Platelet Storage System Manual

Model PC100

Version A

English

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Operation Manual

Installation

1) Carefully unpack your Helmer Platelet Incubator.
   Included in the carton is a bag with the following accessories:
   1) Power cord.
   2) 16mm tube for Quality Control testing. Refer to the Quality Control section.
   3) Fan cover for Agitator. This directs the hot air from the Agitator. Remove the backing on the adhesive strips and press this in place onto your Agitator as shown (Figure 0.0) so that the open side of the box is facing the back of the unit.

2) Select a location keeping the following in mind:

   1) Allow 4 inches (10 cm) of air space above and to the right side of the unit for adequate air circulation. Use a grounded outlet with adequate power specifications as listed on the specifications label on the back of the unit.
   2) Keep away from direct sunlight or high temperature areas.

3) Turn the power switch to "**I**" (ON) and allow the chamber temperature to stabilize (30 minutes) at the factory preset controller values. While waiting for the chamber temperature to stabilize, carefully continue reading through the instruction manual.

4) Open the door to the chart recorder and connect the leads to the 9 volt battery.

5) Insert an approved, calibrated thermometer on the top shelf of your flatbed platelet agitator.

6) To install platelet agitators, open the incubator door and carefully place the platelet agitator onto the center of the incubator. Plug the platelet agitator power cord into the chamber outlet. Make sure that the power cord is properly secured to prevent cord damage. Turn the platelet agitator power switch to the on position and verify that it is centered within the drawer.

-Labeling

(Figure 0.1) - The maximum amperage rating for the interior chamber outlet (1), is 0.5 amps. Do not plug any device into the outlet that exceeds this rating.

Controls and Components

Control Panel: The main control panel contains the following:

See Figure 1.1 in the Appendix for locations of components referenced below.

Digital Controller (1): Provides visual readouts and controlling of the chamber temperature, alarms and other pertinent functions. All settings and calibration inputs are made through the controller touch buttons.

Audible Alarm (2): Generates a tone when activated, signaling an alarm condition.

Main Power Switch (3): Controls all electrical current to the unit. When the switch is turned to "**I**" (ON) the refrigeration, heating, fans and electrical systems become operative. All unit functions are shut down when the main power switch is turned to "**O**" (OFF).

Alarm Interrupt Button (4): Pressing this button when the audible high/low alarm has sounded will temporarily silence the audible alarm by resetting the alarm time delay period.

Audible Alarm Shutoff Switch (5): The audible alarm can be silenced with the key activated shutoff switch. The unit is shipped with the switch in the "**O**" (alarm OFF) position. Turn the switch to the "**I**" (alarm ON) position to activate the alarm.

Refrigeration and Heating System: The chamber is cooled by a refrigeration system in which the compressor unit runs continuously. A heater is turned on by the controller system to maintain the proper set temperature.

Thermostat Switch: A high temperature switch is mounted behind the interior back wall to discontinue power to the heater in the event of heating circuit failure.

Temperature and Alarm Systems

A. Digital Temperature Controller

Your Helmer system incorporates a digital controller system and RTD sensor to accurately control the temperature of the chamber. The controller system provides visual readouts of the chamber operating temperature, alarm system, heater output, and other functions. All temperature, calibration, and alarm settings are made through the controller touch buttons.

See Figure 2.1 in the appendix for locations of the items referenced below.

Heater On Indicator (1): This small round light labeled "1", will light whenever the controller sends power to the heater. This indicator will light on and off continuously during normal use.

Alarm Indicator (2): When the controller senses that the chamber temperature has exceeded the high or low alarm limit the Alarm Indicator, labeled as "2", will illuminate. The audible alarm is delayed for the period of time set by the Alarm Timer Delay. The adjustable Alarm Timer Delay prevents unnecessary warnings that may be caused by temporary temperature fluctuations when opening the doors.

Down Button (▼) (3): Used to decrease the controller digit values in conjunction with the **SET** button and to enter into the program functions in conjunction with the ▲ button.

Up Button (▲) (4): Used to increase the controller digit values in conjunction with the **SET** button and to enter into the program functions in conjunction with the ▼ button.

SET Button (5): Used to display the set temperature and to display the program function values.

B. Accessing the Chamber Set Temperature

To alter the chamber temperature setting:

1) (Figure 3.1) This is the normal display of the current temperature reading.

2) (Figure 3.2) Press and hold the **SET** button to display the current set temperature value.

3) (Figure 3.3) While holding the **SET** button down, press either the ▲ or ▼ button to alter the set value as desired. (If the set value will not change, the Set Point Lockout is in the lockout mode. To unlock this program value refer to "Accessing the Set Point Lockout" in the Controller Lockout section of the Maintenance and Service manual.)

4) Release the **SET** button to complete the chamber temperature setting change.

C. Accessing the Low and High Alarm Programs.

To alter the Low and/or High Alarm settings:

1) (Figure 4.1) Press and hold the ▲ and ▼ buttons until a controller program is displayed. (If the "**CnFg**" prompt appears, the Controller Program Lockout will need to be unlocked. To unlock this program value refer to "Accessing the Controller Program Lockout" in the Controller Lockout section of the Maintenance and Service manual.)

2) (Figure 4.2) Press the ▼ button until the "**ALO**" program appears for the Low Alarm, or "**Ahl**" for the High Alarm program.

3) (Figure 4.3) While holding the **SET** button down, press the ▲ or ▼ button to alter the alarm value as desired.

4) (Figure 4.4) To exit back out to the main operating mode, release the **SET** button and press both the ▲ and ▼ buttons until the operating temperature appears on the digital display.

D. Alarm Timer Delay

The temperature alarm has a variable delay setting, which can be changed to set the length of time desired before activating the audible and central alarm relays. The time can be set from approximately 0 to 8 minutes. You can access this feature by removing the front panel of the unit. The adjustment is made through the dial located on the internal circuit board (Figure 5.1). Turning the dial to its extreme clockwise position sets the delay time to 8 minutes. Turning the dial to its extreme counter-clockwise position sets the delay time to 0 minutes.

E. Power Failure Alarm

In the event of a power interruption the audible alarm will sound and the central alarm relay will activate. To disable this alarm use the keylock switch located on the front control panel of the unit. It is recommended to place the key for this switch in a location separate from the switch.

Disabling the power failure alarm also disables the audible portion of the temperature alarm. However, in this disabled mode the red alarm light on the controller and the central alarm output are still functional.

Quality Control

A. Calibration of Digital Controller

To verify that the digital temperature controller is calibrated correctly allow the chamber temperature to stabilize and then take a temperature reading from a calibrated thermometer placed on the top shelf of the agitator inside the chamber. The temperature controller is calibrated correctly if the thermometer reads the same as the controller display. The temperature controller needs to be calibrated if there is a temperature variance.

As an example, if a calibrated thermometer reads 21.0°C and the Temperature Controller reads 22.0°C, then the controller display ("**CAL**" function) needs to be reduced by 1.0°C. If the thermometer reads 23.0°C and the Temperature Controller reads 22.0°C, then the controller display ("**CAL**" function) needs to be increased by 1.0°C.

To recalibrate the Temperature Controller:

1) (Figure 7.1) Press and hold the ▲ and ▼ buttons until a controller program is displayed. (If the "**CnFg**" prompt appears first, the Controller will need to be unlocked. To unlock this program value refer to "Accessing the Program Lockout" in the Controller Lockout section of the Maintenance and Service manual.)

2) (Figure 7.2) Press the ▼ button until the "**Pid**" Menu prompt appears.

3) (Figure 7.3) While pressing the **SET** button (the digital readout will display "**no**"), press the ▼ button to display "**yes**", and then release the **SET** button.

4) (Figure 7.4) Press the ▲ button once to display the "**CAL**" prompt.

5) (Figure 7.5) While holding the **SET** button down, press either the ▲ or ▼ button to alter the calibration program value.

6) (Figure 7.6) To exit back to the main operating mode, release the **SET** button and press the ▲ and ▼ buttons simultaneously until the operating temperature appears on the digital display.

After making any calibration changes to the Temperature Controller allow the chamber temperature to stabilize and make a new reading to verify that the controller is properly calibrated. Make any additional adjustments as needed until the controller readout is properly calibrated.

B. Alarm System Test

To test for proper functioning of the High and Low Alarm System it is important to follow methods that may be recommended by the AABB or other governing organizations for such alarm system checks. A suggested method to activate an actual alarm test condition is as follows:

1) Fill the supplied 16mm tube with water that is at least 1°C beyond the alarm setting to be tested.

2) Place the tube in the holding bracket and slide it up to submerse the end of the probe in the water. (Figure 8.1)

3) Watch for the alarm indicator light on the Temperature controller to illuminate when the temperature reading passes the alarm set point. The audible alarm will then go into the delay mode and sound after the delay period has cycled.

