Air Boss

Manual for:

Installation • Operation • Maintenance

TRION®
## CONTENTS

### PART A - INSTALLATION
I. INSPECTION ....................................................... 1
II. PRECAUTIONARY STATEMENTS ................................. 1
III. GENERAL DESCRIPTION AND INTRODUCTION ............. 1
IV. PRE-INSTALLATION CONSIDERATIONS ....................... 1
V. DIRECTION OF AIR FLOW THROUGH UNIT .................. 2
VI. UNIT MOUNTING ............................................... 2
VII. DUCTING ....................................................... 3
VIII. PIPING ......................................................... 3
IX. UNIT CONTROLS ................................................. 3
X. WIRING .......................................................... 3
XI. INSTALLATION CHECKOUT ..................................... 3
XII. LITERATURE DISTRIBUTION .................................. 4

### PART B - OPERATION AND MAINTENANCE / SERVICE
I. UNIT DESCRIPTION .............................................. 5
   A. CABINET ..................................................... 5
   B. IONIZING/COLLECTING CELLS .............................. 5
   C. CONTROL ..................................................... 5
      POWER PACK ............................................... 5
   D. INTEGRAL WASH MANIFOLDS (OPTIONAL) .................. 5
   E. BLOWER ....................................................... 5
   F. PRE-FILTER (OPTIONS) ...................................... 5
II. OPERATION ...................................................... 5
   INTRODUCTION AND PRINCIPLES OF OPERATION .......... 5
   PRE-START UP CHECKLIST .................................... 5
   START-UP ...................................................... 6
III. MAINTENANCE .................................................. 7
   ROUTINE MAINTENANCE ........................................ 7
      A. CLEANING FREQUENCY ................................... 7
      B. MANUAL CLEANING ....................................... 7
      C. SEMI-AUTOMATIC CONTROL ............................... 7
      D. AUTOMATIC CLEANING ................................... 7
   PERIODIC MAINTENANCE ....................................... 7
      A. CABINET .................................................. 7
      B. IONIZING-COLLECTING CELLS ............................ 7
      C. METAL MESH FILTERS .................................... 7
      D. INTEGRAL WASHER ....................................... 7
      E. BLOWER .................................................. 8
IV. COMPONENT ADJUSTMENTS .................................................. 8
BLOWER .............................................................................. 8
PROGRAMMABLE LOGIC CONTROLLER ......................................... 8
INTEGRAL WASHER .............................................................. 8
DETERGENT FEEDER ............................................................ 8
TIME SWITCH .................................................................... 8
V. TROUBLESHOOTING .............................................................. 8
WARNING STATEMENT ........................................................... 8
GENERAL ........................................................................... 8
HIGH VOLTAGE OR SECONDARY SHORT CIRCUITS ......................... 8
REFERENCE CHART .............................................................. 9

LIST OF FIGURES AND ILLUSTRATIONS

FIG. 1 TYPICAL SYSTEM ARRANGEMENTS:
(A) AND (B) FREE STANDING APPLICATIONS .............................. 1
(C) AND (D) SOURCE CAPTURE APPLICATIONS ....................... 1
FIG. 2 UNIT AIR FLOW ARRANGEMENTS ...................................... 2
FIG. 3 TYPICAL SUSPENSION HANGER SECUREMENT ..................... 3
FIG. 4 COLLECTING EFFICIENCY CURVE ...................................... 10
FIG. 5 INTERNAL RESISTANCE CURVE ......................................... 10
FIG. 6. BLOWER DATA (A) AND (B) ............................................. 11
FIG. 7 INTEGRAL WASHER ...................................................... 12
FIG. 8 LOCATION OF MAJOR COMPONENTS .............................. 13
FIG. 9 PIPING ........................................................................ 14
FIG. 10 WIRING ...................................................................... 15
FIG. 11 CONTROL SYSTEM TIMING CHART WASHING
WITH PROCESS FLUID AND WASH CHART ................................. 16
FIG. 12 TIME SWITCH PROGRAM INSTRUCTIONS ......................... 17
FIG. 13A CONTROL SYSTEM SCHEMATIC .................................. 18
FIG. 13B CONTROL SYSTEM SCHEMATIC .................................. 19
FIG. 13C CONTROL SYSTEM SCHEMATIC .................................. 20
FIG. 14 DETERGENT FEEDER OUTLINE (A) AND (B) .................... 21
PART A INSTALLATION

I. INSPECTION

Upon receipt, the unit(s) should be inspected for any damage incurred in shipping. Damage should be noted and a claim immediately filed with the carrier at the receiving end. Contact the factory for authorization and instruction prior to the return of any equipment.

