex Buffer O.C.	7407	70036309
U7	I.C. - Darlington Array	ULN2003	70036901
U8	I.C. - Octal Buffer	74HCT244	79930244
U9	I.C. - Octal Transparent Latch	74HCT373	79930373
U10	I.C. - 32K X 8 CMOS RAM	62256	70036619
U11	I.C. - Darlington Array	ULN2003	70036901
U12	I.C. - Quad 2 Input NAND Gate	74HCT00	79930000
U13	I.C. - 1 of 8 Decoder	74HCT138	79930138
U14	I.C. - TTL Hex Inverter O.C.	7406	70036311
U15	I.C. - EEPROM 64X16 Serial	NMC9346N	30800245
U16	I.C. - Transceiver RS-485	75176	70037801
U17	I.C. - Hex Schmitt Trigger Invertor	74HC14	79940014
U18	EPROM Module		See Chart
U19	I.C. - Octal Buffer	74HCT244	79930244
U20	I.C. - Microcomputer	80C196/8097	See NOTE 1
U21	I.C. - Under Voltage Sensing Circuit		30800243
VR1	Voltage Regulator	LM340T5	70036505
Y1	Crystal - Quartz		See NOTE 1

See 65077450 drawing for notes and P/N's.

**EPROM Module Chart**

Computer	EPROM Module
65077450	35147001
65077458	35147011

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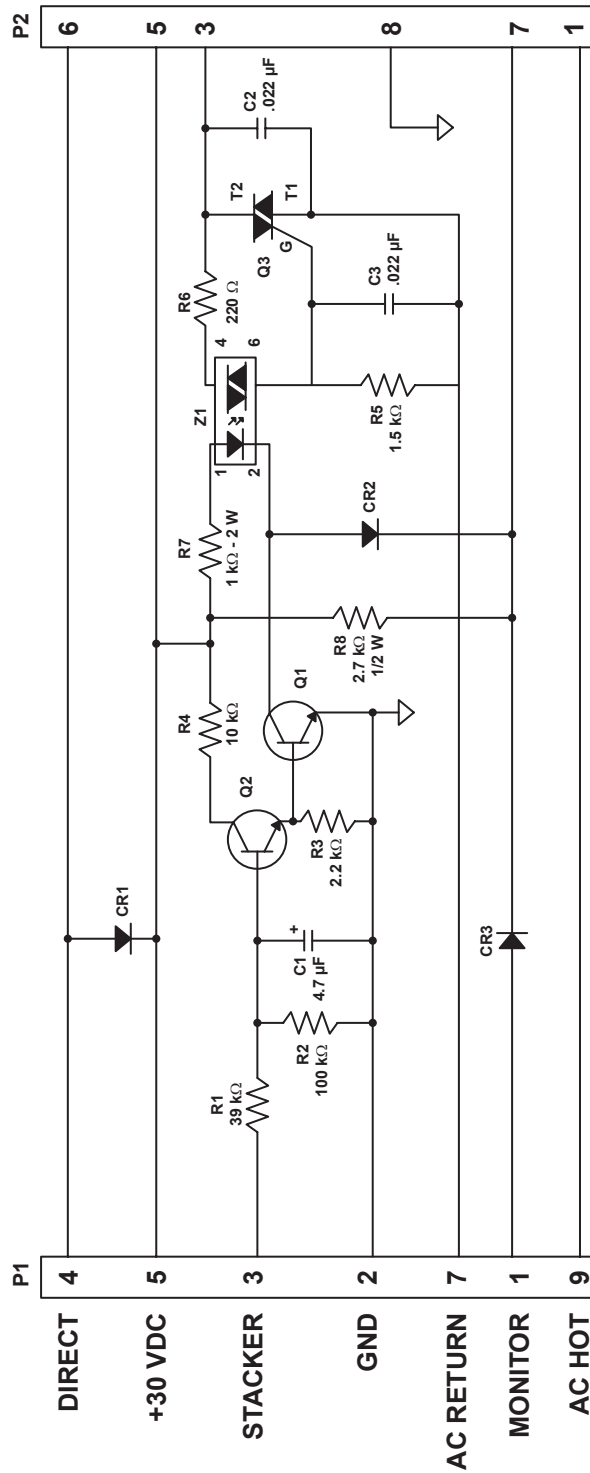


Figure 4-4. Stacker Driver Circuit Board Schematic

**Bill Stacker Driver Circuit Board 65046701 (Rev. L)**

C1	Capacitor - Electrolytic 50 VDC	4.7 $\mu$ F	70023806
C2	Capacitor - Mylar 630 VDC	.022 $\mu$ F	70021609
C3	Capacitor - Mylar 630 VDC	.022 $\mu$ F	70021609
CR1	Diode - Silicon		70035005
CR2	Diode - Silicon		70035007
CR3	Diode - Silicon		70035101
P1	Polarizing Wafer Assembly (90°)	9 Circuit	70076009
P2	Polarizing Wafer Assembly (90°)	8 Circuit	70076008
Q1	Transistor - Silicon (NPN)		70030004
Q2	Transistor - Silicon (NPN)		70030004
Q3	Thyristor - Triac		70033102

**Note: All resistors are ¼ watt 5%, unless otherwise noted.**

R1	Resistor - Carbon	39 k $\Omega$	79901393
R2	Resistor - Carbon	100 k $\Omega$	79901104
R3	Resistor - Carbon	2.2 k $\Omega$	79901222
R4	Resistor - Carbon	10 k $\Omega$	79901103
R5	Resistor - Carbon	1.5 k $\Omega$	79901152
R6	Resistor - Carbon	220 $\Omega$	79901221
R7	Resistor - Carbon	100 k $\Omega$	79901104
R8	Resistor - Carbon 2W 10%	1 k $\Omega$	70012007



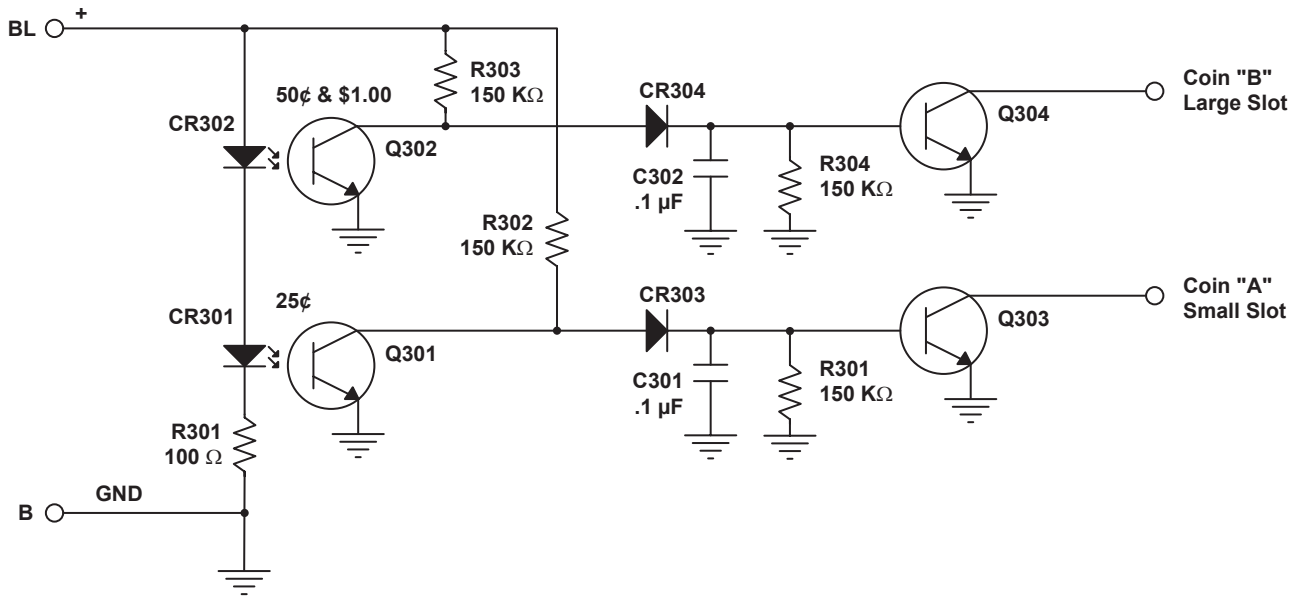


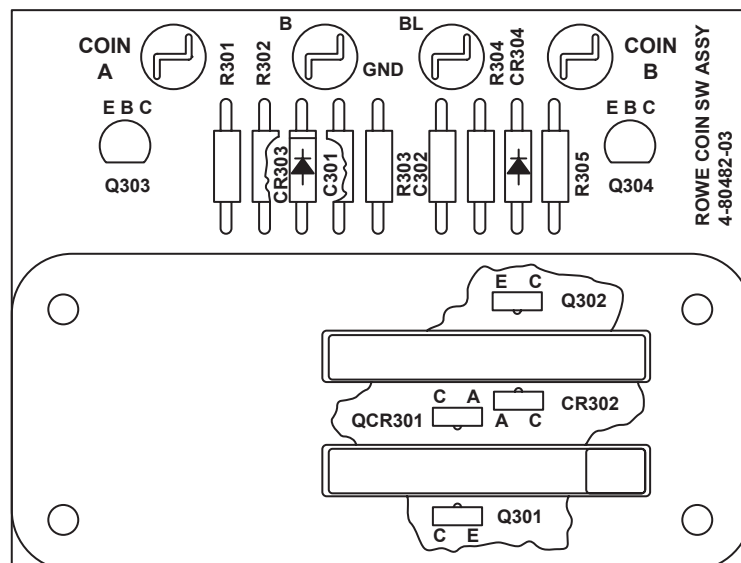
Figure 4-5. Schematic Diagram - Coin Switch (BC-1200 only)

## Coin Switch Circuit Board 45048203 (Rev. L)

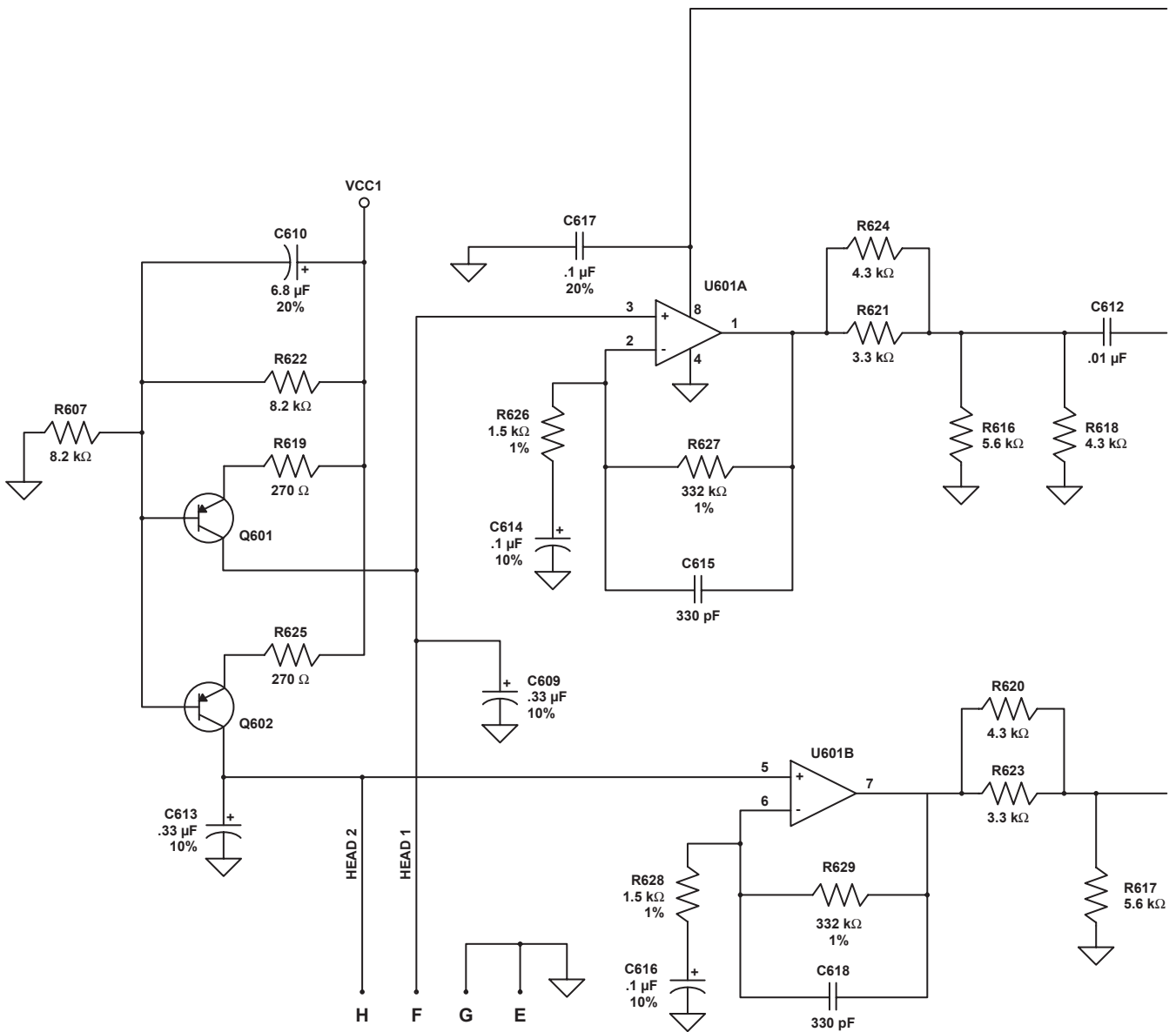
C301	Capacitor - Monolithic	.1 $\mu$ F	70028514
C302	Capacitor - Monolithic	.1 $\mu$ F	70028514
CR301/ Q301	Sensor/LED Pair		70033501
CR302/ Q302	Sensor/LED Pair		70033501
CR303	Diode - Silicon		70035007
CR304	Diode - Silicon		70035007
Q303	Transistor - Silicon (NPN)		70030007
Q304	Transistor - Silicon (NPN)		70030007

**Note: All resistors are 1/4 watt 5%, unless otherwise noted.**

R301	Resistor - Carbon	100 $\Omega$	79901101
R302	Resistor - Carbon	150 $\Omega$	79901154
R303	Resistor - Carbon	150 $\Omega$	79901154
R304	Resistor - Carbon	150 $\Omega$	79901154
R305	Resistor - Carbon	150 $\Omega$	79901154



