

# Operation Guide and Technical Manual

## BFX 4000 Silver Recovery System

Program BFX 2000/4000  
Version 3.2  
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## SECTION I GENERAL OPERATION

### *Introduction*

The Hallmark BFX 4000 is a computer controlled silver recovery system. The computer has many user adjustable settings that are used to customize the performance of the system. The input buttons that are used to change the settings of the system and program the computer are located on the keypad on the front of the power supply of the unit.

The **Batch Recovery Diagram** on the following page shows the layout of the Collection Tank, Batch Tank, and Tailing Tanks in the Hallmark processing system. The computer in the power supply detects the condition of the system switches that are used to measure the level of fixer solution in the tanks. It also controls the pumps that transfer liquids from tank to tank, the pH adjustment liquid pump, and the cathode rotor motor.

The **Distribution Box Panel Diagram** and **Power Supply Front Panel Diagrams** show the layout of the two components of the power supply system.

## Batch Processing Diagram

## Distribution Box Panel Diagram

## Power Supply Front Panel Diagram

## ***Safety Precautions***

A proper earth ground must be provided to assure the safety of people who can come in with contact the machinery.

Be sure to disconnect the AC power source when servicing the system.

If the restart on power failure option is enabled (as it is when the unit is shipped), be sure that operators are aware that the system will automatically restart when power is restored. This is particularly important if electrical power is lost to the entire plant. Operators must be warned to avoid touching moving parts of equipment that will be reactivated when the electricity is restored.

## ***Operation***

The unit is designed to be ON full time so that the computer in the control panel stays alive. The front panel switches that turn the unit OFF only disable the unit from outputting power. The unit is actually still on, but in an idle state. The unit should be connected to the AC power from the power line 100% of the time during normal operation.

The power supply contains an EEPROM to store all of the user inputs for its adjustable settings. The user settings for current and batch times are not lost if the system loses its source of AC power. When AC power is restored to the control system, all the user settings will be intact. In addition to the user settings, the advanced settings are also saved in EEPROM.

## ***Keypad Controls and Message Display***

The power supply has a 6 button keypad and a 2 line message display. The top line of the display always shows the operating state (mode) of the unit, or the significant action that is occurring in the processing system.

The keypad enables the operator or technician to input values for the user adjustable settings and to set up the advanced settings.

## ***Modes***

The power supply can run in four different modes. Each mode defines a different level of operator involvement. The modes range from fully automatic to fully manual. The default setting is the fully automatic mode. The mode is determined by the advanced settings.

## ***Switch Readings and Pump Controls***

The 4 liquid level switches are normally closed if no liquid is present in the tanks. If the system is empty, all 4 LED's on the distribution box should be lit, indicating a closed condition. The default state of the tanks is normally empty; therefore, when the tanks fill, the switches open and the LED's will go out. The connection on the liquid level switches must be opened to tell the power supply to turn on the pumps to fill the tanks. If there is a break in a wire or a bad connection, the tanks will not be overfilled.

### ***Liquid Level Switch 1 (LL1)***

Liquid Level Switch 1 (LL1) is only enabled during the fully automatic mode. This switch will trip when the collection tank is full enough for a batch. When this switch is triggered the power supply starts the pump and the unprocessed fixer will automatically be pumped into the batch tank, and the batch processing protocol will be started.

### ***Liquid Level Switch 2 (LL2)***

Liquid Level Switch 2 (LL2) trips when the batch tank is full. When this switch is triggered the circulating pump starts and begins filling the rotor tank.

### ***Liquid Level Switch 3 (LL3)***

Liquid Level Switch 3 (LL3) trips when the batch tank begins to fill. This switch also indicates when the tank is empty at the end of a batch to signal that a new batch can be started.

### ***Liquid Level Switch 4 (LL4)***

Liquid Level Switch 4 (LL4) is also called the pump saver switch. This switch trips when the bottom tank is half full, but its primary

function is to alert the operator if the level in the tank drops below half full while a batch is being processed. This is used for conduction probe (silver probe) models with continuous circulation.

### ***Fault Conditions***

Fault conditions that can cause the power supply to shut down or not start up are listed below.

