

# SECTION 5:

## MAINTENANCE & ADJUSTMENTS

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### INTRODUCTION

The modular design of the Century Series allows for fast field substitution and easy maintenance of changer components. This section provides instructions for removing Bill Changer components for service, and details mechanical maintenance procedures.

### BILL ACCEPTOR

For specific Bill Acceptor information not included in this manual, refer to the *Bill Acceptor Field Service Manual and Parts Catalog* included with the Bill Changer.

### REMOVING A JAMMED BILL — Rowe® Bill Acceptor Only

To remove a jammed bill from the Bill Acceptor, first try to determine where the bill is jammed in the transport.

Open the bill box and determine if the bill can be reached. If necessary, the gear on the side of the transport can be turned by hand, forward or reverse, to remove the bill.

If the bill is jammed near the bill inlet, first try removing it by turning the transport gear by hand. If this does not free the bill, you will need to remove the inlet. Follow the instructions in this section to remove the transport from the Bill Changer, then refer to Section 3 of your Bill Acceptor manual for instructions to remove the bill inlet.

If bills jam frequently, refer to the *Bill Jamming Checklist* in Section 3 of your Bill Acceptor manual.

If your Bill Changer is equipped with a non-Rowe Bill Acceptor, please refer to its manual for instructions.

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**CAUTION:**

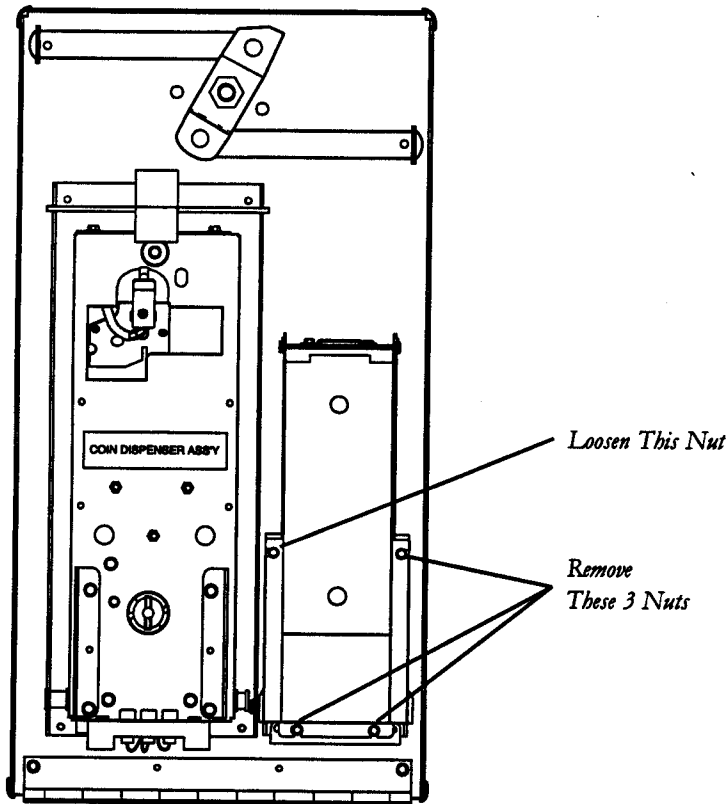
Always turn the Bill Changer power to off before turning the Bill Acceptor gears by hand. Be careful not to pinch your fingers between the gears.

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**Figure 5-1**  
Removing the  
Bill Acceptor  
(C-2/4 Shown)

**NOTE:**

You may want to open the bill box in order to reach the screw between the Bill Acceptor body and the dispenser mounting frame.



**NOTE:**

If the hopper is full, place your hand or an empty bag over the hopper opening to keep coins from spilling out of the top of the hopper.

## REMOVING THE BILL ACCEPTOR

Refer to Figure 5-1 as you remove the Bill Acceptor as follows:

1. Open the door as far as it will go without releasing the door latch.
2. While supporting the door with one hand, lift the latch handle to release the door latch and let the door all the way down.
3. *On the C-2/4 only*, remove the hopper following the instructions in Section 3, *Unloading the Hopper*.
4. Unplug the harness(es) from the Bill Acceptor.
5. Loosen the nut between the Bill Acceptor body and the dispenser mounting frame. Remove the other 3 nuts holding the Bill Acceptor in place. Remove the Bill Acceptor.

## INSTALLING THE BILL ACCEPTOR

Refer to Figure 5-1 as you install the Bill Acceptor as follows:

1. Plug the connector(s) into the Bill Acceptor.
2. Install the Bill Acceptor to its mounting bracket by sliding it under the loosened nut, then replacing the other three #8-32 nuts. Tighten all nuts.

## HOPPER

### REMOVING THE HOPPER

If you are unfamiliar with the procedure to remove and replace the hopper, refer to *Unloading the Hopper* in Section 3 of this manual.

