

**FIELD MAINTENANCE GUIDE
BULK-LOADED DOLLAR BILL CHANGERS**

ARDAC

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INTRODUCTION

Your Ardac changer has been designed to provide dependable service for many years. As with any piece of equipment, however, periodic maintenance and routine service will be necessary to insure the most reliable operation.

This field maintenance guide is not intended to be a complete technical manual for the Ardac changer. Rather, it is to provide quick solutions to the most common problems.

Additional information, technical data and schematics are available from the factory on request.

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SYSTEM DESCRIPTION

The Ardac changer has been designed as a modular system. This means that many of the components can be isolated or even interchanged for troubleshooting or diagnostics.

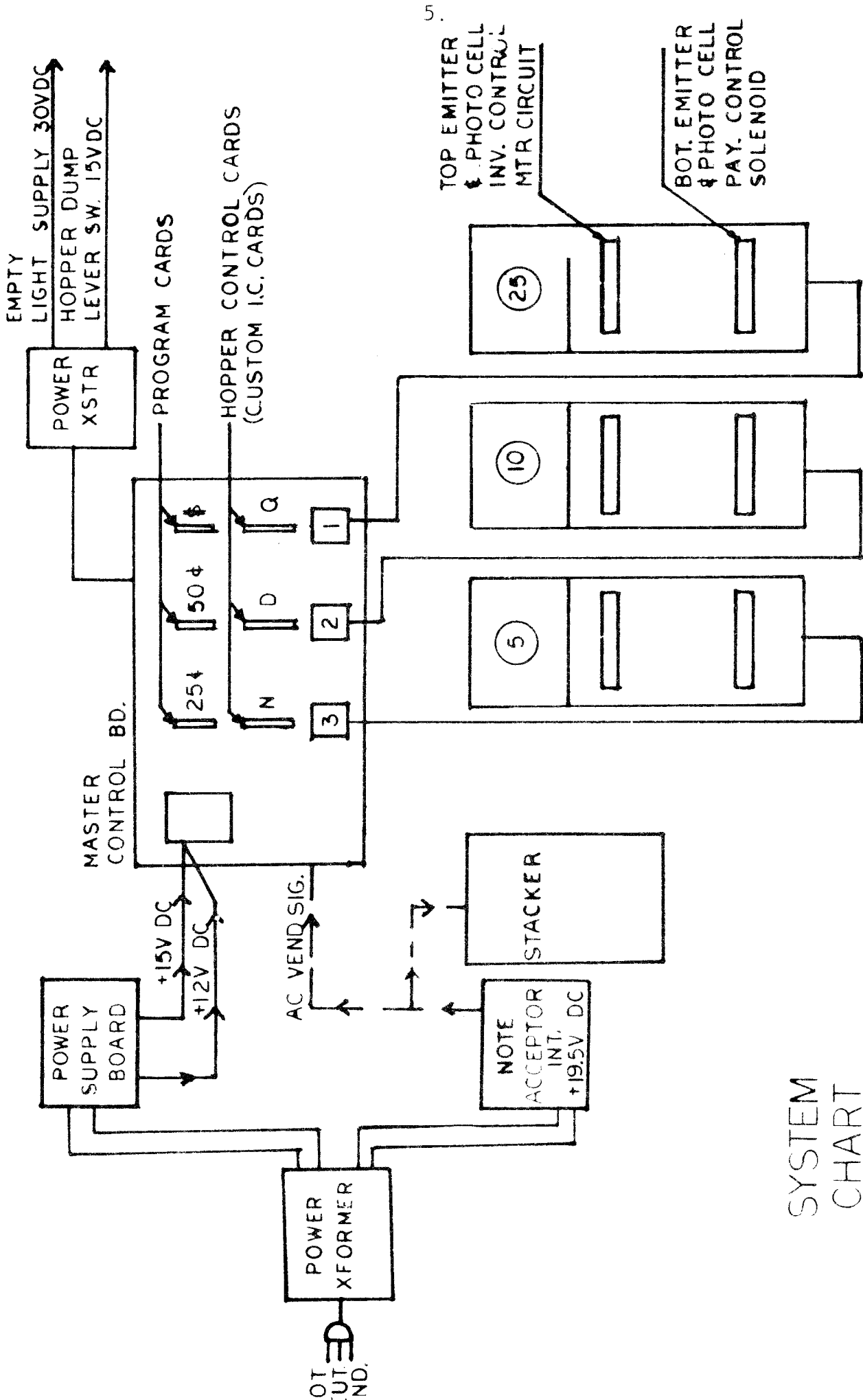
The note stacker can be unplugged and the changer operated without it if a problem is suspected in this component.

The note acceptor can be unplugged and the complete payout system checked with a vend signal simulated by using a jumper wire across the brown and white wires leading from the note acceptor.

