BACTRON ANAEROBIC CHAMBERS

OPERATION MANUAL

MODELS: I, II & IV

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IMPORTANT: READ THIS INSTRUCTION MANUAL IMMEDIATELY.

Your satisfaction and safety require a complete understanding of this unit, including its proper function and operational characteristics. Be sure operators are given adequate training before attempting to put the unit in service. **NOTE: This equipment must be used only for its intended application; any alterations or modifications will void your warranty.**

Orientation

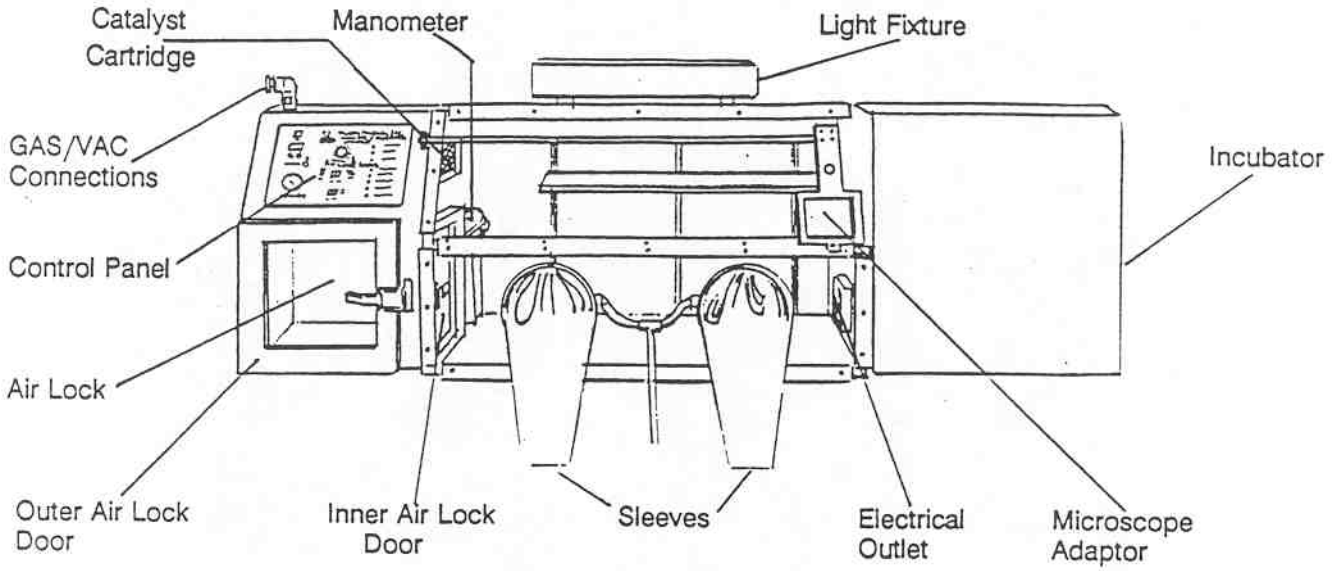

Figure 1. Bactron IV Chamber

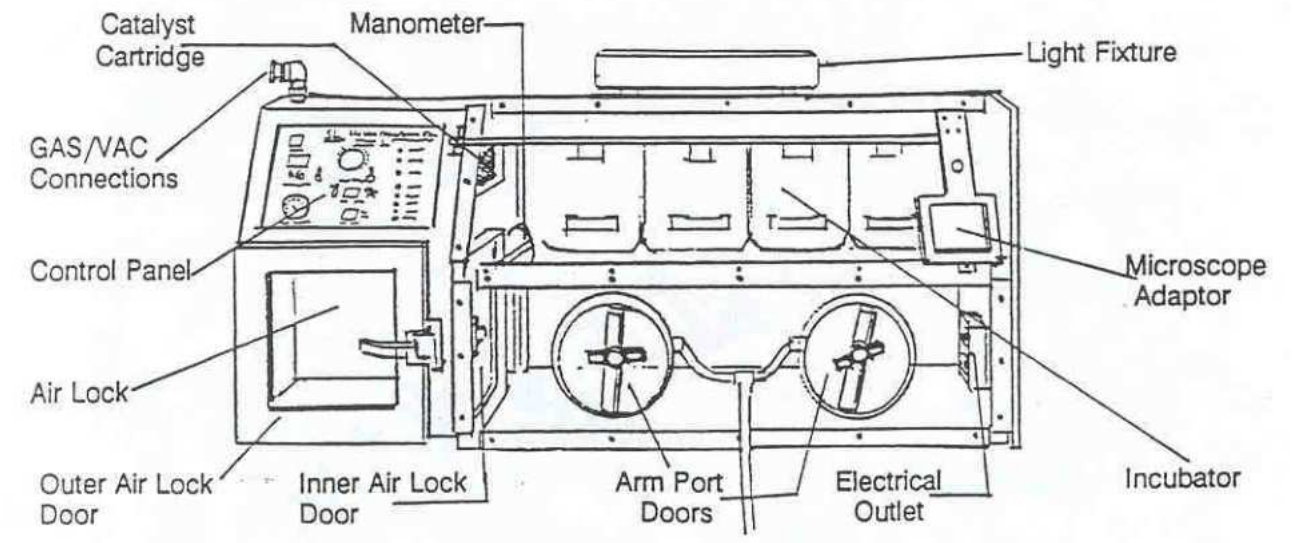

Figure 1a. Bactron II Chamber

Note: Bactron I Chamber is similar; it has three incubator compartments.

Component Drawings

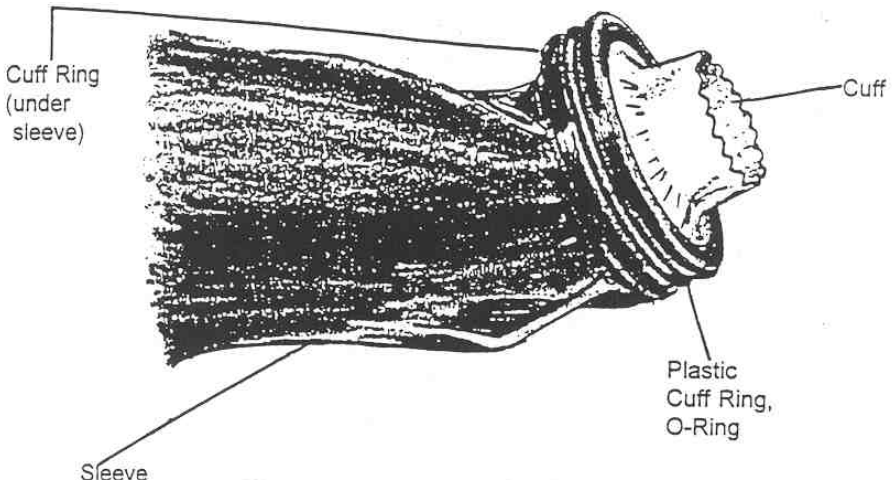

Figure 2. Sleeve/Cuff Assembly

Consists of a neoprene sleeve, a plastic cuff ring, O-Ring, and a soft rubber cuff. The assembly allows gloveless chamber operation.

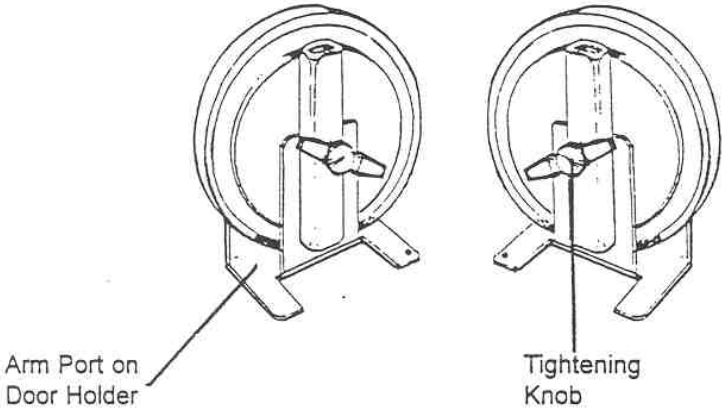

Figure 3. Armport Doors

CAUTION: The Bactron chambers have an efficient method of sealing the chamber by utilizing the Armport doors as shown in Figure 3. The tightening knob on the armport doors should be turned just until the knob begins to "grab". **DO NOT OVER TIGHTEN.** Damage can occur if too much force is placed on the Armport door assembly. See Section 13.5

Doors are used to seal the armports while the chamber is not in use. Doors can be stored using the holders provided while the chamber is in use. Assembly consists of an armport door, tightening knob and locking bar. Doors are secured by tuning the locking bars horizontally to pass through the cutouts in chamber, then turning locking bars verticals and tightening knobs.

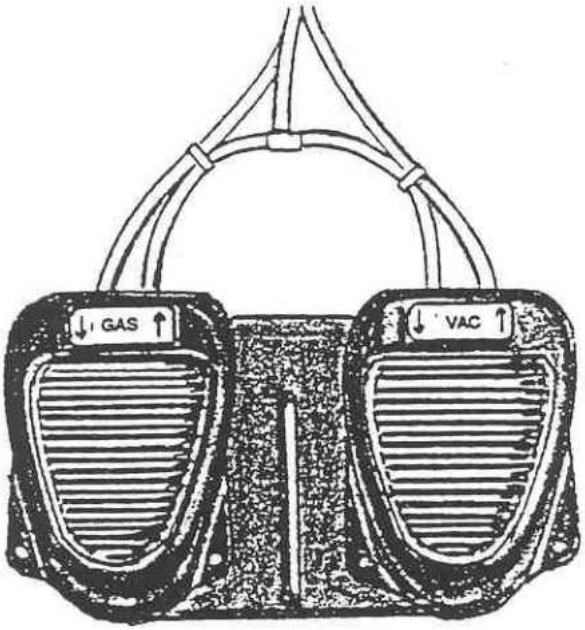

Figure 4. Foot Pedals

Utilize to exchange the sleeve atmosphere (room) with the desired chamber environment (gas mixture). See pages 16 and 17 for further details.

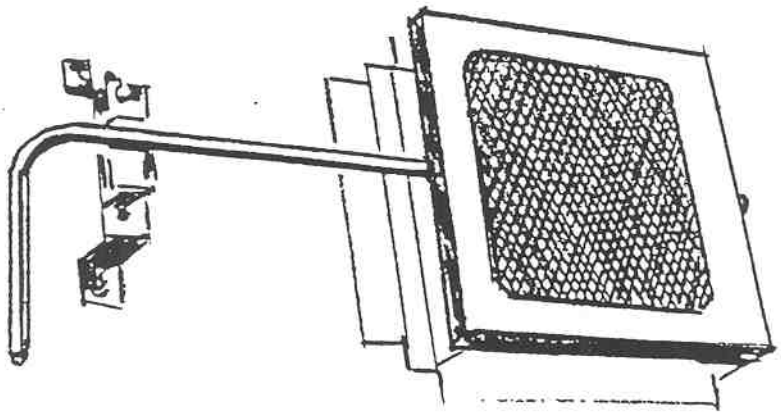

Figure 5. Catalyst Cartridge

Two catalyst containing Palladium catalyst pellets are supplied to remove trace amounts of oxygen. See page 11 and 12 for additional data.

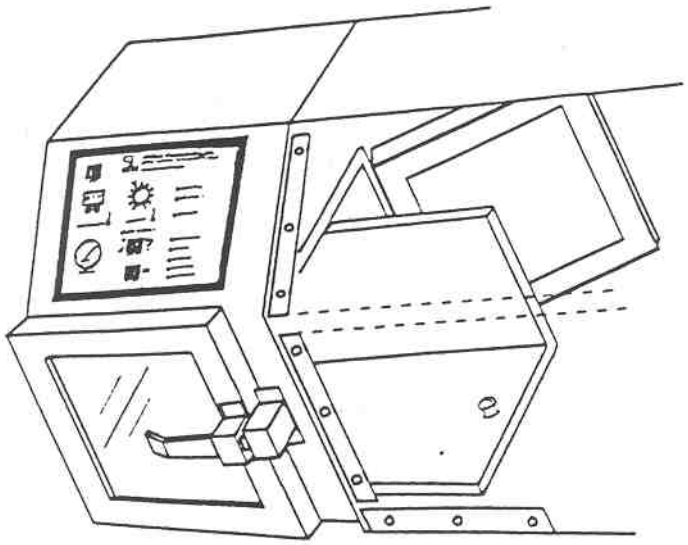

Figure 6. Air Lock

Provides ability to take material into and out of the chamber. Air Lock can be operated either automatically or manually. The Air lock shelf (Models II and IV) allows for materials to be conveniently rolled from the Air Lock into the chamber.

