BACTRON® 110 – 120 Volts

SHEL LAB®

Installation and Operation Manual

BACTRON300, BACTRON600, BACTRON900

Previously Designated:

BACTRONII, BACTRONIV, BACTRONIV-900

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BACTRON Anaerobic Workstation 110 - 120 Volts

Installation and Operation Manual

Part number (Manual): 4861700-1

Revision: January 20, 2016

Pictured on Cover: BACTRON900 (BACTRONIV-900)

BACTRON600 (BACTRONIV)

BACTRON300 (BACTRONII)

These units are TÜV CUE listed as anaerobic chambers for professional, industrial, or educational use where the preparation or testing of materials is done at an ambient air pressure range of 22.14 – 31.3 inHg (75 – 106 kPa) and no flammable, volatile, or combustible materials are being heated.

These units have been tested to the following requirements:

CAN/CSA C22.2 No. 61010-1:2012
CAN/CSA C22.2 No. 61010-2-010:2004 Reaffirmed: 2014-07
UL 61010-1:2012-05
UL 61010A-2-010:2002-03
EN 61010-1:2010
EN 61010-2-010:2014
Supplemented by: UL 61010-2-010:2015

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INTRODUCTION

Thank you for purchasing a Shel Lab BACTRON® Anaerobic Chamber Workstation. We know that in today's competitive marketplace, customers have many choices when it comes to constant temperature equipment. We appreciate you choosing ours. Our continued reputation as a leading laboratory product manufacturer rests with your satisfaction. Sheldon Manufacturing, Inc. stands behind our products, and we will be there if you need us.

BACTRON workstations are intended for professional, industrial, and educational applications as anaerobic workstations suitable for the cultivation of clinical bacteria. These units are not intended for use at hazardous or household locations. Only use this equipment for its intended spectrum of applications; any alterations or modifications void the warranty.

Before using the BACTRON read this entire manual carefully to understand how to install, operate, and maintain the workstation in a safe manner. Keep this manual available for use by all workstation operators. Ensure that all operators are given appropriate training prior to using the BACTRON.

GENERAL SAFETY CONSIDERATIONS

Note: Failure to follow the guidelines and instructions in this manual may create a protection impairment by disabling or interfering with the unit's safety features. This can result in injury or death.

Your BACTRON and its recommended accessories are designed and tested to meet strict safety requirements. The workstation is built to connect to a wall power source using the specific power cord type shipped with the unit.

For continued safe operation of your BACTRON, always follow basic safety precautions including:

- Always plug the unit power cord into a protective earth grounded electrical outlet that conforms to national and local electrical codes. If the unit is not grounded properly, parts such as knobs and controls can conduct electricity and cause serious injury.
- Avoid damaging the power cord. Do not bend it excessively, step on it, or place heavy objects on it. A damaged cord can be a shock or fire hazard. Never use a power cord if it is damaged or altered in any way.
- Always position the unit so that end-users can quickly unplug it in the event of an emergency.
- Do not attempt to move the unit while in operation or before the unit has cooled.
- Use only approved accessories. Do not modify system components. Alterations or modifications to the unit can be dangerous and void the manufacturing defect warranty.
- Follow all local ordinances in your area regarding the use of this unit. If you have any questions about local requirements, please contact the appropriate agencies.
- Ensure that the vacuum line from the vacuum pump to the workstation is not kinked, and that the pump is placed in a location with adequate ventilation to avoid overheating.

ENGINEERING IMPROVEMENTS

Sheldon Manufacturing continually improves all of its products. As a result, engineering changes and improvements are made from time to time. Therefore, some changes, modifications, and improvements may not be covered in this manual. If your unit's operating characteristics or appearance differs from those described in this manual, please contact your Shel Lab dealer or distributor for assistance.

CONTACTING ASSISTANCE

If you are unable to resolve a technical issue with the BACTRON, please contact Sheldon Technical Support. Phone hours for Sheldon Technical Support are 6am – 4:30pm Pacific Coast Time (west coast of the United States, UTC -8).

Please have the following information ready when calling or emailing Technical Support: the **model number** and the **serial number**. These will be found on the unit data plate, which is located in the workspace chamber above the inner pass box door. See page 12.

EMAIL: tech@shellab.com PHONE: 1-800-322-4897 extension 4 or (503) 640-3000 FAX: (503) 640-1366

Sheldon Manufacturing INC.
P.O. Box 627
Cornelius, OR 97113

RECEIVING YOUR BACTRON

Before leaving our factory, all BACTRONs are packaged in high-quality shipping materials to provide protection from transportation-related damage. When the unit departs the factory, safe delivery becomes the responsibility of the carrier. Damage sustained during transit is not covered by the BACTRON's warranty.

This makes it important that you inspect your BACTRON for concealed loss or damage to its interior and exterior when receiving it. If you find any damage to the workstation, follow the carrier's procedure for claiming damage or loss. See the orientation photos on the following pages for a visual reference.

INSPECTING THE SHIPMENT

Carefully inspect the shipping carton for damage. Report any damage to the carrier service that delivered the BACTRON. If the carton is not damaged, open the carton and remove the contents. Carefully check all packaging before discarding. Save the shipping carton until you are certain that the unit and its accessories function properly.

The unit should come with an Installation and Operation Manual and a Certificate of Compliance. Verify that the correct number of items are included with the unit:

Anaerobic Monitoring Strips (5 packets)

Arm Port Door Left

Arm Port Door Right

BACTRON300 / 900 Shelf Spacers (3)

BACTRON600 Arm Port Door Stands (2)

2 Catalyst Cartridges

Leave in Package! Do not Unwrap Yet!

Foot Pedal Unit

Gas Regulator Kit, AMG

LED Lamp Unit

Leveling Feet (4)

BACTRON300/900 Petrie Dish Rack (7)

Small

BACTRON600/900 Petrie Dish Rack (10)

Large

Power Cord NEMA 5-15P

Vacuum Pump 110 - 120 Volt

2 Sleeve Assemblies

(Size 8 Medium)

See page 78 for component replacement part numbers

ORIENTATION PHOTOS

Figure 1: BACTRON900

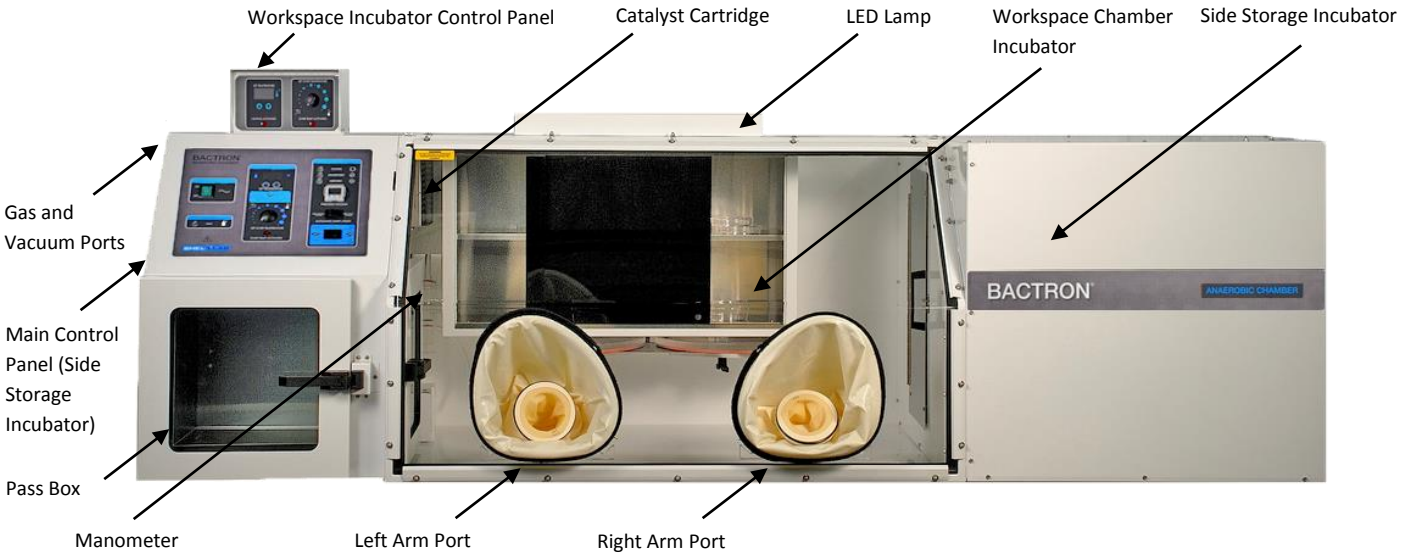
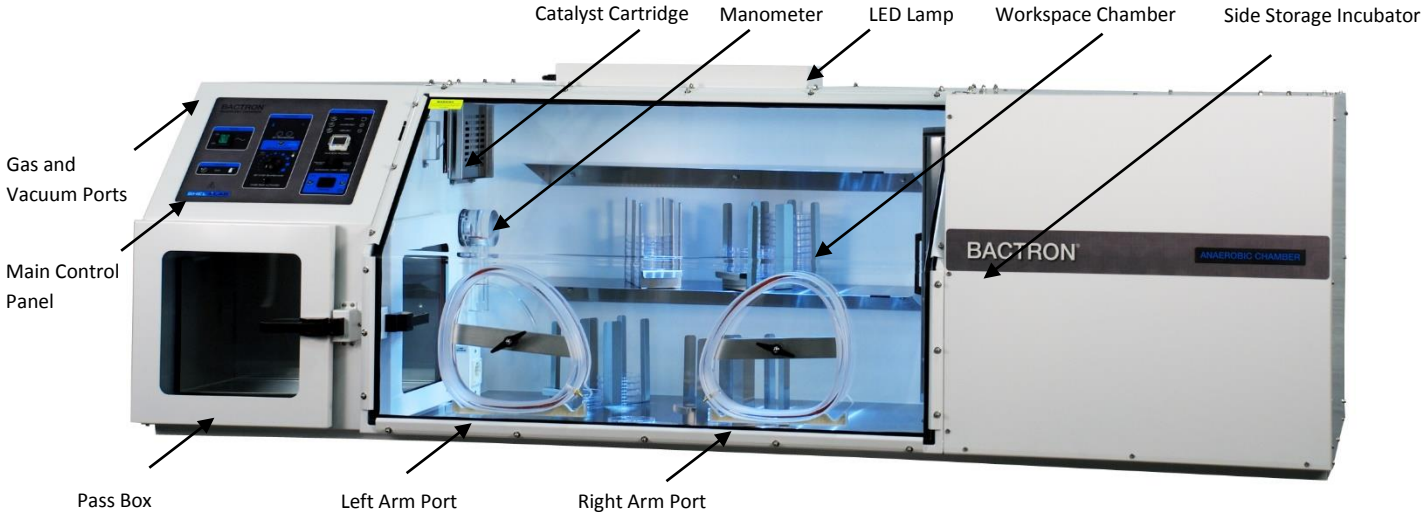


Figure 2: BACTRON600



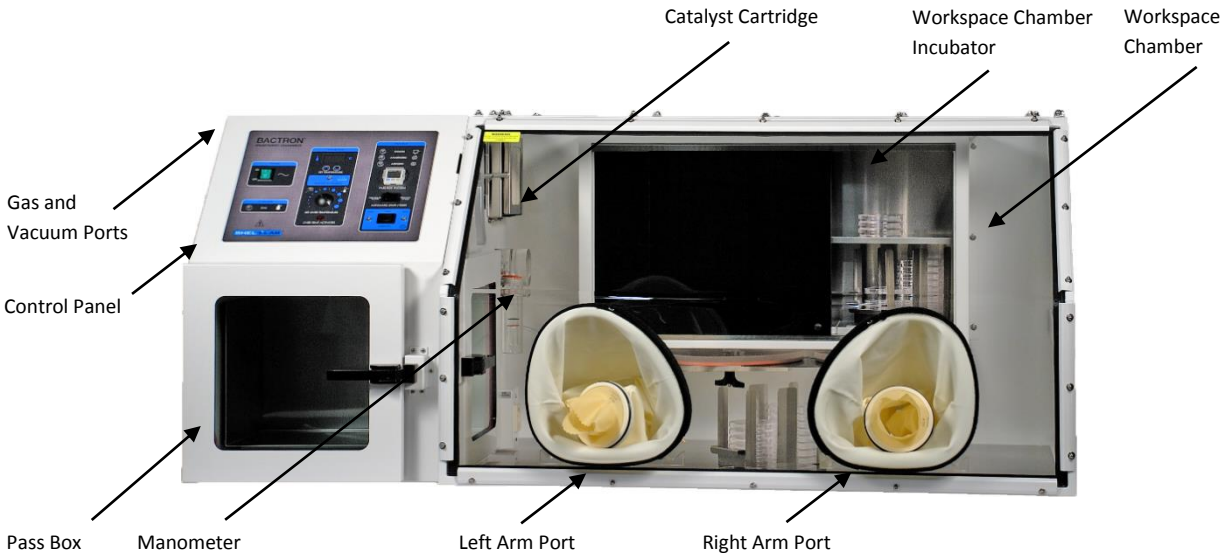


Figure 4: BACTRON300

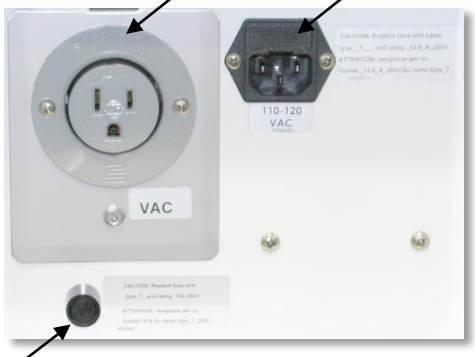


Figure 3: Power Supply Panel, All Units (located on back)

Workspace Chamber Orientation (All Units)

Figure 5: Workspace Chamber Layout

Pass Box Orientation

Figure 6: Pass Box Inner Door and Sliding Shelf

The pass box-style airlock is provided with an integral sliding shelf to facilitate material transfers. Small items may be introduced into the chamber via the Arm Port Doors and Sleeve Assemblies using proper sleeve technique.

RECORD DATA PLATE INFORMATION

Locate the data plate in the workspace chamber above the inner pass box door. The data plate contains the BACTRON model number and serial number. Enter this information below for future reference.

Date Plate Information

Model Number	
Serial Number	

TEMPERATURE REFERENCE SENSOR DEVICE

The BACTRON does not come with a temperature reference device. A reference sensor device must be purchased separately for performing accuracy verifications and calibrations of the incubator temperature display(s).

The reference device must be accurate to at least 0.1°C, and should be regularly calibrated, preferably by a third party.

For best results, use a digital device with a wire-connected temperature sensing probe. For example: a wire thermocouple probe that can be introduced into the incubator, leaving the device outside. Readings taken outside the incubator avoid incubator door openings during verifications and calibrations, and eliminate subsequent waits for the incubator air temperature to re-stabilize before proceeding.

Select a probe suitable for the application temperature you will be calibrating or verifying the display accuracy at.

Alcohol thermometers are insufficient for conducting accurate verifications and calibrations. Do not use a mercury thermometer. **Never place a mercury thermometer in the BACTRON.**

CATALYST OVEN

The BACTRON is provide with two catalyst cartridges containing activated palladium, which are used to scrub oxygen from the workspace chamber atmosphere. Only one cartridge is used at a time. Each cartridge requires a bake out of at least 8 hours at 200°C to reactivate the palladium after 24-hour of use in the chamber. This necessitates at least one bake-out per day.

An oven for reactivating catalyst cartridges must be purchased separately.

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INSTALLATION CHECKLIST

Pre-Installation

✓ Procure an AMG gas supply for the BACTRON, suitable for your application. See page 18 for gas requirements.

Optional: Obtain a neutral, medical-grade gas such as nitrogen (N_2), to reduce AMG use during pass box auto cycles. Obtain a regulator and filtered tubing, see pages 18 and 83.