The hopper control cards are identical for each hopper and are interchangeable. And, the coin hoppers themselves are identical and interchangeable. Many problems can be isolated by moving these components from one position to another.

The changer can operate on one hopper or all hoppers by changing the payout selection.

Figure 1 shows a simplified block diagram of the changer components.



SYSTEM CHART

Figure 1

HOPPERS

PREVENTIVE MAINTENANCE

There's not a great deal of preventive maintenance required on your changer and it will vary by usage and environment. An additional ten minutes spent on an average location every two or three months can prevent many troublesome service calls.

Note Acceptor

Using a soft cloth or pipe cleaner, carefully clean any dirt, grime or smoke that has accumulated on the tray insert and the housing of the secondary sensor (Figure 2). Using a soft brush, carefully remove any dirt or dust that has accumulated in the infra-red filter assembly over the grid lamp. Make sure smoke is cleaned from the top and bottom of the tray insert.

Coin Hopper

Remove the upper channel front and clean both the front and back plastic channels. Remove the emitter lamps and the plastic coin channel front to clean the lower channel and the openings between the emitter and the photo transistors behind the channel. You should not push any object into these holes, however, but simply clean any accumulated dirt from them.

PRIMARY SENSING

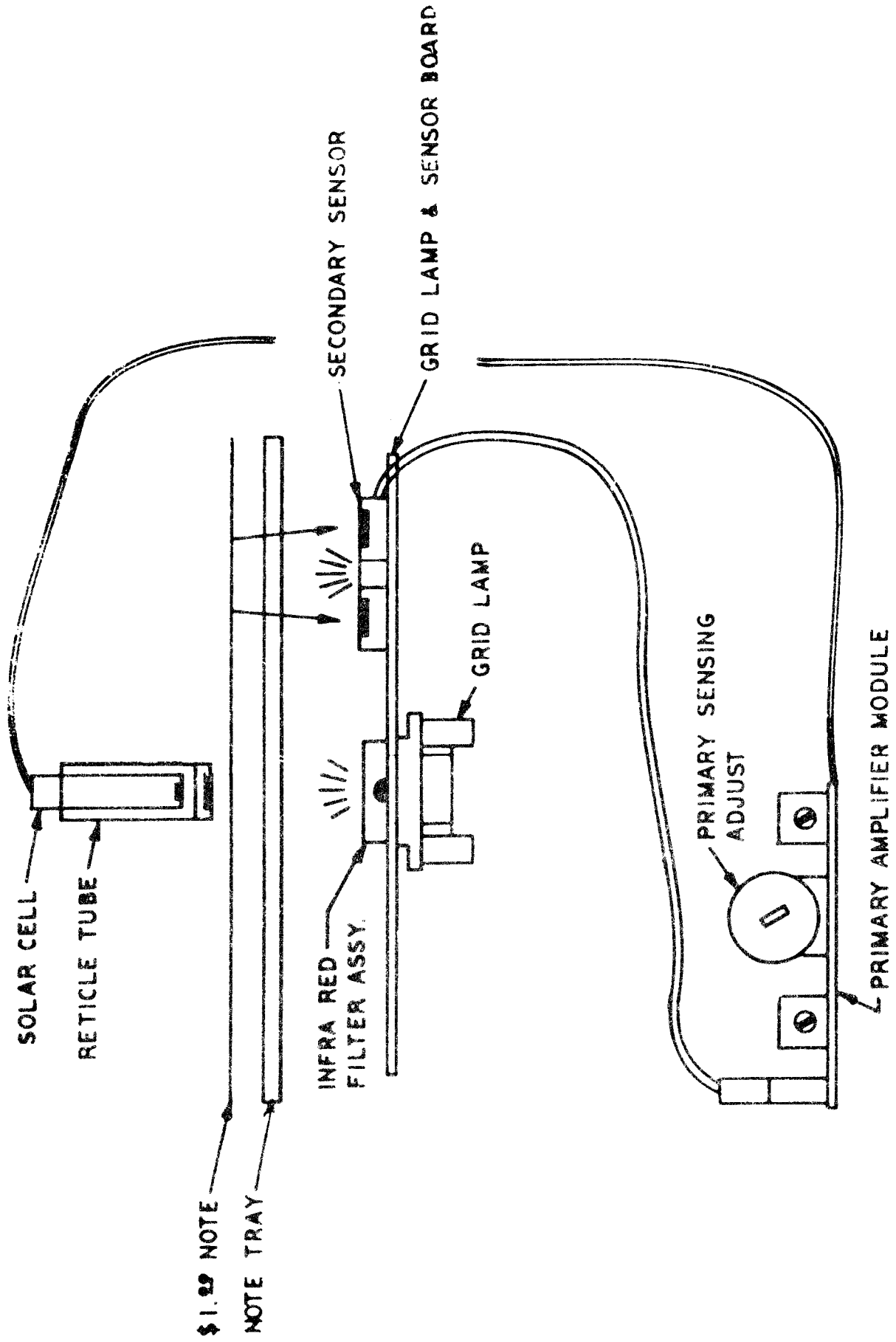


Figure 2

NOTE ACCEPTOR ADJUSTMENTS

Detection Systems

The dollar bill acceptor has two detection systems to validate a genuine note.