**Figure 4-6. Circuit Board Layout**



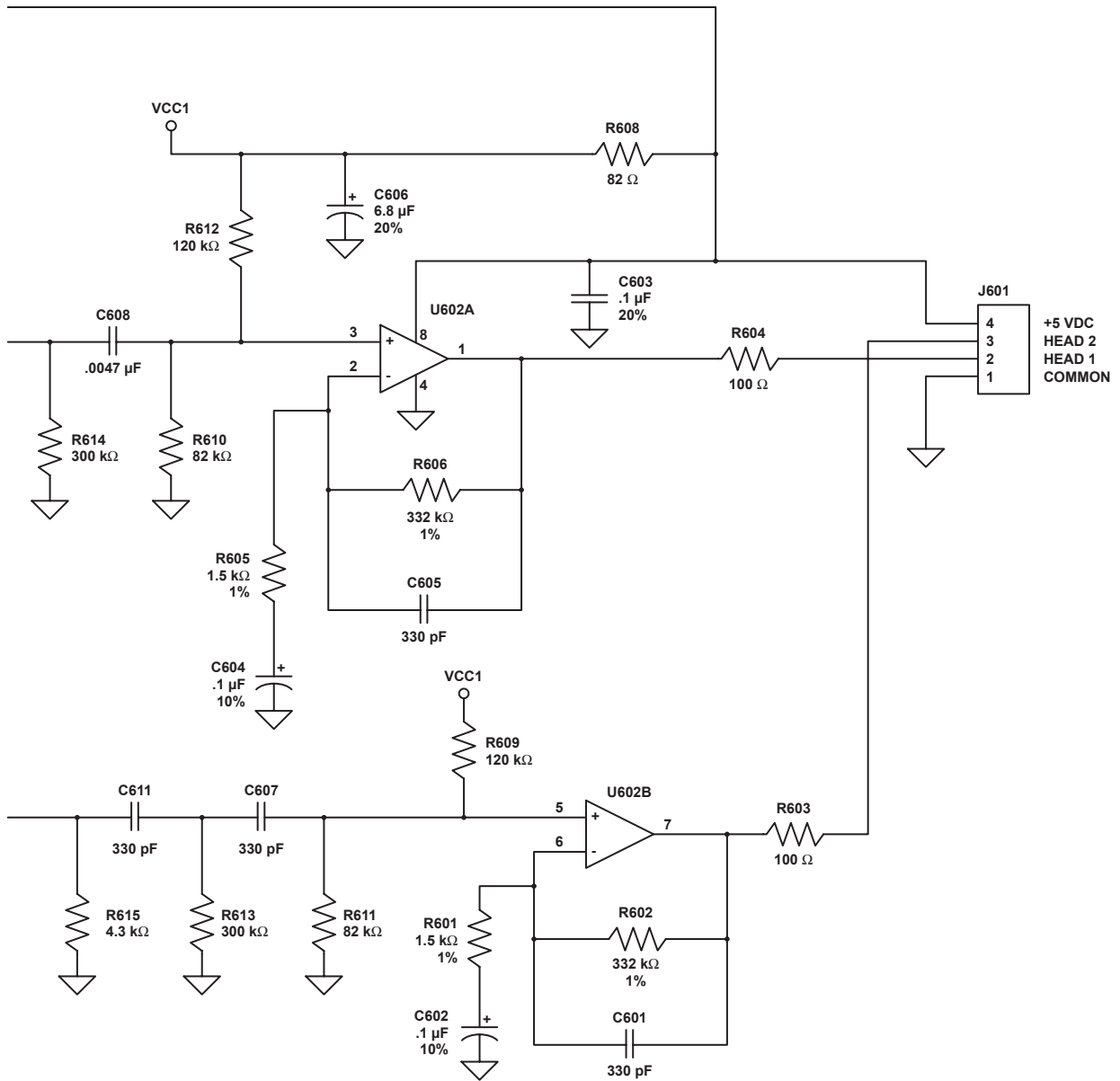


Figure 4-7. Schematic Diagram - Magnetic Amplifier Board

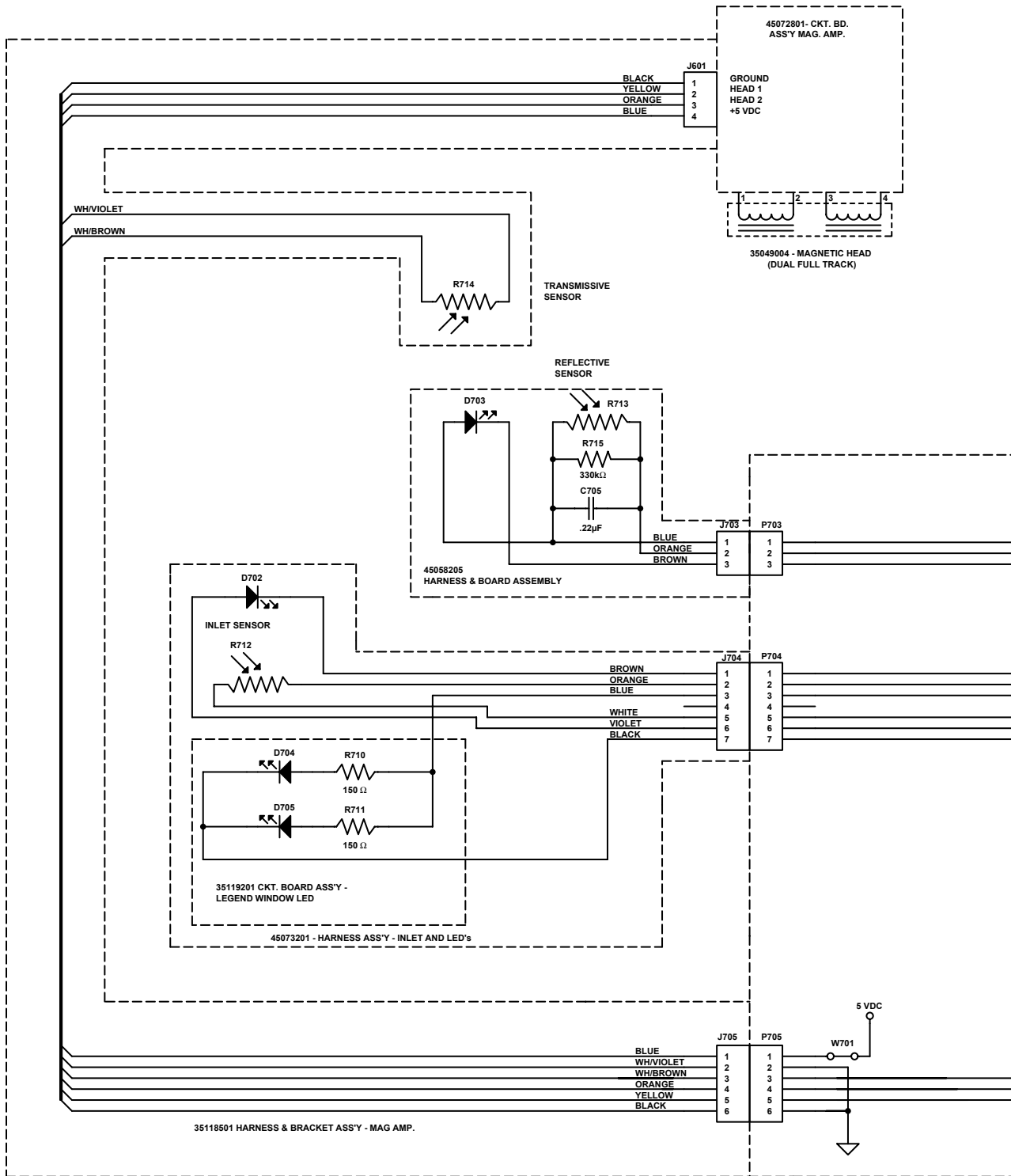
**Magnetic Amplifier Circuit Board 45072801 (Rev. E)****NOTE:**

This components list is intended as a troubleshooting aid only. Rowe does not recommend replacement of any magnetic amplifier circuit board components. Replacing components on this circuit board may damage the magnetic head.

C601	Capacitor - Ceramic 50 VDC 5%	330 pF	70028837
C602	Capacitor - Tantalum 16 VDC 10%	.1 $\mu$ F	70025201
C603	Capacitor - Ceramic 50 VDC 5%	.1 $\mu$ F	70028966
C604	Capacitor - Tantalum 16 VDC 10%	.1 $\mu$ F	70025201
C605	Capacitor - Ceramic 50 VDC 5%	330 pF	70028837
C606	Capacitor - Tantalum 16 VDC 20%	6.8 $\mu$ F	70025203
C607	Capacitor - Ceramic 50 VDC 5%	.0047 $\mu$ F	70025203
C608	Capacitor - Ceramic 50 VDC 5%	.0047 $\mu$ F	70025203
C609	Capacitor - Tantalum 16 VDC 10%	.33 $\mu$ F	70025202
C610	Capacitor - Tantalum 16 VDC 20%	6.8 $\mu$ F	70025203
C611	Capacitor - Ceramic 50 VDC 5%	.01 pF	70028941
C612	Capacitor - Ceramic 50 VDC 5%	.01 pF	70028941
C613	Capacitor - Tantalum 16 VDC 10%	.33 $\mu$ F	70025202
C614	Capacitor - Tantalum 16 VDC 10%	.1 $\mu$ F	70025201
C615	Capacitor - Ceramic 50 VDC 5%	330 pF	70028837
C616	Capacitor - Tantalum 16 VDC 10%	.1 $\mu$ F	70025201
C617	Capacitor - Ceramic 50 VDC 5%	.1 $\mu$ F	70028966
C618	Capacitor - Ceramic 50 VDC 5%	330 pF	70028837
J601	Polarizing Wafer (90°)	4 Position	70074404
Q601	Transistor - PNP		70030106
Q602	Transistor - PNP		70030106

**Note: All resistors are ¼ watt 5%, unless otherwise noted.**

R601	Resistor - Carbon Film 1/8 W 1%	1.5 kΩ	799101501
R602	Resistor - Carbon Film 1/8 W 1%	332 kΩ	799103323
R603	Resistor - Carbon Film	100 Ω	79911101
R604	Resistor - Carbon Film	100 Ω	79911101
R605	Resistor - Carbon Film 1/8 W 1%	1.5 kΩ	799101501
R606	Resistor - Carbon Film 1/8 W 1%	332 kΩ	799103323
R607	Resistor - Carbon Film	8.2 kΩ	79911822
R608	Resistor - Carbon Film	82 Ω	79911820
R609	Resistor - Carbon Film	120 kΩ	79911124
R610	Resistor - Carbon Film	82 Ω	79911823
R611	Resistor - Carbon Film	82 Ω	79911823
R612	Resistor - Carbon Film	120 kΩ	79911124
R613	Resistor - Carbon Film	300 kΩ	79911304
R614	Resistor - Carbon Film	300 kΩ	79911304
R615	Not Used		
R616	Resistor - Carbon Film	5.6 kΩ	79911562
R617	Resistor - Carbon Film	5.6 kΩ	79911562
R618	Resistor - Carbon Film	4.3 kΩ	79911432
R619	Resistor - Carbon Film	270 Ω	79911271
R620	Resistor - Carbon Film	4.3 kΩ	79911432
R621	Resistor - Carbon Film	3.3 kΩ	79911332
R622	Resistor - Carbon Film	8.2 kΩ	79911822
R623	Resistor - Carbon Film	3.3 kΩ	79911332
R624	Resistor - Carbon Film	4.3 kΩ	79911432
R625	Resistor - Carbon Film	270 Ω	79911271
R626	Resistor - Carbon Film 1/8 W 1%	1.5 kΩ	799101501
R627	Resistor - Carbon Film 1/8 W 1%	332 kΩ	799103323
R628	Resistor - Carbon Film 1/8 W 1%	1.5 kΩ	799101501
R629	Resistor - Carbon Film 1/8 W 1%	332 kΩ	799103323
U601	IC - Dual OP Amp	LM358	30800244
U602	IC - Dual OP Amp	LM358	30800244



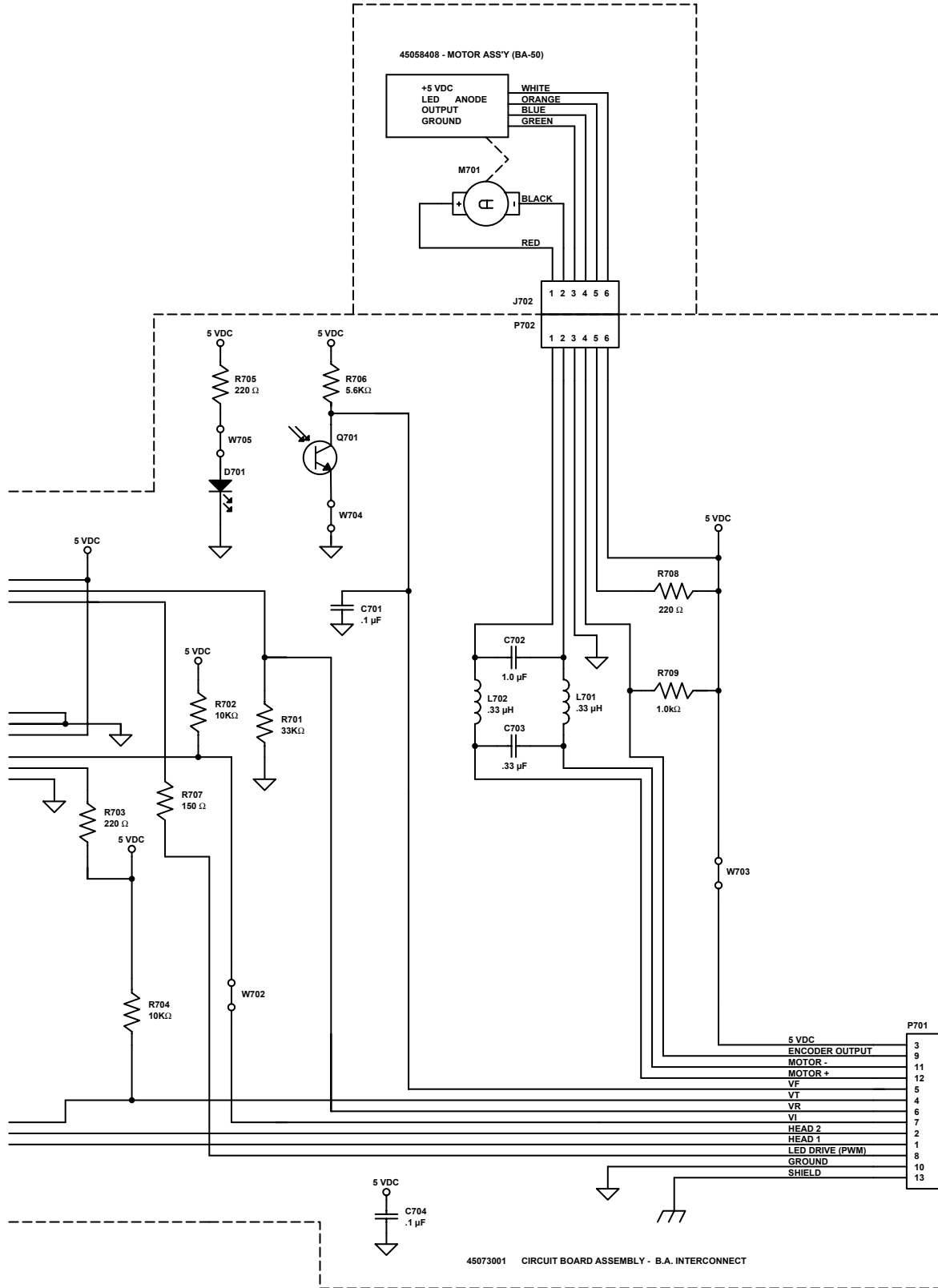


Figure 4-8. Schematic Diagram - BA-50 Transport

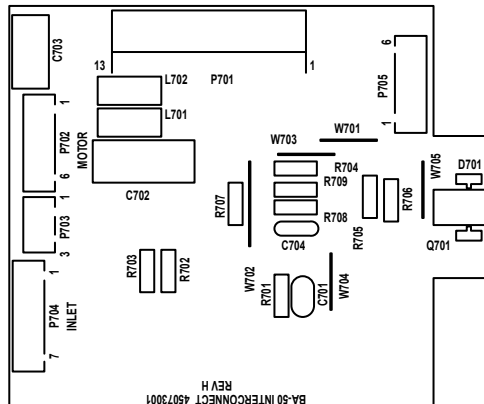


### Interconnect Circuit Board Assembly - 45073001 (Rev. D)

C701	Capacitor - Ceramic 50 VDC (+80%, -20%)	.1 $\mu$ F	70028511
C702	Capacitor - Mylar 100 VDC $\pm$ 10%	1.0 $\mu$ F	70021561
C703	Capacitor - Mylar 100 VDC $\pm$ 10%	.33 $\mu$ F	70021555
C704	Capacitor - Ceramic 50 VDC (+80%, -20%)	.1 $\mu$ F	70028511
D701	Emitter - Infrared (Side Looking)		70033504
L701	Inductor RF $\pm$ 20%	.33 $\mu$ H	70041502
L702	Inductor RF $\pm$ 20%	.33 $\mu$ H	70041502
P701	Header - 90 Degree	13 Pin	70074413
P802	Header - Straight	6 Pin	70074306
P803	Header - Straight	3 Pin	70074303
P804	Header - Straight	7 Pin	70074307
P805	Header - Straight	6 Pin	70074306
Q701	Detector - Infrared		70033505

**Note: All resistors are 1/4 watt 5%, unless otherwise noted.**

R701	Resistor - Carbon Film	33 k $\Omega$	79901333
R702	Resistor - Carbon Film	10 $\Omega$	79901103
R703	Resistor - Carbon Film	220 $\Omega$	79901221
R704	Resistor - Carbon Film	10 k $\Omega$	79901103
R705	Resistor - Carbon Film	220 $\Omega$	79901221
R706	Resistor - Carbon Film	5.6 k $\Omega$	79901562
R707	Resistor - Carbon Film	150 $\Omega$	79901151
R708	Resistor - Carbon Film	220 $\Omega$	79901221
R709	Resistor - Carbon Film	1.0 k $\Omega$	79901102
W701	Wire - Bare		00503200
W702	Wire - Bare		00503200
W703	Wire - Bare		00503200
W704	Wire - Bare		00503200
W705	Wire - Bare		00503200



**Figure 4-9. Interconnect Circuit Board Assembly**

## Section 5: Additional Information

### HARNESS COLOR CODING

Harness wiring in the BC-1200/1400 is color coded according to function. To check wiring in the machine, find the function you want in the chart below and not the wire color associated with this function. Then, check this color wiring to find the source of the problem. The wiring diagram will tell you where the wires are routed.

**FUNCTIONS**

**WIRE COLOR**

**SUPPLY VOLTAGES<sup>1</sup>**

120 VAC Hot	Black/White
120 AC Common	White
+40 VDC Sensed	Violet/Orange
+30 VDC	Red
+5 VDC to out of service lamp	Brown/Yellow
+12 VDC	Violet
+8 VDC	Slate
+5 VDC	Blue

**GROUNDS**

Earth (Fault) Ground	Green/Yellow
High Current Ground	Black
Low Current Ground	Black

**SPECIAL LINES**

**Transport:**

Magnetic Head	White/Brown & White/Green
VF Cell	Brown
VI Cell	Yellow
VT Cell	White
VR Cell	Orange
Transport Motor	Shielded Cable

**Bill Stacker:**

Stacker Drive Signal	Green/Orange
Stacker Monitor	Green/White
Separator Solenoid	Blue/Yellow

<sup>1</sup> Inside the power control center, as voltage lines pass through the circuit breakers, wire colors change for clarity. See the power control center power supply schematic for these wire colors.