II. CAUTION

Application and operation of Trion Air Boss® Electronic Air Cleaners.

1. Due to the inherent characteristic of electric arc over, this equipment should not be used for the collection of, or subjected to, highly volatile substances.

2. The collecting elements should be inspected frequently and collected matter removed regularly to prevent excessive accumulation which may result in flashover or fire damage.

3. Do not operate without mechanical filters in place.

4. Equipment location, installation and operation should comply with all national and local fire codes. When in doubt, consult the proper authorities.

5. Workers and machine operators should be instructed to keep burning objects, such as cigarettes, safely away from air inlets leading to the equipment and all personnel involved with the use of this equipment should comply with the statements pertaining to worker safety as noted in this manual.

III. GENERAL DESCRIPTION AND INTRODUCTION

The Trion Air Boss Electronic Air Cleaner is a self contained unit utilizing ionizing-collecting cells as the primary collector and a belt driven backward inclined blower capable of handling up to 4 inches (H2O) of added external static pressure. A selection of mechanical filters are available to serve as pre and post filters, provide for proper internal air distribution and act as washing fluid baffles. Additional options to best adapt the unit to specific application requirements include an integral water wash system and a variety of cleaning systems.

The unit is designed to collect particulate matter, either liquid or solid, in a typical size range of 0.01 to 10.0 microns. The unit is an efficient air cleaner and will effectively collect the airborne particulate matter delivered to it. Therefore, it is important to locate and install the equipment to obtain an airflow pattern which will efficiently move the contaminant to the unit for collection. In some applications this will simply be a free hanging system, while in most applications, duct work would best serve for capturing the contaminant at its source (See Figure 1).

![Diagram A: Fugitive Contaminant - Free Standing Unit, Elevation and/or Plan View](image1)

![Diagram B: Fugitive Contaminant - Free Standing Units, Plan View](image2)

![Diagram C: Multiple Source Captured Contaminant - Hooded to Trunk Line, Elevation View](image3)

![Diagram D: Multiple Source Captured Contaminant - Hooded to Common Mixing Plenum, Elevation View](image4)

Figure 1
Typical System Arrangements

IV. PRE-INSTALLATION CONSIDERATIONS

The location of the unit(s) should be planned for good air distribution and the pick up of contaminants to maximize efficient operation. Consult your Trion representative for clarification of questionable situations.

In free hanging installations, the unit(s) should be positioned as close to the source of contaminant as practical and at the height where stratification of the particulate takes place. If
more than one unit is to be installed in a given area, it is important to create a clockwise (or counterclockwise) air flow pattern around the area. In addition, the units should be positioned to provide adequate service space to access doors and panels.

When ducting is utilized for source pickup, the external static pressure created by the duct work must be considered in conjunction with the internal resistance created by the mechanical pre and post filters. Refer to Figs. 5 and 6, pages 10 and 11. (Note that the fan curve data is shown for units equipped with 2" metal mesh pre and post filters.) Also refer to "VII. DUCTING" for additional suggestions on ducting.

CAUTION
Ceiling hangers, wall mounting brackets and all associated mounting hardware must be capable of safely supporting the weight of any added options, ducting and auxiliary equipment.

General Weight Guide:

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base unit with 2&quot; metal mesh pre and post filters:</td>
<td></td>
</tr>
<tr>
<td>AIR BOSS-12</td>
<td>650 Lbs.</td>
</tr>
<tr>
<td>AIR BOSS-22</td>
<td>1,185 Lbs.</td>
</tr>
<tr>
<td>Integral washer option:</td>
<td></td>
</tr>
<tr>
<td>AIR BOSS-12</td>
<td>25 Lbs.</td>
</tr>
<tr>
<td>AIR BOSS-22</td>
<td>35 Lbs.</td>
</tr>
<tr>
<td>Impingement mist suppressor option:</td>
<td>20 Lbs.</td>
</tr>
<tr>
<td>Hanger, mounting hardware, ducting, etc:</td>
<td>Determined by Installer</td>
</tr>
</tbody>
</table>

V. DIRECTION OF AIR FLOW THROUGH THE UNIT

The unit, as shipped from the factory will have the horizontal air flow arranged in accordance with the order specification; i.e., from left-to-right or right-to-left when facing the access door.

VI. UNIT MOUNTING

Secure the unit in the planned location. The cabinet will lend itself to whatever means of support that is best suited for the particular location; top suspension, shelf mount or base mount in angle iron frame.