✓ Check that sufficient countertop space is available for the BACTRON. Stands to mount the BACTRON on are available for purchase, see pages 15 and 82

✓ Check that the ambient conditions and ventilation spacing requirements are met, page 15

✓ Check for sources of temperature and atmospheric disruption in the environment, page 15

✓ Verify that no damaging UV light sources are present, page 15

✓ Check that a suitable electrical outlet and power is present, page 16

Install the BACTRON in a suitable location

✓ Review lifting and handling instructions, page 17

✓ Make sure the BACTRON is Level, page 17

Set up the BACTRON for use

✓ Connect the gas supply source(s) to the BACTRON, page 19

✓ Connect a vacuum supply source to the BACTRON, page 20

✓ Connect the foot pedal arm port controls to the BACTRON, page 21

✓ Fill the manometer in the BACTRON workspace chamber with water, page 22

✓ Clean and disinfect the workstation and items that will be placed in the chamber, page 22

✓ Place BACTRON items in the chamber, page 22

✓ Place 5 unopened anaerobic monitoring packets in the workspace chamber, page 23

✓ Install shelf spacers in the workspace incubator (BACTRON300 and BACTRON900), page 23

✓ Prepare the incubators by leaving the incubator doors slightly ajar (0.5 inch / 1cm), page 23

✓ Install the arm port doors, page 24

REQUIRED AMBIENT CONDITIONS

This workstation is intended for use indoors, at room temperatures between **15°C and 30°C (59°F and 86°F)**, at no greater than **80% Relative Humidity** (at 25°C / 77°F). Allow a **minimum of 4 inches (10cm)** between the workstation and walls or partitions, and **2 inches (5cm) of** clearance above the top of the workstation for unobstructed airflow. The BACTRON will require continual connection to 1 or 2 compressed gas cylinders and a vacuum supply source. Both gas and vacuum sources connect to the left side of the unit.

Operating the BACTRON outside of these conditions may adversely affect its incubator temperature range and stability. For conditions outside of those listed above, please contact your distributor or Shel Lab Sales to explore other options suited to your laboratory or production environment.

WORKSPACE

Verify sufficient countertop space exists in the laboratory for the BACTRON, including the spacing described above for ventilation, as well as gas and vacuum supply connections. Please page 74 for unit dimensions. Caster-mounted stands for BACTRONs are available for purchase, see page 82.

ENVIRONMENTAL DISRUPTION SOURCES

When selecting a location to install your BACTRON, consider environmental factors that can affect the workstation temperature and atmospheric integrity:

- Ovens, autoclaves, and any device that produces significant radiant heat
- High-traffic areas
- Direct sunlight
- Heating and cooling ducts, or other sources of fast-moving air currents

Direct exposure to air conditioning vents or other sources of cold air can result in condensation or fogging on the acrylic glass panels of the workstation, depending on humidity and other ambient conditions. Prolonged exposure to cold air flows may adversely affect the temperature performance of the incubator.

UV LIGHTING

Check if your laboratory or workspace contains sources of UV lighting. Sustained exposure to direct sunlight, UVC, or UV germicidal lighting around 254nm, will cause a rapid aging of BACTRON acrylic glass panels and arm port sleeves. Periodic use of long-wave (365nm) UV hand lamps for bacterial identification should not damage the acrylic glass. See the **Maintaining the Acrylic Glass Panels** entry on page 68 for more details.

POWER SOURCE REQUIREMENTS

When selecting a location for the BACTRON, check that **each** of the following requirements are satisfied:

The wall power source for the BACTRON must match the voltage and ampere requirements listed on the unit data plate. These units are intended for 110 - 120V 50/60 Hz applications at the following amperages:

Model	Amperage
BACTRON300	9 Amps
BACTRON600	11 Amps
BACTRON900	14 Amps

- **Supplied voltage must not vary more than 10% from the data plate rating**. Damage to the unit may result if supplied voltage varies more than 10%.
- The wall power source must be protective earth grounded.
- Use a separate circuit to prevent loss of the unit due to overloading or circuit failure.
- **The recommended wall circuit breakers for these units are 15 amps.**
- The wall power source must conform to all national and local electrical codes.

The unit must be positioned so that all end-users can quickly unplug the BACTRON in the event of an emergency.

- The unit comes provided with a 125 volt, 15Amp, 9ft 5 in (2.86m) NEMA 5-15P power cord. Always use this cord or an identical replacement.
- These units come provided with a **T12.5 Amp, 250V 5x20mm fuse** located in the power cord inlet. The unit must be fused in order to operate.

These units come provided with **a T10 Amp, 250V 5x20mm fuse** located in the vacuum pump power outlet. The pump outlet must always be fused for safe operations.

HIGH ALTITUDE EFFECTS

Altitudes of around 6500 feet (2000m) or higher may affect the operation of the BACTRON vacuum system, depending on ambient conditions. If a vacuum pump plugged into the BACTRON runs continuously or near continuously at a high altitude location, contact **Sheldon Technical Support** (see page 7) for assistance.

LIFTING AND HANDLING

The BACTRON is heavy. Use appropriate powered lifting devices. Follow these guidelines when lifting and handling the BACTRON workstation:

- Lift the BACTRON only from its bottom surface.
- Doors, handles, and knobs are not adequate for lifting or stabilization.
- Restrain the BACTRON completely while lifting or transporting so it cannot tip.
- Remove all removeable components, such as shelf spacers and trays, and secure all doors in the closed position during transfer to prevent shifting and damage.

Note: To prevent damage when moving the BACTRON, turn each of the four leveling feet completely clockwise.

LEVELING

The BACTRON must be level and stable for safe operation. Each BACTRON ships with four leveling feet.

1. Insert one leveling foot into each of the four holes in the bottom corners of the workstation.
2. Adjust each foot at each corner until the workstation stands level and solid without rocking.
   a. To raise a foot, turn it in a counterclockwise direction; to lower a foot, turn it in a clockwise direction.

INSTALL THE BACTRON

Install the unit in a workspace location that meets the criteria discussed in the previous entries of the Installation section.

Do not connect the unit to its power source at this time.

GAS SUPPLY REQUIREMENTS

Warning: Never exceed a 5% hydrogen concentration inside the anaerobic workspace chamber.

Avertissement: La concentration d'hydrogène ne doit pas dépasser 5% dans la chambre anaérobie.

AMG (Anaerobic Mixed Gas) - Required

The BACTRON maintains an anaerobic environment in the workspace chamber in part through a catalytic oxygen-capturing scrubbing process. The BACTRON requires an anaerobic mixed gas with 5% hydrogen for this catalysis. Sheldon Manufacturing recommends a source of anaerobic mixed gas (AMG) with the following ratios:

- Hydrogen (H_2) 5%
- Carbon Dioxide (CO_2) 5%
- Nitrogen (N_2) 90%

Anaerobic Mixed Gas is often sold by gas suppliers under the category of **Anaerobic Incubation Mixtures** or **Biological Atmospheres**. Contact your site safety officer and review your institutional safety protocols for handling, storing, and using compressed gases. Follow all local ordinances and national regulations regarding compressed gases in research, clinical, or production environments.

Dual and Single Gas Configuration Options

AMG is also used to cycle the pass box and arm ports. To reduce anaerobic mixed gas consumption during pass box auto cycle purges, the BACTRON can be connected to a second compressed gas cylinder containing a cheaper inert gas such as nitrogen (N_2), for use in the first two stages of the three-stage auto cycle.

- For dual gas configurations, Sheldon Manufacturing recommends one cylinder of AMG gas at the above ratios along with a cylinder of 100% Nitrogen (N_2).
- The BACTRON will not draw from the second cylinder during manual pass box cycles or when cycling the arm ports.

Requirements - All Configurations

- **All gases must be medical grade**. Non-medical grade gas supplies may contain impurities that can contaminate samples and damage BACTRON components. **Use of non-medical grade gases voids the manufacturing defect warranty.**
- Gas regulators for BACTRON applications must be set at **15 - 20 psi**. Please see **the Pressure Unit Conversion table** on page 56 in the Operation Section for working with units other than Pounds per Square Inch.
- Always use a **dual-stage regulator** for each supply cylinder to ensure precise flow rates.
- Use the filtered gas supply tubing kit provided with the AMG regulator.

Figure 7: Gas Tubing Kit

CONNECT THE GAS SUPPLY

Warning: Never exceed a 5% hydrogen concentration in the unit chamber.

Avertissement: La concentration d'hydrogène ne doit pas dépasser 5% dans la chambre anaérobie.

Single Gas Configuration

Figure 8: T-Fitting

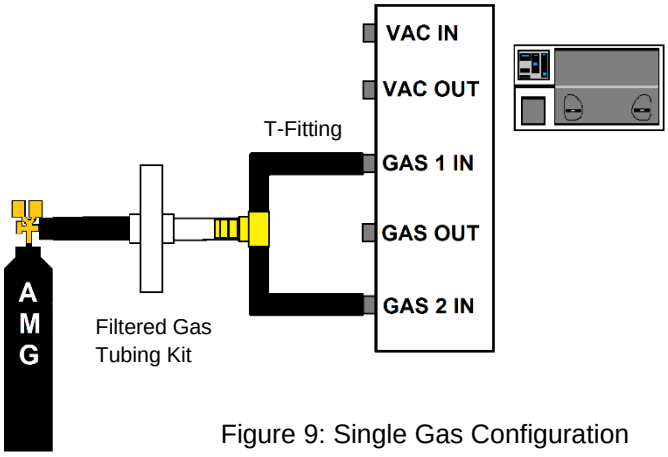


Figure 9: Single Gas Configuration

Carry out the following steps to connect a single cylinder of anaerobic mixed gas.

1. Locate the T-shaped brass fitting included with the BACTRON AMG gas regulator (normally shipped in the regulator box)
2. Connect the fitting to the **GAS 1** and **GAS 2 IN** ports on the BACTRON gas panel
3. Attach the AMG regulator provided with the BACTRON to the cylinder, set to 15 – 20 psi
4. Attach the clear tubing on the filtered gas tubing kit to the barb adapter of the T-fitting. Attach the black tubing of the kit to the AMG regulator.

Note: Failure to connect the T-fitting to **both** the GAS 1 and 2 ports will interfere with pass box auto cycles.

Dual Gas Configuration

Carry out the following steps to set up the dual gas configuration.

1. Attach the AMG regulator provided with the BACTRON to the AMG supply cylinder. Set to 15 – 20 psi
2. Connect an appropriate regulator to the neutral gas cylinder, set to 15 – 20 psi
3. Connect the AMG regulator tubing to the BACTRON **GAS 1 IN** port
4. Connect the inert gas cylinder supply tubing to the BACTRON **GAS 2 IN** port

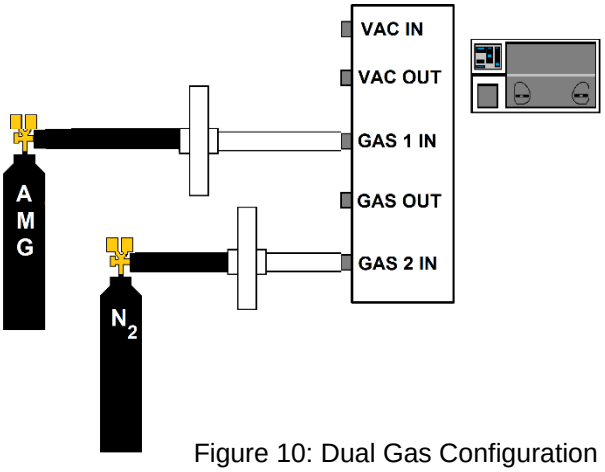


Figure 10: Dual Gas Configuration

Do not start a flow of gas to the BACTRON at this time, for either configuration.

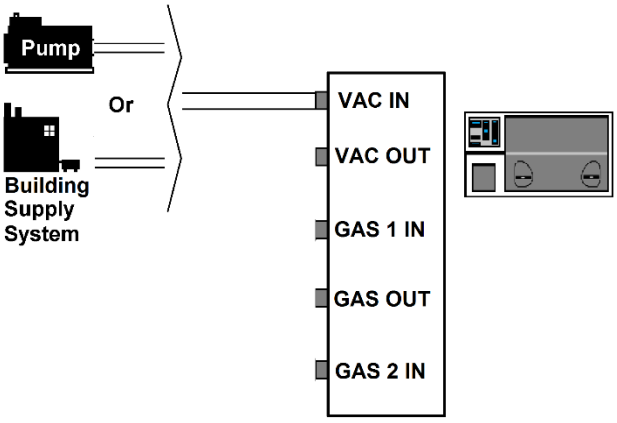


Figure 11: Connection to a Vacuum Supply Source

CONNECT TO A VACUUM SUPPLY SOURCE

The BACTRON requires a supply of vacuum to perform pass box and arm port cycles. The BACTRON may be connected to either a building vacuum supply system, **or** the vacuum pump provided with the unit.

Connect to a Building Vacuum Supply System

An in-house system must be capable of evacuating a minimum of 25 inches (63.5 cm) of mercury. Carry out this procedure to connect the BACTRON to a building vacuum supply system.

1. Connect a 3/8 inch hose from the in-house system to the **VAC IN port** on the left side of the BACTRON.
2. Do not supply vacuum to the BACTRON at this time.

- OR -

Figure 12: Vacuum Pump (9740502)

Connect the Vacuum Pump

Cary out this procedure to connect the vacuum pump included with the BACTRON.

1. Place the vacuum pump in a well-ventilated location adjacent to the BACTRON.
   a. The pump must be ventilated to prevent overheating. An overheated vacuum pump can become a fire hazard.
2. Connect the 3/8 inch hose from the vacuum pump barb adaptor to the BACTRON **VAC IN** port.
3. Plug the vacuum pump power cord into the circular power outlet labeled **VAC** on the power supply panel, located on the back of the BACTRON.
4. Make sure there are no kinks in the vacuum line running from the pump to the BACTRON.

Figure 13: Vacuum Pump Power Outlet

Do not plug the vacuum pump power plug into a wall outlet! This will run the pump non-stop, rather than only when needed by the BACTRON. Continual operations risks overheating the pump and greatly reduces its lifespan.

CONNECT THE FOOT PEDAL CONTROLS

The foot pedal controls allow the user to apply vacuum and AMG to the arm ports in order to cycle the ports and attached sleeves. Cycling is done prior to entering the chamber workspace.

Connect the foot pedal supply line to the arm port door assemblies

1. Place the foot pedal assembly on the floor below the arm port doors.
2. Connect the branched supply line to the foot pedal assembly.
   a. Attach the single end to barb adaptor on the assembly.
   b. Connect the branching lines to the two brass barb adapter fittings on the inner sides of the arm port door assemblies.

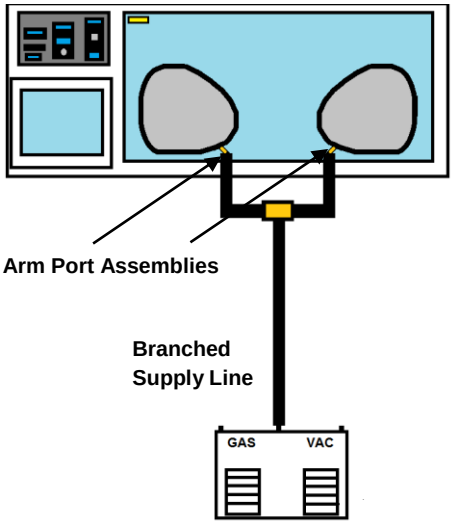


Figure 15: Foot Pedal to Arm Port Assemblies

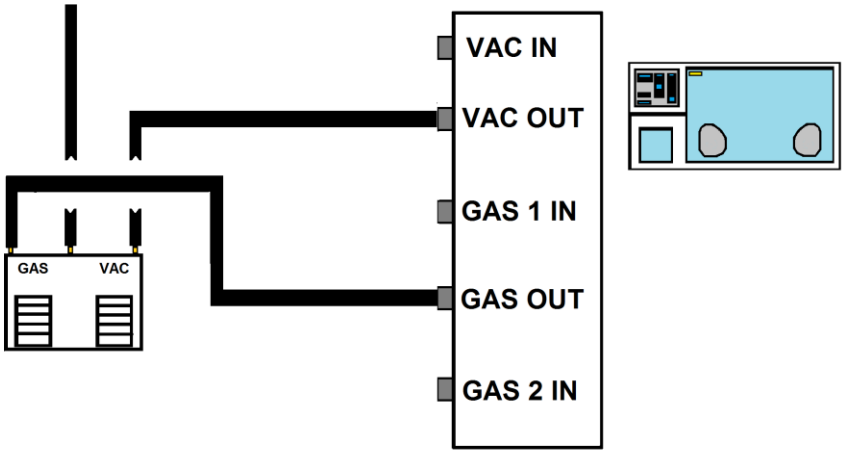
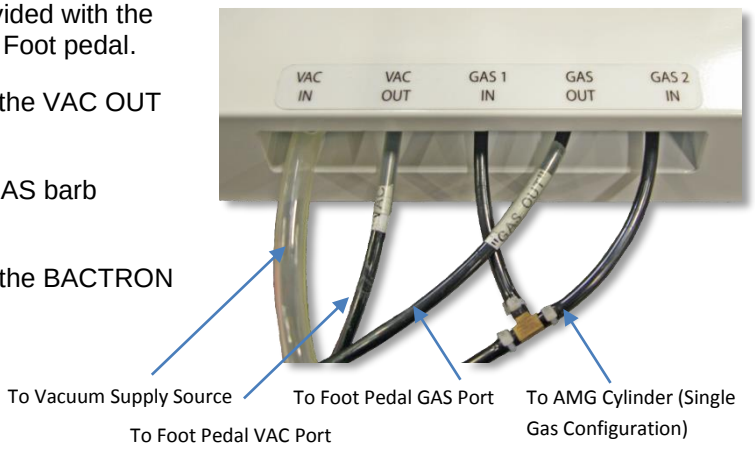


Figure 14: Foot Pedal to Gas Out Ports

Connect the foot pedal supply lines to the BACTRON VAC and GAS OUT ports.

