

SECTION 4-OBA-P MAINTENANCE

INTRODUCTION

This section provides general and detailed service information for the Rowe OBA-P Bill Acceptor, including a physical description, functional description, routine maintenance, and unscheduled maintenance.

GENERAL INFORMATION

The OBA-P Bill Acceptor accepts valid U.S. currency in denominations of \$1 and \$5. It rejects and returns unacceptable currency to the customer.

The Bill Acceptor receives +5 VDC and +24 VDC from the R-90 Main Power Supply and sends Credit pulses to the R-90 Central Control Computer.

PHYSICAL DESCRIPTION

There are three major components to the Bill Acceptor. These are the Bill Transport Mechanism, the Bill Stacker and the Computer Control Unit.

The Bill Transport Mechanism

This device mechanically transports the currency from the Bill Acceptor opening past various sensors. These sensors scan the bill for validation information and relay it to the Computer Control Unit.

Drive Belts

Transporting the bill from the Bill Acceptor opening to the Bill Stacker is accomplished by a D.C. motor and a series of rollers, pulleys and belts. Polyurethane drive belts provide long life and reliable operation while requiring very little maintenance.

The main drive belt and lower bill transporting belts are cogged for more reliable operation, while adjustable idle pulleys are used to maintain correct tension. Upper transporting belts are of a semi-stretch type which require no adjustment. As the bill moves along the path from the opening

to the Stacker it is trapped between the upper and lower transporting belts. This provides a sure non-slip movement through the Transport Mechanism.

Optical Sensors

Three Optical Sensors are used for communicating bill information to the Computer Control Unit while the bill is in the Transport Mechanism. Two of the three, V1 and V4, are used to establish the position of the bill within the Transport Mechanism; the third (V2) provides validation data from the bill as it passes through the Transport.

Magnetic Head

The Magnetic Head checks the magnetic properties of the incoming bill. A spring loaded pressure roller ensures intimate contact between the bill and the Magnetic Head.

Anti-Pull-Back Lever

This lever prevents the bill from being removed by the customer after the bill has been accepted as valid. It also works in conjunction with the V4 sensor to determine the bill's position.

Bill Stacker

The Stacker accepts bills from the Transport Mechanism and stacks them in a locked Bill Box. The Bill Box swings down and forward for easy bill removal.

The Stacker uses a D.C. motor to drive a metal platen which, through a mechanical linkage, pushes the bill into the Bill Box. A cam-actuated switch signals the Computer Control Unit as to the position of the platen. The platen may be in one of two positions either "home" or "off home". An "off-home" signal received by the Control Unit while in standby prompts it to reset the platen and return it to its "home" position. (See **Functional Description** in this section for further details.).

Computer Control Unit

This module contains the electronic circuit board and microcomputer. The Computer Control Unit directs the operations of the various parts of the Bill Acceptor.

See **Electrical Adjustments** in this section if the Computer Control Unit must be replaced.

Mag Adjust

Allows adjustment of the magnetic amplifier circuitry for optimum performance. The amplifier is used in conjunction with the Magnetic Head in the Bill Transport Mechanism for checking specific properties of bills.

Speed Adjust

Allows for transport motor speed adjustment.

Test Button

If this button is depressed when the unit is in the idle (or STANDBY) state, it activates the MOTOR SPEED ADJUSTMENT mode. This allows the rate at which the bill is fed through the Transport Mechanism to be adjusted for optimum performance. If the Bill Acceptor is in the SHUTDOWN mode, rather than the STANDBY mode pushing the Test Button will reset it and put it back into STANDBY (See **Functional Description**).

Visual Indicators

B.A. Status LED

This LED indicates the present status of the OBA-P as follows:

1. The OBA-P is in standby or other normal operation (The LED is off.).
2. Immediately after a bill is rejected and while the bill is still in the transport opening, the LED will flash one or more times (to indicate the cause of the reject). See **Troubleshooting** for details.

3. Motor speed adjust mode (With the test button pressed, the LED indicates whether the motor speed is correct or not (See **Adjustments** in this section.).
4. OBA-P in shutdown mode due to a fault, which prevents proper operation (The LED is on most of the time, but flashes off periodically to indicate the cause of the error condition (See **Troubleshooting** in this section.).

