

# **BA30**

## **BILL ACCEPTOR**

Operation and Service Manual



# TABLE OF CONTENTS

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## Section 1: General Information

Introduction .....	3
Models .....	3
For Your Records .....	3
Features .....	3
After Unpacking .....	3
Main Logic Board Assembly .....	4
Specifications .....	4

## Section 2: Installation

Option Switch Settings .....	5
Installing the Bill Acceptor .....	6

## Section 3: Operation

Bill Recognition .....	7
Bill Validation .....	7
Bill Stacking and Credit .....	7
Bill Rejection .....	7
Component Explanation	
Bill Transport and Stacking .....	7
Left and Right Alignment Sensors .....	7
Center Optic Sensor .....	7
Left and Right Optic Sensor .....	7
Magnetic Sensor .....	7
Anti-Pullback Levers .....	7
Stacker Home Sensor .....	7
Encoder Sensor .....	7
Bill Box Switch .....	7
Component Explanation Drawing .....	8

## Section 4: Maintenance

Component Explanation .....	8
Disassembling the BA30 .....	9
Disassembling the Lower Housing .....	10
Disassembling the Chassis .....	12
BA30 Cleaning Maintenance Procedure .....	16
Cleaning Salt Water Damage .....	17

## Section 5: Troubleshooting

Introduction .....	18
BA30 Diagnostic Flash Codes .....	18
Troubleshooting Guide .....	19

## INTRODUCTION

This manual contains information on installing, operating and maintaining Coinco's BA30 Series bill acceptors. This manual is intended for owners, route operators and shop-level technicians as a primary source of information. Taking time to read this manual and becoming familiar with this information will help you obtain the best performance from your Coinco bill acceptor.

## MODELS

BA30 Series bill acceptors are self-contained units designed to work with existing vending machine interfaces, plus MDB vendors. Listed below are some of the models available:

**BA30B** Bill Acceptor, 300 capacity stacker, 110VAC, Bottler interface and mask

**BA32B** Bill Acceptor, 300 capacity stacker, 24VAC, Bottler interface and mask

**BA50B** Bill Acceptor, 500 capacity stacker, 110VAC, Bottler interface and mask

**BA30SA** Bill Acceptor, 300 capacity stacker, 110VAC, Snack interface and mask, Additional length harness

**BA32SA** Bill Acceptor, 300 capacity stacker, 24VAC, Snack interface and mask, Additional length harness

**BA92T** Bill Acceptor, 950 capacity stacker, 24VAC, Ticket vendor interface and mask

BA30B bill acceptors are primarily used in cold drink vendors which use either the electromechanical, electronic, or MDB interface. This bill acceptor uses the "bottler" interface, which communicates to the vendor through either HIGH LEVEL or MDB communication.

BA30SA and BA32SA bill acceptors are primarily used in either electronic or MDB snack, coffee or food machines. These bill acceptors use the "snack" interface and communicate to the vendor through either PULSE, SERIAL, PARALLEL or MDB communication.

## FOR YOUR RECORDS

A label indicating the model number and serial number is affixed to the back of the bill acceptor. Refer to the model and serial number whenever you call upon your Coinco Service Center for information or service. The first four digits of the serial number contain the manufacturing date code which indicates the beginning of the warranty period.

*EXAMPLE: Serial number 269700135. First and second digits indicate the week of manufacture. The third and fourth digits indicate the year (the 26th week of 1997).*

## FEATURES

- Modular design
- State-of-the-art electronic logic system
- Switch selectable acceptance of the following bills: \$1, \$2, \$5, \$10 and \$20.
- High capacity bill box.
- Vandal resistant design protects against: saltwater, bill pullback, counterfeit bills.
- Utilizes standard mounting and electrical interfaces.
- 110 and 24 VAC and 24 VDC Multi-Drop Bus interfaces available.
- High impact, non-corrosive plastic construction.
- Easily accessible bill path.
- Self-diagnostics communicated via status light.
- Standard/High Level security switch.
- Switch selectable acceptance of bills face up, in one or both directions.
- Optional non-resettable counter.
- Optional hasp for locking bill box.
- Manufactured and supported by Coinco.
- Made in the U.S.A.

## AFTER UNPACKING

After unpacking the unit, inspect it for any possible shipping damage. If the unit is damaged, notify the shipping company immediately. Only the co-signee (the person or company receiving the unit) can file a claim against the carrier for shipping damage. We recommend that you retain the original carton and packing materials to reuse if you need to transport or ship your acceptor in the future.

If the bill acceptor is being stored or used as a spare, always keep it in its shipping carton when not in use. This will keep it clean and offer the best protection for the unit.

# SECTION 1: GENERAL INFORMATION

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## MAIN LOGIC BOARD ASSEMBLY

The main logic board contains the microprocessor which controls all the functions of the bill acceptor based on information from the vending machine, coin mechanism and various bill acceptor sensors.

Also contained on the main logic board is the power supply which receives its primary voltage from the vending machine. For 117VAC units, the primary AC voltage is routed to the transformer in the bill acceptor where it is reduced to 24VAC. This 24VAC is then routed back to the main logic board where it is rectified and filtered for logic board operation. For 24VAC and 24 VDC (MDB) units, no transformer is needed. The primary voltage is rectified and filtered on the main logic board.

## SPECIFICATIONS

### Power Requirements

#### **BA30B, BA30SA — 117VAC**

95 to 130 VAC, 60 Hz

0.2 Amp max standby

0.75 Amp max operating

#### **BA32B, BA32SA — 24VAC**

20 to 32 VAC, 60 Hz

0.2 Amp average standby

2.5 Amp average operating

#### **All MDB — 24VDC**

22 to 45 VDC

0.2 Amp average standby

2.5 Amp average operating

### Operating Temperature

32°F to 150°F

0°C to 65°C

### Storage Temperature

-22°F to 165°F

-30°C to 74°C

### Relative Humidity

5% to 95% non-condensing

### Physical Weight in Shipping Carton

5.7 pounds - 117VAC

4 pounds - 24VAC

### Physical Dimensions

	<b><u>BA30</u></b>	<b><u>BA50</u></b>	<b><u>BA70</u></b>
<b><u>Height</u></b>	11.53 inches	11.53 inches	11.53 inches
<i>from top of bill box to bottom of mounting plate</i>			
<b><u>Width</u></b>	5.31 inches	5.31 inches	5.31 inches
<i>from logic board cover to mounting plate</i>			
<b><u>Depth</u></b>	4.27 inches	4.90 inches	5.52 inches
<i>from mounting plate to back of stacker</i>			

**OPTION SWITCH SETTINGS**

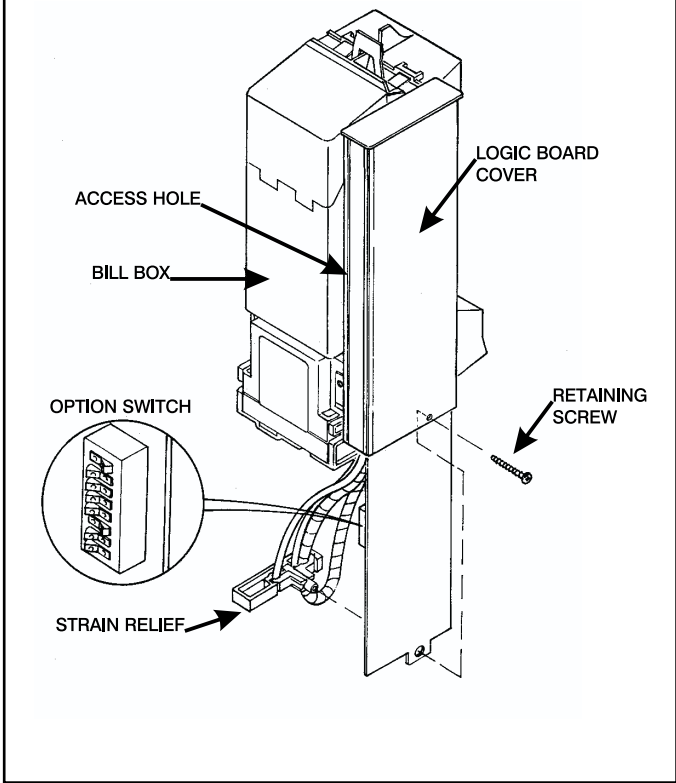
BA30 bill acceptors contain an option switch bank on the main logic board which allows the unit to be customized to the requirements of the individual account. This switch bank is factory set with switches 3 and 8 in the ON position and 1, 2, 4, 5, 6 and 7 in the OFF position.