1. Connect one of the black tubing lines provided with the assembly to the VAC barb adaptor on the Foot pedal.
   a. Connect the other end of that line to the VAC OUT port.
2. Connect the other gas tubing line to the GAS barb adaptor on the foot pedal assembly.
   a. Connect the other end of that line to the BACTRON GAS OUT port.

Figure 16: All Lines Connected



2 Cups (500ml)

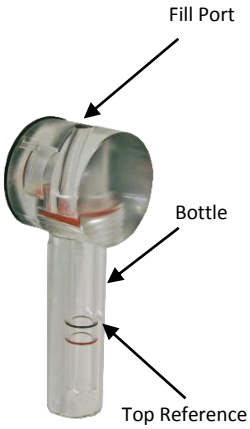


Figure 17: Manometer

FILL THE MANOMETER

The BACTRON manometer serves two functions. It acts as a dynamic pressure valve to compensate for the displacement of atmosphere in the sealed and pressurized workspace chamber. Displacement takes place primarily when a user enters or withdraws their arms through the arm ports. The manometer also serves as a visual gauge of atmospheric pressure in the chamber.

To fulfill both these functions, the manometer must be filled with water. To avoid scaling (mineralization build up), use distilled water. Never use deionized water. The manometer is located on the left wall of the workspace chamber.

1. Water may be poured in through port on the top of the manometer, or you may unscrew the manometer bottle and remove it to fill.
    a. Exercise caution when unscrewing and screwing back in. The bottle can break.
2. Fill the manometer to the top reference ring when setting up the BACTRON.
3. Refill to the bottom ring whenever the chamber is operating and pressurized.

INSTALLATION CLEANING AND DISINFECTION

The workspace chamber was cleaned and disinfected at the factory. However, the BACTRON may have been exposed to contaminants during shipping. Additionally, the factory procedure may not meet the standards of your institutional protocols. Cleaning and disinfecting the workstation during installation reduces the chance of microbiological contamination.

Please see the **Cleaning and Disinfecting** entry on page 66 in the User Maintenance section for information on how to clean and disinfect without damaging the workstation and its components. **Do not used deionized water to clean or rinse the BACTRON!** Remove all protective wrappings from accessories and the workstation prior to cleaning and disinfecting.

- Clean and disinfect the workspace chamber and incubator(s).
- Clean, disinfect, and place the following items in the workspace chamber:

    - The arm port doors
    - The incubator bottom shelf spacers (BACTRON300 and BACTRON900)
    - Arm port door stands (BACTRON600 only)
    - The petri dish racks. These can be placed on the top shelf of the workspace chamber incubator or the BACTRON600 workspace shelves during the setup.
    - A glass flask or beaker. When clean, place the container under the plastic condensation tube on the left side of the chamber.
    - Any equipment and aerobic-tolerant items that you plan on introducing into the workspace chamber. Doing so now saves time and AMG usage by eliminating future pass box cycles.

Do not unwrap, clean, or place a catalyst cartridge in the unit at this time!

PLACE ANAEROBIC MONITORING STRIPS

Place at least 5 anaerobic monitoring strip packets in the chamber. **Do not open the packets at this time!** Packets should only be opened in an anaerobic atmosphere. At least one of these strips will be used when establishing the chamber anaerobic atmosphere, and up to five may be required.

Figure 18: Monitoring Strip Packets

INSTALL SHELF SPACERS

BACTRON300 and BACTRON900

Install the three (3) metal spacers included with the BACTRON300 and 900 in the workspace chamber incubator. These spacers ensure even heat distribution and uniformity.

Set the spacers on the **bottom shelf** of the workspace chamber incubator, side by side, with the “SPACER” label facing out.

An empty plate or dish placed at the bottom of each sample stack can provide additional shielding for heat sensitive anaerobes, or if the incubator is being run at high temperatures.

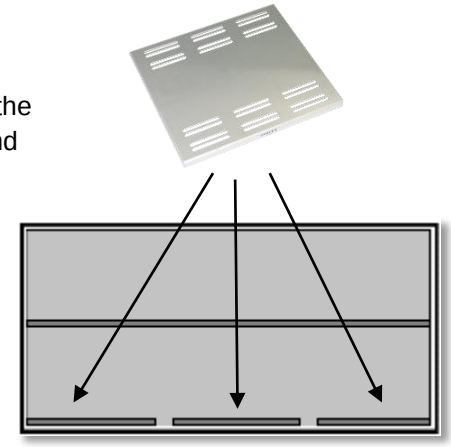


Figure 19: Shelf Spacers in the Workspace Incubator

Figure 20: BACTRON600 and 900 Side Storage Incubator Door Slightly Open

PREPARE THE INCUBATORS

Open all incubator doors to create a 0.5 inch (1cm) gap.

The incubator doors must be placed slightly ajar prior to purging the workspace chamber and establishing an anaerobic atmosphere in the BACTRON. Failure to do so will leave reservoirs of oxygenated laboratory atmosphere in the incubators.

At the same, the incubator doors should only be slightly open to allow the incubators to come up to temperature. Running the BACTRON for an extended period with the incubator doors open widely interferes with the analytic feedback loops that optimize heating in the incubators. This can result in temperature overshoots during the first 24-hours of operation after the incubator doors are closed.

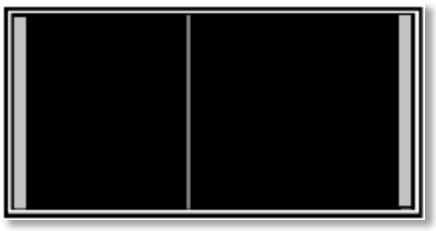
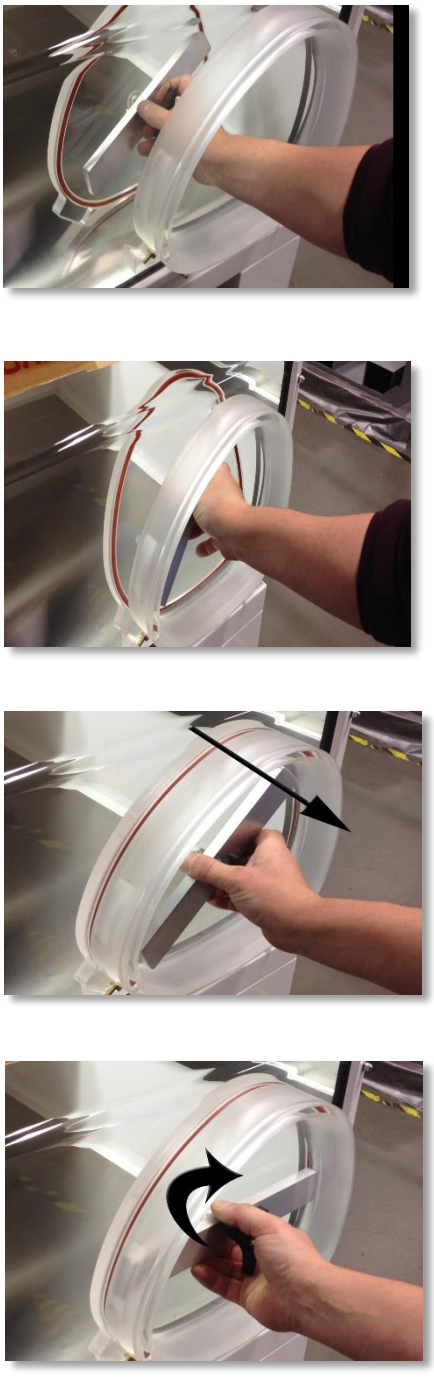


Figure 21: BACTRON300 and 900 Workspace Incubator Doors Slightly Open



INSTALL THE ARM PORT DOORS

Install the arm port doors in the arm ports to seal the chamber. The arm port doors should already be inside the workspace chamber.

1. Turn each silver locking bar to a roughly 45° position.
2. Install each door bottom first, inserting the tabs into the slots on the arm ports.
3. Tilt the door cover up so that it sits securely in the arm port.
4. Turn the locking bar to the horizontal position:
5. Secure the door by turning the black arm port doorknob clockwise
   a. Use wrist strength only, until the knob grabs and feels snug.
   b. Tightening too much may compromise the integrity of the door.

Figure 22: Installing / Closing the Arm Port Doors

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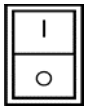
GRAPHIC SYMBOLS

The BACTRON is provided with multiple graphic symbols located on its exterior and interior surfaces. The symbols identify hazards and the functions of the adjustable components, as well as important notes found in the user manual.

Symbol	Definition
	Indicates that you should consult your user manual for further instructions. Indique que l'opérateur doit consulter le manuel d'utilisation pour y trouver les instructions complémentaires.
	Indicates Temperature Repère température
	Indicates the Over Temperature Limit system Indique le système de dépassement de temperature
	Indicates AC Power Repère le courant alternatif
	Indicates I/ON and O/OFF I repère de la position MARCHE de l'interrupteur d'alimentation O repère de la position ARRÊT de l'interrupteur d'alimentation
	Indicates protective earth ground Repère terre électrique
	Indicates UP and DOWN respectively Touches de déplacements respectifs vers le HAUT et le BA
	Indicates UP and DOWN respectively Touches de déplacements respectifs vers le HAUT et le BA
	Indicates Manually Adjustable Indique un bouton réglable manuellement

GRAPHIC SYMBOLS (CONTINUED)

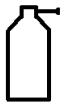
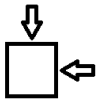
Symbol	Definition
	Indicates Potential Shock Hazard Signale danger électrique
	Indicates the unit should be recycled (Not disposed of in land-fill) Indique l'appareil doit être recyclé (Ne pas jeter dans une décharge)
	Indicates an anaerobic environment in the pass box Indique un environnement anaérobie dans le sas
	Indicates an aerobic environment in the pass box Indique un environnement aérobie dans le sas
	Indicates a injection of gas Indique un flux de gazeux
	Indicates the vacuum pump is evacuating the pass box Indique la pompe à vide se vide dans le sas
	Indicates the incubator heater is active L'élément chauffant est la production de chaleur
	Indicates the pass box doors are closed Indique les portes du sas sont fermés

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Figure 23: Main Control Panel

The main panel on all BACTRON models controls power to the workstation and the operation of pass box cycles. It also indicates injections of AMG into the workspace chamber.

Main Panel Incubator Controls

BACTRON300

The Incubator controls on the main panel control the operations of the **workspace incubator**.

BACTRON600

The Incubator controls on the main panel control the operations of the **side storage incubator**.

BACTRON900

The Incubator controls on the main panel control the operations of the **side storage incubator**. Controls for the **workspace chamber incubator** are located on the **workspace control panel** (see page 32).

Main Control Panel Continued

Power Switch

The power switch controls all power to each workstation and its systems. Power is supplied when the switch is in the (I) on position and illuminated.

Chamber Gas Light

This light illuminates when anaerobic mixed gas is being injected into the workspace chamber.

Incubator Display and Control

Labeled Set Temperature, this display shows the current air temperature in the incubation chamber accurate to within 0.1°C. The arrow buttons can be used to adjust the temperature set point, or place the display in its temperature calibration mode and then enter a display value correction.

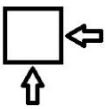
The indicator light labeled Heating Activated illuminates whenever the temperature control system is heating the incubation chamber.

Set Over Temperature

This graduated dial sets the heating cut off point for the OTL temperature limit system. The OTL system prevents unchecked heating of the chamber in the event of a failure of the main digital controller. For more details, please see the **Over Temperature Limit System** description in the Theory of Operations (page 35).

The red Over Temp Activated light illuminates when the Over Temperature Limit system cuts off heating by rerouting power away from the heating elements.

Pass Box Doors Light



The clear Doors pilot light indicates that both pass box doors are closed. This light must be on in order to cycle the pass box.

Anaerobic Light

This is light activates after the completion of a full auto cycle of the pass box Interior.

Aerobic Light

This light activates when the outer pass box door has been opened, exposing the pass box to aerobic atmosphere. It remains on until the next completion of a full auto cycle.

Pass Box Pressure Display

This display shows the level of atmospheric pressure in the pass box, in inches of mercury (inHg). At room pressure, the gauge should read at or close to 0. During cycles, the pressure in the box should drop to -18inHg three times. At the end of an auto cycle the gauge should show a slight overpressure in the box (approximately 0.5inHg).

Main Control Panel Continued

Automatic Start / Reset Switch

The Automatic Start / Reset switch initiates or aborts the pass box auto cycle used to purge aerobic atmosphere from the pass box. Pressing then releasing on the start side (left) initiates the auto cycle. Pressing and holding on the Reset side (right) for three seconds aborts the cycle, then restores the evacuated pass box to the workspace chamber pressure so that the pass box doors can be easily opened.

Pass Box Gas Light

This light illuminates when anaerobic mixed gas is being injected into the pass box during the auto cycle. The pass box Gas light **does not illuminate** during manual gas injections.

VAC Light

The clear VAC pilot light indicates the when the pass box is atmosphere is being evacuated during auto cycles. The Vac Light **does not turn on** when manually cycling the pass box.

Manual Switch

The Manual Gas / OFF / VAC switch allows the user to manually cycle the pass box. Pressing the switch to VAC (the right) vacuums down the pass box, lowering atmospheric pressure inside the box. **Do not vacuum the pass box down to lower than -20inHg of pressure.** Doing so risks boiling sample media and may damage samples or equipment in the pass box.

Depressing the switch to GAS (the left) injects AMG drawn from the GAS 1 IN port into the pass box. AMG injections increase atmospheric pressure in the pass box. Three iterations of evacuating the pass box to -18inHg followed by injections of anaerobic mixed gas back to 0inHg cycles the pass box. A slight overpressure of 0.5inHg after the final iteration can help make the pass box doors easier to open. **Do not exceed 05.inHg of positive pressure.**

Figure 24: BACTORN900 Workspace Incubator Control Panel

The workspace incubator control panel on the BACTRON900 controls the operations of the workspace chamber incubator and Over Temperature Limit system.

Workspace Incubator Display and Control

Labeled Set Temperature, the display shows the current air temperature in the workspace incubator accurate to within 0.1°C. The arrow buttons can be used to adjust the temperature set point, or place the display in its temperature calibration mode and then enter a display value correction.

The indicator light labeled Heating Activated illuminates whenever the temperature control system is heating the incubation chamber.

Set Over Temperature

This graduated dial sets the heating cut off point for the OTL temperature limit system. The OTL system prevents unchecked heating of the chamber in the event of a failure of the main digital controller. For more details, please see the **Over Temperature Limit System** description in the Theory of Operations (page 35).

The red Over Temp Activated light illuminates when the Over Temperature Limit system cuts off heating by rerouting power away from the heating elements.