- **Excessive Heat.** The fan must not be blocked, and the power supply must have an adequate source of fresh, unheated air. The power supply is thermally limited to prevent damage to itself from overheating. If the power supply begins to overheat, the fan will switch to high speed. If the unit continues to overheat, the power supply stops outputting amps. Even if the power supply has stopped its output, the rotors will continue to operate.
- **Low AC Input Voltage.** If the AC input power available has low voltage, the under-voltage lockout signal in the power supply will sense this condition. The installer must check to make sure the AC input voltage levels match the specifications shown on the back panel of the power supply.
- **Improper Grounding.** The unit also must be properly grounded for safety and to ensure the reliability of the output diodes.

### ***Hardware Limits***

The system is configured at the factory with the following hardware and software performance ranges. These defaults are fixed and are not adjustable through software.

Built in voltage limit	5.1 Volt DC
Maximum current	500 Amps Total – Two 250 A. Channels 250 Amps Per Channel
Computer settings range	10 to 250 Amps Per Channel



## ***Default Settings for User Adjustable Settings***

The default settings for the user adjustable values are listed below.

<u>User Adjustable Setting</u>	<u>Value</u>
Current Setting (CV1)	70 AMPS
Batch Time Hours (CV2)	3 HOURS
Batch Time Minutes (CV3)	1 MINUTE
pH Pump Time Minutes (CV5)	1 MINUTE *
pH Pump Time Seconds (CV6)	1 SECOND *

\* ST26 must be set to 1

## ***User Adjustable Settings Change Value (CV) Routines CV1 through CV6***

The system has a routine to change the numeric values of the adjustable setpoints that are available to the end user. The user may change the current, the batch time hours and minutes, and usually the pH pump time hours and minutes. To make changes to these settings, the user needs to enter the **Change Value (CV)** routine. The keypad on the front of the power supply has a key marked Change Values that is used to scroll through each of the settings available. Each CV setting has a specific function or value that it controls, and after the desired change to the value is made by pressing the UP and DOWN arrows on the keypad, the change is locked in (executed) by pressing the ENTER button on the keypad.

***The settings CV1 through CV6 are for general operator use. The other settings available are typically used during initial setup or when there is a major change in system setup. The expanded set of advanced settings (CV8 through CV15 and ST17 through ST18) are documented in Sections II and III – Advanced Settings.***

## ***User Adjustable Settings***

### **CV1 Set Current**

The unit allows the operator to set the number of amps that are output. Use CV1 change the amps up or down. The range available is 5 to 125 amps output per channel.

### **CV2 Set Batch Time in Hours**

The batch timer enables the operator to control the time the unit will run. Use CV2 to set the number of hours that the unit will run. The range available is 0 to 24 hours.

### **CV3 Set Batch Time in Minutes**

Use CV3 to set the minutes, in conjunction with the hours setting, within the range of 0 and 59 minutes.

### **CV4 Bypass Timer / LL Switches**

During setup of the system or when doing diagnostic testing, there may be a need to override the system's normal timers and liquid level switch settings. Use CV4 to bypass a timer or LL switch. This feature forces the computer program to advance to the next step in the process. To utilize this option, scroll through the Change Values options to CV4 and press the ENTER button to bypass the step that the system is presently executing and move on to the next one. The power supply must be in a running state in order to bypass a step in the operation, if the display reads UNIT OFF this feature will not work. A detailed example of the use of this feature while setting up and checking the functions of the system is found at the end of this manual.

### **CV5 Set pH Pump Time in Minutes**

**(If advanced setting ST 26 is set at 1 to disable the pH pump, this setting will not appear.)**

This feature allows the run time for the pH pump to be set by the operator. The range available for this setting is 0 to 10 minutes.

**CV6 Set pH Pump Time in Seconds**

**(If ST 26 is set at 1 to disable the pH pump, this setting will not appear.)**

This feature (if available) allows the run time for the pH pump to be set by the operator. The range available for this setting is 0 to 59 seconds.

**CV7 Exit**

When the unit is in the field, this option is the last selection available to an operator in normal situations. Press the ENTER button to return to the operational display. If the CHANGE VALUE routines are left idle for more than 30 seconds, with no keypad inputs, the computer will exit the CV routines on its own.