FUNCTIONS	WIRE COLOR
<b>Coin Switch Assembly:</b>	
Coin Lockout Coil	White/Blue
25¢ Coin Switch	White/Brown
50¢/\$1.00 Coin Switch	White/Yellow
<b>Dispenser:</b>	
Left Coin Detector	Orange/Green
Center Coin Detector	Orange/Brown
Right Coin Detector	Orange/Black
Left Hopper Motor	Black/Red
Center Hopper Motor	Brown
Right Hopper Motor	Black/Yellow
Left Vend Solenoid	Yellow/Brown
Center Vend Solenoid	Red/Black
Right Vend Solenoid	Blue/White
<b>Bill Return Switch:</b>	Red/Green
<b>Out of Service Lamp:</b>	Brown/Yellow

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# INTRODUCTION

This parts catalog lists replacement parts for the BC-1200 and the BC-1400. The purpose of this parts catalog is to locate and identify replaceable components and supply information on how to order them.

## Catalog Description

This catalog is divided into major sections labeled with figure numbers, which correspond to the illustrations used. Some assemblies require more than one illustration to identify the parts. Each page has a sheet number to identify the sheet as part of that assembly's parts list.

Replacing parts that are welded or riveted onto an assembly is normally impractical. Therefore, replacement parts are not listed for these items. The assembly containing the welded or riveted part should be replaced.

## Parts List Description

The parts list contains four columns:

- **Figure, Sheet, and Index Number** — The first entry in this column is the figure number of the corresponding illustration. An index number, when listed, corresponds to the index number appearing on the illustration. Index numbers are not used when items are listed for reference purposes only or when the item listed is an alternate part.
- **Rowe Part Number** — This column lists the part number to use when ordering replacement parts or making inquiries.
- **Description** — This column gives a word description of each part or assembly. Each item is indented to show its relationship to the next higher assembly.
- **Qty** — This column contains the part quantity used in the assembly. When a figure describes more than one model of an assembly, the "Qty" column is divided to show each model.

## Ordering Replacement Parts

All replacement parts must be ordered directly from an Authorized Rowe® Distributor.

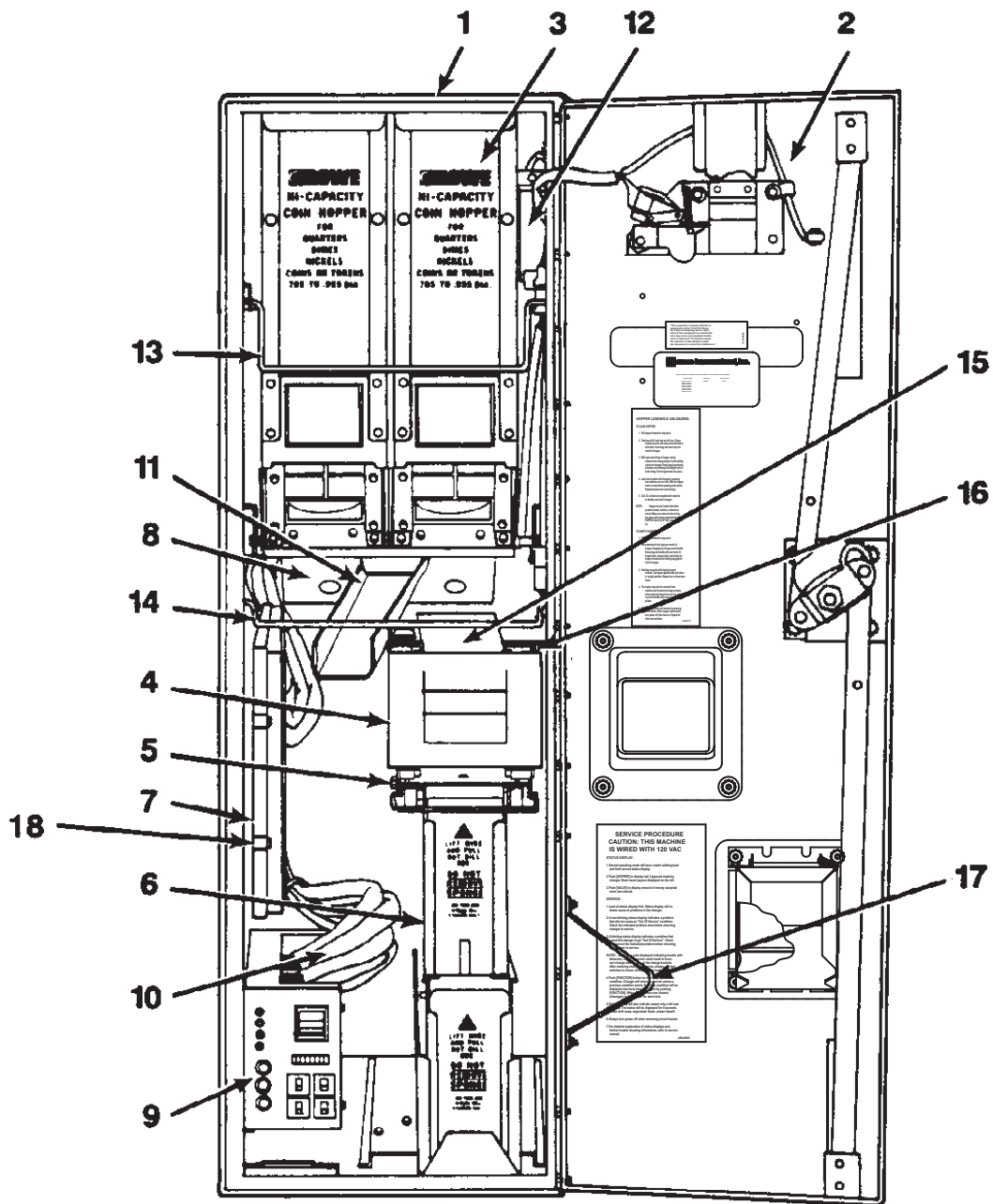
Once the replacement item has been determined, complete a Standard Parts Order Form (available from your Rowe® Distributor at no charge). Very often, parts orders are delayed because of inadequate or incomplete parts order forms. To enable prompt delivery, always specify the following information:

- Part Number and Description (indicate color, if applicable)
- Quantity Required
- Machine Model and Serial Number
- Complete Shipping Address, including the ZIP code
- Shipping Instructions must be supplied. If the shipping method is Parcel Post, Air Parcel Post, United Parcel Service, or Air UPS, and the packages may exceed the size and weight limits of these services, indicate an alternate shipping method.

If the shipment must be delivered as fast as possible, specify "Fastest Way". Rowe® will select the carrier for orders that justify shipment by truck.



Figure 6-1. BC-1200 Bill and Changer Assembly

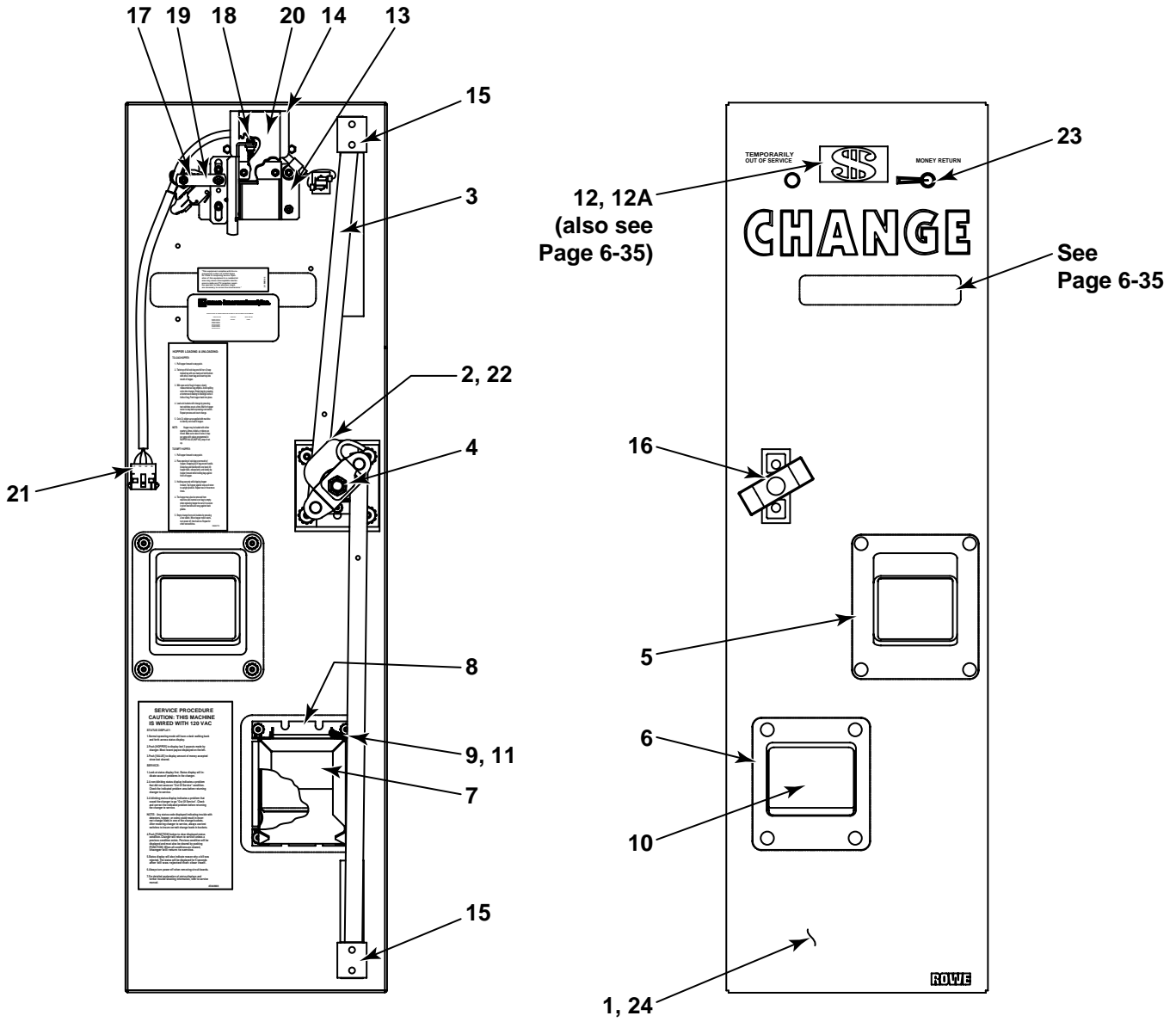


**Figure 6-1. BC-1200 Bill and Changer Assembly**

Ref.	Part No.	Description	Qty
	Ref.	BC-1200 Bill and Coin Changer Assembly	
		• BC-1200 Cabinet Assembly .....	1
1	65037815	• Cabinet Weld Assembly (Charcoal Brown) .....	1
	65037808	• Cabinet Weld Assembly (White)	
	65037809	• Cabinet Weld Assembly (IBM Black)	
2	Ref.	• Door Assembly (see Figure 6-2) .....	1
3	Ref.	• Hi-Capacity Hopper Assembly (see Figure 6-10) .....	As Ordered
	65027608	•• Nickel, Dime, and Quarter Hopper .....	As Ordered
	65027609	•• Quarter, Dollar Coin, and Token Hopper .....	3
4	65068501	• Bill Acceptor Transport Assembly (see Figure 6-5) .....	1
5	65046804	• Dual Bill Stacker Assembly (see Figure 6-13A) .....	1
6	45034603	• Bill Box Assembly .....	2
7	65069059	• Control Computer Assembly (see Figure 6-7) .....	1
	27023902	• Hopper Brush (not shown) .....	1
	47002004	•• Label - "Pays \$ Coins" .....	1
	25238802	•• Service Manual .....	1
	25168801	•• Shoulder Screw (1/4-20 SQHD) .....	4
	89954004	•• Drive Screw (#10 x 1/4) .....	1
	25030901	•• Warning Label .....	4
	70121408	•• Spacer .....	4
	87835700	•• Hex MS Nut (1/4-20) .....	4
	25070232	•• Bill Insertion Label (\$1 & \$5 <sup>1</sup> ) .....	1
	25070233	•• Bill Insertion Label (\$1, 5, 10 <sup>1</sup> ) .....	1
	25070234	•• Bill Insertion Label (\$1, 5, 10, 20 <sup>1</sup> ) .....	1
	25165802	•• Hopper Identification Label .....	1
	25254801	• Cleaning Strips .....	1
8	65058011	• Coin Dispenser (see Figure 6-8) .....	1
9	45078006	• Power Control Center with Bracket (see Figure 6-6) .....	1
10	65067905	• Main Harness Assembly .....	1
11	45087501	• Chute Assembly - Coin Cup .....	1
12	25228001	• Junction Box and Filter Assembly .....	1
	25175801	• Junction Box Cover Assembly .....	1
	25152704	• Filter and Lug Assembly .....	1
13	25164601	• Hopper Retainer Bail .....	1
14	25166502	• Stop Rod .....	1
15	25166602	• Coin Spill Shield .....	1
16	35023307	• Bill Acceptor Mounting Bracket .....	2
17	25111202	• Push Bar (Cash Box) .....	1
18	45060803	• Guide Plate - Control Computer .....	1
	70093403	• Cable Clamp (1") .....	4

<sup>1</sup> For additional labels, see the list of accessories at the end of this parts catalog.