THEORY OF OPERATION AND MAJOR COMPONENT FUNCTIONS

Achieving Anaerobic Conditions

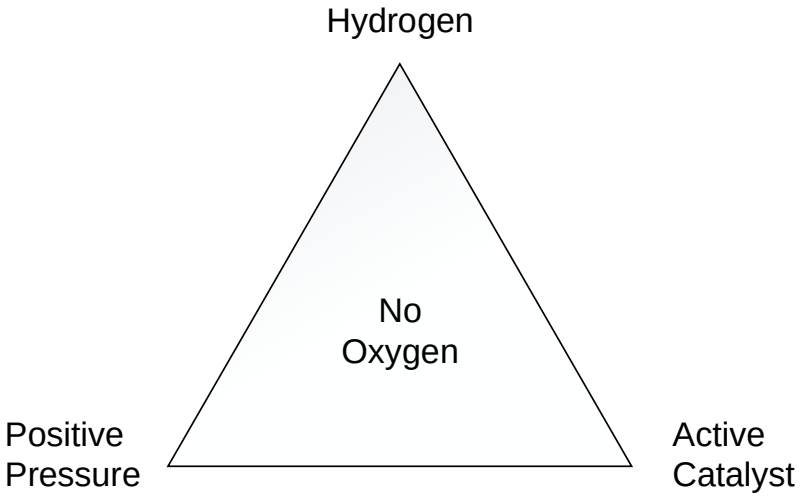


Figure 6: Atmosphere Control Measures

The BACTRON workstation is designed to establish and maintain an anaerobic atmosphere suitable for clinical cultivation of anaerobic bacteria. This atmosphere is initially achieved through a purge of the workspace chamber using a flow of anaerobic mixed gas (AMG). This pushes normal atmosphere out through the right arm port, with the door slightly ajar. Subsequent maintenance of the chamber atmosphere is achieved with injections of AMG, and a resultant catalytic reaction between the AMG hydrogen, any free oxygen, and the activated palladium of the chamber catalyst scrubber. This reaction captures the oxygen in the formation of water vapor (H_2O).

Each palladium catalyst must be kept clean and active by baking the catalyst cartridge at 200°C for 8 hours after every 24 hours of usage.

Additionally, the BACTRON is programmed to maintain a mild overpressure in the chamber to prevent the infiltration of external atmosphere, including the diffusion of molecular oxygen through seals.

The presence of oxygen in the workstation is detected through the use of color-changing Oxoid brand indicator strips. Microbiological controls such as *Clostridium novyi* or *Pseudomonas aeruginosa,* may also be used to indicate anaerobic or aerobic conditions. Use of an optional, activated carbon scrubber in the chamber helps absorb volatile fatty acids and hydrogen sulfides generated by cultivation processes or other applications.

Condensation Management

Sample media evaporation from Petri dishes and water vapor from the catalytic reaction is trapped on the cold plate of a Peltier-effect condensate chiller located behind catalyst cartridge. Condensed moisture is then channeled into a drain tube that empties into a receptacle placed in the workspace chamber by the end-user. The receptacle must be drained regularly. The Peltier condensate chiller eliminates the need to use chemical desiccants, which can retain condensate and dry out culture media.

Accessing the Workspace Chamber

Items such as media containers and laboratory equipment can be introduced to or removed from the sealed workspace chamber through the pass box. The pass box functions as an airlock, creating a near anaerobic environment through three partial atmosphere evacuations to reduce air volume, followed by gas replenishment injections. The evacuations take the pass box pressure down to -18 inches of mercury pressure, which will not boil sample media. Remaining oxygen is captured by the O_2 scrubber catalyst, located in close proximity to the pass box and chamber circulation fan.

Normally the pass box is cycled by users initiating an auto cycle. The BACTRON comes with a control to manually cycle the airlock in the event of an auto cycle malfunction.

Users can access and work glove-free in the anaerobic workspace chamber by donning the sleeve assemblies attached to the front panel arm ports. The sleeve assemblies are compatible with exam gloves for handling pathogenic samples. After being donned – but prior to opening the arm port doors – the sleeve assemblies and ports are cycled by using the foot pedal controls to apply reduced pressure to the sleeves with the vacuum pump, then to charge the sleeves with AMG. Three evacuation and gas backfill iterations are required.

Cycling and effective use of the sleeve assemblies requires bare skin contact between the widest part of the user's forearms and the cuff ring of the sleeve assembly. Smooth, small items held in hand may be introduced into the workspace chamber through the sleeve assemblies.

Incubators

BACTRON300 and BACTRON900 are each provided with a cabinet style incubator in the workspace chamber. The BACTRON600 and BACTRON900 come with two rotating shelves (Lazy Susans) in a side storage incubator.

Each incubator is controlled by a microprocessor board with a solid state temperature sensor probe attached to the incubator body, along with two heating elements. The processor employs proportional-integral-derivative analytical feedback-loop functions when measuring and controlling the chamber air temperature. PID-controlled heating pulse intensities and lengths are proportional to the difference between the measured chamber temperature and the current set point. The frequency of pulses are derived from the rate of change in that difference. The integral function slows the rate of pulses when the temperature nears the set point to avoid overshooting.

The temperature set point is set by the end-user.

Each incubator relies on natural heat radiation for cooling. An incubator can achieve a low-end temperature of the ambient room temperature +5°C.

The PID functions are also used to optimize incubator warming rates for hotter or cooler environments. If the BACTRON is moved to a new location with a significant temperature difference, it may require 24 hours of incubator run time for the processor to fully adapt to the new thermal environment. This is why the incubator should run at its application set point for 24 hours prior to loading samples or verifying the temperature display accuracy. Additionally, the heat loss from leaving the incubator doors open for long periods of time (an hour or more) can trick the controller into thinking it is operating in a cool environment. This can result in a period of temperature overshoots.

The Over Temperature Limit System

The OTL is a mechanical heating cutoff included with each incubator, and which operates independently of the incubator microprocessor. It is intended to be set by the user to approximately 1°C above the current operating temperature set point. The OTL prevents runaway heating in the event that the main controller fails while in its heating mode.

If the incubators temperature exceeds the OTL cutoff setting, a red indicator illuminates and an alarm buzz sounds. At the same time OTL depowers the incubator heating elements. It will continue to do so as long as the incubator air temperature remains higher than the OTL cutoff setting.

Manometer Pressure Gauge and Check Valve

The water-filled manometer in the workspace chamber serves as a visual pressure gauge and dynamic venting check valve during instances of excess overpressures. The manometer is filled to the top reference ring when the chamber is at room pressure. When an anaerobic atmosphere has been established and the chamber is under overpressure, the water will be forced down by 0.5 inches to the bottom reference ring.

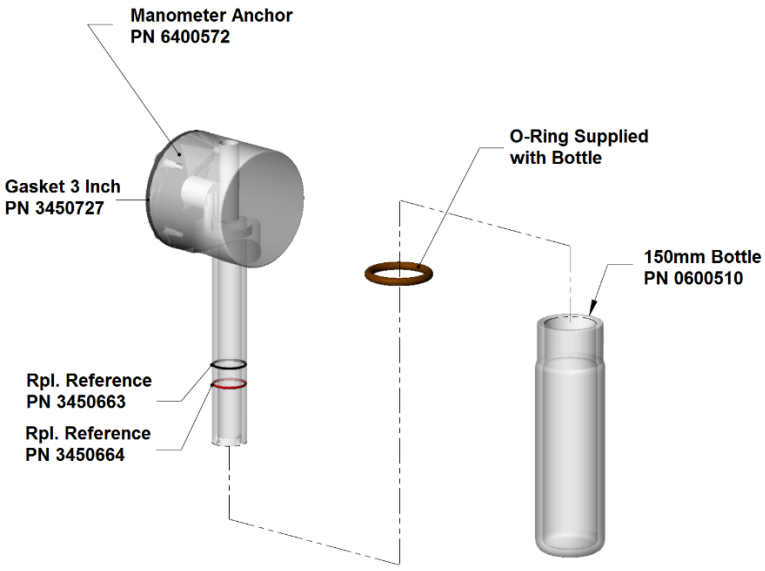


Figure 25: Chamber Manometer8

An increase in atmospheric pressure inside the workstation drives down water farther within the Manometer. Excessive pressure will cause the water to bubble as chamber atmosphere is vented through the manometer and out of the workstation. This helps prevents damage to workstation gaskets and the acrylic glass panels. The manometer exhaust vent is a port consisting of a transparent tube and black O-ring located on the back, right side of the BACTRON.

PLACE THE BACTRON IN OPERATION

The BACTRON requires an activated catalyst for operation. Catalyst cartridges come from the factory ready for use. However, if the cartridge has been stored for 6 months or longer, a bake out of at least 8 hours at 200°C will be needed to reactivate the catalyst. The BACTRON requires a continual supply of AMG to set up and operate. The BACTRON300 needs approximately 200 psi of AMG for its purge of the workspace chamber atmosphere. The BACTRON600 and BACTRON900 require around 400 psi of AMG for the setup purge of the chamber and side storage incubator.

The BACTRON should run for 24 hours prior to loading samples. This ensures the stability of both the anaerobic atmosphere and incubator air temperature.

Carry out the following steps and procedures to place the BACTRON in operation:

1. Plug the power cord receptacle into to power inlet on the BACTRON power supply panel. The panel is located on the back of the BACTRON.

2. Insert the power cord plug into the room power source outlet.
3. Power the BACTRON by placing the main control panel power switch in the On (I) position.
    a. The power switch and all digital displays should illuminate and remain on.
    b. The control panel indicator lights will briefly illuminate.
    c. A vacuum pump plugged into the BACTRON will turn on and run briefly to establish a supply of vacuum in the BACTRON internal supply line. If the vacuum pump runs near continually at higher altitudes (above 6500 feet / 2000 meters) the BACTRON requires adjustment. Please contact Sheldon Technical Support.

Note: If you are using a building vacuum system, supply at least -25inHg (-63.5cmHg) of vacuum to the BACTRON VAC IN port now.

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4. Carry out the following procedures in the Operations section to ready the BACTRON for use.

Establish an Anaerobic Atmosphere page 37

Install the Sleeve Assemblies page 41

Chamber Entry page 41

Verify the Anaerobic Atmosphere page 42

Exiting the Chamber page 46

Set the Incubator Temperature page 47

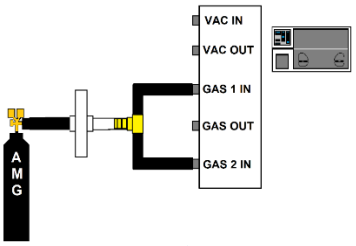
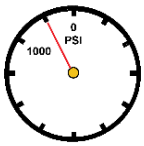
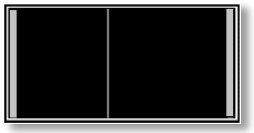
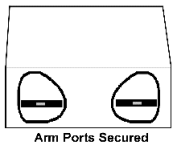
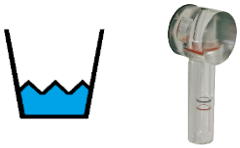
Set the Over Temperature Limit page 50

Optional: Verify Incubator Temperature Display Accuracy page 48

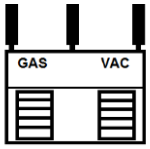
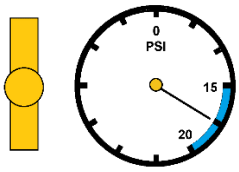
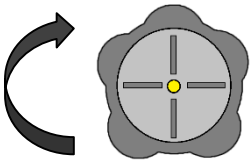
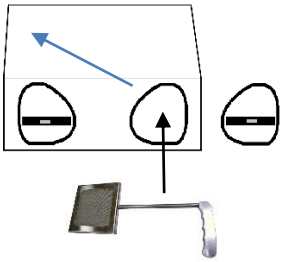
Load Samples page 36

ESTABLISH AN ANAEROBIC ATMOSPHERE

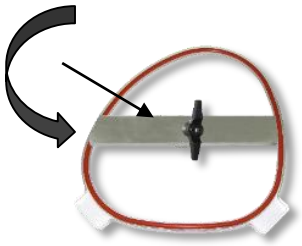
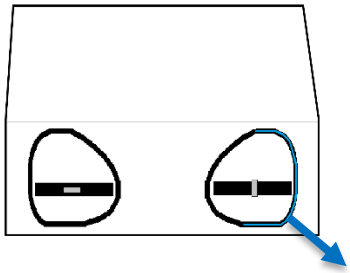
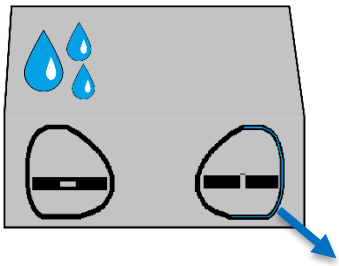
Carry out the following steps to purge aerobic atmosphere from the workspace chamber and incubators, and establish an anaerobic atmosphere. If the BACTRON has previously been in use, remove the right arm port sleeve prior to starting the procedure. This procedure requires approximately 1 to 4 hours to complete.

Establish an Anaerobic Atmosphere	
1. Verify that the BACTRON is connected to an AMG gas source. a. A dual gas configuration is acceptable. An AMG source with a 5% hydrogen concentration must be attached to the GAS 1 IN port	 ✓
2. Note the reading on the AMG gas regulator. a. The BACTRON300 requires approximately 200 psi of AMG for the initial setup purge. b. The BACTRON600 and BACTRON900 need around 400 psi of AMG for the initial setup purge. **Note**: Sufficient AMG should be on hand to continue operating the BACTRON after setting up the anaerobic atmosphere.	 **SupplyReading AMG** ✓
++++++++ 3. Verify all incubator doors are slightly open (0.5 inches / 1cm) to avoid leaving reservoirs of aerobic atmosphere.	 ✓
4. Verify the arm port doors are closed and sealed.	 ✓
5. Check that the manometer has been filled to the fill line (upper ring) with purified water.	 ✓

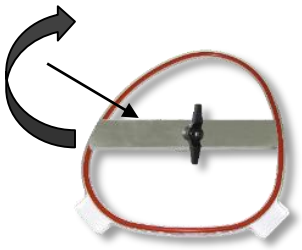
Continued on next page

Establish an Anaerobic Atmosphere (Continued)	
6. Verify the interior and exterior pass box doors are closed and securely latched.	 ✓
7. Check that the arm port foot pedal control assembly is connected to both arm ports and the VAC and GAS out ports on the BACTRON.	 ✓
8. Make sure the AMG supply cylinder regulator is set to provide 15 to 20 psi of gas flow.	 **AMG** ✓
9. Open the AMG supply valve all the way to start a flow of gas to the BACTRON. a. **Nitrogen and other inert gases will not successfully purge workstation**.	
10. Open and remove the right arm port door. 11. Unwrap and install a fresh or reactivated catalyst cartridge on the left wall inside the workspace chamber. a. The catalyst cartridge will grow warm in the presence of oxygen and AMG. **Note:** You may open the left arm port door to install the catalyst. Close and seal the arm port door immediately after finishing, as per the **Installing the Arm Port Doors** procedure on page 24. Leaving the left arm port unsecured and unsealed may cause AMG to "stream" through the chamber and exit straight out to the left door. During the purge, AMG should build up on the left side of the chamber, gradually pushing aerobic atmosphere out the right arm port door.	 

Procedure continued on next page

Establish an Anaerobic Atmosphere (Continued)	
12. Reinstall the right arm port door and secure it, as per the **Installing the Arm Port Doors** procedure on page 24. a. Once secured, loosen the knob on the right arm port door by about half a turn. This should create a small leak that aerobic atmosphere can be pushed out through.	
13. AMG should pulse rather than flow continually into the chamber. The Chamber Gas light should activate for 1 to 2 seconds before deactivating for 1 to 2 seconds. This will be accompanied by a clicking sound that is the chamber gas solenoid opening and closing. a. If the interval between pulses are longer than 1 to 2 seconds, or if there is no pulsing, slowly loosen the arm port knob until the interval decreases. b. If gas continually pulses into the chamber, tighten the right arm port door knob until an injection interval of 1 to 2 seconds is established. Continual streaming means that gas is likely exiting the chamber directly through a door, rather than accumulating and creating the turbulence necessary to purge the chamber atmosphere.	 **Aerobic Atmosphere Exiting Chamber**
14. **Fogging and humidity**. Depending on ambient conditions (temperature of the room and humidity) there may be mild or heavy condensation on the inside of the chamber during the gas purge. a. This is due to the formation of water vapor during the catalytic reaction. b. The condensate should dissipate by the end of the purge as oxygen decreases and the condensate controller removes water vapor from the chamber atmosphere.	
15. Do not enter the workspace chamber or use the pass box while the BACTRON is purging the chamber atmosphere.	