## SECTION II ADVANCED SETTINGS

### *Program/Lockout Jumper*

The advanced settings for the BFX 4000 are normally altered only by processing plant supervisors, factory engineers, and field technicians. Under most circumstances, the end user has no need to change any of these settings.

The BFX 4000 system has two computers. One computer is inside the power supply and one is inside the distribution box. Each computer has a PROGRAM/LOCKOUT jumper that must be set. On the computer inside the distribution box, the jumper is JMP1. On the computer inside the power supply, the PROGRAM/LOCKOUT jumper is J4.

**The BFX 4000 is shipped with the jumpers in the PROGRAM position. All advanced settings are available for adjustment.**

If the PROGRAM/LOCKOUT jumpers JMP1 and J4 are absent (not installed), the unit will be continually in PROGRAM mode. The unit will still be operational but the advanced program settings will not be protected from accidental alteration. **Once a system has been installed and is running properly, it is recommended that the jumpers be set to LOCKOUT. In the LOCKOUT position the user can change the user accessible settings at any time, but is denied access to the computer routines for changing the advanced settings.**

#### **WARNING**

**If the user or technician attempts to move the JMP1 and J4 jumpers, the system and the user must be well grounded to prevent an electrostatic discharge. Changing the jumper could cause static that could harm or destroy sensitive electronic components. Before touching any internal components, the user must touch the power**

**supply case first to discharge any static buildup and to equalize the potential.**

When the jumpers are in the PROGRAM position, additional CHANGE VALUE (CV) settings CV8 through CV15 are revealed and may be changed. Also, another series of adjustable advanced settings, STATE CHANGE (ST) are available. The STATE CHANGE settings can only be reached by inputting a special keystroke sequence on the keypad, further protecting them from inadvertent changes. The STATE CHANGE settings are used to customize each system and will usually be set by the factory or a Hallmark technician. Section III of this manual discusses the ST (STATE CHANGE) settings.

### ***Additional Change Value Settings***

#### **CV8 Set Hold Times in Minutes – *Advanced Setting***

The range available is 0 to 30 minutes. This setting controls the amount of time the system pauses to allow the rotor (cathode) tank to fill at the beginning of a processing cycle, and also the amount of time the system pauses for the system to drain at the end of processing a batch. The hold time minutes are the same for both parts of the automatic cycle (they are not independently adjustable).

#### **CV9 Clear Batch Count – *Advanced Setting***

This setting will reset the batch counter to zero. During normal operations, the system counts how many batch cycles it has processed. If CV9 is reset, the batch counter tally is set to zero. There is no option to partially reset the batch count – the system can only be reset to start its counting sequence at 0.

**CV11 Prompt Level – *Advanced Setting*****Pause Before Emptying Batch Tank or Automatically Empty Batch Tank****Set at 1 For Most Systems That Are Totally Manual****1 = Prompt                      0 = No Prompt**

This setting determines if the system will pause before emptying each processed batch, or if it will automatically empty the batch tank. The prompt mode setting (Prompt 1) is used if the operator needs to evaluate the silver content in each processed batch, and possibly re-run some batches. If the display reads PROMPT 0, the unit is in the No Prompt (automatic) configuration. The No Prompt mode will automatically empty the batch tank at the end of the processing time. The processing time is set through CV2 and CV3.

When direct operator control is desired, the unit should be set to PROMPT 1. This setting is used if an operator needs to evaluate each batch to determine if the batch needs to be reprocessed, or if the batch is finished. The Prompt 1 setting will make the unit stop and wait for operator input before emptying the batch tank. The unit remains stopped until the operator pushes the RESET button or the RUN button. If the operator determines that silver still remains and the batch needs reprocessing, the operator presses the RESET button. The unit will run for one (1) additional hour before stopping again to allow the operator to reevaluate the batch's silver content. If the operator presses the RUN button, the batch tank is emptied, and the system runs through its cycle and prepares to receive a new batch.