4) Remove the tube and empty the water. Do not leave the tube in a position that covers the RTD sensor. Doing so will cause the controls to take incorrect chamber temperature readings.

Caution

When the RTD sensor is placed into the water the control system will be responding as if the chamber temperature is the temperature of the water. As a result, the system will adjust to this input accordingly and the actual temperature of the chamber will change. Be careful not to expose any platelets in the chamber to an extended period of varying temperatures.

Specifications

Weight:	48 kg
Input Power:	115 / 230 V~, 50/60 Hz
Consumption:	920 VA Includes the load from standard agitator placed inside the chamber.
Circuit Breakers:	115 V: 12 A 230 V: 6 A
Size:	53 cm (W) x 63 cm (H) x 43 cm (D)
Operating Temperature:	+5 up to +35°C

This device complies with CSA standard 151 and UL standard 1252 for construction and electrical safety.

Description of Symbols

CE - Conforms to 93/42/EEC

- Date of Manufacturing

Maintenance

It is recommended to conduct the following maintenance items to help keep your Helmer Platelet Incubator in good working condition:

Quarterly:	Clean condenser grill. Conduct alarm and calibration checks. Check the 9V-chart recorder battery.

Cleaning

The importance of proper cleaning of your Helmer Platelet Incubator cannot be under estimated. Lack of cleaning of items, such as the condensor fins, can significantly cut down on the life expectancy of this equipment.

Exterior - A soft cotton cloth and non-abrasive liquid cleaner should be used for cleaning the exterior surfaces. The door should be cleaned with a soft cotton cloth and window cleaner. The black condensor fins located on the upper right side of the unit should be cleaned and vacuumed often.

Interior - Always turn the power switch off when cleaning the interior of the incubator. A disinfectant cleaner should be used to wipe down the inside stainless steel walls, drawer and interior water drain tray. This should be done on a regular basis or when leaking bags require you to clean the chamber.

Troubleshooting

The information in this section is for the benefit of the user in diagnosing certain issues. If the user cannot resolve a particular problem your service agent may use the more extensive Troubleshooting section in the Service Manual. Contact HELMER or your authorized service representative if more help is needed.

Electrical

Problem	Possible Cause	Action to be Taken
Unit does not turn on.	- Circuit breaker or fuse activated.	- Reset circuit breaker or replace fuse.
	- Faulty outlet connection.	- Verify outlet is good. Plug into a different outlet.
	- Faulty power cord.	- Verify proper cord connections. Change power cord.
	- Faulty power switch.	- Replace switch.
Platelet agitator not operating.	- Faulty platelet agitator.	- Verify that agitator is working properly.
Power cord on agitator rubbing.	- Agitator not centered in chamber.	- Verify positioning of agitator.
	- Power cord not positioned properly.	- Verify positioning of cord.

Alarms and Controller

Audible alarm not sounding.	- Not waiting for alarm delay to cycle.	- The alarm system has a delay system before the audible alarm will sound. Wait sufficient time for alarm delay to cycle.
	- Verify Alarm and Controller settings.	- The controller alarm value or other values may have been altered causing the non-alarm condition. Refer to the proper controller value settings and change accordingly.
Alarm sounding sporadically.	- Faulty alarm system.	- Verify proper operation of the controller, secondary circuit board and line connections.
	- Alarm deviation value set too tight.	- During normal operation the temperature will fluctuate as a result of many factors. If the alarm value is set too tight to the operating value the alarm may sound often. The alarm system is to warn of serious unit temperature fluctuations. Increase the alarm value.
	- Door not closing.	- Verify proper alignment of door closure.
	- Air gaps around door.	- Verify door gaskets are sealing properly.
	- Chamber temperature not stabilizing.	- Verify that the chamber temperature is maintaining a proper and consistent temperature. Refer to Quality Control section.
Alarm not activating at proper temperature.	- Calibrate controller.	- Refer to section on Calibration of the Digital Controller.
Controller setting not calibrated properly.	- Calibrate controller.	- Refer to section on Calibration of the Digital Controller.

Other

Ice lying in water tray.	- Refrigerant pressure is low.	- Verify refrigerant pressures. Add refrigerant as needed.
Severe water puddling in water tray.	- Drain hole plugged.	- Unclog drain hole.
	- Door not closing tight, allowing humid air into the chamber.	- Verify that door gasket is sealing and door is closing properly.
Water is puddling outside of the incubator.	- Drain pan leaks.	- Seal any leaks in drain pan with silicone.
	- Water is condensing on evaporator lines to the compressor.	- Apply additional cork tape to copper lines.
	- Excessive humidity.	- Water will accumulate more during humid periods. Make sure door is closing properly.
Platelets are "pooling" to one side of the bag.	- Unit not level.	- Verify that the unit is sitting level. Verify that the agitator is sitting level.

Limited Warranty

(USA and Canada)
The Helmer Platelet Incubators are warranted for one year for materials and labor at our factory.
(For all other countries contact your local distributor.)

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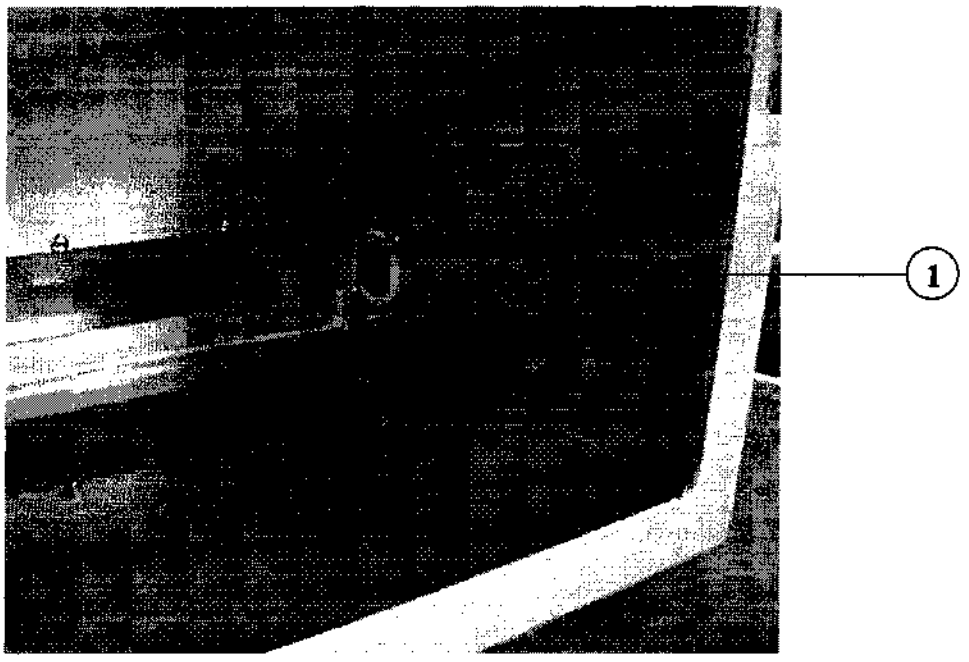
0.1



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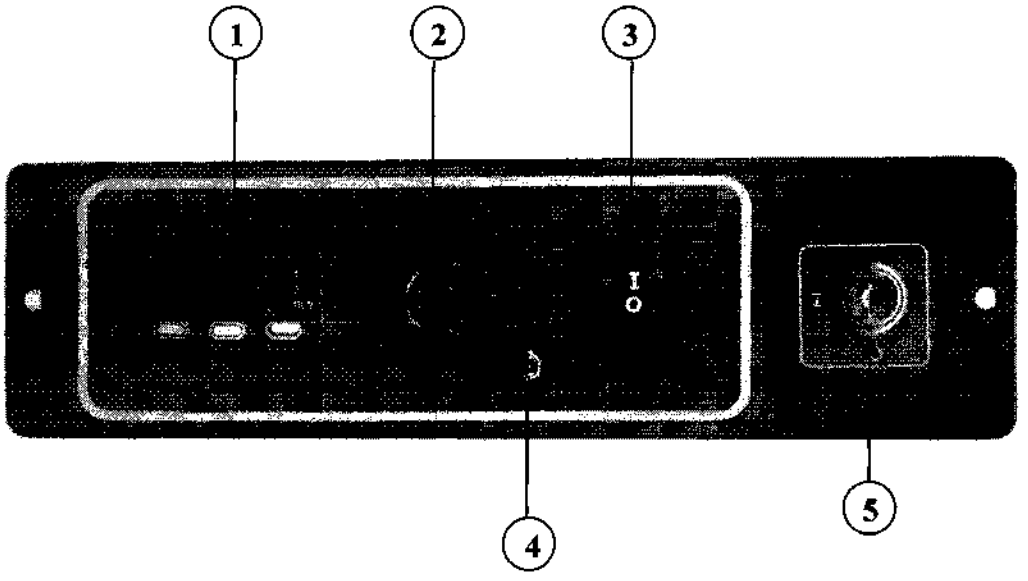