Whichever arrangement is used, it must safely support the weight of the unit (AIR BOSS-12 - 650 Lbs., AIR BOSS-22 - 1,185 Lbs.) plus any of the options or auxiliary equipment used. Refer to equipment specification sheets and consult authorities concerning building code restrictions.
Typically, most units will be suspended from the ceiling. Drill (4) 1/2" diameter holes to receive 1/2-13 threaded rod or mounting hardware. See Figure 3 for a typical arrangement to locate and secure threaded rod to the cabinet.

After the unit has been suspended, it should be adjusted to a level position and all fasteners tightened.

**NOTE:**
When mounting the cabinet (and attaching duct work if required) it may be advantageous to remove the ionizing-collecting cells and the pre and post filters. When these items are reinstalled be sure the "spiked" ionizer section of the cells and the large weave of the metal mesh filters are on the air entering side.

**Figure 3**
Typical Suspension Hanger Securement

**VII. DUCTING**

When required or specified, the effectiveness of an installation can be enhanced by capturing contaminants at their source and conducting them in an enclosed air stream to the air cleaner.

The design of the pickup hood, the duct size to obtain proper transport velocities and the transition between ducting and air cleaner should not be oversimplified if optimum results are to be expected. Due to the wide range of contaminants and their characteristics and the various methods of their manufacture, the subject warrants a great deal more consideration than can be given here; therefore, it is recommended that a recognized text be consulted such as Industrial Ventilation — "A Manual of Recommended Practice" published by the Committee on Industrial Ventilation, P.O. Box 16153, Lansing, Michigan 48901.

Basically, however, the duct between the hood and the air cleaner should be as short as possible, of adequate cross sectional area to provide a transport velocity of approximately 2,000 FPM, sloped to prevent pooling of any liquids and sealed to prevent leakage. The air entering the unit should be evenly distributed. Ideally the transition from duct to unit should have a contraction ratio of 1 in 3 (approximately 20°). If space prohibits, turning vanes, air baffles or other means may be utilized. (The unit contains pre-filters on the air entering side to aid in even air distribution).

Refer to Figures 5, 6A and 6B, for fan curves providing data on external static pressure and internal resistance of the various optional accessories.

**VIII. PIPING**

Refer to Figure 9 and complete the piping as shown.

**IX. UNIT CONTROL**

The unit control, which includes disconnect, power supply(s) etc. is contained in a NEMA 12 enclosure. It should be mounted at a location convenient for operating the unit. The control should be mounted in a fixed location where it will be protected from physical abuse and vibration. Typically, three conduit runs will be required between the control and the unit.

**X. WIRING**

Refer to Figure 10 and complete the wiring as shown.

**XI. INSTALLATION CHECKOUT**

1. Be sure inside of cabinet and any adjoining duct work is
clean and free of debris.

2. Be sure that the ionizing-collecting cells are installed with the spiked ionizer on the air entering side of the cabinet and that the pre and post filters are in place.

3. Secure all access panels and doors.

4. Check blower rotation.
   A. Turn main power to unit “on.”
   B. Turn unit power switch on front of control “on” then “off” and observe rotation of blower through air outlet grille.
   C. It should rotate clockwise. If it rotates counterclockwise interchange the wires connected to terminals T1 and T2 on relay 220 CR. After changing wires, recheck rotation.

5. Turn unit power switch “on” Green power on light in the off-on switch and red power supply light will glow indicating unit is ready for operation. If lights do not glow, refer to troubleshooting section of service manual.

NOTE: When units are initially energized, occasional electrical arc-over in the ionizing/collecting cell is normal.

6. Turn all switches “off.” Unit is ready for operation.

XI. LITERATURE DISTRIBUTION

It is important that all of the literature included with the unit, options and auxiliary equipment is directed to the operating personnel. If this cannot be accomplished in person, all of the material should be secured to or left with the unit. Items to be included are:

- All installation instructions
- Installation/Operation/Service manual(s)
- Warranty registration card(s)
PART B  OPERATION/SERVICE

I. UNIT DESCRIPTION

The Air Boss is an electronic air cleaner designed to collect liquid or solid contaminants.

The unit cabinet contains ionizing-collecting cells, wash manifolds and drive, pre and post filters and a backward inclined blower.

A. Cabinet - The unit cabinet is constructed of rust protected 16 ga. steel. Access to ionizing-collecting cells is through a removable hinged door. Access to the blower is through a panel secured by screws.

B. Ionizing-Collecting Cells - The ionizing-collecting cells are constructed mainly of aluminum. End plates and ionizer ground electrodes are .090" aluminum and the collecting plates are .025" aluminum. The charged ionizing elements are 24 ga. stainless steel spiked blades supported between electrically grounded electrodes. The ionizing-collecting cells are gasketed at both ends to insure a positive air seal. The air seal accomplishes two functions. It seals all areas of bypass and maintains positive pressure required for the VIP (Venturi Insulator Principle) system. The VIP system develops an air shield to steer contaminants away from the insulators which enables the cell to collect conductive contaminant. The cell operates at 12 KVDC on the ionizer section and 6.2 KVDC on the collector.