**CV12 Manual or Automatic – *Advanced Setting*****Automatically Start a New Batch, or Wait for Operator to Start Each Batch****Set at 1 For Most Systems That Are Totally Manual****1 = MANUAL                      0 = AUTO**

If the display reads Manual 1 the operator determines when the unit will begin filling and operating. The manual prompt mode allows the operator to be in complete control of when new batches are started. During operation in this mode when the collection tank is full, the system displays

the message Press Run to Start and waits until the operator press RUN button.

This setting determines if the unit will start itself automatically when there is enough solution in the collection tank to begin processing a batch, or if it waits for the operator to start each new batch. If the display reads Manual 0 the unit is in the automatic configuration, and will begin a batch without operator input. In this automatic mode the system uses the LL1 switch to determine when there is enough solution in the collection tank and begins a cycle when the collection tank is full. For this feature to run automatically, there must be a LL1 switch installed on the system, and ST22 must be set to 0.

### **CV13 Set to Fault or Restart on Power Failure**

#### **On/Off Option – *Advanced Setting***

**0 = Restart on Power Failure**

**1 = Fault on Power Failure**

The power supply needs electrical power at all times. However, if the AC power from the electrical service fails, the power supply has a memory backup that saves operation information. All Change Value (CV) and State Change (ST) settings are stored in the EEPROM. The system will restart when power is restored. CV13 is the setting that is used to determine how the restart sequence will proceed. The technician can determine if the power supply will restart upon restoration of power or will stay off. If the display reads 0, the option is set for automatic restart after a power failure and the unit will resume operation at the exact state of processing when the power interruption occurred without any operator keypad input. If this setting is set to 1, the option is off and the display screen on unit will show the message

**POWER FAIL - RUN OR RESET**

and the system will wait for a manual restart. Pushing RUN will restart the batch where it left off and RESET will take the system out of its routine and back to the beginning of the processing cycle. **MAKE SURE THE BATCH TANK IS EMPTY BEFORE STARTING FROM THE BEGINNING.**

WARNING - If the unit is in a location where human contact with moving parts is possible, then set this variable to 1 to have MANUAL restart with a prompt message.

### **CV14 Amps Display Method – *Advanced Setting***

**0 = Average      1 = Peak**

#### **Set at 0**

#### **LEAVE THIS SETTING AT 0**

*Background Information:*

This option may be used by the technician to diagnose hardware problems.

If the display is set shows Peak 0, the unit is not using the peak display method, and will instead show the average amps from readings taken over a 4 second period.

If the display is set to Peak 1 the unit is set up to show the peak amps from readings taken over a 4 second period.

If the readings seem to jump around and not stay consistent, then the peak setting will give a more accurate reading. If it becomes necessary to use the peak reading regularly, it is an indication the brushes located in the tank are becoming worn.

### **CV15 Exit – *Advanced Setting***

Press ENTER to exit the CHANGE VALUES routine and resume normal operation.



### SECTION III ADDITIONAL ADVANCED SETTINGS

#### *State Change Routines*

#### *To Change State Change Settings ST 17 through ST 24*

**Keystroke Sequence Required:**

Pressing UP Arrow While CV15 is Displayed

**Hardware Conditions Required:**

1. PROGRAM/LOCKOUT Jumper J4 in the Power Supply Set to PROGRAM Position

2. PROGRAM/LOCKOUT Jumper JMP1 in the Distribution Box Set to PROGRAM Position

available from Hallmark Refining. Some of the settings refer to options used on other Hallmark power supply models.

All of the ST settings are shown in binary logic. The display will read 0 or 1, and an explanatory word to indicate which setting is being adjusted. The table at the end of this documentation summarizes the settings in a one-page format.