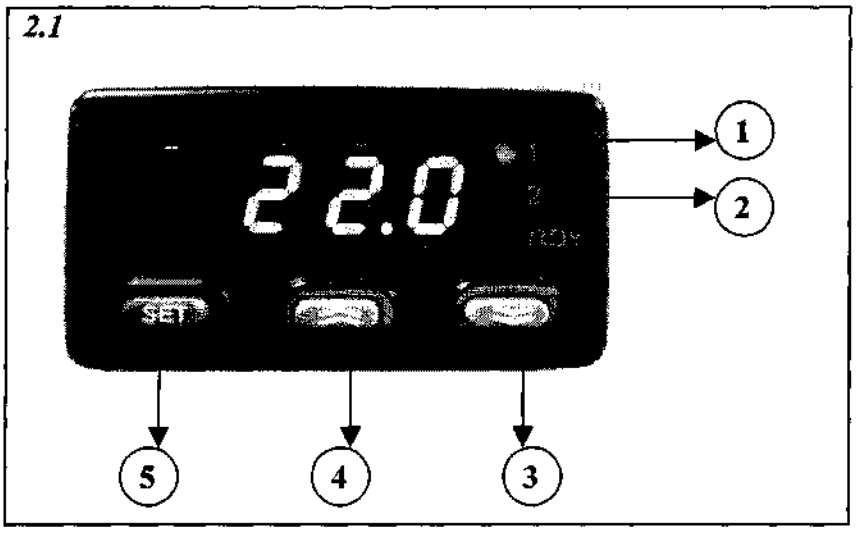
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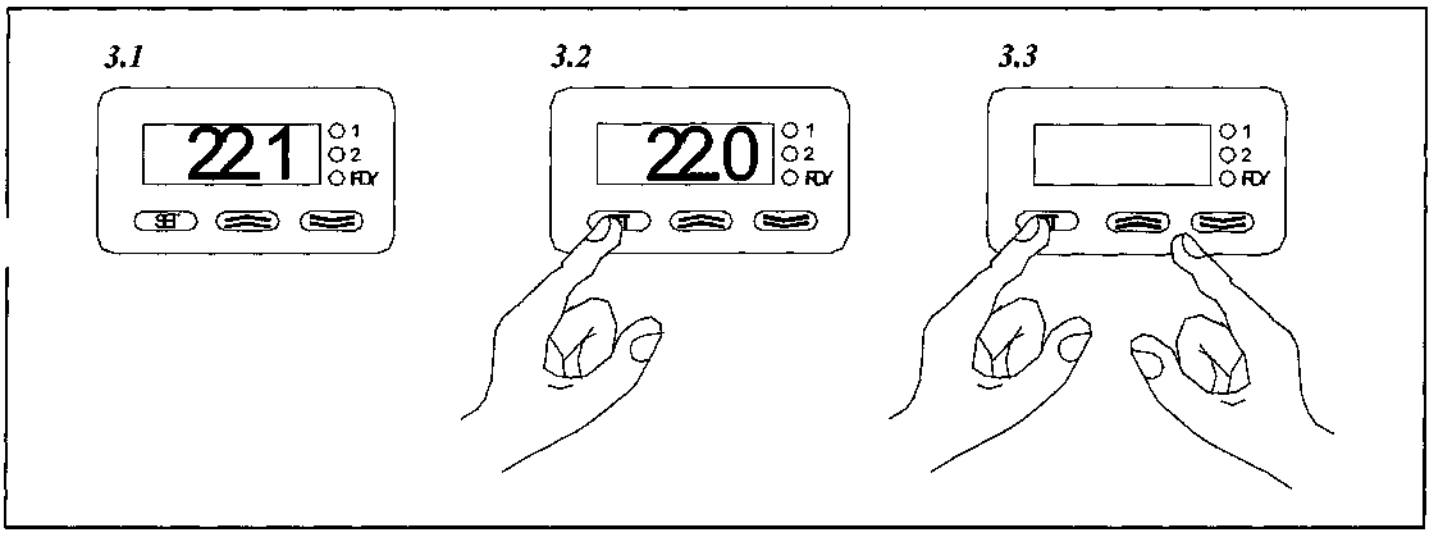
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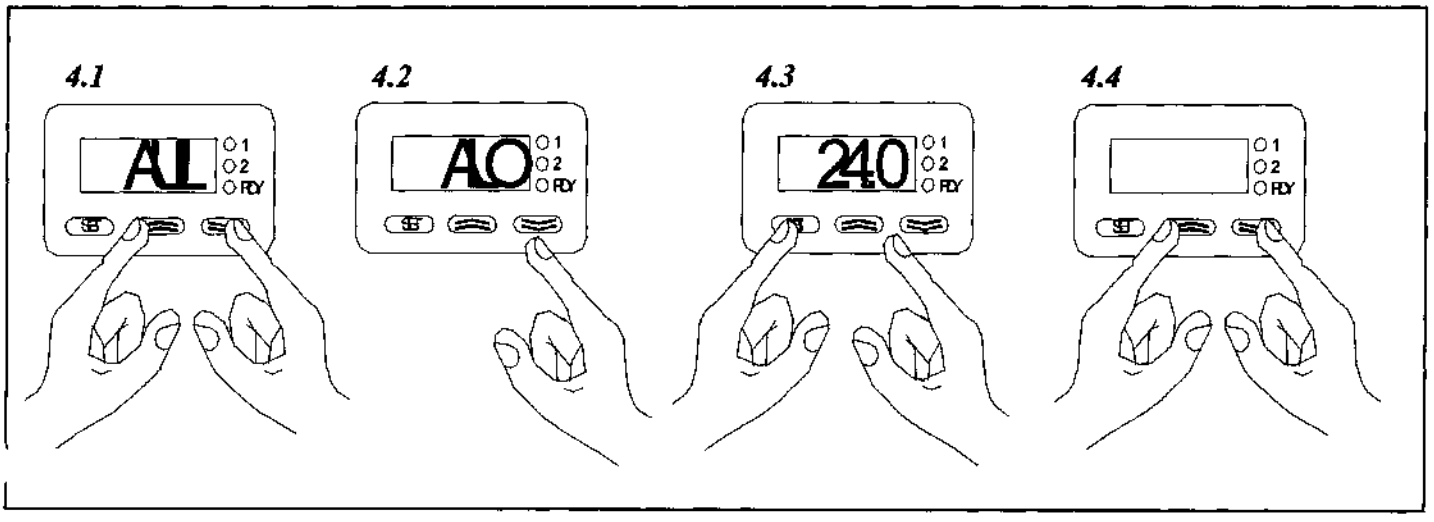
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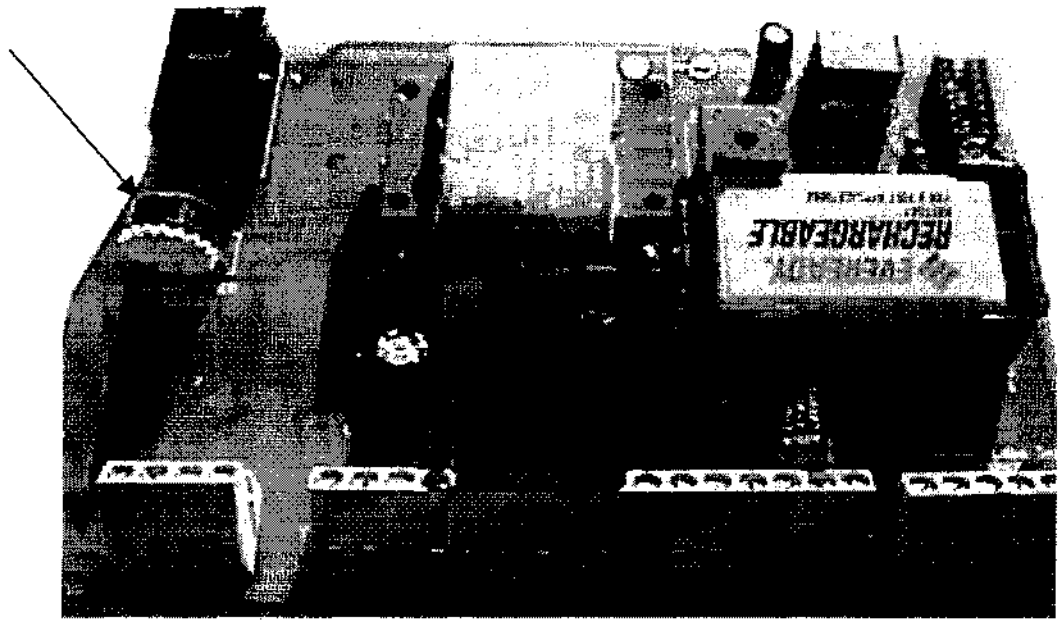