1. Primary Detection. This system scans the top side of a note. It examines the grid pattern engraved around the portrait area to determine the correct pattern and characteristics of the ink. It consists of a reticle tube and solar cell on top of the tray insert, and a grid lamp and infra-red filter assembly under the tray. These items are shown in Figure 2.
2. Secondary Detection. This system looks at the back of a note. It is a self-contained reflective sensor. It is also shown in Figure 2.

Both detection systems are optical and utilize a light source and receiver. Heavy collections of dust and dirt on any component can have an adverse effect on the acceptance of genuine notes. Periodic cleaning of these systems, particularly the infra-red filter assembly and the secondary sensor, will help maintain a high rate of acceptance.

Primary Detection System Adjustmant

Adjustment of the primary detection system is made by turning the primary acceptance control, R1, which is located on the amplifier module board (Figure 3).

1. Disable the Secondary Detection System by unplugging the SSTR2 sensor, plug J5 (Figure 3).
2. Turn the primary acceptance control fully counter-clockwise.
3. Adjust the primary acceptance control by turning it in a clockwise direction until

all reasonably good notes are accepted.
Do not advance the sensitivity control
further clockwise than necessary.

4. Reconnect plug J5.

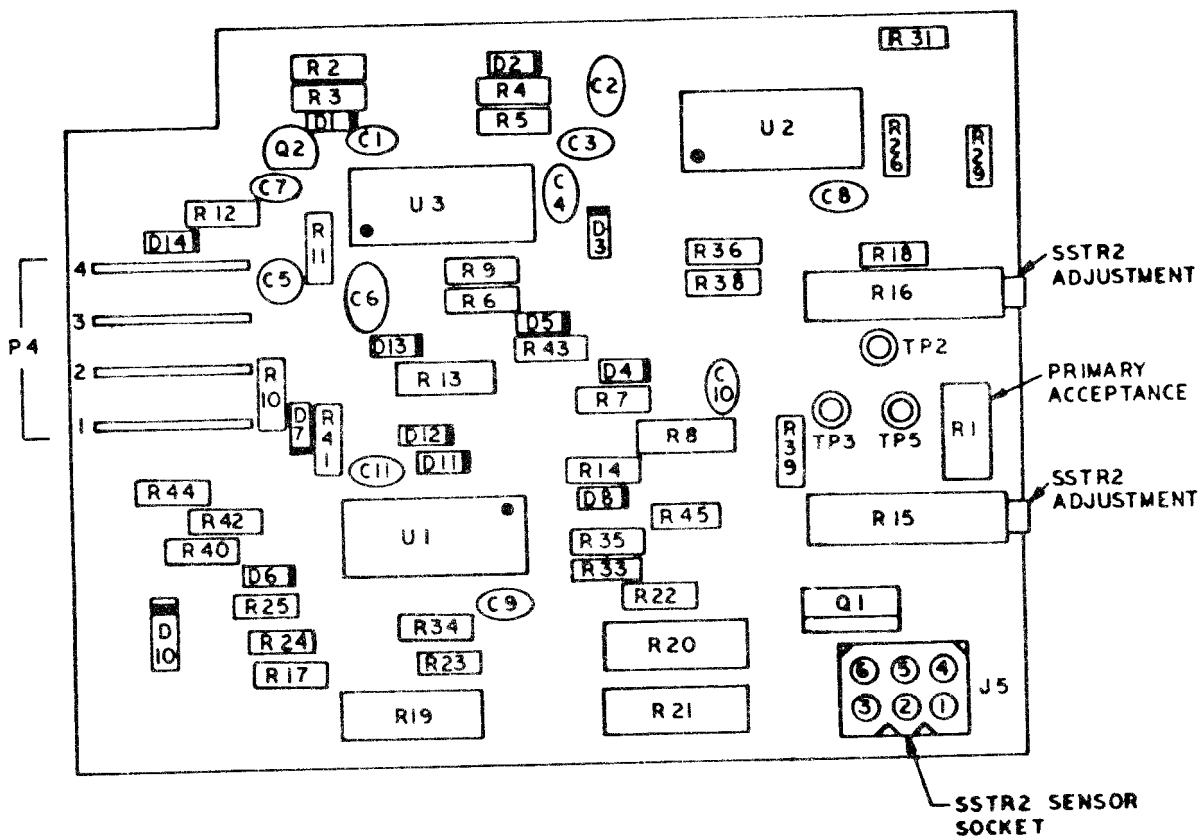


Figure 3

Secondary Detection System Adjustment (SSTR2)

The secondary detection system adjustments, R15 and R16, are also located on the amplifier module board (Figure 3).