#### *ST Settings Factory Defaults*

Settings if the unit leaves the factory set to run as a BFX 4000 125 Amp quad unit. The default ST settings are set as follows:

### **BFX 4000 125 Amp Quad Unit**

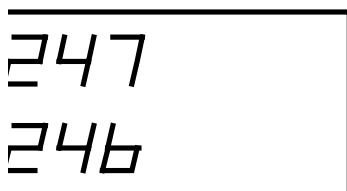
STATE CHANGE ITEM	SETTING	EXPLANATION
ST17	1	250 Amp Power Supply Scaling Must Be Set At 1 For BFX 4000
ST18	1	Set At 1 For BFX 4000. Combine 4 LED Display into 2 LED Display.
ST19	1	Channels #1 and #2 Displayed.
ST20	1	Channels #3 and #4 Displayed
ST21	0	Not Applicable. Scaling For 62 Amps.
ST22	1	LL1 Switch Not Present Used For Manual Start of Batch
St23	0	LL2 Switch Present and Enabled
ST24	1	LL4 Switch Disabled
ST25	0	Set For Master Unit (1 = Slave )
ST26	1	pH Pump Disabled
ST27	0	Set For Batch Mode
ST28	0	Not Applicable To Batch Timer Units

*ST Settings***ST17 SET POWER SUPPLY SCALING FACTOR****0 = 40/80 Amp****1 = 125/250 Amp****BFX 4000: Set to 1****Always leave this setting at 1 for the 250 Amps per channel units.**

Selects what kind of power supply the computer is running. 0 selects a 40 amp power supply and 1 selects a 125/250 Amp power amp series power supply.

**ST18 TWO CHANNELS SHUNTED TOGETHER OR ALL CHANNELS ARE SEPARATE****0 = Channels are separate and not doubled****1 = Channels are combined and doubled****BFX 4000: Set to 1**

This option enables the system to run two channel outputs as one with a metal shunt connecting the two channels. By doing this, the output is doubled. For example, by combining 125 amp outputs with a shorting shunt jumper, the system runs as a dual 250 Amp unit, which is the hardware setup for the BFX 4000. By combining two 125 Amp power supplies, the system runs as a single 250 Amp unit. The amperage is set with the ST17 setting and is also determined by the hardware of the unit. The BFX 4000 units must always have this setting set at 1. The diagram below shows how the LED displays the combined amps from two channels.



OUTPUT AMPERES

**ST19 CHANNELS 1 AND  
2 – AMPERAGE  
INFORMATION  
INPUT TO COMPUTER**  
**0 = Input from 1 Channel**

**Only****1 = Input from both Channel 1 and 2****BFX 4000: Set to 1**

ST19 should be set to 1 to input amperage input from both channels 1 and 2 into the computer. If ST18 is set to 1 to combine the amps from the shunted channels 1 and 2 together, the total amps for the two channels are added together. The sum of the two channels is displayed.

**ST20 CHANNELS 3 AND 4 – AMPERAGE  
INFORMATION INPUT TO COMPUTER**

**0 = Input from Channels 3 only****1 = Input from both Channels 3 and 4****BFX 4000: Set to 1**

ST19 should be set to 1 to input amperage input from both channels 3 and 4 into the computer. If ST18 is set to 1 to combine the amps from the shunted channels 3 and 4 together, the total amps for the two channels are added together. The sum of the two channels is displayed.

**ST21 NOT APPLICABLE**

**BFX 4000: Set to 0**

This selection is for scaling the outputs to 62.5 Amps instead of 125 Amps per channel. This is used in the Quad 62.5 FX 6000.

**ST22 LL1 ENABLED OR DISABLED**

**0 = LL1 Present 1 = LL1 Not Present****BFX 4000: Usually set to 1**

Most BFX 4000 systems don't have a Liquid Level 1 (LL1) switch. This setting tells the computer there will be no input from the LL1 switch. If there is an LL1 switch in the collection tank, this must be set to 0 indicating the switch is present. If there is not an LL1 switch installed in your system, this setting should be set at 1.

### **ST23 LL2 ENABLED/DISABLED**

**0 = LL2 Enabled (LL2 is Present)**

**1 = LL2 Disabled (No LL2 Switch Present on System)**

#### **BFX 4000: Set to 0**

Selects if there is a Liquid Level 2 (LL2) switch. Set at 0 if LL2 is present. Set at 1 if LL2 is not present. The Liquid Level 2 switch determines if the batch tank has been completely filled and is ready to begin processing.

### **ST24 LL4 ENABLED/DISABLED**

**0 = LL4 Enabled 1 = LL4 Disabled**

#### **BFX 4000: Set to 1**

Selects if there is Liquid Level 4 (LL4) PUMP SAVER switch. Set at 0 if LL4 is present. Set at 1 LL4 is not present. If the unit does not have an LL4 switch, change this to a 1 to keep from triggering a fault in the processing state. This is usually set by the factory to 1 in the BFX 1000/2000/4000.

