



TRION[®]

Indoor Air Quality

READ AND SAVE THESE INSTRUCTIONS

Air Boss[®] Model 60 Series
with Integral Washing System
Electrostatic Precipitator

Electrostatic Precipitator

Air Boss® Model 60 Series

TABLE OF CONTENTS

Design 2

Installation 5

Operation and Service..... 9

Reference 17

This manual provides information for installation, operation, and service of your TRION Air Boss® Model 60 Series. Before installing and using the air purifier, carefully read these instructions to ensure maximum benefits from the unit and to avoid needless service costs that may result from improper installation and maintenance.

Design

FOR THE SYSTEM DESIGN ENGINEER

General Description

Model 60 equipment consists of factory assembled components to be “built-up” in the field into a completed unit. Depending on the system requirements, the installation may consist of a single unit or a multi-section unit. A multi-section unit is simply two or more single units placed side-by-side.

The factory-assembled components are designed to be mounted on a field prepared pad in the form of a drain basin, typically constructed of poured concrete.

The standard major components supplied with each unit for installation are as follows:

- **Framework** – Support members, complete with sheet metal panels on the top and sides, to receive and locate the ionizing-collecting cells.
- **Ionizing-Collecting Cells** – The elements used to remove and collect the contaminants from the air stream.
- **Control/Power Supply Box(es)** – Located in the control enclosure and converts 115VAC to the high voltage DC required to energize the ionizing-collecting cells.

The programmable logic controller (PLC) electrically sequences the washing operation. The Pulse Width Modulated (PWM) power supplies, providing the necessary high voltage for the air cleaner and the controls initiating and sequencing the wash cycle are furnished in a NEMA 12 enclosure designed for remote mounting. The distance between the controller and unit must be determined as the interconnecting high voltage leads are furnished to the specified length. Consult factory for distances greater than 50 ft. Cables are not to be spliced at any point along their length. In addition, the enclosure is a central junction for the primary wiring.

- **Water Wash System** – Oscillating manifolds located on both sides of the ionizing-collecting cells to periodically wash away the collected contaminants with detergent water.

The detergent system is furnished as a completely assembled unit to be piped directly to the wash water supply, into the wash manifold headers.

The strainer and solenoid valves are to be installed in the wash water supply lines.

Note: 30- or 55-gallon detergent tanks are available as an option.

- **Accessories** – Electrical interlocks, lights and switches for safety and monitoring.

Note: TRION Tridex Detergent is specially formulated for use with TRION electronic air cleaners. Use of other cleaners and detergents not specifically approved by TRION can cause possible failures in the unit and will void any and all warranties on our equipment.

System Design/Floor Layout

The arrangement of the supplied components and the general layout of the system will vary according to application, adjoining equipment and available space. However, there are several basic factors pertaining to all installations that must be considered:

To maintain the selected cleaning efficiency, it is important to assure that the total air volume (capacity in CFM) is uniformly distributed across the entire face area of the unit. However, since most air ducts are designed to handle air velocities greater than the rated velocity of the air cleaner, it is necessary to properly transition any attached ducting. If possible, a contraction ratio of 1 in 3 (approximately 20 degrees) should be maintained. If space prohibits, turning vanes, air baffles or other means may be utilized. Ducting – where attached to the sheet metal panels – should be gasketed, caulked or otherwise made water and airtight.

When there is a danger of rain, snow or debris being drawn into the system with outside air, the make-up air intake should be protected with rain louvers, hooding and hardware cloth to prevent the rain, snow or debris from entering the electronic air cleaner.

Contaminants to be collected – such as oils in vaporous state – must be condensed into particulate form prior to entering the ionizing-collecting cells in order to maintain the anticipated efficiency. Gases, vapors or any non-particulate cannot be precipitated and will therefore pass through the air cleaner. Any condensing that takes place downstream from the air cleaner defeats the purpose. By the same token, heavy concentrations of water vapor, or other matter that becomes highly conductive when condensed, must be prevented from entering and/or condensing in the collecting elements to prevent electrical arc over and shorting.

SAFETY NOTE

Factory designed access to all electrically charged high voltage components contain electrical interlocks for the safety of operating personnel. Any additional access that may be provided in the system, where there is access to high voltage, must be equipped with such interlocks. Interlocks are readily available from the factory.

A foundation and drain basin design must be provided to carry off the wash water used to clean the ionizing-collecting cells. It is suggested that a new concrete basin be poured prior to the scheduled shipment of the hardware. Refer to Figure 3, Recommended Foundation and Drain Basin Layout Drawing.

Serious consideration should be given to any deviation from the suggested design which would result in improper drainage, leakage, air bypass and mounting.

In addition to the governing plumbing codes, the following points should be considered in the construction of the basin.

- Drain lines must be of adequate size to carry off

the required amount of detergent/wash water used. Refer to the Piping Schematic , Figure 4.

- Drain lines must be suitably trapped and vented to prevent line gases from entering the air handling system.
- The basin floor should be properly pitched and finished to prevent puddling.
- The cross members containing the anchoring studs to receive the air cleaner base frame must be even and level to provide a proper foundation for the metal framework base.

Where the installation site is not suitable for a poured concrete basin, rust resistant metal pans may be used. The metal should withstand the weight of service personnel in addition to the weight of the unit.

Wash water to the unit must meet the volume required for the specific unit involved and must be between 40 PSIG Min. – 60 PSIG Max. at full flow to provide proper spray patterns from the wash nozzles. The wash water **MUST** be Hot water (140 degrees F recommended) and installed as close as possible to the unit and detergent system.

Note: The hot water tank is not provided by TRION.

Each installation varies according to needs, but normally the controller is located near the air cleaner. Ideal mounting height is at eye level for ease in reading the instrumentation and to facilitate service.

For ease in maintenance and component removal, adequate space, **39" Minimum Required**, must be provided in front of all access doors, motors, pump and accessory equipment. Access doors must be 24-30" wide.

Outdoor Installations

Requirements for outdoor protection vary in accordance to climate and equipment component arrangement for the particular job. The best approach, for equipment protection, is the construction of a heated shed or building over

the installation. As an alternative, the installing contractor should treat the equipment as required to meet the specific needs.

Controller/PWM Power Supplies

As the controller/power supplies are designed for remote mounting, they can be, in many cases, located indoors and still be reasonably close to the main cabinet. If located outdoors with the cabinet, it must be weather protected.

Wash Water Supply Line

Naturally, the length of the run between the TRION cabinet and the heated building should be kept to a minimum. Preferably the line would go through the roof directly below each of the two manifold headers with the strainer, solenoid valve and back flow preventer kept indoors. Installed in this manner, a dumping valve can be included in the supply line to drain the remaining water and prevent freezing. The normally open dumping valve should be energized to close when the water wash solenoid valve is energized to open. The strainer and solenoid valve are supplied by TRION. The dumping valve and back flow preventer or check valve are to be supplied by others.

If the above method is not employed, the supply line and manifold headers must be kept from freezing with heat wrap or other means.

Detergent System

The detergent system, designed for remote mounting, should be installed indoors and piped to the water supply line within the heated interior. Detergent feed line should be piped with as short a run as possible and inject into the wash water supply line as close as possible and upstream from the Model 60 header connection points.

Contact the local TRION Sales Office or the factory if questions arise, or any additional information is required.

Installation

FOR THE INSTALLING CONTRACTOR

Unpack & Inspect

At the time the unit is received, all shipping containers and their contents should be examined for damage. Any damage occurring in shipment must be immediately reported to the carrier, an inspection report completed and a claim filed at the receiving point.

The number of shipping containers included in the shipment is dependent upon the unit size and type. When packaging the material for shipment, consideration is given to grouping the components into the installation categories in which they will be used. The packing list included with shipment identifies the various items to a specific box number. In general, the grouping is as follows:

- Framework
- Ionizing-Collecting Cells
- Washing System Components
- Controller with Power Supplies
- Accessories

For the protection of the components, it is recommended that those materials not immediately needed for installation be stored in the container in which they are received in a safe, dry and clean location. This is particularly true with the ionizing-collecting cells, which may be damaged when not properly handled.

Assemble Framework

The base frame, two sides and top are match marked on the air entering side of the air cleaner at the factory prior to shipment. See Figure 5.

1. Position the base frame on the drain basin. Make sure it is located with the marking "BOTTOM FRONT" on the air entering side. The anchoring studs in the drain basin should be located on the inside of the frame channels and the entire frame should be level. Shim as necessary.

2. Secure the base as illustrated. It is important that the studs do not protrude above the base frame channel. Cut top of studs, if necessary. Each anchor should be treated to prevent rust.
3. Attach the side and top panels, match marking where the pieces join on the air entering side; A to A, B to B, etc. The required fasteners are packaged and marked for the framework.
4. After the outside frame structure is complete, position and secure the intermediate cell supports. The side to receive the air bypass strips marked "FRONT" should be positioned toward the air entering side.

Attach Adjoining Ductwork

Depending on the application, the installation plan may or may not call for adjoining ductwork on the air entering and/or air leaving sides of the cabinet.

When adjoining ducting is to be installed, attach to the flanges on the air entering and air leaving sides of the unit. Maintain structural squareness during attachment. The seam should be made air and watertight by caulking or gasketing. The seam between the concrete drain basin and the metal work must be caulked or grouted to form a good water tight seal.

When a blower is installed downstream from the TRION cabinet, the ducting between the cabinet and the blower will be under negative pressure and should be made air tight to prevent infiltration of contaminated air.

After the ductwork has been installed, clear remaining material or debris from inside ducts and bottom of cabinet.

Install Ionizing-Collecting Cells

Before placing the ionizing-collecting cells into the framework, the electrical cell-to-bus connectors must be inserted through the holes located in the flanges of the end plates and secured into place. There are two connectors per cell; one short collector standoff and a long ionizer standoff. Connect the bus bars and cell wiring as shown on Figure 6, 6A, 6B and Figure 7.

NOTE: Follow the directional arrows located on the cell end plates. The side of each cell containing the spiked ionizer blades must be located on the air entering side of the cabinet.

Install Air By-Pass Baffles

The air baffles are provided to be secured to the air entering side of the unit to block off the air gap between the frame and the top and the sides of each cell. They are secured into place with the screws provided. The vertical baffles for the cell ends are all rubber backed. The horizontal baffles across the top of each cell are plain. There are different sizes of each baffle. Refer to Figure 8 and 8A for the arrangement.

Install Wash System Components

General

The ionizing-collecting cells are washed, both from the front and the rear of the unit. A unit may be made up of one or more sections. For each section there are two sets of wash components; one for the front and one for the rear. Both sets are identical except for rotation of the manifold drive motors; one being clockwise and the other counterclockwise.

The components required for any one section are as follows:

- 2 each Wash Manifolds for each cell tier of unit height
- 2 each Manifold end supports
- 2 each Manifold header supports
- 2 each Manifold headers
- 2 each Manifold drive motor assemblies
- 2 each Top connecting links
- 2 each Main drive links
- Bolts, nuts, bushings and fasteners as required

Refer to Figure 9. The illustration shown is left hand as determined when standing in the ductwork in front of the unit with air flow striking the back. The unit is factory built to the hand specified and positions the manifold headers and drive motors,

usually on the same side as the duct access door. Completely assemble the washer on one side then follow the same procedure for the remaining side.

Mount Manifold Drive Motors

Select the manifold drive motors by observing the directional arrow on the housing denoting the rotation of the drive arm. The drive arm should rotate over the top toward the cells. Refer to Figure 12B.

Position and secure the motor assemblies to the mounting plate located between the two members protruding from the top frame. Refer to Figure 9 & 10.

Mount Manifold Headers

Position the header supports to the members protruding from the top frame and attach by the top bolt only, allowing the bottom to temporarily swing free. Then work the open end of the headers into the holes in the top of the sheet metal housing and the 90 degree fittings along it's length into the holes in the support. When all is in place, secure the headers with the pipe clamps provided and the bottom of the supports to the members protruding from the bottom frame.

Install Wash Manifolds

Position and secure the manifold end support, both at the top and bottom. Install the manifold end bushings (Black snap rings) into each of the holes along the vertical length. Then install the manifolds by inserting the closed end into the holes in the end support and coupling the quick disconnect fitting at the header end.

Connect Drive Linkage

Refer to Figure 10 and install the linkage. Pay close attention to the brass bushings at each connection. They are slightly different lengths and color-coded for identification. The bushing at motor drive arm is 9/16" long and coded black. The bushing at top manifold connecting link is 3/4" long and coded white. The bushing for the lower manifold connecting arms are 7/16" long and are not coded – natural brass.

Mount Detergent Feeder Assembly

Refer to the DETERGENT FEEDER OUTLINE and the PIPING SCHEMATIC. Locate the assembly

indoors on the outside of the ducting and as close to the air cleaner as practical, providing sufficient space to service the storage tank, pump and motor. When the assembly has been located in accordance to the reference drawings and instructions, secure it into place at the predrilled factory mounting pads either by bolting or welding.

Connect Piping

Refer to the PIPING SCHEMATIC and complete the piping connections as shown.