**Setting Option Switches (see Figure 1)**

**For units manufactured without an access hole in the logic board cover:** Remove power from the bill acceptor. Remove the retaining screw that secures the main logic board and strain relief. Carefully slide the main logic board and strain relief from the cover. Allow the strain relief to disengage the logic board and continue to slide the logic board down until the option switch bank is accessible. Set the option switches as desired. Reassemble the bill acceptor in the reverse order of disassembly. Apply power and test for proper operation.

**For units manufactured with an access hole in the logic board cover:** Removed power from the bill acceptor. Remove the bill box. Located on the side of the logic board cover is a clear decal seal which covers the option switch access hole. Carefully remove this decal seal to access the option switch bank. Insert a small screwdriver through the access hole to set the option switches as desired. Place the decal seal back over the access hole and reinstall the bill box. Apply power and test for proper operation.

Figure 1



## SECTION 2: INSTALLATION

### INSTALLING THE BILL ACCEPTOR

1. Remove power from the vending machine.
2. Set the bill acceptor option switches as desired.
3. Mount the bill acceptor according to the instructions found in the vending machine manual or appropriate kit literature.
4. Connect the bill acceptor harness to the mating harness in the vending machine.
5. Load the vending machine with product and fill the coin changer with change.
6. Apply power to the vending machine.
7. Test for proper operation.

### BA30B/BA32B Option Switch Settings (see Figure 2)

SWITCH	ON	OFF
1	High Security	Standard Acceptance
2	Accepts bills in one directions only (face up, green seal first)	Accepts bills in both directions (face up)
3	Standard credit pulse 150ms on 150ms off	Short credit pulse 50 ms on 50 ms off
4	\$20 Accept	\$20 Reject
5	\$10 Accept	\$10 Reject
6	\$5 Accept	\$5 Reject
7	\$2 Accept	\$2 Reject
8	\$1 Accept	\$1 Reject

### BA30SA/BA32SA Option Switch Settings (see Figure 2)

SWITCH	ON	OFF
1	High Security	Standard Acceptance
2	Accepts bills in one directions only (face up, green seal first)	Accepts bills in both directions (face up)
3	Serial or Parallel Interface	Pulse Interface
4	\$20 Accept	\$20 Reject
5	\$10 Accept	\$10 Reject
6	\$5 Accept	\$5 Reject
7	\$2 Accept	\$2 Reject
8	\$1 Accept	\$1 Reject

### **BILL RECOGNITION**

When a bill is inserted into the bill acceptor and it blocks the left and right alignment sensors as well as the center optic sensor, the transport motor begins to run.

### **BILL VALIDATION**

From the time the transport motor begins to run until the trailing edge of the bill leaves the alignment sensors, optical and magnetic sensors send information to the microprocessor to determine the validity of the bill.

### **BILL STACKING AND CREDIT**

If the bill is determined to be authentic, it is transported to the stack position. Once the sensors of the lower housing's anti-pullback lever signals the microprocessor that the bill is in the stacking position, the stacker motor runs and credit is given.

### **BILL REJECTION**

If the bill is determined to be invalid, the wrong denomination or the anti-pullback levers are active when the bill is determined to be in the stack position, the transport motor will reverse returning the bill to the customer.

### **COMPONENT EXPLANATION (see Figure 3)**

#### **Bill Transport and Stacking**

The bill transport system is composed of a motor and gearcase assembly and three sets of pulleys and belts: the lower housing belts, the chassis belts and the intermediate frame belts. When the transport motor is energized, it pulls the bill in by sandwiching it between the lower housing belts and the chassis belts. During the validation process, the bill is transferred from the lower housing and chassis belts to the intermediate frame and chassis belts.

The bill stacker is composed of a motor and gearcase assembly and a pusher plate assembly. When the bill is transported past the anti-pullback levers into the stacking position, the stacker motor energizes driving the pusher plate, which in turn, pushes the bill into the bill box.

#### **Left and Right Alignment Sensors**

The left and right alignment sensors send information to the microprocessor to insure that the bill is the right width and that it is being fed in correctly.

#### **Center Optic Sensor**

The center optic sensor informs the microprocessor that the bill is ready to be transported if the information from the alignment sensors is correct.

#### **Left and Right Optic Sensors**

The left and right optic sensors and associated circuitry perform various optical checks on the bill and send that information to the microprocessor for bill validation.

#### **Magnetic Sensor**

The magnetic sensor and its associated circuitry performs checks on the magnetic properties of the bill and sends that information to the microprocessor for bill validation.

#### **Anti-Pullback Lever**

The lower anti-pullback lever is optically monitored to tell the microprocessor when the bill has entered the stack position or if an attempt to defraud the unit is taking place.

#### **Stacker Home Sensor**

The stacker home sensor is an optical sensor that informs the microprocessor of the position of the stacker pusher plate.

#### **Encoder Sensor**

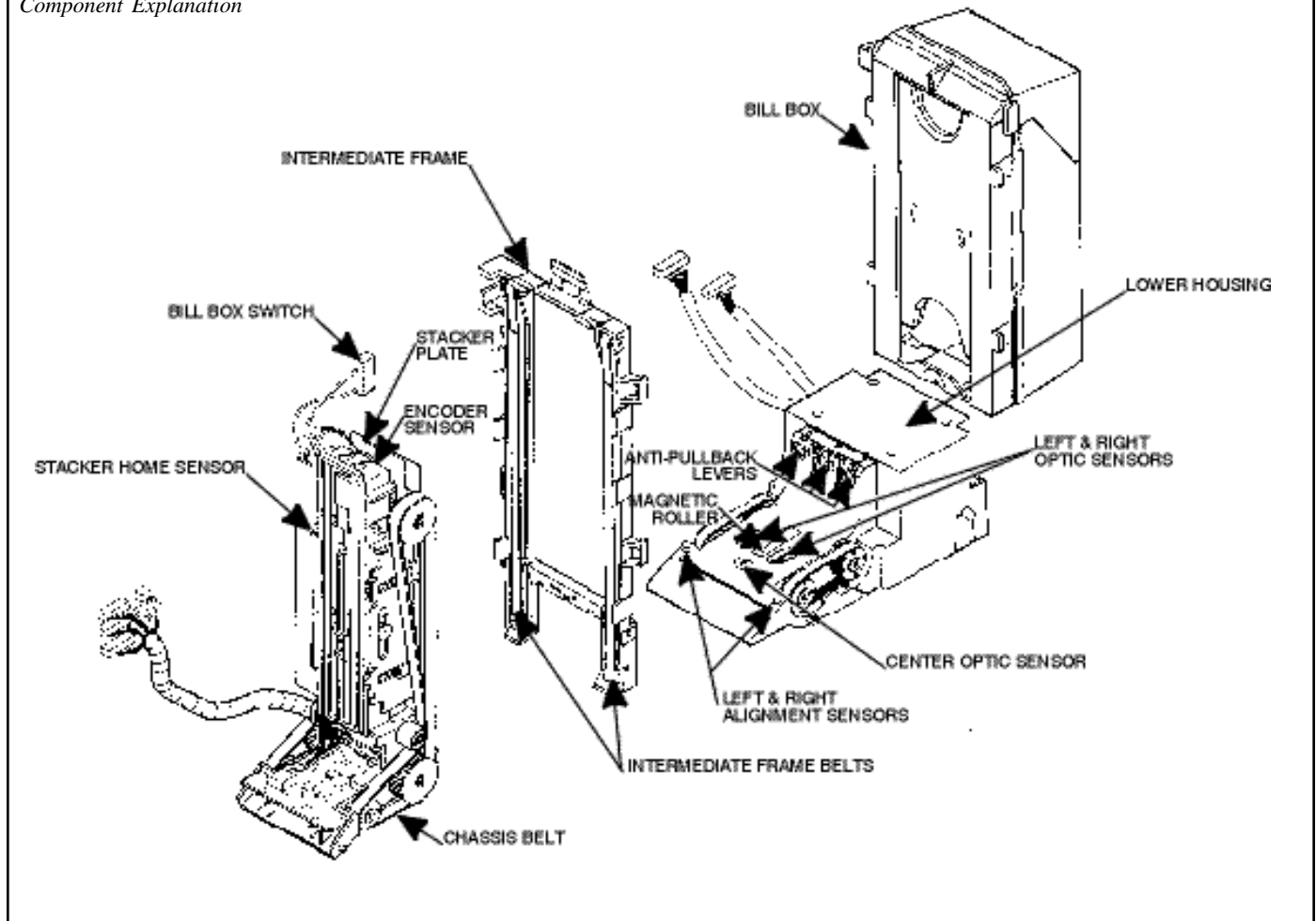
Connected to the transport motor is an encoder wheel which is optically monitored to determine the speed of the transport motor and to determine the position of the bill in the bill path.