1.0 RECEIVING AND INSPECTION

1.1 The carrier, when accepting shipment, also accepts responsibility for safe delivery and is liable for loss or damage claims. On delivery, you must inspect for visible exterior damage. Note and describe on the freight bill any damage found and enter your claim on the form the carrier supplies.

1.2 Inspect for concealed loss or damage on the unit itself, both interior and exterior. If any, the carrier will arrange for official inspection to substantiate your claim. Save the shipping crate until you are sure the unit has been delivered in good condition.

1.3 If for any reason you must return the unit, contact your sales representative for authorization and supply nameplate data.

2.0 INSTALLATION

2.1 Local city, county, or other ordinances may govern the use of this equipment. If you have any questions about local requirements, please contact the appropriate local agency.

2.2 Under normal circumstances these units are intended for use indoors, at room temperatures between 5° and 40°C, at no greater than 80% relative Humidity (at

25°C) and with a supply voltage that does not vary by more than 10%. These ovens should not be operated at an altitude exceeding 2000 meters. Installation category is CAT-II.

2.3 Pollution Degree 2. Customer service should be contacted for operating conditions outside of these limits. Installation may be performed by the end user. It is unnecessary for this unit to be installed by a technician.

2.4 **Location:** When selecting a site for the unit, consider conditions which may affect performance, such as heat from steam radiators, ovens, autoclaves, etc. Avoid direct sun, fast-moving air currents, heating/cooling ducts, and high traffic areas. To ensure air circulation around the unit, allow a minimum of 2" between chamber rear and sides and any walls, partitions, or obstructions to free airflow.

2.5 **Power Source:** The power source must match the voltage, cycle, phase and amperage requirements listed on the data plate. Plug the cord into a grounded outlet. **VOLTAGE OF THE OUTLET SHOULD NOT VARY MORE THAN 10% FROM THE DATA PLATE RATING.** A separate circuit is recommended to precluded loss of product due to overloading or circuit failure. Note that the electrical supply to the unit must conform to all national and local electrical codes.

2.6 **Gas Source:** Install the gas regulator(s) on the tank(s) of gas. Chain the gas tanks(s) to a secure position on the wall. **Set the regulator(s) to 10 psi**.

2.7 If you are using an anaerobic gas mixture (AMG), we recommend 5% (H_2), 5% Carbon Dioxide (CO_2) and 90% Nitrogen(N_2).

2.8 If you are using a two gas anaerobic application, we recommend one tank of AMG gas and the second tank of 100% Nitrogen (N_2).

Figure 7. Warning Label

2.9 **Cleaning:** The Bactron unit was cleaned at the factory, however, a general cleaning is recommended. Use BENZALKONIUM CHLORIDE to clean your chamber. See page 23 for a list of cleaning products.

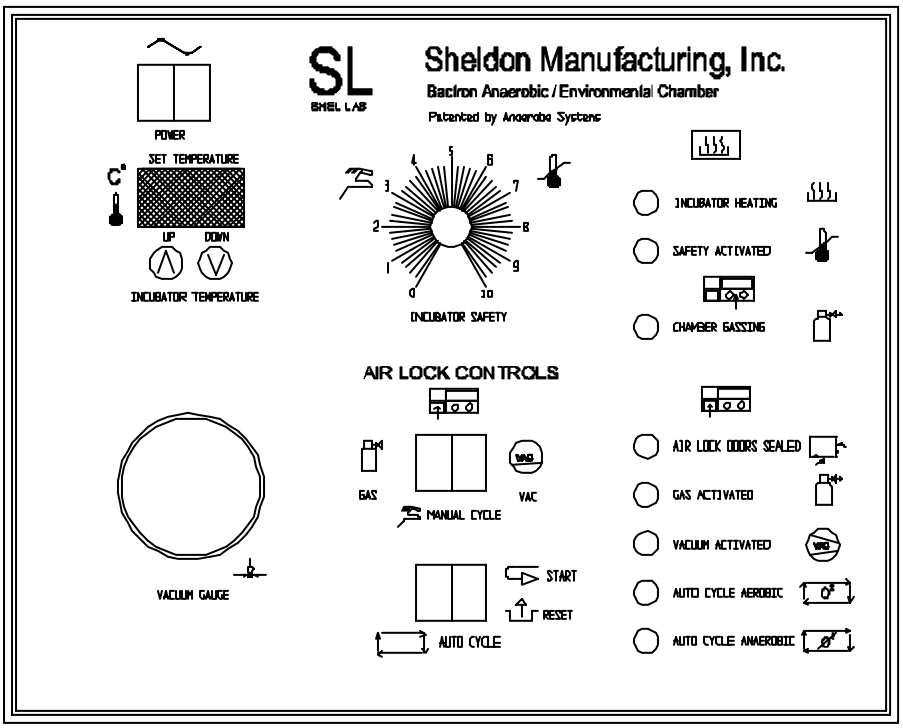

Figure 8. Control Panel

3.0 CONTROLS OVERVIEW

3.1 Power: The lighted power "I/O" switch controls all power to the Bactron Chamber. It must be in the "I" position before any systems are operational, including control circuitry.

3.2 Digital Display: The actual incubator temperature will be digitally displayed to + .1°C.

3.3 Main Temperature Control: This control consists of the Up/Down buttons and the digital display.

3.4 Vacuum Gauge: Analog dial shows the vacuum level of the Air Lock in inches of mercury.

3.5 Incubator Safety: The Safety is an independent thermostat that monitors incubator temperature. It guards against any failure of the incubator controller which would allow temperature to rise past set point. If temperature rises to the Safety set point, the Safety will take over control of the heating element and an audible alarm will be activated. The Safety controller allows for continued use of the chamber until service can be arranged.

3.6 Air Lock Controls. Manual Cycle: The manual cycle switch controls the vacuum and the gassing process of the Air Lock. Push VAC to evacuate the Air Lock then GAS to fill the Air Lock with the desired gas mixture. This process should be done three times.

3.7 Air Lock Controls. Auto Cycle: The automatic cycle switch will evacuate the Air Lock and then fill the chamber with the desired gas mixture. The process will cycle three times and upon completion the ANAEROBIC light will activate. The cycle can be aborted by pressing the switch to the START/RESET and holding it down for five seconds.

3.8 Incubator Heating: Light indicates that the heating element is activated and that the incubator is heating.

3.9 Safety Activated: Light indicates that the Incubator Safety audible alarm is activated and controlling the incubator temperature.

3.10 Chamber Gassing: Light indicates that the chamber is demanding gas. The light activates when the operating the Air Lock and sleeves, in addition to maintaining positive pressure in the working chamber.

3.11 Air Lock Doors Sealed: Light indicates that both the Air Lock doors are closed.

3.12 Gas Activated: In the manual cycle the GAS light indicates that the Gas switch is activated. In the automatic cycle, third cycle, light indicates that the GAS is activated in the Air Lock.

3.13 Vacuum Activated: Light indicates that the VAC switch of the manual cycle Air Lock is activated. Light is also on during automatic vacuum cycles.

3.14 Auto Cycle Aerobic: Light indicates that the Auto cycle has not been activated. When the automatic cycle has been activated, the Auto Cycle Anaerobic lights will alternate.

3.15 Auto Cycle Anaerobic: Light indicates that the Auto Cycle has been activated and is complete. When the automatic cycle has been activated, the Auto Cycle Anaerobic lights will alternate.

⏚ Indicates **"Earth Ground"**

4.0 HOSE AND ELECTRICAL CONNECTIONS

4.1 Hose ports for the gas and vacuum supplies and foot pedal controls are provided on the top back left side of the control module section. The Bactron models have five access ports. (Older models have four access ports.) Figure 9 shows a typical hose connection for a five port model.

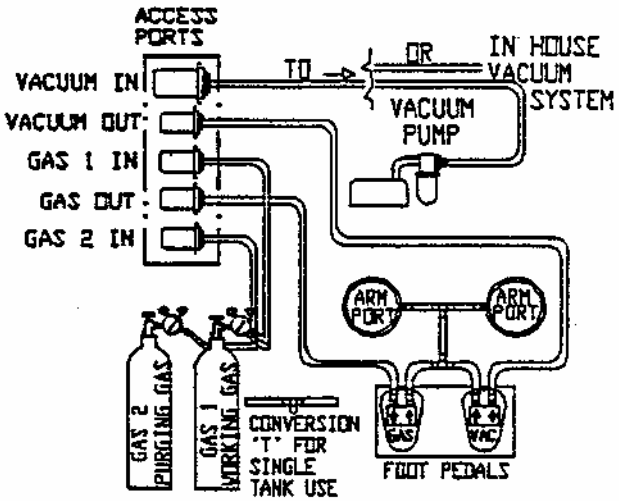

Figure 9. Hose Connections

4.2 Install the hose from the gas regulator of the working gas, for example AMG, (GAS 1) tank to the port marked **"GAS 1"** on the chamber module.

4.3 Install the hose from the gas regulator of the purging gas, for example Nitrogen, (GAS 2) tank to the port marked **"GAS 2"** on the chamber module.

NOTE: If using only one gas supply, install the "T" tube/fitting assembly (provided in the accessory pack) between the "GAS 1 IN" port and the "GAS 2 IN" port on the control module. Then attach the hose from GAS 1 tank regulator, as in 4.2, to the unused brass "T" tube end. Failure to follow this procedure will render the purging cycles of a single gas system inoperative.

4.4 Connect the 3/8" hose from the vacuum pump or a 3/8" hose from a suitable in-house vacuum system, to the port marked VAC IN. In-house vacuum systems must be capable of evacuating to a minimum of 25 inches of mercury.

4.5 Plug the vacuum pump power cord into the outlet receptacle at the top left of the control module. This outlet is marked **"5 AMPS"** (installations using in-house vacuum supplies will not follow this step).

NOTE: <u>CONNECTING HOSES.</u> Hose connections are intended to be simple. Insert the hose into the appropriate connector until the hose stops. Pull back slightly to ensure hose will stay in place. Reinsert if hose pulls out.

4.6 Connect the center "T" section from the foot pedal assembly to the tube fittings located on the inner sides of the armport access openings on the front of the chamber.

4.7 Connect the tube from the **GAS** side of the foot pedal assembly to port marked **GAS OUT** on the control module section.

4.8 Connect the tube from the **VAC** side of foot pedal assembly to the port marked **VAC OUT** on the control module section.

4.9 Plug power cord from Chamber into a 115 VAC, 60 Hz (220 volt units are also available) electrical outlet. Turn the power switch on to verify power to the system.

4.10 When the main power switch is turned on, the vacuum pump should come on for a few seconds and then go off. If the pump does not come on, or comes on and will not go off, consult the Troubleshooting Guide for adjustment.

4.11 When the power switch to the Chamber is turned on, you should see Power ON, **CHAMBER GASSING, AIR LOCK DOORS SEALED** and **AUTO CYCLE AEROBIC** lights illuminate, along with a readout of the incubator temperature. If any of these appear not to work, consult the Troubleshooting Guide.

5.0 MANOMETER

5.1 Located below the right end of the control panel and inside the chamber, the Manometer provides a visual way to measure pressure in the chamber. It also functions as a pressure release system to prevent damage to the chamber in the event over-pressurization occurs. By measuring the difference between the inner and outer water levels one can obtain the chamber pressure in inches of water. If pressure becomes too great, excess gas will push out through the inner tube and bubble through the water thus releasing pressure from the chamber.

5.2 Purpose: The function of the manometer is two-fold:

a. Provides visual way to measure the pressure in the chamber. As the pressure inside the chamber increases, the water level in the inner tubes moves down a distance proportional to the pressure increase. By measuring the difference of the inner and outer water levels, the user can obtain the chamber pressure in inches of water. A water level indicator notifies user that water is high or low.

b. It acts as a pressure release system to prevent damage to the chamber in case of inadvertent over-pressurization. If the pressure becomes too great, the excess gas simply bubbles through the water and out the back of the chamber.

5.3 Filling Procedure: Use a pipette or plastic wash bottle to fill the manometer with distilled water to a level of two or three inches. Lines on the manometer provide a guide. Fill water to the top line. This may be done from the top of the manometer inside the chamber.

6.0 CATALYST CARTRIDGE

6.1 The catalyst cartridge removes ant trace amounts of oxygen from the chamber. Two catalyst cartridges containing Palladium catalyst pellets are provided. See drawing pg. 4

6.2 One cartridge should always be in the chamber. The second spare cartridge is provided so that reactivation of the catalyst can be done after each chamber usage.

6.3 The catalyst cartridge is installed on the left wall inside the chamber. To install slide the cartridge into the metal tracks and secure the handle into the bracket.