Connect Drain

Connect a drain line to the pipe coupling in the cabinet drain basin in accordance with the governing plumbing codes. The drain line must be sealed with a trap or other means to prevent air by pass. If a trap is used, it should hold sufficient water column to overcome the system air pressure and to assure that loss of liquid from evaporation between cleaning periods will not break the seal. The drain line should not be smaller than the drainpipe coupling, or it will otherwise restrict the flow of water.

Connect Water Wash Supply

The items furnished to be included in the wash water supply are a strainer, an electrically operated solenoid valve, and a detergent system. Refer to the Piping Schematic Figure 4.

Unless otherwise specified, the water wash supply should be hot (**140 degrees F recommended-WATER HEATER NOT SUPPLIED BY TRION**) at the volume specified for the given unit, and at a full flow pressure between 40 and 50 PSIG.

WARNING

Adequate precautions should be taken in the event the water supply, detergent system and drains are subjected to freezing temperatures.

Although not required, a pressure gage and a manual service valve are recommended as shown in the diagram. The components should be located within the system to provide for service access.

Mount Controller

The Controller should be mounted at eye level and located as close to the air cleaner as practical. It must be mounted indoors out of the weather unless supplied with a weatherproof cabinet. Allow sufficient space in front of the access door(s) for service. Refer to appropriate Control/Remote PWM Box Outline Drawing for mounting hole layout and dimensions.

Complete Wiring

High Voltage Wiring

WARNING
EXERCISE ALL THE NORMAL PRECAUTIONS
WHEN WORKING WITH HIGH VOLTAGE AND
COMPLY WITH NEC AND ALL APPROPRIATE
LOCAL CODES.

The high voltage wiring consists of interconnecting the ionizing-collecting cells into banks with bus bars, then wiring each bank of interconnected cells to its corresponding power supply with the high voltage cable.

NOTE: It is important to wire each bank of cells to its corresponding power supply as each power supply is marked with a specific operating range and sized for a given bank of cells.

Refer to Figure 6A or 6B, and select the appropriate unit model. Interconnect the cells with the bus bars as shown. When fully connected, the cells will be grouped into banks as indicated by the letters "A" and "B".

Next, wire the interconnected cell banks to their corresponding power supplies with the high voltage cable provided. Depending on the size of the unit, there may be from 3 to 14 PWM Power Supplies.

NOTE: Each high voltage cable should be run in a separate conduit and must not be spliced at any point between the power supply and the cell termination.

Use the blue cable for the ionizer and the black cable for the collector plates. At the cell termination, the outer jacket of insulation should carefully be stripped back from the inner layer of insulation a distance of four (4) inches to prevent tracking.

Normally the high voltage cable entrance should be made from the top of the ductwork. If the installation demands entrance from some other point, the conduit should be sealed where it terminated at the duct to prevent moisture from entering the conduit during the washing operation.

At the power pack termination, be sure the blue ionizer cable is connected to the terminal marked IONIZER and the black collector cable is connected to the terminal marked COLLECTOR.

Primary Wiring

Duct Door Electrical Interlocks (two are furnished as standard) - Outside each duct access door.

Duct Door Electrical Interlock and Pilot Lights (two are furnished as standard) – Outside each duct access door and adjacent to the electrical interlocks.

Duct Lights (two are furnished as standard) – On air entering side and on air leaving side of air cleaner on the inside of the duct work.

Disconnect Switch and Pilot Lights (four are furnished as standard) – Two on Inside, Two on Outside of each access door at most convenient location near the door. Those located inside are wired in series with the electrical interlocks and used as a safety measure to control the primary power to the high voltage power supplies from inside the duct. Those located outside control the duct lights.

Grounding: An earth ground must be provided to the Model 60 cabinet and control. All ground connections must be in contact with bare metal and securely affixed. Ground conductor size and connection means will be in accordance with all applicable electrical code standards.

Check Out for System Start-Up

When the installation has been completed, assure that the equipment is ready for start-up by checking the following:

1. All construction debris is removed from the ionizing-collecting cells, drain basin and ductwork.
2. The inside of the controller and detergent tank are clear of any foreign materials.
3. The drain line from the TRION drain basin is clear and completely connected to its point of termination.
4. All piping is completed to the manifold headers and wash water is available to the supply line.
5. Supply line power is available and electrical wiring is completed to the following components:
 - Controller
 - Solenoid Valves
 - Section Valves (When required)
 - Detergent Pump Motors
 - Manifold Drive Motors
 - Electrical Interlocks
 - Ionizing-Collecting Cells
 - The System Fan
 - Duct Lights, Indicating Lights, and Switches

NOTE: Do not put the initial supply of detergent into the detergent tank. This is to be done after volume settings are made at start-up.

Operation and Service

FOR THE MAINTENANCE ENGINEER

WARNING
RISK OF ELECTRIC SHOCK
 These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Introduction

The TRION electronic air cleaner is technically known as an electrostatic precipitator. In this type of equipment, all airborne particles, even of microscopic size, are electrically charged (positively) as they pass through a high voltage ionizer. 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 ionizer consists of charged stainless steel spiked blades or tungsten ionizing wires spaced between grounded electrodes. The collecting section consists of parallel plates arranged so that each alternate plate is charged while the intermediate plates are electrically grounded.

Periodically, depending on the type and concentration of contamination in the air, the contaminate is washed from the plates by the integrally constructed water wash system.

Three major functional components comprise the air cleaner:

1. Ionizing-collecting cells to ionize and collect airborne particulate matter.
2. Power supply(s) to supply high voltage direct current to the ionizing-collecting cells.
3. Control operated washer to automatically wash away the collected contaminate.

Normally, systems are designed for collection efficiencies in the range of 90 percent or more. Collecting a contaminant at these efficiencies, especially when there are high concentrations can result in large accumulations in a relatively short period. Therefore, maintenance must encompass two areas; the operation of the equipment for efficient collection and the systematic removal of the collected contaminant.

General Description

The ionizing-collecting cells (contaminant collecting elements) are housed in the cabinet on unistrut frames. They can be removed from the unit as required, from the backside (downstream airflow

side). When installing cells into the cabinet, observe the directional arrows on the cell end plates. The side of the cell containing the spiked ionizer blades always must be located on the air entering side.

The Power Supply(s) convert the 115 volt, 60HZ, single phase AC supply to the high voltage DC needed to power the ionizing-collecting cells. Potential of 13 KVDC are required for the ionizer sections and 6.5 KVDC for the collector sections of the cells.

The integral wash system consists of a series of spray nozzles soldered into oscillating water wash manifolds. The manifolds are located in the front and rear of each cell tier. They are oscillated through straight drive linkage powered by fractional HP motors. A detergent system is also incorporated into the wash system. The amount of detergent used for washing is readily adjustable, and that amount is dependent upon the type and amount of collected contaminant.

The washing operation is cycled periodically, and again the frequency is dependent on the type and amount of contaminant collected. The events in a wash cycle are:

- Power Supply(s) and System Fan "OFF"
- Washer and Detergent "ON"
- Washer and Detergent "OFF"
- Pause for Detergent to react
- Washer "ON" (without detergent for rinse)
- Washer "OFF"
- Pause for Drip Dry
- Blower "ON" for forced dry
- Power Supply(s) "ON"

The time span for all of the events is factory set when the equipment is initially ordered.

Initial Start-Up

1. Inspect the inside of the adjoining ductwork and TRION cabinet to be sure it is clean and free of any debris or construction materials. Especially note the opening in the drain basin for any restrictions. The ducting, where secured to the cabinet collars, should be sealed water tight either with gasketing or caulking.
2. Inspect the ionizing-collecting cells to see that all of the ionizing blades or wires are intact, that no large pieces of foreign material are lodged between the plates, and that the cells are properly installed in the cabinet with the spiked ionizing blades located on the air entering side.
3. Check the high voltage leads to see that they are connected to the proper terminal both at the ionizing-collecting cells and inside the controller. Refer to Figure 12A.
4. Be sure that the drain lines from the TRION cabinet drain basin are completely connected and properly terminated. A trap or seal of some type should be incorporated in the line to prevent air bypass.
5. Check the water supply line to be sure water is available and that the strainer, solenoid valve, and detergent system are properly installed and connected. Refer to Figure 4.
6. Be sure that electrical power is available, that the wiring is completed, and that the system blower is ready to energize.
7. Be sure that all access door interlocks are closed.
8. Close the system electrical supply switches, making power available to the TRION controller and the system fan.
9. Turn the controller selector switch to the "ON" position. The blower should run (if installed) and the power supply(s) should be energized. Electrical arcing within the ionizing-collecting cells may occur. It is a normal occurrence caused by accumulation of dusts from construction or other sources in the cell(s) and should subside quickly. If the arcing is continuous and does not subside, recheck the routing of the high voltage leads between the power supply(s) and the cell(s). Refer to the field wiring diagram. The ionizer lead must be connected to the ionizer and the collector lead to the collector.
10. Ensure 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 completed.**
11. (Review this paragraph in its entirety before initiating the wash start button.)

Next, set the detergent volume setting per wash at the detergent feeder. Manually initiate the wash cycle by pushing the “Wash Start” button on the control. The wash control duration is 70 minutes and by means of a factory preset programmable logic controller (PLC) will sequence the washing events as previously outlined. When the detergent pump is energized, note the amount that is used by observing the reduction in the liquid level in the tank. The usage should be approximately 1 part of detergent to 20 parts of water. The water and detergent requirements for each unit model are listed on the Piping Schematic, Figure 10. To adjust the volume output from the pump, refer to the Detergent System Outline, Figure 9. 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.

12. When the wash control has cycled out, manually set the programmable timer relay (TR), or initiator clock, located in the control for automatic initiation of the washing operation. This setting can be tailored to the washing frequency best suited for the specific application and may be best explained by example.

Suppose the application of the equipment is to clean restaurant kitchen exhaust air. The collected contaminant to be washed away is of greasy nature, containing particulate such as smoke and fume from the grill, mist and vapors from the French fryer, flour dust and other various matter that is created by normal kitchen operation.

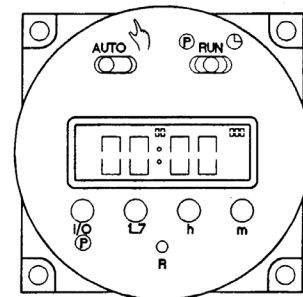
In our example, the restaurant operates Monday through Saturday (closed Sunday) and opens daily at 6:00 a.m. and closes daily at 11:30 p.m.

This busy schedule presents a relatively heavy dirt loading and being of greasy nature should be washed away daily. The best time being shortly after closing when the atmosphere has settled but before the greasy contaminant collected has had a chance to harden and setup.

From the above, a wash schedule of every day except Sunday at 1:00 a.m. can be established. As the duration of events preset at the factory is approximately 70 minutes, the cycle will end at approximately 2:20 a.m.

Prior to setting the initiator clock it will be necessary to charge the battery located inside the clock. This is accomplished by turning the selector switch on the front of the control to the “ON” position. A light inside the switch will glow. If it does not glow, check to be sure there is supply line power to the control. **DO NOT PUSH THE WASH BUTTON.** Allow the control to remain in the “ON” position for 24 to 36 hours while the battery is charging.

Initiator clock setting:



Initiator Clock (Programmable Timer Relay)

To set the initiator clock, it is first necessary to set the existing time, then the program times that are to be initiated.

To set existing time:

1. Depress the reset (R) button to cancel out any previous settings.
2. Slide the P-Run switch to the clock position . Monday (MO) will be indicated.
3. Push the (1 ... 7) button until the present day of the week is indicated.
4. Push the hour (h) button to the present hour of the day.

5. Push the minute (m) button to the minutes past the hour of the day.
6. Slide the P-Run switch to the run position. The colon will blink indicating the clock has been set.

To set the programs (wash times) according to the times in the example outlined above:

1. Slide the auto-manual 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. This indicates the time the first program is to be turned "ON."
3. Push the day (1 ... 7) button until only the day Monday (MO) appears on the display.
4. Push the hour (h) button until the designate hour (01:00) appears on the display.
5. It is not necessary to set the minute (m) as 1:00 o'clock on the hour was the selected wash initiation "ON" time. The "ON" time has now been set.
6. Next, set the program "OFF" time. This will be 1 minute after the "ON" time. A 1-minute duration is adequate program time as the initiation signal is sent to the wash control logic timer instantaneously.

Push the I/O (P) button. The word "OFF" and the number 1 will appear on the display. This indicates the set time the first program is to be turned "OFF."

7. Push the day (1 ... 7) button until only the day Monday (MO) appears on the display.
8. Push the hour (h) button until the hour 01:00 appears on the display.
9. Push the minute (m) button until the time 01:01 appears on the display. Program 1, wash time "ON" and "OFF," for Monday has now been set.
10. Next set the second program which will be the Tuesday (TU) washing. Push the program I/O (P) button. The word "ON" and the number "2" will appear on the display.
11. Repeat the setting process for TU as outlined above in steps 3 through 9 for MO "ON" - "OFF" time.
12. After the wash program has been set for TU,

repeat the same setting procedure for WE, TH, FR and SA. Omit SU.