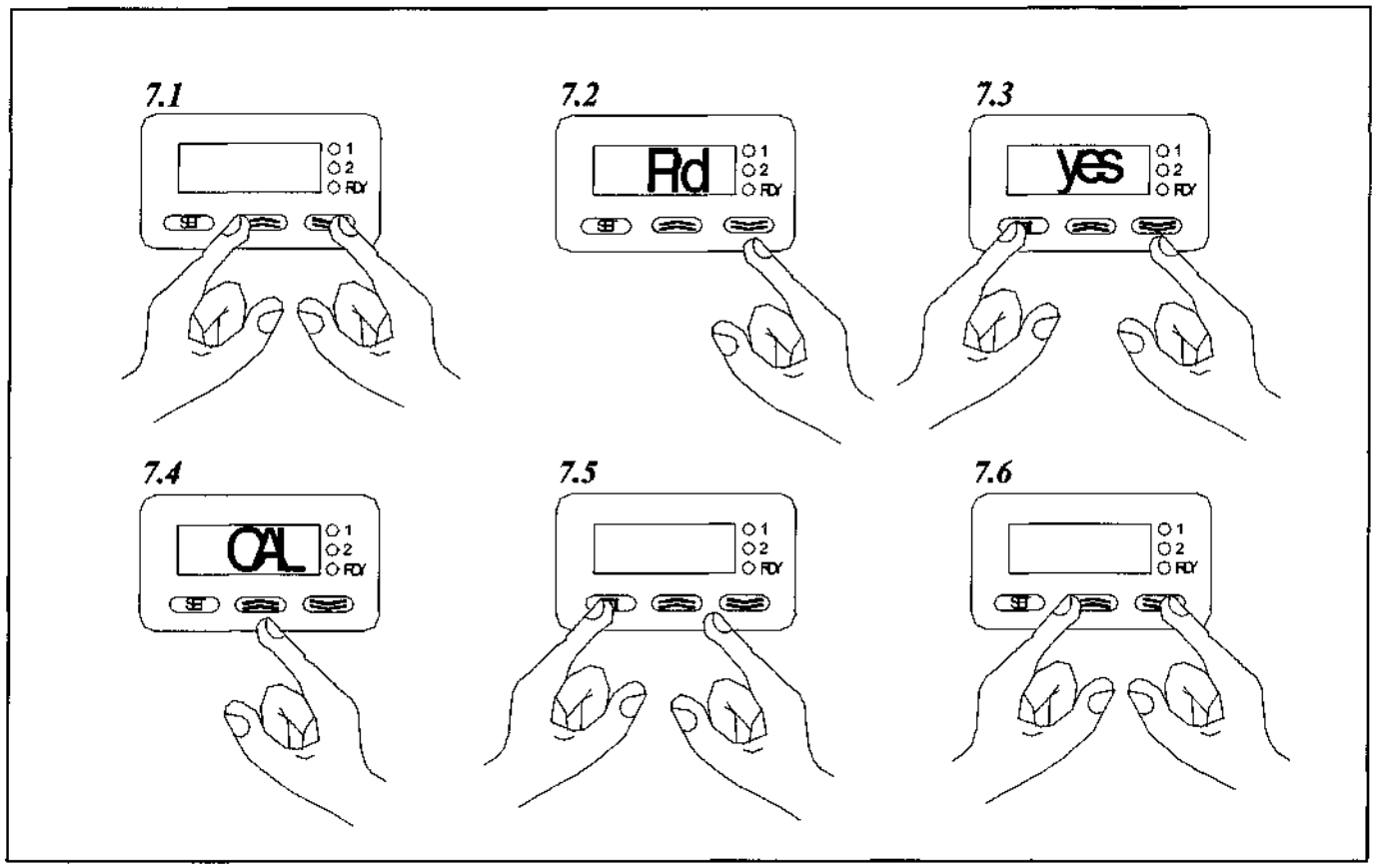
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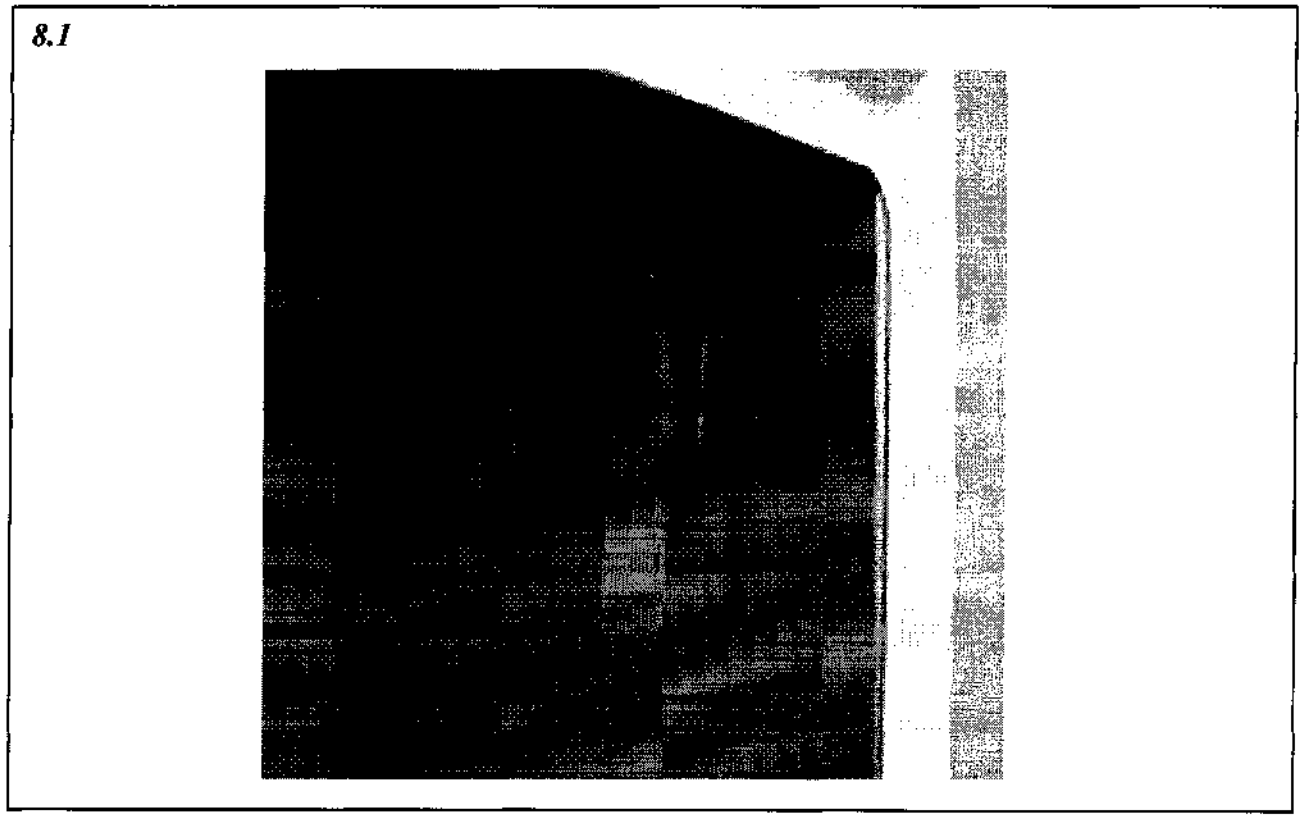

8.1

Service Manual

Version A

Model PC100

Central Alarm Hook-up

The central alarm hookup described in this section is for the high/low alarm and the power failure alarm. By using this system you are connecting to a relay switch, either normally open or normally closed, depending on terminals used. There is no voltage output provided from this connection. To connect a central alarm system into the platelet incubator's high/low alarm outputs you will need to do the following:

1) Turn the power switch off and unplug the unit.
2) Remove the front panel.
3) Locate the three terminals on the right side of the secondary circuit board. These three outputs are for connecting to a central alarm system. The outside terminal (#16) is the common, the next terminal to the left (#15) is the normally closed contact and the second terminal to the left (#14) is the normally open contact.
4) Connect the central alarm wires to the proper terminals for your alarm system.
5) Cable tie the wires as necessary for stability.
6) Run the central alarm wires through the small grommet located in the back of the exterior panel that was removed.
7) Replace the panel.

To connect a central alarm system to the agitator alarm in the platelet incubator, see the agitator or motion alarm instructions. A hole is provided on the right side of the chamber wall for wire access to the chamber. Remove the plug on the exterior side of the wall for access.