1. Insert the adjustment card, 49 X 218, in the tray with the words "SSTR Balance" pointed towards the acceptor. The tray should not be held in for more than four seconds at a time during adjustment.

2. Turn potentiometer R15 and R16 fully counter-clockwise.
3. Set your meter on a 20 to 50 VDC scale. Hook the black (-) meter lead to the acceptor chassis (Ground). Hook the red (+) lead to TP5 located behind the primary acceptance control. Adjust R15 until the voltage reading is $10.0 \pm .5$ VDC.
4. Remove the black meter lead from the chassis and hook it to TP2 leaving the red lead on TP5. Push tray in and adjust R16 until the voltage reading is $0.0 \pm .15$ VDC.
5. Remove the adjustment card and test unit.

Clearing Circuit Adjustment

The clearing circuit in your note acceptor provides a high level of security to prevent manipulation of a note during the collection cycle. It prevents a vend signal from being issued until the note is removed from the tray. If it is out of adjustment, the acceptor may not issue a vend signal, however, the correct adjustment is easily made.

1. Place a jumper wire between pins 1 and 4 of plug J2 on the master board (Figure 4).
2. Turn potentiometer R8 fully counterclockwise. This potentiometer may have a Factory Sealed label over it which must, of course, be removed.
3. Connect your volt meter with the common lead to the acceptor chassis and the positive lead to test point one, TP1 (Figure 4).
4. Insert the adjustment card, 49 X 218, into the tray with the words "Clearing Circuit Adjustment" pointing towards the note acceptor but facing down. Close the tray and adjust potentiometer R8 for a reading of approximately .5 to .7 VDC (less than one volt).
5. Release the tray, remove the adjustment card and insert it with the words "Clearing Circuit Adjustment" away from the note acceptor facing down, side B. Close the tray and measure the voltage at TP1. This voltage must be equal to

or greater than 7 volts. If unable to obtain 7 volts, repeat step 4 and readjust to a voltage closer to one volt.

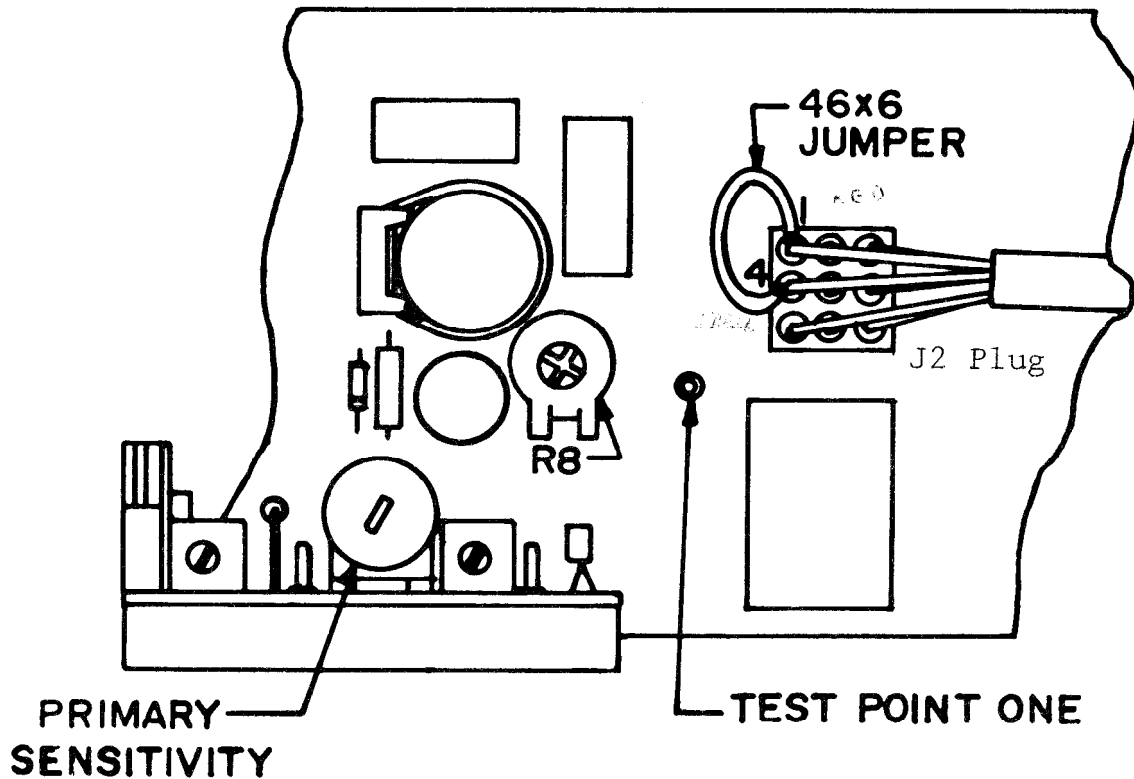


Figure 4

Note Transport System Adjustment

The solenoid, motor rail and drive rollers make up the note transport system. Proper adjustment of the assembly is necessary to ensure proper delivery of the note. Improper adjustment can result in folded notes in the stacker or, in the worst case, a jam. Adjust the system as follows:

1. Solenoid Adjustment
 - a. Loosen the adjustment locking screws (Figure 5).
 - b. Move the solenoid fully right towards the front of the acceptor.