### CLEANING THE HOPPER COIN PATH

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**NOTE:**

*Chain lubrication is not normally required.*

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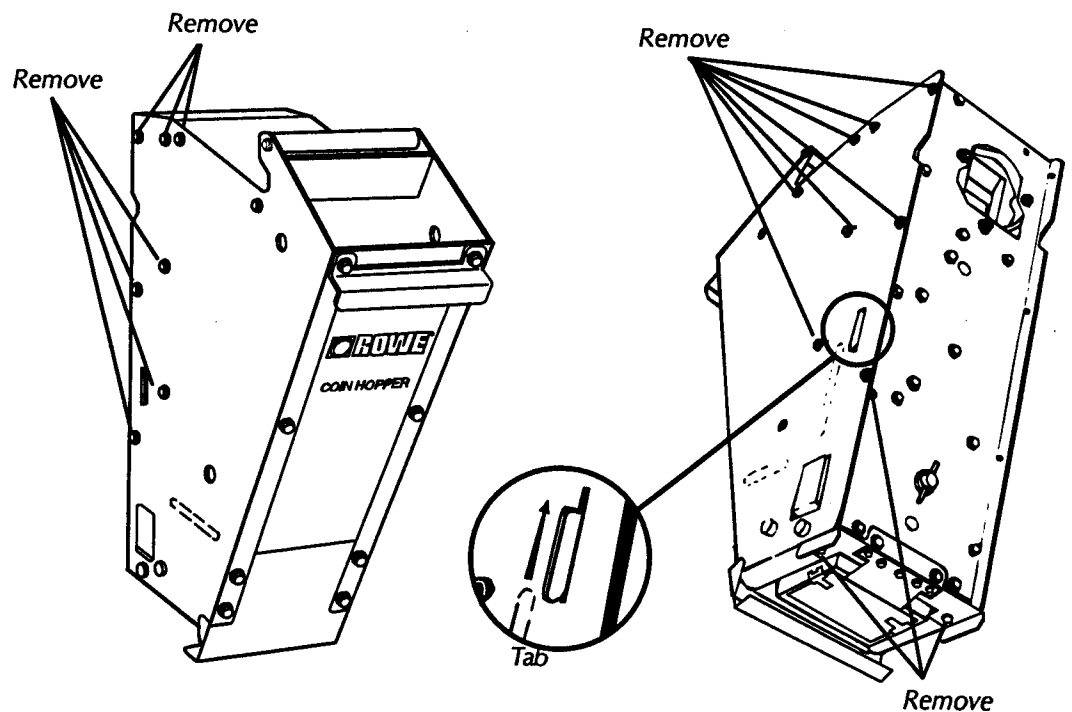
The coin tracks inside the hopper are Teflon coated to minimize dirt build-up. It may still be necessary to clean them at regular intervals, as dictated by the number of vends and the environment, to prevent dirt accumulation in the coin path.

Failure to keep the coin path clean may result in coins sliding out of the track, causing the  $E_r B$  message to occur even though the hopper contains a sufficient amount of coins.

Clean the hopper as follows:

1. Remove the hopper from the bill changer and place it on a working surface.
2. Remove the black screws on each side of the hopper (*Figure 5-2, 17 total*), and lift the chain guide assembly up so that the tab (*Figure 5-2, enlarged*) can be pulled through the slot in the right hand side plate of the hopper assembly. When the tab is free, pull the chain guide assembly straight back out of the hopper.

**Figure 5-2**  
Removing the  
Hopper Chain  
Guide Assembly



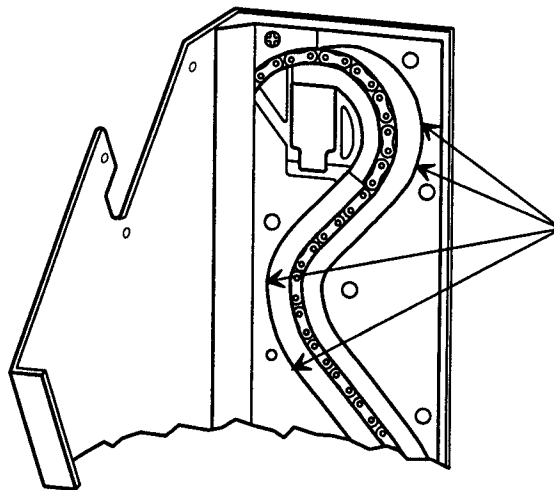
**NOTE:**

Do not use detergents to clean the hopper.

Detergent cleaners destroy the hopper's factory 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 (*Figure 5-3*).
4. To reassemble the hopper, replace the chain guide assembly, securing the tab in its slot, and then *start* each of the screws removed in step 2. When all of the screws have been started, tighten all screws.
5. Replace the hopper in the bill changer. Be sure it is sitting securely in the pivot brackets, snug against the dispenser plate, and the catch is engaged.
6. Make a test vend to check for proper hopper operation.

**Figure 5-3**  
Cleaning the  
Hopper Coin Path



*Clean top and angular coin path surfaces, especially at guide edges, as shown*

## HOPPER CHAIN ADJUSTMENT

If the hopper coin path has been cleaned and the hopper still fails to operate correctly (jams or fails to pick up coins), you may need to adjust the hopper chain.

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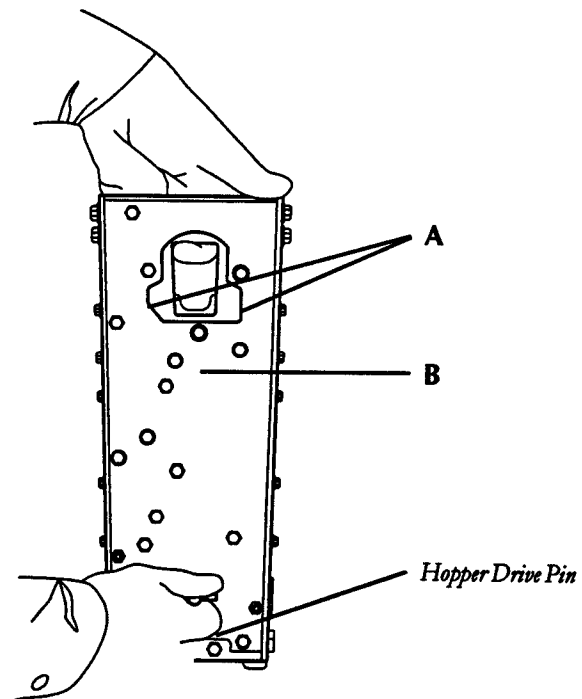
**NOTE:**

*Make sure that all coins have been removed from the hopper before you adjust the chain tension.*

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1. Remove the hopper from the bill changer and empty it of all coins (*Section 3, Unloading the Hopper*).
2. Loosen the three screws at the top back of the hopper (*Figure 5-4, Ref. A and B*) which allow the black plastic upper chain guide ring to move diagonally upward.
3. Pull the chain guide ring up with your index finger as shown in *Figure 5-4*. At the same time, rotate the hopper drive pin clockwise with your other hand until all slack is removed from the chain, but no binding is evident.
4. Tighten the two top screws (A), and then the bottom screw (B), that you loosened in step 2. If a torque wrench is available, adjust the chain so that the torque input at the drive shaft is one to four inch pounds.

