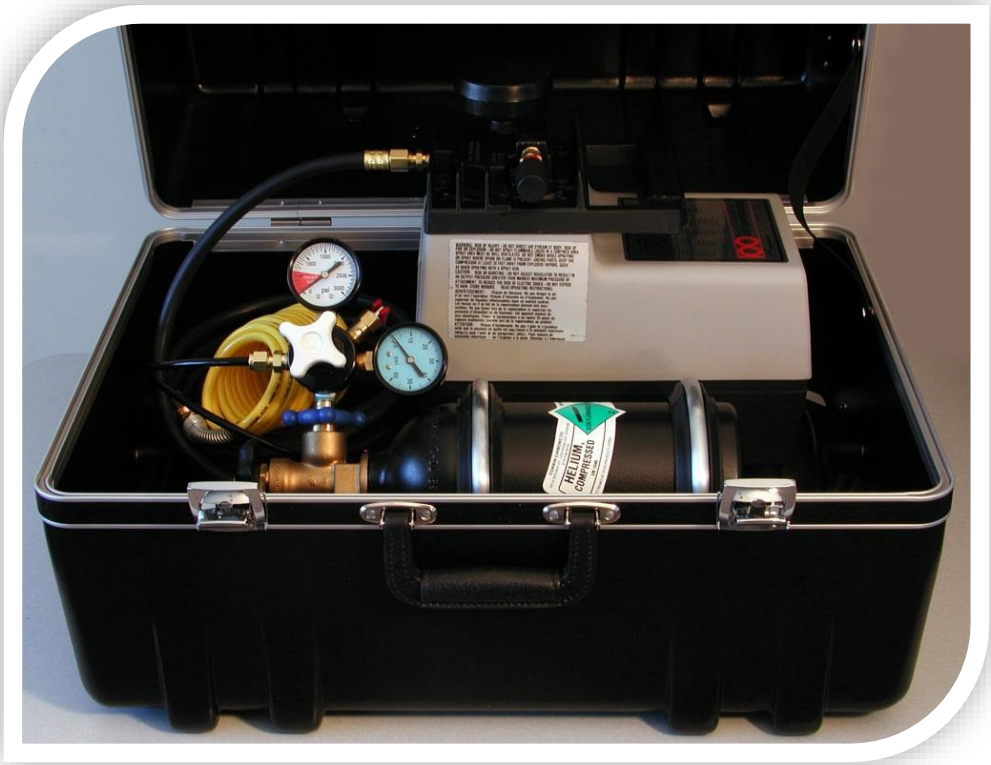

SAI MODEL 4

AUXILIARY AIR & HELIUM SUPPLY

DESCRIPTION AND OPERATING INSTRUCTIONS

WARNING: ***This equipment uses gases under high pressure. Read ALL of the instructions completely before operating and follow them carefully.***

SAI HELIUM BUBBLE GENERATOR SYSTEMS

THE AUXILIARY AIR & HELIUM SUPPLY

General Description

The SAI™ Auxiliary Air & Helium Supply System provides a compact way to operate the SAI™ Helium Bubble Generator in any location where air and helium are not conveniently available. Weighing 60 lbs., the unit is compact and portable. This makes it ideal to use in the study of ventilation patterns, cleanroom airflows and similar applications.

Key Features:

Flexibility – Choice of a 110Vac or 220Vac air compressor when purchased. Use of Industrial Oil-less compressor assures low maintenance.

Ease of Operation - The SAI™ AA&HS is easy to use. All the components are easily adjusted and serviced.

Quality of Construction - Quality components assure high reliability and durability.