- c. Move the solenoid in small increments towards the rear of the acceptor until the lower drive rollers and the upper idler rollers are firmly in contact when the solenoid is activated. The rollers should touch one another but never move the upper idler rollers more than half way up the oval slot in which they ride.
- d. Test unit to make sure bills move cleanly out the rear of the acceptor in a straight line.

2. Note Stop Adjustment

The note stops prevent improper placement of the note in the tray. They are the white plastic stops mounted on the rear of the tray assembly. When the tray is closed and the motor rail engaged, the note stops must be lowered below the surface level of the tray to allow the note to pass through the acceptor. This is accomplished with adjustable tabs on the motor rail. They can be re-formed up or down to increase or decrease deflection of the note stops.

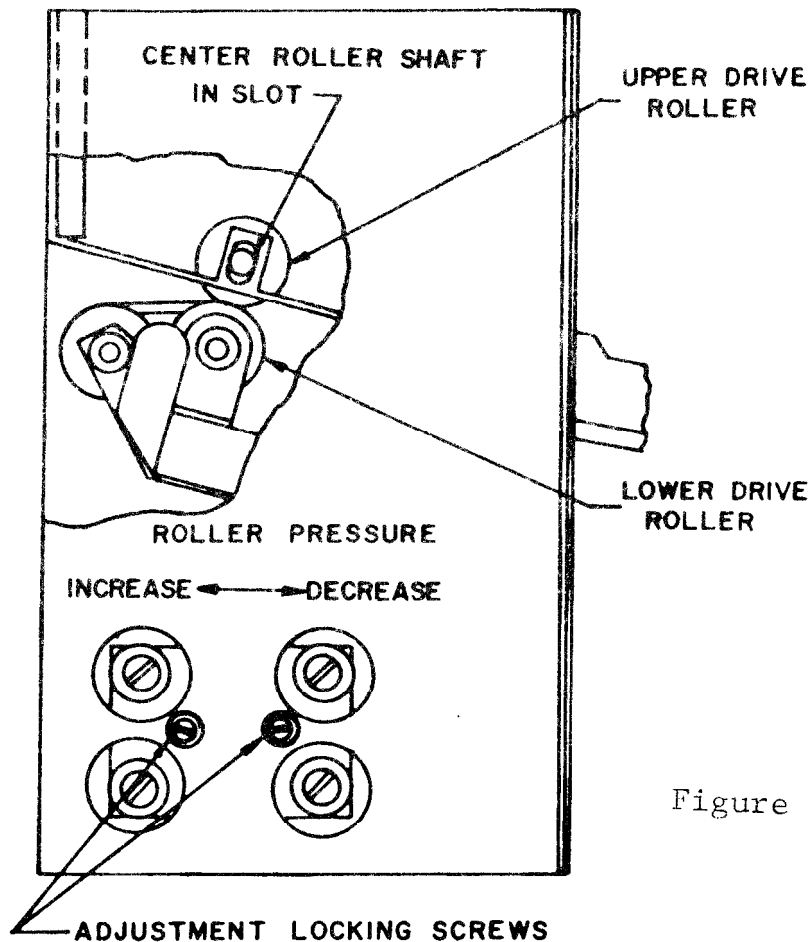


Figure 5

Grid Lamp Alignment

It is important for the correct operation of the note acceptor that the grid lamp be focused correctly on a note. The lamp pattern can be determined by removing the infra-red filter assembly and inserting the adjustment card, 49 X 218, into the tray with the words "Lamp Alignment" towards the acceptor. Close the tray and observe the lamp pattern as it shines onto the oval printed on the card. Sample lamp patterns are as follows:

Alignment oval



Misaligned. Remove lamp, turn it around, reinsert and test again.

lamp spot



Same as above.



Pattern too small. Replace lamp.



Pattern deformed. Replace lamp.



Good lamp pattern. Light fills oval on alignment card.