13. Slide the P-Run switch to the run position. The existing time of day will show on the display. The six selected wash days established in the example have been set.

NOTE: Using the above procedures, different washing days and "ON - OFF" times may be established and set into the initiator clock to best serve a specific application.

NOTE: Once the reset key (R) is pressed, the previous time and program will be cleared to the initial state.

Wash Control & Detergent Settings

Some dirt's being more tenacious than others are more difficult to remove and require a stronger detergent solution. Average settings have been factory set. Best possible settings for any given installation, however, are determined through experience. Determination can be made by visually examining the collecting elements after the first few washings.

To adjust the volume of detergent used within the given time setting, loosen the knurled knob with an Allen wrench on the control valve located in the by-pass line. Refer to the Detergent System Outline. Turning the knob clockwise increases the volume and counter clockwise decreases the volume. When adjustment has been made, be sure to retighten the setscrew.

Routine Maintenance

Washing Frequency

The frequency that the collected dirt is to be washed from the unit depends upon the type and amount of dirt in the air to be cleaned. Dirt which is greasy in nature tends to harden after collection and should be washed away often. Likewise, units operating under extremely heavy dirt loads should be washed more often as a large build-up of

collected material will have a tendency to “blow-off” if permitted to remain on the collecting elements for long periods of time. In that the type and amount of dirt varies geographically (and from one location to another in any given area) it is recommended to start operation with a washing frequency of at least once a week. This schedule may then be altered as needed after visual examinations of the collected material contained on the ionizing-collecting cells. Daily washing is not unusual for units operating on heavy welding fume, kitchen exhaust hoods or similar applications.

Detergent

Effective washing is dependent upon detergent. The detergent reservoir should be examined on a routine basis, a minimum tank level established and never permitted to empty. An empty tank not only means poor washing, but can also be detrimental to the pump. The inside of the tank should be kept clean, free from dirt and foreign objects. The detergent, as supplied by TRION, is formulated specifically for electronic air cleaners. If substitutes are used, they must be approved by TRION, so as to not void the warranty. They should be safe for use in ventilation systems and non-caustic, as 95% of the ionizing-collecting cells are constructed of aluminum and special high voltage insulation and gasket seals.

Electrical Operation

The Air Boss controller (Optional) contains a digital LED display for kilovolt and milliampere readings. The milliammeter should be observed on a routine basis to be sure that it is reading within the prescribed operating range as marked on the data plate. For those units containing a voltmeter, the collector voltage should be between 6 and 7 KV, and the ionizer between 12.5 and 13.5 KV.

The ATS controller and remote PWM box both have LED indicating lights to show power to the PWM power supplies. Flickering or failed LED's indicate electrical arcing and/or power failure.

Periodic Maintenance

Water Wash System - Every 6 Months

The water wash spray pattern should be checked on each nozzle to be sure that a full spray pattern is developed. Distorted patterns are usually caused by dirt in the nozzle orifice, which can be cleaned by inserting a small gage, soft copper wire into the orifice. If any one manifold contains several nozzles that are restricted, the drain plug at the idler end of the manifold should be removed, after the nozzles have been cleaned, and the manifold flushed with clean water. The main supply line strainer and the strainer in the detergent system should be checked and cleaned. Check the wash manifold drive linkage connections and tighten or adjust as required.

Controller - Every 12 Months

The inside of the controller cabinet should be examined for accumulated dirt and dust. If required, the components should be cleaned using a good brand of electrical contact cleaner. All terminal connections should be checked for securement and tightened or reworked as required.

Ionizing-Collecting Cell - Every 6-12 Months

Remove and inspect the ionizing-collecting cells for excessive dirt accumulations not removed by the integral washing system. Manually clean as required in a soak tank, commercial car wash, or with a pressure hose or pressure cleaner using a low pressure setting. At this time, particular care should be taken in cleaning each of the insulators.

WARNING
RISK OF ELECTRIC SHOCK
DO NOT USE HIGH PRESSURE STEAM
CLEANING EQUIPMENT TO CLEAN CELLS.
THE EXCESSIVE HEAT AND PRESSURE WILL
CAUSE THE PLATES TO WARP AND IN TURN
POSSIBLY CAUSE EXCESSIVE ARCING.

Motors - Every 24 Months

As the operation of detergent pump motor is limited, frequent oiling is not required. Lubricate with several drops of SAE 10 motor oil every two years. DO NOT OVER OIL. The manifold drive motors are factory lubricated for life and do not require oiling.

Filter Devices - Every 4-6 Months

Hoods, impingers, metal mesh filters, ducts and other appurtenances shall be cleaned to bare metal at frequent intervals prior to surfaces becoming heavily contaminated with grease, oil or other contaminant. It may be advantageous to clean readily removable items, such as impingers, metal mesh filters or other permanent filter devices in a soak tank, with a pressure hose or pressure cleaner at low setting. After cleaning to bare metal, components shall not be coated with powder or other substance.

When a cleaning service is used, a certificate showing dates of inspection and/or cleaning shall be maintained on the premises.

WARNING

Flammable solvents or other flammable cleaning aids shall not be used.

At the start of the cleaning process, electrical switches that could be accidentally activated shall be locked out. Components of the fire suppression system (if installed) shall not be rendered inoperable during the cleaning process.

Care should be taken not to apply cleaning chemicals on any fusible links or other detection devices of the automatic extinguishing system.

Troubleshooting

WARNING

EXERCISE THE USUAL PRECAUTIONS WHEN WORKING WITH HIGH VOLTAGE. THE MAXIMUM OPERATING OUTPUT FROM THE POWER SUPPLY IS 15,000 VDC AND 5.5 MA. to 11.0 MA. WHEN IN PARALLEL.

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 HANDLED SCREW DRIVER BY SHORTING TO GROUND THE POINTS OF HIGH VOLTAGE DC POTENTIAL.

WARNING

RISK OF ELECTRIC SHOCK

The servicing Instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the service instructions unless you are qualified to do so.

Introduction

This section on troubleshooting provides a description of potential malfunctions, their cause, location and correction. A Troubleshooting Reference Chart listing the most probable causes and corrections follows the general text.

The electronic air cleaner is the unit within the system that has the highest efficiency collection rating and is also the one with the highest potential for malfunction. When a mal-function does occur, the outage is usually found in the electrical secondary circuit in the ionizing collecting cell(s).

Indicating lights are installed in the face panel of the control to monitor the electrical operation of each power supply and the ionizing collecting cell(s) they energize. The quantity of power supplies per unit is dependent upon unit size with one or two power supplies for each ionizing collecting cell tier in height. Other than the basic hand tools, it is advantageous to have a volt/ohm/milliammeter with a 20 KVDC high voltage probe. These instruments are standard catalog items by several manufactures.

Secondary Short Circuit

The most common outage is a short in the secondary circuit and is best located through the process of elimination. Symptoms are a flickering indicating light accompanied by an arcing noise in the ionizing collecting cell(s) or an indicating light that is not glowing.

A flickering light with an arcing noise is an indication of a high resistance short circuit and a light that is not glowing is an indication of a dead short. (A light that is not glowing can also be an indication of an open circuit in the primary circuit.

Refer to the paragraph on open circuits.) The short may be in the power supply, the high voltage cables or the ionizing collecting cell(s). To isolate the short to any one of these three components, proceed as follows:

WARNING

When safety interlock switches are closed, do not come in contact with high voltage components. The operating output from the high voltage power supply(s) is 12,600 VDC and 6 MA. to 11.0 MA.

When the power supply(s) is de energized there is a 20 second delay for the voltage to decay. Always short from ground to a point of high voltage with a well Insulated jumper wire or an insulated handled screwdriver to bleed off any remaining residual charge.

1. Disconnect both high voltage leads from their respective terminals in the power supply and support them away from any point of contact.
2. Energize the power supply:
 - If the light still flickers or does not glow, the trouble is indicated to be in the power supply. First, check the inline fuse mounted on the circuit board and replace if it is blown. Second, replace the power supply in its entirety.
 - If the light glows steady with the leads disconnected the power supply is indicated to be normal.

NOTE: It will be necessary to close the access door electrical interlock switch operated by the access door , to complete the primary circuit to the power supply.

3. Next reconnect both high voltage leads to their respective terminals inside the power supply and disconnect them at the ionizing collecting cell(s). Support them away from any point of contact and energize the power supply.
 - If either high voltage lead is defective the light will indicate the trouble. Each lead may then be checked separately by disconnecting them, one

at a time, from their respective terminals at the power supply. When a lead is found to be defective, replace it in its entirety. Do not repair or splice.

- If the light glows steady with the leads disconnected at the ionizing collecting cell(s) the trouble is then indicated to be in the ionizing collecting cell(s).

The trouble can then be isolated to a single cell, or the ionizing or collector section of a given cell as follows:

- First determine if the short is in the ionizing section or the collecting section by connecting each high voltage lead to its respective section, one at a time, and energizing the power pack. (The lead not connected must be supported away from any point of contact.) The short symptoms will still exist for the section in which the short is located. If the trouble causing the short is bridging both sections, then the short will be indicated in both sections when they are individually connected.
- When the short is isolated to a cell tier, remove all the cells within the tier and visually check the sections indicated to contain the short.
 - If the short is in the ionizer section, look for a broken or defective insulator.
 - If the short is in the collector section, look for a large piece of foreign material bridging the collector plates or a defective insulator.
 - If the short is indicated to be in both sections, it will probably be a foreign object bridging the air gap between the ionizer and the collector.
- Open Circuits
 - Although open circuits can occur in the secondary they usually take place in the primary. If the unit contains only one power supply and the indicating light does not glow the outage is probably one of the following.
 - Supply line power to the control disconnected. Reconnect.
 - Open access door interlock in control of electronic air cleaner. Be sure all access doors are properly closed and secured.
 - Blown in line fuse - Replace Power Supply.
 - Outage in the power supply. Look for charred or burned components or a loose

wiring connection. Replace power supply or reconnect wiring.

- Defective indicating light. Replace light.
- Malfunctions other than short or open circuits. Refer to troubleshooting reference chart in this section.

Spare Parts

Recommended spare part quantities are usually based on the unit size and the amount of units per installation. For specific recommendations, consult the TRION

factory or nearest Sales Office. Consideration, however, should be given to stocking the following components;

Description	Quantity
PWM Power Supply	2
Cell Insulators	6
LED	2

Part Numbers are not listed as they are subject to change. Always state Unit Model and Serial Numbers when ordering parts.

Troubleshooting Reference Chart

Problem/Symptom	Probable Cause	Location	Reason - Correction
Indicating Light Not Glowing	Short Circuit	Ionizing Section of Cell	1. Dirty Insulator(s) - Clean 2. Defective Insulator(s) - Replace 3. Foreign Object between Ionizing Bar and Ground electrode - Remove
		Collecting Section of Cell	1. Dirty Insulator(s) - Clean 2. Defective Insulator(s) - Replace 3. Foreign Material Bridging Plates - Remove 4. Bent Plates - Straighten or Replace
		High Voltage Leads	1. Disconnected High Voltage Lead Contacting Ground - Reconnect 2. Defective Lead/Insulation Breakdown - Replace Entire Lead
		Power Supply	Charred/Overheated Components - Replace Power Supply
Indicating Light Not Glowing	Open Circuit	Control	1. Disconnected Supply Line Power - Reconnect 2. Faulty Indicating Light - Replace
		Power Supply	1. Blown Fuse - Replace Power Supply 2. Disconnected Wire - Replace 3. Charred/Overheated Components - Replace Power Supply
		Electronic Air Cleaner Housing	1. Electrical Interlock Switch Not Closed - Close Access Door 2. Faulty Electrical Interlock Switch - Replace
Indicating Light Flickering	High Resistance Short	High Voltage Circuit	1. Ionizer High Voltage Lead Connected to Plate Section and Plate Lead to Ionizer - Reconnect Leads 2. Loose or Disconnected High Voltage Lead - Tighten or Reconnect 3. Loose or Defective Intercell Connection (on Multicell Units) - Tighten or Replace 4. Foreign Object Adrift in Ionizer or Plate Section of Cell - Remove