This feature is also referred to as the "pump saver" feature, which is very important in the FX 6000 continuous recovery systems. The Liquid Level 4 switch allows the computer to detect if the batch tank is full or not. When enabled, this feature will detect inadequate liquid levels during the processing of a batch and will shut down the unit if there is a tank leak. If the liquid levels are low, an alarm will sound to notify the operator of the problem. The most common cause of this occurrence is a leak in the tank or re-circulating pump system.

If this setting is enabled and the batch tank is not full, then the unit will not run. This is a safety feature and should never be ignored. There should never be a need to run a partial batch. If a partial batch is run the

rotors will not be fully covered and the amperage output will be, in effect, doubled which could cause an inconsistent result in the silver being extracted.

**Warning:**

**If this feature is disabled, there is no protection to prevent damage to the pumps if the liquid level drops below the level that is safe for the circulation pumps.**

**ST25 MASTER/SLAVE SELECTION**

**0 = Master                      1 = Slave**

**BFX 4000: Set to 0**

In one keypad action, ST25 sets the both the computer in the power supply and the computer in the distribution box to Master mode. When the power supply and the distribution box are physically connected, the computer in the power supply detects the connection and automatically overrides the Master setting in ST25 and becomes a slave to the distribution box computer. This is the normal operating mode. When the units are connected during normal operation, the display window shows the letter "R" in the upper right, indicating that the REMOTE computer, i.e. the distribution box computer, is controlling the system, as it should. If the connection between the distribution box and power supply is broken, the power supply computer detects that it is alone, and sets itself to a stand-alone operating mode. It will display an "S" in the upper right corner of the display, indicating stand-alone operation.

**ST26 ACCEPT OR REMOVE pH PUMP**

**0 = pH Pump Enabled    1 = pH Pump Disabled**

**BFX 2000/4000: Usually Set to 1**

If there is a pH pump installed, 0 selects if the pH pump is present.

NOTE: 1 disables the pH pump fill time during filling, and removes the pH pump time options (CV5 and CV6) from the change value options.

**ST27 BATCH OR C-PROBE****0 = Batch Timer Unit 1 = C-Probe Unit****BFX 4000: Set to 0**

This setting is used for Hallmark units using a silver probe (C-Probe). The BTD4 DISTRIBUTION units are not equipped for this option. This manual does not cover C-probe operation. This setting should always be set at 0 for the BFX 4000.

**ST28 C-PROBE OR VOLTAGE CONDUCTIVITY****0 = Remote C-Probe 1 = Voltage Conductivity****BFX 4000: Set to 0**

This setting is used for Hallmark units using a silver probe (C-Probe).

0 selects C-Probe. 1 selects voltage conductivity. This is an option for C-Probe units. This is ignored by batch units. This option must be set at 0 for the BFX 4000 units.

**ST30 EXIT**

Allows exit from the ST programming values routine. Press ENTER to return to the main program immediately. If there is no keypad activity for 30 seconds, the unit will revert back to the main program on its own.

## Settings Checklist

### *Suggested Defaults*

#### END USER SETTINGS

CV1	70 AMPS	<i>A setting that is frequently changed.</i>
CV2	3 HOURS	<i>A setting that is frequently changed.</i>
CV3	1 MINUTE	<i>A setting that is frequently changed.</i>
CV4	NO SETTING	
CV5	0 MINUTES	<i>This setting is usually disabled with ST26=1</i>
CV6	0 SECONDS	
<b>CV7</b>	<b>EXIT</b>	

#### BFX 4000 ADVANCED SETTINGS

Jumper J4 Must be Set to Program Mode to Access these Settings.  
*These settings are rarely changed.*

CV8		5 MINUTES
CV9		NO SETTING
CV11	1	FOR PROMPT MODE
CV12	1	FOR MANUAL MODE
CV13	0	FOR AUTO RESTART ON PF
CV14	0	FOR AVERAGE READINGS
CV15		EXIT OPTION