Remote Probe Installation

To install a third party probe for monitoring or for a supplemental temperature alarm system you will need to do the following:

1) Locate the chamber access hole on the right side of the chamber wall. It is shipped with a hole plug in it.
2) Remove the hole plugs and run the probe through the wall. Depending on the diameter of your probe you may want to drill a hole in the hole plugs and run the probe through those so that the plugs can be replaced in their positions.
3) Locate the two screws on the bottom edge of the rear wall. These two screws are for use in mounting the probe. You may use both or just one depending on the length of the probe. Mount the probe.
4) Seal the access hole in the right wall. If the hole plugs are reused pack the cavity in the wall with a filler material.

Note: For accurate readings of the supplemental system you install using the above probe it is important to locate the probe in this position.

Temperature Controller Programs

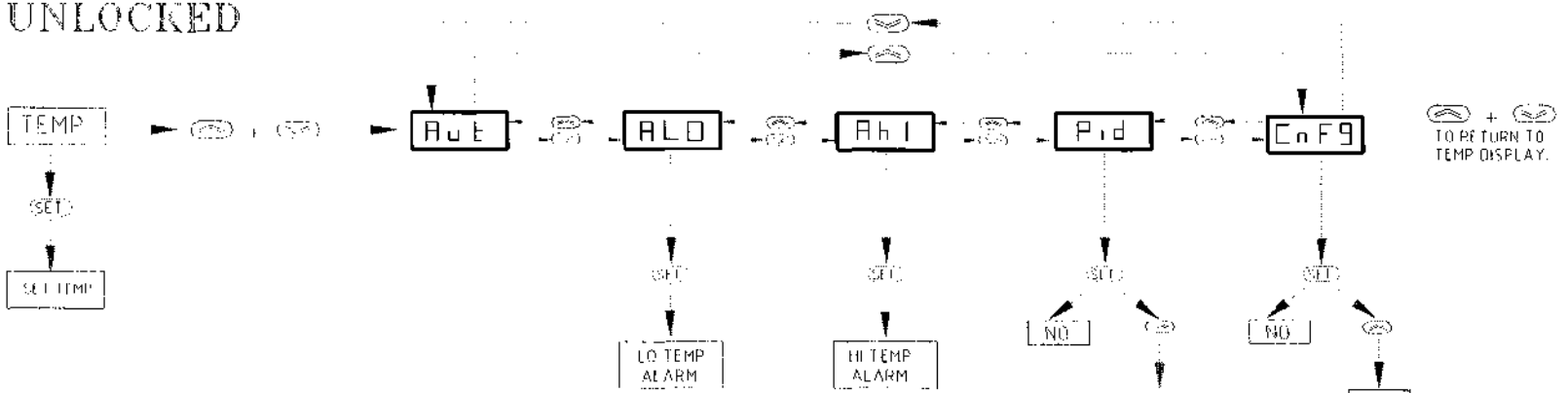
The digital controller contains internal programs that effect the operation and accuracy of the controller and alarm system. A few of the internal programs may be altered by the operator for specific requirements and are noted below by an asterisk (*). **The remaining program functions must not be altered without consulting Helmer - doing so could effect the operation of the unit and the manufacturer's warranty.** The following is a summary of the controller's internal programs with their description and proper value settings:

Main Program Titles and Access	Program Description	Program Display	Program Value
1. Operating Set Temp.			
Press **SET** button	Chamber Set Temperature		*22.0
2. Operations Menu			
Press ▲ and ▼ buttons	Auto-tune	Aut	no
together for 3 seconds	Low Alarm Deviation	ALO	*20.0
	High Alarm Deviation	Ah1	*24.0
	PID Menu	Pid	no
	Configuration Menu	CnFg	no
3. PID Menu			
Change the "**Pid**"	Proportional Band	Pb h	1.0
Menu setting to "**yes**"	Cycle Time	Ct h	0.5
	Integral Function	It	30.00
	Derivative Function	dE	0.80
	Calibration Offset	CAL	*varies
4. Configuration Menu			
Change the "**CnFg**"	Input Type	In	Rt.d
Menu to "**yes**"	Celsius	C_F	°C
	Temperature Low Limit	rL	15.0
	Temperature High Limit	rh	35.0
	Output 1 Function	Ot1	hEAt
	Output 2 Function	Ot2	ALr7
	Display Default	dISP	Ac
	Alarm Type	ALty	Prno
	Alarm Hysteresis	AhyS	0.1
	Alarm Latch	LAt	no
	Alarm Silencing	SIL	no
	Failure Mode	FAIL	bPLS
	Set Point Lockout	SLOC	*no
	Controller Lockout Tag	tAg	_C_A

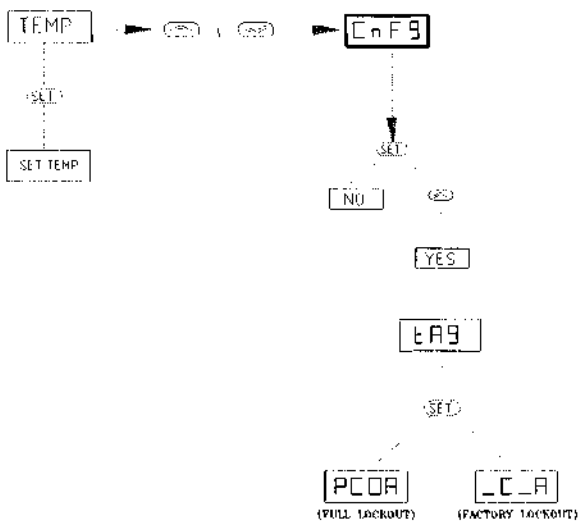
ECO	REV	DATE	REVISION DESCRIPTION	BY	APV

CONTROLLER PROGRAM FLOWCHART

UNLOCKED



LOCKED



To unlock refer to "Accessing the Controller Program Lockout".

CONPRO1

Controller Lockout System

A) Factory Lockout Mode: **tag = (_C_A)**

The digital Temperature Controller has been set in a "factory lockout" mode. This means that the user can access the Set Temperature, Low and High Alarms, Calibration Offset and the Controller Lockout program values.

B) Full Lockout Mode: **tag = (PCOA)**

If the Controller Lockout is set to "**PCOA**" then all controller programs will be inaccessible, except the Set Temperature.

C) Unlocked Mode: **tag = (_ _ _ _)**

If the Controller Lockout Tag is set to "_ _ _ _", then all controller programs will be accessible to the user.

D) Set Point Lockout: **(SLOC) = "yes" or "no"**

If the Set Point Lockout is set to "**no**", the operating set temperature can be changed by the user. If the Set Point Lockout is set to "**yes**", the operating set temperature is locked and can not be changed.

1) Accessing the Controller Program Lockout:

1) Press and hold the ▲ and ▼ buttons until a controller program is displayed. If the lockout is in the factory lockout setting, the first controller program to appear will be "**ALO**". If the "**Aut**" prompt appears, the controller programs are fully unlocked. If the "**CnFg**" prompt appears, the controller programs are fully lockout.

2) Press the ▲ or ▼ button until the "**CnFg**" prompt appears.

3) While pressing the **SET** button in (the digital readout will display "**no**") press the ▲ or ▼ button to display "**yes**", and then release the **SET** button. If the "**In**" prompt appears, proceed to step 4. If the "**tAg**" prompt appears, you are at the program display for the Controller Lockout Tag, proceed to step 5.

Caution

Do not change the "In" or "°C" program values. Doing so automatically changes many of the controller program values causing uneven temperature controlling of the incubator.

4) Press the ▲ button once to display the "**tAg**" prompt. You are now at the program display for the Controller Lockout Tag.

5) Press and hold the **SET** button to display the current input value of the "**tAg**" program.

6) To change the lockout program value, hold the **SET** button down and press the ▲ or ▼ button to change the program value.

7) To exit back to the main operating mode, release the **SET** button and press both the ▲ and ▼ buttons until the operating temperature appears on the digital display.

2) Accessing the Set Point Lockout (SLOC):

1) With the controller fully unlocked, (refer to steps 1-6 in the Accessing the Controller Program Lockout), press and hold the ▲ and ▼ buttons until a controller program is displayed.

2) Press the ▲ or ▼ button until the "**CnFg**" prompt appears.

3) While pressing the **SET** button in (the digital readout will display "**no**"), press the ▲ or ▼ button to display "**yes**", and then release the **SET** button. The "**In**" prompt will appear.

4) Press the ▲ button twice to display the "**SLOC**" prompt. You are now at the program display for the Set Point Lockout.

5) Press and hold the **SET** button to display the current input value of the Set Point program - either "**yes**" or "**no**" will be displayed. The "**yes**" prompt means that the Set Point Lockout is in the Lockout mode. The "**no**" prompt means that Set Point Lockout is Unlocked.