Reference

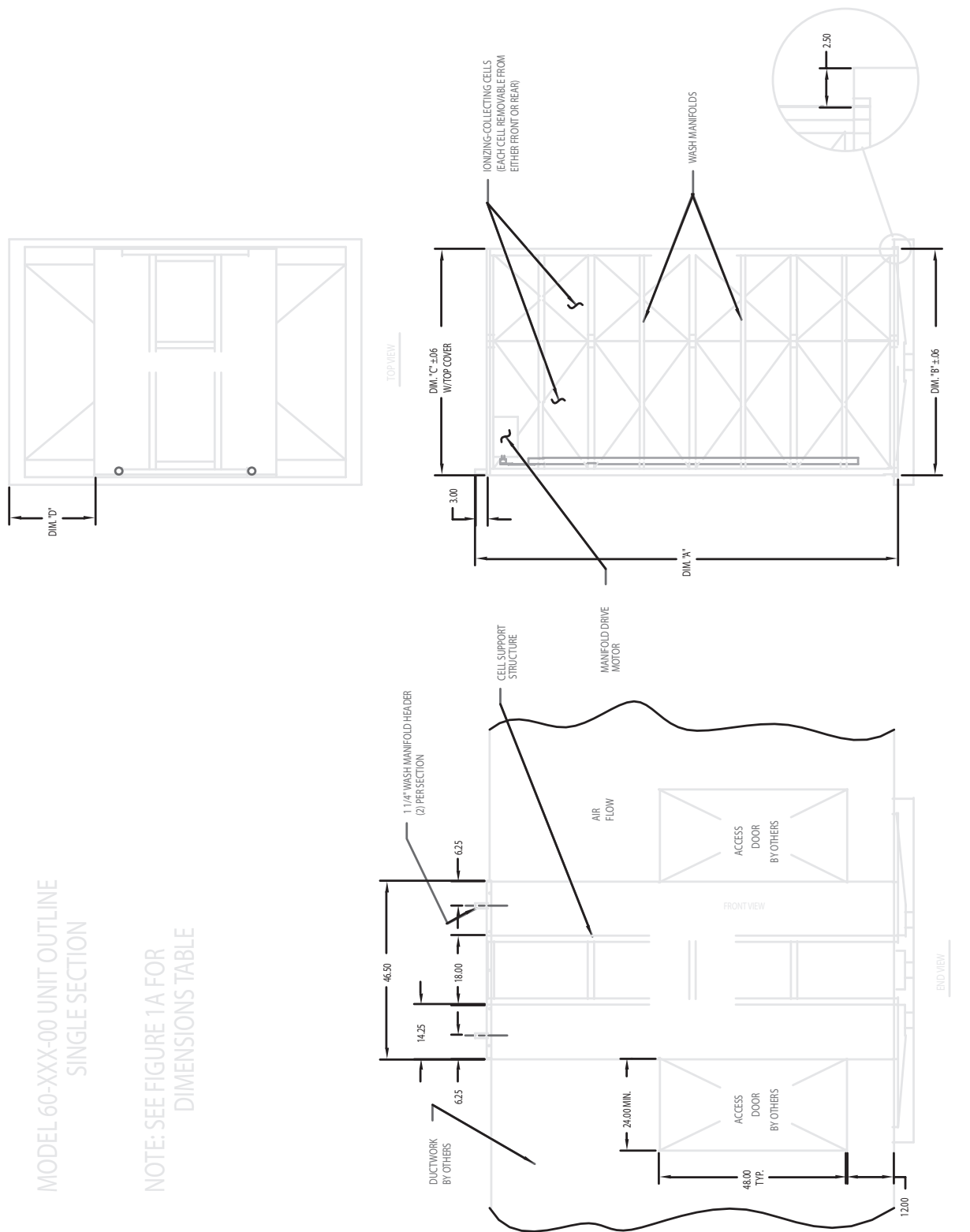


Figure 1

SINGLE SECTION
MODEL 60-XXX-00 UNIT OUTLINE
NOTE: SEE FIGURE 1 FOR PICTORIAL

UNIT MODEL NO.	DIM "A"	DIM "B"	DIM "C"	DIM "D"	WATER REQ'D @ 40 PSI	DETERGENT REQUIRED	POWERPACKS REQ'D. PER UNIT	APPROXIMATE UNIT WEIGHT
60-304-00	79.31	47.81	47.94	21.75	25 GPM	1.2 GPM	1	995 LBS.
60-305-00	79.31	59.00	59.12	21.75	29 GPM	1.4 GPM	1	1135 LBS.
60-306-00	79.31	70.19	70.31	21.75	36 GPM	1.7 GPM	1	1275 LBS.
60-307-00	79.31	81.03	81.16	21.75	40 GPM	1.9 GPM	2	1435 LBS.
60-308-00	79.31	92.21	92.34	21.75	47 GPM	2.3 GPM	2	1575 LBS.
60-309-00	79.31	103.40	103.53	21.75	50 GPM	2.4 GPM	2	1715 LBS.
60-403-00	105.19	36.88	37.00	21.75	24 GPM	1.1 GPM	1	1070 LBS.
60-404-00	105.19	47.81	47.94	21.75	34 GPM	1.6 GPM	1	1275 LBS.
60-405-00	105.19	59.00	59.12	21.75	38 GPM	1.8 GPM	2	1460 LBS.
60-406-00	105.19	70.19	70.31	21.75	48 GPM	2.3 GPM	2	1640 LBS.
60-407-00	105.19	81.03	81.16	21.75	53 GPM	2.5 GPM	2	1845 LBS.
60-408-00	105.19	92.21	92.34	21.75	62 GPM	3.0 GPM	2	2025 LBS.
60-409-00	105.19	103.40	103.53	21.75	67 GPM	3.2 GPM	2	2205 LBS.
60-504-00	131.06	47.81	47.94	21.75	42 GPM	2.0 GPM	2	1555 LBS.
60-505-00	131.06	59.00	59.12	21.75	48 GPM	2.3 GPM	2	1780 LBS.
60-506-00	131.06	70.19	70.31	21.75	60 GPM	2.9 GPM	2	2000 LBS.
60-507-00	131.06	81.03	81.16	21.75	66 GPM	3.1 GPM	2	2255 LBS.
60-508-00	131.06	92.21	92.34	21.75	78 GPM	3.7 GPM	3	2485 LBS.
60-509-00	131.06	103.40	103.53	21.75	84 GPM	4.0 GPM	3	2705 LBS.
60-604-00	156.94	47.81	47.94	33.75	50 GPM	2.4 GPM	2	1775 LBS.
60-605-00	156.94	59.00	59.12	33.75	58 GPM	2.8 GPM	2	2040 LBS.
60-606-00	156.94	70.19	70.31	33.75	72 GPM	3.5 GPM	2	2310 LBS.
60-607-00	156.94	81.03	81.16	33.75	79 GPM	3.8 GPM	3	2610 LBS.
60-608-00	156.94	92.21	92.34	33.75	94 GPM	4.5 GPM	3	2875 LBS.
60-609-00	156.94	103.40	103.53	33.75	101 GPM	4.8 GPM	3	3140 LBS.
60-704-00	182.81	47.81	47.94	33.75	59 GPM	2.8 GPM	2	2060 LBS.
60-705-00	182.81	59.00	59.12	33.75	67 GPM	3.2 GPM	2	2365 LBS.
60-706-00	182.81	70.19	70.31	33.75	84 GPM	4.0 GPM	3	2675 LBS.
60-707-00	182.81	81.03	81.16	33.75	92 GPM	4.4 GPM	3	3025 LBS.
60-708-00	182.81	92.21	92.34	33.75	109 GPM	5.2 GPM	4	3335 LBS.
60-709-00	182.81	103.40	103.53	33.75	118 GPM	5.7 GPM	4	3638 LBS.

NOTES:

1. MODEL DESIGNATION DETERMINED AS FOLLOWS:



EXAMPLE: UNIT SHOWN IS MODEL 60-405-00

EQUIPMENT TYPE: MODEL 60 (FIELD ASS'Y)

NO. OF CELLS IN HEIGHT: 4

NOMINAL UNIT WIDTH: 5 FT (ONE 2 FT. & ONE

3 FT. CELL)

FEATURE 00: DUAL WATER WASH
(FRONT & REAR)

2. SPECIFY UNIT HAND, EITHER RIGHT OR LEFT.

UNIT HAND DETERMINES THE SIDE OF THE UNIT
(IN DIRECTION OF AIR FLOW) FOR CONNECTION OF
WASH MANIFOLD HEADERS AND MANIFOLD DRIVE
MOTORS. (LEFT HAND UNIT SHOWN)

3. TWO STANDARD CELL SIZES, 2 FT & 3 FT NOMINAL-
EACH CELL AT SAME HEIGHT. STANDARD UNITS
EQUIPPED WITH MAXIMUM NUMBER OF 3 FT. CELLS
FOR EACH NOMINAL UNIT WIDTH.

EXAMPLE: STANDARD MODEL 60-408-00 HAS
A NOMINAL UNIT WIDTH OF 8 FT.-
ONE 2 FT. CELL & TWO 3 FT. CELLS
(NOT, FOUR 2 FT. CELLS).

4. 55 GALLON DETERGENT FEEDER MUST BE USED
WHEN UNIT DETERGENT REQUIREMENT EXCEEDS 3.0 GPM.