WARNING - Each cell weighs 45 Lbs. Exercise caution when removing cells from cabinet.

C. Control - The control cabinet is located remotely from the unit. The control consists of a Programmable Logic Controller (PLC) and DIN rail mounted components for ease of maintenance, as well as the pulse width modulated power supply(s). The control will be equipped to handle the following unit options:

A. Unit without integral washer.
B. Unit with integral washer utilizing the process fluid as a cleaning agent.
C. Unit with integral washer utilizing water and detergent as a cleaning agent.
D. Unit with other special engineered options.

A digital timer is included for completely automatic wash.

Power Pack - The power pack is pulse width modulated and is mounted on the inside of the control cabinet. It is electrically interconnected to the high voltage parts of the front ionizer-collection cell(s) with high voltage cable. The high voltage is then conveyed to the rear ionizing-collecting cell(s) by positive contact spring loaded plungers. A safety interlock switch interrupts primary power to the power pack when the cell access door is open. The pulse width modulation (PWM) technique enables operation over an input range of 105 VAC to 135 VAC. The high voltage output is 12 KVDC for the ionizer section and 6.2 KVDC for the collector section. The circuit contains an LED light located on the control cabinet to monitor the output voltage.

D. Integral Wash Manifolds - The Trion Air Boss has a traversing wash manifold that cleans the cells from the front and top. The manifold is electrically driven using a ball screw linear actuator.

E. Blower - The backwardly inclined airfoil blower wheel is belt driven with an adjustable sheave for field adjustment when required. External static pressures range is up to 4.0"W.G. at 2000 CFM (Model 12) and 4400 CFM (Model 22) at 4.0"W.G. Noise levels at 3' are less than 85 dBA on the 7 1/2 HP and 82 dBA on the 5 HP.

F. Pre-Filter Options - Mechanical pre-filter options include 2" metal mesh, 40% open perforated plate, or 2" impinger (inertial separator). Pre and post filters can be easily removed through the cell access door.

II. OPERATION

Introduction and Principle of Operation

The Trion Air Boss is technically known as an electrostatic precipitator. In this type of air cleaning equipment, all airborne particles, liquid and solid, even of submicron size, are electrically charged (positive) as they pass through a high voltage ionizer. The ionizer consists of charged 24 gauge stainless steel spiked blades supported between grounded electrodes. These charged particles are then attracted and adhere to a series of parallel collecting plates which form the negative elements of an electrostatic field. The collecting section consists of parallel plates arranged so that each alternate plate is charged while the interleaving plates are electrically grounded. When the contaminant has been collected it either drains away of its own accord if it is a liquid or is washed away with an integral washer.

Pre Start-Up Checklist

A. Open cell access door and remove pre-filter assemblies, ionizing-collecting cells and post filter assemblies. These components slide from the cabinet on guide rails. High voltage wires must be disconnected from ionizing-collecting cell(s) before removing cell(s). Tie the wires out of the way to prevent damage when removing cell(s).
WARNING - Each cell weighs 45 Lbs. Exercise caution when removing the cells from the cabinet.

B. Inspect the inside of the adjoining duct work and Trion cabinet to insure it is clean and free of any debris or construction material.

C. Any ducting secured to the cabinet collar should be tightly sealed either with gasketing, caulking or solid weld.

D. If the unit contains an integral wash manifold, check all connections.

E. Inspect pre and post filters for damage and assure they are free of debris. Then reinstall them in air cleaner cabinet.

NOTE: The coarse side (or the side with the larger weave) on the metal mesh filters should be located on the entering side.

F. Inspect ionizing-collecting cells for the following:
   a. Foreign material in collecting section.
   b. Bent ionizing blades or collector plates.
   c. Loose or damaged insulator assemblies.
      Tighten as required.
   d. Check spring loaded high voltage contacts (back cell(s) only) to assure plunger moves freely.

G. Reinstall ionizing-collecting cells on cell slide rails making sure the spiked ionizer blades are installed toward the air entering side. Be sure the cell(s) with spring loaded plunger contacts are installed first, followed by those without contacts. Reconnect high voltage wires to cell(s).

H. Close and secure cell access door.

I. Remove blower compartment door and discharge panel.

J. Inspect blower compartment to make sure it is clean and free from construction and/or shipping debris.

K. Inspect belt and blower wheel. Insure blower wheel is free to turn and belt is tight. Proper belt tension is approximately 1/2" deflection with moderate finger pressure.