**Figure 5-4**  
Hopper Chain  
Adjustment



## DISPENSER

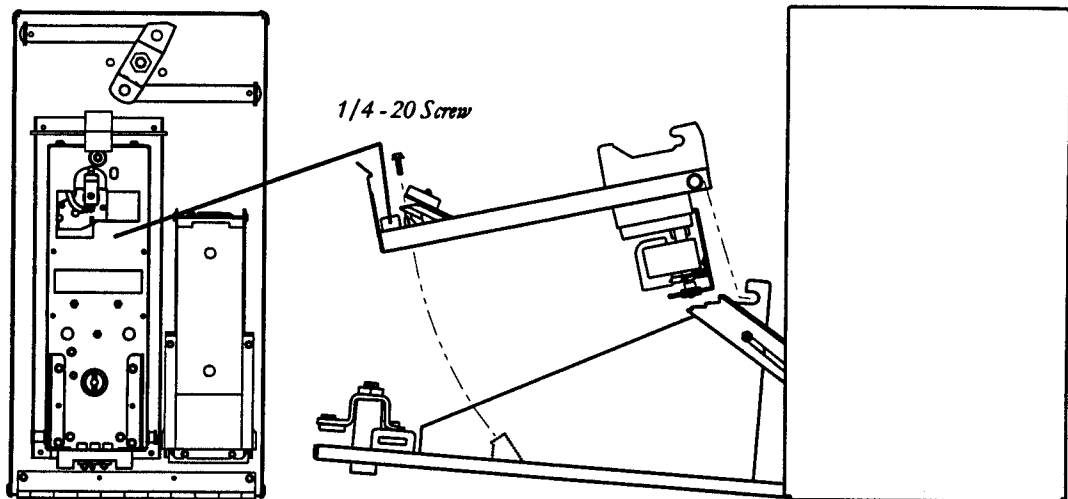
### REMOVING THE DISPENSER ASSEMBLY

1. Remove the hopper from the dispenser assembly (*Section 3, Unloading the Hopper*).
2. Unplug the main harness from the dispenser.
3. Remove the 1/4 - 20 screw on the dispenser plate near the upper coin chute assembly (*See Figure 5-5 for C-2/4 and Figure 5-6 for C-6*).
4. Pivot and slide the dispenser assembly towards you and lift it off of its mounting bracket.

### INSTALLING THE DISPENSER ASSEMBLY

1. Seat the dispenser assembly in its bracket with the motor toward the bracket.
2. Insert the 1/4 - 20 screw through the hole in the dispenser plate and thread it into the mounting bracket.
3. Plug the dispenser harness to the main harness.
4. Replace the hopper. Be sure it is sitting securely in the pivot brackets, snug against the dispenser plate, and the catch is engaged.

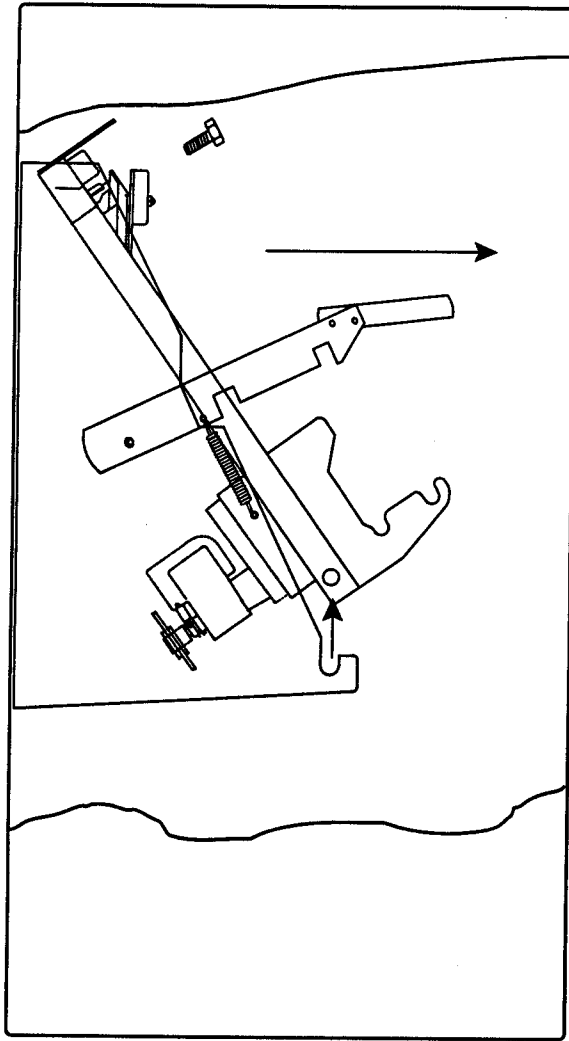
**Figure 5-5**  
Removing  
The Dispenser  
Assembly  
C-2/4



**C-2/4 Door**  
(Hopper Removed)

**Side View**

Figure 5-6  
Removing  
The Dispenser  
Assembly  
C-6



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# **SECTION 6:**

## **TROUBLESHOOTING & SELF-DIAGNOSTICS**

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### **INTRODUCTION**

The Century Series Bill Changers offer a number of self-diagnostic features that aid in troubleshooting. The microcomputer in the Changer Control Computer (CCC) monitors the changer functions, and displays an error code if it detects a malfunction. The meaning of each of the two-character error codes, and instructions for correcting each error, are discussed in this section.