#### **Bill Box Switch**

The bill box switch (if installed) resets the bill acceptor each time the lid is closed. For units without a bill box switch, reset is microprocessor controlled.

## SECTION 3: OPERATION

Figure 3  
Component Explanation



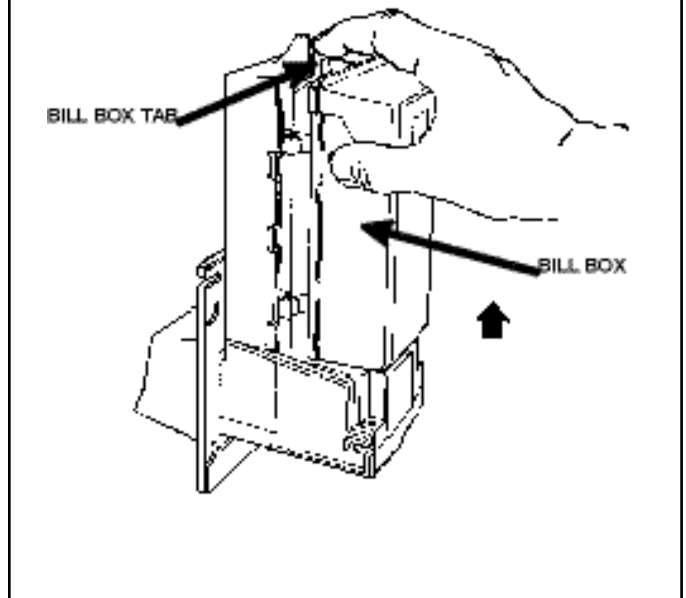


**DISASSEMBLING THE BA30**

**Removing the Bill Box (see Figure 4)**

Push the bill box tab forward while sliding the bill box up.

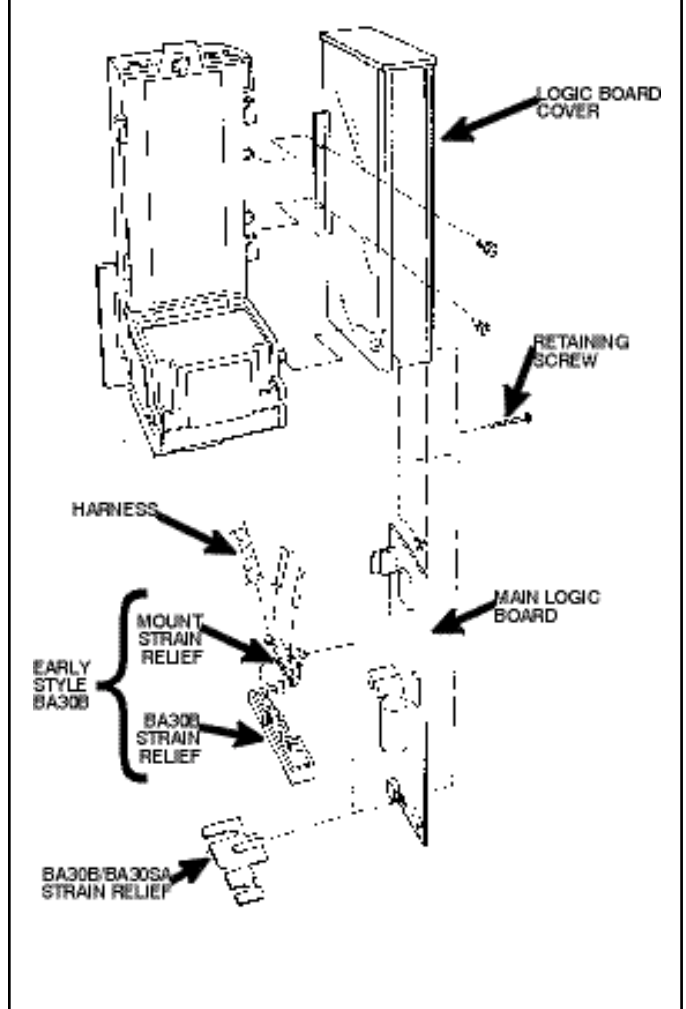
Figure 4



**Removing the Main Logic Board (see Figure 5)**

Remove the three Phillips screws that secure the logic board cover to the main frame. Remove the Phillips screw from the bottom of the logic board cover that retains the harness strain relief and slide the logic board out of the logic board cover. (The harness strain relief is located at the bottom of the logic board cover.) Unplug the harnessing from the logic board and place the logic board in a static-free area. Remove the strain relief from the harnessing.

Figure 5



## SECTION 4: MAINTENANCE

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### **Removing the Lower Housing**

To remove the lower housing, push the locking tab on the bottom of the bill acceptor and pull the lower housing to the rear.

### **Removing the Intermediate Frame**

Using a small straight tip screwdriver, free the ten locking tabs which secure the intermediate frame to the main frame and remove the intermediate frame. On early units with a position sensor, it is necessary to remove the position sensor from the intermediate frame. Use a small straight tip screwdriver to remove the position sensor cover from the intermediate frame and remove the position sensor.

***NOTE:** Units beginning with serial #109300187 or later do not have a bill position sensor.*

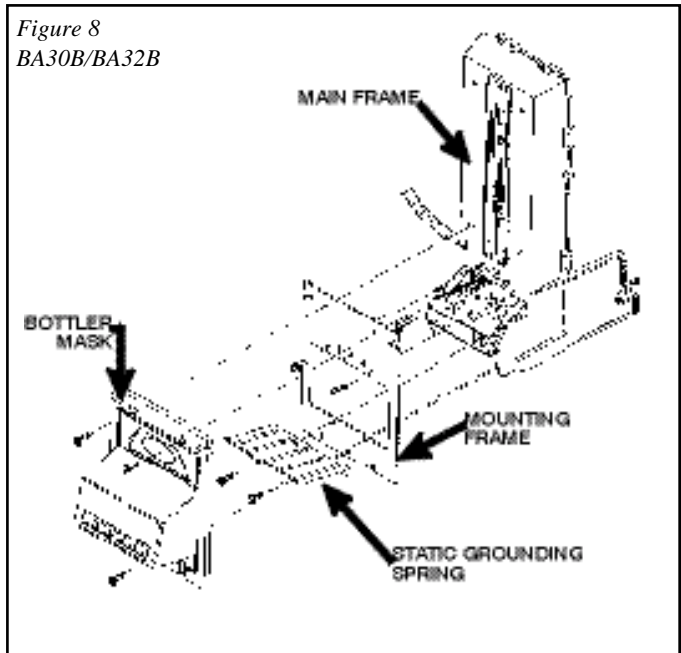
**Removing the Inlet Mask  
(see Figure 8 or 9)**

Using a Phillips screwdriver, remove the three screws that secure the mask to the mounting frame.

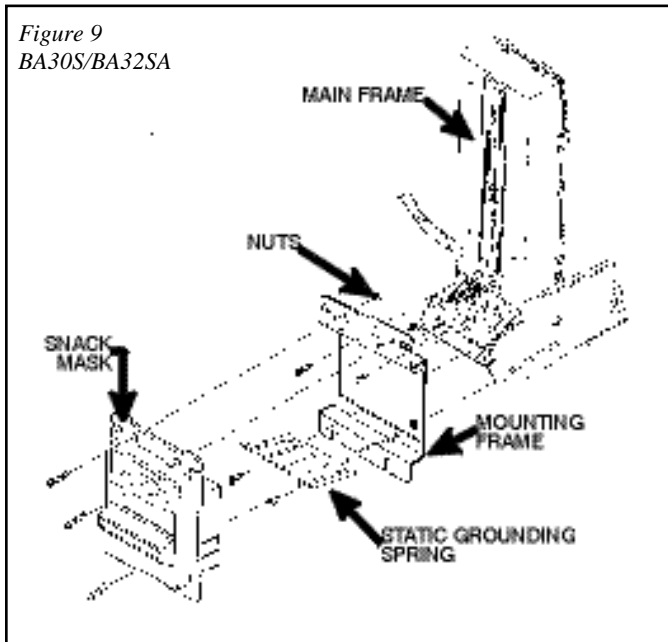
**Removing the Mounting Frame and Static Grounding Spring (see Figure 8 or 9)**

Using a Phillips screwdriver, remove the screws that attach the mounting plate and grounding spring to the main frame.

*Figure 8  
BA30B/BA32B*



*Figure 9  
BA30S/BA32SA*



**Removing the Chassis from the Main-frame**

Free the bill box switch (if equipped) from the main frame by sliding it toward the bill box area until it clears the main frame. Let the switch hang. Remove the web wrap or spiral wrap from the chassis harness. Spread the main frame apart to release the two locating pins of the chassis from the main frame then pull down on the chassis. Carefully feed the chassis harness through the opening in the main frame. Pull the chassis out through the lower main frame opening.