+5 VDC LED

When lit, this LED indicates the presence of +5 VDC, which is the normal condition.

+24 VDC LED

When lit, this LED indicates the presence of +24 VDC, which is the normal condition.

Connectors

Four connectors, labeled P1, P2, P3, and P4, connect the four major modules or components of the Bill Acceptor to each other and to the R-90.

P1 connects the Computer Control Unit to the R-90 Power Supply.

P2 connects the Bill Transport Mechanism to the Computer Control Unit.

P3 connects the Bill Stacker to the Computer Control Unit.

P4 connects the OBA-P to the R-90 Central Control Computer (Credit output).

FUNCTIONAL DESCRIPTION

The following is a sequential description of the Bill Acceptor operation. This description will give you a basic understanding of how the Bill Acceptor normally operates. This section can also be used as a troubleshooting aid.

Bill Acceptor in Standby Mode

Ready to Accept Bills

When the power is supplied to the Bill Acceptor in normal operation, it assumes a standby state and is ready to accept bills. While in this state, it is continually checking the various sensors in the Bill Transport and Bill Stacker mechanisms. If it senses an incorrect signal, it takes the appropriate action as follows:

V4 Sensor Active

The Bill Acceptor assumes that something is trapped in the Bill Transport path if this sensor is active while in the STANDBY mode. The Bill Acceptor then begins the Reject sequence to remove the trapped object from the path. For further information see the section that follows on the Reject Sequence.

Stacker Home Switch Not Activated

The Bill Acceptor turns on the Stacker Motor and attempts to return the Stacker platen to its home position. If successful, the Bill Acceptor returns to the STANDBY mode. If it is unsuccessful in its attempts, after 2.5 seconds, it shuts itself down. For further information see the section on Shutdown sequence that follows.

Bill Acceptor Response

Reject Sequence

In order to clear the Bill Transport Mechanism and purge any objects from the path, the Bill Acceptor turns on its motor in the reverse direction. If the Bill Acceptor is following a normal bill rejection sequence, it will reject the bill and the Transport Mechanism will return the bill to the Bill Acceptor opening. The transport will place the bill so that it can be easily grasped by the customer. At this time the BA status LED will flash one or more times to indicate the reject cause. If the customer retrieves the

bill within 3 seconds and all other sensors indicate that the transport path is clear, the Bill Acceptor returns to the STANDBY mode. If the track is not clear, the Bill Acceptor begins the Self-Clearing Sequence described in the following section.

Self-Clearing Sequence

If the Transport Path fails to clear as just described, the Bill Acceptor begins a Self-Clearing Sequence. This consists of a series of reverse-forward-reverse cycles to dislodge any object trapped in the transport. If this procedure is successful, the Bill Acceptor returns to the STANDBY mode. If the track is not cleared, the unit will shutdown. The Shutdown Sequence follows:

Shutdown Sequence

Several things may cause a Bill Acceptor shutdown. In the previous situation, an unsuccessful attempt by the Bill Acceptor to clear an object lodged in the Transport Path will initiate a Shutdown Sequence. In the event of a Shutdown, the Bill Acceptor turns everything off except the Status LED, which it turns on and then periodically flashes off one or more times. The number of flashes are determined by the failure that is causing the shutdown.

Bill Acceptance Sequence

When the customer inserts the bill, V1 is blocked. The Transport Motor then begins pulling the bill into the Transport Path.

As the bill moves forward the Bill Acceptor monitors the bill's progress by monitoring V1, V2, and V4 for the proper signals. During this phase V1 should be active (the sensor is covered) and V4 should be inactive (the Anti-Pull Back Lever should be in STANDBY position).

When the leading edge of the bill activates the Anti-Pull-Back Lever, which blocks the V4 cell, the OBA-P begins a complex series of precise magnetic and optical checks. In addition to the magnetic and optical checks being performed, the Bill Acceptor checks the position of the bill in the Transport Path. If it receives an incorrect signal from V1, V2, or V4 the Bill Acceptor immediately begins the Reject Sequence described earlier.

If the bill passes all of the magnetic and optical checks, it continues to move through the transport until the trailing edge leaves the back of the transport and allows the Anti-Pull-Back Lever to return to its "at rest" position (unblocking the V4 cell).