Figure 6-2. BC-1200 Front Door Assembly

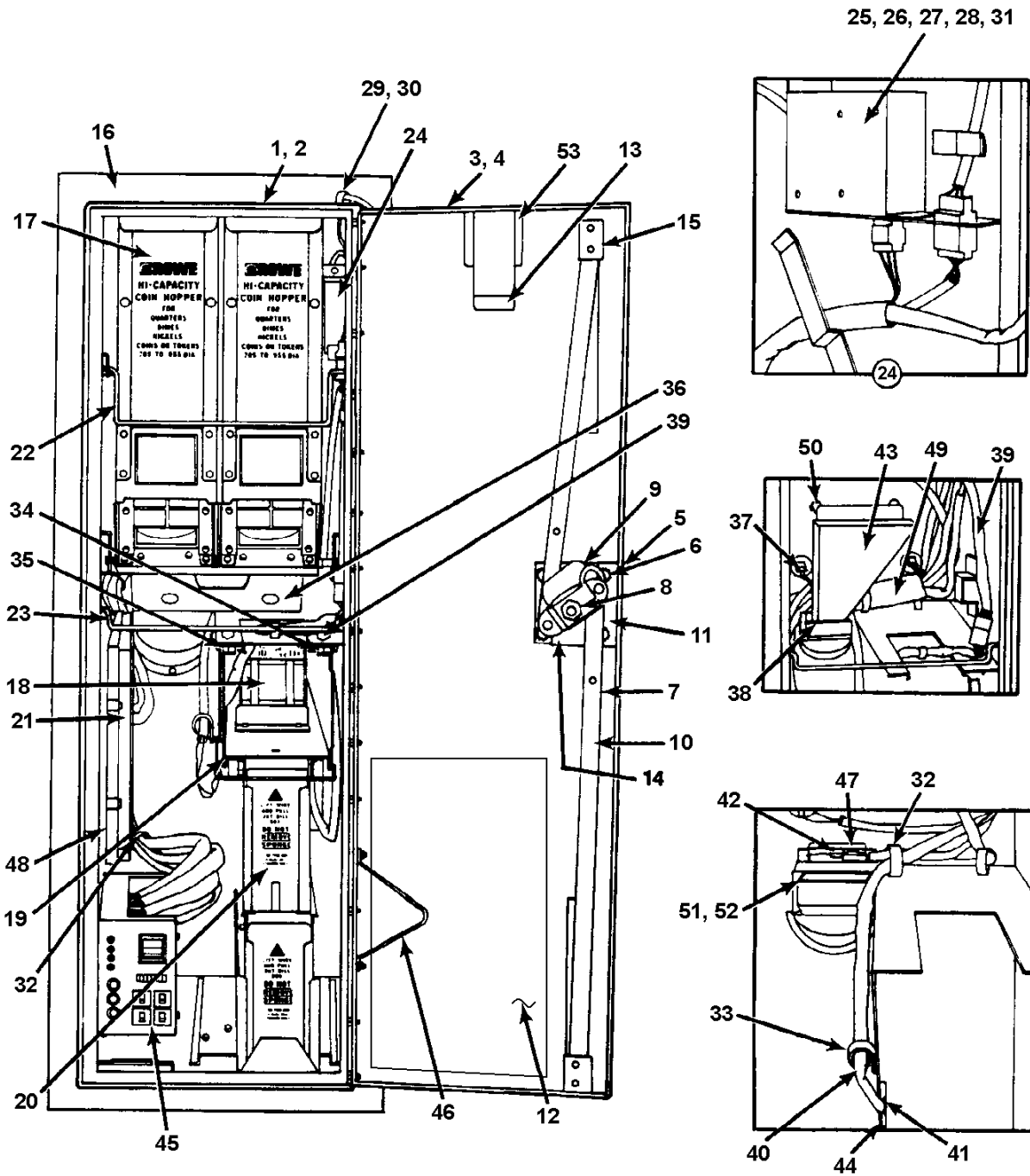


**Figure 6-2. BC-1200 Front Door Assembly**

Ref.	Part No.	Description	Qty
Ref.		Door Assembly (No Coin Acceptor - see the list of accessories for coin acceptor kits)	
<b>Note:</b> Use the following numbers to order the complete door assembly with hardware (listed door color/decals color). For Decal part numbers, refer to the Accessory List at the end of the section.			
		<b>Door Color/Decal Color</b>	
	65071321	• Black/Black	
	65071352	• Charcoal Brown/Brown	
	65071353	• Blue/Blue	
<b>Note:</b> Use the following numbers to order the painted door only (without hardware or decals).			
	65071207	• • Door Weld Assembly (Black)	
	65071208	• • Door Weld Assembly (Charcoal Brown)	
	65071209	• • Door Weld Assembly (Blue)	
1	65071206	• Door Weld Assembly (Black) without 35085101 Bracket	1
2	25164401	• Spring - Strap	1
3	35027708	• Lockbar Assembly	1
4	21357815	• Nut - Elastic Stop (1/2-13 UNC)	1
5	45087101	• Bill Acceptor Trim Plate	1
	70134212	• • Carriage Bolt	4
	87845700	• • Hex Nut	4
	70121408	• • Spacer	4
6	45087201	• Coin Chute Trim Plate	1
	70134121	• • Carriage Bolt	4
	87845700	• • Hex Nut	4
7	45085601	• Change Cup Assembly (Coins)	1
8	35121501	• Mounting Bracket (Coin Cup)	2
9	25181701	• Tension Spring	1
10	35116901	• Change Cup Door	1
11	25239701	• Door Shaft (Coin Cup)	1
12	35038204	• Coin Inlet Trim (No Coins)	1
	25211713	• Decorative Decal	1
12A	35038203	• Coin Inlet Trim (w/ Coins)	A/R
13	45112101	• Chute Assembly - Coin Inlet	1
14	35085101	• Hopper Hold-Down Bracket	1
15	25224901	• Flat Spring (Lockbar)	2
16	45062002	• T-Handle Assembly (Tubular or Medeco) w/o Lock Cylinder & Key	1
17	25255801	• Switch (NC)	1
18*	21083601	• Tension Spring	1
19	25251203	• Pivot Link	1
20	25190002	• Sponge Rubber Pad	1
21	35032009	• Harness Assembly - Empty Light	1
22	25064401	• Tension Spring	1
23	25192801	• Handle & Shaft Assembly	1
	70146008	Nyliner Bearing	2
	25092909	Reject Lever Bearing	1
Service Door Assembly			
24	27045701	BC-1200 Black Service Door Assembly (includes 35085101 Bracket)	

\* See also Figure 6-14 for more detail on the Money Return Lever Assembly.

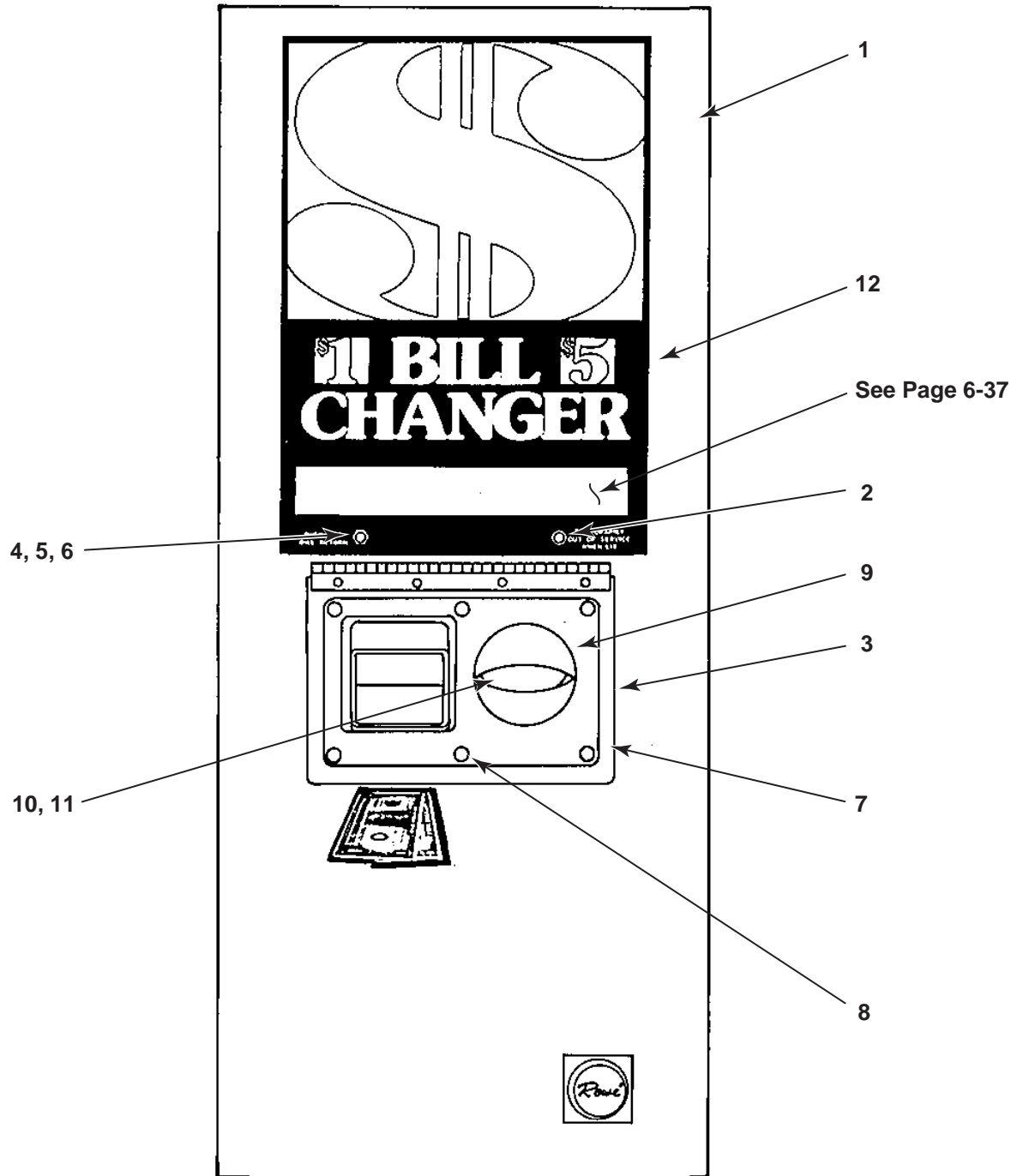
Figure 6-3. BC-1400 Bill Changer Assembly



**Figure 6-3. BC-1400 Bill Changer Assembly**

Ref.	Part No.	Description	Qty
1	52078020	BC-1400 Bill Changer Assembly	1
2	65037816	• Cabinet Weld Assembly (Charcoal Brown)	1
3	65071330	• Door Assembly (Charcoal Brown)	1
4	65061806	• • Door Weld Assembly w/Lock Cylinder & Key (Charcoal Brown)	1
5	45062001	• • T-Handle Assembly (visible from front of door)	1
6	70134103	• • Carriage Bolt (10-24 x 3/4)	2
7	25064401	• • Tension Spring	1
8	21357815	• • 1/2-13 Hex Lock Nut	1
9	25164401	• • Spring Strap	1
10	35027708	• • Lockbar Assembly	1
	35025506	• • Lock Lever and Bracket Assembly	1
11	35068302	• • Lock Plate	1
12	45048909	• • Service Label	1
13	25190002	• • Sponge Rubber Pad	1
14	25199101	• • Lockbar Stop Bracket	1
15	25224901	• • Lockbar Flat Spring	2
16	65064403	• • Front Panel Assembly (see Figure 6-4)	1
17	Ref.	• Hi-Capacity Hopper Assembly (see Figure 6-10)	2
	65027608	• • • Nickel, Dime, and Quarter Hopper	2
	65027609	• • • Quarter, Dollar Coin, and Token Hopper	2
18	65068501	• • Bill Acceptor Transport Assembly (see Figure 6-5)	1
19	65046808	• • Dual Bill Stacker Assembly (see Figure 6-13B)	1
20	45034603	• • Bill Box Assembly	2
21	65069059	• Control Computer Assembly (see Figure 6-7)	1
22	25164606	• Hopper Retainer Bail	1
23	25166502	• Stop Rod	1
24	25228001	• Junction Box and Filter Assembly	1
	25175801	• • Junction Box Cover Assembly	
25	70092108	• • Solderless Connector	2
26	70124004	• • Cup Washer	1
27	70134112	• • Special Ground Screw (Green)	1
28	25152704	• • Filter and Lug Assembly	1
29	25078407	• • Cord and Plug Assembly	1
30	70232302	• • Strain Relief (Right Angle)	1
31	70232203	• • Strain Relief	1
32	70093403	• Cable Clamp (1")	1
33	70093402	• Cable Clamp (13/16")	1
34	35085701	• Guide Rail Assembly (LH)	2
35	35085801	• Guide Rail Assembly (RH)	1
36	65058012	• Coin Dispenser Assembly (BC-1400) (see Figure 6-8)	1
37	35120701	• • Empty Light Harness Assembly	1
38	35110901	• Chute Overlay Bracket	1
39	35118801	• Transport Harness Assembly	1
40	45070302	• Heater Harness and Plug Assembly	1
41	25234001	• • Flexible Heater	1
42	25234102	• Thermostat Assembly	1
43	45060002	• Coin Chute Assembly	1
44	35099801	• Holder and Stud Assembly	1
45	45078006	• Power Control Center with Bracket (see Figure 6-6)	1
47	25111202	• • Cash Box Push Bar	1
47	35111403	• • Thermostat Mounting Bracket	1
48	45060803	• • Guide Plate (Control Computer)	1
49	65067905	• • Main Harness Assembly	1
50	25112901	• • Support Post	2
51	35121601	• • Coin Cup Cover	1
52	35091001	• • Support & Chute Assembly	1
	25231313	• • Accessories Bag Assembly	1
	25030901	• • • Warning Label	1
	70121408	• • • Spacer	1
	25070232	• • • Bill Insertion Label (\$1 & \$5)	1
	25070233	• • • Bill Insertion Label (\$1, \$5, & \$10 BL)	1
	25070234	• • • Bill Insertion Label (\$1, \$5, \$10, and \$20)	1
	25165802	• • • Hopper Identification Label	1
	25239601	• • • Decal - \$10 (BC-1400 only)	1
	25239602	• • • Decal - \$10 & \$20 (BC-1400 only)	1
	47002004	• • • Label (Pays \$1 Coins)	1
	27023902	• • • Hopper Brush	1
	25254801	• • • Bill Transport Cleaning Strip	1
	25242117	• • • Schematic Addendum	1
53	35085101	• Hopper Hold-Down Bracket	1