6.4 Reactivate spare catalyst daily by heating for a minimum of 1 –1/2 to 2 hours at 160°C (320°F). You may keep the unused cartridge in the heating oven at 160° prior

to its use. (NOTE: Catalyst cartridge should be reactivated for the first time before installing into the unit.)

6.5 Quality control catalyst monthly by flowing anaerobic gas over the reactivated pellets. If the pellets become warm to hot, they are working properly and are ready for use in the chamber. If they do not heat up when the gas is applied, reheat to 180° to 200°C and flow gas over catalyst again to remove any buildup of sulfides that might hinder its effectiveness.

6.6 The entire catalyst cartridge can be placed in the heating oven for reactivating. However, if necessary, the handle on the cartridge can be removed.

6.7 A catalyst cartridge can also be placed inside the Air Lock to remove any trace amounts of oxygen.

7.0 THERMOELECTRIC CONDENSATE CONTROLER

7.1 The thermoelectric condensate controller collects excess humidity and eliminates chamber condensation. Moisture is funneled into a tube for collection inside your chamber.

7.2 The thermoelectric condensate controller is located on the left side of the chamber interior behind the catalyst cartridge. A plastic tube drains excess moisture into the working chamber, on the back left side.

7.3 Place a container, e.g., glass flask or beaker, under the tube for collection. Empty the container **DAILY.**

7.4 Desiccants are not recommended in the chamber. Desiccants are drying agents that can regrettably pull moisture from your samples.

8.0 INCUBATOR TEMPERATURE CONTROLLER/INCUBATOR SAFETY

8.1 **Setting Incubator Controller:** The INCUBATOR TEMPERATURE controller regulates the incubator temperature by use of Up/Down buttons. To enter set point mode on the control, press either the Up or Down button one time. The digital display will start to blink, going from bright to dim. While blinking, the Digital Display is showing the set point. To change the set point, use the Up and Down buttons. If the buttons are not pressed for five (5) seconds, the display will stop blinking and will read the temperature of the unit. Note that the INCUBATOR SAFETY should be turned to its maximum position, (clockwise) until the unit has stabilized at desired set point temperature. Allow the incubator at least 24 hours to stabilize. Then re-calibrate the digital display to your reference thermometer, follow the calibration instructions given in Section 9. This incubator was calibrated at the factory at 37°C.

8.2 **Setting Incubator Safety:** Set the control to the desires incubator temperature. Then set the INCUBATOR SAFETY to its maximum position. Allow 24 hours for stabilization before proceeding.

If, after 24 hours the temperature is not at desired level, adjust the INCUBATOR TEMPERATURE up or down until the precise desired temperature is achieved. (See Section 9 for calibration procedures)

When stabilization at the desired temperature has been achieved, turn the INCUBATOR SAFETY control knob counter-clockwise until the INCUBATOR SAFETY ACTIVATED light comes on and audible alarm is activated. Next, carefully turn the INCUBATOR SAFETY knob clockwise until the light is just off. The Safety is now set; the INCUBATOR SAFETY ACTIVATED light should remain OFF during normal operation.

NOTE: An accurate thermometer should be used inside the incubator as a reference when setting and calibrating the incubator temperature.

8.3 It is a good idea to mark the INCUBATOR SAFETY label with the desired setting or position as a backup in case the knob is moved accidentally. If the SAFETY ACTIVATED light is on and audio alarm is activated at any time, check the INCUBATOR TEMPERATURE controller setting to be sure that it is not set above the INCUBATOR SAFETY setting.

9.0 INCUBATOR CALIBRATION

9.1 Compare the reading of the digital temperature display to an accurate reference thermometer. If there is a difference, put the display into calibrate mode by pressing both the Up and the Down buttons at the same time and holding them in for about five (5) seconds or until the two outside decimal points start to flash on and off.

When the decimal points are flashing, the display can be calibrated to match the reference thermometer by pressing the Up or Down button until the display reads correctly.

10.0 VACUUM ADJUSTMENT

10.1 The vacuum gauge for the Automatic Air Lock Cycle is factory calibrated. It is recommended that customers note the setting of the vacuum gauge during Auto Air Lock Cycle to ensure that the setting is correct. Evacuation and the vacuum pump capabilities can effect the calibration.

10.2 The vacuum setting for the Auto Air Lock Cycle are factory set at the High Limit 18 and the Low at 4.

10.3 Vacuum calibration procedure:
High Limit

A) Activate the Auto Air Lock Cycle and note the high level reached by the vacuum gauge. If the vacuum gauge is not at the desired High setting of 18, adjust the high vacuum switch located on the left outside if the control housing box.

B) This switch is illustrated in the "CONTROLS: View From Behind Control Panel" Page 25, #10.

C) Adjust the High setting by turning the large knob until the desired value of 18 is reached. (Black notch on knob toward 0 to decrease or toward 30 to increase). See page 25.

D) Activate the Auto Air Lock Cycle and observe the vacuum gauge on the high level reached.

E) Repeat steps C and D.

Vacuum calibration procedure:
Low Limit

A) Activate the Auto Air Lock Cycle and note the low level reached by the vacuum gauge. If the vacuum is not at the desired Low setting of 4, adjust the Low vacuum switch located in the same area as the high vacuum switch noted above.

B) Repeat the procedure noted above under High vacuum to adjust the low Vacuum setting except adjust for the lower value of 4.

11.0 PRESSURE ADJUSTMENT

11.1 The chamber pressure of your unit is factory calibrated but local elevations may make adjustment of this value necessary.

11.2 If the manometer is bubbling when no one is working inside the chamber or the water level of the manometer is less than ½ inches, the pressure should be adjusted. See manometer diagrams on page 11 for a reference. Following is the adjustment procedure:

A) The chamber pressure switch is located on the outer left side of the control housing box. It is adjusted by means of an Allen wrench adjustment screw (clockwise to increase/counterclockwise to decrease) see page 25.

B) Adjust the setting of this valve only if the manometer level is above the ½ inch mark or is bubbling as noted above.

C) Repeat the adjustment, if necessary, observing carefully the result, until the proper performance is obtained.

12.0 TESTING THE CHAMBER FOR GAS LEAKS

12.1 Each chamber is individually tested at the factory before shipping. The following procedure, however, should still be followed to detect any possible damage due to shipping.

12.2 Make sure the catalyst is removed from the chamber during initial leak testing.

12.3 Check to ensure Manometer is filled.

12.4 Close the outer and inner air Lock doors.

12.5 Secure the Armport doors. Turn the locking bars horizontally to pass through the cutouts in the chamber, then turn bars so they are vertical, tighten knobs**. Do not over tighten**. See Note at the end of Section 13.0

12.6 Open the gas tank valve all the way on and set the gas regulator to 10 psi.

12.7 Turn the power switch on. As before, with the power switch on, you should see the **POWER SWITCH, INCUBATOR TEMPERATURE** display, **CHAMBER GASSING, AIR LOCK DOORS SEALED,** and **AUTO CYCLE AEROBIC** light illuminate.

12.8 The **CHAMBER GASSING** light will turn OFF when the water level in the manometer reaches a level of approximately ½" of water. The **AIR LOCK DOORS SEALED** light will turn ON when the inner and outer Transfer Module doors are both closed. If

this light is not ON, either the doors are not closed properly or one or both of the door sensors are improperly adjusted (See Troubleshooting Guide).

12.9 If there are no leaks in the system, the **CHAMBER GASSING** light will remain OFF, and the water level in the manometer will remain stable at approximately ½" water. Normally, a "leak-tight" chamber will go from 15 to 30 minutes without the **CHAMBER GASSING** light coming on again.

12.10 If the system has a gas leak, the **CHAMBER GASSING** light will flash ON and OFF. Flashing every 10-30 seconds indicates a very large leak, whereas flashing every 10 minutes or so indicates a small leak. This is accompanied by a "clicking" sound (originating from the chamber gas solenoid). In this case, check the following:

A) Armport doors for adequate seal of O-rings.
B) Air Lock outer/inner door gaskets for adequate contact with doors.

12.11 If the system still has a leak, refer to:

A) Chamber Maintenance: Leak Detection
B) Trouble Shooting: Excessive Gas Consumption

13.0 MAKING THE CHAMBER ANAEROBIC/DESIRED ENVIROMENT

Prior To Purging The Chamber

13.1 Turn Power switch to the "O" (Off) position.

13.2 Place about six oxygen indicators inside the system. Place one unopened indicator in the incubator, and place one unopened indicator in the work area. The others can be stores in the work are for future use.

13.3 Place catalyst in the chamber. For more information about the correct placement of the catalyst, see Section 6.0. Catalyst Cartridge page 11 and 12.

13.4 Open the incubator doors before leaving the chamber. This allows the incubator to become anaerobic also.

13.5 Put armport doors in place.

NOTE: The Bactron chambers have an efficient method for sealing the chamber by utilizing the Armport doors as shown in Figure 3 on page 4 . The tightening knob on the Armport doors should be snug, <u>DO NOT OVER TIGHTEN</u>. Damage can occur if too much force is placed on the Armport door assembly. When the knob just begins to "grab", the tightening bolt has reached its maximum point. Over tightening will cause the bolt to slip inside the handle and cause leakage.

Purging the Chamber

13.6 Turn Power Switch to the "I" (On) position.

13.7 Note the reading on the gas regulator.

13.8 Loosen the right armport door to create a small leak. (Remove sleeves from the armports if they have been placed there. This will make it easier to adjust the armport doors to create the proper leak.) Adjust the doors so that the **CHAMBER GASSING** light flashes ON and OFF for equal periods. It is important that the gas flows into the chamber in "pulses" rather than as a "stream". If the gas "streams", it tends to go to the open door only.

13.9 Bleed the gas mixture through the chamber until the reading on the tank regulator gauge is 300-400 psi less than the original reading. Normally, it takes 1-1/2 to 2 hours to flush out all atmosphere from the chamber.

13.10 After the gas purge, tighten the armport doors to prevent leaking. The **CHAMBER GASSING** light will turn off, flow of gas into the chamber will stop, and the water level difference in the manometer should again be approximately ½" and should remain stable.

13.11 At this point it is important to check if the chamber is completely anaerobic before using it. Check this by first replacing the sleeves on the armports, and the entering the chamber. For more information about entering the chamber see Section 15.0, Entering the Chamber page 19.

13.12 **A)** Once inside the chamber, open one indicator strip in the incubator, and one strip in the work area.

NOTE: Please note and follow the directions for use for the type of indicator strip you are using.

B) If the strips indicate that the atmosphere is anaerobic, the chamber is ready for use.

C) If the strips indicate an aerobic or slightly aerobic atmosphere, then exit the chamber. Create a small leak as detailed in Step 13.8. Flush an additional 100-200 psi through the chamber. After this step, proceed to step 13.11, until indicator strips indicate an anaerobic atmosphere.

D) The gas flowing through the chamber may cause previous indicator strips to dry out. Use fresh indicator strips stored in step 13.2 each time you test the atmosphere.

NOTE: During the initial purge you may notice heavy condensation within the chamber. This is due to catalytic formation of water from hydrogen gas and oxygen initially in the chamber. Most of this condensation will dissipate by the end of the gas purge cycle.

CAUTION: The catalyst cartridge will be HOT at this point. If you must touch it for any reason, use extreme care.

Summary

The chamber is ready when:

A) The **CHAMBER GASSING** light remains off indicating no gas leaks.
B) The incubator doors are OPEN.
C) Oxygen indicators are in the chamber.
D) The catalyst cartridge is in place.

14.0 CHAMBER OPERATION

Air Lock Operation

14.1 Load the Air Lock with samples, materials, supplies, etc.

14.2 Close the outer and inner Air Lock Doors.

14.3 Activate the Air Lock by one of two methods:

A) Manual Cycle (Manual Gas/Vacuum Switch):

i. Locate the 3 position Manual Gas/Vacuum Cycling Switch which should be in the middle.

ii. Turn the Manual **GAS/VAC** switch to **VAC** until a vacuum of 17 to 20-in. Hg is reached, as indicated by the **VACUUM GAUGE**.

iii. Flip the **GAS/VAC** switch to **GAS** to refill the Air Lock with the gas mixture until the AIR LOCK VACUUM GAUGE reads approximately 4-in. Hg on the first two cycles. On the third and last cycle leave the gas on until the gauge reaches zero to ensure that there is no vacuum still present in the Air Lock, then return the switch to the middle or off position.

iv. It is essential to perform the cycle at least three times. Once this is done, you may enter the chamber through the armports, using the procedure specified in the next section, and take your materials into the chamber through the inner Air Lock door.