Jumper J4 Must be Set to Program Mode to Access these Settings  
Special Keystroke Sequence Needed to Access these Settings  
Keystroke Sequence Shown on Page 1 of Section III. *These settings almost never change, and an improper setting could disable the system.*

ST17	1	FOR 125 SCALING
ST18	0	FOR QUAD 125 BFX 4000
ST19	1	CHANNELS 1 AND 2 DISPLAYED SEPARATELY
ST20	1	DISPLAY CHANNELS 3 AND 4 SEPARATELY



(continued on the following page)

ST21	0	SCALE FOR 125
ST22	1	LL1 SWITCH DISABLED (Manual Start)
ST23	0	LL2 SWITCH ENABLED
ST24	1	LL4 SWITCH DISABLED
ST25	0	FOR MASTER SETTING
ST26	1	pH PUMP NOT PRESENT
ST27	0	BATCH MODE
ST28	0	NOT APPLICABLE TO BATCH TIMER
<b>ST30</b>		<b>EXIT</b>

***System Testing Procedure***  
***Bypass the Timer and Override Liquid Level Switches***

The steps outlined below can be used to test the system during installation or to troubleshoot the system.

***Initial Startup – First Time***

Check that the power supply is connected to AC power. The green LED and the display should be lit. The display should say:

**HALLMARK REFINING CORPORATION**

The display will quickly change to another message. The second message displayed will vary depending on the way the system has been configured at the factory. For most operations the automatic mode has been selected and the display will read:

**WAITING FOR BATCH**

***Quick Testing of Computer Sequences Without Running Batches***

The system must be running. If it is not running, start it by pressing the RUN key. CV4 is a special routine that allows the user to bypass the waiting between a processing step and immediately jump to the next step in the sequence. The computer is forced to perform the next part of the processing sequence, regardless of the state of the liquid level switches and regardless of the timing that has been set for various steps. This is useful when the installer needs to see what steps the computer will perform without actually running batches through the system.

Each time the installer wants to force the computer to the next step in a sequence, CV4 should be invoked from the keypad.

**CV4 is used to bypass any step of the batch processing or to override any liquid level LL switch the computer monitors.**

The following list details several situations when the computer waits for liquid level switches to trip. It also has timed waiting periods in a normal processing cycle. During testing, all of these steps can be bypassed and the computer forced to move to the next step in its program.

Step 1: *Waiting for Batch*

During this step the computer is waiting for input from the LL1 switch.

Step 2: *Filling*

This is step to fill the batch tank. The LL2 switch will trip to stop this step.

Step 3: *Holding*

This is a timed step to fill the rotor tank.

Step 4: *Processing*

This is a timed step to remove the silver from the fixer solution.

Step 5: *Holding*

This is a timed step to allow the rotor tank to drain. This is the same length of time as the holding time to fill the rotor tank.

Step 6: *Emptying*

During this step, the rotor tank is drained by the tailing pump. When the tank is empty the LL3 switch will close, telling the computer that the tank is ready to start a new batch.

**CV4 can be used to bypass any of the steps listed above, forcing the system to move to the next part of the cycle. To use this procedure, follow the steps below.**

At any point in the processing sequence, the current sequential step can be stopped and the system forced to move to the next step.

Step 1: Push the CHANGE VALUE key until the CV 4 Bypass Timer/LL option is displayed.

Step 2: When this option is found, push the ENTER button. The computer will move on to the next step in the sequence.

Example: Overriding the Liquid Level 1 Switch

The LL1 switch is located in the collection tank. This switch flips open when there is enough fixer collected in the tank. When the LL1 switch opens, the computer program detects that the rotor tank is ready to begin filling. During installation and testing of the system, if the user does not want to wait until the LL1 switch opens, it can be bypassed by using the CV4 option in the CHANGE VALUE routines. Using the CHANGE VALUE button located on the front keypad, cycle through the options until CV4 appears. Push the ENTER button to force the computer to ignore the LL1 switch. The remainder of the automatic cycle will proceed normally. If there are additional waiting periods in a normal cycle that the user wants to bypass, CV4 can be used repeatedly to move the system through a cycle.