L. Do not reinstall blower access panel at this time. This will be part of start-up procedure.

M. Insure electrical power is available, and field wiring has been completed according to the drawing for your specific application. See “Fig. 10, Field Wiring.”

N. Make sure drain and supply piping have been completed according to piping schematic for your specific application. See “Fig. 9, Piping Schematic.”

Start-Up

A. Be sure supply line voltage is the same as that shown on the data labels on both the unit and control. Be sure the wash pump, if any, is wired for the input voltage to the control. Close system electrical supply switch supplying power to unit.

B. Momentarily activate blower while observing the blower wheel to insure blower is rotating clockwise. If blower wheel is rotating counterclockwise, the supply wiring to the blower motor must be reversed. Turn system electrical supply line power “off” and interchange the wiring connected to terminals T1 and T2 on contactor 220CR in the control panel.

C. Reinstall and secure blower access panel.

D. Turn unit on and observe the following:
   a. Blower is running smoothly and quietly.
   b. Power on light (green) in the off-on switch and high voltage indicator light(s) (red) is glowing.

   NOTE: Electrical arc-over within the ionizing-collecting cell may occur. It is a normal occurrence caused by accumulated construction dust in the duct work and cells and should soon subside. If within a short period of time it does not subside, refer to steps B., E. and F. in the pre start-up checklist.

E. Steps E., F., and G. below apply to units washing with water and detergent. Be sure the detergent tank is clean, then fill the tank 1/8 full with clean water. Do not fill with the detergent until start-up adjustments have been made.

F. Manually initiate the control by initiating the wash start button.

   NOTE: The blue light will glow and remain glowing until the wash cycle has ended and the unit is back in the collection mode. The Programmable Logic Controller (PLC) controlling the washing operation is factory set for approximately thirty minutes and will sequence the events as shown in the control system timing chart, Fig. 11.

G. When the detergent pump is energized, note the amount of detergent that is used by observing the reduction in the liquid level in the tank. The usage should be approximately one part of detergent to twenty parts of water. The water requirements for each unit model are listed in GPM, as shown in “Fig. 9 Piping Schematic.” To adjust the volume output from the pump, refer to the Detergent System Outline, Fig. 15 and locate the control valve. The pump is a constant displacement type and the amount of detergent forced into the water supply to wash the unit is dependent upon the setting of the control valve in the bypass return
line to the reservoir. The side of the translucent reservoir is marked with volume markers. Adjust the control valve to obtain the correct usage for the given unit model, then secure the setting with the Allen Head set screw located in the valve adjustment knob. When the correct adjustment has been made, remove the remaining water from the reservoir and fill the tank with initial supply of detergent furnished.

Start-up is complete.

III. MAINTENANCE

Routine Maintenance

A. Cleaning Frequency - Like all air cleaners, the collected contaminant must be periodically removed from the filtering elements. Depending on the system, the cleaning operation is accomplished by manual, semiautomatic or completely automatic means and the frequency of the cleaning operation is dependent upon the type and amount of contaminant collected. Even those units removing liquid particulate that is self-draining and relatively clean should be subjected to the cleaning operation periodically as small amounts of collected substances remain on component surfaces and “hardening out” or “gelling” takes place over a period of time.

To best establish a set time between cleaning, the collecting elements should be visually examined several times on newly installed units or new applications. It may be necessary to clean every week or every two weeks or longer on some applications, while on other applications such as extremely heavy welding fume it may be necessary to clean daily. Once a cleaning schedule is determined, it should be faithfully maintained to obtain optimum results.

B. Manual Cleaning (units without integral washer) - There are several methods that may be employed to remove collected contaminants from the collecting elements after they have been removed from the cabinet.

a. Soak Tank - If available, a plain tank or an air agitated tank charged with a suitable solvent, de-greaser or hot, 160° to 180°F, detergent solution (such as Trion Tri-Dex detergent) is a practical method providing the time required for soaking and rinsing is not restricted. If time is restricted, a spare set of collecting elements may be advantageous enabling one set to be in the unit working while the other set is being cleaned.

CAUTION

The ionizing-collecting cells weigh 45 lbs. and are slippery when wet. Exercise care when handling. The collecting elements are made of aluminum and the use of caustic cleaning agents should be avoided. Thorough rinsing after cleaning is a recommended practice.

b. High Pressure Wash - A pressure wash such as a car wash or an industrial pressure sprayer charged with an agent as stated in (A.) above presents an alternative method. Here again, rinsing after cleaning is recommended.