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DESCRIPTION & COMPONENTS

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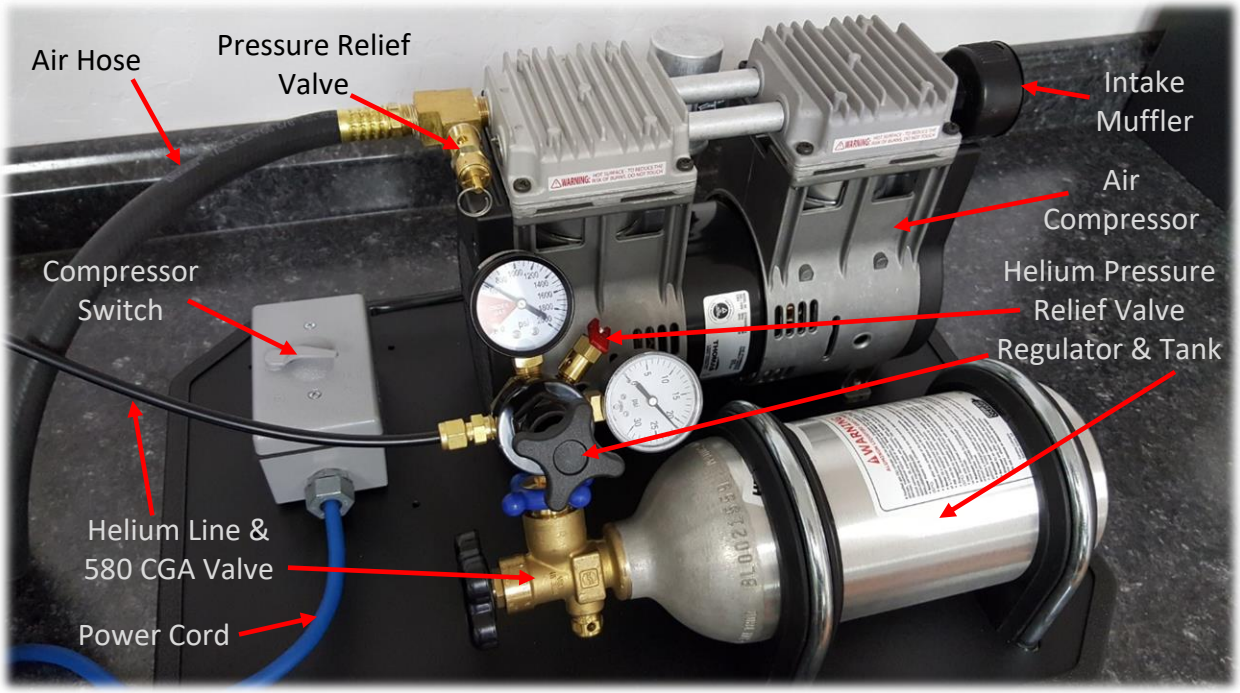
For the air supply, a Thomas industrial duty oil-less piston compressor generates 3.5 cfm of air at 40 psi. It is designed to provide the required flow rate and pressure to the Console with either one or two Plug-In Heads in operation, so no pressure regulator is required. The compressor has a 3/4 hp, direct drive motor with thermal overload protection.

For the helium supply, a rechargeable aluminum cylinder stores the compressed helium. The regulator connected to the aluminum cylinder is used to control and maintain the required operating pressure of 20 psi. This combination can deliver 10 hours of continuous running time with both Plug-In Heads in operation, or 20 hours with one Plug-In Head. The inlet port of the regulator comes with a CGA 580 bullet shaped nipple fitting. Since this fitting is the same fitting that is on larger bottles, it can be used interchangeably. Also provided is a Transfill Manifold which can be used to refill the helium cylinder as needed.

The air compressor and helium cylinder are mounted to an aluminum base plate and set in a heavy-duty case, about 24” L x 18” W x 16” H. The assembly can be removed from the case for general operation and, as necessary, to recharge the helium cylinder, this also allows for easy maintenance and repair.



SETUP & OPERATION

1. Set up the Auxiliary Air & Helium Supply in the proximity of the helium bubble generator and open the cover. The compressor and helium bottle are mounted on an aluminum plate. It is not necessary, but this assembly may be removed from the case to allow the unit to run externally from the case if desired. Wait for the air compressor to cool before doing so, when ready lift the entire assembly out of the case by holding the neck of the helium bottle and the head of the air compressor. Once it is clear of the case, set the assembly down on a suitable flat surface.

2. Fill the helium bottle if necessary, see instructions on page 5. A few hundred pounds of compressed helium is shipped with the system.

3. The air compressor will have either a 115 Vac or 230 Vac motor. Read the label to confirm the voltage required to operate the air compressor. Verify that the power switch for the air compressor is off, and then plug the power cord into the appropriate electrical outlet.