The Stacker motor is now activated by the Computer Control Unit, which monitors the Home switch to ensure that the Bill Stacker Platen leaves the Home Position and stacks the bill in the Bill Box. After stacking the bill, the Computer Control Unit checks the Home Switch to make sure that the platen returns to its original position. If the Stacker Platen does not leave the home position within 750 milliseconds or if it does not return to the home position within 2.5 seconds, the Computer Control Unit begins its shutdown sequence.

When the bill stacking process is completed, the Computer Control Unit sends a Credit signal to the R-90 Central Control Computer and is ready to begin another bill acceptance sequence. The Credit signal consists of one 75 ms +5 volt pulse for a dollar bill or five pulses for a five dollar bill. Multiple pulses are separated by 75 ms.

ROUTINE MAINTENANCE

Cleaning

Since environmental conditions vary considerably, no prescribed maintenance schedule is set. Instead, the following items should be inspected periodically and cleaned as necessary:

Bill Inlet and Track

These surfaces should be wiped with a soft, clean, lint-free cloth.

V2 Sensor

The V2 backside sensor, which includes both an emitter and a detector, should be kept clean to ensure that all valid bills will be accepted. A soft cloth or cotton swab moistened with denatured alcohol can be used for this purpose.

Magnetic Head

Due to the abrasive nature of currency, the magnetic head does not normally require cleaning. If the magnetic head does collect dirt, the dirt may be removed with a cotton swab saturated with denatured alcohol.

Drive Belts

Drive belts can be cleaned by wiping them with a clean lint-free cloth moistened with denatured alcohol. Do not soak belts in a solvent.

Bill Stacker

Use a clean cloth to remove any excess dirt from the Stacker, platen, and surrounding areas.

Lubrication

Bill Stacker

The Bill Stacker does not require lubrication.

Bill Transport Mechanism

The Bill Transport Mechanism does not require lubrication with normal use. If the Transport Mechanism is difficult to turn or if the transport mechanism is excessively noisy, apply one drop of light machine oil to each nylon bearing and to any shaft location that supports a plastic roller.

UNSCHEDULED MAINTENANCE

Mechanical Adjustments

Bill Stacker

The Bill Stacker does not normally require adjustment. If the Computer Control Unit indicates a problem involving the Home switch while in shutdown mode (See **Troubleshooting.**), then the switch adjustment may be checked by performing the following procedures:

1. Rotate the cam so that the switch actuator rests on the high point of the Stacker Motor Cam.
2. Place a .040 to .050-inch gauge between the cam and the actuator. The bottom of the actuator should rest against the switch case. If the adjustment is incorrect, reposition the switch by loosening its two mounting screws.
3. Align the pusher plate to the guide rails by loosening the three motor bracket screws and moving the motor assembly. The pusher plate and the guide must be positioned within 1/64 inch as shown in Figure 4-1.).

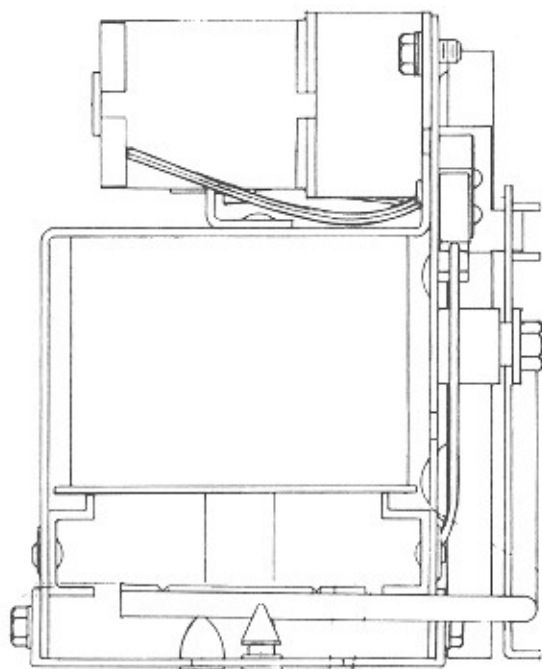


Figure 4-1. Pusher Plate Adjustment

Bill Transport Mechanism

The Transport Mechanism does not require any initial set-up or routine adjustment. If any slipping or binding occurs in the mechanism, make the following adjustments:

Drive Belt Tension (See Figure 4-2.)