Continued on next page

Establish an Anaerobic Atmosphere (Continued)	
16. **Optional**. Set the incubator(s) temperature set point. a. While waiting for the oxygen purge to complete, you may set the temperature set point of the incubators to your application temperature. b. Each incubator comes from the factory set to run at 37°C. c. Please see the **Setting the Incubator Temperature** procedure on page 47.	**Optional** **Setting the Incubator Temperature,** page 47 
17. End state **BACTRON300**. When the purge has gone through 200 psi of AMG **or** gone on for 2 hours (whichever happens first), tighten and secure the right arm port door. Then carry out the **Installing the Sleeve Assemblies**, **Chamber Entry**, and **Verifying Anaerobic Atmosphere** procedures on the following pages. **BACTRON600** and **BACTRON900**. When the purge has used 400 psi of AMG **or** gone on for 4 hours (whichever happens first), tighten and secure the right arm port door. Then carry out the **Installing the Sleeve Assemblies**, **Chamber Entry**, and **Verifying Anaerobic Atmosphere** procedures on the following pages.	**BACTRON300** 200 psi AMG Or 2 Hours **BACTRON600 and 900** 400 psi AMG Or 4 Hours
18. Seal the right arm port door when the end state has been achieved. a. Turn the knob on the arm port door to the right (clockwise) until snug, using finger strength.	

End of procedure

ATTACH THE SLEEVE ASSEMBLIES

Prior to verifying the achievement of an anaerobic atmosphere, attach and secure both sleeve assemblies to the arm ports. This allows access to the chamber through the ports without introducing oxygen from the outside atmosphere.

Figure 26: Sleeve Assembly Installation

Start with either arm port.

1. Unroll the large opening of a sleeve over the lip of the arm port door.
    a. Place the ring on the large end of the sleeve inside the groove on the arm port.
    b. Make sure none of the sleeve material is trapped or pinched between the ring and the seating groove.
2. Secure the sleeve to the arm port using the 48 inch (121cm) self-griping strap included with the sleeve.
    a. Exercise caution when placing the strap next to the arm port gas lines.
3. Repeat the process for the 2nd sleeve and arm port.

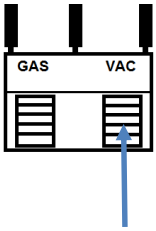
Sleeves may be left attached to the BACTRON when not in use.

CHAMBER ENTRY

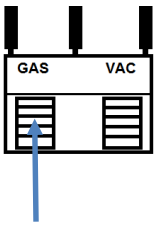
Perform these steps to enter and work in the workspace chamber without drawing in aerobic atmosphere. See the **Exiting the Chamber procedure** (page 46) for how to withdraw without compromising the anaerobic atmosphere. **You must don the BACTRON sleeve assemblies prior to entering the chamber.**

1. Remove watches, bracelets, large rings, and any sharp objects that might damage the sleeves or cuffs.
2. Place your hands in the sleeve assemblies so the cuff rings sit snug against bare skin on the widest part of your forearms.
    a. The BACTRON comes with mid-sized, size 8 cuffs. Please see the Parts List on page 78 for other cuff sizes.

Cycling the Sleeves



3. Evacuate air from the sleeve assemblies by depressing the VAC foot pedal (right).
    a. Hold your hands approximately 4 – 6 inches (10 cm – 15 cm) away from the arm port doors, and slightly to either side. This helps prevent the collapsing sleeves from pulling your hands into the arm port doors.
    b. Both sleeves will deflate simultaneously.
    c. Continue deflating until the definition of your fingernails is visible through the sleeves.



4. Flush the sleeves with AMG mixture by depressing the Gas foot pedal (left).
    a. Stop as soon as you can no longer see the definition of your fingernails through the sleeve, and the sleeve material does not cling to your forearms.
    b. Do not overfill the sleeves. “Ballooning” the sleeves wastes gas, and risks compromising the seals around the cuff rings and arm ports.
5. Repeat steps 3 and 4 for three complete iterations of evacuation and AMG replacement.

Entry

1. Loosen both arm port doorknobs by 2 or 3 turns.
2. Rotate the locking bars to roughly 45° diagonals: 
3. Slowly push one door into the chamber, then the second.
    a. Avoid pushing both doors in the same time. Pushing both doors in simultaneously creates a significant displacement of pressurized chamber atmosphere.
4. Stow the arm ports doors, one at a time.
    a. **BACTRON300** and **BACTRON900** – place the arm port doors one at a time in the hanging door shelves on the bottom of the workspace chamber incubator.
    b. **BACTRON600** – Place the arm port doors one at a time in the arm port door stands included with the unit.

MOVING IN THE PRESSURIZED CHAMBER

There is a minor, but noticeable feeling of resistance while working in the overpressure environment of the workspace chamber. Moving in the chamber will temporarily increase the chamber pressure. Large and fast movements can cause the manometer to bubble as anaerobic atmosphere is forced out of the BACTRON. This results in increased AMG usage as gas injections are made to maintain overpressure. Move deliberately and steadily when in the chamber. Withdrawing one sleeved arm partly into the arm port while reaching in with the other (a movement combination that looks something like swimming) can help reduce pressure and gas consumption. Use the vacuum foot pedal to reduce any ballooning of the sleeves.

ANAEROBIC MONITORING STRIPS

In the next procedure (Verifying an Anaerobic Atmosphere) an anaerobic monitoring strip packet is opened to verify that a strict anaerobic atmosphere has been established in the chamber.

Figure 27: Saturated Pink (Significant O_2 Present)

Strip Indicator Functions

- The monitoring strips remain white in the absence of oxygen
- The strips turn pink in the presence of oxygen
- The more color on the strip, the more oxygen is present.
- The strips do not lose color after having been exposed to O_2. A strip hold its pink coloring, even if oxygen is removed from the chamber atmosphere.
- A new packet must be opened to resume monitoring for O_2 once all oxygen is purged or scrubbed from the chamber atmosphere.

Opening and Handling

Keep the following points in mind when opening and handling the monitoring strips.

- Do not touch the monitoring strip. Doing so risks contaminating the strip and creating false oxygen positive coloring, even in a fully anaerobic environment.
- For the best accuracy and to lengthen the amount of usable time, the strip should be left in the packet, partly exposed. This avoids contamination from surfaces and wicks oxygen-detecting fluid from bottom of the packet.
- Bending the edges or partly folding the packet allow it to stand upright.
- Once a monitoring strip has dried out, it can no longer indicate new oxygen contamination.
- There should be one opened and moist anaerobic monitoring strip in the workspace chamber at all times while maintaining anaerobic conditions. Place the strip where it will be clearly visible.

VERIFYING AN ANAEROBIC ATMOSPHERE

This procedure verifies that an anaerobic atmosphere has been established prior to placing anaerobe samples in the workstation.

Figure 28: Oxygen Free Indication (Anaerobic)

1. After entering the workspace chamber, open one of the Oxoid brand anaerobic monitoring strip packages.
2. If the strip remains white, the chamber atmosphere is free of oxygen and ready to use.
    a. Exit the chamber using the steps described in the **Exiting the Chamber procedure** on page 46.
    b. The verification procedure is now complete.

- Or -

3. If the strip turns partly or completely pink, exit the chamber using the **Exiting the Chamber procedure** steps to avoid introducing more oxygen into the chamber.
4. The chamber must be further purged.
    a. Loosen the right arm port door to create a controlled leak that aerobic atmosphere can be expelled through. See the **Establish an Anaerobic Environment procedure** steps on page 39.
    b. Allow an additional 50 psi or 30 minutes worth of AMG to flush through the chamber.

Note: The sleeve assemblies can be left on the BACTRON during this second purge.

5. When 30 minutes has elapsed **or** 50 psi of AMG have been flushed through the chamber (whichever comes first), re-enter the chamber using correct entry procedures, and open a second anaerobic monitoring strip.
    a. If the second anaerobic indicator strip shows less pink than before, repeat steps 4a and 4b to finish purging the chamber.
    b. If the second strip turns completely pink or shows the same degree of coloring as the first, contact **Sheldon Technical Support** for assistance. See page 7. Also, see the optional troubleshooting procedure on the next page for steps to identify possible sources of oxygen in the workstation.

TROUBLESHOOTING OXYGEN IN THE CHAMBER

Carry out the following steps to troubleshoot oxygen in the workspace chamber.

1. Make sure the arm port doors and sleeve assemblies are correctly installed.
2. Verify proper sleeve donning, and arm port entry and exit procedures have been used.
3. Check if closed containers are being introduced through the pass box. Closed containers can hold significant volumes of oxygen.
    a. Containers should be loose-capped when placed in the pass box.
4. Verify that the manometer is filled with water. The water level should be at the bottom of the two reference rings if the chamber is under the normal operating overpressure of 0.5 inches (1cm).
5. Verify that gas supply lines are attached to **both** the BACTRON GAS IN 1 and GAS IN 2 ports
6. Make sure the foot pedal controls branched supply line is securely connected to the barb adaptors on both arm ports.
7. Check that the foot pedal assembly GAS and VAC lines are connected to the GAS OUT and VAC OUT ports on the BACTRON.
8. Make sure that both box doors are being closed after all transfers.
9. Set the AMG cylinder regulator to 20 psi to ensure adequate pressure. Check for kinks or damage to AMG gas supply line.
10. Consolidate pass box uses if possible to reduce the number of daily chamber entries.
11. Uninstall the catalyst cartridge. If the cartridge is not warm, it may not be active, or it has not been exposed to AMG and oxygen. Replace it with the second catalyst cartridge included with the BACTRON. Reactivate the first cartridge.
    a. Please see the **Reactivating the Catalyst** procedure on page 54.

Note: Use caution when uninstalling the catalyst cartridge. The catalyst can grow hot during a purge of the chamber.

12. Make sure anaerobic monitoring strip packets have not been opened prior to being placed in the oxygen-free atmosphere of the chamber

EXITING THE CHAMBER

Withdrawing your arms through the arm ports creates a negative pressure in the chamber. If done too quickly, the motion can draw in outside oxygenated atmosphere through the sleeve cuffs or manometer. Use the following steps to exit the chamber without pulling in aerobic atmosphere.

1. Check that the exterior and interior pass box doors are closed and latched to avoid drawing aerobic atmosphere in through the pass box.
2. Charge the sleeves with gas to help prevent binding while withdrawing from the chamber.
    a. Depress the GAS foot pedal (left) for one or two seconds.
3. Pick up one arm port door. Slowly withdraw the arm holding the door from the chamber.
    a. Close and seal the arm port door. See the Install the **Arm Port Doors procedure** on page 24 for how to correctly seal the arm port doors.
    b. Pick up, withdraw, and close and seal the other arm port door.
4. Withdraw arms from the sleeves one at a time.

Door Seal Check

Carry out the following steps to make sure the arm port doors are sealed.

1. Hold the sleeves away from the BACTRON, allowing them to fill with air.
2. Twist and firmly grip the sleeves approximately 3 to 4 inches (7 – 10cm) behind the cuffs to create seals.
3. **Gently** and **slowly** push **both** sleeves towards the doors. This will cause the sleeves to balloon.
4. If the manometer bubbles in response to the pressure in the sleeves, one or both arm port doors are not sealed correctly.

Note: **Do not physically press on the arm port doors to test the seals!** Doing so, especially doing so routinely, may warp the acrylic glass front panel or damage the doors and arm ports.

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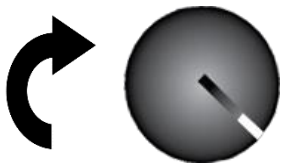
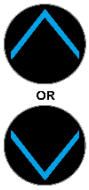
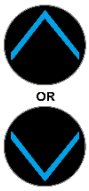
5. If the arm port doors are not correctly sealed, don and cycle the sleeves, then reseat and reseal the doors.
    a. You may also test one door and sleeve at a time. When doing so, use your free hand to manually plug the GAS / VAC port on the inside of the arm port not being tested. This prevents air from escaping into the GAS / VAC supply line and out the other port.

SET THE TEMPERATURE SET POINT

Perform the steps below to change the set point to the operational temperature you will be using during your incubation application. Incubators come from the factory with a set point of 37°C. Each incubator set point must be set independently.

Note: The visual example below depicts adjusting the incubator set point from 35°C to a 37°C application temperature.

Set Temperature Set Point	
1. Turn the **OTL** dial clockwise to its max setting, if not already set at max. a. This prevents the Safety cutoff system from interfering with this procedure.	
 OR 2. Press and release either of the **temperature arrow buttons** to activate the temperature set point adjustment mode. a. The display will briefly flash the letters “SP” to indicate the Set Point is about to be shown. b. The temperature display will then show the flashing, adjustable temperature set point. **Note:** The display will automatically exit the adjustment mode after 5 seconds of inactivity, with the last shown set point value saved.	 **Set Point Adjustment Mode**  **Initial Set Point**
 OR 3. Use the **Up** or the **Down arrow keys** to adjust the set point to your application temperature.	 **New Set Point**
4. Wait 5 seconds after entering the set point. a. The display will stop flashing, and the set point is now saved in the controller. b. The chamber will now automatically heat or passively cool to match your set point. c. The display will revert to showing the current chamber air temperature.  **Wait 5 Seconds**	  **Heating to Set Point**
See the **Set the OTL procedure** on page 50 for how to set the OTL system once the incubation chamber has stabilized at your application temperature set point, after you have performed any display verifications or calibrations.	

End of Procedure

TEMPERATURE ACCURACY VERIFICATION

Note: Performing a temperature accuracy verification requires a temperature reference device. Please see the **Reference Sensor Device entry** on page 12 for the device requirements.

Optional: Each BACTRON incubator was calibrated at the factory at 37ºC. A verification of the display accuracy may be carried out when preparing the incubator for use or when required by your laboratory or production protocol. The verification procedure compares the displayed incubator temperature with the actual chamber air temperature, as provided by a calibrated reference device.

If a difference between the actual and displayed temperatures is discovered, perform a temperature calibration. Please see the **Calibrate Temperature Display procedure** on page 70 in the User Maintenance section.

Temperature display accuracy must be verified separately for each incubator in the BACTRON900.

Probe

A reference device sensing probe may be introduced into an incubator through the door space. In the cabinet style incubators the wire may be introduced through the finger hole in either door.

Place the sensor probe head as close as possible to the geometric center of the incubator. A thermocouple sensor probe sleeve may be taped to the shelving using non-stick, non-marking tape, as long as the exposed copper end is 2 inches (5cm) away from the shelf (see Figure 29). An exposed sensor probe in direct contact with the shelving may experience heat sinking, which can result in an inaccurate temperature reading.

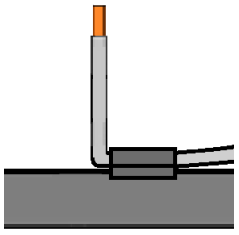


Figure 29: Probe End Taped 2 inches (5cm) From Shelf Surface

In a side storage incubator, carefully close the incubator door over the probe wire, and, if possible, latch the door. Use non-stick, non-marking tape to secure the wire and to seal any gaps.

Temperature Stability

After introducing and placing the temperature probe, allow the incubator to operate undisturbed for 8 hours (for example, overnight) prior to performing the verification. A 24-hour wait is strongly recommended if the BACTRON has just been installed in a new location.

The incubator must operate at its verification temperature set point for **at least 1 hour with no fluctuations** of ±0.1°C or greater in order to be considered stabilized. Failure to wait for stabilization will result in an inaccurate verification. If the incubator door is opened during the verification the chamber must be allowed to re-stabilize before continuing.

Verifying the Temperature Display Accuracy	
1. Once the chamber temperature has stabilized, compare the reference temperature device and incubator display readings. a. If the readings are the same, or if a difference between the two falls within the acceptable range of your protocol, the display is accurately showing the chamber air temperature. **The Temperature Verification procedure is now complete**. b. See step 2 if a difference falls outside the acceptable range of your protocol.	**Reference Device**  
2. If there is an unacceptable difference, a display **temperature calibration** must be performed to match the display to the reference device. a. Please see page 70 in the User Maintenance section.	**Reference Device**  

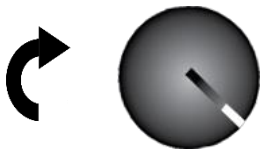
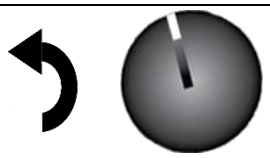
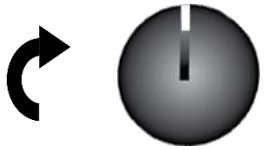
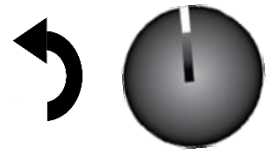
End of procedure

Note: Test the OTL system at least once per year for functionality.

Note: Each incubator OTL must be set independently in the BACTRON900.