4. Connect the line from the regulator of the helium tank to the bubble generator by inserting the male quick connect fitting at the end of the line into the mating female quick connect inlet fitting labeled “HELIUM” located at the top left of the Model 5 Console panel.

5. In similar fashion, connect the air line coming from the the air compressor to the female quick connect inlet fitting labeled “AIR” located at the top right of the cosole panel.

6. Verify that the helium regulator is OFF by turning the adjusting handle in a counter-clockwise direction until there is no resistance and it feels loose.

7. Slowly open the brass CGA valve at the top of the helium cylinder counterclockwise and observe the high-pressure gauge for a rise in pressure to indicate the pressure inside the aluminum cylinder. After full pressure is reached, further open the valve another 1/2 turn.

8. Turn the adjusting handle on the regulator clockwise to set the delivery pressure to 20 psi.

9. Now refer to the “Setup & Operation” Section of the helium bubble generator instructions if necessary and perform any remaining steps to finish setting it up, then proceed to step 10.

10. Open the air toggle valve on the bubble generator and set the metering valves to their calibrated settings before turning on the air compressor. It is necessary to have the valves

open to serve as a “bleeder” when the compressor starts. Otherwise, the compressor pressure relief valve will start “popping” indicating the toggle valve needs to be opened.

11. Turn on the air compressor by moving the on/off switch to the “on” position.

12. Finish any remaining steps for the proper operation of the bubble generator.

REFILLING THE HELIUM CYLINDER

When the helium tank pressure has been reduced to 100 psi or so, the helium cylinder should be refilled as follows:

1. If the Auxiliary Helium & Air Supply is not in use, set it down on the floor and open the top cover. If the unit has been in use, shut it down, unplug the power cord and allow the compressor to cool off.

2. Make sure the brass 580 CGA valve on the top of helium tank is closed and the regulator valve is OFF.

3. Disconnect the helium line from the bubble generator if necessary.

4. Disconnect the air line to the bubble generator if necessary.

5. Lift the assembly out of the case. To do so, grasp the neck of the helium bottle with the left hand and the air compressor with the right hand and remove assembly from the case. Once it is clear of the case, set the assembly down on a suitable flat surface.

6. Check once more to make sure the CGA valve at the top of the cylinder is closed and any residual pressure in the regulator has been relieved. Loosen the handtight fitting that connects the regulator to the CGA valve to disconnect the regulator from the CGA valve and set it aside. ***See illustration on next page***.

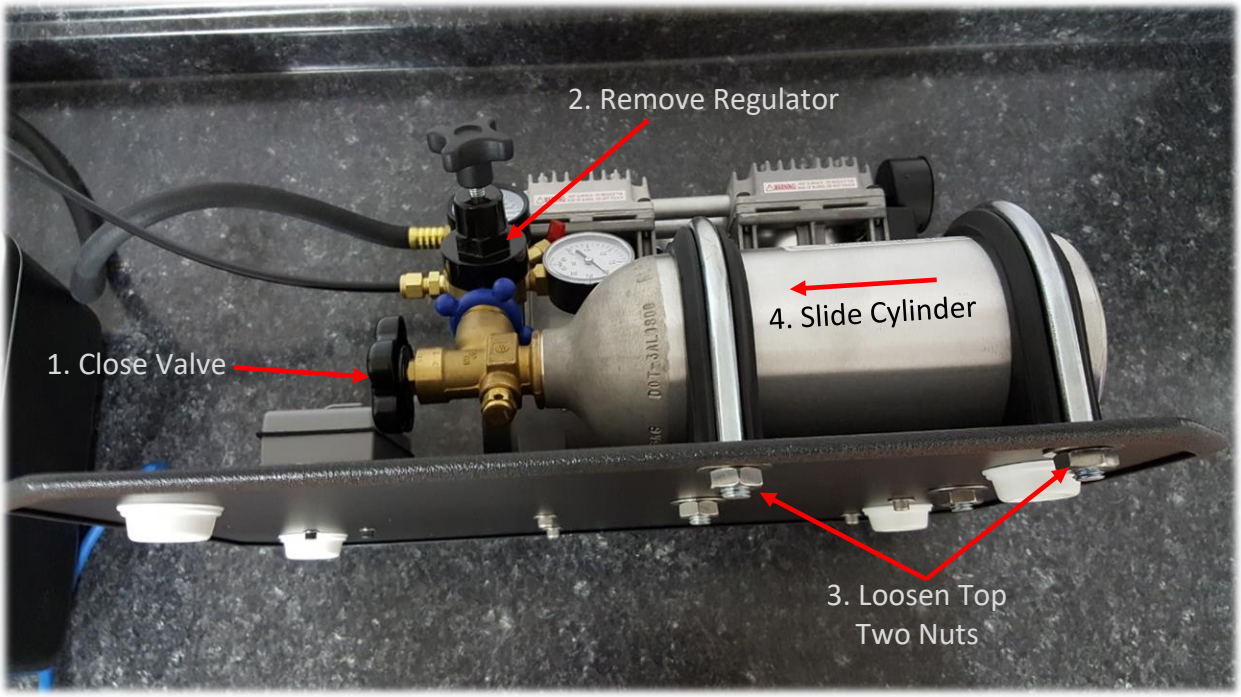
7. *Only if its necessary*, remove the helium tank from the base plate. This is done by tipping the assembly up so that the compressor is resting on its back side. Make sure the power cord is out of the way. At this point, the bottom of the assembly should be facing you with the four hex nuts at the ends of the U-bolts readily accessible.