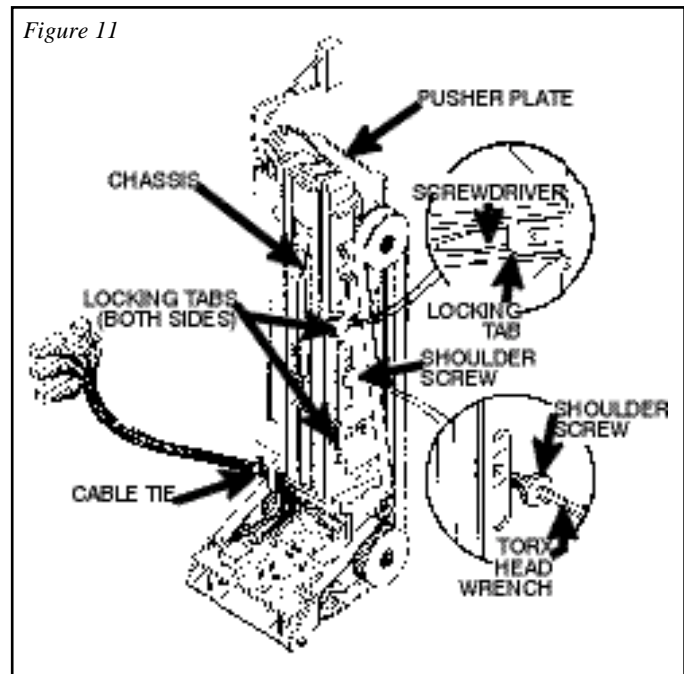
## SECTION 4: MAINTENANCE

### DISASSEMBLING THE CHASSIS

#### Removing the Pusher Plate from the Chassis (see Figure 11)

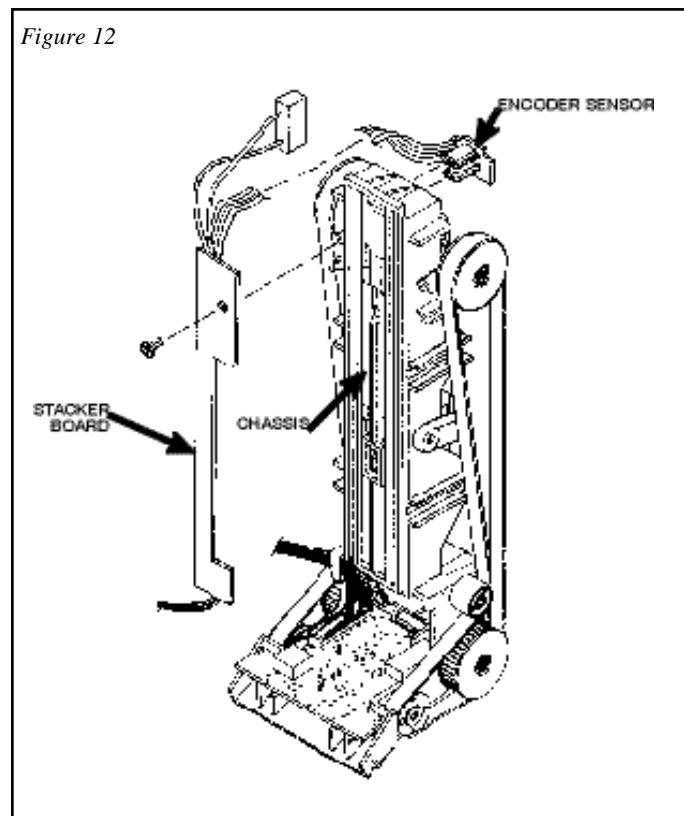
Cut the cable tie that secures the chassis harnessing. Remove the two T15 Torx head shoulder screws that secure the pusher plate to the stacker gear box assembly. Pull the pusher plate straight out until the locking tabs of the stacker slides catch the chassis. Using a small screwdriver, release the four tabs and remove the pusher plate.

*NOTE: Early models used 1/8" hex shoulder screws.*



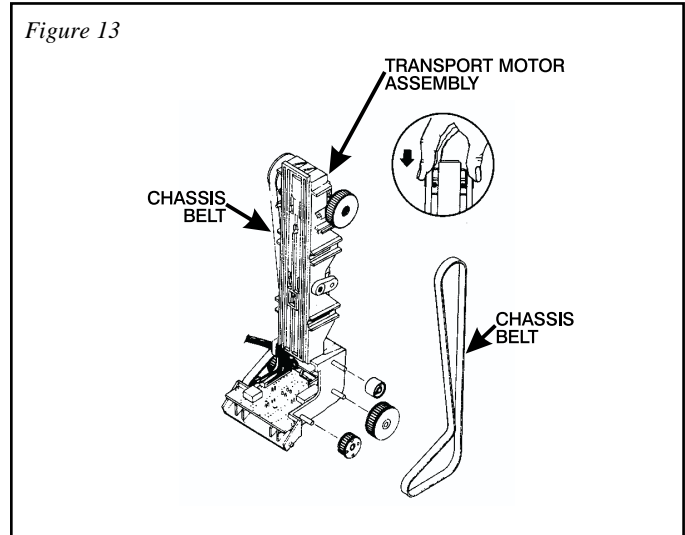
#### Removing the Encoder Sensor and Stacker Board (see Figure 12)

Free the encoder sensor from the top of the transport motor gear case assembly. Remove the Phillips screw that secures the stacker board to the chassis and remove the stacker board.



## Removing the Chassis Belts and Pulleys (see Figure 13)

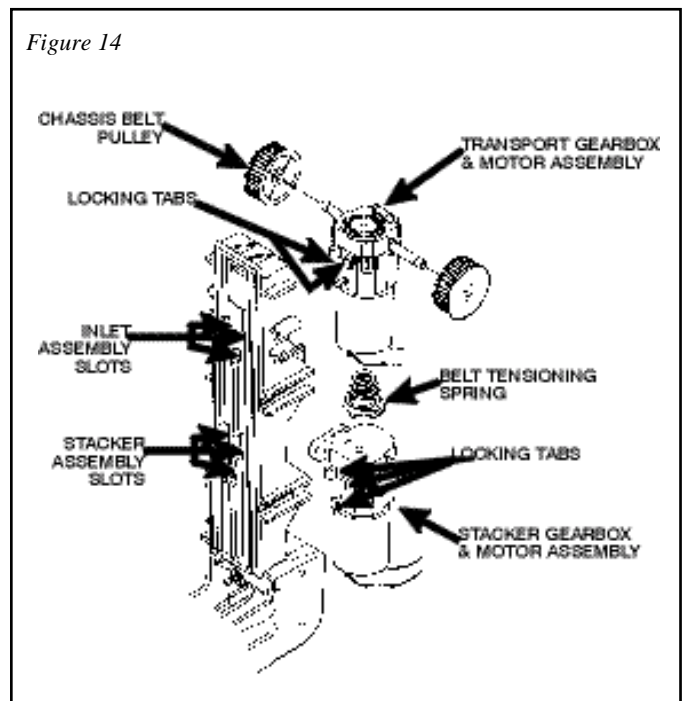
Compress the belt tensioning spring by pressing down on the transport motor and gear case assembly and remove the belts. Slide the pulleys off the lower shafts to prevent them from falling off.



## Removing the Transport and Stacker Motor Assemblies (see Figure 14)

Compress the belt tensioning spring by pushing up on the stacker motor and gear case assembly until the three locking tabs of the gear case can be freed from their mating slots in the chassis. Remove the stacker motor and gear case assembly along with the tensioning spring. Slide the transport motor and gear case assembly down until its three locking tabs are freed from their mating slots on the chassis.

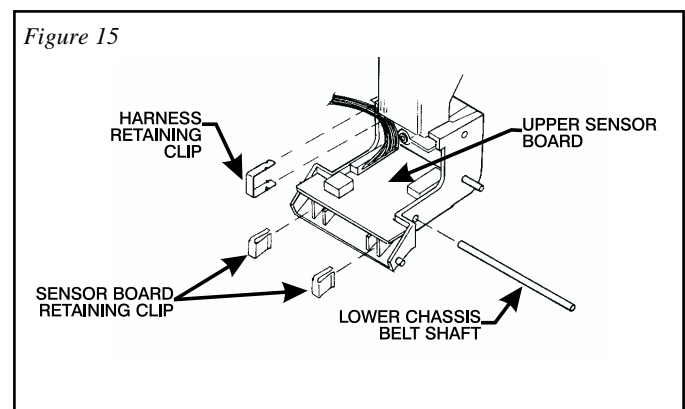
**NOTE:** It may be necessary to remove the chassis belt pulleys from the transport motor assembly.