TROUBLE SHOOTING GUIDE

<u>Problem</u>	<u>Probable Cause</u>	<u>Corrective Action</u>
Changer will not accept bills.	Faulty component in changer.	Disconnect stacker and plug cabinet harness directly to the note acceptor. If unit now accepts, replace defective stacker. Turn main power off. Remove the clear plastic inhibit relay from the power supply board. Turn power on. If unit now accepts, the problem is a Hopper control board, hopper or harness. These components should be operated one at a time to isolate defective one.
	Secondary detection system in note acceptor out of adjustment.	Disconnect sensor plug J5 (Figure 3). Test unit. If unit accepts bills, adjust secondary detection system (Page 9).
	Sensing module loose.	Make sure amplifier module (Figure 2) is inserted properly and making good contact.
	Defective grid lamp.	Remove top plate of acceptor. Lift tray clear switch. If a red light does not appear under the infra-red filter (Figure 2), replace grid lamp.
	Broken wire to solar cell.	Check wires (Figure 2) and replace solar cell if wires are broken.
Changer will not accept coins.	Loose connection to coin acceptor.	Make sure plug is connected to coin acceptor.
	Defective block-out coil.	Make sure block-out coil activates when changer is turned on.
	Faulty component in changer.	Follow same procedure described for non-acceptance of bills.

<u>Problem</u>	<u>Probable Cause</u>	<u>Corrective Action</u>
Poor acceptance of bills.	Dirty tray insert or dirty sensors.	Clean secondary sensor and infra-red filter assembly with soft brush. See section on preventive maintenance. Clean tray insert with damp cloth.
	Secondary detection system out of adjustment.	Disconnect sensor plug J5 (Figure 3). Test unit. If acceptance is good, adjust secondary system (Page 9).
	Primary detection system out of adjustment.	Adjust primary detection (Page 7), and check grid lamp alignment (Page 13).
Poor acceptance of coins.	Dirty coin acceptor.	Clean unit with soap and water.
No vend signal No coins paid out.	Defective note acceptor.	If there is no payout and the stacker does not operate,* the problem is in the note acceptor.
		Listen to the actuation of the rear clear switch to make sure it actuates and de-actuates as a bill moves through the unit. Reform the wire switch actuator if necessary to make sure the switch operates even with a very limp bill. Turn potentiometer R8 (Figure 4) fully clockwise. If vend occurs, readjust clearing circuit (Page 10). Check grid lamp alignment (Page 13).
	Defective changer component.	If there is no payout and the stacker operates,* the problem

* If a stacker is not used, short the brown and white wires in the plug to the note acceptor. If a vend occurs, the problem is in the note acceptor. If no vend occurs, the problem is elsewhere.

<u>Problem</u>	<u>Probable Cause</u>	<u>Corrective Action</u>
Intermittent vend signal. <i>FROM NOTE ACCEPTOR</i>	<p data-bbox="485 653 841 751">Defective clearing circuit in note acceptor.</p> <p data-bbox="485 877 841 974">Faulty operation of the rear clear switch.</p>	<p data-bbox="898 365 1487 625">is most likely in the changer control box. Check all wires, harnesses, plugs and pins for broken or poor connections. Check all boards to make sure they are seated correctly. Replace main board in control box if necessary.</p> <p data-bbox="898 653 1487 848">Turn R8 potentiometer (Fig.4) fully clockwise. If this corrects the problem, adjust the clearing circuit (Page 10) and check the grid lamp alignment (Page 13).</p> <p data-bbox="898 877 1487 940">Check and adjust the switches as previously described.</p>
Incorrect coin pay out.	<p data-bbox="485 1010 841 1073">Wrong coins in the wrong hopper.</p> <p data-bbox="485 1171 841 1262">Program card not seated correctly in connector.</p> <p data-bbox="485 1297 841 1360">Defective hopper control board.</p> <p data-bbox="485 1528 841 1591">Defective lower emitter lamp.</p> <p data-bbox="485 1808 841 1871">Defective hopper harness.</p>	<p data-bbox="898 1010 1533 1136">Make sure the correct denomination coins are loaded in the right hoppers and not mixed together.</p> <p data-bbox="898 1171 1533 1234">Check program cards for good connection.</p> <p data-bbox="898 1297 1533 1486">Interchange hopper control boards and test pay out. If incorrect pay outs occur in different hoppers following the control board, replace defective board.</p> <p data-bbox="898 1528 1533 1780">Interchange upper and lower emitter lamps. If problem is corrected, replace the emitter lamp that was previously in lower position. Make sure opening through which the light passes is clean and free of dust or dirt.</p> <p data-bbox="898 1808 1533 1898">Check all plugs and pins to make sure proper connection is made.</p>