This section also describes miscellaneous problems that can occur but may not cause an error code to be displayed, as well as checking procedures used to verify that the Bill Changer is functioning properly.

## TROUBLESHOOTING

Logical troubleshooting minimizes the effort and expense of removing and replacing the wrong part. The *Corrective Actions* in this section are written in order from the most common to least probable solution, to help you put your Bill Changer back in service quickly, and with as little effort as possible.

Many failures are caused by minor problems such as loose connections or dirty contacts. Before replacing any parts, check to make sure that all plugs are firmly seated and that connector pins are not bent, broken, or pushed through the back of the connector when mated.

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### WARNING:

*The Bill Changer operates on 120 or 220/240 VAC line voltage. If any possibility exists that the wall outlet may be wired backwards, or if the changer is connected to a wall outlet via a two-pronged grounding adapter, pull the plug from the outlet before attempting troubleshooting procedures. Failure to do so could result in serious electrical shock.*

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## CLEARING BILL CHANGER ERROR CODES

After performing one of the *Corrective Actions*, reset the Bill Changer by pushing the UP and DOWN buttons simultaneously on the CCC while the NORMAL/PROGRAM switch is in the NORMAL position. If the error has been corrected, a dash will move from left to right across the 4-character status display.

If necessary, perform a test vend (or a number of them) with a valid bill to make sure that the error does not reappear.

## ERROR CODES

The self diagnostic features of the Century Series Bill Changers are centered around the four-character status display on the CCC. The message displayed will tell you the type of fault encountered.

A description of each of the possible Bill Changer error codes follows. The Bill Acceptor may experience an error condition that is not communicated to the Changer Control. This is particularly true when pulse-type Bill Acceptors are used. There may be no indication that the Changer is disabled, but there will be no activity with the Bill Acceptor due to such an internal malfunction. In these cases, refer to the status indicator on the Bill Acceptor itself - and the Bill Acceptor Manual provided - in order to isolate and solve the problem.

## ERROR CODES:

Er 1

### **Problem:**

No coins or bills are accepted.

### **Symptom:**

*The changer is in shutdown due to an EEPROM error.*

### **Corrective Action:**

1. **Enter the programming mode and check each program option.**
2. **Reprogram the machine if necessary.**
3. **Exit the programming mode. If the error returns, replace the CCC.**

Er 2

### **Problem:**

The changer did not payout coins for a bill accepted. A bill may have been stacked but no payout made.

### **Symptom:**

*The changer is in shutdown because the bill acceptor sent the credit signal for a bill that was not programmed.*

### **Corrective Action:**

1. **Verify that if a bill type is enabled at the bill acceptor, it is also enabled and the payout for that bill is programmed into the CCC. Verify proper setup of the bill acceptors' switch or jumper settings. See setup instructions provided by the bill acceptor manufacturer for further instructions.**

Er 3

**Problem:**

The changer did not payout coins for a bill accepted. A bill may have been stacked but no payout made.

**Symptom:**

*The changer is in shutdown because the bill acceptors' output pulse was too long.*

**Corrective Action:**

1. **Check wiring harness from CCC to bill acceptor for a short to ground.**
2. **Replace bill acceptor.**

Er 4

**Problem:**

No coins or bills are accepted.

**Symptom:**

*The changer is in shutdown because of a fault with the bill acceptor.*

**Corrective Action:**

1. **Check for a full bill acceptor stacker.**
2. **Check for any debris in the bill acceptor.**
3. **Replace the bill acceptor.**

Er 5

This error should never occur in a Century 2, 4, or 6 Changer. If it does, replace the CCC.

Er 6

**Problem:**

The changer did not payout the correct number of coins.

**Symptom:**

*The changer is in shutdown because no coins were paid out of the hopper for 60 seconds after the dispenser was enabled or for 60 seconds after the previous coin during a dispense cycle.*

**Corrective Action:**

1. **Make sure the hopper is lifting the coins into the coin chute.** Check for dirt build-up on the coin path (See Section 5). Check for coin jam or binding parts in the hopper.
2. **Check the hopper motor.** Remove the hopper and clear the error code. Perform a test vend on the changer using a valid bill or coin. If the motor runs, check carefully for excessive bind in the hopper (See Section 5). If the motor does not run, check for 120 VAC at the hopper motor. If voltage is present, the motor is defective. If there is no voltage present, proceed to Step 3.
3. **Check for voltage at the CCC connection to the dispenser harness.** If 120 VAC is present between P3 Pin 6 and P3 Pin 9, then the harness is at fault. Disconnect the 120 VAC, either at the wall plug or by disconnecting the harness at P4 on the CCC and then check for continuity between pin 6 and the hopper motor and pin 9 and the hopper motor. If continuity test fails, repair or replace the harness.

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**Note:**

*If the motor feels very hot to the touch, wait until it cools down, then reset the CCC. Insert a bill to test for proper operation. If the motor operates after cooling off, check hopper for coin jams or binds.*

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Er 7

**Problem:**

The changer may have paid an extra coin from the hopper.

**Symptom:**

*The changer is in shutdown because two extra coins have been paid out, since the last time the changer was reset.*

**Corrective Action:**

1. **Check for mechanical problems with the dispenser assembly.** Most likely the cause is mechanical, rather than electrical. Check the hopper motor brake's stop-pawl for wear or breakage. Check magnetic brake actuator for binds or sticking. Repair or replace hopper motor.
2. **Check the wiring to the photo-detector cell and LED on the dispenser assembly for loose connections or pinched wiring.** Repair wiring or replace photo-detector cell or LED.

Er 8

This error should never occur in a Century 2, 4, or 6 Changer. If it does, replace the CCC.

Er 9

**Problem:**

The changer may have paid an incorrect number of coins.

**Symptom:**

The changer is in shutdown because the coin-detector is (or was) blocked.