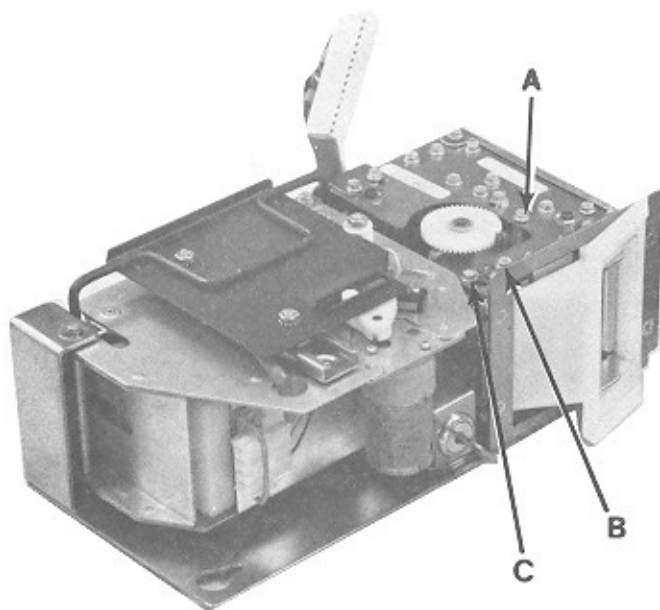


Figure 4-2. Drive Belt Tension

Adjust the drive belt on units with Pivoting Motor Bracket as follows: (See Figure)

1. Loosen the three hex head-screws labelled A, B and C.
2. Pivot the Motor Assembly on Screw A until the Drive Belt has a total flex of approximately 3/32 inch between the Gear Pulley and the Drive Shaft Pulley.
3. Tighten Screw A and then B and C.
4. Check the belt tension. If the Drive Belt will not hold tension properly because the motor assembly will not pivot, the belt has become stretched and should be returned to an authorized service center for repair.

Adjust the Lower Belt tension as follows: (See Figure 4-3.)

1. Loosen the four hex-head screws holding the ends of the Idler Pulley Shaft and the take-up brackets (Shown in Figure 4-3.).

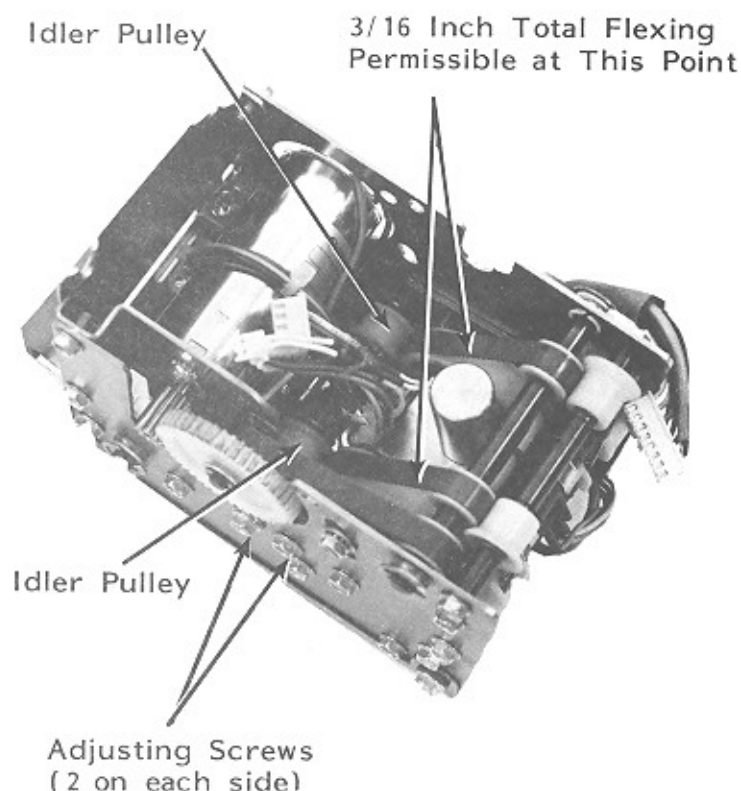


Figure 4-3. Lower Belt Adjustment

2. Remove the circuit board by removing the three screws that hold the brackets and unplug the three connectors.
3. Push down on the idler pulleys until the belt flexes about $\frac{3}{16}$ of an inch.
4. Tighten all four screws and check the belt tension again. The tension must be equal on both belts.
5. Replace the circuit board and plug in the three connectors.
6. If the adjusting screws are against the ends of the slots and the timing belts are still loose, the transport should be returned to an authorized service center.