## Removing the Upper Sensor Board from the Chassis (see Figure 15)

Remove the lower chassis belt shaft. Using a small screwdriver, remove the two metal sensor board retaining clips and the harness retaining clip. Lift the front of the sensor board and pull forward.

**NOTE:** On earlier units with a position sensor, remove the upper chassis belt shaft and remove the Phillips screw that retains the position sensor board and remove the sensor.



## SECTION 4: MAINTENANCE

### Removing the Chassis Anti-Pullback Lever and Spring

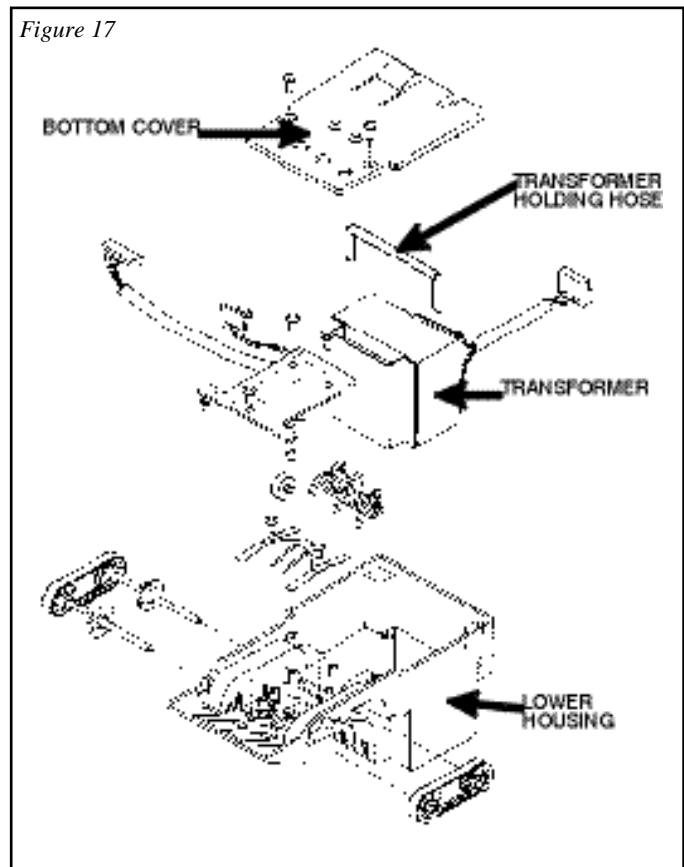
Remove the center chassis belt shaft and remove the anti-pullback lever and spring.

### DISASSEMBLING THE LOWER HOUSING

#### Removing the Transformer (see Figure 17)

Remove the two Phillips screws from the bottom of the lower housing that secure the bottom cover. Remove the bottom cover. Cut the cable tie and separate the harness. Remove the hose that holds the transformer in place. Remove the transformer.

Figure 17



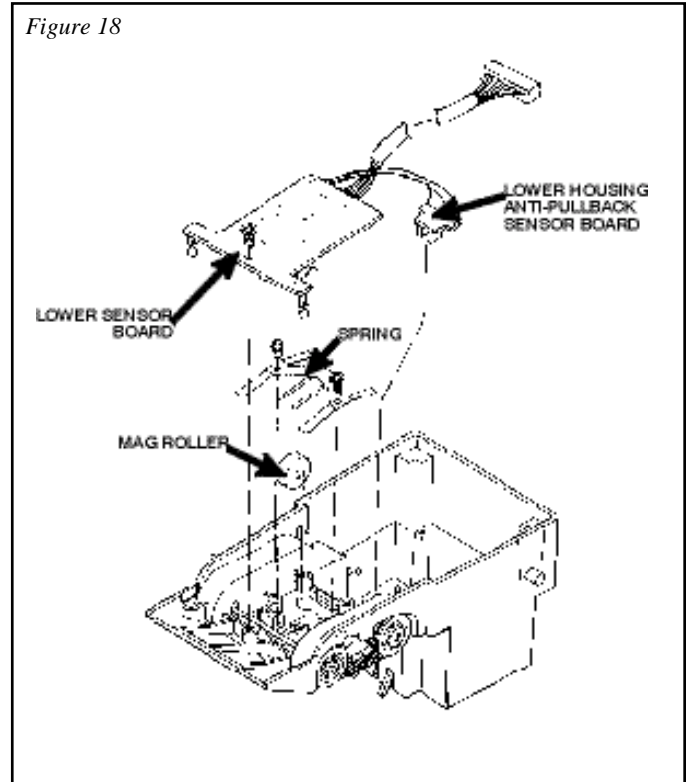
### Removing the Lower Sensor Board (see Figure 18)

Remove the Phillips screw that secures the sensor board to the lower housing, unsnap the lower housing anti-pullback sensor board and remove the lower sensor board.

*NOTE: Earlier units may have the anti-pullback sensor board glued into place.*

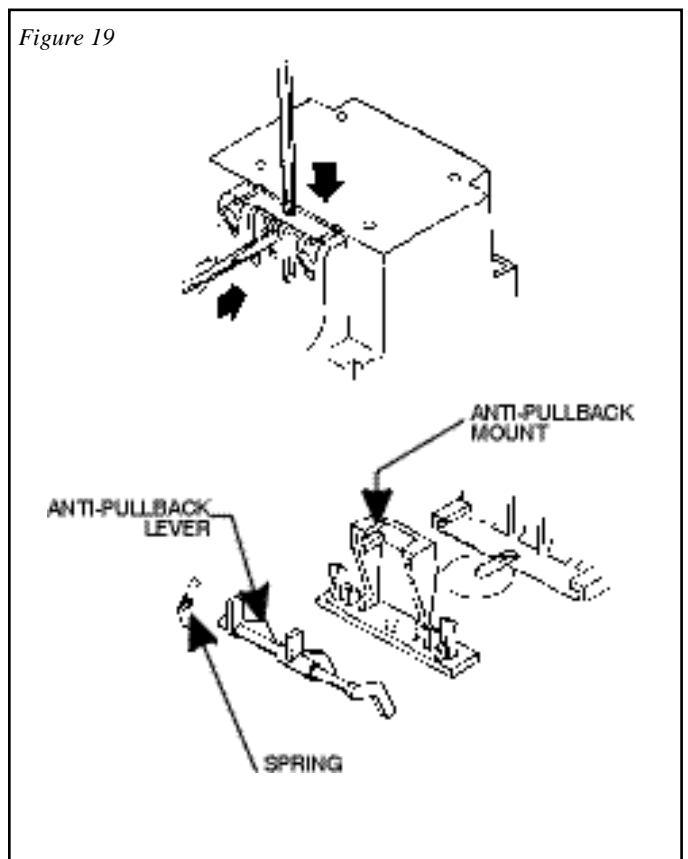
### Removing the Mag Roller and Spring (see Figure 18)

Remove the two Phillips screws that secure the mag roller spring and remove the spring and roller.



### Removing the Lower Housing Anti-Pullback Lever and Spring (see Figure 19)

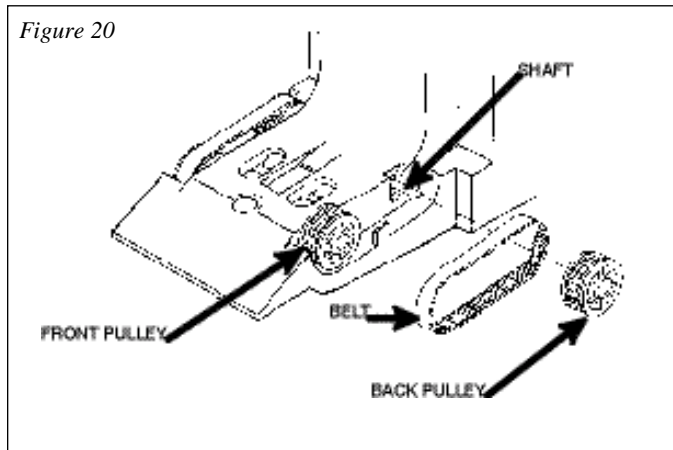
Using a small drift or Phillips screwdriver, depress the locking tab in the small hole in top of the lower housing. At the same time, insert a small standard blade screwdriver into the center slot and push the anti-pullback assembly back out of the retaining tabs. Remove the anti-pullback lever from its mount by releasing the locking tabs. Pay close attention to the placement of the spring to assure its correct position on reassembly.



## SECTION 4: MAINTENANCE

### Removing the Lower Housing Belts and Pulleys (see Figure 20)

Slide either the front or back pulley off its shaft to free the belt for removal.