C. Semi-Automatic Cleaning (units with integral washer) - When the unit is equipped with an integral wash manifold and piped for cleaning with a process fluid, or a water/detergent mixture, the wash cycle is initiated by depressing the wash start button located either on the unit control cabinet. Once initiated, the Programmable Logic Controller (PLC) located in the control activates and times the various functions required in the washing operation. The duration time for each function is factory set. Refer to Figure 11 for a description of the wash cycle functions and times.

D. Automatic Cleaning (units with integral washer) - When completely automatic cleaning is desired, set and use the time clock integrated into the control. The time clock overrides the manual wash button. Refer to Figure 12 for adjustment instructions.

Periodic Maintenance

The following maintenance frequencies are suggested averages and should be adjusted to best serve the specific application as experience dictates.

A. Cabinet (every 6 - 12 months)

1. Check the drain pan and remove any accumulated buildup of contaminant.
2. Check the high voltage cables and rubber bushings mounted in the cell end plates inside the access door and clean as required with electrical contact cleaner.
3. Check door gaskets, clean and/or replace if necessary.

B. Ionizing-Collecting Cells (every 3 - 6 months)

1. Check for any accumulation of collected contaminant buildup between plates and clean if necessary. Refer to "Part B, III. B. Manual Cleaning."
2. Check sealing gaskets, clean and/or replace if necessary.

C. Metal Mesh and/or Mechanical Filters (every 6 months)

1. Check for matting and cleanliness of filter media and back flush, clean or replace as required.

D. Integral Washer (every 12 months)
1. Check spray nozzle spray pattern and clean nozzles if distortion to spray is noted. (Nozzles are not removable.)

2. Examine the fasteners securing the components for securement and tighten if required.

E. Blower (every 6 - 12 months)
1. Check drive belt for wear and adjustment. Replace or adjust tension if required. Proper tension is 1/2" of belt deflection with moderate finger pressure.

2. Grease pillow block blower bearings sparingly with a good industrial grade bearing grease.

3. Most blower motors used in this product are lubricated for life and have no oil ports. However, if the motor on your unit does contain oil ports, lubricate lightly every 6 months with a good motor oil.

IV. COMPONENT ADJUSTMENTS

Blower

To obtain access to the blower/motor assembly remove the complete cabinet end panel containing the air discharge grille.

A. The drive belt tension is adjusted by sliding the motor mounting plate up or down as required. Proper belt tension is approximately 1/2" of belt deflection under moderate finger pressure.

B. When air volume adjustments are required, a variable sheave is located on the blower motor shaft. Refer to the applicable blower curves, "Fig. 6, Blower Data."

Programmable Logic Controller (PLC) (for units with an integral washer)

The PLC located in the control is used to sequence and set the time for each event in the cleaning operation that removes the collected contaminant from the collecting elements. Refer to Figure 11. Changes to the PLC require a programming device. Please consult the factory.

Integral Washer

Adjustments are typically controlled by water pressure.

Min. 45 PSI @ inlet to unit
Max. 60 PSI @ inlet to unit
See Figure 9.

Detergent Feeder

The volume of detergent flow can be adjusted with the control valve located in the detergent feeder assembly bypass line. Refer to Figure 14 “Detergent Feeder Outline,” for location.

The volume of detergent feed, as well as the cleaning frequency are dependent upon the characteristics of the contaminant collected and for best results should be coordinated and adjusted as experience is gained. This is best accomplished by several visual examinations of the collecting elements after the cleaning cycles. Proper “fine tuning” will provide maximum cleaning with minimum detergent.

To adjust the volume of detergent used within a given time setting, loosen the knurled knob on the control valve with an Allen Wrench. Turning the knob clockwise increases the volume and counterclockwise decreases the volume. When adjustment has been made, be sure to tighten the set screw.

Time Switch

When furnished, adjustments to the time switch are as described in Figure 12 “Time Switch Program Instructions.”

V. TROUBLESHOOTING

**WARNING**

Exercise the usual precautions when working with high voltage. The maximum operating output from the power supply is 12,500 VDC and 5 MA.

If safety switches are closed and circuit is energized, do not touch high voltage. When the circuit is de-energized, always bleed off remaining static charge with an insulated handle screwdriver by shorting across ground and points of high voltage DC potential.

General

Power outages in electrostatic precipitators occur more frequently in the high voltage circuit rather than in the auxiliary systems such as the controls and washer. Other than the basic hand tools, it is advantageous to have a standard volt-ohm-milliammeter with both a 25 KVDC and 10 KVAC high voltage probe. These instruments are standard catalog items by several manufacturers.