**Corrective Action:**

1. **Check for debris such as paper or a foreign object stuck between the photo-detector and the LED on the dispenser assembly.**
2. **Verify that the LED is lit.** Check the wiring to the photo-detector cell and LED on the dispenser assembly for loose connections or pinched wiring. Repair wiring or replace photo-detector cell or LED.

Er 10

**Problem:**

Programming Error.

**Symptom:**

*The computer will not exit the programming mode because there is an error in the present setup.*

**Corrective Action:**

1. **A programmable setting is not correct for the conditions under which it was set.** An example of this would be an additional bill type was enabled, but the payout settings for that bill type were not set. Verify all programming options and make any necessary changes. If the settings are correct, and the error persists, replace the CCC.

Er 12

**Problem:**

The changer is out of service.

**Symptom:**

*The last customer was most likely short-changed due to loss of power during the payout cycle.*

**Corrective Action:**

1. **Make certain that there is a continuous power source connected to the Changer.** Check to be certain that the supply is again restored properly. Check the fuse or circuit breaker is OK.
2. Check the internal circuit breaker (5A) and the ON-OFF switch for intermittent contact.
3. If the problem recurs, and power failure can be completely ruled out, replace the CCC.

Er 13

This error should never occur in a Century 2, 4, or 6 Changer. If it does, replace the CCC.

Er 14

This error should never occur in a Century 2, 4, or 6 Changer. If it does, replace the CCC.

Er 15

This error should never occur in a Century 2, 4, or 6 Changer. If it does, replace the CCC.



*Er16***Problem:**

The changer does not contain enough coins to continue in service.

**Symptom:**

*The changer is in shutdown because the low coin level sensor in the hopper has signalled a low level and the CCC has counted down to within 25 coins of the maximum payout.*

**Corrective Action:**

1. **Refill the hopper with the appropriate coins or tokens.**
2. **If the hopper contains sufficient coins, check the low level sensing circuit.** The decimal point on the second-from-left 7-segment display is used as a low coin condition indicator for the hopper when lit.

If a low-level indicator is lit, but the hopper contains sufficient coins, the low coin level sensing circuit should be checked for proper operation.

3. **Remove the hopper.** The low-level indicator LED should not be lit. If it is lit, check the wiring between the low-level sensor contacts on the dispenser assembly and the CCC for pinched or shorted wiring. The voltage across pins 2 & 5 of P3 on the CCC should be 4.5 - 5.0 VDC. If this is the case, replace the hopper, or repair the low-level sensing circuits in the hopper.

*Er21 or Er22 or Er23***Problem:**

The changer goes out of service when trying to exit the programming mode.

**Symptom:**

*The computer experienced a problem while saving information in its onboard memory chip.*

**Corrective Action:**

1. The most likely cause for this would be a power loss during the programming process. Another possible cause could be a recurring low line voltage condition—See *Er12*.

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This error should never occur in a Century 2 or Century 4 Changer. If it does, replace the CCC.

**Problem (Century 6 only):**

The Changer will not accept coins.

**Symptom:**

The coin equipment is disabled because of a coin related error.

**Corrective Action:**

1. **If a mechanical coin acceptor is installed, check the coin switch and switch actuator wire for proper operation.** Check for a stuck coin or other object holding the switch closed. Clear the obstruction, and reset the error.
2. **If an electronic coin acceptor is installed, check for a stuck coin or other object in the flight deck.** Check the programming. Verify that if a coin type is enabled at the coin acceptor, it is enabled and the payout for that programmed into the CCC. If an electronic coin acceptor accepts a coin that was not programmed into the CCC, this error code will appear.
3. **Check the wiring between the coin acceptor and the CCC for pinched or shorted wiring.** If in doubt, disconnect the coin acceptor harness at the CCC. Reset the error. If the error does not return, replace the coin acceptor or the coin acceptor harness. If the error does return, replace the CCC.

## MISCELLANEOUS PROBLEMS

The following problems may occur in the Bill Changer without causing a fault code.

### ERRATIC PAYOUT

**Problem:**

The changer is not consistently dispensing the correct number of coins.

**Symptom:**

*One vend is short a coin. The next vend contains an extra coin.*

**Corrective Action:**

1. **Check the coin chute on the back of the dispenser.** Most likely, a coin is getting hung up in the dispenser coin chute, after it has been "counted" by the detector, then being shaken loose by a later vend. Check the coin chute for any dirt or obstruction that might cause a coin to hang up.

### LARGE NUMBER OF VALID BILLS REJECTED

**Problem:**

The bill acceptor rejects a large number of valid bills.

**Corrective Action:**

*Refer to the Troubleshooting Chart in the Bill Acceptor Field Service Manual and Parts Catalog included with your Bill Changer.*

### BILLS JAM FREQUENTLY

**Problem:**

Bills repeatedly become jammed in the Bill Acceptor transport.

**Corrective Action:**

*Refer to the Bill Jamming Checklist in the Bill Acceptor Field Service Manual and Parts Catalog included with your Bill Changer.*

## COIN COUNTING PHOTOTRANSISTOR (SENSOR) CHECK

Use the following procedure to check the phototransistor (sensor) in the dispenser coin detector system:

1. Switch the Bill Changer power OFF at the electrical box.
2. Remove the black plastic cover from the phototransistor and connect a common meter lead to the metal dispenser backing plate as shown in Figure 6-1.
3. Connect the positive (+) meter lead to the blue wire (*Figure 6-1, Sensor Check - Blue Wire*).
4. Turn the power switch ON and check to see that the LED is lit. The meter should indicate between 4.7 and 5.2 VDC.