NOTE: When cycling the Air Lock manually, the AUTO CYCLE ANAEROBIC light on the control panel will not illuminate when the cycle is completed, as it does at the end of the automatic cycle.

B) Automatic Cycle:

i. Make sure both Air Lock doors are closed. The automatic cycle will not start otherwise.

ii. Press the **"AUTO CYCLE START/RESET"** button to initiate the cycle. The **AUTO CYCLE AEROBIC/AUTO CYCLE ANAEROBIC** lights will alternately flash on and off, indicating the cycle is in progress. When the cycle is complete, the system will stop automatically with the **AUTO CYCLE ANAEROBIC** light on.

iii. If the cycle does not follow the sequences in the previous section on manual operation (eg: cycle won't start, cycle does not go through three times, cycle cot within specified limits, door won't open upon completion, etc.), consult the Troubleshooting Guide for adjustments.

NOTE: Do not hold Auto Cycle Start Switch down. Simply Press the button and let go to activate.

iv. If you **WANT TO** abort the cycle, **press and hold** the **"AUTO CYCLE START/RESET"** switch for **5 seconds**. The vacuum gauge will go to 0 and stop. Then the **AUTO CYCLE AEROBIC/AUTO CYCLE ANAEROBIC** light will stop flashing.

15.0 ENTERING THE CHAMBER

15.1 The rubber cuffs of the sleeve should be secured around your arm as opposed to clothing. Remove watches, bracelets, etc., as they may damage the cuffs.

15.2 Insert your hands and forearms into the sleeves. The cuffs must be firmly secured around your bare forearms. Keep your hands four to six inches away from the armport doors.

15.3 Depress the VAC foot pedal (this procedure evacuated both sleeves), and continue depressing until the sleeves have collapsed completely and firmly around your forearms.

15.4 Flush the sleeves with the gas mixture by depressing the GAS foot pedal. Do not overfill the sleeves. Stop when you feel a small separation of space between your hands and the sleeves.

15.5 Repeat steps 15.3 – 15.4 three more times to ensure that the sleeves are completely anaerobic/desired atmosphere before entering the chamber.

NOTE: ALWAYS enter the chamber with both arms simultaneously.

15.6 Loosen the armport door knobs a few turns and rotate the locking bars to a horizontal position. The armport doors can now be pushed forward into the chamber interior and can be secured on the armport door holders.

NOTE: Arm movements that are to forceful may cause the sleeves to dislodge from the armports.

16.0 EXITING THE CHAMBER

16.1 Before leaving the chamber the incubator doors and the inner Air Lock door must be closed.

16.2 Depress the GAS foot pedal to allow the sleeves to fill with gas. This procedure keeps the sleeves from collapsing as you move outward, making it easier to reposition the doors.

16.3 Hold the locking bars in a horizontal position, and close the doors. Rotate the locking bars to a vertical position, and gently tighten both armport door knobs, just until they "grab".

16.4 Before removing arms from the sleeves:

A) Check to be sure that armport doors are securely sealed by slowly pushing both arms forward (this action generates a pressure within the sleeves).

B) If the Manometer bubbles when the arms are pushed forward, this indicates that the doors are improperly sealed. Loosen the armport door knobs again, remove the doors. Check the O-rings for any particulate matter on the sealing areas, and repeat Step "A". If Manometer remains stable, the doors are sealed properly.

16.5 When the armport doors are properly sealed, slowly and carefully withdraw both arms from the sleeves.

17.0 MAINTENANCE

DAILY/ROUTINELY:

1. Before using any cleaning or decontamination method except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment**.**

2. Exchange chamber catalyst cartridge with reactivated one.

3. Remove & empty condensate collection container.

4. Change oxygen indicators.

5. Disinfect the chamber interior.

6. Check the cuffs on the sleeve system. If the cuffs have holes or any tears, replace.

7. Check incubator temperature. See Example Checklist page 22.

8. Record gas tank reading.

9. Change/Rejuvenate anatox.

Anatox absorbs volatile fatty acids and hydrogen sulfide in the chamber. Recommended use is 250 grams placed in a beaker in the chamber.

Anatox-1000 grams (packaged in 250 gram packages)

Instructions:

A. Empty two 250gram packages into two separate 500 ml Pyrex beakers.

B. Day one – place one beaker in the chamber (new anatox can be placed directly into the chamber).

C. Day two – remove beaker in the chamber and replace with the second beaker of anatox (also new).

D. Day three – reactivate the first beaker of anatox by heating at 160°C for 2 hours. Then replace the beaker in the chamber with this reactivated beaker.

E. Day four – six months – continue switching the reactivated beakers daily until six months is complete, then discard the old anatox and repeat the procedure again.

18.0 CHECKLIST

CHAMBER QC SHEET

Month					
	Record Temperature	Change Catalyst	Change Indicator	Drain Condensate	Record Tank Pressure Gauge Reading
Date					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
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31					

19.0 ACCESSORIES

Tank Switch

Switches and monitors dual gas tank supply. Provides automatic switch-over to second gas tank alarm sounds when both tanks are empty. Tanks can be switched manually at any time.

Model # 2002-B

Nitrogen Gas Regulator

Optional accessory used in a two gas chamber

Model # 7150500

Extended Service Contracts

The contract offers a twelve month warranty on parts and labor. Ensures customer of product satisfaction and optimal performance.

Cleaner

Benzalkonium Chloride

#AS-972V recommended to use in Manometer. From Anaerobe Systems Co. #408/782-7557

Anatox

#B90010 From Anaerobe Systems Co. #408/782-7557

Plexiglass Cleaner

8oz size; # 1060503

Plexiglass Scratch Remover

8oz size: # 1060504

Chamber Stand

Provides work bench to support Bactron chambers. Chamber Stand height 30". Stands feature locking casters and storage Space.

Model: Bactron I, II, and IV

Microscope Recommendation

The LEICA brand of microscope is a commonly used unit with Bactron System.

Microscope: # 9990516
Illuminator: # 4650502

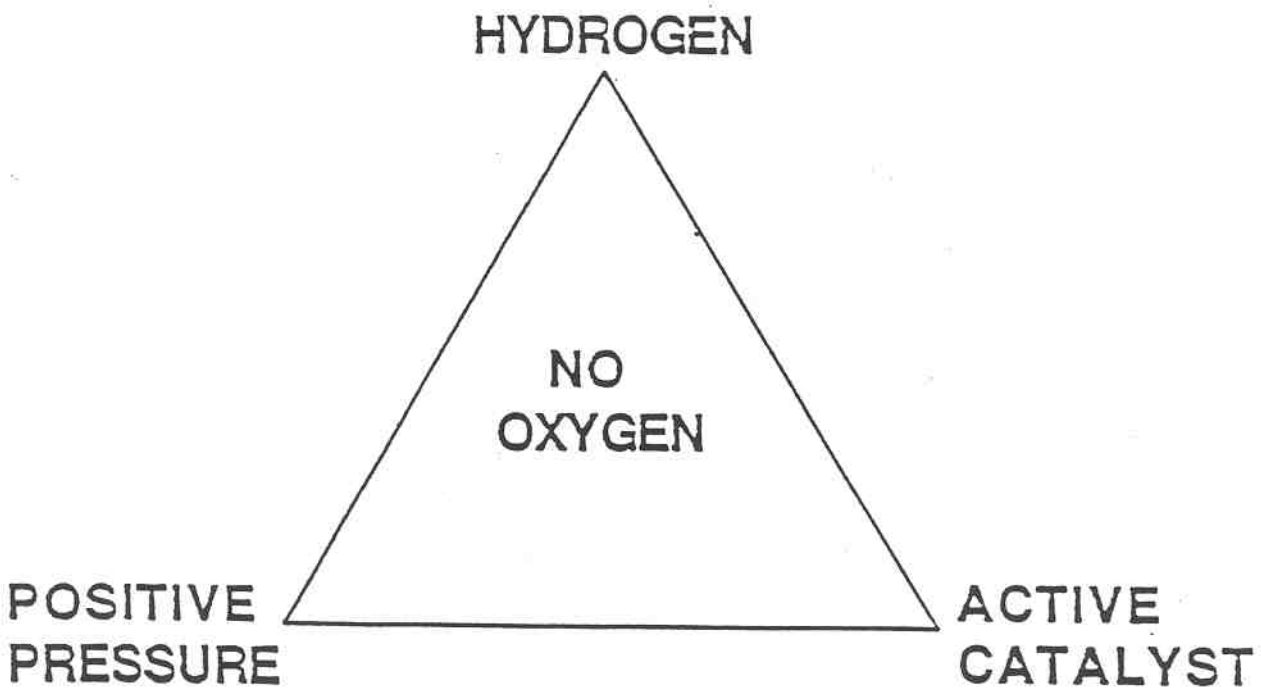
A LUKAS illumination system is also available, which includes a 250 watt fiber optic light, light ring, 250 watt Lamp house, and 0.3x lens.

Illumination system: #4650503
Spare Lamp: # 4650504

Parts

Catalog No.	Product
9990502	Catalyst Holder Filled
5110730	Petri-Plate Rack 2x13
9490513	Light Fixture
9990514	Sleeves, Complete
9490507	UV Light Source
9490512	Start Up Kit-MDL I
9490511	Start Up Kit-MDL II,IV,X
3600500	Rubber Cuffs, Sm Size 7
3600501	Rubber Cuffs, Med Size 8
3600502	Rubber Cuffs, Lrg Size 9
6000501	O-Ring For Door
6000504	O-Ring For Cuff
3450506	Gasket-Airlock, Bactron I
3450507	Gasket-Airlock, Bactron II,IV,X

20.0 CHAMBER SYSTEM DRAWINGS



Gas

Anaerobic mixture is 5% hydrogen, 5% carbon Dioxide, and 90% nitrogen. Do not exceed 5% hydrogen for safety reasons. Test for the presence of hydrogen in the gas mixture by flowing the gas over the active catalyst. The catalyst will get hot if hydrogen is present.

Catalyst

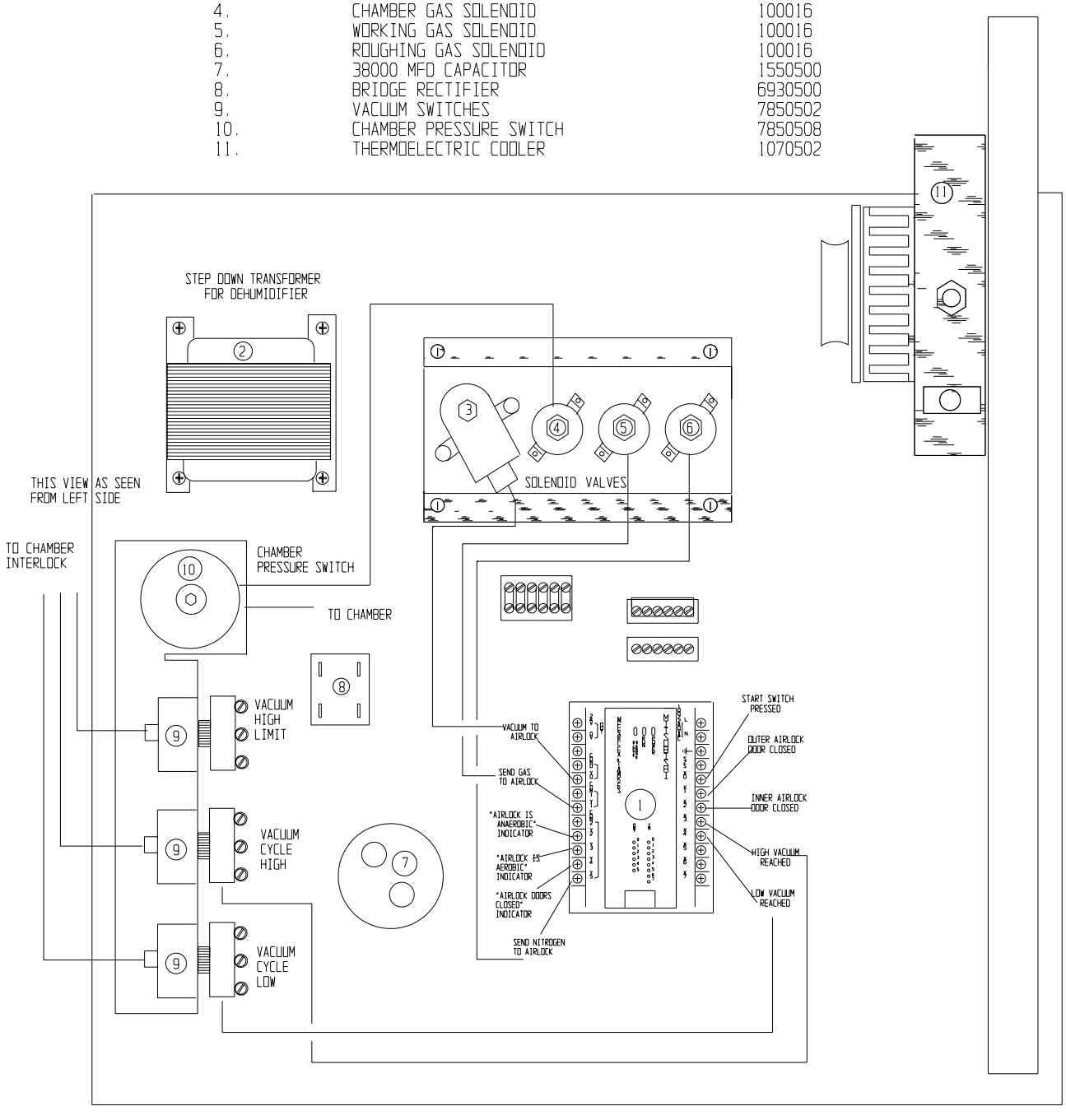
Reactive by heating for 2 hours at 160° C. Test by flowing the anaerobic gas mixture over the catalyst. If the catalyst is active, it will get hot. The catalyst can be "cleaned" by heating to 200°C, then flowing the anaerobic gas mixture over the catalyst.