Figure 6-4. BC-1400 Front Panel



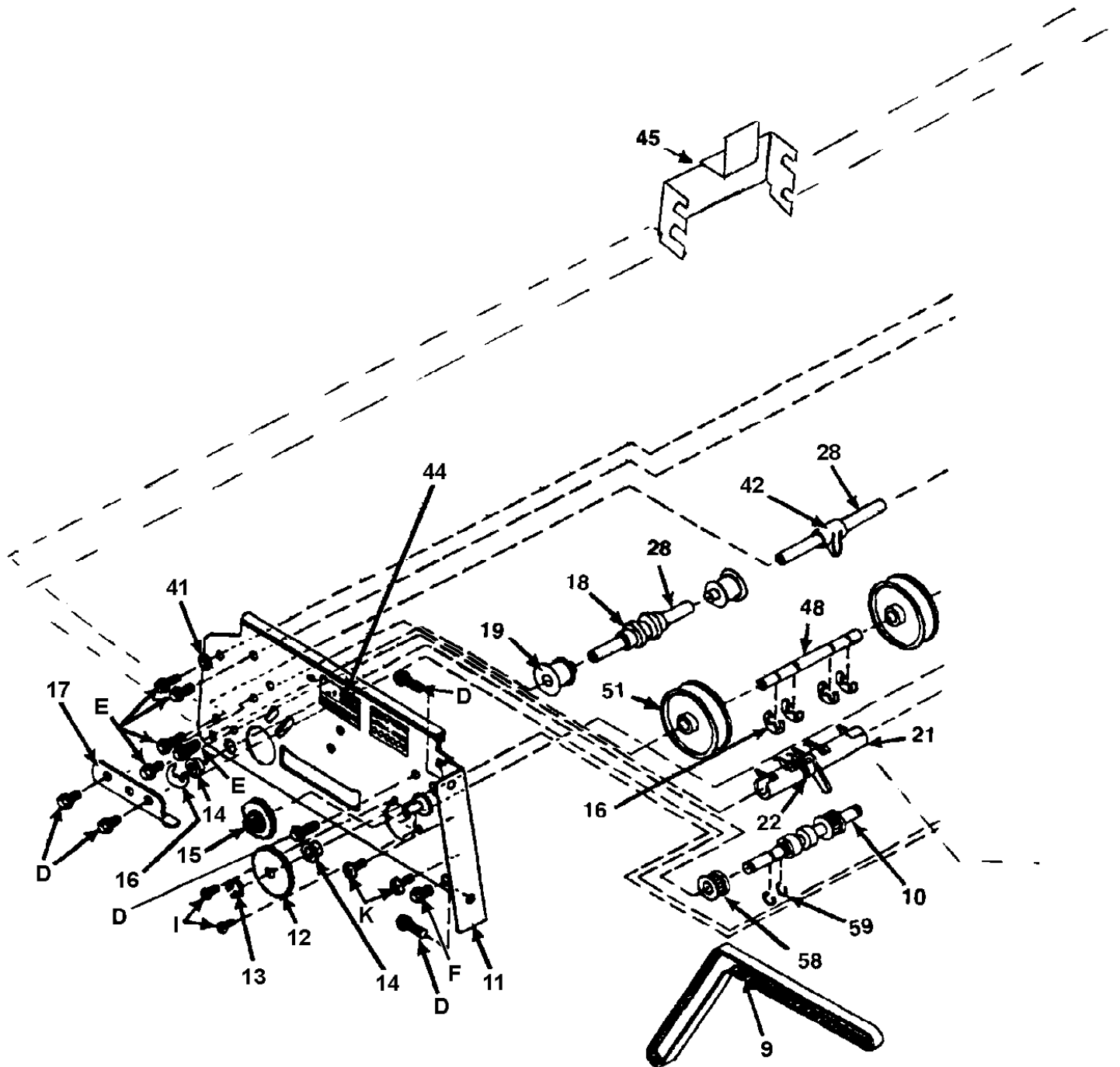
**Figure 6-4. BC-1400 Front Panel**

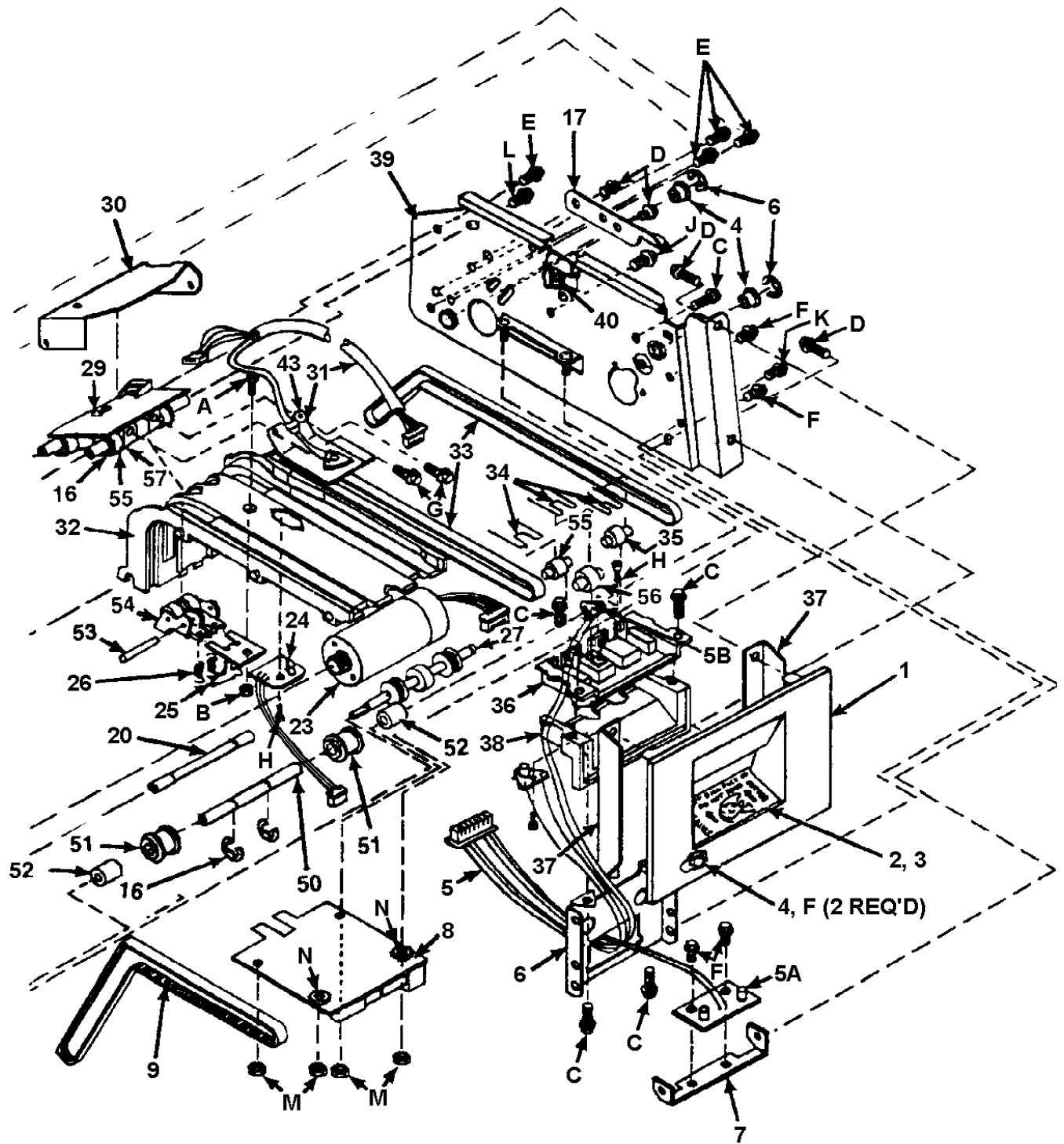
Ref.	Part No.	Description	Qty
		BC-1400 Front Panel	
	65064403	• BC-1400 Front Panel Assembly .....	1
1	65053605	•• Stainless Steel Panel Assembly (Grey) with Grapic Lettering and Logo .....	1
2	25191301	•• Indicator Light .....	1
3	35085501	•• Shield and Hinge Assembly .....	1
4	21581801	•• Pushbutton Swtich .....	1
5	70122001	•• Lock Washer (Internal) .....	1
6	25198401	•• Protective Cover (Switch) .....	1
7	45048004	• Trim Plate (Bill Acceptor and Coin Cup) .....	1
8	70134121	• Chrome Head Screw .....	6
9	35003201	• Coin Cup .....	1
10	35000201	• Change Door .....	1
11	25062001	• Hinge Wire .....	1
12	27029312	• Decal - \$1 & \$5 (Service Part) .....	1
	<b>Optional:</b>		
	65064402	• BC-1400 Front Panel Assembly with Lettering and Logo (No Graphics)	
	65053604	• S.S. Panel with Lettering and Logo (No Graphics)	



# Figure 6-5. BA-50 Bill Acceptor Assembly

(Corresponding Parts List on page 6-14)





**Figure 6-5. BA-50 Bill Acceptor Assembly (Sheet 1)**

Ref.	Part No.	Description	Qty
	65068501	BA-50 Bill Acceptor	
1	65022401	• Trim - Front (Bill Acceptor) .....	1
2	30622102	• Window - Clear .....	1
3	35118901	• Insert - Window .....	1
4	21384701	• Retainer - Window .....	1
5	45073201	• Harness and Board Assembly with Inlet and LED's .....	1
	35119201	•• Circuit Board (with LED's) .....	1
	25236302	•• Photoconductive Cell (only) .....	1
	70035314	•• LED (only) .....	2
6	25076501	• Support Bracket .....	1
7	35119101	• Bracket - Legend Window .....	1
8	45073001	• Board Assembly - Interconnect .....	1
9	35082005	• Timing Belt (210-Tooth - .080 Pitch) .....	2
10	35114501	• Shaft and Pulley Assembly .....	1
11	35036003	• Plate Assembly - Side (LH) .....	1
12	35114401	• Drive Gear .....	1
13	70143801	• External Retaining Ring (1/4-Inch Diameter) .....	1
14	70146004	• Nyliner Bearing .....	4
15	B0031936	• Gear Reduction .....	1
16	70143004	• External Retaining Ring (1/4-Inch Diameter) .....	9
17	25194102	• Take-up Bracket (Roller Shaft) .....	2
18	25238902	Components:	
	25193402	• Shaft - Crowned Pulley .....	1
	25238902	• Output Roller (with Coupling) .....	1
	25193605	• Roller Creasing (with Coupling) .....	2
19	Ref.	Components:	
	35080003	• Pulley Shaft .....	1
	35080101	• Drum Pulley .....	2
20	Ref.	Components:	
	25196403	• Anti-Cheat Lever Shaft .....	1
	35096404	• Anti-Cheat Lever .....	1
	35081602	• Torsion Spring .....	1
21	Ref.	Components:	
	3508004	• Roller Shaft (Take-up) .....	1
	35080301	• Take-up Roller .....	2
	25243201	• Take-up Shaft Spacer .....	2
22	35113601	• Drive Shaft Assembly .....	1
23	45058408	• Motor Assembly with Encoder .....	1
24	45058205	• Harness and Board Assembly - Lower Reflector .....	1
	70035314	•• LED .....	1
	25236302	•• Photoconductive Cell .....	1
	25194803	•• Mounting Pad (TO18) .....	1
25	35114001	• Spring Bracket .....	1
26	25225003	• Tension Spring .....	2
27	Ref.	Components:	
A	25191702	• Pivot Pin .....	1
B	35080604	• Roller Assembly - Pressure (Mag. HD) .....	2
28	25193402	• Shaft - Crowned Pulley .....	1
29	45073101	• Head and Holder Assembly .....	1
30	35120201	• Cover - Mag. Amp (with Insulator) .....	1

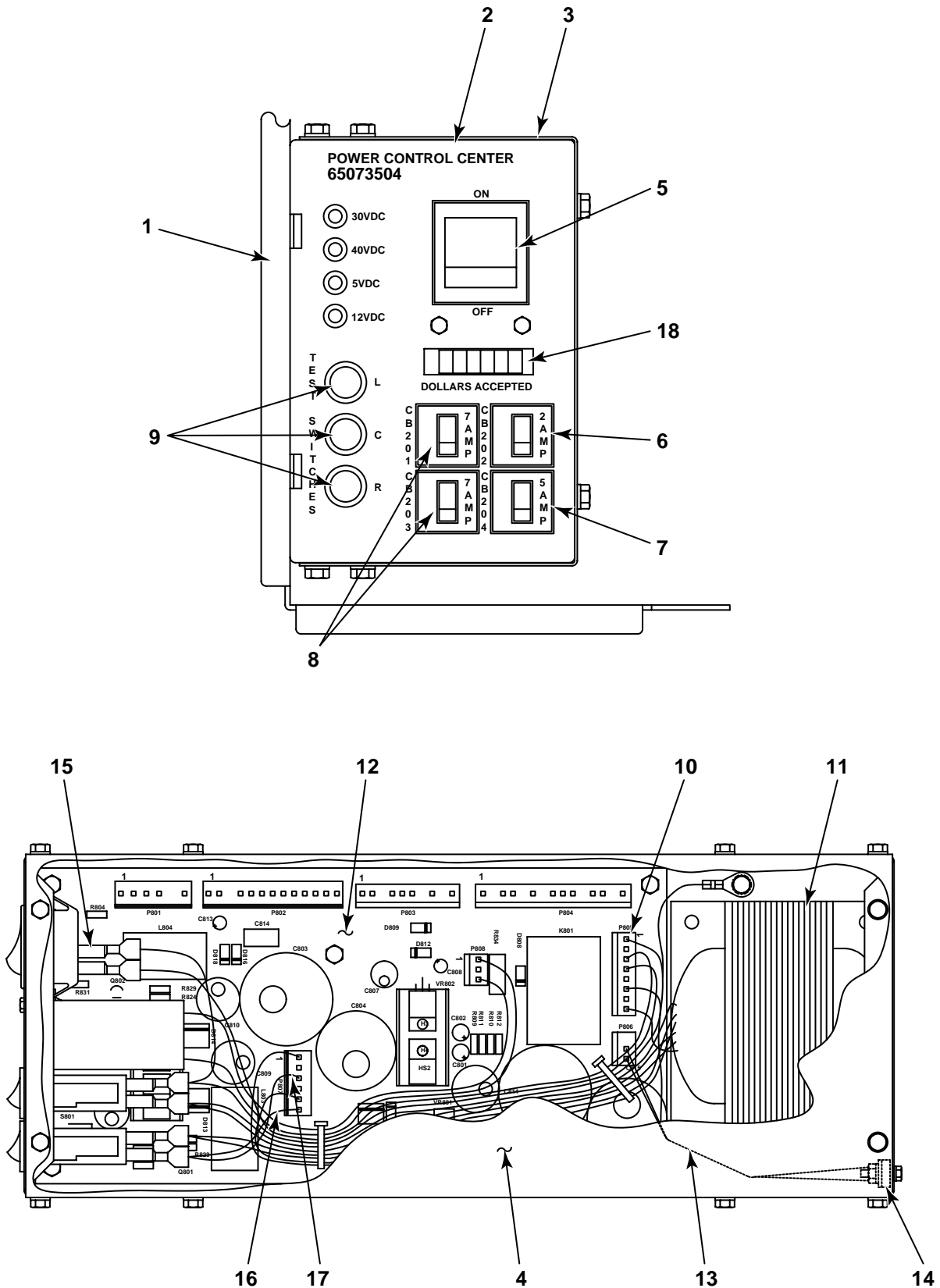
**Figure 6-5. BA-50 Bill Acceptor Assembly (Sheet 2)**

Ref.	Part No.	Description	Qty
31	35118501	• Harness and Bracket Assembly - Mag. Amp .....	1
	25240801	• • Mounting Bracket Assembly (Sensor) .....	1
	21814009	• • Hex Lock Nut .....	1
	45073301	• • Harness & Board Assembly - Mag. Amp .....	1
32	65067101	• Track - Lower .....	1
33	35114901	• Drive Belt (Upper) .....	2
34	21342702	• Retaining Spring (Roller) .....	3
35	25235001	• Roller Shaft .....	3
36	65067501	• Bill Inlet (Upper) .....	1
37	25060101	• Bracket Side Shield .....	2
38	65067601	• Bill Inlet (Lower) .....	1
39	35035209	• Plate Assembly - Side (RH) .....	1
40	21398501	• Tension Spring .....	1
41	20922510	• Spacer .....	1
42	35126501	• Anti-Cheat Lever (Pull Back) .....	1
43	25079801	• Lug .....	1
44	25223101	• Flag Label .....	1
45	35104002	• Output Drive Guide .....	1
46	35147301	• Anti-Pullback Block .....	1
47	21776005	• Speed Clip Fastener (U Type) .....	1
48	35080003	• Pulley Shaft .....	1
49	35080101	• Pulley .....	2
50	35080004	• Roller Shaft (Take-Up) .....	1
51	35080301	• Take-Up Roller .....	2
52	25243201	• Shaft Spacer (Take-Up Roller) .....	2
53	25191702	• Pivot Pin .....	1
54	35080604	• Pressure Roller Assembly .....	2
55	25193301	• Crowned Roller .....	4
56	25193902	• Roller - Idler (Input) .....	1
57	70120915	• Washer .....	4
58	25192902	• Timing Pulley (22-Tooth) .....	1
59	70143301	• External Retaining Ring .....	2

**HARDWARE LIST**

A	80653006	#8-32 x 3/8 Hex HMS .....	1
B	87843000	#8-32 Keps Hex MS Nut .....	1
C	89293007	#8-18 x 7/16 Hex WRHS (Hi-Lo) .....	6
D	80443008	#8-32 x 1/2 Hex WRHMS (SF) .....	8
E	80443006	#8-32 x 3/8 Hex WRHMS (SF) .....	9
F	80443004	#8-32 x 1/4 Hex WRHMS (Hi-Lo) .....	7
G	89292307	#6-19 x 7/16 Hex WRHS (Hi-Lo) .....	2
H	89281605	#4-24 x 5/16 Phil Pan RO HS (Hi-Lo) .....	3
I	80542304	#6-32 x 1/4 Sems Phil RO HMS .....	2
J	80384405	#10-32 x 5/16 Phil Pan HMS (SF) .....	1
K	80403004	#8-32 x 1/4 Phil Pan HMS (SF) .....	3
L	80383006	#8-32 x 3/8 P.R. HMS (SF) .....	1
M	87842300	#6-32 Keps Hex MS Nut .....	4
N	88903000	#8 External Lockwasher .....	2
O	80443007	#8-32 x 7/16 Hex WHS (Swage Form) .....	2

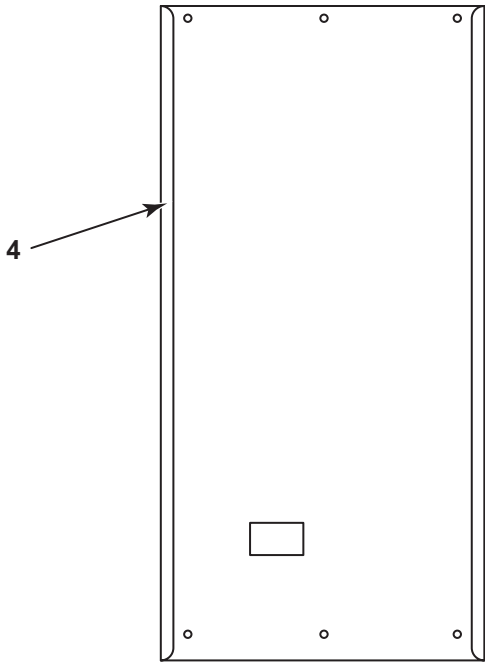
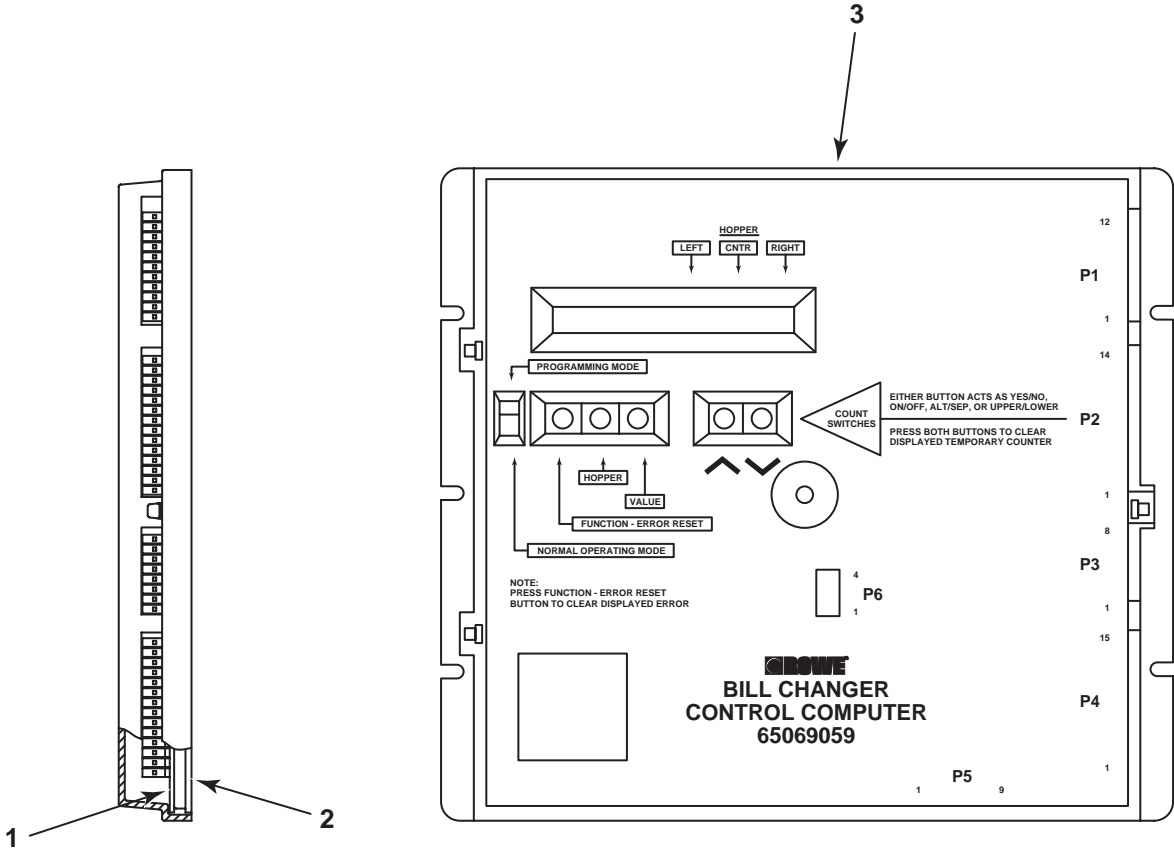
**Figure 6-6. Power Control Center Assembly**