<u>Problem</u>	<u>Probable Cause</u>	<u>Corrective Action</u>
Coin jam in upper coin channel.	Coin stripper on top of hopper is not touching belt.	Position coin stripper against belt.
	Hopper does not shut off when front coin channel is full.	Interchange upper and lower emitter lamps. Test unit. If hopper shuts off, replace lamp that was previously in upper position. If the hopper does not shut off, replace defective hopper control board.
	Defective toggle mechanism.	Check operation and replace if broken.
Hopper turns on and immediately resets to empty.	Defective emitter lamp.	Interchange upper and lower emitter lamps. Test unit. If problem disappears, replace emitter lamp previously in lower position.
Front coin channel does not fill completely. Changer goes on empty with coins in hopper.	Belt too loose.	Readjust spring tension on belt. Replace belt if necessary.
	Too many cleats missing from belt.	Replace belt.
	Defective emitter lamps.	Interchange emitter lamps to determine if one is faulty. Replace defective lamp.
Bills jam or fold in note acceptor or stacker.	Defective hopper control board.	Interchange hopper control cards operating one hopper at a time to determine if control board is defective. Replace any defective board.
	Incorrect adjustment of solenoid and note transport.	Adjust solenoid as previously described. (Page 11)
	Note stops interfere with transport of bill.	Adjust note stops as previously described. (Page 12)

<u>Problem</u>	<u>Probable Cause</u>	<u>Corrective Action</u>
	Spring tines interfere with transport of bill.	Reform tines so they do not slow the note as it moves through the acceptor.
	Foreign material in note path.	Remove top cover and top roller plate. Clean and remove all foreign objects.
Coins found loose in bottom of changer cabinet.	Hopper bottom is not snug against belt.	Some adjustment is possible by reforming hopper dump arms. Bent hopper bottom plate must be replaced.

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ARDA

ADJUSTMENT
CARD

49 x 218

7 APRIL 1983

This adjustment card is necessary to make sure your note acceptor is working properly. It is referred to several times in this manual.

OTHER SECONDARY DETECTION SYSTEMS

On older Ardac note acceptors, you may encounter different secondary detection systems. Although there is some similarity between these secondary detection systems, it is important to know the difference between them to make sure the right adjustment is made on your acceptor. Here is how you can distinguish between the systems:

- OLDEN
1. STR The adjustment potentiometers (R15 and R16) are valued at 250K ohms each. The sensor is mounted on the right side of the lamp board looking from the back of the acceptor.
 2. SSTR The adjustment potentiometers (R15 and R16) are valued at 1 meg ohm and 500K ohm respectively. The sensor is mounted on the left side of the lamp board looking from the back of the acceptor.
 3. SSTR2 The sensor socket on the amplifier module is a square configuration with six pins whereas STR and SSTR modules have five pin sockets.
- NEWEN

STR SECONDARY DETECTION SYSTEM ADJUSTMENT

The secondary detection controls are located on the amplifier module board (Figure 1).

1. Insert an STR Balance Card (49X108) in the tray. The tray should not be held in for more than four seconds at a time during adjustment.
2. Turn potentiometers R15 and R16 fully counter-clockwise.
3. Set your meter on a 20 to 50 VDC scale. Hook the black (-) lead to the acceptor chassis (ground); hook the red (+) lead to TP5. Adjust R15 until the voltage reading is $10.0 \pm .5\text{VDC}$.
4. Remove the black (-) lead from chassis ground and connect it to TP2. Adjust R16 until the voltage reading is $0.0 \pm .15\text{VDC}$.
5. Remove the STR Balance Card and test the unit.

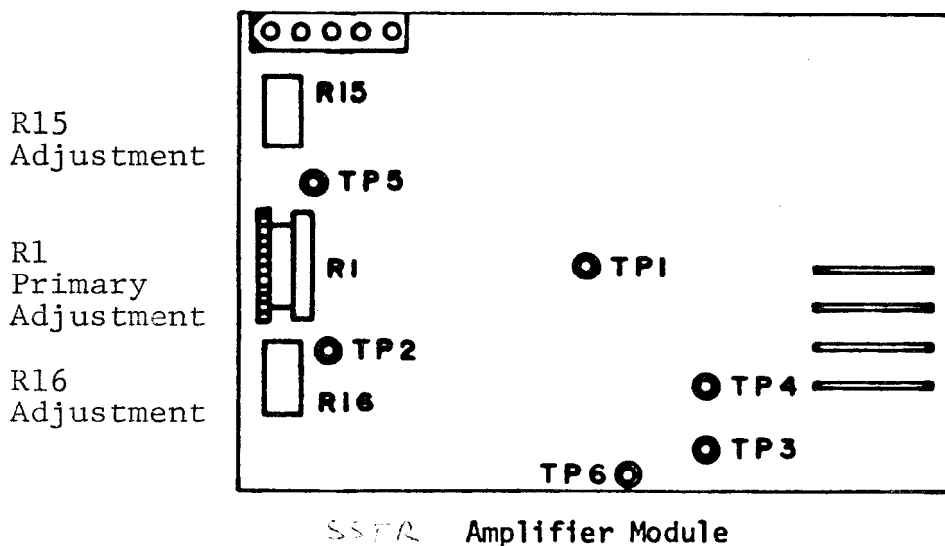
SSTR SECONDARY DETECTION SYSTEM ADJUSTMENT

The secondary detection controls are located on the amplifier module board (Figure 1).