Figure 1A

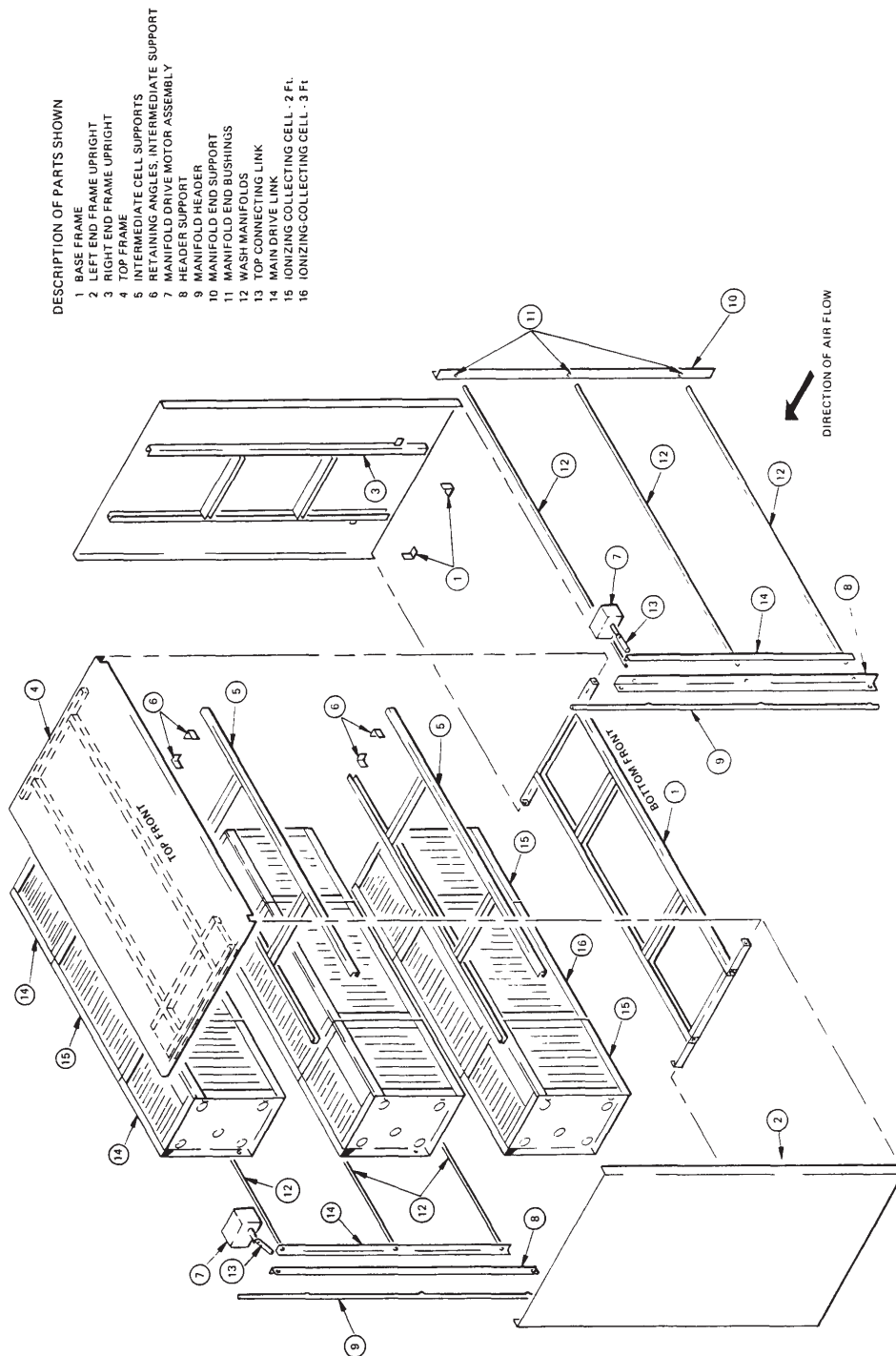


Figure 2

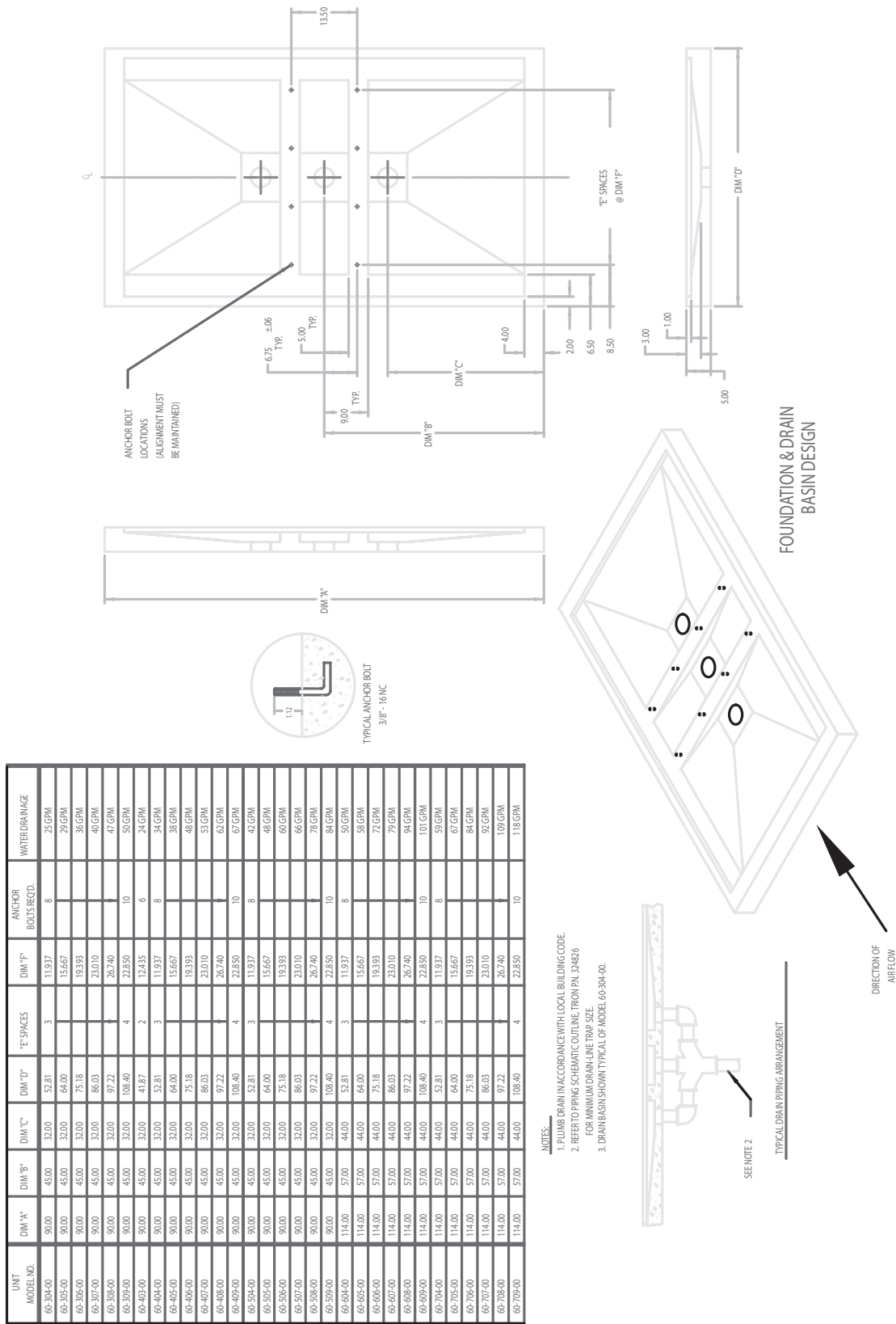


Figure 3

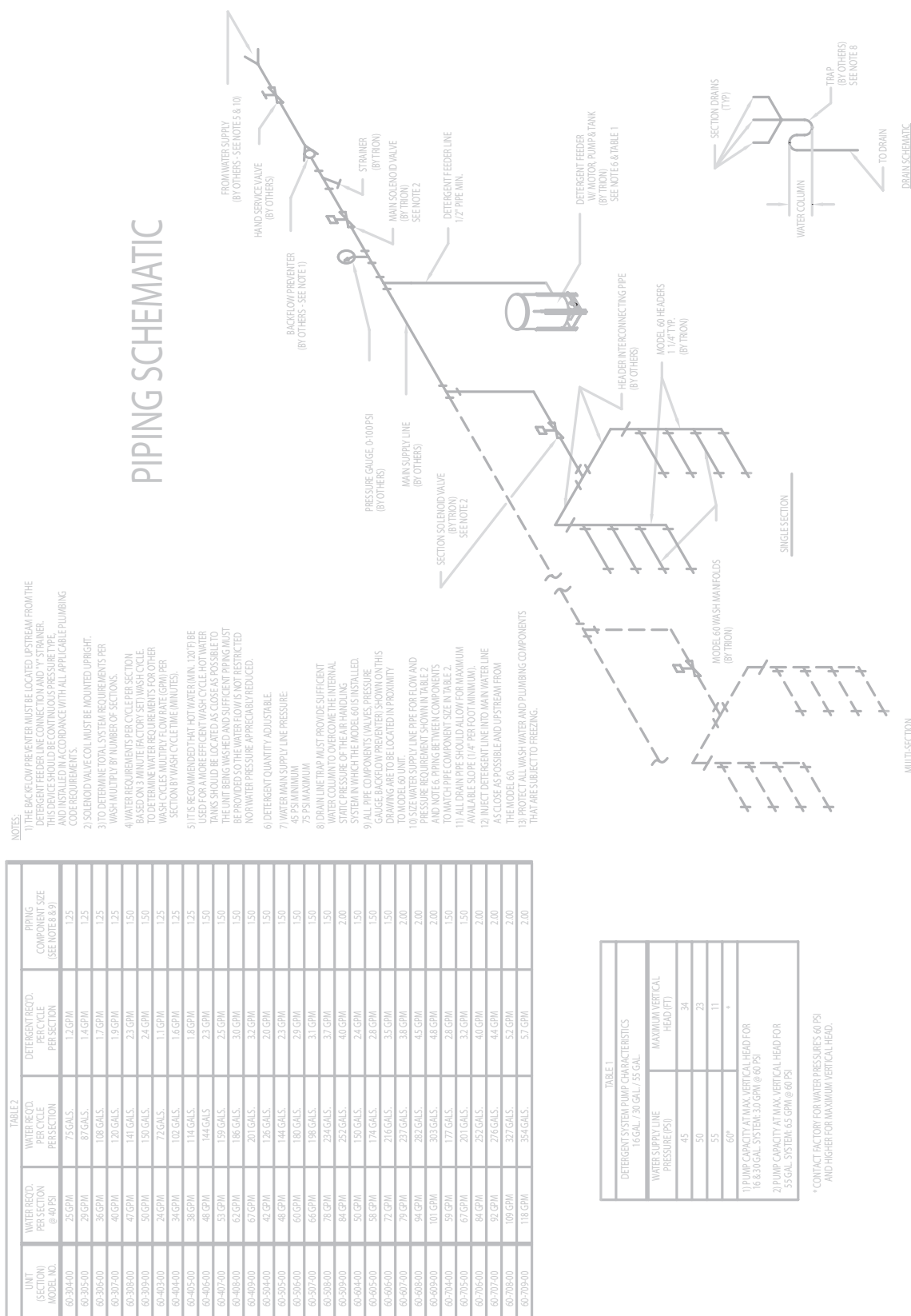


Figure 4

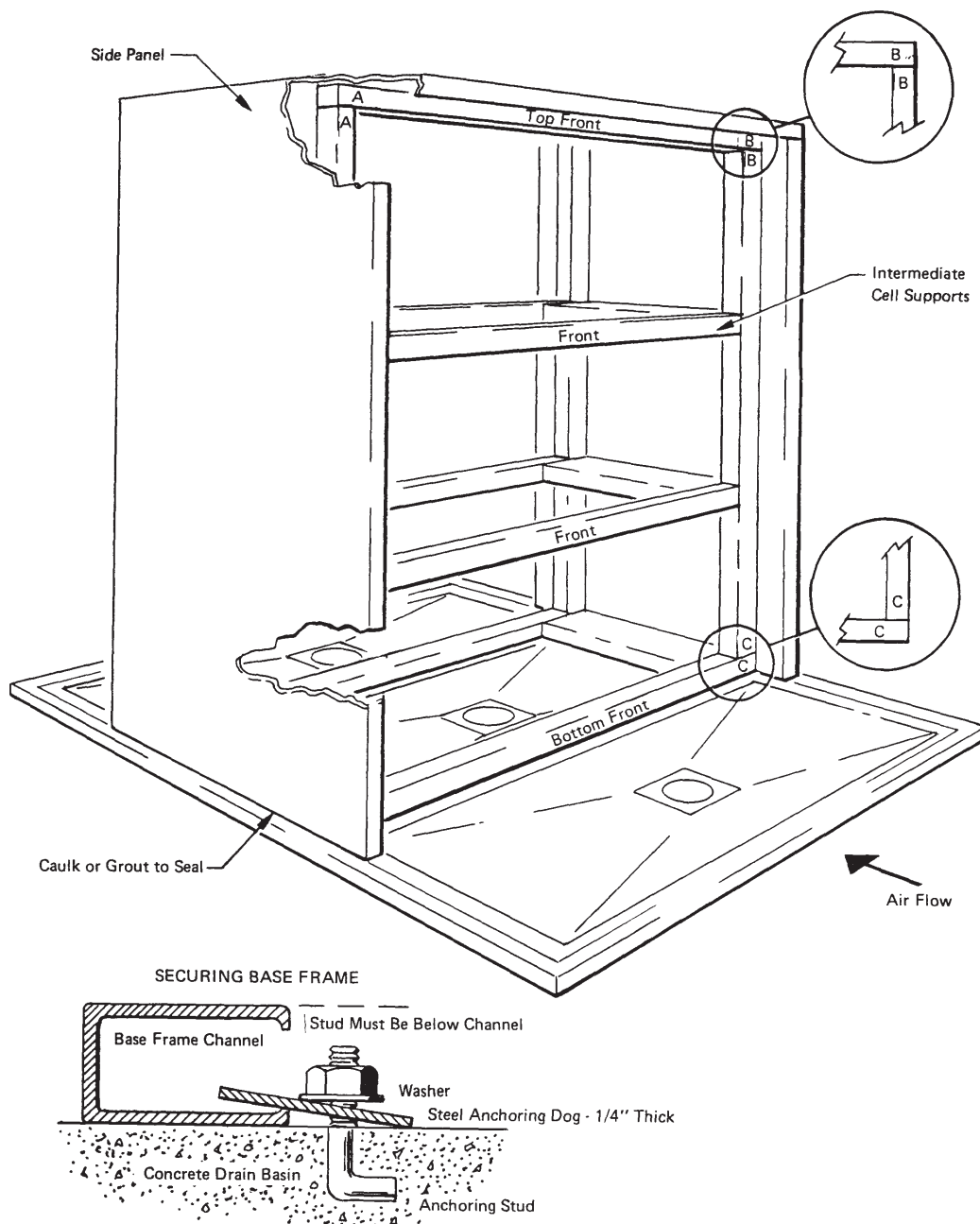
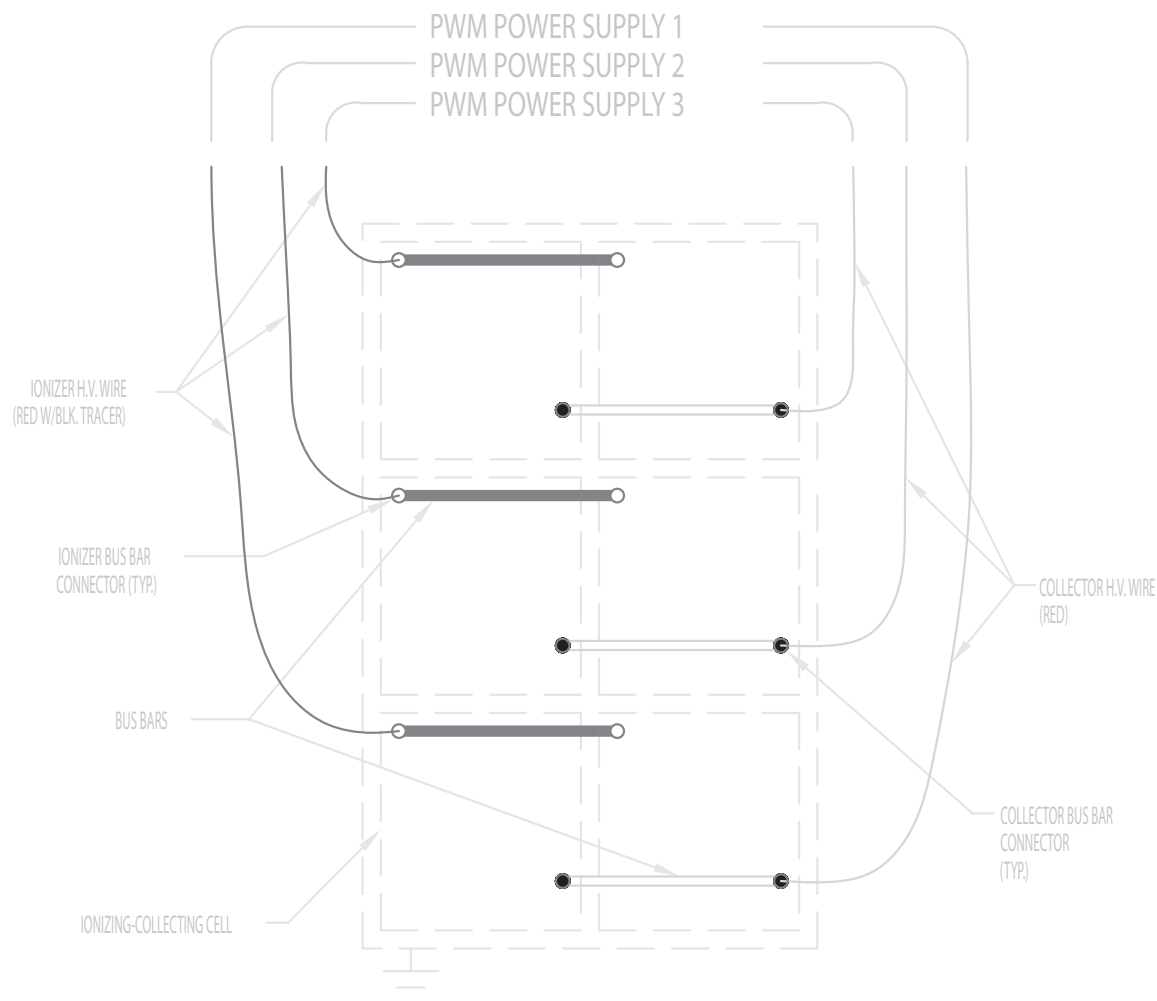


Figure 5

CELL ARRANGEMENT & BUS BAR CONNECTIONS MODEL 60-XXX-00 & 01



NOTES:

- 1) BUS BAR CONNECTIONS ARE MADE ON THE AIR LEAVING SIDE OF IONIZING-COLLECTING CELLS AS SHOWN.
- 2) USE SEPARATE CONDUIT FOR EACH IONIZER & COLLECTOR H.V. WIRE.
- 3) ALWAYS USE CONTINUOUS LENGTH OF H.V. WIRE. DO NOT SPLICE H.V. WIRE.
- 4) SEE FIGURE 6A & 6B FOR EACH UNIT PICTORIAL.