SET THE OVER TEMPERATURE LIMIT

The incubator must be operating at your incubation application temperature, and must be stable for at least 1 hour prior to setting the OTL. Perform the following steps to set up the **Over Temperature Limit** heating cutoff system for use:

Set OTL	Example
1. Turn the **Set Over Temperature Limit** control dial clockwise to the maximum position, if it is not already set to maximum.	
2. Turn the dial counterclockwise until the red Over Temperature Limit Activated light illuminates. 	
3. Slowly turn the dial clockwise until the Over Temperature Limit Activated light turns off. Stop turning the control.  a. The Over Temperature Limit is now set approximately 1˚C above the current incubator air temperature.	
4. **Optional**: You may turn the dial slightly to the left to bracket in closer to the set point temperature. This sets the OTL cutoff threshold nearer to the current incubator air temperature. 	
5. Leave the OTL dial set just above the activation point.	

If the OTL is sporadically activating, you may turn the dial very slightly to the right (clockwise).

If the OTL continues activating, check for ambient sources of heat or cold that may be adversely impacting the unit temperature stability. Check if any powered accessories in the workspace chamber are generating heat. If you can find no sources of external or internal temperature fluctuations, contact Tech Support or your distributor for assistance.

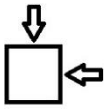
End of Procedure

CYCLING THE PASS BOX

Figure 30: Pass Box

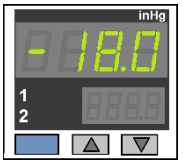
The pass box operates as an airlock, so at least one door must be closed at all times when an anaerobic atmosphere is present in the workspace chamber. If the main control panel Aerobic light is lit, the outer pass box door has been opened since the last auto cycle, allowing oxygenated atmosphere into the pass box. Always run a pass box cycle prior to opening the inner pass box door when the Aerobic light is on.

Auto Cycle



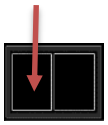
1. Both pass box doors must be closed and latched, with the Doors light illuminated on the main control panel, for the auto cycle to launch.

2. Briefly depress the Automatic Start / Reset Switch to the left to initiate the auto cycle.
    a. The Aerobic and Anaerobic indicator lights will flash alternatingly, indicating the pass box is being cycled.
    b. The pass box will evacuates down to -18 inches of mercury pressure (inHg), and then refill with purging gas three times. The third purge is always AMG drawn from the GAS 1 IN port.



    c. When the cycle finishes the Anaerobic light will illuminate on the main control panel.
3. **Do not open the outer pass box door while the inner pass box door is opened**!
4. Always close an open pass box door after offloading or loading items.
    a. This safeguards against accidental exposure to oxygen from an inattentive user opening the outer door while the inner door is open.

Aborting: To abort a running auto cycle, depress and hold the Auto Cycle Start / Reset switch to the left for **3 seconds**. The BACTRON will cease vacuuming and automatically restore pressure to the pass box. The vacuum gauge must rise to at least -2inHg (near room pressure) before the Pass Box Aerobic and Anaerobic lights will stop flashing, and the inner pass box door can be opened.

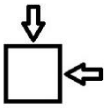


Vacuum Interruption

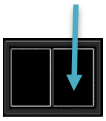
The pass box will briefly cease vacuuming down during a pass box cycle if the BACTRON injects AMG into the workspace chamber. Injections are made in response to the chamber atmosphere pressure falling below 0.5in (1cm) relative water column pressure. If the Chamber Gas light illuminates frequently during a cycle, abort the cycle. There may be a leak along the inner pass box door, allowing the pass box to pull atmosphere out of the workspace chamber and into the pass box vacuum line. Check that the inner pass box door is latched and sealed. Contact Technical Support if gas injections interrupt the next cycle attempt.

Manual Cycle

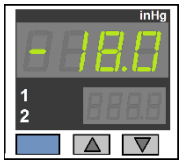
Users may manually cycle the pass box. This option is provided as a backup for the auto cycle.



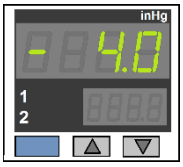
1. Both pass box doors must be closed and latched, with the Doors light illuminated on the main control panel, to safely cycle the pass box.
    a. **Do not cycle the pass box if the Pass Box Doors light is not illuminated!**



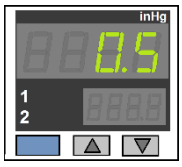
2. Depress the Manual switch to the right (VAC).
    a. Hold the switch down until the pass box pressure display shows between **-17 inHG and -20 inHg** of atmospheric pressure in the pass box.
    b. Immediately cease vacuuming if the water in the manometer gauge bubbles or the gas injection light illuminates frequently, interrupting evacuation of the pass box. There may be a leak along the inner pass box door. Continuing to vacuum may damage the BACTRON. Contact Technical Support.



3. After achieving the low atmosphere pressure target in step 2, depress the Manual switch to the left (GAS) to inject AMG into the pass box.
    a. Hold the switch in this position until the pass box pressure display reads approximately -4inHg.
    b. This completes one iteration.



4. Repeat steps 3 and 4 twice more. Three iterations of evacuation and AMG backfill are required to fully cycle the pass box.
    a. On the third and final iteration, hold the Manual switch to the left (GAS) until the pressure display reads **0.5inHg**. This puts the pass box pressure near the workspace chamber overpressure, allowing the inner pass box door to be opened without difficulty.
    b. The pass box interior door can now be opened.



5. The Anaerobic indicator light **does not** illuminate after the completion of a manual cycle.
6. **Do not open the outer pass box door while the inner pass box door is opened**!
7. Always close an open pass box door after offloading or loading items.
    a. This safeguards against accidental exposure to oxygen from an inattentive user opening the outer door while the inner door is open.

Note: Failure to cycle the pass box to the standards described above risks introducing aerobic atmosphere into the workspace chamber.

LOAD SAMPLES

Sheldon Manufacturing recommends waiting 24 hours after establishing an anaerobic atmosphere before loading samples into the unit.

Airtight containers can introduce significant amounts of oxygen into the anaerobic environment of the BACTRON. Whenever possible, closed containers placed in the pass box should be loose-capped or ventilated to allow the pass box cycles to draw oxygen from the containers. Syringes should be loosened and sealed containers partly opened, if permitted by your laboratory or production protocol.

The pass box sliding shelf can hold and transport up to 252 plates.

Place samples and other media containers on the shelves inside each incubator as evenly spaced as possible. Good spacing allows for atmosphere circulation and a higher degree of temperature uniformity. If the anaerobes sensitive to heat are being cultivated, it may be necessary to place an empty Petri dish or plate at the bottom of each stack.

This concludes the Placing the BACTRON into Operation portion of the Operation Section

REACTIVATING THE CATALYST CARTRIDGES

Note: A flow of AMG for testing and cleaning can be obtained by disconnecting the foot pedal GAS - VAC line from an arm port **while the door is closed**, and then depressing the GAS pedal.

An active catalyst cartridge must be installed in the workspace chamber to achieve and maintain anaerobic conditions. A spare cartridge is provided with each BACTRON so that cartridges can be swapped out for reactivation. For optimum performance, reactivate a catalyst cartridge after every 24 hours of use.

To reactivate, perform the following:

1. Heat the catalyst cartridge at 200°C overnight (a minimum of 8 hours).
    a. The handle of the cartridge can be removed prior to heating, and reinstalled afterwards. Use appropriate Personal Protective Equipment (PPE) to prevent burns.

A quality control test should be performed on each cartridge once per month.

1. Flow anaerobic mixed gas with hydrogen over a reactivated catalyst cartridge in a normal aerobic atmosphere, or place the reactivated catalyst cartridge in the pass box and run a full auto cycle.
    a. The palladium coated pellets inside the catalyst cartridge should grow warm in the presence of oxygen and hydrogen, indicating that the cartridge is ready for use.
2. If the cartridge does not heat up when exposed to AMG and oxygen, reheat to 200°C.
3. While the cartridge is still hot, flow AMG over the cartridge in an oxygen environment. This helps remove buildups of hydrogen sulfides or other contaminants that interfere with cartridge effectiveness.
4. Test the room temperature reactivated cartridge again with another flow of AMG in an aerobic environment.

AMG CONSERVATION METHODS

1. Minimize the number of pass box cycles per day.
2. Moving a large number of items through the pass box in one transport reduces the volume of AMG used in cycling the pass box.
3. When transporting a small number of items through the pass box, place a large solid object in the box. This reduces the volume of gas utilized.
4. Introduce small, individual items such as sealed microplates or transport tubes, into the workspace chamber through the sleeve assemblies, rather than the pass box.
5. Employ proper sleeve techniques when entering and exiting the workspace chamber.
6. Avoid fast or large movements while working in the chamber. Use a swimming motion, withdrawing one arm partly into the arm port while reaching in with the other.

VOLATILE COMPOUND SCRUBBER AND REJUVENATION CYCLE

Activated carbon scrubber media can be placed in the workspace chamber to absorb volatile fatty acids (VFAs) or volatile sulfur compounds (VSCs) produced by sample cultivation. This helps keep the workstation interior clean, reduces odors, and prolongs catalyst endurance during cultivation processes producing significant amounts of VFAs or VSCs.

Please see the **Accessories section** on page 81 for information on scrubber media recommended by Sheldon Manufacturing.

1. Recommended use is 250 grams (one packet) of media placed in a 500ml beaker inside the chamber. Place another 250 grams into a second 500ml beaker.
    a. A scrubber fan is also available to place scrubber media in for increased air circulation and scrubbing rate. Please see page 81.
2. On day 2 replace the first beaker of carbon media with the second.
3. On day 3 reactivate the first beaker of carbon media.
    a. Heat at a minimum of 160°C for at least two (2) hours). Place the reactivated scrubber in the chamber.
    b. Remove and reactivate the second scrubber. For best effect, reactivate the scrubber overnight.
4. Repeat this cycle for 6 months. Discard scrubber media after 6 months and replace.

ATTACHING EQUIPMENT TO THE CHAMBER ACCESSORY OUTLETS

BACTRON workstations are provided with two accessory outlets located inside the workspace chamber, on the left wall. The power switch on the main control panel controls power to these accessory outlets. The outlets can power equipment such as magnetic stirrers, a volatile compounds scrubber fan, etc. Do not attach equipment drawing more than 1 amp from both outlets.

Accessory equipment may produce additional heat in the workspace chamber. This can affect the temperature performance of the incubator. Monitor the chamber pressure and incubator performance when using powered accessories inside the workspace chamber.

DEIONIZED AND DISTILLED WATER

Do not use deionized water for cleaning or humidifying the BACTRON!

While commonly available in laboratory environments, deionized water is an aggressive solvent that attacks most metal surfaces. Use of deionized water in a BACTRON voids the manufacturing defect warranty and may damage the workstation. Sheldon Manufacturing recommends the use of distilled water in the resistance range of 50K Ohm/cm to 1M Ohm/cm, or a conductivity range of 20.0 uS/cm to 1.0 uS/cm, for cleaning and humidifying applications.

HUMIDIFYING INCUBATORS

Placing a small number of Petri dishes or other open media containers in the BACTRON for several weeks may lead to excessive drying of sample media. A small open container such as a flask, of 500ml of distilled water, set on each shelf of the incubator can help to slow sample drying.

PRESSURE UNIT CONVERSION

Conversion table for pressure units

	kPa	MPa	kgf/cm^2	bar	psi	mmHg (Torr)	inHg	atm
1 kPa	1	1×10^{-3}	1.01972×10^{-2}	1×10^{-2}	1.45038×10^{-1}	7.50062	0.2953	9.86923×10^{-3}
1 MPa	1×10^{3}	1	1.01972×10	1×10	1.45038×10^{2}	7.50062×10^{3}	0.2953×10^{3}	9.86923
1 kgf/cm^2	9.80665×10	9.80665×10^{-2}	1	9.80665×10^{-1}	1.42234×10	7.35559×10^{2}	2.8959×10	9.67841×10^{-1}
1 bar	1×10^{2}	1×10^{-1}	1.01972	1	1.45038×10	7.50062×10^{2}	2.953×10	9.86923×10^{-1}
1 psi	6.89473	6.89473×10^{-3}	7.03065×10^{-2}	6.89473×10^{-2}	1	5.17147×10	2.036	6.80457×10^{-2}
1 mmHg (1 Torr)	1.33322×10^{-1}	1.33322×10^{-4}	1.35951×10^{-3}	1.33322×10^{-3}	1.93368×10^{-2}	1	3.9370×10^{-2}	1.31579×10^{-3}
1 inHg	3.3864	3.3864×10^{-3}	3.4531×10^{-2}	3.3864×10^{-2}	0.4912	2.5400×10	1	3.342×10^{-2}
1 atm	1.01325×10^{2}	1.01325×10^{-1}	1.03323	1.01325	1.46960×10	7.60000×10^{2}	2.9921×10	1

Figure 31: Pressure Measurement Unit Conversion

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Chamber Quality Control Check Sheet

Month:	Record Incubator Temperature	✓ Catalyst Changed	✓ Condensate Receptacle Drained	AMG Cylinder Pressure Reading	✓ Monitoring Strip Changed
Date:					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
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You may copy this sheet for institutional use

DAILY MAINTENANCE

1. Exchange the catalyst cartridge in the chamber with a reactivated one.
2. Remove and empty the condensate collection container as needed.
3. Change the anaerobic monitoring strip at least once per 24 hours, or as often as necessary so that the strip in the workspace chamber remains moist.
4. Check that the pass box gaskets are properly seated.
5. Check the cuffs on the sleeve assemblies for holes, tears, and other signs of wear that may compromise integrity. Replace if necessary.
6. Check the incubator temperature to ensure the set point is correct.
7. Record the gas cylinder reading(s).
8. Change or reactivate the carbon volatile compounds scrubber media, if installed. Please see the **Activated Carbon Scrubber and Rejuvenation Cycle** on page 55 in the Operation section.
9. Check the water level in the manometer. While the chamber is operating under its normal overpressure of 0.5 inches, the water level should be even with the lower of the two reference rings.
10. Clean and disinfect the workspace chamber in accordance with your laboratory or production protocols, or regulatory requirements.

NORMAL GAS CONSUMPTION

A sealed and undisturbed BACTRON workstation will typically go for more than 30 minutes between gas injections into the workspace chamber. When injecting, the Chamber Gas light will illuminate, accompanied by a pair of audible clicks from the chamber gas solenoid opening and closing. Pass box cycles, entering or exiting the arm ports, and working within the workspace chamber will temporarily increase the frequency of gas injections.

The manometer water column should be depressed by approximately 0.5 inches (1 cm) under normal operating conditions.

Injections taking place every thirty minutes or less in an undisturbed unit **may** indicate a small leak. Injections every 10 – 30 seconds are indicative of a large leak.

LEAK DIAGNOSTIC – UNIT IN USE

Perform this procedure to check for leaks in and around the workspace chamber when the BACTRON is loaded with samples and cannot be taken out of use. Leaks can result from damage, long-term wear on BACTRON components, or from user error.

Establish a Baseline

A baseline of AMG usage should be established before attempting to determine if the workstation is leaking. Because the rate of AMG use is increased by users accessing and working within the workspace chamber, the baseline should be established for when the unit is sitting undisturbed.

1. Record the gas cylinder gauge level at the end of the workday. Note the gauge level next morning. Read the **Normal Gas Consumption** section on the previous page.
2. If the BACTRON is using a significant amount of AMG overnight while sitting undisturbed, it is likely there is a leak. Review the AMG cylinder readings recorded in the maintenance log to see if a period of increased usage or loss can be identified.
3. If the BACTRON is injecting AMG more frequently than every 30 minutes after sitting undisturbed overnight, it is highly likely there is a leak.
    a. The Chamber Gas indicator will illuminate when the BACTRON is injecting AMG into the workspace chamber to main overpressure. Injections are accompanied by a clicking noise that is the chamber gas solenoid opening then closing.

Verify Chamber Overpressure

Verify that the manometer has been periodically refilled or topped off as part of daily maintenance. This is necessary for the manometer to show an accurate pressure reading. Allowing the manometer to run dry will result in a major chamber leak.

4. If the manometer has been correctly filled and the water level is not depressed to the lower reference ring and the BACTRON is not injecting AMG frequently, the unit may be failing to inject gas or may not be supplied with gas.
5. If the water level is not depressed and the BACTRON is injecting AMG frequently it is likely there is a significant leak.