Gear Backlash Adjustment

A degree of backlash should exist between the gears, as shown in Figure 4-4. To adjust the gear backlash:

1. Loosen the two Phillips-Head screws holding the motor. Move the motor to give the correct backlash. This adjustment is not critical, but make sure that backlash is present at all points, as you rotate the gears.
2. Tighten the two screws and recheck the gear backlash.

Magnetic Head Alignment

The Magnetic Head is aligned with the Harness and Holder assembly at the factory. If a problem with the head develops, the Harness and Holder assembly must be replaced. Order the Harness and Holder Assembly, Part Number 4-50598-01.

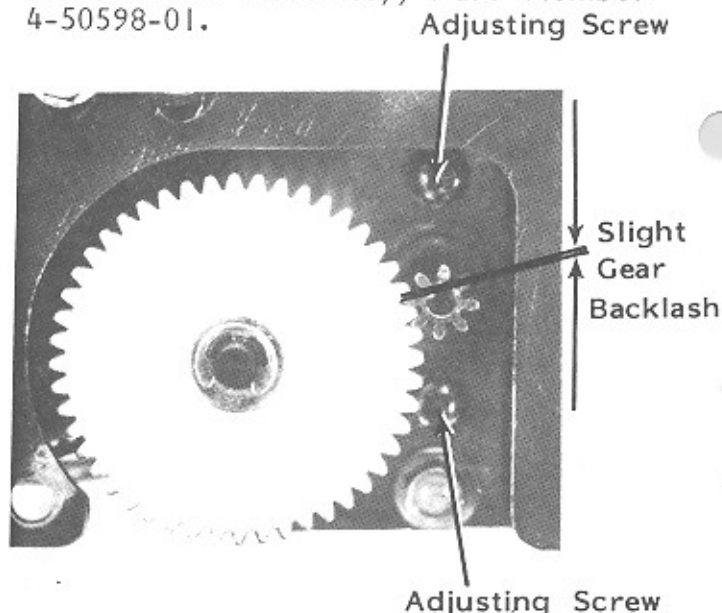
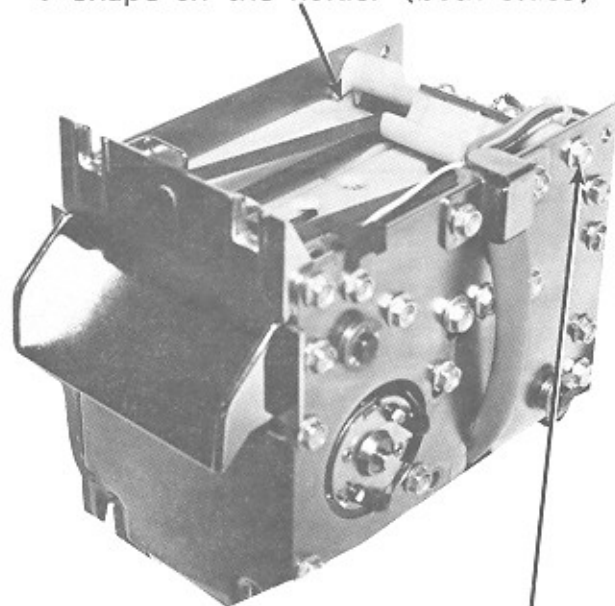


Figure 4-4. Gear Backlash Adjustment

To replace the Harness and Holder Assembly:

1. Install the four screws loosely, and align the assembly with the lower track by pressing the V on the holder firmly against the V on the lower track (as shown in Figure 4-5.).