Figure 6

CELL ARRANGEMENT & BUS BAR CONNECTIONS
MODEL 60-XXX-00 & 01



Figure 6A

CELL ARRANGEMENT & BUS BAR CONNECTIONS
MODEL 60-XXX-00 & 01

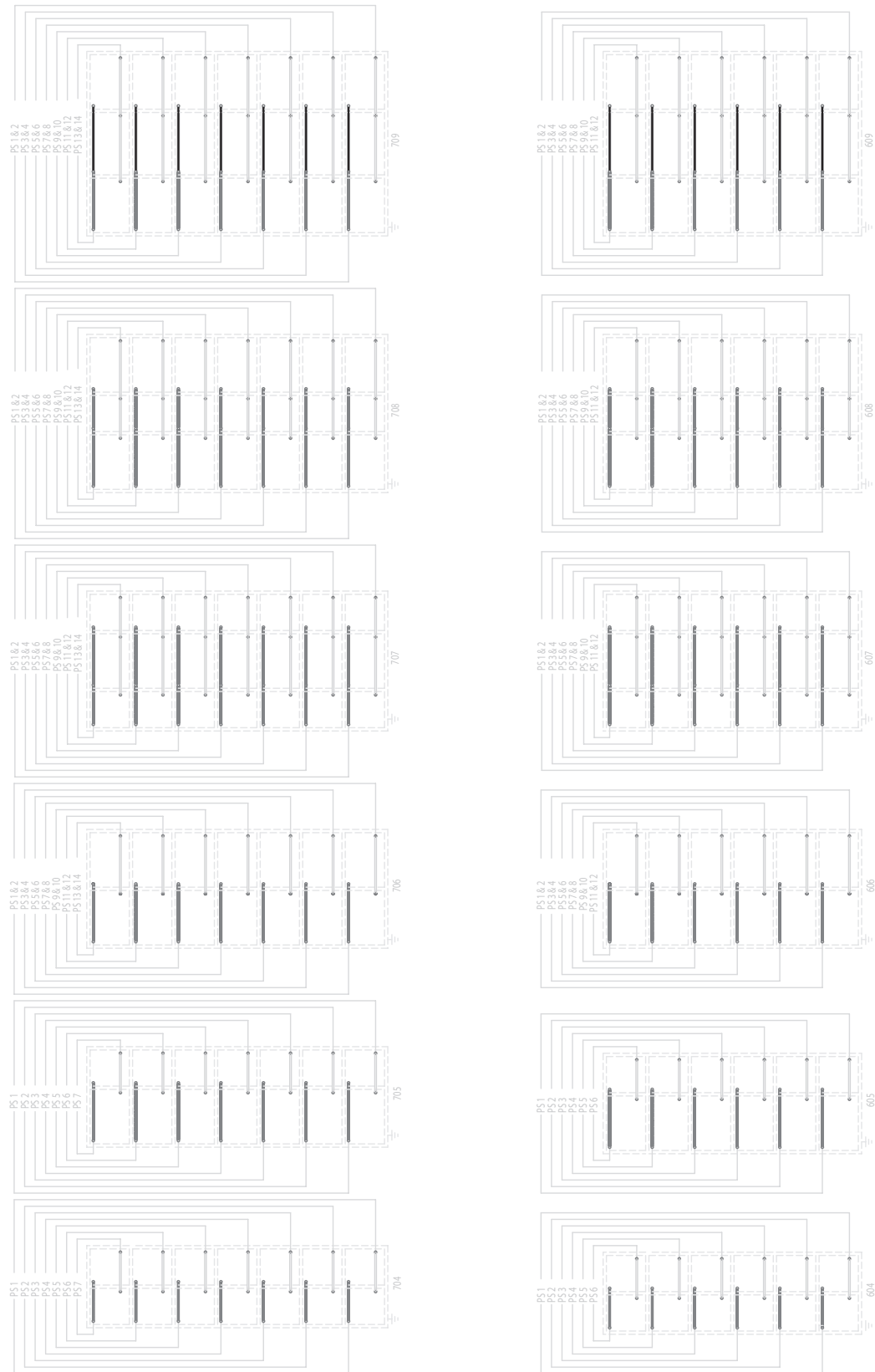
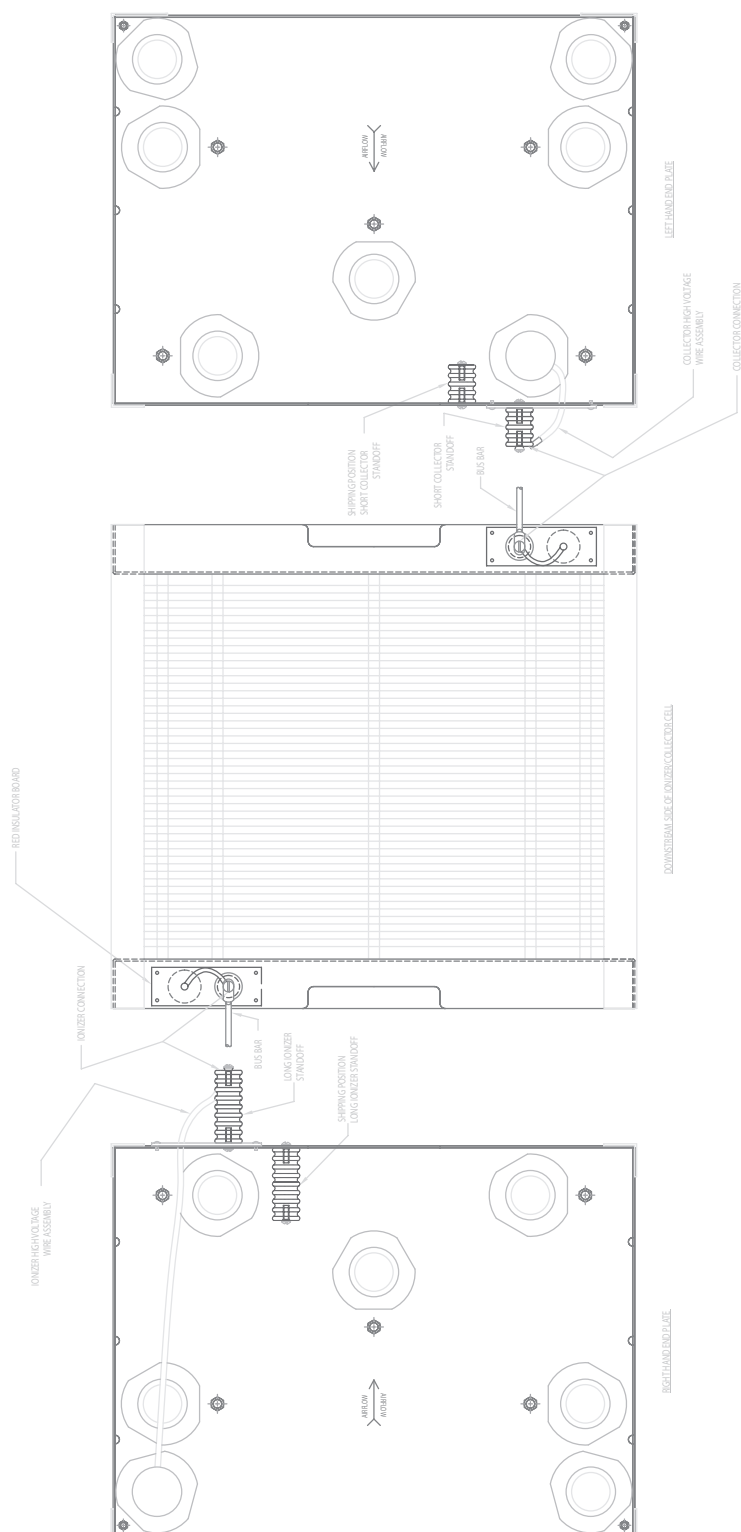