Positive Pressure

The Manometer will indicate if positive pressure is present in the chamber.

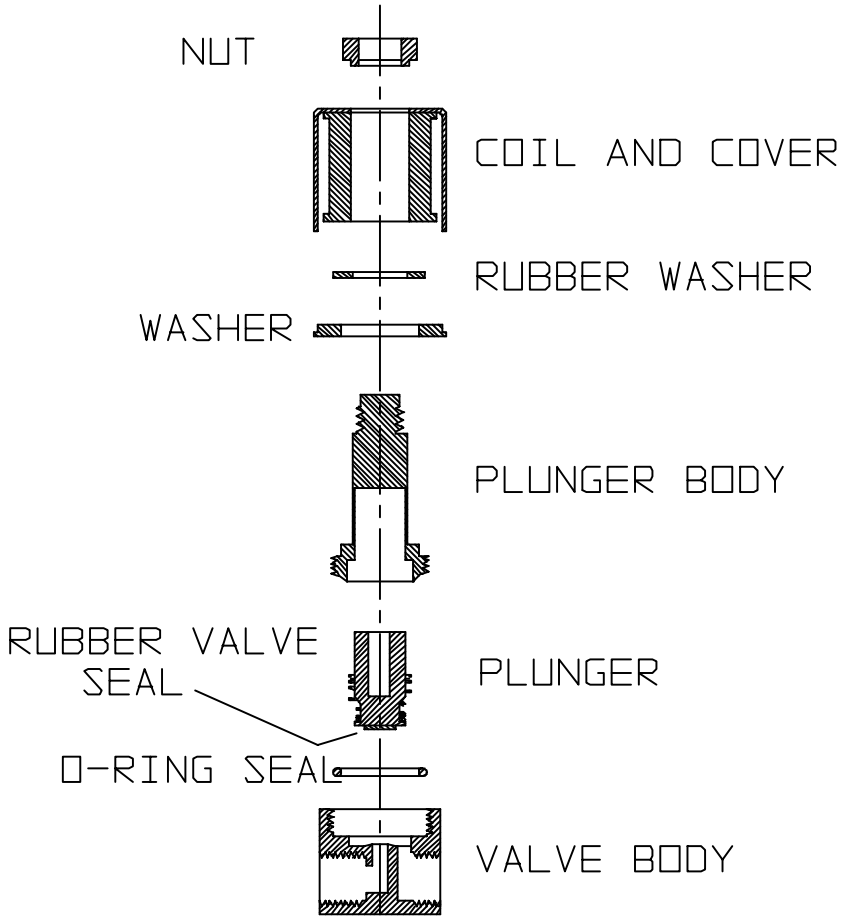
System Controller And Controls: View From Behind Panel

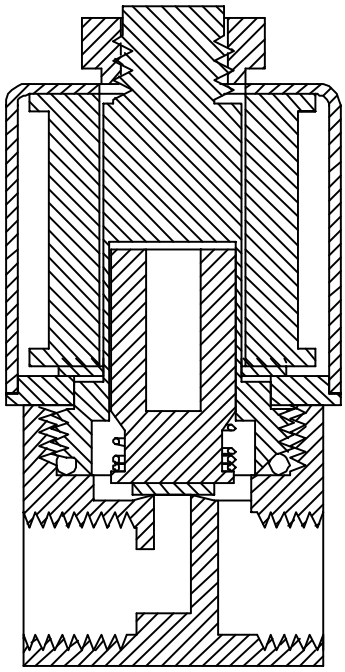
ITEM	DESCRIPTION	PART #
1.	SYSTEM PROGRAM CONTROLLER	103207
2.	STEP DOWN TRANSFORMER	8350500
3.	VACUUM SOLENOID	8600509
4.	CHAMBER GAS SOLENOID	100016
5.	WORKING GAS SOLENOID	100016
6.	ROUGHING GAS SOLENOID	100016
7.	38000 MFD CAPACITOR	1550500
8.	BRIDGE RECTIFIER	6930500
9.	VACUUM SWITCHES	7850502
10.	CHAMBER PRESSURE SWITCH	7850508
11.	THERMOELECTRIC COOLER	1070502



DOCUMENT
9850802 7/30/97

Solenoid





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System Controller Indicator Guide

	Function	At Rest No action. Both doors closed. Airlock aerobic.	Start Start button pressed.* Lights flashing	Vacuuming Vacuum on. Vacuum Going up. Lights Flashing	High Vacuum Switch Point Reached	Gassing Gas on. Vacuum going down Lights flashing	Low Vacuum Switch Point Reached	Completed Airlock anaerobic
Inputs								
x0	Start	Off	On*	Off	Off	Off	Off	Off
x1	Outer Door	On	On	On	On	On	On	On
x2	Inner Door	On	On	On	On	On	On	On
x3	High Vacuum	On	On	On	Off**	On	On	On
x4	Low Vacuum	On	On to Off	Off	Off	Off	On	On
Output								
y0	Vacuum Solenoid	Off	On	On	On to Off	Off	Off to On	Off
y1	Gas (AMG) Solenoid	Off	Off	Off	Off to On (1)	On (1)	On to Off (1)	Off
y2	Anaerobic Light	Off	Flashing	Flashing	Flashing	Flashing	Flashing	On
y3	Aerobic Light	On	Flashing	Flashing	Flashing	Flashing	Flashing	Off
y4	Door Light	On	On	On	On	On	On	On
y5	Nitrogen**	Off	Off	Off	Off to On (2)	On (2)	On to Off (2)	Off

*Input 0 is only when the start button is pushed
** Input 3 comes on only for a short moment
(1) Gas comes on for the last cycle only.
(2) Nitrogen comes on for the first two cycles.

CAUTION: Extreme caution must be exercised any time access is made into areas housing electrical components. Repair, replacement or adjustment of components in these areas must only be done by qualified technicians familiar with electrical circuitry and the operation of the anaerobic chamber.

ATTENTION: Des Précautions extrèmes sont requises à chaque fois que vous accédez à des endroits qui abritent les composantes électriques. La réparation, le remplacement oi ìajustement de composanted dans ces endroits ne doivent être effectués que par un technicien qualifié familier avec les circuits électriques et ì opération des étuves anaérobiques.

21.0 Troubleshooting

General Troubleshooting Guide

I. GAS CONSUMPTION

Problem	Possible Cause	Solution
CHAMBER GASSING light comes on every five (5) minutes or less	A. Armport door not sealing.	A. Tighten knob until it "grabs", Check for worn O-rings.
	B. Leak in seams.	B. Check front plexiglass panel with leak detector. Call for service.
	C. Manometer leak, indicated by very large leak out manometer hole. (Confirm with soap solution)	C. Seal inner tube to block, and block to mounting plate with solvent cement.
	D. Oxygen present-hydrogen being consumed by combing with oxygen.	D. No action necessary.
CHAMBER GASSING light comes on more often with the outer door open than with it closed	A. Inner door gasket not sealing-check with leak detector.	A. Check for worn gasket.

General Troubleshooting Guide Continued

I. Gas Consumption

Problem	Possible Cause	Solution
Chamber pressure Increase, Manometer Bubbles, CHAMBER GASSING light on.	A. Chamber pressure sensor switch stuck in "on" position.	A. Tap switch to jar contacts loose, then replace switch.
	B. Pressure set too high. Adjust pressure sensor. See diagram page 25.	B. Turn adjustment screw counter-clockwise to decrease pressure.
Excessive gas usage - no chamber leaks	A. Foot pedal leaking.	A. Disassemble and clean GAS valve or replace.
	B. Gas regulator/gas input connections leaking.	B. Check for and repair any leaks. Check regulator for 10 psi maximum output.
	C. Leak in supply line.	C. Check all gas lines for leaks.
Chamber pressure increases, Manometer bubbles. CHAMBER GASSING light off.	A. Chamber gassing Solenoid leaking, inlet gas pressure normal. Pinch hose to chamber to see that bubbling stops.	A. Disassemble and clean or replace solenoid valve if necessary. See Diagram pg. 26.
	B. Chamber gassing solenoid leaking, inlet gas pressure too high.	B. Set inlet gas pressure to 10 psi.
	C. Chamber gassing solenoid hosed incorrectly.	C. See Figure 9, pg. 9.
	D. Air Lock gas solenoid leaks. Pinch hose to module, see if it stops.	D. Disassemble and clean or replace solenoid valve. See pg. 26.
	E. Incubator temperature increase on startup.	E. No action necessary.

General Troubleshooting Guide Continued

II. AEROBIC CHAMBER CONDITIONS

Problem	Possible Cause	Solution
Indicator strips are Activated , I.e. - turn color.	A. Low chamber pressure.	A. Adjust chamber pressure sensor by turning clockwise to increase. See diagram pg. 25.
	B. Catalyst inactive.	B1. Use freshly heated catalyst, flush chamber with approx. 50 to 100 psig of gas depending on how long chamber has been aerobic and size of chamber. B2. Check to see that gas makes catalyst hot. If not, heat to 200 C and blow gas mix through to remove sulfide layer.
	C. Circulating blower not functioning.	C. Replace fan.
	D. Air lock not evacuating to high enough vacuum (17 - 18 inches Hg).	D. Turn High side switch clockwise to increase. See diagram on page 25.
	E. Outer Air Lock door not sealing properly.	E. Check for damaged gasket - replace if necessary.
	F. User did not perform sleeve technique properly upon entering chamber.	F. Check technique of all chamber users.
	G. Gas tank mixture contains an insufficient concentration of Hydrogen.	G1. Check for very low or empty tank. G2. Check label for at least 5% Hydrogen.

General Troubleshooting Guide Continued

III. AIR LOCK

Problem	Possible Cause	Solution
Air Lock does not hold Vacuum.	A. Split gasket inner & outer door.	A. Check gasket. If split, replace.
	B. Inlet fitting to module not sealed.	B. Tighten/reseal with teflon tape if necessary.
	C. Air Lock solenoids hosed incorrectly.	C. See diagram pg. 26.
	D. Vacuum solenoid leaking Pinch hose to module and see if leak stops.	D. Disassemble and clean solenoid - replace if necessary. WD40 can be used to clean solenoid.
	E. Defective vacuum gauge.	E. Replace gauge.
Automatic cycle will not start.	A. Input/output terminal buss is not seated correctly.	A. Press down on the terminal buss so that it snaps into place. NOTE: Power should be turned off.
	B. User pushed start switch & held inadvertently held down. Thus aborting Auto Cycle.	B. Push start switch once then release. See pg. 19.
	C. Make sure both doors are closed. Door sensors not making contact-check that DOORS light is ON. If not, check programmable Controller input display IN 0001 (outer door) and IN 0002 (inner door) should be on.	C. Adjust location of the door sensor so that DOORS light is on when both doors are closed.