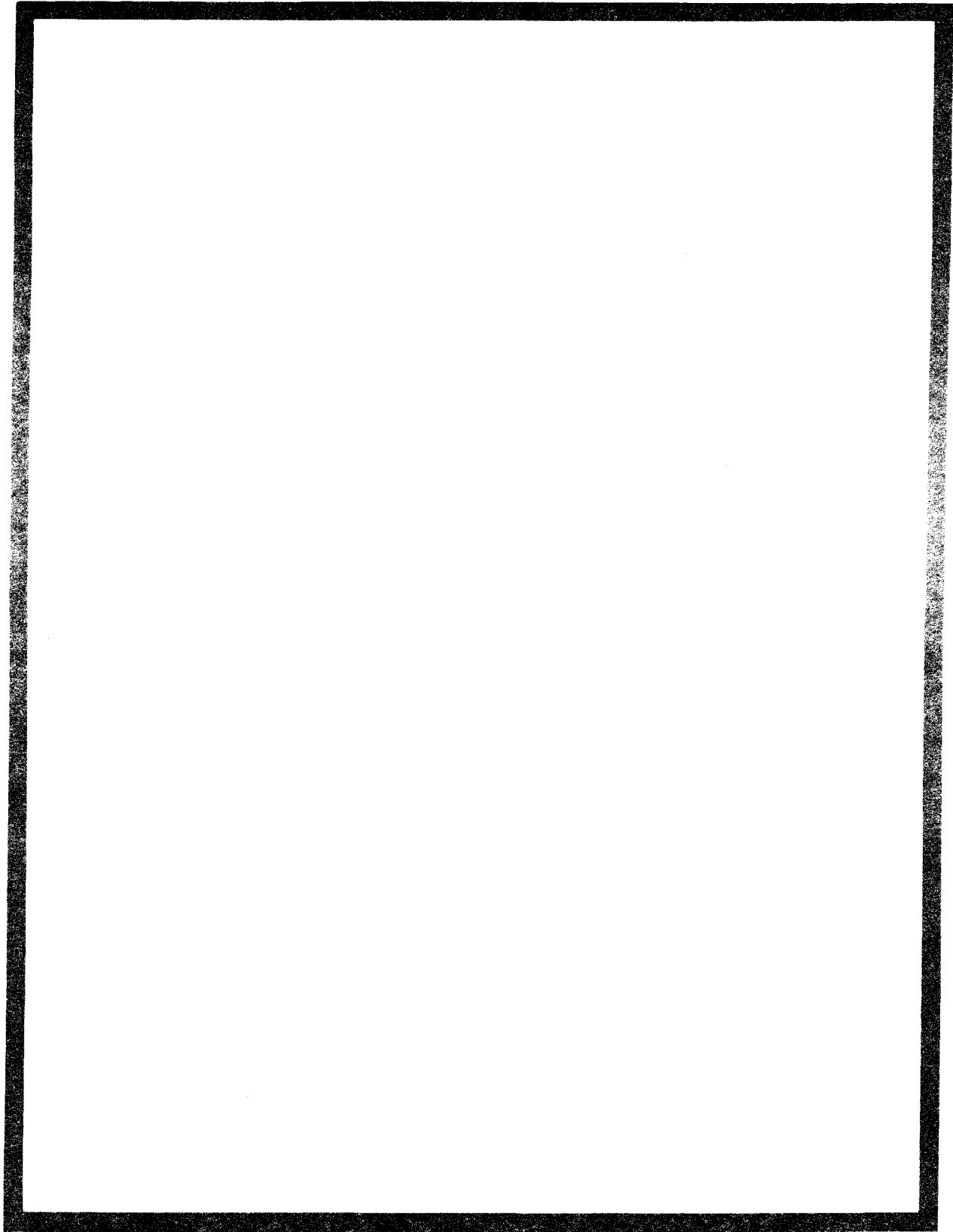
1. Insert the Adjustment Card (49X130 or 49X218) in the tray. The tray should not be held in for more than four seconds at a time during adjustment.
2. Turn potentiometer R15 and R16 fully counter-clockwise.
3. Set your meter on a 20 to 50 VDC scale. Hook your black (-) meter lead to the acceptor chassis (ground). Hook the red (+) lead to TP5. Adjust R15 until the voltage reading is $10.0 \pm .5\text{VDC}$.
4. Remove the red (+) lead and connect it to TP2. Adjust R16 until the voltage reading is 9.0.
5. Remove the adjustment card and test the unit.

NOTE: You will only be able to achieve an acceptance rate of 85 to 90 percent on 1981 notes with SSTR units due to a change in the printing process on these notes. *UNLESS UNIT IS RETURNED TO FACTORY FOR MODIFICATION TO 1510-2.*

Figure 1



NOTE: Place jumper wire between TP3 and TP6 to disable secondary detection system on all STR and SSTR units.



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