Figure 6B

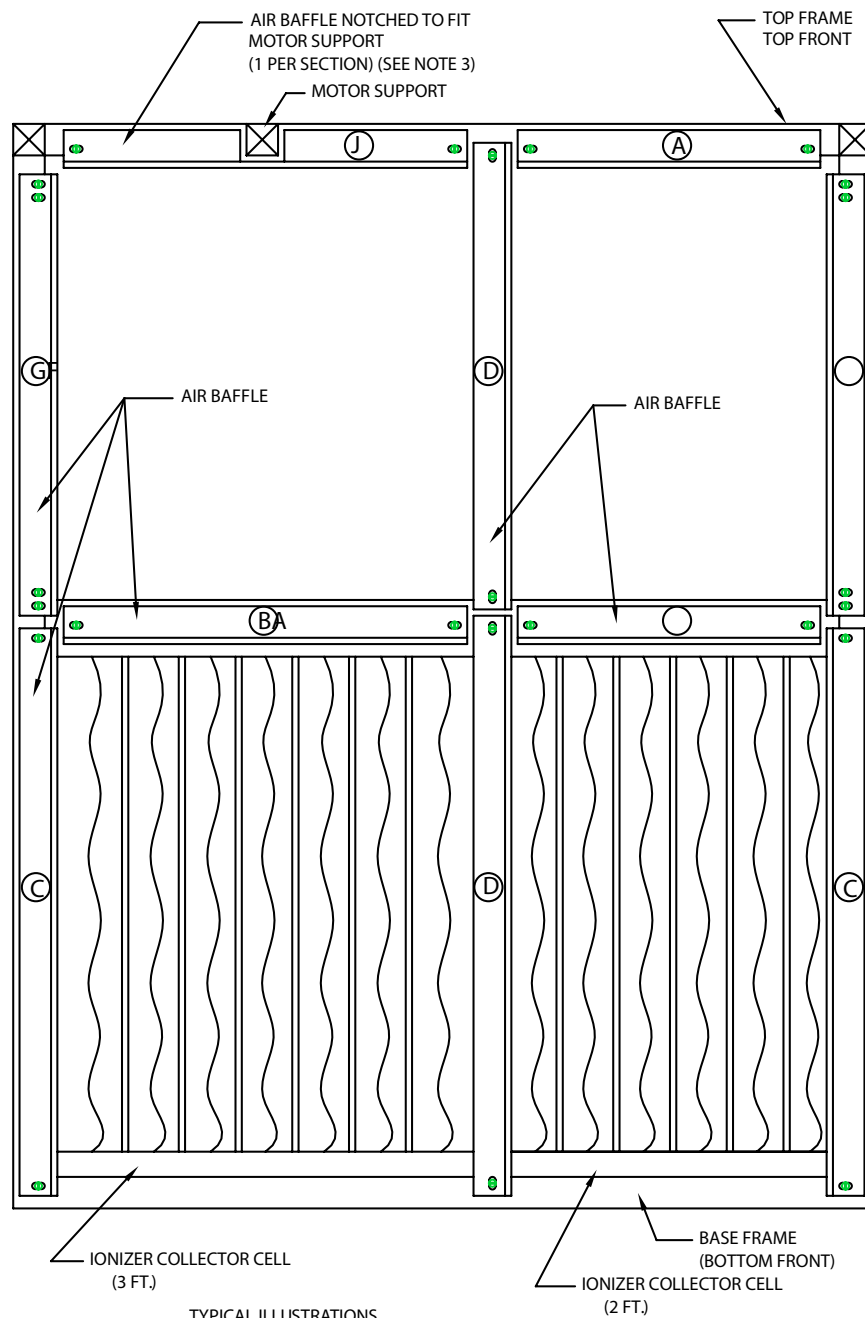


MODEL 60 CELL ASSEMBLY

- ASSEMBLY SEQUENCE**
- 1) REMOVE THE LONG COLLECTOR STANDOFF FROM SHIPPING POSITION ON THE INSIDE SURFACE OF RIGHT HAND END PLATE AND SAVE MOUNTING HARDWARE (1/4-20 PAN HEAD SCREW & 1/4" LOCK WASHER).
 - 2) POSITION LONG COLLECTOR STANDOFF OVER 3/16" DIAMETER MOUNTING HOLE ON THE RED INSULATOR BOARD LOCATED ON THE INSIDE SURFACE OF LEFT HAND END PLATE. POSITION THE LONG COLLECTOR STANDOFF OVER THE 1/4" LOCK WASHER AND MOUNTING HARDWARE (1/4-20 PAN HEAD SCREW & 1/4" LOCK WASHER) SAVED FROM STEP 2.
 - 3) REPEAT THE SEQUENCE ABOVE FOR THE SHORT COLLECTOR STANDOFF ON THE LEFT HAND END PLATE.
 - 4) INSTALL CELLS IN MODEL 60 FRAMEWORK. NOTE THE AIR FLOW DIRECTION ON EACH CELL END PLATE. WHEN INSTALLED, REFERENCE TRION DRAWING GAO 4-23081 FOR CELL ARRANGEMENT AND BUS BAR CONNECTION.
 - 5) REMOVE THE HARDWARE (1/4-20 PAN HEAD SCREW & 1/4" LOCK WASHER) FROM THE END OF EACH SHORT COLLECTOR STANDOFF. POSITION THE HARDWARE AND PINNACLE TERMINAL FROM THE COLLECTOR WIRE ASSEMBLY & BUS BARS OVER THE END OF THE SHORT COLLECTOR STANDOFF. POSITION THE HARDWARE AND PINNACLE TERMINAL INTO THE STANDOFF. DO NOT TIGHTEN ASSEMBLY DOWN UNTIL ALL HIGH VOLTAGE BUS BAR CONNECTION POINTS ARE TIGHTENED. TIGHTEN ALL HARDWARE ON THE SHORT COLLECTOR STANDOFF.
 - 6) REPEAT STEP 5 FOR THE CONNECTION OF THE IONIZER WIRE ASSEMBLY & BUS BARS ON THE LONG COLLECTOR STANDOFF FOR EACH CELL.
 - 7) TIGHTEN ALL HARDWARE ON HIGH VOLTAGE BUS BAR CONNECTION POINTS FOR EACH CELL.

Figure 7

MODEL 60 AIR BAFFLE ARRANGEMENT

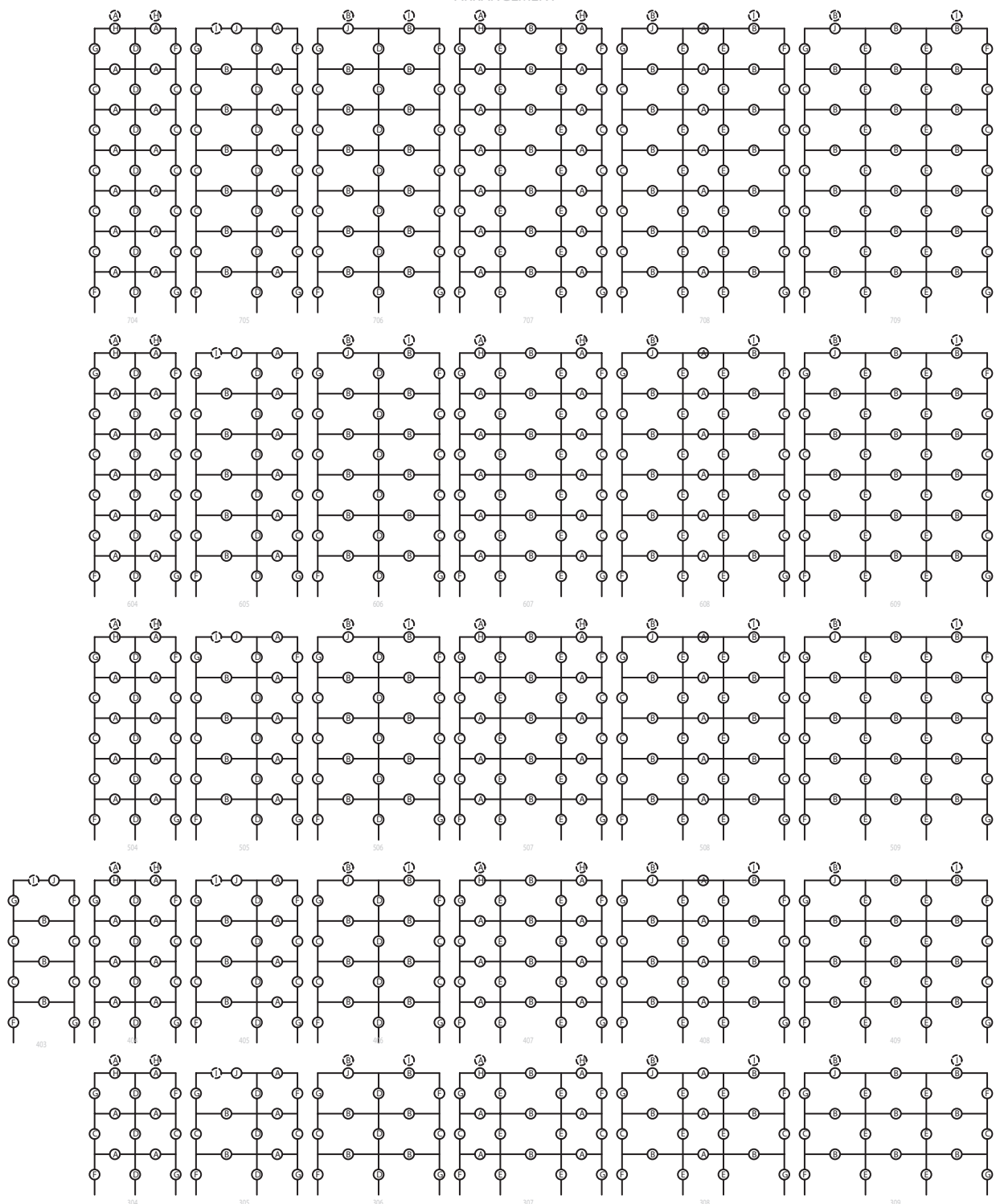


TYPICAL ILLUSTRATIONS

- NOTES: 1. AIR BAFFLES ARE INSTALLED ONLY ON AIR ENTERING SIDE OF UNIT AS SHOWN.
 2. AIR BAFFLES ARE LETTER CODED. SELECT CORRESPONDING MODEL AND FOLLOW DIAGRAM.
 3. UNIT WILL BE LEFT OR RIGHT HAND AS SPECIFIED. LEFT HAND IS SHOWN. USE LETTER CODING IN SOLID CIRCLE FOR LEFT HAND UNITS. USE LETTER CODING IN BROKEN CIRCLE FOR RIGHT HAND UNITS.
 4. SEE FIGURE 8A