General Troubleshooting Guide Continued

III. AIR LOCK

Problem	Possible Cause	Solution
Automatic cycle will not start. (Continued)	D. Start button inoperative - check input display - IN 0000 should be on when start button is pushed, OFF when not.	D. Replace start button.
	E. No power to controller - check power light on Controller.	E1. Check for 24 volt DC out of power supply. E2. Check for continuity between power supply and controller.
Chamber pressure goes down (Manometer level rises) when cycle is started.	A. Inner door gasket not Making proper seal.	A. Replace door gasket if necessary
Cycle only goes through two cycles.	A. System Controller Malfunction.	A. Replace System Controller.
Switch will not go from Vacuum to Gas.	A. Insufficient vacuum supply.	A. Adjust switch on VAC pump to allow higher vacuum before shut off, around 20 inches Hg.
	B. High vacuum set point too high, it should be around 17 - 18 inches Hg.	B. Turn High side switch counterclockwise to decrease. See diagram pg. 25.
Doors difficult to open upon completion of cycle.	A. Low vacuum set point too high.	A. Turn Low side switch Counter clockwise to Decrease. See diagram pg. 25.

General Troubleshooting Guide Continued

IV. INCUBATOR

Problem	Possible Cause	Solution
Steady digital readout Matches set point, but actual temperature does not.	A. Temperature Controller out of calibration.	A. Turn to pg. 13 to follow Complete Temperature Controller instruction.
	B. Incubator door open.	B. Close incubator door and allow incubator to stabilize.
Digital readout and actual Temperature continue to Increase past set point.	A. Incubator fan not functioning. Model Bactron IV, See drawing pg. 44.	A. Replace fan, Model Bactron IV.
	B. Output relay stuck - Check to see if " Incubator Heating" Indicator light stays on while temperature is Increasing.	B. Replace Temperature Controller.
	C. Incubator door open.	C. Close incubator door and allow incubator to stabilize.
Audible alarm sounds.	A. Temperature has risen Beyond the set range for the High Limit Safety.	A. Determine cause of temperature increase from prior section and take appropriate action. Call for service.

General Troubleshooting Guide Continued

V. VACUUM PUMP

Problem	Possible Cause	Solution
Pump continually turns on off in rapid succession. Ideally, pump should remain off for 30 minutes or more Before coming on again.	A. Leaking check valve - Normally due to debris Between poppet and O - ring seal.	A. Disassemble check valve clean off any debris from poppet, O - ring, reassemble.
	B. Vacuum foot pedal valve may be leaking. Check to see if pinching its hose Stops problem.	B. Remove hose barbs from valve - there may be some debris holding valve open. Replace valve if necessary.
	C. Leak in pump plumbing - pipe fitting switch, hose, etc.	C. Tighten any loose fittings, check hoses for cuts, holes, leaks around hose barbs.
	D. Air Lock vacuum Solenoid leaking.	D1. Disassemble solenoid, clean plunger, O - ring spring, etc. and reassemble.
		D2. Make sure vacuum hose from pump is not pinched.
Vacuum motor does turn on.	A. Broken vanes in Pumping section (the end of pump with filter jars.)	A. Remove the end of the pump and replace any broken vanes.
	B. Electrical problem with Motor.	B. Replace pump.
	C. Check pump power Supply.	C. Check circuit breaker on back of chamber.
Pump runs continuously when there is no demand for vacuum.	A. Set point on pump Vacuum switch set too high.	A. See pg. 25, " Setting vacuum High switch".

General Troubleshooting Guide Continued

VI. MISCELLANEOUS

Problem	Possible Cause	Solution
Excessive moisture buildup in chamber.	A. Thermoelectric condensate controller fan is not operating.	A. Replace fan.
	B. Ambient room temperature too low.	B1. Maintain room temperature a bit higher. B2. Cover chamber with a blanket overnight as means of installation.
	C. Air conditioner unit directly above chamber.	C. Relocate chamber, redirect the air conditioning duct.
	D. Thermoelectric condensate controller not emptied regularly.	D. Empty thermoelectric condesate controller container daily. as means of installation.
Loop sterilizer does not work.	A. Loop covered with oxidized layer which insulates from power supply.	A. Use a new loop.

General Troubleshooting Guide Continued

VI. MISCELLANEOUS

Problem	Possible Cause	Solution
Loop sterilizer does not work. (Continued)	B. Sterilizer unit not getting power.	B1. See that the unit is Plugged into internal Outlet. B2. See that the internal Outlet is getting power. B3. Replace.

22.0 BACTRON OPERATION TIPS

Keeping the Bactron Chamber Anaerobic:

The Bactron chamber will be anaerobic if it has the following three things: Hydrogen, Positive Pressure, and an Active Catalyst. See Instruction Manual drawing on page 24.

User should place oxygen indicators inside the chamber or an oxygen meter to ensure that they have an anaerobic environment. One indicator should be placed inside the working chamber and another in the incubator. The indicators turn color in the presence of oxygen, and are available through distributors and supply companies.

If the indicators appear “very blue” purge the chamber with 100 PSI and wait for 30 minutes. The open a new indicator. If the new indicator is “white” in color your chamber in anaerobic. The greater the color of the indicator, the more gas to purge through the chamber and the longer users should wait before re-checking system.

Gas Source:

Sheldon Manufacturing, Inc. recommends an AMG, Anaerobic Mixed Gas, mixture of 5% CO_2, 5% Hydrogen, and 90% Nitrogen for anaerobic applications.

This mixture is available marked “NON-FLAMMABLE”.

Two national sources of AMG gas are AIRCO and Air Products.

How much gas will a Bactron chamber use?:

Gas usage is dependent upon two things; the number of times a user enters their chamber daily and operating technique.

Our product literature states the Air Lock uses approximately 96 liters of gas and the sleeve system uses approximately 3 liters of gas. A standard tank contains 2,200 PSI of gas. During chamber installation, 300 PSI of gas is used. There is about 70-80 Air Lock cycle uses per tank of gas.

Methods to Conserve Gas:

Users can utilize the Air Lock as a holding station. As samples are received they can be stored in an anaerobic environment by placing them in the Air Lock and activating either the automatic or manual Air Lock cycle.

1. Users should evaluate and try to limit the number of times the Air Lock is opened. For example, placing samples in the Air Lock once in the morning and once in the afternoon as opposed to four times a day is desirable.

2. Gas is also conserved by bringing samples in through the sleeve system. Easy samples to transport through the sleeves are transport tubes as well as plates that are sealed.

3. Placing an object in the Air Lock will reduce the amount of cubic area therefore reducing the amount of atmosphere exchanged and gas utilized.

4. Good sleeve system technique. During the first vacuum cycle, remove all the atmosphere from the sleeve. Users should be able to see the outline of their fingers. Next, bring enough gas in to the sleeve (by pressing the GAS foot pedal) as to eliminate the definition of the fingers or when the sleeve is nor clinging to the arm.

   Users should not "balloon" the sleeve out when flushing with gas. This action will waste gas.

5. The bubbling of the manometer and the activation of the "chamber gassing" indicator light on the control panel notifies the user of usage will working in the chamber.

   When a user is in the "working Area" they should be aware of the effects their movements have on gas consumption.

   Gas consumption can be reduced by balancing arm movements. For example, when extending the right arm into the chamber, bring the left arm close to the front of the chamber, thus balancing the pressure and reducing gas displaced by area.

Aborting Auto-Cycle: The automatic Air Lock can be aborted by pressing and holding the "Auto Start/Reset" button for five (5) seconds. If a user forgets to place a sample in the Air Lock the cycle can be aborted in order to eliminate the unnecessary use of gas.

How much does AMG gas cost?: The price that a gas supplier charges is often determined by the amount of the gas the customer uses. The price per tank will decrease as the quantity ordered decreases.

Sheldon recommends that customers get competitive bids on their gas to ensure that they are receiving the "best" market price.

The average cost of AMG gas is $30.00 per tank, and $10.00 for nitrogen in the United States. The cost range of AMG gas is between $8.00 and $58.00 per tank.

Dual Gas Systems:

The Bactron product line comes standard with the capability to operate a chamber with a single gas or a dual gas system. This is an exclusive feature that provides customer flexibility.

Refer to the Instruction Manual "Gas Connections" for installation details.

A dual gas system, the nitrogen gas is utilized in the first two flushes of the automatic cycle of the Air Lock. The third and final flush is AMG gas. The sleeve system always utilizes AMG gas.

Therefore, in a dual gas system, less AMG gas is used. AMG gas is more expensive than nitrogen, and the users overall gas expense is reduced.

Customers using a dual gas system need to have two regulators. An AMG regulator is supplied with the Bactron Chamber. A nitrogen regulator is listed in the Instruction Manual accessory parts list.

Catalyst:

Two catalyst cartridges containing palladium pellets are provided with the Bactron Chamber. The catalyst must be active in order to ensure an anaerobic environment.

Customers need to place a reactivated catalyst in their chamber each day the chamber is used. The catalyst can be reactivated by heating for a minimum of 1-1/2 to 2 hours at 160° Celsius.

The catalyst can be tested to ensure it is activated by flowing anaerobic gas over the pellets. If the pellets become warm or hot, they are working properly and are ready for use in the chamber.

The catalyst can be "cleaned" by heating to 200° Celsius, then flowing the anaerobic gas mixture over the catalyst.

Positive Pressure:

If the chamber is installed properly and is connected to a gas supply the system will have positive pressure.

The manometer provides users with a visual indication that they have positive pressure. When the manometer bubbles, for example when a user enters the chamber, it is releasing chamber atmosphere/pressure.

Role of Condensate Controller:

The Condensate Controller is an exclusive Bactron feature of Sheldon Manufacturing, Inc. Our competitors use desiccants. Desiccants are a drying agent and often dry out samples.

The Condensate Controller ensures the following:

1. Eliminates condensation in the chamber.

2. Samples will not dry out.

3. Chamber will not fog.

The Condensate Controller system is located on the left side of the chamber interior behind the catalyst cartridge. Excess moisture is drained into a tube for easy removal.

Place a container i.e. a flask or beaker under the tube for collection. Customers should empty the container routinely.

Chamber Checklist:

It is recommended that customers review a checklist before they enter the Bactron Chamber. The checklist serves as a reminder of supplies and samples they need to bring into the unit.

Common items listed on a checklist are: re-activated catalyst, samples and loops. The checklist can be placed on the front Plexiglass panel.

How to Determine if A Chamber is Leaking:

Users should note the level of their gas tank(s) on a routine basis. This provides a way to monitor chamber gas consumption.

Users can perform the following check before they exit the chamber through the sleeve system to ensure the chamber is closed properly. Upon closing the arm port doors and before removing arms form the sleeves, user should push on the sleeves. If the arm port doors are not closed properly, the manometer will bubble.

Hand Held Leak Detector:

If a chamber leak is suspected use the hand held leak detector provided to identify where the leak is located. The detector senses hydra-carbons, in our case hydrogen.

Be aware that when using the leak detector, the manometer vent hole on the back of the chamber will activate the detector. This is because hydrogen is being release from the chamber through the manometer.

To check the manometer for leaks, use a soap and water solution over the manometer and observe for bubbles.

Amount of Water Collected in the Dehumidifier:

The amount of water collected in the dehumidifier depends on the number and types of samples in the chamber. The typical amount collected is around 50cc each day of chamber use.

Size of Sleeve Cuffs:

It is critical that the sleeve cuffs seal around the user's arm during chamber operation to ensure the desired anaerobic environment.

The location that the cuffs seal on the user's arm is determined by individual preference.

The size of the cuffs that come standard with the Bactron Chamber is medium, size 8 glove. Other sizes are available; large size 9, and small size 6 ½.