### BA30 CLEANING MAINTENANCE PROCEDURE

*NOTE: Petroleum-based cleaners and freon-based propellants can damage plastic and some electronic components. Scouring pads and stiff brushes may harm the protective coating on the circuit boards and can mar the plastic. These items should never be used when cleaning the BA30 bill acceptor.*

The BA30 should be cleaned every 20,000 bills or every two years (or as needed, depending on the environmental conditions of the location). Dust can be removed with a soft brush or cloth or it can be blown out using compressed air.

#### Procedure

1. Disconnect power from the bill acceptor.
2. Remove the bill box and use a soft cloth to wipe any dust from around the intermediate frame and stacker plate.
3. Remove the lower housing.
4. Using compressed air or a soft brush, blow or brush the dust off of the optic sensors and out of the recessed sensor openings.
5. Remove dust from around the belts and pulleys on the lower housing and the sensors on the upper sensor board. The upper sensors are located directly above the lower housing sensors when the lower housing is installed.
6. The bill path can be further cleaned of any dirt or oil by using a soft cloth moistened with a mild soap and water solution.
7. Clean the magnetic head with a cotton swab and isopropyl alcohol.
8. Blow the dust out of the encoder wheel and its sensor. (It may be necessary to extend the stacker plate to access the encoder wheel. This can be done by supplying power to the unit momentarily so the stacker plate extends outward.)
9. Remove dust from the transport belt areas and any other places of build up.
10. Once the lower housing is dry, place it back into the mainframe making sure the tab on the bottom locks into place.
11. Remount the bill box.
12. Apply power and insert bills to verify the unit is functioning properly.



### BA30 CLEANING PROCEDURE FOR SALT WATER POLLUTED UNITS

*NOTE: Petroleum-based cleaners and freon-based propellants can damage plastic and some electronic components. Scouring pads and stiff brushes may harm the protective coating on the circuit boards and can mar the plastic. These items should never be used when cleaning the BA30 bill acceptor.*

#### Procedure

1. Remove power from the bill acceptor.
2. Remove the bill acceptor from the vending machine.
3. Open the bill box lid and verify that the stacker plate is in the standby/home position. If it is not in the home position, apply power and observe that the stacker plate returns home.
4. Remove the bill box.

*WARNING: If moisture is present, allow the unit to dry thoroughly before applying power to avoid possible shock hazard. If the stacker plate does not return to the home position, remove power and carefully remove the bill box to avoid damaging the bill box and/or stacker plate.*

5. Remove the lower housing.
6. Remove the bottom cover from the lower housing.
7. Run hot water (110°-140°F) over the lower housing from the top and bottom. Using a soft brush, gently clean any salt residue. Use a soft, absorbent cloth to clean residue off the lower housing. If the transformer gets wet, allow the unit to dry for 24 hours before applying power.
8. Remove the front mask. Using hot water and a soft brush, clean the front mask, upper sensor board and main frame anti-pullback levers.

*CAUTION: The motors are not protected from water, therefore the unit must be held in a manner that prevents water from running over them.*

9. (For units prior to serial number 109300187 only) Remove the position sensor cover on the crossbar and carefully lift the LED from its mount. Clean all salt residue from the mount, sensor hole and detector area. (The detector can be seen through the sensor hole and is located in the chassis.) Replace the position sensor cover.

*CAUTION: Protective coating on the LED leads should not be damaged.*

10. Verify the anti-pullback levers move freely and that the spring returns them to their extended position.
11. Allow the unit to dry thoroughly.
12. Clean the magnetic head using a swab and isopropyl alcohol.
13. Replace the front mask.
14. Replace the lower housing cover.
15. Place the lower housing into the main frame.
16. Remount the bill box.
17. Apply power and insert bills to verify the unit is functioning properly.

## SECTION 5: TROUBLESHOOTING

### INTRODUCTION

The Troubleshooting Guide on the following pages is intended to help locate problems within the bill acceptor. If a bill acceptor cannot be repaired by following this guide, return the unit to the nearest Coinco Service Center for repair along with a complete description of the problem you are having with the bill acceptor.

Logic troubleshooting minimizes the time spent in removing and replacing parts that are not defective. Some failures are caused by minor problems such as dirt or loose/faulty connections. Please check the following before replacing any parts:

- Clean any dirt or dust from the bill path.
- Coin changer inventory tubes are filled to their correct levels.
- Connectors are inserted correctly.
- Connector pins are not bent or broken.
- All wires are properly secured.

### COINCO BA30 DIAGNOSTIC CODES

Troubleshooting can be done by reading the number of flashes or blinks of light from the LED located inside the logic board cover. These flashes can be seen through the smoked gray cover.

#### For all BA30's up to serial number 1297XXXXX with CPU 921068-5 or 921638-8:

Diagnostic codes 1-5 may appear during normal servicing of the BA30. To access diagnostic codes 6-18, open the bill box lid and turn off power to the BA30 for 10 seconds. Reapply power to the BA30 with the bill box lid open. Diagnostic codes 6-18 will appear for the respective error conditions detected in the BA30. If more than one error exists, the lower number code will appear until its condition is corrected.

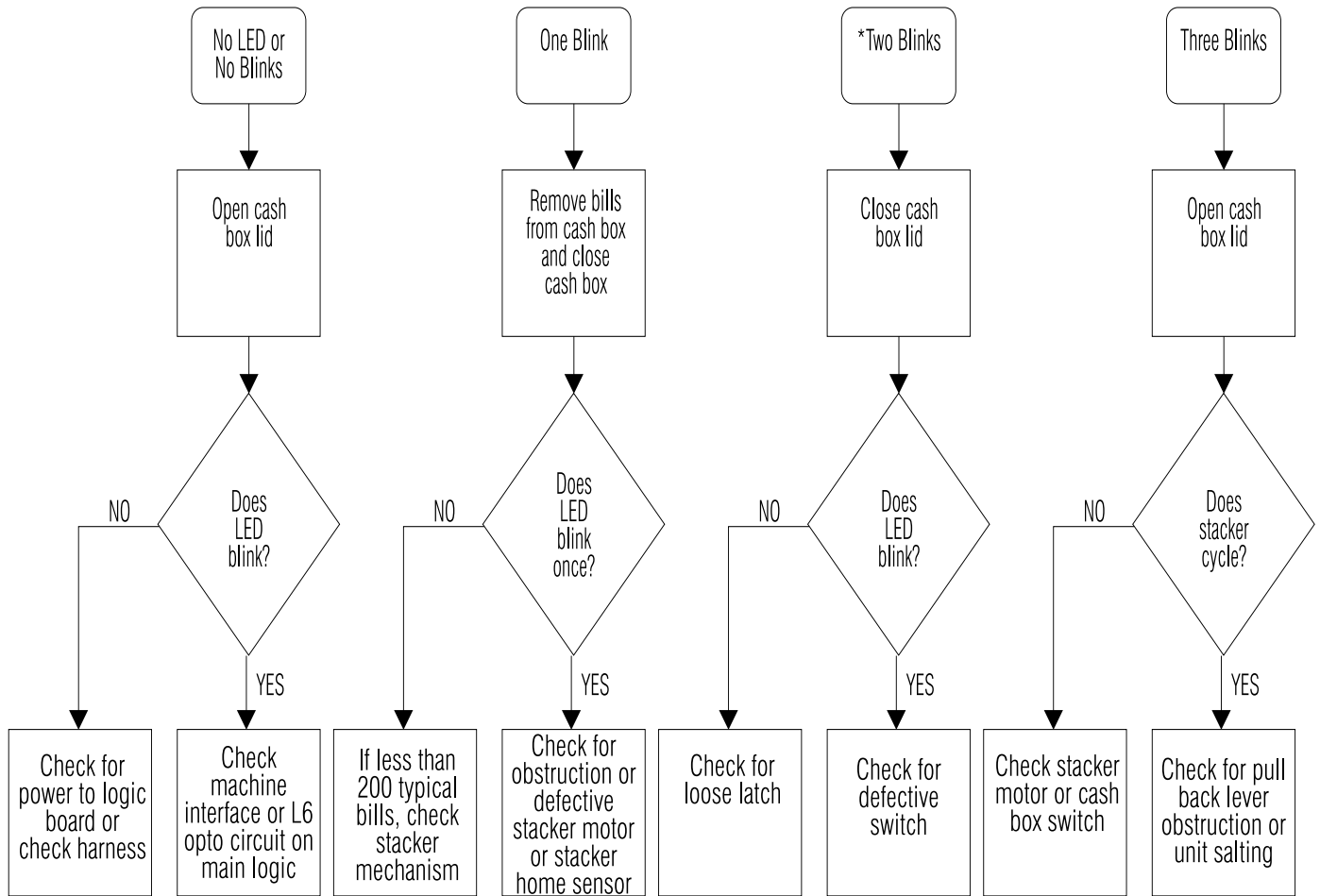
#### For BA30's manufactured after serial number 1297XXXXX with CPU 67044-4:

Diagnostic codes 2, 8, 14, and 18 are not used. Codes 1, 3, 4, 5, 15, 16 may appear during normal servicing of the BA30. If the BA30 is flashing a #5 code, turn off power to the BA30 for 10 seconds. Reapply power to the BA30 and diagnostic codes 6, 7, 9, 10, 11, 12, 13, and 17 will appear for approximately 30 seconds. After 30 seconds these codes will revert back to the #5 code. If more than one error exists, the lower number code will appear until its condition is corrected. The left and right sensors referenced in the next column are given viewing the BA30 from the front.