The V shape on the Lower Track must be firmly aligned with the V shape on the holder (both sides)



Tighten This Screw First (One Each Side)

Figure 4-5. Magnetic Head Alignment

2. Tighten the two screws at the V's to hold the alignment.
3. Tighten the two remaining screws.

Electrical Adjustments

The electrical adjustments on the Bill Acceptor are factory set and should not be changed under normal operating circumstances. Replacing a Bill Transport Mechanism or Computer Control Unit will require recalibration of the system. The following steps must be taken to complete the necessary adjustments:

Motor Speed Adjustment

1. Depress the TEST button and hold it.
2. Turn the Speed Adjust pot either clockwise or counterclockwise until the Bill Acceptor Status LED reaches maximum brightness.

MAG ADJUST

Turn the MAG ADJUST potentiometer fully clockwise. If bills are rejected, adjustments will have to be made. See **Troubleshooting** in this section for details.

TROUBLESHOOTING

This section is a guide to help you isolate problems and return the Bill Acceptor to service as quickly as possible. This section provides the information needed to make adjustments and replace modular components.

This manual does not provide procedures or information to diagnose or repair defective modules. Rowe suggests that modules, such as the Transport, Bill Stacker, or Computer Control Unit be returned to Rowe or your distributor for repair.

The following troubleshooting chart is designed to lead you through a step-by-step procedure to solve a particular problem. Begin at Step 1 and proceed through as many of the steps as needed to solve the problem. Before using any of the procedures, check the harnesses and electrical connections to ensure that no connections are loose, missing, or frayed. You can reduce your effort by checking the electrical connections first.

TROUBLE	SYMPTOM	PROBABLE CAUSE
Transport motor does not start when a bill is inserted.	+5 or +24 LED on Control Unit not lit.	1. Problem in R90 power supply or harness to OBA-P 2. Defective Control unit
	Transport doesn't start but clicking sound in Control unit is heard.	1. Object jammed in transport mechanism 2. Defective transport 3. Defective Control unit
	No sound or other indication that transport is trying to run.	1. Defective V1 cell in transport 2. Defective Control unit
	B.A. STATUS LED is blinking.	1. OBA-P is not operational due to a fault condition See the following section
OBA-P in SHUTDOWN.	BA STATUS LED blinks off once every second and then pauses before blinking again.	1. Object in transport covering V1 cell 2. Defective transport 3. Defective Control unit
	BA STATUS LED blinks off twice every second and then pauses before blinking again.	1. Object in transport activating anti-pull back lever 2. Defective transport 3. Defective Control unit
	BA STATUS LED blinks off 3 times every second and then pauses before blinking again.	1. Bill stacker full 2. Bill stacker jammed in off-home position 3. Bill stacker home switch out of adjustment See Electrical Adjustments in this section 4. Defective bill stacker 5. Defective Control unit
bills jam frequently.		1. Anti pull back lever not operating freely 2. Bill pressure roller binding 3. Transport inlet or track surfaces contain projections, rough spots, or dirt 4. Transport belts out of adjustment or dirty See Maintenance this section. 5. Transport belts not centered on rollers 6. Transport upper input roller does not move up and down freely 7. Defective R90 power supply (+28 VDC).

TROUBLE	SYMPTOM	PROBABLE CAUSE
Bill acceptor rejects a large number of valid bills	BA status LED blinks once after rejecting the bill. See note 1.	1. Defective V1 or V4 cell in transport 2. Defective control unit
	BA status LED blinks twice after rejecting the bill. See note 1.	1. Defective V2 cell in transport 2. Defective control unit
	BA status LED blinks three times after rejecting the bill. See note 1.	1. Object lodged in transport 2. Binding anti-pull-back lever 3. Defective V4 cell 4. Defective control unit
	BA status LED blinks four times after rejecting the bill. See note 1.	1. Mag adjust set too low; turn clockwise 1/8 turn 2. Incorrect motor speed See Electrical Adjustments in this section 3. Defective magnetic head or transport 4. Defective control unit
	BA status LED blinks five times after rejecting the bill. See note 1.	1. Incorrect motor speed See Electrical Adjustments in this section 2. Defective transport 3. Defective control unit
	BA status LED blinks six times after rejecting the bill. See note 1.	1. Mag adjust set too high Turn counterclockwise 1/8 turn 2. Defective magnetic head or transport 3. Defective control unit

Note 1. The BA status LED indication will only be valid if the rejected bill remains in the transport opening.