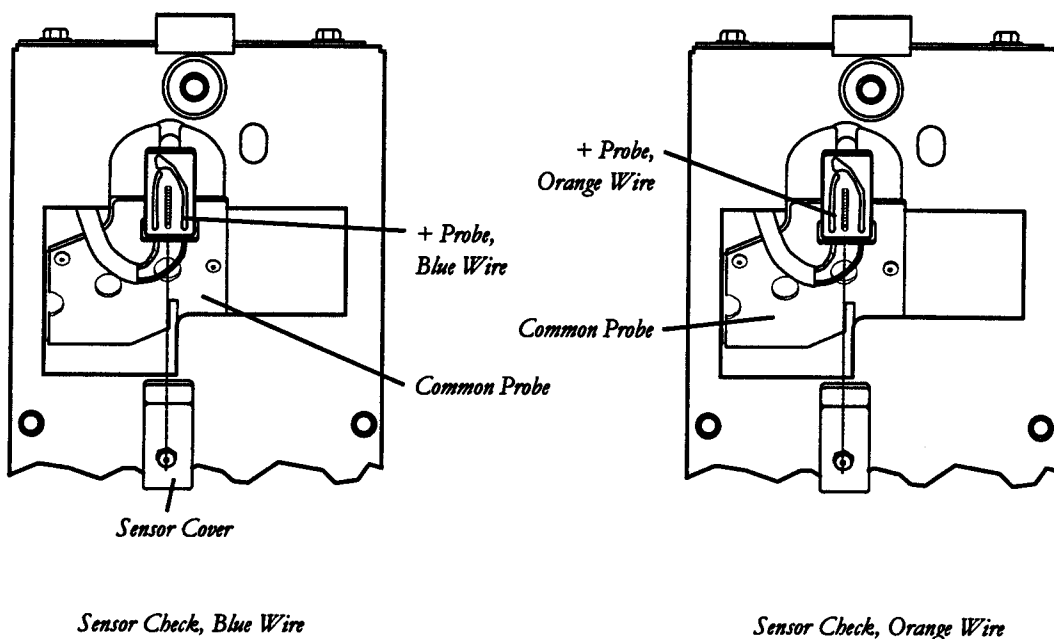
If the meter indication is not correct (between 4.7 and 5.2 VDC), the voltage regulator on the CCC board may need replacement (*see Section 7*). Repair the malfunction before continuing this procedure.

If the meter reading is correct:

5. Move the + meter lead to the orange wire on the phototransistor as shown in *Figure 6-1, Sensor Check - Orange Wire*. The meter should indicate between 3.5 and 5.0 VDC.

If the voltage is less than 3.5 volts, replace the phototransistor board with the correct part number listed in *Section 8: PARTS CATALOG*.

Figure 6-1  
Sensor Check



## LOW COIN SENSOR ELECTRICAL CHECK

Perform the following procedure to ensure that the Low Coin Sensor is functioning properly.

1. Turn the Bill Changer power to OFF.
2. Remove the hopper and empty it of all coins.

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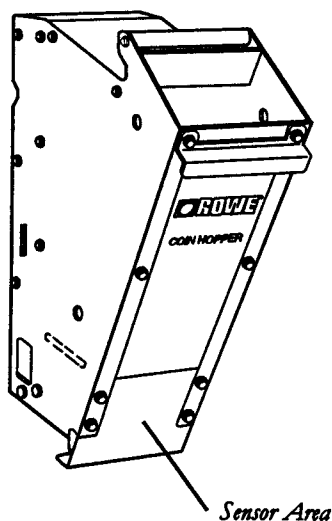
**WARNING:**

Make sure that the power is OFF before performing the following step.

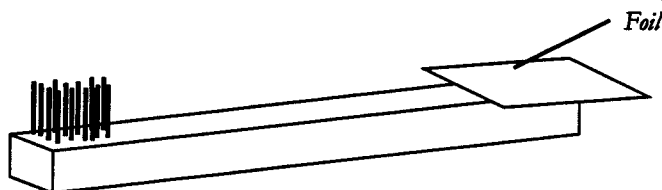
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3. Locate connector P3 on the Changer Control Computer (CCC). Connect a DC voltmeter to P3-5 (GND) and P3-4 (+).
4. Replace the empty hopper and turn Bill Changer power to ON. The voltmeter should read less than +.5 volts DC.
5. Tape 2 x 2 inch piece of aluminum foil around the end of a non-metallic object such as a long plastic ruler or wood stick. Figure 6-3, the Hopper Cleaning Brush is good for this purpose.
6. Place the foil end of the test object *inside* the hopper as close as possible to the location of the sensor (Figure 6-2, Hopper Sensor Area). The voltmeter should now have a reading of no less than 4.3 volts and a maximum of 5.5 volts.

**Figure 6-2**  
Hopper Sensor  
Area



**Figure 6-3**  
Hopper Cleaning  
Brush



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# SECTION 7:

## TECHNICAL INFORMATION

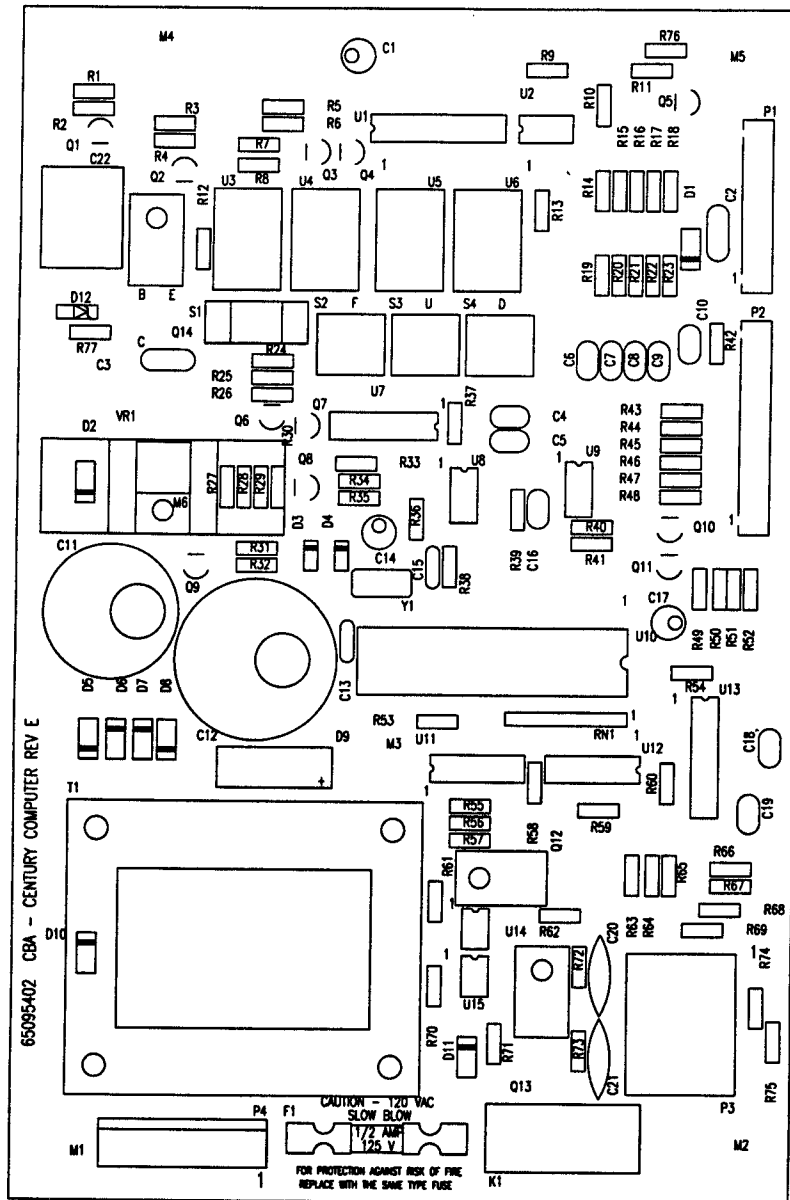
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### INTRODUCTION

The information contained in this section details the electronics found on the Changer Control Computer board, and is not intended for the casual repair person or the novice technician. No attempt should be made to repair the CCC board unless you have had considerable experience troubleshooting and repairing complex, microprocessor controlled electronic circuit boards.

Rowe® recommends that you send any failed CCC boards back to the factory for service.

Figure 7-1  
CCC Circuit Board  
Layout  
65095402





# COMPONENTS LIST

## CCC CIRCUIT BOARD 65095402 Rev. E

C1	CAPACITOR - ELECTROLYTIC 10 VDC	20%	100 UF	70028128
C2	CAPACITOR - MONOLYTHIC CERAMIC	20%	1 UF	70028521
C3	CAPACITOR - MONOLYTHIC CERAMIC	20%	1 UF	70028521
C4	CAPACITOR - MONOLYTHIC CERAMIC	20%	.1 UF	70028514
C5	CAPACITOR - MONOLYTHIC CERAMIC	20%	.1 UF	70028514
C6	CAPACITOR - MONOLYTHIC CERAMIC	20%	.1 UF	70028514
C7	CAPACITOR - MONOLYTHIC CERAMIC	20%	.1 UF	70028514
C8	CAPACITOR - MONOLYTHIC CERAMIC	20%	.1 UF	70028514
C9	CAPACITOR - MONOLYTHIC CERAMIC	20%	.1 UF	70028514
C10	CAPACITOR - MONOLYTHIC CERAMIC	20%	.1 UF	70028514
C11	CAPACITOR - ELECTROLYTIC 25 VDC	20%	4700 UF	70023613
C12	CAPACITOR - ELECTROLYTIC 50 VDC	20%	2200 UF	70023602
C13	CAPACITOR - MONOLYTHIC CERAMIC	20%	22 PF	70028705
C14	CAPACITOR - ELECTROLYTIC 10 VDC	20%	100 UF	70028128
C15	CAPACITOR - MONOLYTHIC CERAMIC	20%	22 PF	70028705
C16	CAPACITOR - MONOLYTHIC CERAMIC	20%	.1 UF	70028514
C17	CAPACITOR - ELECTROLYTIC 10 VDC	20%	100 UF	70028128
C18	CAPACITOR - MONOLYTHIC CERAMIC	20%	.1 UF	70028514
C19	CAPACITOR - MONOLYTHIC CERAMIC	20%	.1 UF	70028514
C20	CAPACITOR - CERAMIC DISK 1 KV	20%	.01 UF	70022508
C21	CAPACITOR - CERAMIC DISK 1 KV	20%	.01 UF	70022508
C22	CAPACITOR - ELECTROLYTIC 16V LOW ESR	20%	2200 UF	70028311
D1	DIODE - SILICON		1N4004	70035005
D2	DIODE - SILICON		1N4004	70035005
D3	DIODE - SILICON		1N4148	70035012
D4	DIODE - SILICON		1N4148	70035012
D5	DIODE - SILICON		1N4004	70035005
D6	DIODE - SILICON		1N4004	70035005
D7	DIODE - SILICON		1N4004	70035005
D8	DIODE - SILICON		1N4004	70035005
D9	RECTIFIER - BRIDGE		3 AMP	21822503
D10	DIODE - SILICON		1N4004	70035005
D11	DIODE - SILICON		1N4004	70035005
D12	DIODE - ZENER 13V, 1W		1N4743A	70035506
F1	FUSE - SLOW BLOW 1/2 AMP 125V			70072101
K1	RELAY PC BOARD (SPST) 12 VDC			70042410
P1	HEADER - 2.5 MM	12 POS.		70074312
P2	HEADER - 2.5 MM	15 POS.		70074315
P3	HEADER - PC BOARD	12 POS.		30763506
P4	HEADER - POLARIZED .156	8 POS.		70075008
Q1	TRANSISTOR - SILICON PNP		MPSA56	70030104
Q2	TRANSISTOR - SILICON PNP		MPSA56	70030104
Q3	TRANSISTOR - SILICON PNP		MPSA56	70030104
Q4	TRANSISTOR - SILICON PNP		MPSA56	70030104
Q5	TRANSISTOR - SILICON DARLINGTON		TN6725A	70030215
Q6	TRANSISTOR - SILICON NPN		MPSA06	70030008
Q7	TRANSISTOR - SILICON NPN		MPSA06	70030008
Q8	TRANSISTOR - SILICON PNP		MPSA56	70030104