High Voltage or Secondary Short Circuits

The most common outage is a short in the secondary circuit and is best located through the process of elimination. Symptoms are indicated when the POWER ON light dims or goes out. The short may be located in the ionizing-collecting cells, high voltage cables or the power pack. To isolate the short
circuit to any one of these three components, proceed as follows:

A. Disconnect both high voltage leads from their respective terminals at the ionizing-collecting cell(s) and energize the pack. If the light remains dim or does not glow the trouble is probably defective high voltage leads or power pack. Defective high voltage leads can usually be determined by close visual examination. The power pack is not field repairable but can be returned to the factory for repair or replacement.*

B. If the light glows bright and steady with the high voltage leads disconnected the trouble is indicated to be in the ionizing-collecting cells. The trouble can usually be detected by close visual examination. Look for the following:
   (a) Bent or damaged collecting plates. Carefully straighten or return to the factory for repair or replacement.*
   (b) Foreign material bridging the space between the plates. Remove being careful not to distort the plates.
   (c) Broken or defective insulators. Replace as required.

*NOTE:
Prior arrangements must be made on all returns to factory.

---

### REFERENCE CHART

<table>
<thead>
<tr>
<th>TROUBLE</th>
<th>POSSIBLE CAUSE</th>
<th>LOCATION</th>
<th>REASON/CORRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit not running</td>
<td>No primary power</td>
<td>Disconnect switch or unit</td>
<td>Replace fuse. Check safety interlock switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>safety interlock switch</td>
<td></td>
</tr>
<tr>
<td>Blower not running</td>
<td>Control is in early part</td>
<td>Control</td>
<td>Allow wash cycle to finish</td>
</tr>
<tr>
<td></td>
<td>of Wash Cycle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit not collecting</td>
<td>Low or no high voltage</td>
<td>Unit power pack or cells</td>
<td>Refer to High Voltage and Secondary Short Circuits above</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excessive arcing</td>
<td>Excessive contaminant</td>
<td>Ionizing-collecting cells</td>
<td>Clean unit</td>
</tr>
<tr>
<td></td>
<td>collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced air volume</td>
<td>Clogged pre-filter</td>
<td>Inside cabinet</td>
<td>Clean or replace</td>
</tr>
</tbody>
</table>
COLLECTION EFFICIENCY

<table>
<thead>
<tr>
<th>%</th>
<th>85</th>
<th>90</th>
<th>95</th>
<th>100</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>(1710)</td>
<td>(1520)</td>
<td>(1330)</td>
<td>(1140)</td>
<td>(950)</td>
</tr>
</tbody>
</table>

AIR VELOCITY IN FEET PER MINUTE ---
AIR VOLUME IN CUBIC FEET PER MINUTE (---)

CURVE IDENTIFICATION:
1. ASHRAE STANDARD 52.78 DUST SPOT TEST METHOD ATMOSPHERIC AIR.
2. DOP DIOCTYLPHthalATE AEROSOL USING PENETRATION METER.

Figure 4
Collecting Efficiency Curve

INTERNAL RESISTANCE

<table>
<thead>
<tr>
<th>P.D.</th>
<th>0.0</th>
<th>0.2</th>
<th>0.4</th>
<th>0.6</th>
<th>0.8</th>
<th>1.0</th>
<th>1.2</th>
<th>1.4</th>
<th>1.6</th>
<th>1.8</th>
<th>2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;H&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AIR VELOCITY IN FEET PER MINUTE

CURVE IDENTIFICATION
1. Ionizing Collecting Cell only
2. Cell with 1" metal mesh pre and post filters
3. Cell with 40% perforated plates before and after cell
4. Cell with 40% perforated plate before cell and 2" metal mesh post filter
5. Cell with 2" metal mesh pre and post filters
6. Cell with impinger and 2" metal mesh post filter

Figure 5
Internal Resistance Curve
Figure 6A
Blower Data AIR BOSS-12

NOTE: CURVES SHOWN ARE FOR A UNIT EQUIPPED WITH 2" ALUMINUM MESH PRE- AND AFTER-FILTERS.