8. Holding the cylinder in place with one hand, loosen the U-bolt nuts with a 3/4” wrench. It is not necessary to completely remove the nuts.

9. Slowly "rock" the helium cylinder with both hands as necessary and withdraw the cylinder from its clamps. In the process, you may have to wiggle the U-bolts back and forth a little as well.

10. Take the cylinder to a facility approved for refilling helium tanks if a larger bottle is not available to refill from. For convenience, a Transfill Manifold is provided to do the refilling

on-site from a larger tank. This should only be done with the permission of the appropriate safety personnel and strictly in accordance with the Conwin Instructions which are on the next page.



11. After refilling, replace the cylinder, regulator and interior assembly, going through the above Steps in reverse order. Do not overtighten the U-bolt nuts. The threads of the bolt should not extend above the head of the nut.

12. It may be convenient during continued testing to purchase one or more cylinders and have them filled and readily available. Again, be very sure all procedures for handling gases under high pressure are adhered to or are directed by appropriate safety personnel. A pressurized cylinder that is mishandled or has a CGA valve broken off can be very lethal.

Transfill Manifold
Instruction Sheet

Important Safety Guidelines

1. Never fill a cylinder without permission of the owner.

2. Before filling a cylinder visually inspect the cylinder to verify it is in good condition. Do not fill the cylinder if there are dents, deep scratches, evidence of being in the presence of a fire, signs of rust, or if the pressure valve is damaged in any way.

3. Verify the cylinder has been hydrostatically tested within the last 5 years. The hydrostatic test date will be stamped in the crown of the cylinder. The numbers will be in this order: Month/Test Facility ID /Year. For example, a cylinder tested in April 2001 will have a stamp that looks like this:

04 B8 01
73

If the cylinder test date is over five years, **do not fill the cylinder**. Out-of-date cylinders must be sent to an authorized hydrotest company for testing.

Department of Transportation Regulations

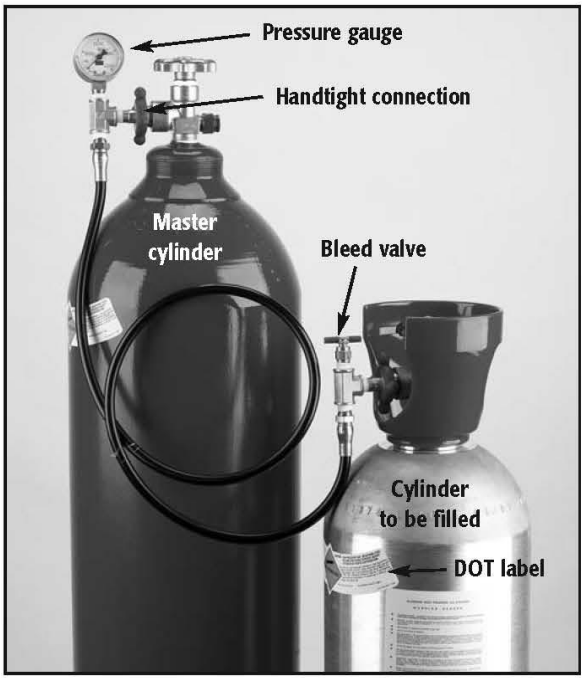
DOT Label

1. Make sure the cylinder has a DOT Helium Label. All cylinders must be identified with a Department of Transportation label.