Replacement of Cuffs:

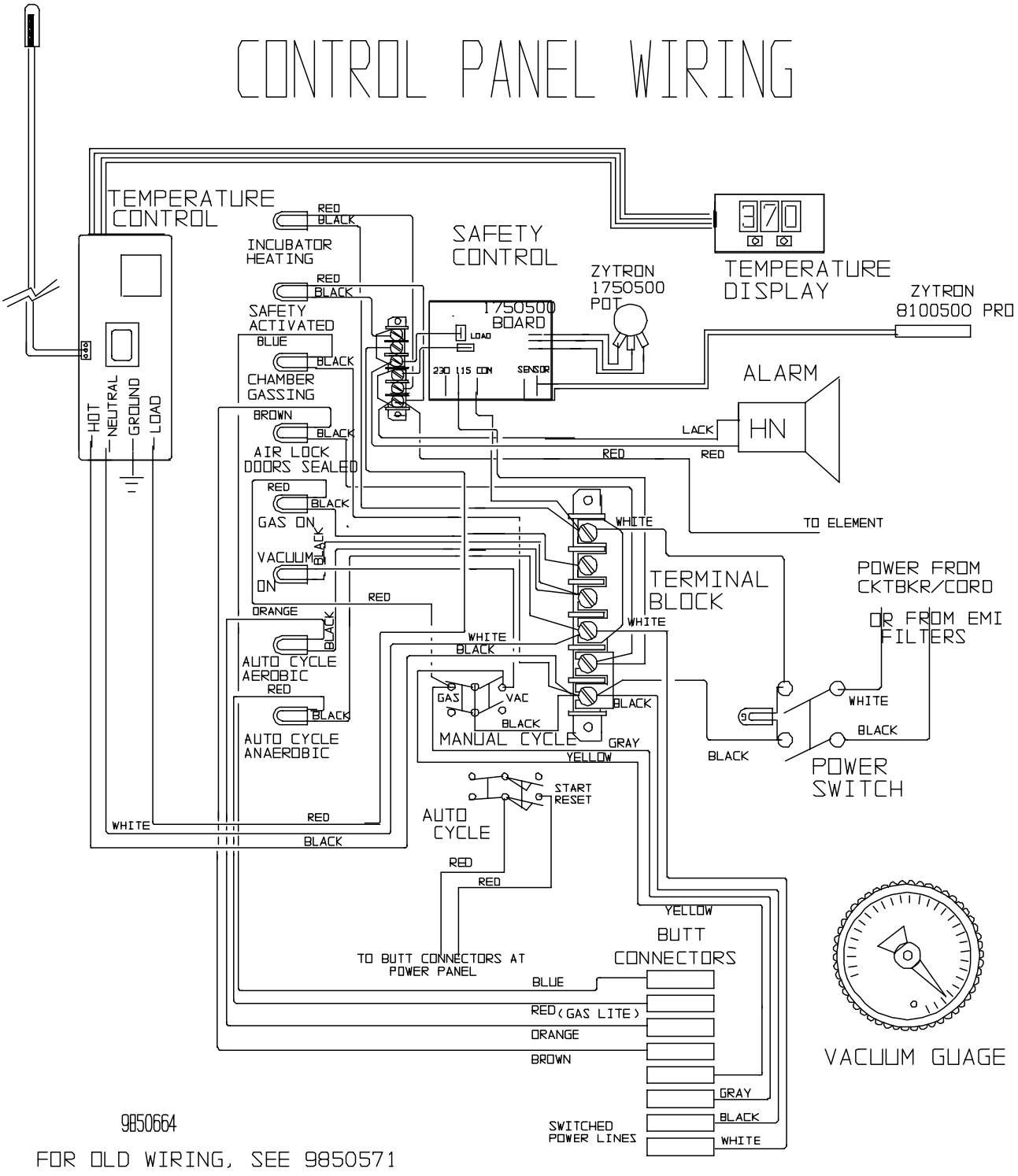
When and how often the cuffs on the sleeve need to be replaced depends on customer care and technique. Typically the cuffs are replaced about every three months.

Customers should watch for small holes that can appear where the cuffs are placed on the "ring cuff". If holes are present the cuffs should be replaced to avoid gas leak. Watches and jewelry can damage the cuffs and are not recommended to be worn during chamber use.

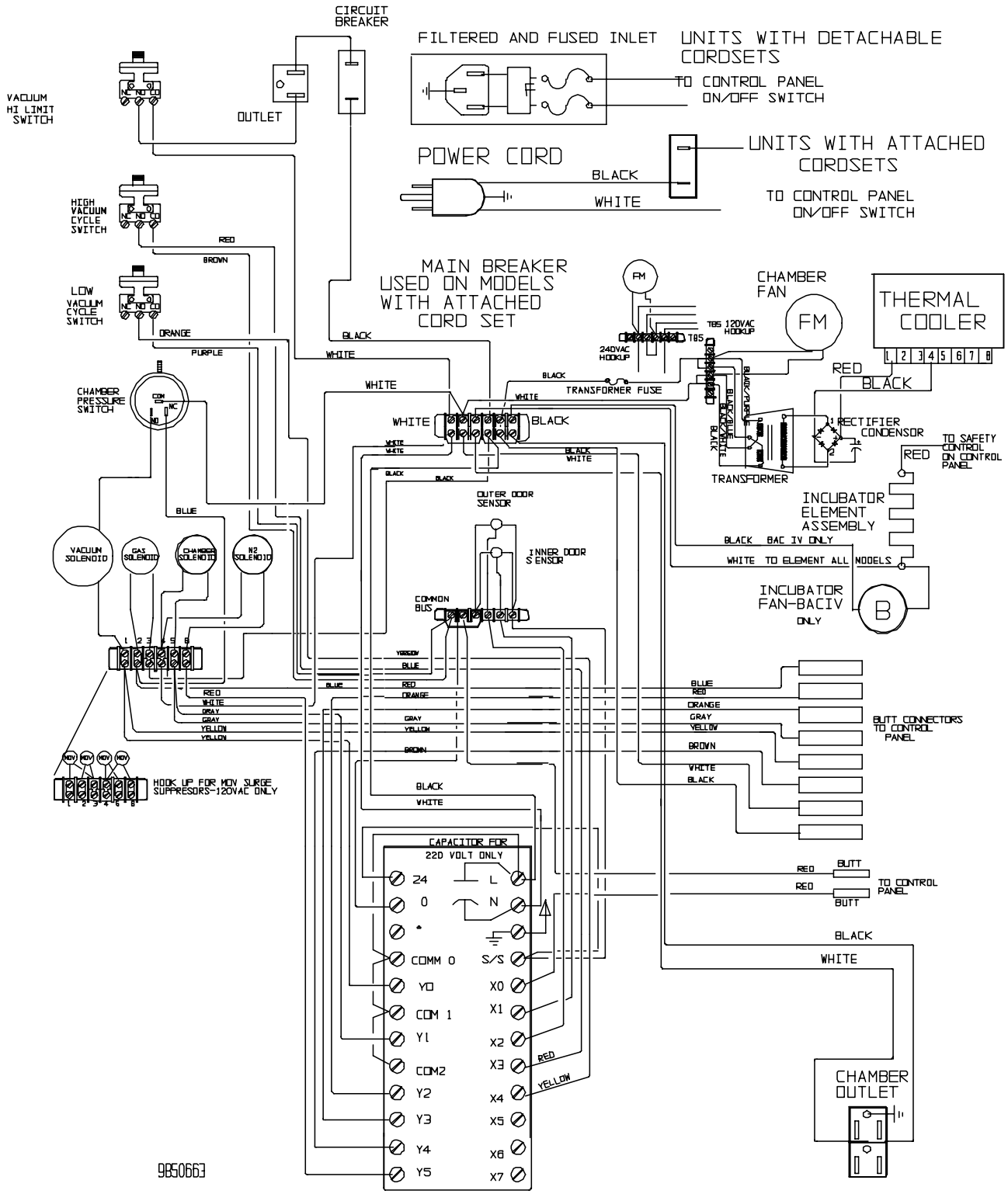
Electrical

Model	Volts	Amps	VA	Cycles
BacI	120	8	1100	50/60 hz
	240	4	1100	50/60 hz
BacII	120	8	1100	50/60 hz
	240	4	1100	50/60 hz
BacIV	120	11	1350	50/60 hz
	240	6	1350	50/60 hz