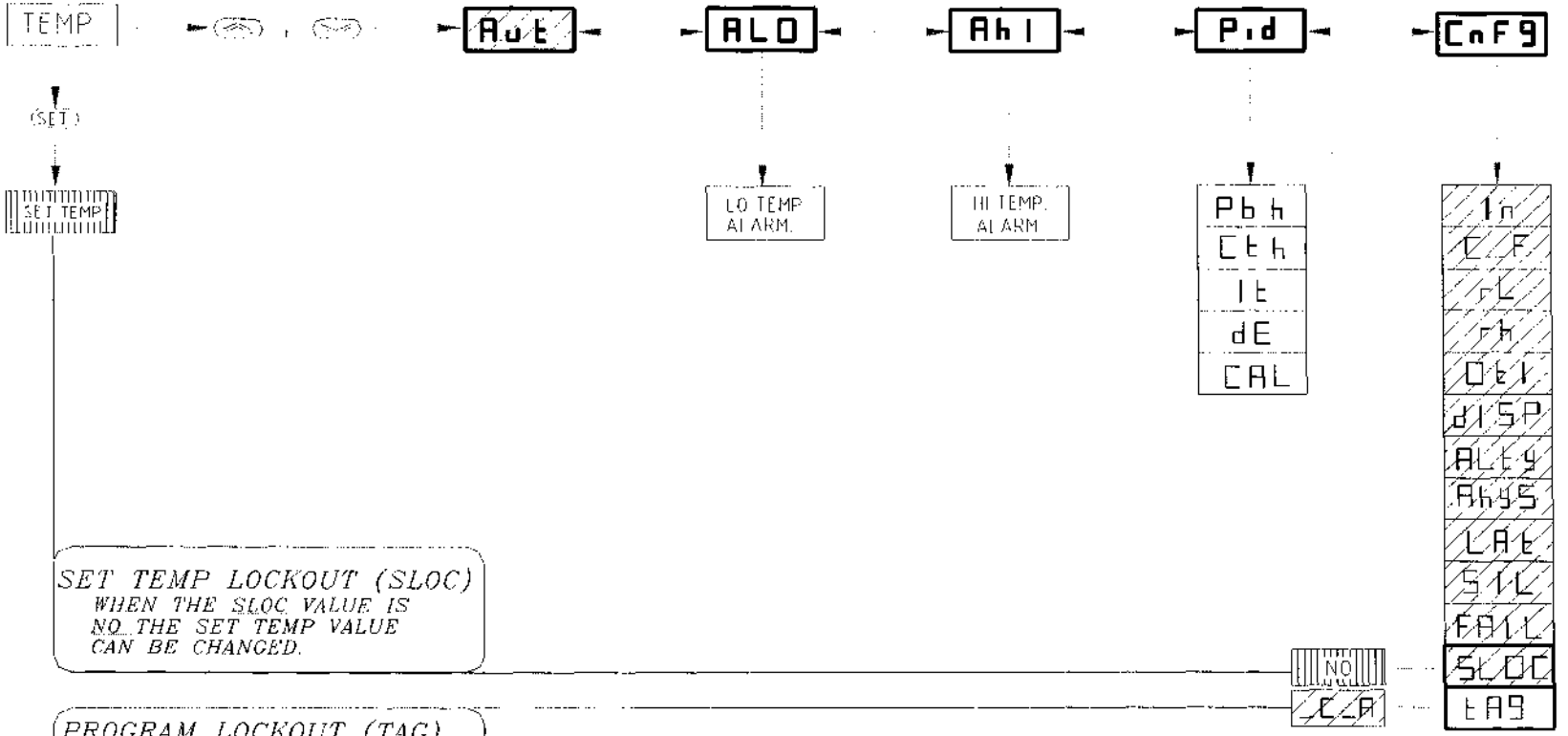
6) To exit back to the main operating mode, release the **SET** button and press both the ▲ and ▼ buttons until the operating temperature appears on the digital display. If you want to reset the lockout function, do so before returning to the main operating mode.

7) To change the program value simply hold the **SET** button in while pressing either the ▲ or ▼ button once.

ECO	REV	DATE	REVISION DESCRIPTION	BY	APV

CONTROLLER PROGRAMS IN THE FACTORY LOCKOUT MODE.

TO ACCESS THE CONTROLLER PROGRAMS, REFER TO THE " CONTROLLER PROGRAM FLOWCHART "



Error Codes

The temperature controller can diagnose certain problems and communicate the diagnosis through error messages on the digital readout.

Error Code	Problem
Er1	Reversed RTD sensor wires
Er2	Incorrect input value ("**In**") in the configuration menu - or - Open RTD sensor circuit
Er3	RTD sensor type mismatch
Er4	Open RTD sensor circuit (bad connection, broken wire)

Parts List

Model PC100

To order parts for your Helmer Platelet Incubator, indicate the quantity, part number and description with your purchase order number. Please provide the model number and serial number as well.

Description	Part Number		
		115 Volt	230 Volt
Digital Controller	400324		
Audible Alarm	120160		
On/Off Power Switch	120158		
Chart Recorder	400409-1		
Chart Recorder Paper – 4 inch (52/box)	220273		
Alarm Delay Switch	120197		
Audible Alarm Shutoff Switch	120227		
Heater Thermostat	120250		
Secondary Circuit Board	400320		
Chamber Electrical Outlet		120074	120097
Chamber Heater		120313	120314
Chamber Fan		120009	120010
Compressor		400333	400334
Condensor Fan Motor		120178	120309
Circuit Breaker		120259	120288

Refrigeration Recharging Chart

Approximate recharging weight is 5 oz. (Note: Refrigerant is R134A)

After recharging follow the procedure below:

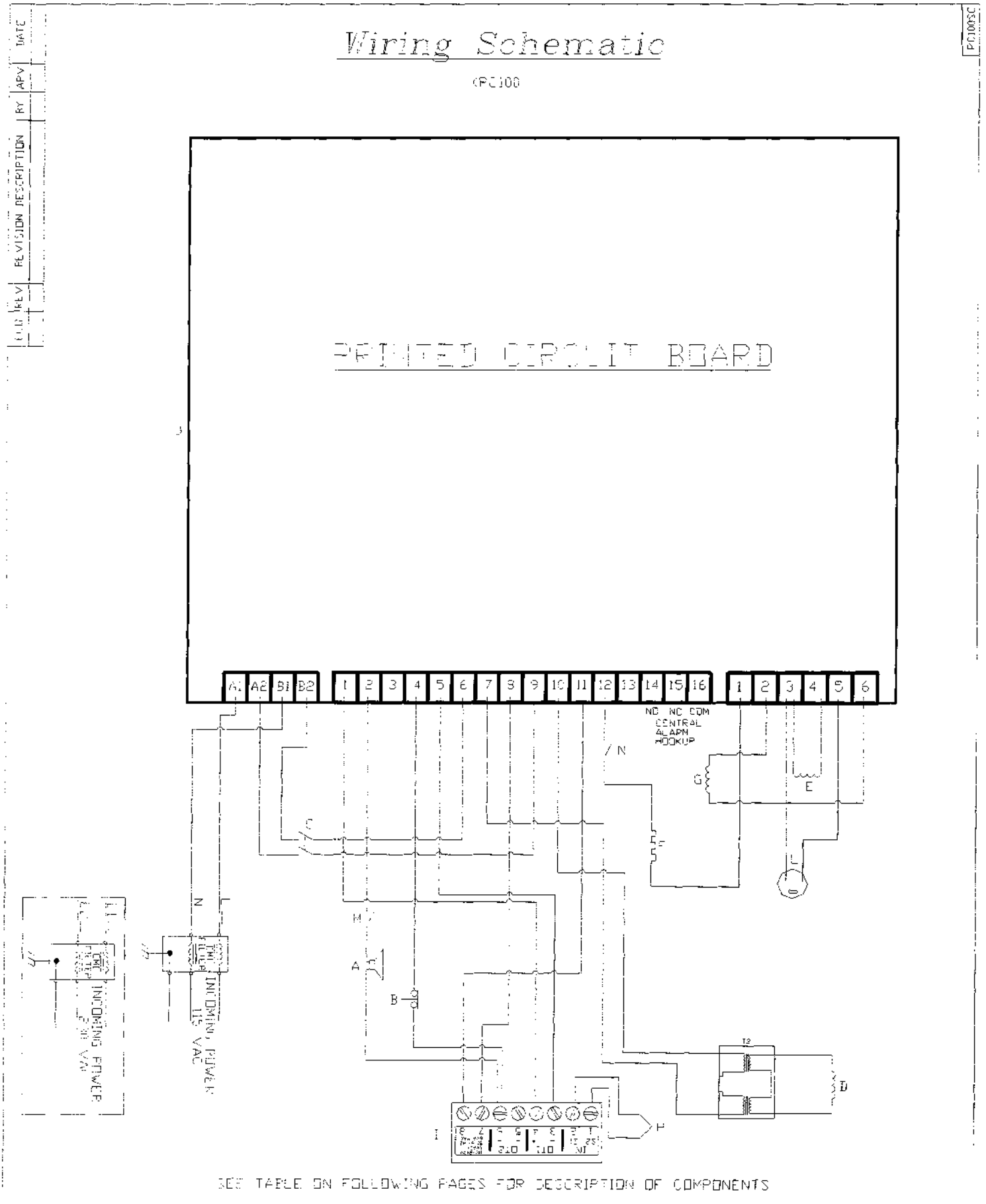
Allow the incubator chamber temperature to stabilize at 22.0 degrees C. With a pressure gauge set on the refrigeration lines, the refrigerant pressure should be as follows:

Room Temperature		**Low Side (suction) Pressure**
C	**F**	**PSI**
18	64.4	29.0
19	66.2	29.5
20	68.0	30.0
21	69.8	30.5
22	71.6	31.0
23	73.4	31.5
24	75.2	32.0
25	77.0	32.6
26	78.8	33.3
27	80.6	33.5
28	82.4	34.3
29	84.2	34.8
30	86.0	35.4

A fluorescent additive has been added to the refrigeration system. Leaks may be diagnosed with the aid of an ultraviolet light. Shine the light on joints where leaks may be occurring. A leak is identified by a bright film residing at the site of the leak.

Wiring Schematic

CPC100



Wiring Descriptions

Digital Controller Terminals

Terminal	Wire Color	Description
1	Red	RTD input
2	Red	RTD input
3	Orange	Voltage output to secondary circuit for heater system (1.2 volts (+) dc).
4	Blue	Voltage output to secondary circuit for heater system (1.2 volts (-) dc).
5	Not Used	
6	(2) Red	Voltage output to secondary board and alarm (6 volts (+) dc).
7	Brown	Incoming power supply from circuit board.
8	Blue	Incoming power supply from circuit board.

Secondary Circuit Board Terminals

Terminal (T1)	Wire Color	Description
1	Orange	Voltage input for heater system (1.2 volts (+) dc).
2	Yellow	Voltage output to alarm (6 volts (-) dc).
3	----	This terminal is not used.
4	Red	Voltage input for alarm delay system (6 volts (+) dc).
5	Dark blue	Voltage input for heater system (1.2 volts (-) dc).
6	Brown	Power input from switch.
7	Brown	Power output to chart recorder transformer.
8	Brown	Power output to controller (#7).
9	Blue	Power input from switch.
10	Blue	Power to chart recorder transformer.
11	Blue	Power output to controller (#8).
12	Black or Red	Power output to chamber heater thermostat.
13	----	This terminal is not used.
14		Central Alarm (normally open).
15		Central Alarm (normally closed).
16		Central Alarm (common).

Terminal (T2)	Wire Color	Description
A1	Brown	Main power input to unit and power failure alarm.
A2	Brown	Main power to power switch.
B1	Blue	Main power input to unit and power failure alarm.
B2	Blue	Main power to power switch.

Terminal (T3)	Wire Color	Description
1	Black	Power to Heater.
2	Black	Power to compressor.
3	Brown Brown	Power to Interior fan. Power to Interior Outlet.
4	Blue	Power to Interior Fan.
5	Blue	Power to Interior Outlet.
6	Black w/stripe	Power to compressor.

Component List for Schematic

Component	Location	Access
A - Audible alarm	Front control panel	Remove control panel
B - Alarm delay switch (NC)	Front control panel	Remove control panel
C - Main power switch	Front control panel	Remove control panel
D - Chart recorder	Top front panel	Open chart panel
E - Chamber fan	Inside chamber (behind back wall)	Remove chamber back wall
F - Chamber heater	Inside chamber (behind back wall)	Remove chamber back wall
G – Compressor and Condensor fan	Top of unit	Remove top panel
H - RTD	Top of chamber	Remove front panel
I - Temperature controller	Front control panel	Remove control panel
J - Secondary circuit board	Top of unit (inside)	Remove control panel
L - Chamber outlet	Inside chamber (right side wall)	Remove back panel
M - Audible alarm switch	Top front panel	Remove control panel
N - Thermostat Switch	Inside chamber (back wall)	Remove chamber back wall
T2 – Chart transformer	Top of unit (inside)	Remove front panel

Components on secondary circuit board

P1 - Alarm Timer Adjustment	See secondary circuit board above

Troubleshooting
(PC100)

Electrical

Problem	Possible Cause	Action to be Taken
Unit does not turn on.	- Circuit breaker or fuse activated.	- Reset circuit breaker or replace fuse.
	- Faulty outlet connection.	- Verify outlet is good. Plug into a different outlet.
	- Faulty power cord.	- Verify proper cord connections. Change power cord.
	- Faulty power switch.	- Replace switch.
Controller does not turn on.	- Faulty connections.	- Verify connections from the power switch to the controller.
	- Faulty controller.	- Verify voltage to the controller. If receiving voltage and not operating, replace controller.
Platelet agitator not operating.	- Faulty platelet agitator.	- Verify that agitator is working properly.
	- Faulty power outlet.	- Verify voltage to outlet. If no voltage, check connections to and within the outlet.
Power cord on agitator rubbing.	- Agitator not centered in chamber.	- Verify positioning of agitator.
	- Power cord not positioned properly.	- Verify positioning of cord.
Chamber fan not operating.	- No power to fan.	- Verify power to the fans. If no voltage check connections.
	- Faulty fan.	- Replace fan.

Compressor not running	- Compressor not getting power.	- Visually verify that condenser fan is operating. If fan is operating see the next step. If not, check for faulty connection.
	- Compressor failure.	- Replace compressor.
	- Compressor in thermal shutdown.	- Verify that the compressor unit is getting proper airflow - at least 4 inches from any obstacles. Make sure the condenser grill is clean. Turn power off and allow compressor to cool down. Turn unit back on and verify whether compressor is operating. If the compressor fails to operate either the compressor thermal switch could be faulty or the compressor itself could be faulty.

Alarms and Controller

Audible alarm not sounding.	- Not waiting for alarm delay to cycle.	- The alarm system has a delay system before the audible alarm will sound. Wait sufficient time for alarm delay to cycle.
	- Verify Alarm and Controller settings.	- The controller alarm value or other values may have been altered causing the non-alarm condition. Refer to the proper controller value settings and change accordingly.
	- Faulty controller.	- Refer to the Alarm System Test portion of this manual. If the alarm light on the controller is not illuminating, replace the controller. If the controller alarm light is operating, verify voltage to inputs 4 and 6 on the secondary circuit board. If receiving voltage, proceed to next step.
	- Faulty secondary circuit board.	- After waiting for alarm delay period, if no voltage is going to the alarm, then replace the secondary circuit board.
	- Faulty connections.	- Verify proper line connections.
	- Faulty alarm	- Replace alarm.
Alarm sounding sporadically.	- Faulty alarm system.	- Verify proper operation of the controller, secondary circuit board and line connections.
	- Alarm deviation value set too tight.	- During normal operation the temperature will fluctuate as a result of many factors. If the alarm value is set too tight to the operating value the alarm may sound often. The alarm system is to warn of serious unit temperature fluctuations. Increase the alarm value.
	- Door not closing.	- Verify proper alignment of door closure.
	- Air gaps around door.	- Verify door gaskets are sealing properly.

	- Chamber temperature not stabilizing.	- Verify that the chamber temperature is maintaining a proper and consistent temperature. Refer to Quality Control section.
Alarm not activating at proper temperature.	- Calibrate controller.	- Refer to section on Calibration of the Digital Controller.
Controller setting not calibrated properly.	- Calibrate controller.	- Refer to section on Calibration of the Digital Controller.
Central alarm not operating.	- Faulty connections.	- Verify proper connections to incubator and within the central alarm system.
	- Alarm output relay is faulty.	- Verify that you have the proper relay for your central alarm system and that it is connected properly (refer to the section on central alarm hook-up). Verify that the relay is operating. If not, replace the faulty relay.
	- Faulty controller.	- Verify that the controller alarm system is operating correctly. If not, replace the controller.
	- Faulty secondary circuit board.	- Verify that there is voltage output to the alarm. If not, replace the secondary circuit board.