Check the Pass Box

Verify the integrity of the pass box if the previous steps indicate a leak.

6. Check the pass box door gaskets. There should be no brittleness or dryness, and no cracks.
7. Check that both gaskets are securely seated on the mounting frames. Sample media is sticky, and if spilled, can cause a pass box door to pull a gasket off the mounting frame.
8. The Pass Box Doors light does not illuminate when both doors are closed, check that both doors are sealed. The pass box door windows should sit flush against the door gaskets.
9. Verify that users are closing the inner pass box door after transferring items into or out of the workspace chamber.

Check the Arm Port Doors

Failure to correctly close and seal the arm ports can result in the chamber leaking anaerobic atmosphere and increasing the rate of gas injections while sitting undisturbed.

10. Check the door ring seals for signs of damage or excessive wear. Replace the rings if there are obvious signs of damage or wear.
11. Check that the arm port doors are sealed and secure when not in use.
    a. The locking bars should be in the horizontal position.
    b. The knobs should be tightened clockwise using only wrist strength. Tightening the knobs too far can damage the doors by pulling out of position the threaded post the knob and locking bar are mounted on. This can result in a leak of chamber atmosphere around the post.

Locating Leaks

A gas leak detector capable of detecting hydrogen (Part Number 4600501) can be used to locate leaks along the sealed edges of the acrylic glass panels, arm port doors, the outer pass box door, back panel, as well as the side incubator in the BACTRON600 and 900.

The manometer exhaust port on the back of the BACTRON will register as a leak under normal operating conditions. Some hydrogen gas naturally diffuses through the water-filled manometer. **Do not seal or otherwise obstruct the manometer exhaust port.** Doing so compromises the BACTRON overpressure and gas regulation system, and voids the manufacturing defect warranty.

Fixing a Leak

Contact your institutional maintenance department or Sheldon Technical Support for assistance if a leak is confirmed, or if heightened gas consumption is not restricted to periods of increased use.

Excessive AMG Usage During Work Hours

Check the following items if AMG usage is excessive when users are working in the BACTRON.

- Verify users are operating the pass box correctly
- Check that users are employing correct sleeve donning, entry, and exit procedures.
- Check the integrity of the sleeves and sleeve components.
- Read the **AMG Conservation Methods** entry on page 54 for ways to reduce AMG usage.

LEAK CHECK – EMPTY UNIT

Use this comprehensive procedure to verify the atmospheric integrity of the workspace chamber when the BACTRON can be taken out of operation. All samples should be removed from the workstation prior to carrying out this procedure as aerobic atmosphere will be present in the chamber.

This procedure places the unit at a steady state temperature and atmospheric pressure, then carries out a set of leak checks.

1. Turn off the BACTRON.
2. Remove the left arm port sleeve and open the left arm port door.
3. Remove the catalyst cartridge from the BACTRON.
    a. The catalytic production of water vapor reduces the volume of atmosphere in the chamber and may interfere with performing an accurate leak check.
4. Verify the manometer is filled with water up to the top reference ring (the fill line) while the BACTRON is at room atmospheric pressure with the arm port open.
5. Check the integrity of the pass box door gaskets.
    a. Replace if brittleness, dryness, or cracks are present.
    b. Clean the gaskets with warm water and soap if sticky or dirty. Dry and seat securely on the pass box mounting frames.
6. Close and latch both pass box doors.
    a. Verify that window panels of both doors sit flush against the gaskets.
7. Check the arm port door ring seals for signs of damage or wear.
8. Close and secure the left arm port.
9. Check that both the arm port doors are secure, with the locking bars in the horizontal position, and the knobs snugly tightened clockwise using wrist strength.
10. Check that the AMG gas regulator is set to 15 to 20 psi.
    a. Open the gas cylinder valve all the way on if not already opened.
11. Turn on the BACTRON.
    a. Check that the Chamber Gas light illuminates. Listen for the accompanying clicking noise of the chamber gas solenoid opening and closing.
    b. The BACTRON should begin injecting AMG to establish overpressure in the chamber.
12. Set the temperature of the incubator(s) to 0.
    a. An incubator actively heating from room temperature to achieve a set point increases air pressure in the workstation due to thermal expansion of the chamber atmosphere.
    b. This can interfere with performing an accurate leak check.

13. The pass box doors light should illuminate, indicating that both doors are closed.
    a. If the light does not activate, check that both doors are sealed.
    b. If the light does not activate and both doors are sealed, there may be a problem with door sensors. Fixing the door sensors is a service-level procedure.
14. As overpressure is established in the chamber the manometer water should drop from the top reference ring down to the bottom ring.
15. If there is no leak, the Chamber Gas light will remain off approximately 30-minute intervals after achieving 0.5 inches (1cm) of overpressure, as indicated by the manometer.
16. If there is a leak, the Chamber Gas light will illuminate more frequently than roughly every 30 minutes.
    a. Continual chamber gas injections every 10 – 30 minutes are indicative of a large leak.
    b. Failure to obtain chamber overpressure is indicative of a leak. Or the chamber atmospheric pressure switch that sets the overpressure level needs to be adjusted. Adjusting the chamber pressure switch is a service-level procedure.

Locating leaks

See the **Locating Leaks entry** on page 61 for instructions on using a hydrogen leak detector to pinpoint or find the leak.

DOOR GASKET MAINTENANCE AND USAGE

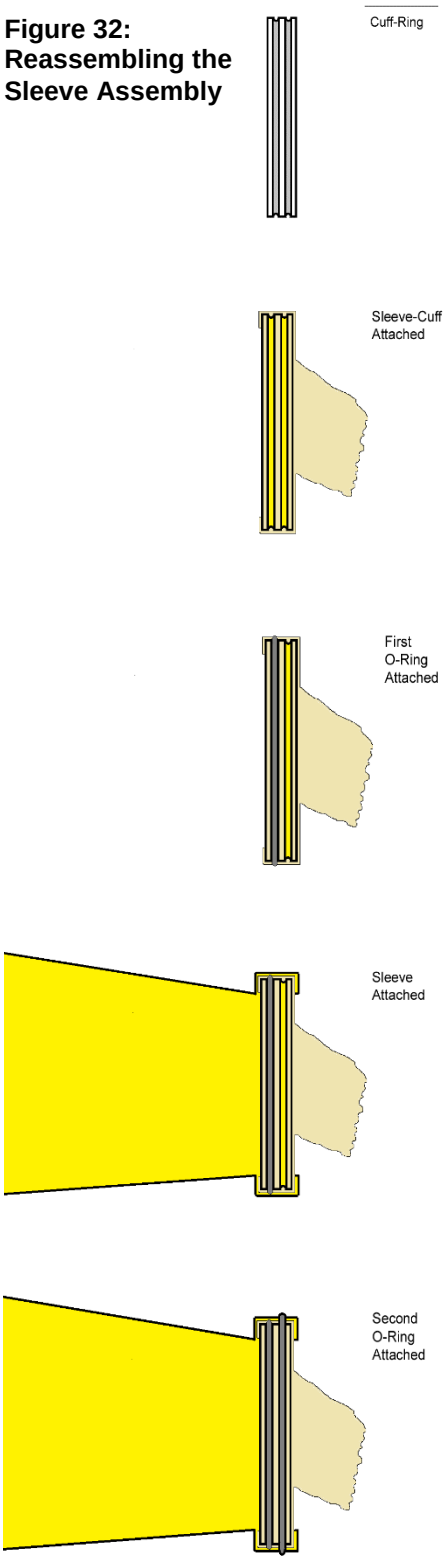
BACTRON door gaskets are subject to significant compression during pass box cycles. Users cycling the pass box more than 15 times per day will need to replace the door gaskets every 3 to 6 months. Heavy institutional users may wish to keep a pair of spare door gaskets on hand (Part Number 3450507).

Spilling sample media on door gaskets or the interior surfaces of pass box doors may cause the gaskets to stick to the doors. This can compromise the atmospheric integrity of the pass box. The gaskets can be cleaned with dish soap and warm water, if your laboratory or production protocol permits.

SLEEVE MAINTENANCE AND USAGE

Sleeves may be washed with dish soap and warm water between uses. Disinfection should be carried out per laboratory or production protocols. Institutions with several users for each BACTRON may wish to keep a pair of sleeves in small, medium, and large sizes on hand. Or keep a pair of sleeves for each user.

Figure 32: Reassembling the Sleeve Assembly



REPLACING SLEEVE ASSEMBLY COMPONENTS

Replace any sleeve assembly component that shows signs of brittleness, dryness, or developing cracks. Typically the cuffs have the fastest rate of wear.

Carry out the following steps to disassemble the sleeve assembly

1. Roll the black O-ring on the outside of the sleeve assembly off the cuff and remove
2. Pull the sleeve cuff and its cuff-ring out of the sleeve.
3. Remove the 2nd black O-ring, holding the sleeve-cuff to the cuff-ring.
4. Inspect all components for brittleness, dryness, or cracks. Replace as needed.

Reassemble the sleeve assembly:

1. Pull the sleeve-cuff on over the cuff-ring.
2. Roll an O-ring onto the cuff-ring, over the sleeve cuff. Place the ring into the groove opposite fringed side of the cuff.
3. Pull the lip of the sleeve over the sleeve cuff and cuff-ring from the same side as the O-ring. The fringed end of the sleeve cuff should remain outside the sleeve.
4. Roll on the second O-ring. Fit the O-ring into the groove on the outside of the sleeve and sleeve cuff. This is the unoccupied cuff-ring groove on the side of the sleeve-cuffs fringed end.

End of Procedure

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Warning: Prior to maintenance or service on this unit, disconnect the power feed from the power supply.

Avertissement: Avant d'effectuer toute maintenance ou entretien de cet appareil, débrancher le cordon secteur de la source d'alimentation.

CLEANING AND DISINFECTING

If a **hazardous material or substance** has spilled in the unit, immediately initiate your site Hazardous Material Spill Containment protocol. Contact your local Site Safety Officer and follow instructions per the site policy and procedures.

The BACTRON should be cleaned and disinfected prior to first use. Periodic cleaning and disinfection are required to prevent microbiological contamination.

Do not use spray-on cleaners or disinfectants. These can leak through openings and coat electrical components. Do not use cleaners or disinfectants that contain solvents capable of harming paint coatings, acrylic glass, or stainless steel surfaces. **Do not use chlorine-based bleaches or abrasives—these will damage the chamber liner.** Consult with the manufacturer or their agent if you have any doubts about the compatibility of decontamination or cleaning agents with the parts of the equipment or with material contained in it.

Warning: Never clean the unit with alcohol or flammable cleaners.

Avertissement: Ne jamais nettoyer l'appareil à l'alcool ou avec des nettoyants inflammables.

Cleaning

Perform the steps below for a complete cleaning of the BACTRON interior:

1. Remove and clean the sleeve assemblies and all removable interior accessories, except for the catalyst cartridges.
    a. **Never clean the catalyst using water, cleaning agents, or disinfectants**. See page 54 for how to clean the catalyst cartridge with heat and AMG.
    b. Wash the arm port doors, sample dish racks, shelf spacers, pass box gaskets, and sleeve assemblies with a mild soap and water solution.
2. Clean the workspace chamber, incubator, and pass box interiors with a mild soap and water solution, including all corners.
    a. Take special care when cleaning around and chamber power outlets to prevent damage. Do not clean the pass box door alarm sensors (see Figure 33).
    b. **Do not use chloride-based cleaners** except Zephiran benzalkonium chloride solution. Other types may have adverse effects on microbiological samples.
3. Rinse with distilled water and wipe dry with a soft cloth. **Do not use deionized water**. See the **Distilled and Deionized Water** paragraph in the Operation section.
4. Wipe down the interior surfaces with Zephiran. Allow the Zephiran to evaporate, do not wipe up.

Disinfecting

Disinfect the BACTRON on a regular basis. Perform the following steps to carry out a complete disinfection of the workstation:

1. Turn the unit off. Open all doors and carry out your laboratory, clinical, or production space disinfection protocol.

2. If possible, remove all interior accessories (shelf spacers, racks, and other non-attached items) from the chamber when disinfecting. Disinfect all corners, the incubator interior(s), and the pass box interior. Take special care when cleaning around the pass box doors and arm port door gaskets so as not to impair the positive seal.

3. Disinfect the BACTRON using commercially available disinfectants that are non-corrosive, non-abrasive, and suitable for use on stainless steel, painted surfaces, and acrylic glass. Contact your local Site Safety Officer for detailed information on the disinfectants compatible with your cultivation or culturing applications.

4. Do not use overtly volatile disinfecting agents. Chlorines, amphyls, and quaternary ammonias will evaporate into the chamber environment. Concentration in the chamber atmosphere will increase over time, potentially leading to inhibited growth or metabolic symptoms in sample populations.

5. After completion of your institutional protocol, allow all disinfectants to evaporate completely. Wipe down all surfaces except the door sensors with distilled water and Zephiran until the workstation no longer has a volatile odor. Use nonabrasive wipes.

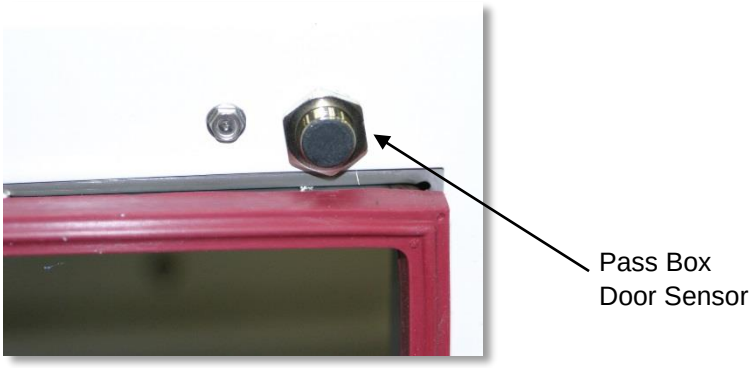


Figure 33: Pass Box Door Sensor

MAINTAINING THE ACRYLIC GLASS PANELS

Sheldon Manufacturing recommends using Novus brand acrylic glass cleaner and scratch remover for cleaning and maintaining acrylic glass surfaces on the BACTRON. Please see the **Accessories section** on page 81. Alcohol or alcohol-based solvents and other aggressive solvents should never be used to clean the BACTRON, and may damage the acrylic glass panels.

Never expose the BACTRON to sustained UV light. Prolonged exposure to UV will result in rapid aging of the acrylic glass, leaving it vulnerable to compression forces, and generating cracks across all exposed areas. UV light will also quickly age sleeve assemblies, turning the sleeves yellow and result in a quick loss of elasticity.

Disable or redirect laboratory UV lighting away from the BACTRON. The BACTRON should not be exposed to direct sunlight. Verify that your laboratory or workspace environment does not use UV lighting at night. This type of light is usually referred to as short-wave UVC or germicidal UV light and operates at roughly 254nm.

Damage from prolonged or high-intensity UV exposure is not covered under the manufacturing defect warranty. Periodic use of long-wave (365nm) UV hand lamps used for bacterial identification should not damage the acrylic glass.

VACUUM PUMP MAINTENANCE

Refer to the operation manual supplied with your vacuum pump for recommended maintenance routines.

ELECTRICAL COMPONENTS

Electrical components do not require maintenance. If the BACTRON electrical systems fail to operate as specified, please contact your Shel Lab dealer, distributor, or Technical Support for assistance.

CONDENSATION AND THE DEW POINT

Relative humidity inside the BACTRON should never exceed 80% at 25°C. Exceeding this threshold can result in condensate forming on incubator and workspace surfaces.

Condensate will appear whenever the humidity level in the chamber reaches the dew point. The dew point is the level of humidity at which the air cannot hold more water vapor. The warmer the air, the more water vapor it can hold.

As the level of humidity rises in the chamber, condensate will first appear on surfaces cooler than the air temperature. Near the dew point, condensate forms on any item or exposed surface that is even slightly cooler than the air. When the dew point is reached, condensate forms on nearly all exposed surfaces.

Mild condensate can be present in BACTRON units fully loaded or loaded to near capacity with open media plates, depending on ambient temperature and humidity. Cold air blowing on the exterior of the BACTRON may help cause condensation in the workspace chamber by chilling the acrylic glass panels or metal bulkheads.

Managing excessive condensation at humidity levels that overwhelm the BACTRON condensate controller depends on either lowering the humidity level in the chamber or increasing its air temperature.

Note: Note: Rising or falling air pressure from the weather will adjust the dew point up and down in small increments. If the relative humidity in the BACTRON is already near the dew point, barometric fluctuations may push it across the dew point threshold.