**Figure 6-6. Power Control Center Assembly**

Ref.	Part No.	Description	Qty
	45078006	Power Control Center Assembly with Bracket	
1	65069901	• Power Control Center Mounting Bracket .....	1
2	65073504	• Power Control Center Assembly .....	1
3	45075804	• Power Control Box Assembly .....	1
4	45075501	• Power Control Box Cover Assembly .....	1
5	30785701	• Rocker Switch (SPST) .....	1
6	70073605	• Circuit Breaker - 2 Amp (CB202) .....	1
7	70073608	• Circuit Breaker - 5 Amp (CB204) .....	1
8	70073610	• Circuit Breaker - 7 Amp (CB201, CB203) .....	2
9	21638002	• Switch Cap .....	3
10	35120301	• Power Control Harness Assembly .....	1
11	45049505	• Power Transformer Assembly .....	1
12	65069705	• Circuit Board Assembly - Power Supply .....	1
		<i>(see Schematic and Components List in Section 4)</i>	
13	25255901	• Resistor Harness Assembly .....	1
14	70013001	• Resistor - 50Ω, 30W (R813) .....	1
15	21621837	• Jumper Assembly (Black/Yellow) .....	1
16	21621836	• Jumper Assembly (Red/Yellow) .....	1
17	21621835	• Jumper Assembly (Yellow/Green) .....	1
18	25065709	• Counter Assembly (Bills Accepted) .....	1
	21441802	•• Electric Counter .....	1
	70075701	•• Keying PLug .....	1
	70075503	•• Conector Housing (3 Pin) .....	1

Figure 6-7. Control Computer Assembly

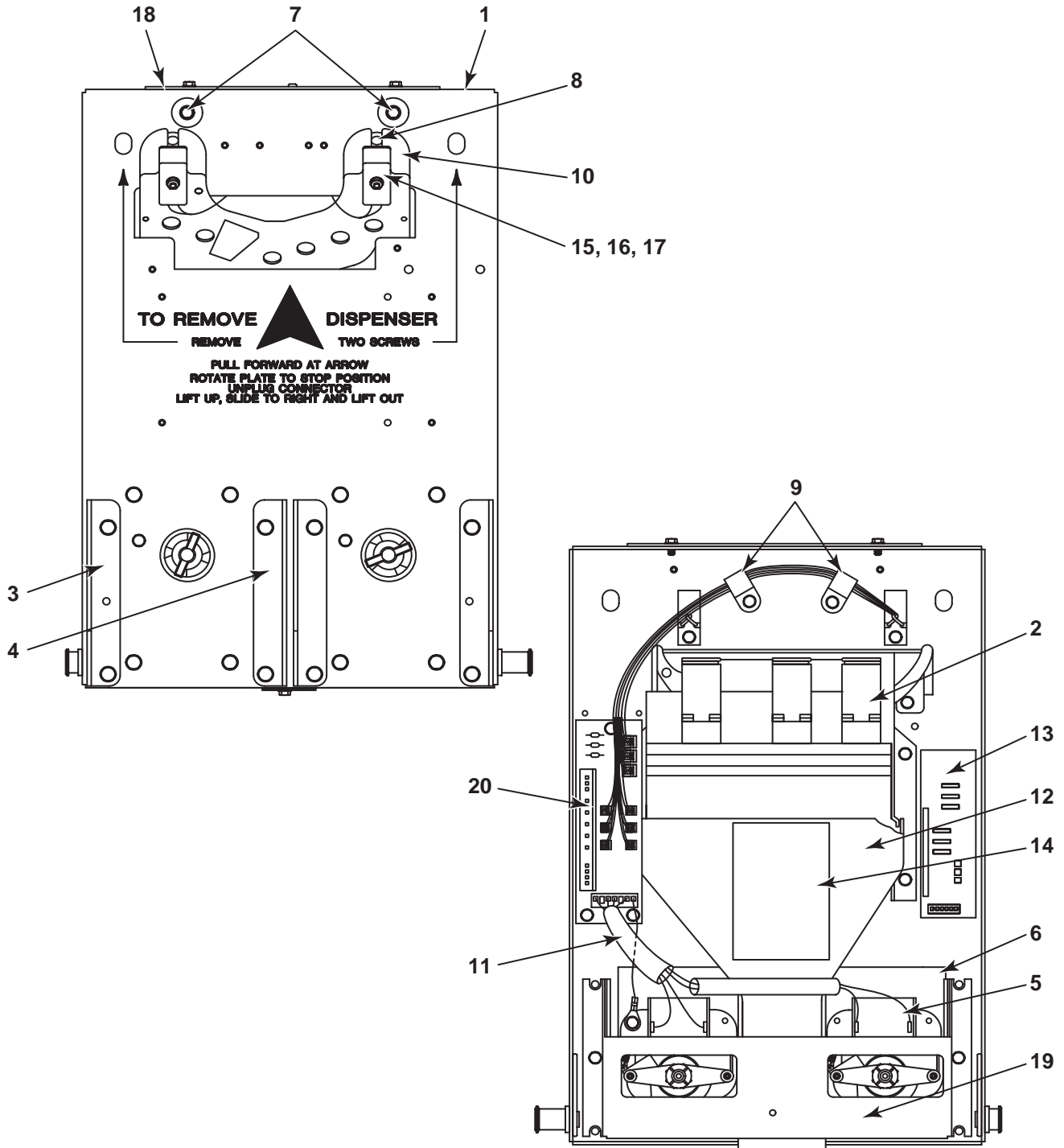


**Figure 6-7. Control Computer Assembly**

<b>Ref.</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty</b>
	65069059	Control Computer Assembly	
1	65077459	• Control Computer Board Assembly ..... (see <i>Schematic in Section 4 for components</i> )	1
2	65069401	• Base Cover Assembly .....	1
3	65069308	• Cover .....	1
4	45060803	• Guide Plate (see <i>Figure 6-3, Item 49</i> ) .....	1



Figure 6-8. Coin Dispenser Assembly



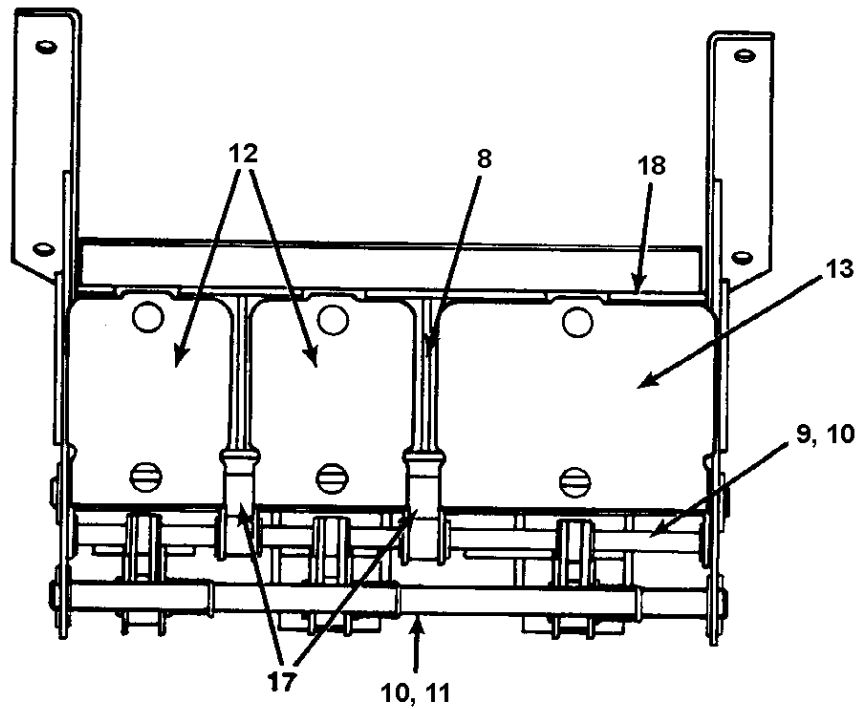
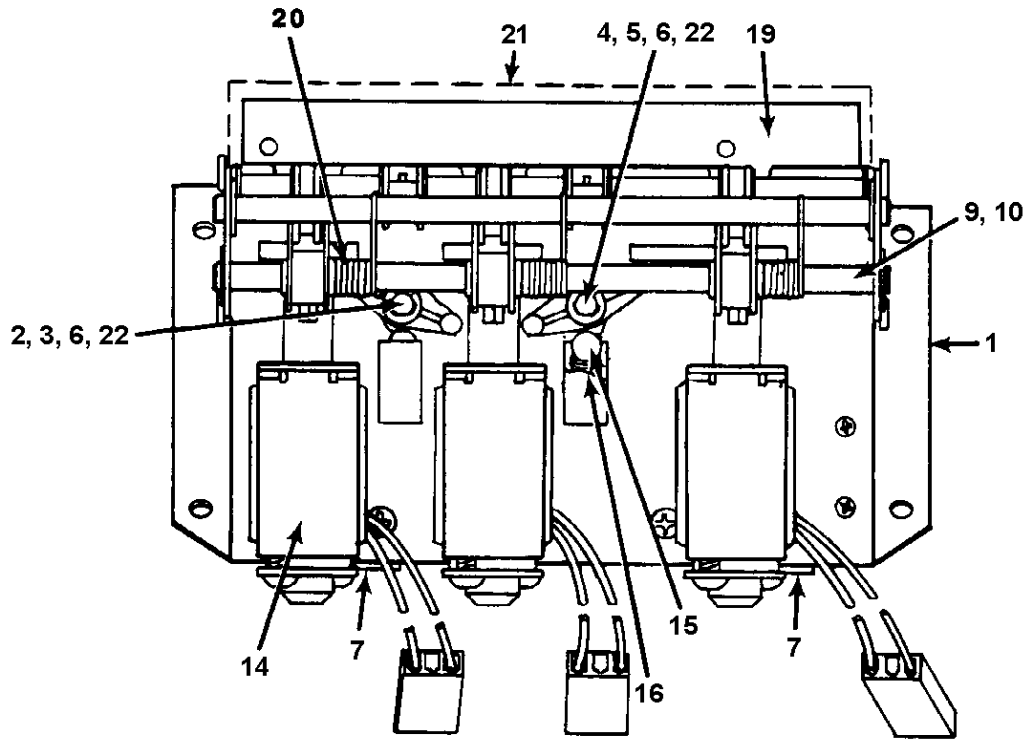
**Figure 6-8. Coin Dispenser Assembly**

Ref.	Part No.	Description	Qty
Ref.		Coin Dispenser Assembly	
	65058011	• BC-1200 only	
	65058012	• BC-1400 only	

Both the BC-1200 and the BC-1400 use the same components, except as noted.

1	45035311	• Frame and Pivot Assembly .....	1
2	Ref.	• Change Bucket Assembly .....	1
	45032615	• BC-1200 only ( <i>see Figure 6-9</i> )	
	45032616	• BC-1400 only ( <i>see Figure 6-9</i> )	
3	35044702	• Mounting Bracket (Hopper LH) .....	2
4	35044802	• Mounting Bracket (Hopper RH) .....	2
5	35049102	• Hopper Drive Motor Assembly .....	2
	45034102	•• Hopper Drive Motor	
	45034001	•• Ratchet Coupling	
	25097701	•• Compression Spring	
	70120904	•• Washer (Nylon)	
	70110126	•• Groove Pin (1/8 x 3/4)	
	37004601	•• Gear Box	
6	35046401	• Mounting Bracket (Motor) .....	2
7	25112701	• Rubber Bumper .....	2
8	45076101	• LED Holder Assembly .....	2
	70035315	•• LED .....	2
9	70093106	• Cable Clamp (7/16") .....	2
10	45035006	• Chute Assembly .....	1
11	65029114	• Dispenser Harness Assembly .....	1
12	35068202	• Chute Assembly - Coin Weld (BC-1200 only) .....	1
13	25169106	•• Dispenser Wiring Label .....	1
14	25163902	• Dispenser Bucket Lube Label .....	1
15	25175702	• Photodetector Board and Terminal Assembly .....	2
16	70121626	• Spacer (Nylon) .....	2
17	35048202	• Terminal Board Cover .....	2
18	35125401	• Hopper Latch Assembly .....	1
19	45042602	• Dispenser Motor Guard .....	1
20	45076402	• Circuit Board Assembly - Interconnect .....	1
A	70035006	•• Diode .....	3
	25189411	• Coin Dispenser Label .....	1

Figure 6-9. Change Bucket Assembly



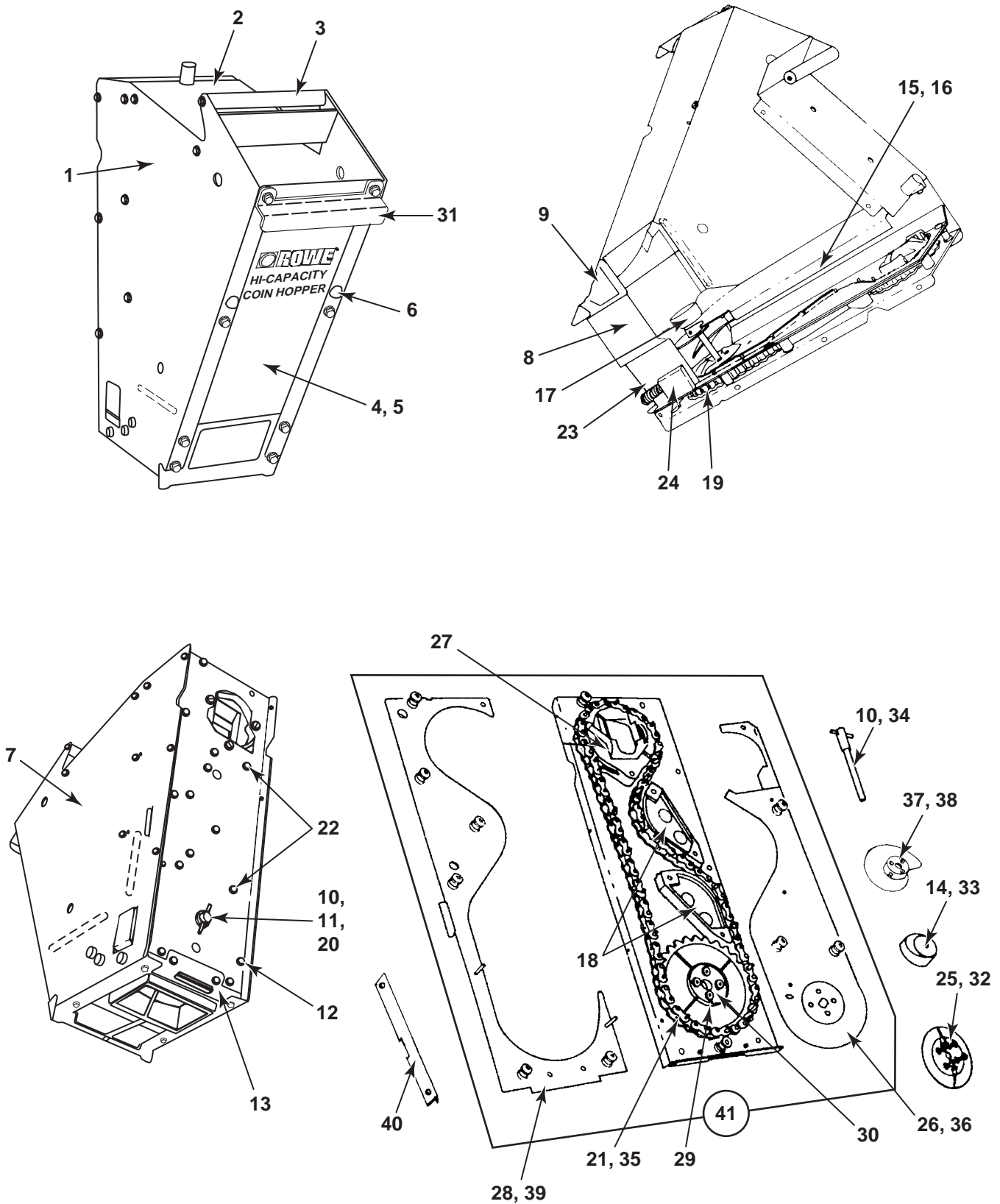
**Figure 6-9. Change Bucket Assembly**

Ref.	Part No.	Description	Qty
	45032615	Change Bucket Assembly (BC-1200) .....	1
	45032616	Change Bucket Assembly (BC-1400) .....	1

Except for the mounting bracket (*Ref. 19*) and the shroud (*Ref. 21*), both bucket assemblies are the same.