2. A Gas Transportation Document must be in plain view in driver's compartment while full or partially filled cylinders are being transported. Visit http://www.ConwinOnline.com to download a sample Gas Transportation Document.

3. For additional safety guidelines and regulations, visit the National Department of Transportation's website at http://hazmat.DOT.gov

Filling Instructions



1. After reviewing the safety guidelines above, handtight connect the Transfill Manifold with the pressure gauge next to the master cylinder and the bleed valve next to the cylinder you are filling. Make sure the bleed valve is closed - turn the valve clockwise to close.

2. Verify the maximum pressure rating of the small cylinder. The maximum pressure is stamped in the crown of the cylinder. This is the maximum amount of pressure to transfill into the cylinder. The stamp will appear like this: **DOT 3AL 1800**

The last number (in this case 1800) indicates the maximum pressure rating.

3. Fully open the valve on the small cylinder. If there is any pressure in the cylinder it will register on the gauge. This will be the starting pressure. Slowly, open the valve on the large cylinder. Watch the pressure increase on the gauge. When the pressure reaches 1800 PSI, or the maximum rating, close the valve on the large cylinder then close the valve on the small cylinder.

4. After both cylinder valves are closed, open the pressure bleed valve and release the pressure from the transfill manifold and remove the small cylinder from the filling hose. Close the pressure bleed valve.

SHUTDOWN

1. Turn off the compressor and unplug the power cord. Coil and set in case.
2. Close the CGA valve on the helium cylinder by turning it clockwise.
3. Turn off the regulator by turning its adjusting handle counter-clockwise until it feels loose.
4. Wait for the air compressor to cool down. This can take 5 minutes or so.
5. Disconnect the air and helium lines of AA&HS from the air and helium lines of the bubble generator.
6. Coil both sets of lines and place in the case.
7. Coil the Transfill Manifold and place in the case.
8. Close cover and store.

HAZARDS & PRECAUTIONS

1. Observe the appropriate safety precautions when working with compressed gases.

2. Read any appended instructions and observe their recommended safety precautions.

3. Make sure the on/off switch is in the “off” position before plugging in the compressor.

4. Make sure the toggle valve(s) and the micro-metering valve(s) for the air are open before starting the compressor.

5. **AVOID DIRECT CONTACT** with the heads of the air compressor and the air hose coming from the top of the compressor itself, because they get very hot under continuous operation.

6. Allow the compressor to completely cool down before attempting to remove it to recharge the helium cylinder.

7. Also allow the compressor to cool down before closing the top cover of the transit case.

SPECIFICATIONS

Helium Supply Pressure: Regulated, 0-20 psi

Air Supply Pressure: 40 psi

Helium Delivery Flow Rate: 400 ccm @ 20 psi

Maximum Air Delivery Flow Rate: 3 cfm @ 40 psi

Helium Cylinder: 4.38" Dia x 10.60 " L, 8.8 cu ft Capacity, 1800 psi max

Helium Cylinder Recharge: Recharge Off-Site at Helium Gas Supplier or Recharge On-Site w/ Transfill Manifold Supplied

Air Compressor: Thomas Industrial Duty, Oil-less Piston Compressor, may be purchased 115 Vac 60 Hz or 220 Vac 50 Hz Motor

Cooling: Twin Fans On Compressor

Base Plate: 21 3/4" L x 16" W x 1/8" T, Black Painted Aluminum w/ Trimlok Edging With 2" Dia Rubber Feet

Case: Rugged Black A.B.S. Case with wheels and transport handle

Dimensions: 24.83" L x 19.69" W x 11.88" H

Overall Weight: 60 lbs.

Supply Lines: 15' Power Cord, 15' Air Hose and 15' Helium Line