If excessive condensate is forming in the BACTRON chamber, check the following:

- Is the BACTRON exposed to an external flow of cold air such as an air-conditioning vent or a door to a cooler hallway or adjacent room? Block or divert the air, or move the BACTRON.
- Does the ambient humidity in the room exceed the stated BACTRON operating range of 80% relative humidity? If so, lower the room's humidity.
- Does the number of media containers in the BACTRON exceed its rating? The BACTRON300 can hold 300 plates; the BACTRON600 holds 600 plates; the BACTRON900 can hold 900 plates. Reduce the number of sample containers.
- Remove or cap open containers of water or media. Drain the condensate controller catch vessel frequently. **Do not drain the manometer**.

CALIBRATE THE TEMPERATURE DISPLAY

Note: Performing a temperature display calibration requires a temperature reference device. Please see the **Reference Sensor Device entry** on page 12 for device requirements.

Temperature calibrations are performed to match an incubator temperature display to the actual air temperature inside the incubator. The actual air temperature is supplied by a calibrated reference sensor device. Calibrations compensate for long-term drifts in the BACTRON microprocessor controller as well as those caused by the natural material evolution of the sensor probe in the humid and heated chamber space. Calibrate as often as required by your laboratory or production protocol, or regulatory compliance schedule.

Each temperature display and its incubator must be calibrated separately in the BACTRON900.

Probes

Reference device sensing probes may be introduced into an incubator through the door space. In the cabinet style incubators, the wire may be introduced through the finger hole in either door.

Place the sensor probe head as close as possible to the geometric center of the incubator. A thermocouple sensor probe sleeve may be taped to the shelving using non-stick, non-marking tape, as long as the exposed copper end is 2 inches (5cm) away from the shelf (see Figure 34). An exposed sensor probe in direct contact with the shelving may experience heat sinking, which can result in an inaccurate temperature reading.

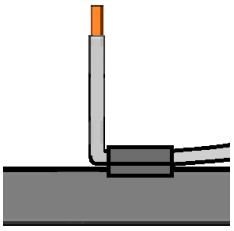


Figure 34: Probe End 2 inches (5cm) From Shelf Surface

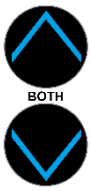
In a side storage incubator, carefully close the incubator door over the probe wire, and, if possible, latch the door. Use non-stick, non-marking tape to secure the wire and to seal any gaps.

Stability

Prior to calibration, an incubator should operate undisturbed at its application temperature set point for 8 hours in order to stabilize. A common practice is to introduce and place the temperature sensor probe in the incubator near close of business, allow the unit to operate and stabilize overnight, and then calibrate the display next morning.

The incubator is considered stabilized when it has operated for **1 hour** with no fluctuations of ±0.1°C or greater. Failure to wait for stabilization will result in an inaccurate calibration.

Continued on next page

Temperature Calibration	
1. Once the incubator temperature has stabilized, compare the reference device and incubator temperature display readings. a. If the readings are the same, or the difference between the two (2) falls within the acceptable range of your protocol, the display is accurately showing the test space chamber air temperature. **The Temperature Calibration procedure is now complete**. b. If a difference falls outside of your protocol range, advance to step 2.	**Reference Device**  
2. A display calibration adjustment must be entered to match the display to the reference device. See next step.	**Reference Device**  
3. Place the display in its temperature calibration mode.  a. Press and hold both the **UP and DOWN** temperature arrow buttons simultaneously for approximately 5 seconds. b. Release the buttons when the temperature display shows the letters “CP”. The display will begin flashing the **current temperature display value**. **Note:** If an arrow key is not pressed for five seconds, the display will cease flashing, and store the last displayed number as the new current chamber temperature value.	

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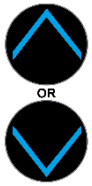
Temperature Calibration (Continued)	
 4. Use the **Up** or **Down** arrows to adjust the current display temperature value until it matches the reference device temperature reading.	**Reference Device** 
5. After matching the display to the reference device, wait 5 seconds.  a. The temperature display will cease flashing and store the corrected chamber display value. b. The incubator will now begin heating or passively cooling in order to reach the set point with the corrected display value.	 **Cooling to Set Point**
 6. Allow the BACTRON sit for at least one 1 hour undisturbed to stabilize **after the incubator has achieved the corrected temperature set point**. a. Failure to wait until the incubator is fully stabilized will result in an inaccurate reading.	 **Set Point Achieved**
7. Compare the reference device reading with the chamber temperature display again. a. If the reference device and the chamber temperature display readings are the same or the difference falls within the range of your protocol, **the incubator is now calibrated for temperature**. b. See the next step if the readings fail to match or fall outside of your protocol range.	**Reference Device**  

Continued on next page

Temperature Calibration (Continued)	
8. If the two readings are not the same, and the difference still falls outside the acceptable range of your protocol, repeat steps 3 – 7 up to two more times. a. Three calibration attempts may be required to successfully calibrate units that are more than ±2°C out of calibration.	**Reference Device**  
9. If the temperature readings of the incubator temperature display and the reference device still fall outside your protocol after three calibration attempts, contact your distributor or **Sheldon Technical Support** for assistance.	

End of procedure

UNIT SPECIFICATIONS

These BACTRONs are 110 – 120 volt workstations. Please refer to the unit data plate for individual electrical specifications.

Technical data specified applies to units with standard equipment at an ambient temperature of 25°C (77°F) and a voltage fluctuation of ±10%. The temperatures specified are determined in accordance to factory standard following DIN 12880 respecting the recommended wall clearances of 10% of the height, width, and depth of the inner chamber. All indications are average values, typical for units produced in the series. We reserve the right to alter technical specifications at all times.

WEIGHT

Model	Shipping Weight	Unit Weight
BACTRON300	610lbs / 276kg	328.5lbs / 149kg
BACTRON600	760lbs / 344.7kg	412lbs / 187kg
BACTRON900	760lbs / 344.7kg	436.5lbs / 198kg

WORKSTATION DIMENSIONS

Inches

Model	Exterior W × D × H	Workspace Chamber W × D × H
BACTRON300	61.3 x 31.3 x 26.5 inches	42.5 x 28.5 x 25.2 inches
BACTRON600	88.2 x 31.3 x 26.5 inches	42.5 x 28.5 x 25.2 inches
BACTRON900	88.2 x 31.3 x 26.5 inches	42.5 x 28.5 x 25.2 inches

Centimeters

Model	Exterior W × D × H	Workspace Chamber W × D × H
BACTRON300	155.7 x 79.5 x 67.3 cm	108 x 72.4 x 64 cm
BACTRON600	224 x 79.5 x 67.2 cm	108 x 72.4 x 64 cm
BACTRON900	224 x 79.5 x 67.2 cm	108 x 72.4 x 64 cm

STAND DIMENSIONS

Model	Inches W × D × H	Centimeters W × D × H
BACTRON300	61.5 x 30 x 30 inches	156 x 76.2 x 76.2 cm
BACTRON600	88.5 x 30 x 29 inches	225 x 76.2 x 74 cm
BACTRON900	88.5 x 30 x 29 inches	225 x 76.2 x 74 cm

PASS BOX INTERIOR DIMENSIONS

Model	Inches W × D × H	Centimeters W × D × H
All Models	12 x 13.5 x 12	30.5 x 34.3 x 30.5

PASS BOX PLATE CAPACITY

Model	Plates
All Models	252

INCUBATOR DIMENSIONS

Workspace Chamber Incubator

Model	Inches W × D × H	Centimeters W × D × H
BACTRON300	27.5 x 8 x 13.5	70 x 20 x 34
BACTRON600	--	--
BACTRON900	27.5 x 8 x 13.5	70 x 20 x 34

Side Storage Incubator

Model	Inches	Centimeters
BACTRON300	--	--
BACTRON600	23.5 diameter x 18.5	59.7 diameter x 47
BACTRON900	23.5 diameter x 18.5	59.7 diameter x 47

CAPACITY

Workspace Chamber Volume

Model	Cubic Feet	Liters
BACTRON300	17.6	498
BACTRON600	19	538
BACTRON900	17.6	498

Workspace Incubator Volume

Model	Cubic Feet	Liters
BACTRON300	1.4	39.6
BACTRON600	--	--
BACTRON900	1.4	39.6

Side Storage Incubator Volume

Model	Cubic Feet	Liters
BACTRON300	--	--
BACTRON600	4.6	130
BACTRON900	4.6	130

Pass Box Volume

Model	Cubic Feet	Liters
All Models	1.1	31

UNIT SPECIFICATIONS (CONTINUED)

TOTAL PLATE CAPACITY

Model	Plates
BACTRON300	300
BACTRON600	600
BACTRON900	900

TEMPERATURE

Model	Range	Uniformity Workspace Incubator	Uniformity Side Incubator
BACTRON300	Ambient +5°C to 70°C	±-0.5°C @ 37°C	--
BACTRON600	Ambient +5°C to 70°C	--	±1°C @ 37°C
BACTRON900	Ambient +5°C to 70°C	±0.5° @ 37°C	±1°C @ 37°C

POWER

Model	AC Voltage	Amperage	Frequency
BACTRON300	110-120	9	50/60 Hz
BACTRON600	110-120	11	50/60 Hz
BACTRON900	110-120	14	50/60 Hz

PARTS LIST

Description	Parts Number
Anaerobic Monitoring Strips (Box of 100 packets)	 **9900706**
Pass Box Door Gasket 12 x 12 (burgundy)	 **3450507**
Arm Port Door Left	 **9900699**
Arm Port Door Right	 **9900698**
Arm Port Door O-Ring	 **6000509**
BACTRON600 Arm Port Door Stand	 **9990761**
Catalyst Holder Assembly (includes catalyst cartridge)	 **9990759**
Power Cord 5-15 NEMA	 **1800540**

Description	Parts Number
Shelf Spacer (BACTRON300 and 900 workspace Incubator)	 **5680502**
Foot Pedal Controls Assembly	 **9990735**
Fuse, Power Cord Inlet, Type T 12.5Amp, 250V, 5x20mm	 **3300520**
Fuse, Vacuum Pump Outlet, Type T 10Amp, 250V, 5x20mm	 **3300516**
Gas Regulator Kit, Anaerobic Mixed Gas	 **9740501**
Leveling Foot	 **2700506**
Petri Dish Rack, 2 stacks of 11 Petri plates (for workspace incubators)	 **5110729**
Petri Dish Rack, 2 stacks of 13 Petri plates (for side storage incubators)	 **5110730**

PARTS (CONTINUED)

Description	Parts Number	Description	Parts Number
Sleeve Assembly Size 6.5, Extra Small (2 cuffs, 2 cuff-rings, 4 0-rings, 2 sleeves, 2 self-gripping straps)	 **9990738XS**	**Sleeve Cuffs Latex, Size 7** (for sleeve assembly)	
Sleeve Assembly Size 7, Small (2 cuffs, 2 cuff-rings, 4 0-rings, 2 sleeves, 2 self-gripping straps)	 **9990738S**	**Sleeve Cuffs Latex, Size 8** (for sleeve assembly)	 **3600501**
Sleeve Assembly Size 8, Medium (2 cuffs, 2 cuff-rings, 4 0-rings, 2 sleeves, 2 self-gripping straps)	 **9990738M**	**Sleeve Cuffs Latex, Size 9** (for sleeve assembly)	 **3600502**
Sleeve Assembly Size 9, Large (2 cuffs, 2 cuff-rings, 4 0-rings, 2 sleeves, 2 self-gripping straps)	 **9990738L**	**Sleeve Cuffs Nitrile, Size 7** (for sleeve assembly)	 **3600513**
Sleeve Cuff-Ring 4 Inches, interior diameter	 **6400590**	**Sleeve Cuffs Nitrile, Size 8** (for sleeve assembly)	 **3600514**
Sleeve Cuff O-Ring, Black, 4 Inches	 **6400504**	**Sleeve Cuffs Nitrile, Size 9** (for sleeve assembly)	 **3600515**
Sleeve Cuff-Ring 3.5 Inches, interior diameter (for extra-small sleeve assembly)	 **6400619**	**Sleeve 10 Inches** (25 cm) (for sleeve assembly)	 **3600521**
Sleeve Cuff O-Ring, 3.5 inches, (for extra-small sleeve assembly)	 **6000503**	**Vacuum Pump** 110-120 Volt	 9740502

ORDERING PARTS AND CONSUMABLES

If you have the Part Number for an item, you may order it directly from Sheldon Manufacturing by calling 1-800-322-4897 extension 3. If you are uncertain that you have the correct Part Number, or if you need that specific item, please contact Sheldon Technical Support for help at 1-800-322-4897 extension 4 or (503) 640-3000. Please have the **model number** and **serial number** of the BACTRON ready, as Tech Support will need this information to match your workstation with its correct part.

ACCESSORIES

Shel Lab offers the following BACTRON accessories for sale. Please see our website for prices.

Activated Carbon Media (2 lbs / 0.9 kgs)

For scrubbing hydrogen sulfides, fatty acids, and some toxic or corrosive compounds from the workstation atmosphere.

Part Number 1060500

Activated Carbon, Volatile Compounds Scrubber Fan

Holds activated carbon scrubber media. Significantly speeds the removal of sulfides, fatty acids, and toxic or corrosive compounds.

Part Number 9490578 (For 110 – 120 volt units)

Acrylic Glass Cleaner (2oz / 59.2ml)

Novus brand acrylic glass cleaner.

Part Number 1060503

Acrylic Glass Scratch Remover (2oz / 59.2ml)

Helps remove visible scratches and nicks from acrylic glass.

Part Number 1060504

Anaerobic Chamber Start-Up Kit

Includes a spare 12 X 12 pass box door gasket, carbon volatile compounds scrubber media, chamber cleaner (benzalkonium chloride solution), Novus acrylic glass cleaner and scratch remover, 10 Oxoid brand anaerobic indicator strips, 2 sets of spare latex cuffs, and a spare sleeve O-ring.

Part Number 9490511

Anaerobic Indicator Strips

A box of 100 Oxoid anaerobic indicator strips.

Part Number 9900706

ACCESSORIES (CONTINUED)

Compressed Gas Cylinder Switcher, Automatic

Allows two gas cylinders to be connected to one gas port, and automatically switches from the first to the second cylinder when the first is empty.

Part Number 2002-B (110 - 120 Volts)

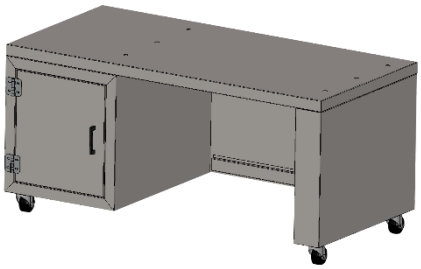
BACTRON300 and BACTRON600 \ BACTRON900 Microscope Adaptors

Designed for the Lecia S6 Spotting Stereo Microscope.

BACTRON300: Part Number 9990535

BACTRON600 and BACTRON900:

Part Number 9990511



BACTRON300 Stand

A rolling stand with cabinet for the BACTRON300.

29.3 inches high by 61.5 inches wide

(74cm high by 156cm wide)

Part Number 9000511

BACTRON600/900 Stand

A rolling stand with two (2) cabinets for the BACTRON600 and 900.

88.5 inches wide, 30 inches depth, 29 inches high

(225cm wide, 76.2cm depth, 74 cm high)

Part Number 9000512

ACCESSORIES (CONTINUED)

Leak Detector

A handheld gas detector for locating leaks. Recommended for units that have been in service for 4 or more years.

Part Number 4600501

Leica S6 Spotting Stereo Microscope and Assembly

Requires the appropriate BACTRON microscope adaptor.

Part Number 9990516

Lukas Fiber Optic Micro Lite Illumination System

A fiber optic, adjustable brightness, halogen light box and guide. Provides a stable, long-lasting light for use with BACTRON workstations and stereo microscopes.

Part Number 4650503

Nitrogen Regulator Kit

Delivery gauge range of 2 – 40 PSIG. Includes barbed adaptor fitting and 10 feet (3 meters) of flexible tubing.

Part Number 9740546

ACCESSORIES (CONTINUED)

UV Viewing Lamp

A handheld UV lamp for use with BACTRON workstations.

Parts Number 9490507

Zephiran Benzalkonium Chloride Chamber Cleaner

1 Gallon, 0.133%.

Part Number 1060501

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