1	35045004	• Frame Assembly - Bucket .....	1
2	35045101	• Door Assembly - Diverter (LH) .....	1
3	25110001	• Toggle - Door (LH) .....	1
4	35045201	• Door Assembly - Diverter (RH) .....	1
5	25110101	• Toggle - Door (RH) .....	1
6	70143003	• External Retaining Ring .....	2
7	25112902	• Support Bracket .....	2
8	25098701	• Spacer Support .....	2
9	25099004	• Pivot Shaft (Door) .....	2
10	70143004	• External Retaining Ring .....	6
11	25099005	• Pivot Shaft (Door) .....	1
12	25158901	• Plunger and Door Assembly (Small Door) .....	2
13	25158902	• Plunger and Door Assembly (Large Door) .....	1
14	25232104	• Solenoid and Terminal Assembly .....	3
15	20746501	• Ball Bearing (1/4-Inch) .....	2
16	25099701	• Compression Spring .....	2
17	25098301	• Spacer Sleeve .....	2
18	35074801	• Plate Assembly - Front (Bucket) .....	1
19	25112402	• Mounting Bracket - Dispenser Chute (BC-1200 only) .....	1
20	25112002	• Torsion Spring .....	3
21	35090802	• Change Bucket Shroud (BC-1400 only) .....	1
22	70113005	• Roll Pin (1/16 x 7/16) .....	2

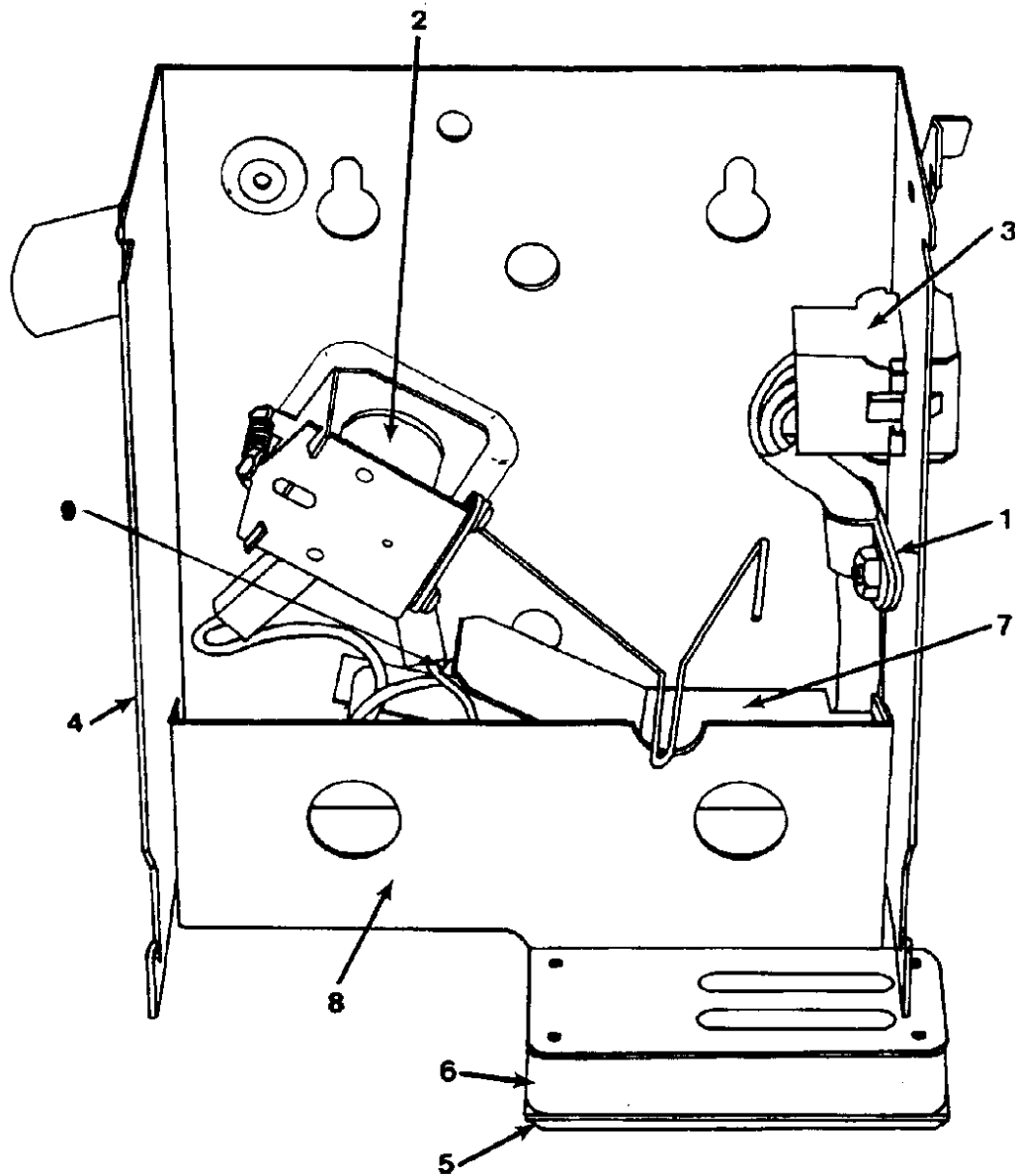
**Figure 6-10. Hi-Capacity Hopper Assembly**



**Figure 6-10. Hi-Capacity Hopper Assembly**

Ref.	Part No.	Description	Qty
	65027608	Hi-Capacity Hopper Assembly (Small Coins) .....	Ref.
	65027609	Hi-Capacity Hopper Assembly (Large Coins) .....	Ref.
1	45032402	• Side Assembly - LH .....	1
2	35074201	• Top Assembly - Large Hopper .....	1
3	25098101	• Hopper Handle .....	1
4	35044608	• Front Cover Small Coins (Small Coins) .....	1
5	35044609	• Front Cover Small Coins (Large Coins) .....	1
6	25114701	• Bumper .....	2
7	45032503	• Side Assembly - RH .....	1
8	65027902	• Fixed Funnel (Intermediate) .....	1
9	65027901	• Fixed Funnel .....	1
10	25113701	• Drive Shaft and Pin Assembly (Small Coins) .....	1
11	70120903	• Washer .....	1
12	70121624	• Spacer .....	2
13	35048801	• Tie Bracket .....	1
14	35058101	• Agitator Cam (Small Coins) .....	1
15	45072101	• Coin Baffle and Stud Assembly (Small Coins) .....	1
	25224501	• • Baffle and Bracket Assembly .....	1
16	45072102	• Coin Baffle and Stud Assembly (Large Coins) .....	1
	25224501	• • Baffle and Bracket Assembly .....	1
17	70146006	• Nylon Bearing .....	1
18	35048501	• Chain Guide .....	2
19	35060501	• Plate and Post Assembly .....	1
20	70146021	• Nylon Bearing .....	1
21	35043703	• Extended Pin Chain (Small Coins) .....	1
22	70134109	• Special Screw (#8-32 Black) .....	2
23	25113401	• Compression Spring .....	2
24	65028202	• Sliding Funnel .....	1
25	45034205	• Agitator (Small Coins) .....	1
26	35144502	• Inner Guide Assembly (Small Coins) .....	1
27	65028803	• Chain Guide Ring .....	1
28	45031902	• Outer Slide Assembly (Small Coins) .....	1
29	45035601	• Sprocket .....	1
30	35017101	• Drive Spacer .....	1
31	25165902	• Hopper Handle .....	1
32	45034204	• Agitator (Large Coins) .....	1
33	35058102	• Agitator Cam (Large Coins) .....	1
34	25113702	• Drive Shaft and Pin Assembly (Large Coins) .....	1
35	35043705	• Extended Pin Chain (Large Coins) .....	1
36	35044504	• Inner Guide Assembly (Large Coins) .....	1
37	25171202	• Upper Agitator Assembly (Large Coins) .....	1
38	70113013	• Roll Pin (.099/.103 x 7/8) .....	1
39	445031903	• Outer Slide Assembly (Large Coins) .....	1
40	25223901	• Coin Ramp (Large Coins) .....	1
41	Ref.	This assembly includes items 26, 28, & 37, and is available as a replacement part as follows:	
	47000601	• Coin & Chain Guide Assembly (Small Coins) .....	1
	47000602	• Coin & Chain Guide Assembly (Large Coins) .....	1

**Figure 6-11. Coin Acceptor Bracket and Harness Assembly  
(BC-1200 Option Only)**

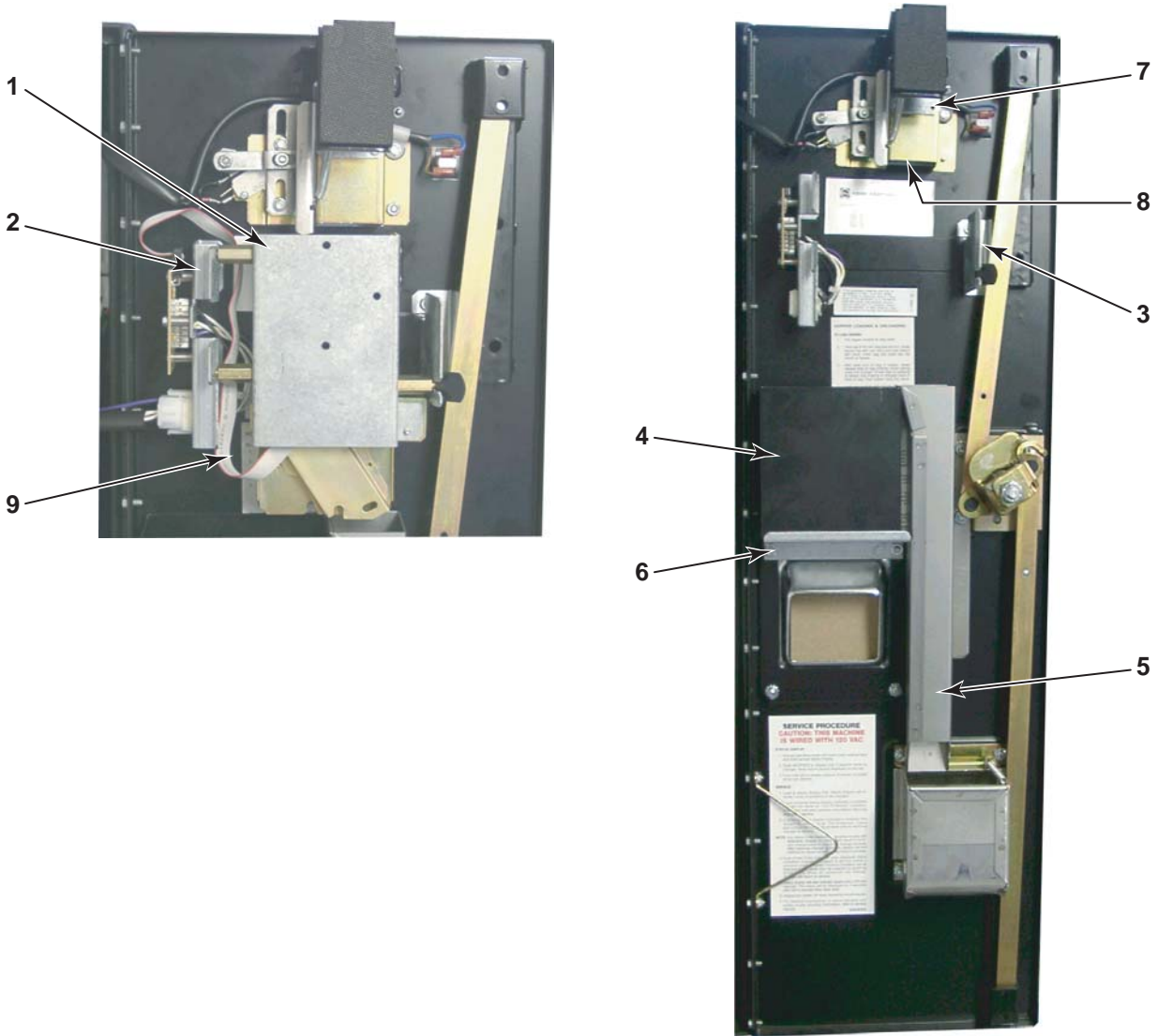


**Figure 6-11. Coin Acceptor Bracket and Harness Assembly  
(BC-1200 Option Only)**

Ref.	Part No.	Description	Qty
	35026111	Coin Acceptor Bracket and Harness Assembly	
1	70093104	• Cable Clamp .....	1
2	35031702	• Lockout Magnet .....	1
3	35028208	• Coin Acceptor Harness and Plug Assembly .....	1
	30422517	•• Terminal Strip (3 Position) .....	1
	70035005	•• Silicon Diode (D305) .....	1
4	35031801	• Coin Acceptor Bracket and Lock Assembly .....	1
5	25171101	• Solid-State Coin Switch Cover .....	1
6	45048203	• Solid-State Coin Switch Assembly .....	1
		<i>(see Schematic and Components List in Section 4)</i>	
7	25163101	• Shield Bracket .....	1
8	35063001	• Mounting Bracket (Coin Switch) .....	1
	40861402	•• Mechanical Coin Acceptor - 25¢ (not shown) .....	1
	40861404	•• Mechanical Coin Acceptor - \$1 (not shown) .....	1



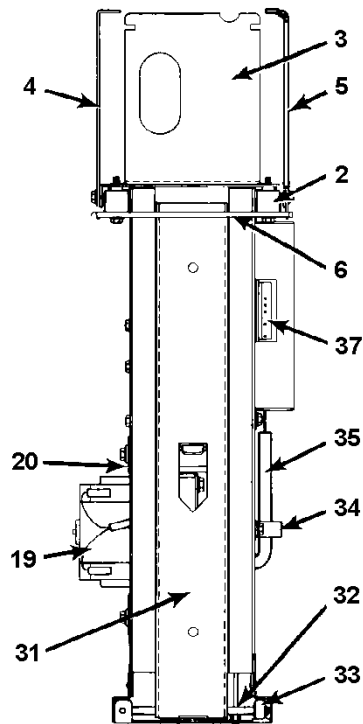
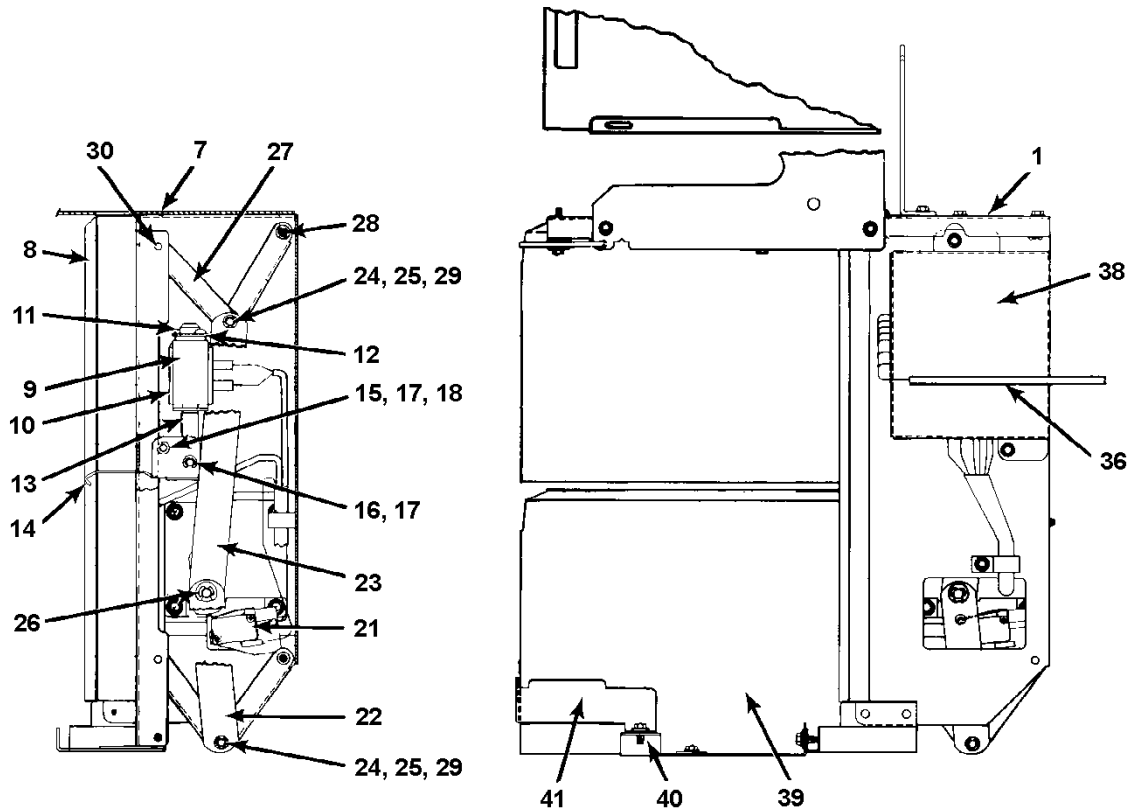
**Figure 6-12. Coin Acceptor  
(BC-1200 Option Only)**



**Figure 6-12. Coin Acceptor (BC-1200 Option Only)**

<b>Ref.</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty</b>
1	30998802	Holder/Adapter Assembly .....	1
2	35175301	Mini-Acceptor Hinge Bracket .....	1
3	35175501	Mini-Acceptor Snap Bracket Assembly .....	1
4	45050502	Cash Box .....	1
5	45086703	Slug Chute .....	1
6	35069201	Coin Box Bracket .....	1
7	25172802	Coin Deflector .....	1
8	25169902	Bottom Chute - Coin Inlet .....	1
9	35028216	Adapter Harness .....	1