- \* Units beginning with serial #109300187 do not have a bill position sensor.
- \* Units beginning with serial #359300001 do not have upper board anti-pullback sensors.
- \*\* Bill box diagnostic code is used on BA30B models with the CPU #921068-5 only.

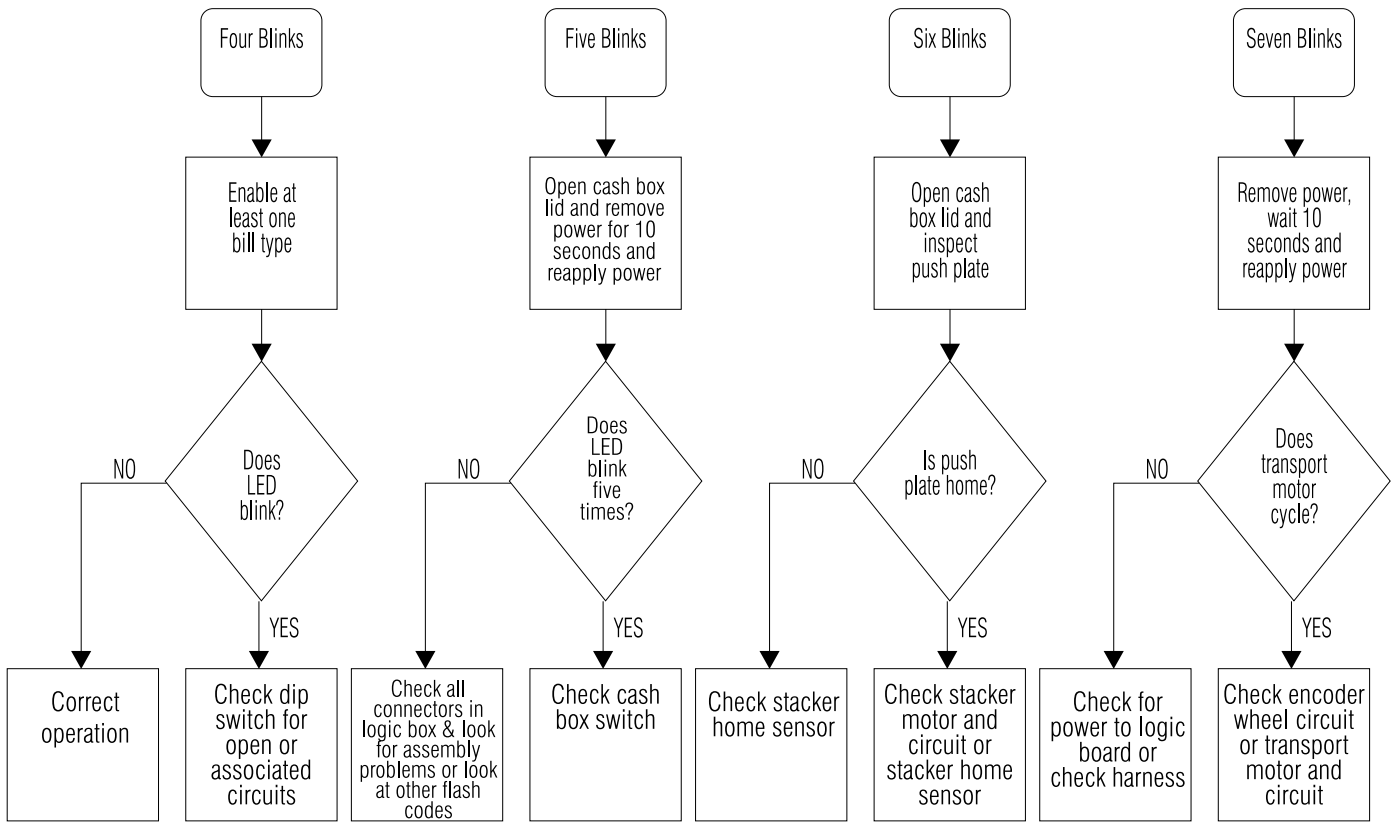
# Of Flashes	Description of Diagnostic Codes
1	Bill Box Full
2	Bill Box Lid Is Open or Bill Box Is Off **
3	Check Bill Path
4	All Bill Accept Switches Are Off
5	Bill Jam or Sensor Error
6	Stacker Motor/Home Sensor
7	Transport Motor/Encoder Sensor
8	(Reserved for Future Use)
9	EEPROM Check Sum Error
10	RAM or ROM Check Sum Error
11	Center Optic Sensor
12	Right Optic Sensor
13	Left Optic Sensor
14	Bill Position Sensor Error *
15	Right position Sensor
16	Left Position Sensor
17	Lower Board Anti-Pullback Lever Sensor
18	Upper Board Anti-Pullback Lever Sensor *

# SECTION 5: TROUBLESHOOTING

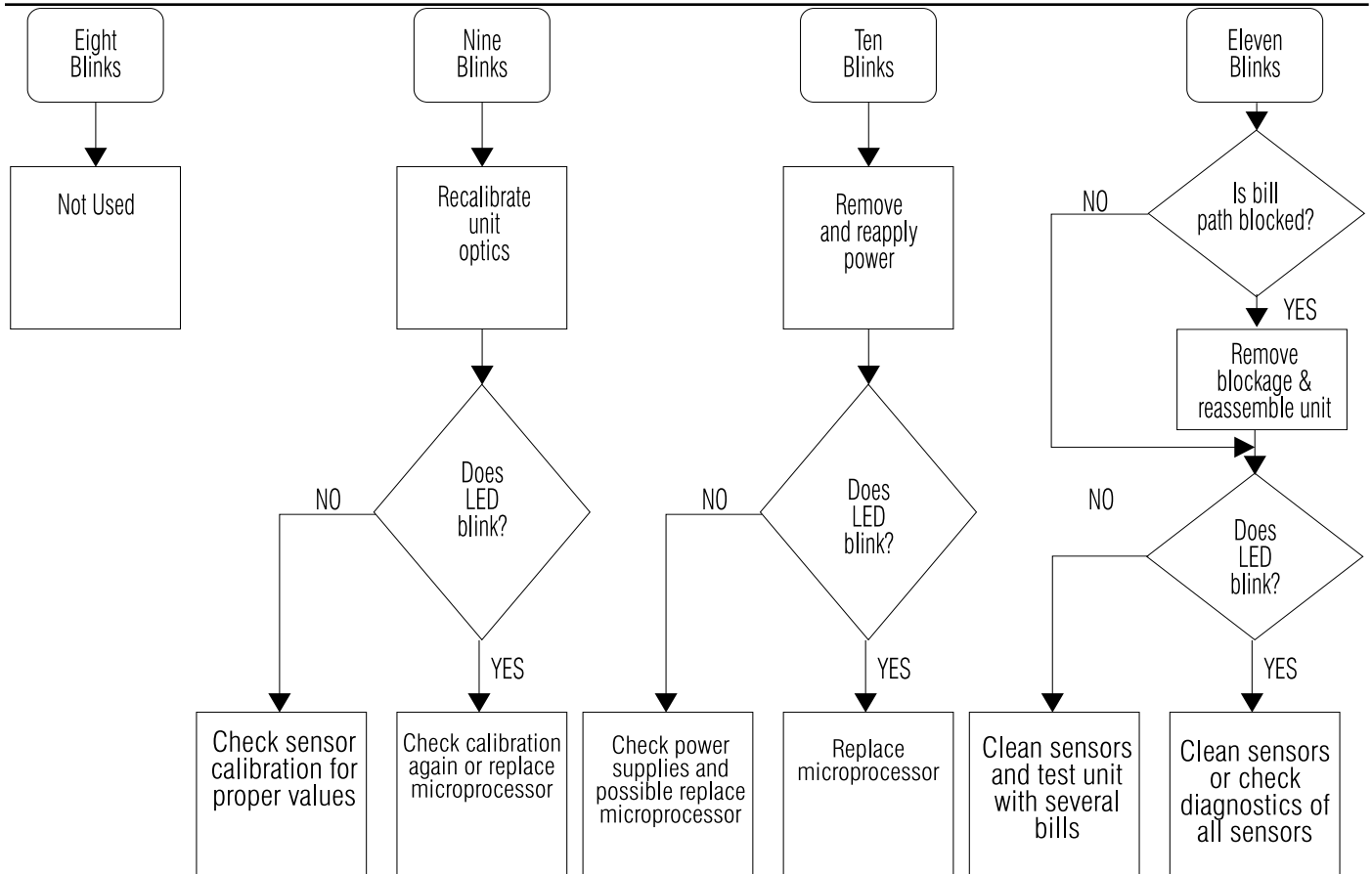


\*Bill box diagnostic code used on BA-30B model with chip 921068-5 only.