23.0 Wiring Diagram



POWER PANEL WIRING



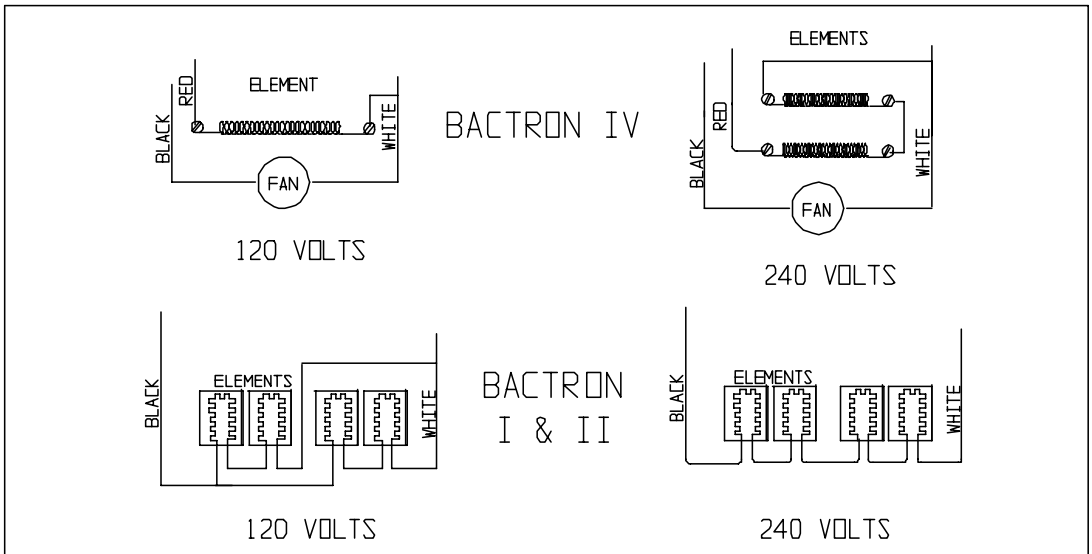


FIGURE 1. INCUBATOR WIRING

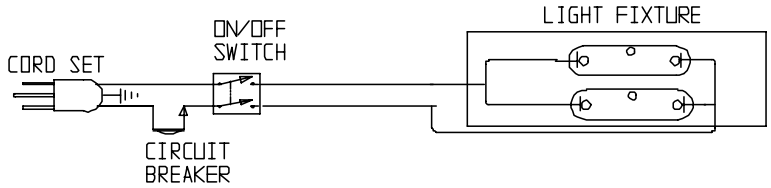


FIGURE 2. LIGHT BOX WIRING

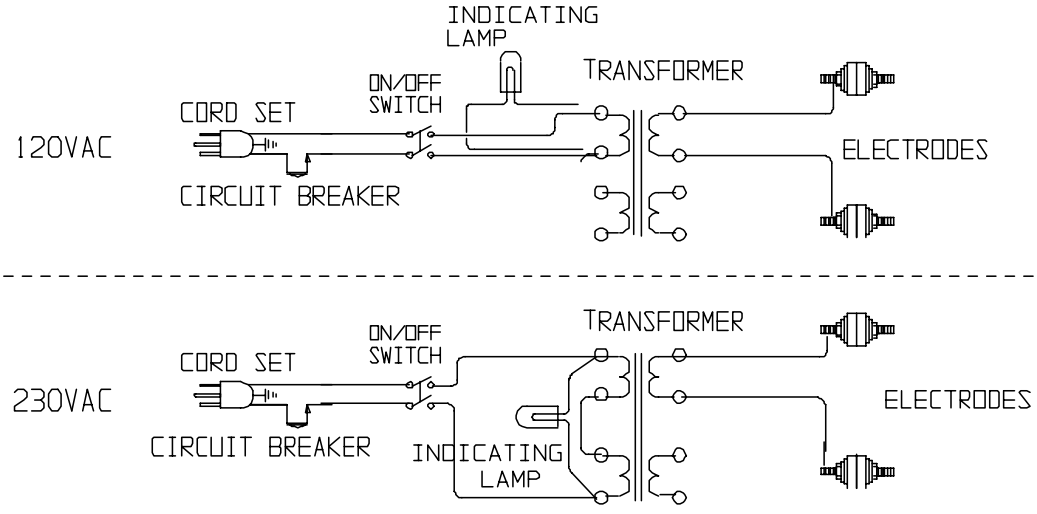
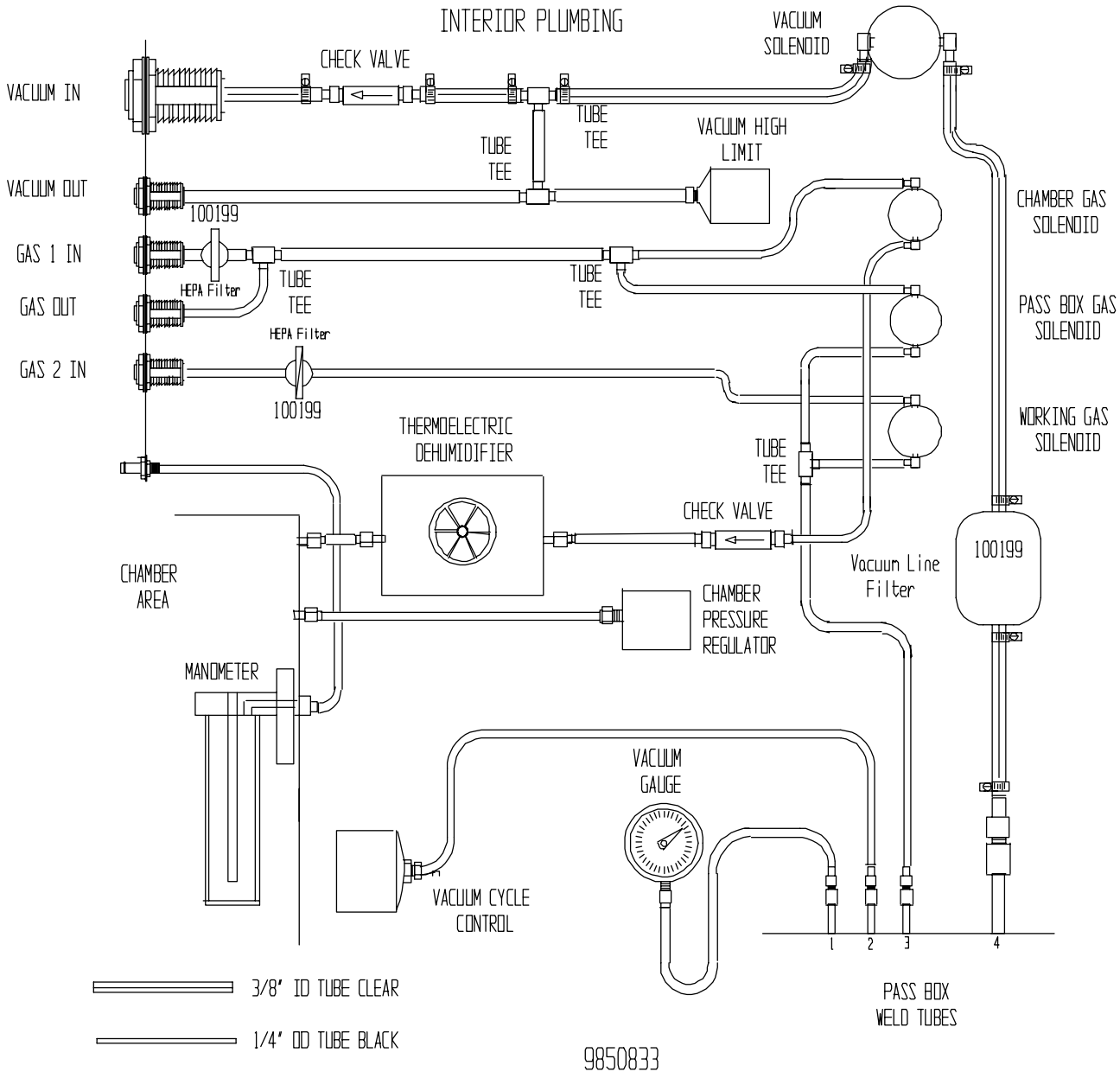
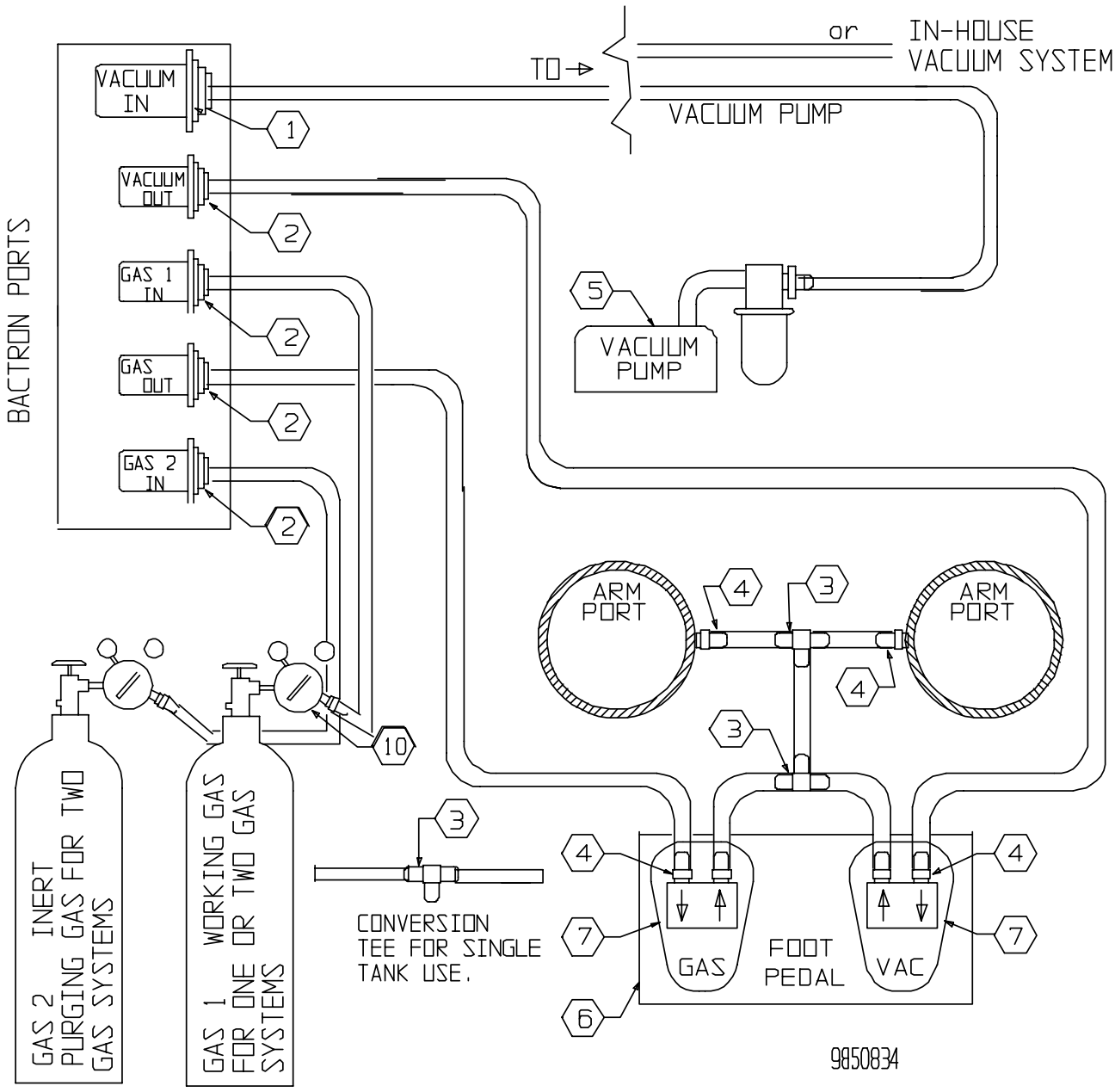


FIGURE 3. LOOP STERILIZER

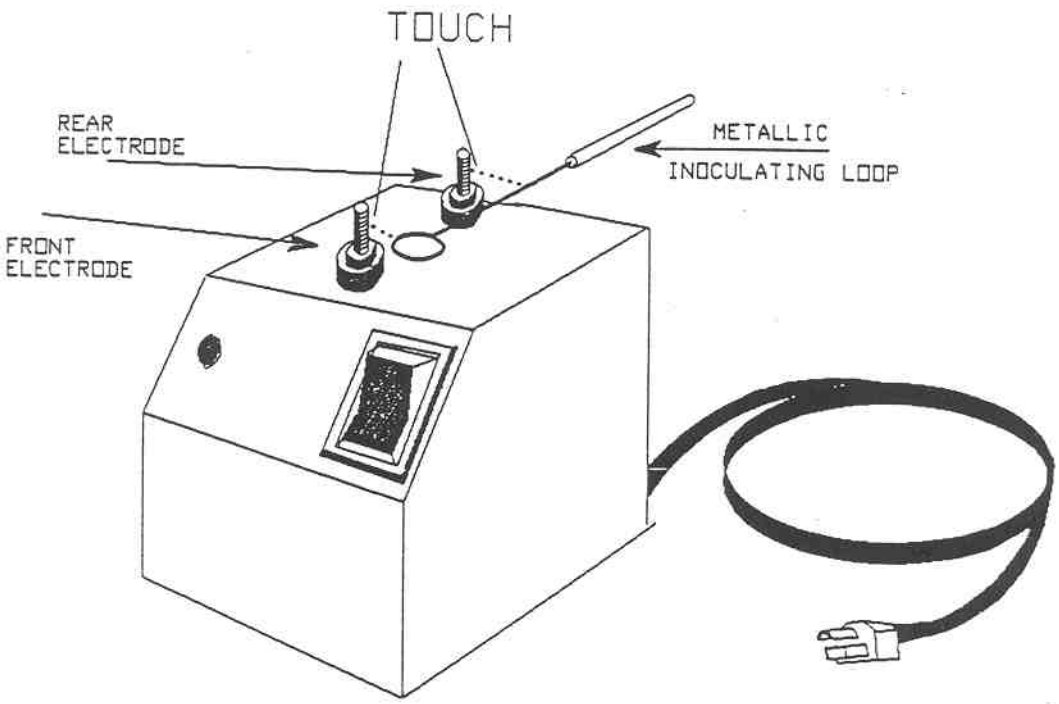

INTERIOR PLUMBING
VACUUM SOLENOID
CHECK VALVE
VACUUM IN
TUBE TEE
TUBE TEE
VACUUM HIGH LIMIT
VACUUM OUT
100199
CHAMBER GAS SOLENOID
GAS 1 IN
HEPA Filter
TUBE TEE
TUBE TEE
GAS OUT
PASS BOX GAS SOLENOID
HEPA Filter
GAS 2 IN
100199
WORKING GAS SOLENOID
THERMOELECTRIC DEHUMIDIFIER
TUBE TEE
CHECK VALVE
100199
CHAMBER AREA
Vacuum Line Filter
CHAMBER PRESSURE REGULATOR
MANOMETER
VACUUM GAUGE
VACUUM CYCLE CONTROL
1
2
3
4
3/8" ID TUBE CLEAR
1/4" OD TUBE BLACK
PASS BOX WELD TUBES
9850833


BACTRON PORTS
VACUUM IN
VACUUM OUT
GAS 1 IN
GAS OUT
GAS 2 IN
TO
or
IN-HOUSE VACUUM SYSTEM
VACUUM PUMP
VACUUM PUMP
ARM PORT
ARM PORT
CONVERSION TEE FOR SINGLE TANK USE.
GAS
FOOT PEDAL
VAC
GAS 2 INERT PURGING GAS FOR TWO GAS SYSTEMS
GAS 1 WORKING GAS FOR ONE OR TWO GAS SYSTEMS
9850834

24.0 BACTRON PARTS LIST

DESCRIPTION	PART NUMBER	PART NUMBER	QUANTITY
	115 VOLT	220 VOLT	
Gasket 9x9 Soft Lt. Blue (Bac I)	3450506	3450506	1
Gasket 12x12 Soft Lt. Blue (Bac II, IV)	3450507	3450507	1
Power Cord	1800516	101990	1
Main Circuit Breaker	1100505	1100505	1
Main Switch	103351	103351	1
Incubator Safety Alarm	250501	250502	1
Incubator Safety Thermostat	1750500	1750500	1
Incubator Safety Indicator	200020	200020	1
Heating Element			
Bactron I, II	2350502	2350502	2
Bactron IV	890081		1
Bacrton IV		890081	2
Vacuum Pump Ckt Bkr	1100505	1100505	1
Incubator Fan (Bac IV)	210002	210001	1
Vacuum Pump Outlet	100020	101483	1
Door Sensors	103208	103208	1
Start Switch	101970	101970	1
Vacuum Control Switch	7850502	7850502	3
System Control Switch	103207	103207	1
Gas/Vacuum Switch	X1000411	X1000411	1
Gas 2 Solenoid Valve	8600528	8600529	1
Door Indicator	200020	200020	1
Aerobic Indicator	200020	200020	1
Anaerobic Indicator	200020	200020	1
Gas Indicator	200020	200020	1
Vacuum Indicator	200020	200020	1
Gas 1 Solenoid	8600528	8600529	1
Chamber Gas Solenoid	8600528	8600529	1
Chamber Gas Indicator	200020	200020	1
Vacuum Solenoid	8600509	8600508	1
Thermoelectric			
Condesensate Controller	1070502	1070502	1
Cooling Fan	X1000300	X1000300	1
Chamber Pressure Switch	7850508	7850508	1
Bacloop / Light Box Switch	X1000124	X1000124	1EA
Bacloop / Light Box Cord	100014	101990	1EA
Bacloop / Light Box Breaker	1100505	1100505	1EA
Light Fixture	X1000292	X1000751	1
Bacloop Pilot Light	200020	200020	1
Bacloop Transformer	103352	103352	1

25.0 Loop Sterilizer



Directions For Use

1. Touch the end of in inoculator loop or needle to the front and rear shorting posts as shown.
2. As soon as the inoculator needle or loop glows red, remove it from the contact with the shorting bars.
3. Allow the needle or loop to cool before putting into use or setting aside.