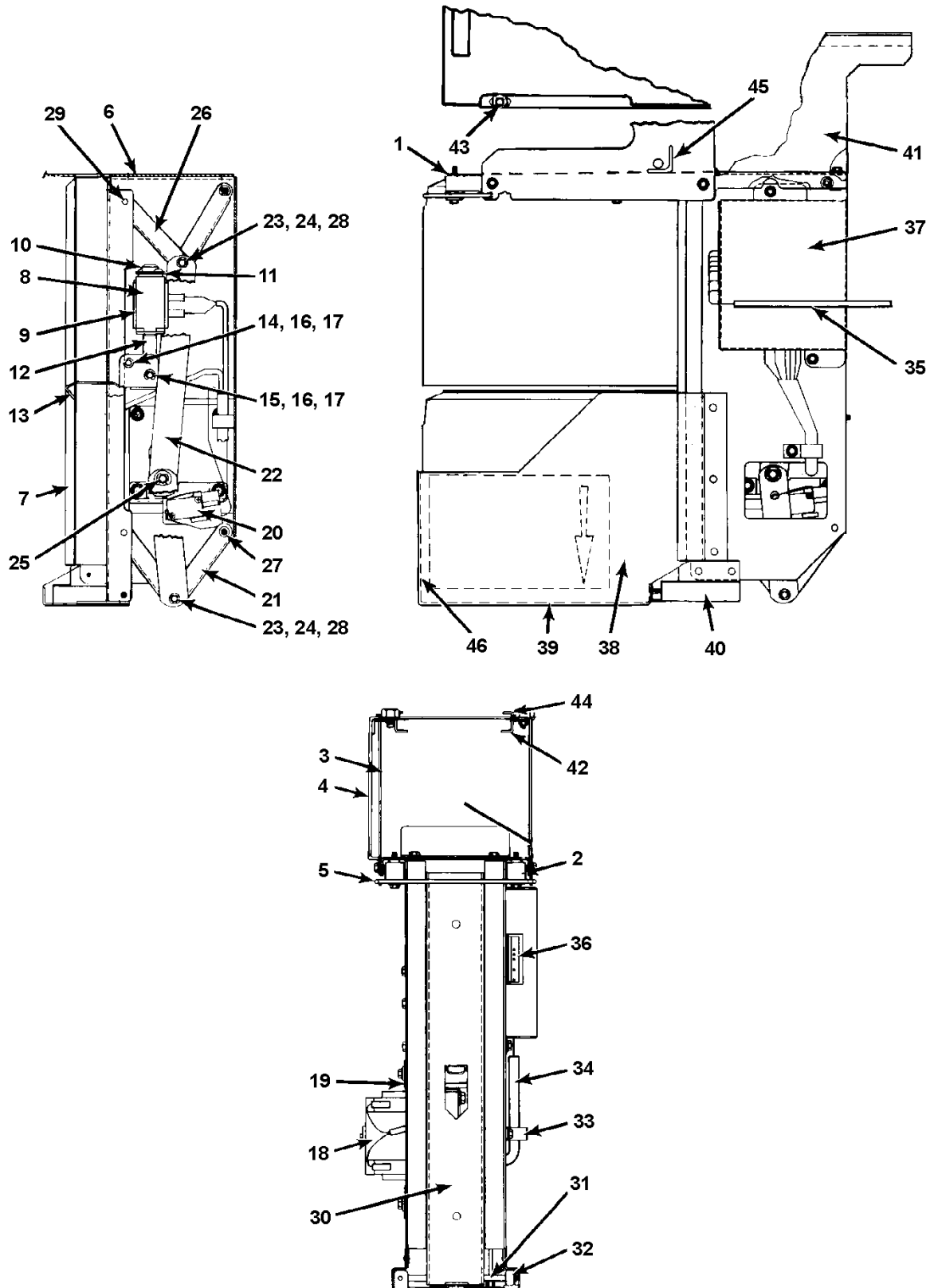
Figure 6-13A. BC-1200 Dual Bill Stacker Assembly



**Figure 6-13A. BC-1200 Dual Bill Stacker Assembly**

Ref.	Part No.	Description	Qty
	65046804	BC-1200 Dual Bill Stacker Assembly	
1	45052501	• Support Frame .....	1
2	25156911	• Shoulder Washer .....	6
3	35072001	• Rear Hanger .....	1
4	35072101	• Front Hanger .....	1
5	45082202	• Front Hanger (RH) .....	1
6	25178401	• Bill Box Catch .....	1
7	45052601	• Separator Chute Assembly .....	1
8	35072801	• Chute Edge .....	2
9	21150509	• Solenoid Assembly .....	1
10	25178501	• Solenoid Bracket .....	1
11	25158001	• Stop Assembly .....	1
12	25098403	• Solenoid Stop Plate .....	1
13	25178601	• Solenoid Plunger Assembly .....	1
14	25178701	• Bill Stop .....	1
15	25178801	• Bill Stop Pivot .....	1
16	21534705	• Pivot Pin .....	1
17	70143003	• External Retaining Ring .....	4
18	70146003	• Bearing .....	19
19	35072201	• Motor and Crank Assembly .....	1
	45052901	• • Gear Motor .....	1
	25179701	• • Crank and Pin Assembly .....	1
	70113204	• • Spiral Pin .....	1
20	35072301	• Motor Mounting Plate .....	1
21	35099701	• Switch Assembly .....	1
	25179001	• • Switch Plate .....	1
	21073102	• • Switch .....	1
	21082901	• • Switch Actuator .....	1
	21083001	• • Twin Nut .....	1
	25054801	• • Insulator .....	1
22	35072401	• Drive Link .....	1
23	35072402	• Drive Link .....	1
24	70146004	• Bearing .....	2
25	70146010	• Bearing .....	2
26	70143004	• External Retaining Ring .....	1
27	25179101	• Push Plate Link .....	4
	70146003	• • Bearing .....	16
28	25179202	• Support Shaft .....	2
	70143003	• • External Retaining Ring .....	8
29	21534706	• Pivot Pin .....	2
	70143003	• • External Retaining Ring .....	4
30	21534707	• Pivot Pin .....	2
	70143003	• • External Retaining Ring .....	4
31	35072501	• Push Plate .....	1
32	25179501	• Roller Shaft .....	1
33	25179601	• Roller .....	2
	70143003	• • External Retaining Ring .....	6
34	70093401	• Cable Clamp .....	2
35	45052401	• Bill Stacker Harness Assembly .....	1
36	35077302	• Double Stacker Harness Assembly (6" long) .....	1
37	65046701	• Driver Circuit Board Assembly (see Schematics and Components List in Section 4)	
38	45052701	• Circuit Board Cover .....	1
39	45034603	• Cash Box Assembly .....	2
	25096101	• • Foam Black .....	2
	35039204	• • Pressure Plate Assembly .....	2
40	45052801	• Lower Bill Box Mounting Bracket .....	1
41	25181801	• Lower Bill Box Stop an Stud Assembly .....	1

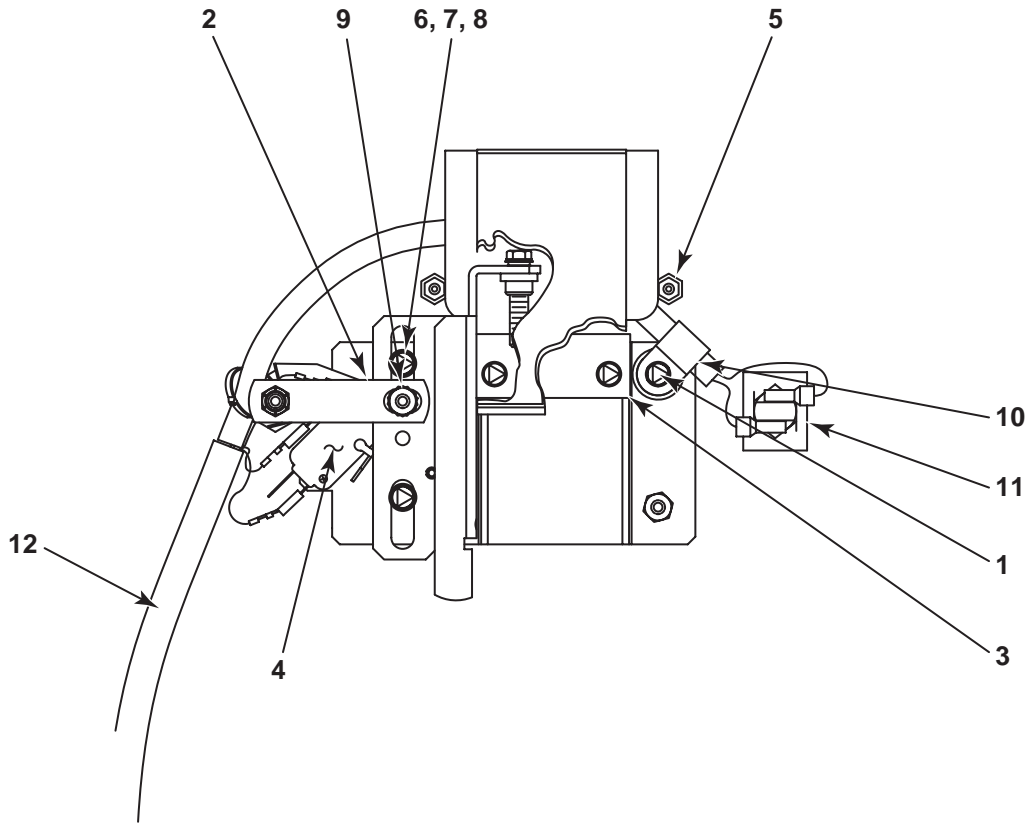
Figure 6-13B. BC-1400 Dual Bill Stacker Assembly



**Figure 6-13B. BC-1400 Dual Bill Stacker Assembly**

Ref.	Part No.	Description	Qty
	65046808	BC-1400 Dual Bill Stacker Assembly	
1	45052501	• Support Frame .....	1
2	25156911	• Shoulder Washer .....	6
3	35072101	• Front Hanger .....	1
4	35072102	• Front Hanger .....	1
5	25178401	• Bill Box Catch .....	1
6	45052603	• Separator Chute Assembly .....	1
7	35072801	• Chute Edge .....	2
8	21150509	• Solenoid Assembly .....	1
9	25178501	• Solenoid Bracket .....	1
10	25158001	• Stop Assembly .....	1
11	25098403	• Solenoid Stop Plate .....	1
12	25178601	• Solenoid Plunger Assembly .....	1
13	25178701	• Bill Stop .....	1
14	25178801	• Bill Stop Pivot .....	1
15	21534705	• Pivot Pin .....	1
16	70143003	• External Retaining Ring .....	4
17	70146003	• Bearing .....	19
18	35072201	• Motor and Crank Assembly .....	1
	45052901	• • Gear Motor .....	1
	25179701	• • Crank and Pin Assembly .....	1
	70113204	• • Spiral Pin .....	1
19	35072301	• Motor Mounting Plate .....	1
20	35099701	• Switch Assembly .....	1
	25179001	• • Switch Plate .....	1
	21073102	• • Switch .....	1
	21082901	• • Switch Actuator .....	1
	21083001	• • Twin Nut .....	1
	25054801	• • Insulator .....	1
21	35072401	• Drive Link .....	1
22	35072402	• Drive Link .....	1
23	70146004	• Bearing .....	2
24	70146010	• Bearing .....	2
25	70143004	• External Retaining Ring .....	1
26	25179101	• Push Plate Link .....	4
	70146003	• • Bearing .....	16
27	25179202	• Support Shaft .....	2
	70143003	• • External Retaining Ring .....	8
28	21534706	• Pivot Pin .....	2
	70143003	• • External Retaining Ring .....	4
29	21534707	• Pivot Pin .....	2
	70143003	• • External Retaining Ring .....	4
30	35072501	• Push Plate .....	1
31	25179501	• Roller Shaft .....	1
32	25179601	• Roller .....	2
	70143003	• • External Retaining Ring .....	6
33	70093401	• Cable Clamp .....	2
34	45052401	• Bill Stacker Harness Assembly .....	1
35	35077302	• Double Stacker Harness Assembly (6" long) .....	1
36	65046701	• Driver Circuit Board Assembly (see Schematics and Components List in Section 4)	
37	45052701	• Circuit Board Cover .....	1
38	45034603	• Cash Box Assembly .....	2
	25096101	• • Foam Block .....	2
	35039204	• • Pressure Plate Assembly .....	2
39	45052801	• Lower Bill Box Mounting Bracket .....	1
40	25181801	• Lower Bill Box Stop an Stud Assembly .....	1
41	45060901	• Mounting Frame (BA) .....	1
42	35023307	• Mounting Bracket (BA-50) .....	2
43	25197801	• Post Spacer .....	2
44	35084801	• Guide .....	2
45	25198102	• Stop Bracket .....	1
46	25189901	• Caution Label .....	1

**Figure 6-14. Money Return Lever Assembly**



**Figure 6-14. Money Return Lever Assembly**

Ref.	Part No.	Description	Qty
	Ref.	Money Return Lever Assembly	
1	21301801	• Cup Washer .....	2
2	25251203	• Pivot Link .....	1
3	27027206	• Coin Block Bracket (50¢/\$1) .....	A/R
4	25255801	• Switch .....	1
5	70135512	• Palnut .....	2
6	70146008	• Nyliner Bearing .....	2
7	70120703	• Plain Washer (Teflon) .....	1
8	70143004	• External Retaining Ring .....	1
9	21357811	• Elastic Stop Nut (#8-32) .....	1
10	70093103	• Cable Clamp (1/4") .....	1
11	25191301	• Indicator Light .....	1
12	35032009	• Empty Light Harness Assembly .....	1

## DECALS

<b>BC-1200 Only (from Figure 6-2)</b>				
<b>Accepted Bill Decals</b>				
Door Color	\$1's	\$1 & \$5's	\$1, \$5, \$10's	\$1, \$5, \$10, \$20's
Black	35133702	35133703	35133704	35133705
Brown	35133712	35133713	35133714	35133715
Blue	35133707	35133708	35133709	35133710
<b>Accepted Coin Decals</b>				
25211706	25¢ Decal			
25211709	25¢/\$1 Decal			
25211710	\$1 Decal			

<b>BC-1400 Only</b>	
<b>Accepted Bill Decals</b>	
25239601	\$10 Decal
25239602	\$10 & \$20 Decal

47002004      Label - "Pays \$1 Coins"  
 27029312      Decal - Service (BC-1400)  
 27029313      Decal - Service (BC-2800)



## ACCESSORY KITS

25223401	National Keyset Lock Cylinder & Key
25223402	Van Lock Cylinder & Key
25223403	Chicago Flexace Lock Cylinder & Key
25223404	Abloy Lock Cylinder & Key
25223405	Medeco Lock Cylinder & Key
27033503	Touch-Up Paint (White)
27033504	Touch-Up Paint (Blue)
27033505	Touch-Up Paint (Charcoal Brown)

## REPAIR KITS

27025801	Bucket Solenoid Plunger Kit (Narrow Door)
27025802	Bucket Solenoid Plunger Kit (Large Door)
27035901	Hopper Baffle Kit - High-Capacity (Quarters, Dimes, Nickels)
27035902	Hopper Baffle Kit - High-Capacity (\$1 Coins)
27029902	Hopper Motor Brake Lever Assembly
27020302	Motor Armature Assembly (Multi-Products)
27020801	Motor Armature Repair Kit (Molon)
27023302	Motor Brake Pawl (Multi-Products)
27023301	Motor Brake Pawl (Molon)
37004601	Hopper Motor Gear Case Assembly (Heavy Duty)
27033202	Hopper Conversion Kit (from small coins to large coins)
27034601	Door Guard Kit - high security frame that fits around the door openings
27031001	Line Filter Kit
27023902	Nylon Hopper Brush
65027609	S.B.A. Dollar Coin Hopper (or Large Tokens)
67002606	Service Cabinet with Door and Lock
35027806	T-Handle Assembly (Chicago Lock)
45062001	T-Handle Assembly (Medeco - w/Medeco Lock Cylinder)
35087512	Stellar Bank Kit - converts Standard Charcoal Brown Base & Filler Kit to Stellar Styling
27037401	25¢ Coin Acceptor Kit
35087503	Bank Kit (includes Base & Top Filler)      Blue
35087504	Bank Kit (includes Base & Top Filler)      White
35087505	Bank Kit (includes Base & Top Filler)      Black
35087513	Bank Kit (includes Base & Top Filler)      Charcoal Brown
35087533	Genesis Bank Kit - converts standard bank kit to Genesis Styling (should be used with 35087505 Black Base & Filler Kit to match vending bank)

## REPAIR KITS *(continued)*

35087403	Top Filler Kit	Blue
35087404	Top Filler Kit	White
35087405	Top Filler Kit	Black
35087203	Base Kit	Blue
35087204	Base Kit	White
35087205	Base Kit	Black
47000601	Coin and Chain Guide Assembly (Small Coins)	
47000602	Coin and Chain Guide Assembly (Large Coins)	

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