Figure 8

MODEL 60 AIR BAFFLE ARRANGEMENT



SEE FIGURE 8 FOR
TYPICAL ILLUSTRATION

Figure 8A

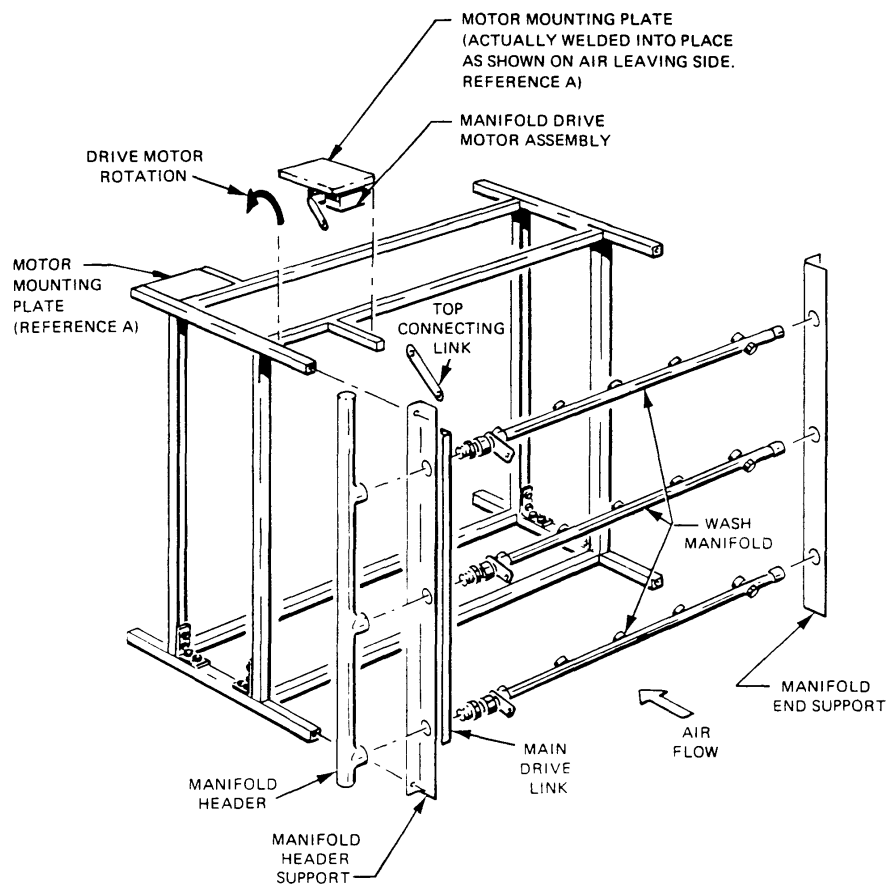


Figure 9

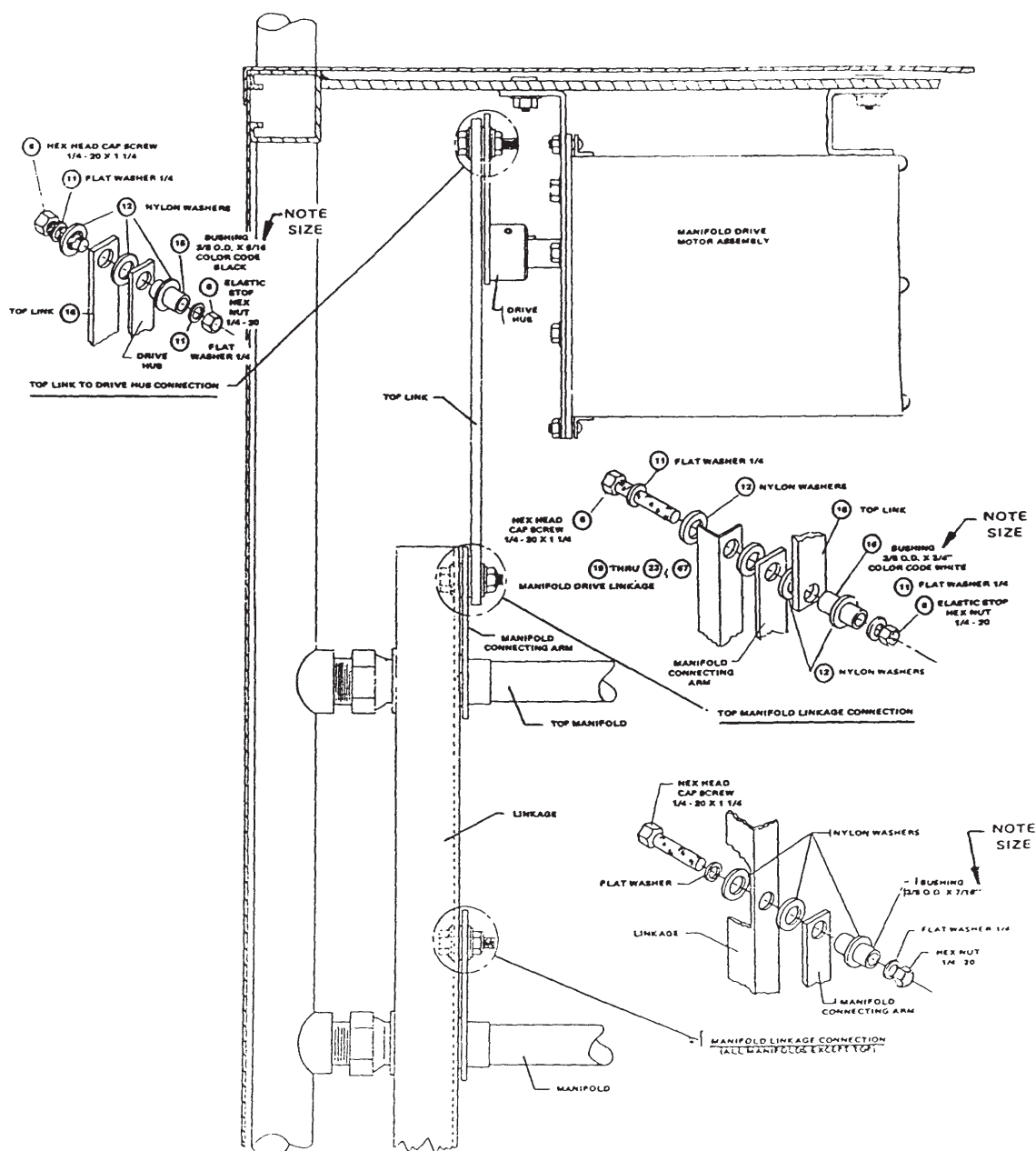


Figure 10

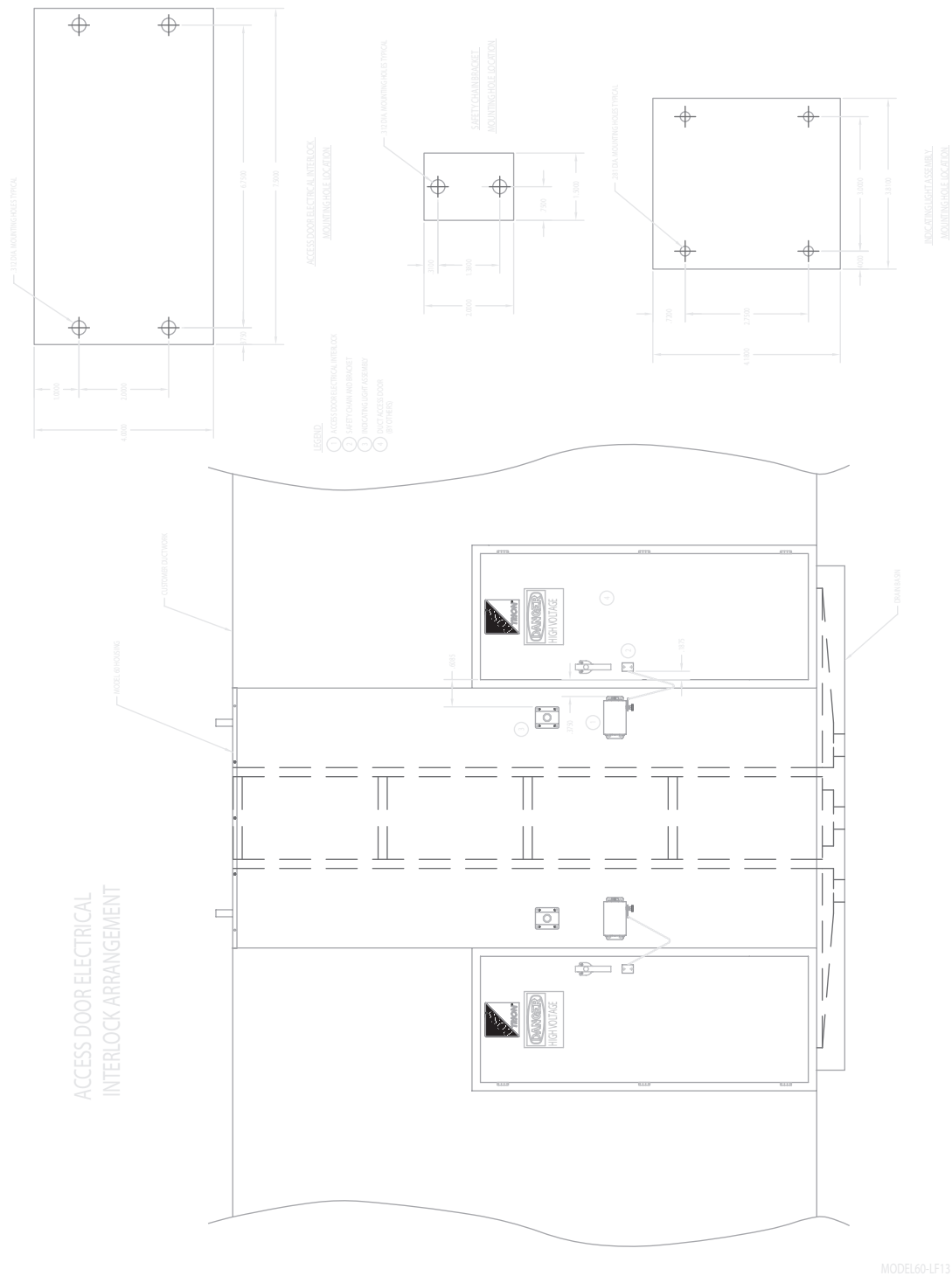
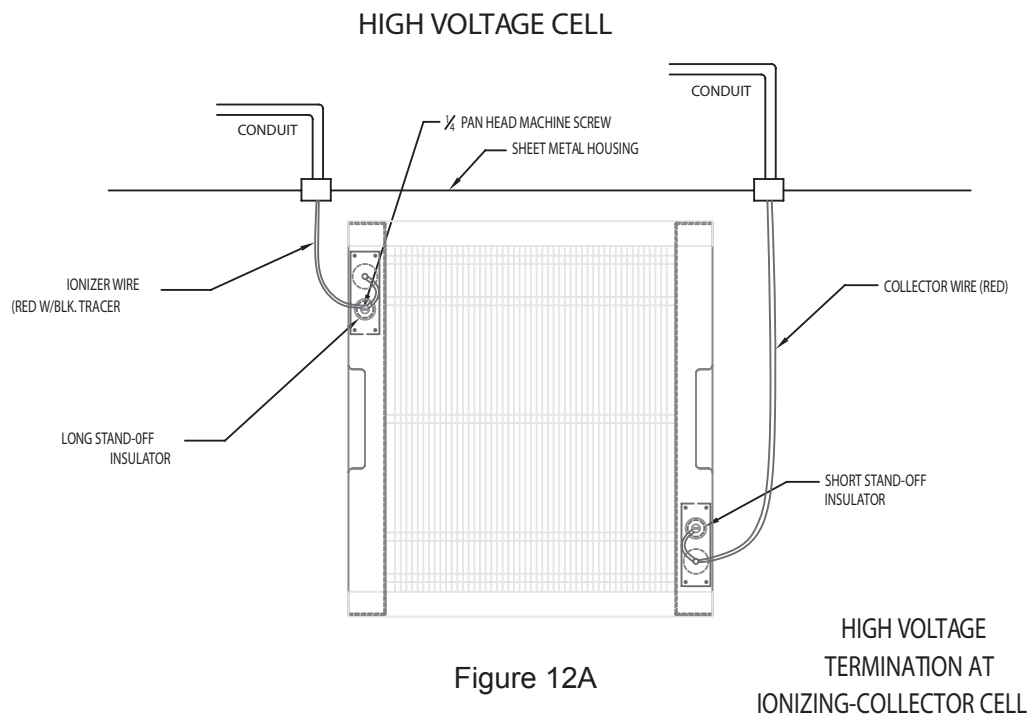
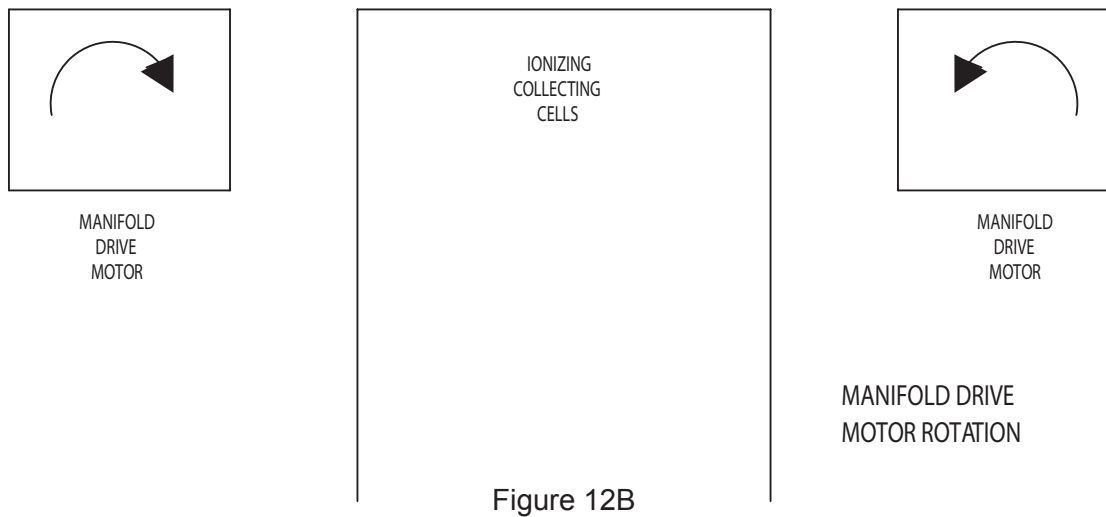


Figure 11



NOTE: MANIFOLD DRIVE MOTORS MUST
ROTATE (OVER THE TOP-TOWARD
THE CELLS) AS SHOWN BELOW FOR
PROPER OPERATION.

(MOTORS ARE REVERSIBLE-FACTORY WIRED AND MARKED AS SHOWN)



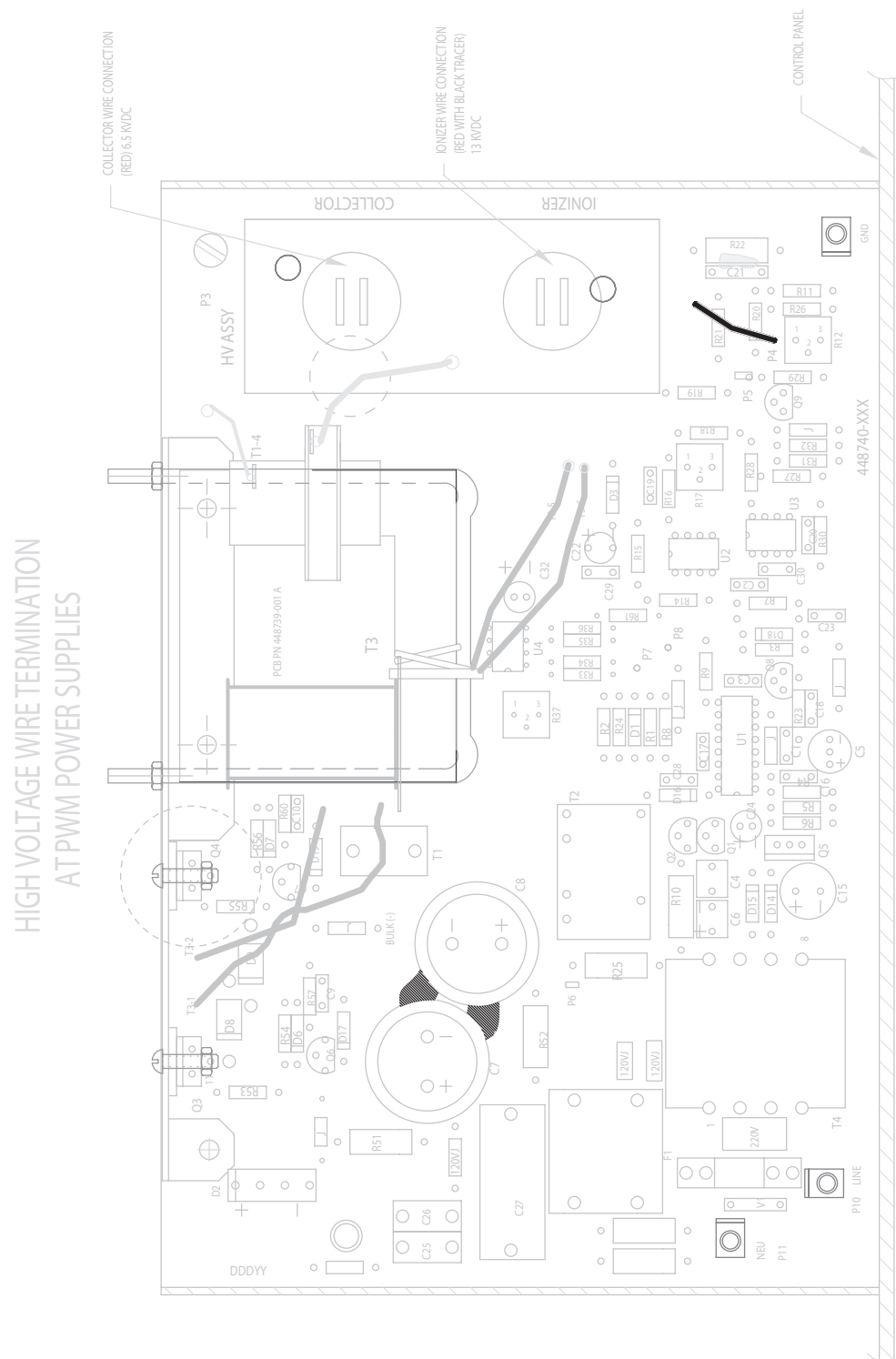


Figure 13



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