Figure 6B
Blower Data Air Boss-22
1. Power and Control Cable
2. Linear Actuator
3. Wash System Support Track (welded into cabinet)
4. Manifold Support
5. Top Manifold Tube Assembly
6. Center Manifold Tube Assembly (Model 22 only)
7. Manifold Inlet Assembly
8. Bottom Guide Block
9. Hose
10. Wash System Inlet Fittings

Figure 7
Integral Washer (Air Boss-22 shown)
1. Blower Assembly
2. Cell Access Door
3. Ionizer-Collector Cells
4. Pre-filters
5. Post Filters
6. Wash System (see Figure 7)
7. Motor Junction Box
8. Wash System Junction Box
9. Ionizer and Collector High Voltage Leads

Figure 8
Location of Major Components (Air Boss-12 shown)
Figure 9
Piping Schematic
Figure 10
Field Wiring - Drawing #249971
<table>
<thead>
<tr>
<th>FUNCTIONAL COMPONENTS</th>
<th>TIME</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30 MIN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLOWER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POWER SUPPLY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRESH WATER (OR OTHER SOLVENT) SOLENOID VALVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DETERGENT (OR OTHER PUMPED WASH AGENT) PUMP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MANIFOLD DRIVE LINEAR ACTUATOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A = NORMAL AIR CLEANING MODE. WASH CYCLE IS INITIATED MANUALLY OR AUTOMATICALLY AT END OF "A."
B = 30 SECONDS TO ALLOW BLOWER TO COAST TO A STOP AND FOR CHARGE TO BLEED OFF CELLS.
C = WASH FOR APPROXIMATELY 160 SECONDS. TIME MAY VARY SUBSTANTIALLY BECAUSE OF VARIATIONS IN LOAD ON AND VOLTAGE TO MANIFOLD DRIVE LINEAR ACTUATOR.
D = SOAK FOR 2 MINUTES.
E = RINSE FOR APPROXIMATELY 160 SECONDS. TIME MAY VARY AS IN "C" ABOVE. THIS PART OF THE CYCLE WILL OPERATE REGARDLESS OF WHETHER A PUMP IS INCLUDE IN THE WASH SYSTEM.
F = Drip dry for 2 minutes.
G = Forced dry for 20 minutes.
H = AIR CLEANER RETURNS AUTOMATICALLY TO NORMAL AIR CLEANING MODE OF OPERATION.
Prior to setting the time switch wash initiator clock it will be necessary to charge the internal battery in the clock. This is done by turning the OFF-ON switch on the front of the control to the ON position. The switch knob should glow when the control is on. If not, check to be sure there is supply line power to the control, and that the disconnect switch located in the control is on. **DO NOT PUSH THE WASH BUTTON.** Allow the control to remain on for 24 to 36 hours to allow the battery to charge.

To set the time switch it is first necessary to set the actual time, followed by the program times. Note that the switch clock uses military time; that is, 1:00 p.m. is 13:00.

![Time Switch Diagram](image)

3. Push the day (1...7) button until the day, or combination of days that the wash is to be actuated at the same time, appears on the display. In addition to the individual days of the week, 3 additional choices are provided: all days, Monday through Friday, and Saturday and Sunday. It may be possible to use one or more of these combinations to simplify programming the time switch.
4. Push the hour (h) button until the designated hour appears on the display.
5. Push the minute (m) button until the correct time in minutes appears. The first program on time has now been set.
6. Push the I/O and P button. The word “OFF” and the number “1” will appear on the display, indicating the day and time the first program is to be turned off.
7. Repeat steps 3 – 5 to program the day or days, and time.
   Set the day or days and hour the same setting as for the on time. Set the minutes one minute later than used for the on time, as only a moment is required to initiate the wash cycle within the control.
8. The set the next program, if any, press the I/O and P button. The word “ON” and the number “2” will appear indicating the day and time the second program is to be turned on. Repeat steps 3 – 7 to complete the second program. All subsequent programs will be set in the same way.
9. After all program on and off times have been set, slide the P–Run– button to the run position. The present day and time will be shown. Programming the time switch initiator clock is complete.

**OPERATION:**

When the unit control is on the wash cycle will be automatically initiated at the set days and times when the Auto– switch on the clock is in the “Auto” position. To override automatic initiation of wash cycle(s) slide the Auto– switch to the position. Wash cycles will no longer be initiated.

**NOTE:** When the reset (R) button is depressed all settings for current day and time and programs will be lost.

**To set the Programs (Wash Times):**

1. Slide the auto-manual (Auto–) switch to the auto position.
2. Slide the P–Run– Switch to the program (P) position.
   The word “ON” and the number “1” will appear on the display, indicating the day and time the first program is to be turned on.
Figure 13B
Air Boss Control Schematic - Drawing #448950 Rev. E
NOTES:
1) DETERGENT FEEDER WEIGHT -
   EMPTY 50 LBS.
   FULL 200 LBS.
2) TANK CAPACITY 16 GALLONS.
3) ADD .50 TO DIMENSION FOR
   56 FRAME PUMP MOTOR.

Figure 14A
DETERGENT FEEDER OUTLINE - 16 GALLON
Figure 14B
DETERGENT FEEDER OUTLINE - 30 GALLON