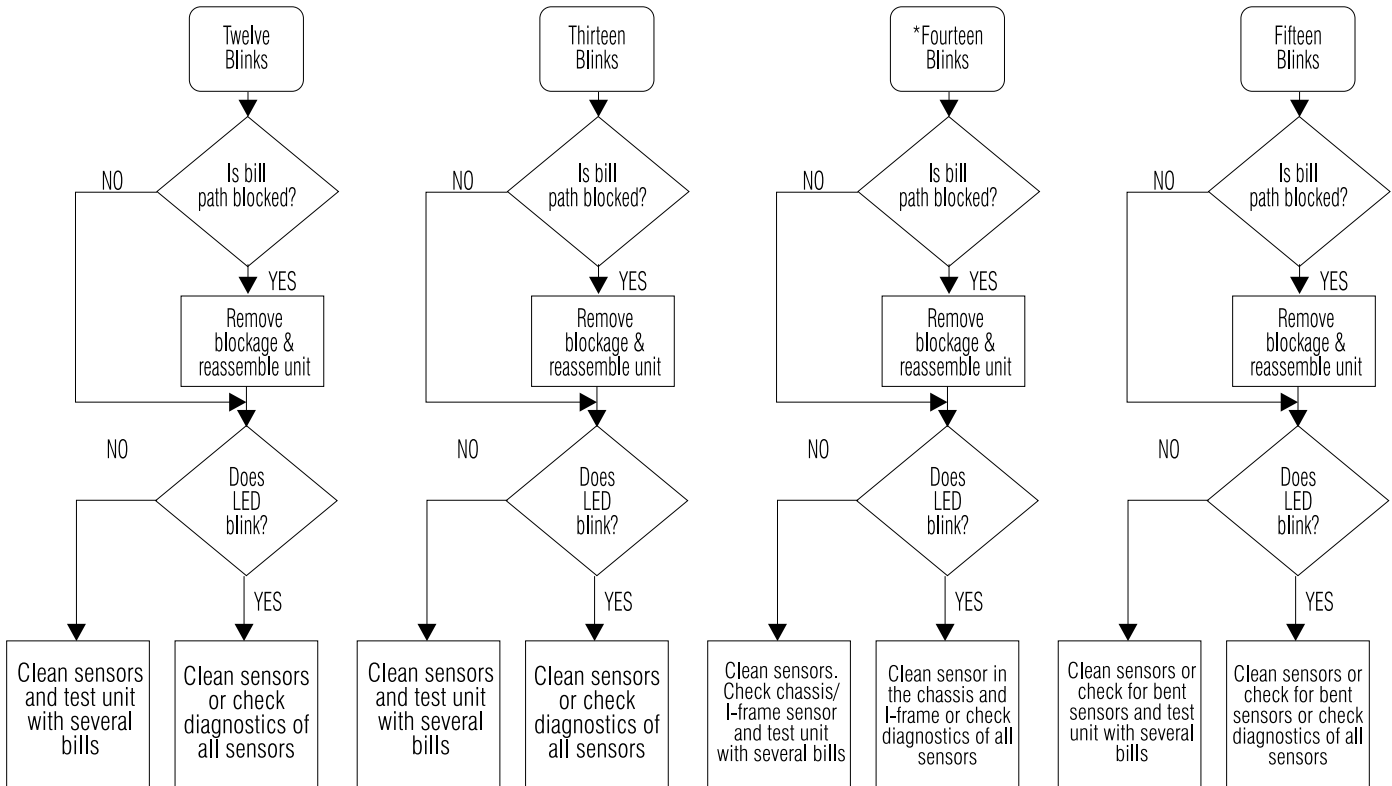
## SECTION 5: TROUBLESHOOTING



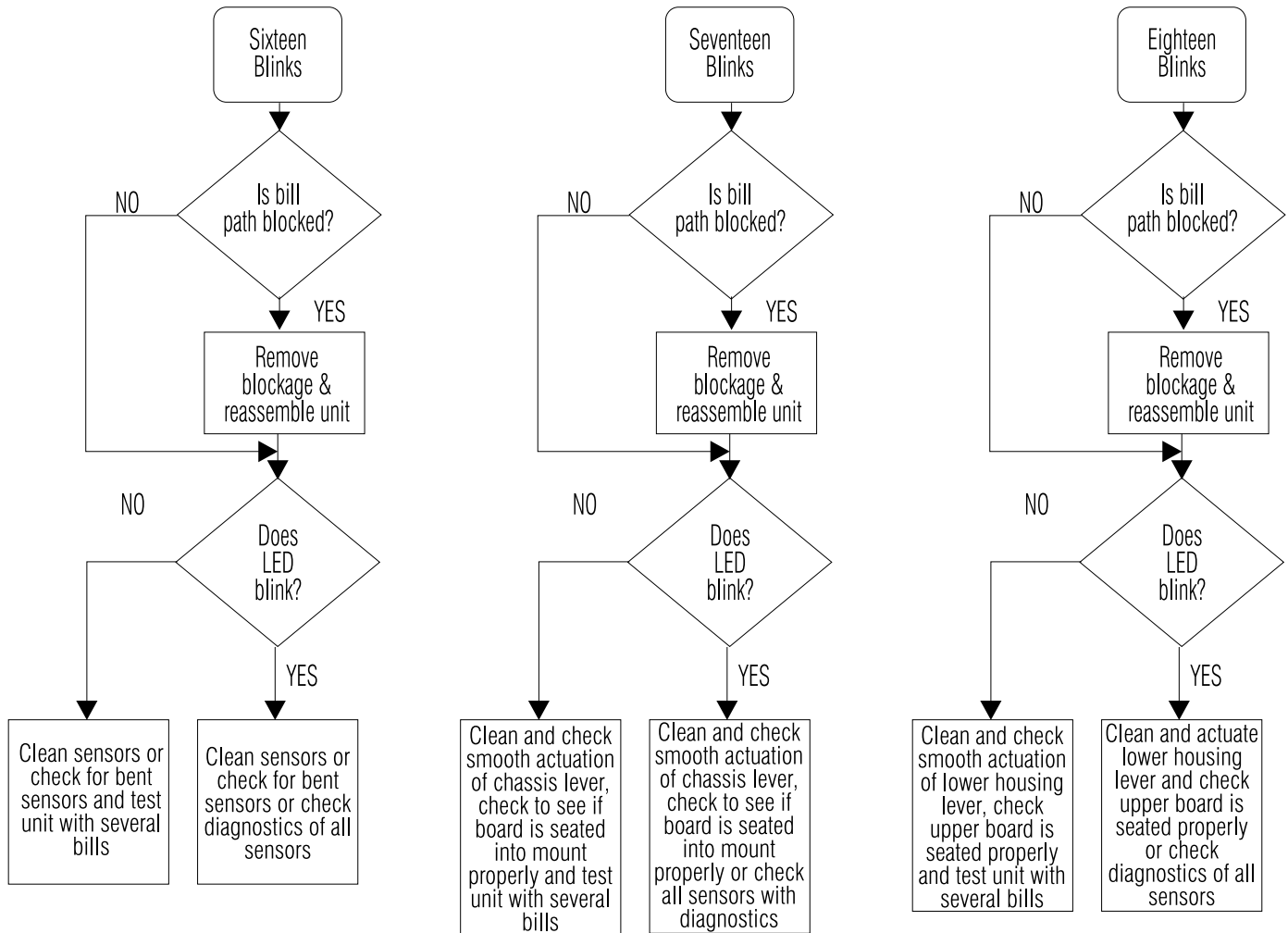
# SECTION 5: TROUBLESHOOTING



## SECTION 5: TROUBLESHOOTING



\*Units with serial number 109300187 or later do not have a bill position sensor.



\*Units with serial number 359300001 or later do not have a chassis anti-cheat sensor.



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# SECTION 4: MAINTENANCE

## INTERCONNECTIONS