*** Chamber Temperature ***

Chamber temperature not cooling.	- Low refrigerant pressure.	- Verify proper refrigerant level in compressor unit.
	- Faulty compressor.	- Verify connections. Change compressor unit.
	- Faulty controller.	- If heater light is always illuminated even when the chamber temperature is above the set value, controller is not operating correctly. Verify correct controller input values. If correct, then replace the controller.
	- Faulty secondary circuit board.	- Current should only be going to heater when controller heater light is on. If current is going to the heater all the time from the secondary circuit board (line 12), then change secondary circuit board.
	- Door not sealing tight.	- Verify that door is closing and sealing properly.
Chamber temperature not heating.	- Faulty controller.	- Verify that controller heater light is illuminating to operate heater. Verify voltage going into connections 1 and 5 on the secondary circuit board when the heater light is illuminated. If no voltage, change controller.
	- Faulty thermostat	- Verify that the heater thermostat is functioning properly. It should be closed when the chamber temperature is within normal operating limits. If it is not closed then replace thermostat.
	- Faulty secondary circuit board.	- Current should be coming out of line 12 on the secondary circuit board to the heater when the controller heater light is on. If not, change secondary circuit board. If yes, check connections to the heater.
	- Faulty heater.	- Replace heater.

Other

Ice lying in water tray.	- Refrigerant pressure is low.	- Verify refrigerant pressures. Add refrigerant as needed.
Severe water puddling in water tray.	- Drain hole plugged.	- Unclog drain hole.
	- Door not closing tight, allowing humid air into the chamber.	- Verify that door gasket is sealing and door is closing properly.
Water is puddling outside of the incubator.	- Drain pan leaks.	- Seal any leaks in drain pan with silicone.
	- Water is condensing on evaporator lines to the compressor.	- Apply additional cork tape to copper lines.
	- Excessive humidity.	- Water will accumulate more during humid periods. Make sure door is closing properly.
Platelets are "pooling" to one side of the bag.	- Unit not level.	- Verify that the unit is sitting level. Verify that the agitator is sitting level.

CHART RECORDER

OPERATION & TROUBLESHOOTING

Section 1 – Operation

1) **Temperature calibration:** If the temperature marked by the chart recorder does not match that of the chamber (once stabilized at setpoint), adjustment is possible using the left and right arrow keys (see figure 1). These must be pressed and held down for five seconds to initiate stylus movement. Continue to hold down until stylus has moved to the correct temperature. If neither button is pressed for 5 seconds the new offset will take effect and the recorder will return to normal operation.

2) **Changing the chart paper:** Press and hold the "C" button. When the stylus begins to move toward the left, release the button. Wait until the stylus has moved to the edge of the chart then remove the old chart paper. Position the paper so that the correct time line coincides with the time line groove (see fig 1). Re-attach the chart knob and screw it securely against the chart.

   CAUTION: When stylus is in change pressing the Left or Right arrow buttons will change the chart recorder temperature range. See section 1.5 for setting the chart ranges.

   Press and hold the "C" button again until the stylus begins to move to the right, then release. Check to make sure that the stylus is marking on the chart paper. If not, refer to Section 2: troubleshooting.

3) **Battery Backup:** Install a 9 volt battery as shown in figure 1 and connect the lead. This battery allows the recorder to continue to function normally for approximately two hours in the event of a power failure. The light on the face of the chart recorder remains a constant green color indicating the battery is good. If the battery becomes weak and needs to be replaced, the light will begin flashing.

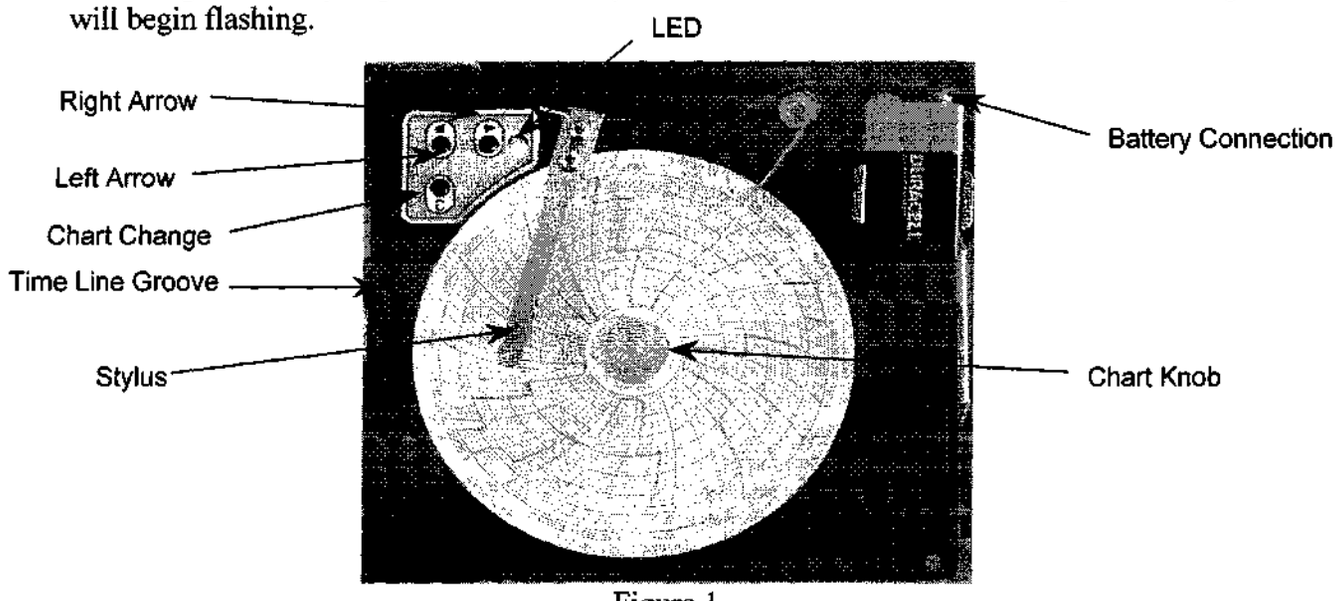


Figure 1

15425 Herriman Blvd, Noblesville, IN 46060
PHONE (317) 773-9073 FAX (317) 773-9082
USA & CAN:1-800-743-5637
www.helmerinc.com

4) **Procedure to run test pattern** (to verify operation of motors and electronics)

   a) Press and hold chart change and right arrow buttons simultaneously for about 5 seconds until the LED goes out.

   b) The recorder will proceed through a test consisting of stepped patterns through the temperature range, which will end once the pattern has completed one rotation. The test may be terminated at any time by pressing any button for about one second.

   c) After testing, the chart recorder will automatically return to normal operation and the LED will turn back on.

5) **Chart Range:** The Helmer chart recorder supports three temperature ranges:

Range 1	0 to 35°C (Platelet Incubator Products)	LED Single Flash
Range 2	-5 to 20°C (Helmer Refrigerator Products)	LED Double Flash
Range 3	-50 to 0°C (Helmer Freezer Products)	LED Triple Flash

To determine current chart range, press and hold change paper button until stylus begins moving toward the edge of the chart. The LED will flash out the currently selected chart range 1, 2 or 3. The chart range may be changed by pressing the RIGHT or LEFT buttons, increasing or decreasing the range value, respectively. The LED will flash out the currently selected range. To save new range setting press and hold change chart button again until stylus begins moving toward temperature range.

Section 2– Trouble Shooting

1) **Chart recorder paper not moving:**
   a) Chart knob not tightened on paper: Tighten the chart knob.
   b) Ribbon cable at P2 is either not connected or reversed with P3.
   c) No power to the recorder: Check for line voltage supply to the chart recorder transformer. Check for 13VAC from the transformer to the chart recorder. (See product service manual for location of chart recorder transformer).
2) **Stylus exceeds outer edge of paper:** Home Stop Post Bent.

   If the home stop post, which is located on the bottom of the circuit board, is bent the stylus will travel off the paper. Verify that it is straight and that the stylus bracket makes contact with the post during start up.
3) **Chart stylus off scale and will not adjust back to center:** JP1 is in probe simulation position (over both pins). Move JP1 to one pin.
4) **LED continuously blinks**:
   a) Battery is either low or not hooked up. Measure battery and check connection.
   b) RTD probe defective. Move JP1 to probe simulation position (over both pins) if chart returns to normal operation replace probe. Make sure to return JP1 to one pin after probe is replaced.
   c) Chart is in paper change mode, as indicated by a repeated sequence of flashes. Press and hold "C" button for about 2 seconds.
5) **Chart stylus not marking on paper:** Stylus is bent away from paper.

   Gently bend stylus until it touches paper. If it is still not marking, remove the stylus arm by loosening the two stylus arm mounting screws, bend the bracket, replace and retighten screws. Note: when refastening the stylus arm, ensure it is positioned in line with the time line groove in figure 2.
6) **After changing paper with the "C" button, the stylus does not return to the proper temperature:** When the stylus was in the change paper position, the Left or Right button was accidentally pressed changing the chart temperature range. Refer to section 1.5 for setting the temperature range.