Q9	TRANSISTOR - SILICON NPN	MPSA06	70030008
Q10	TRANSISTOR - SILICON PNP	MPSA56	70030104
Q11	TRANSISTOR - SILICON PNP	MPSA56	70030104
Q12	THYRISTOR - TRIAC	T2500D	70038102
Q13	THYRISTOR - TRIAC	T2500D	70038102
Q14	TRANSISTOR - DARLINGTON NPN	TIP102	70030808
R1	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R2	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R3	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R4	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R5	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R6	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R7	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R8	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R9	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R10	RESISTOR - CARBON FILM 1/4W 5%	2.2 K	79901222
R11	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R12	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R13	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R14	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R15	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R16	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R17	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R18	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R19	RESISTOR - CARBON FILM 1/4W 5%	100 OHM	79901101
R20	RESISTOR - CARBON FILM 1/4W 5%	100 OHM	79901101
R21	RESISTOR - CARBON FILM 1/4W 5%	100 OHM	79901101
R22	RESISTOR - CARBON FILM 1/4W 5%	100 OHM	79901101
R23	RESISTOR - CARBON FILM 1/4W 5%	100 OHM	79901101
R24	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R25	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R26	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R27	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R28	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R29	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R30	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R31	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R32	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R33	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R34	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R35	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R36	RESISTOR - CARBON FILM 1/4W 2%	5.6 K	79902562
R37	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R38	RESISTOR - METAL FILM 1/4W 1%	1 K	799121001
R39	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R40	RESISTOR - CARBON FILM 1/4W 5%	390 OHM	79901391
R41	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R42	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R43	RESISTOR - CARBON FILM 1/4W 5%	220 OHM	79901221
R44	RESISTOR - CARBON FILM 1/4W 5%	220 OHM	79901221
R45	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R46	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R47	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R48	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R49	RESISTOR - CARBON FILM 1/4W 5%	6.8 OHM	79901689

R50	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R51	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R52	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R53	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R54	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R55	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R56	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R57	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R58	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R59	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R60	RESISTOR - CARBON FILM 1/4W 5%	10 K	79901103
R61	RESISTOR - CARBON FILM 1/4W 5%	150 OHM	79901151
R62	RESISTOR - CARBON FILM 1/4W 5%	150 OHM	79901151
R63	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R64	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R65	RESISTOR - CARBON FILM 1/4W 5%	4.7 K	79901472
R66	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R67	RESISTOR - CARBON FILM 1/4W 5%	1 K	79901102
R68	RESISTOR - CARBON FILM 1/4W 5%	100 OHM	79901101
R69	RESISTOR - CARBON FILM 1/4W 5%	100 OHM	79901101
R70	RESISTOR - CARBON FILM 1/4W 5%	150 OHM	79901151
R71	RESISTOR - CARBON FILM 1/4W 5%	1.5 K	79901152
R72	RESISTOR - CARBON FILM 1/4W 5%	1.5 K	79901152
R73	RESISTOR - CARBON FILM 1/4W 5%	150 OHM	79901151
R74	RESISTOR - CARBON FILM 1/4W 5%	47 OHM	79901470
R75	RESISTOR - CARBON FILM 1/4W 5%	47 OHM	79901470
R76	RESISTOR - CARBON FILM 1/4W 5%	1.8 OHM	79901189
R77	RESISTOR - CARBON FILM 1/2W 5%	150 OHM	79904151
RN1	RESISTOR NETWORK SIP 5% SIP9	10K X 8	799091030901
S1	SLIDE SWITCH - MICRO MINIATURE		70045001
S2	SWITCH PUSHBUTTON		21773303
S3	SWITCH PUSHBUTTON		21773303
S4	SWITCH PUSHBUTTON		21773303
T1	TRANSFORMER - PC MOUNT		45084403
U1	IC - LED DISPLAY DRIVER	MM5481	30800264
U2	IC - EPROM 128 X 16 SERIAL	93C56	30800263
U3	LED DISPLAY 7 SEGMENT COMMON ANODE		21766708
U4	LED DISPLAY 7 SEGMENT COMMON ANODE		21766708
U5	LED DISPLAY 7 SEGMENT COMMON ANODE		21766708
U6	LED DISPLAY 7 SEGMENT COMMON ANODE		21766708
U7	IC - 1 OF 8 MULTIPLEXER	74HCT151	79930151
U8	IC - UP SUPERVISOR	MAX813L	30800296
U9	IC - DUAL OP AMP	LM358	30800214
U10	MICROCOMPUTER	87C52	70039411
U11	IC - HEX INVERTER OPEN COLLECTOR	74LS05	70037108
U12	IC - HEX INVERTER OPEN COLLECTOR	74LS05	70037108
U13	IC - DRIVER OCTAL SINK	ULN2595A	70036913
U14	IC - OPTOCOUPLER OPTO - TRIAC	IS-3021	70033705
U15	IC - OPTOCOUPLER OPTO - TRIAC	IS-3021	70033705
UX1	SOCKET - IC DIP - 40 (U-10)		70074240
VR1	VOLTAGE REGULATOR - LOW DROPOUT	LM330T-5.0	70036528
Y1	CRYSTAL - QUARTZ 9.216 MHZ		25167323

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