RECEIVING • INSTALLATION • MAINTENANCE

INSTRUCTIONS

TYPE PC CABINET UNITS

HORIZONTAL AIR FLOW - MOVABLE NOZZLE WASHING AND ADHESIVE APPLICATION

Westinghouse

Precipitron®

THE *ELECTRONIC* AIR CLEANER

for

Industrial and Commercial Applications

115 Volts
Single Phase

60 and 50 Cycle
Alternating Current

The Precipitron is an electronic air cleaning apparatus used in ventilating and air conditioning systems of industrial plants and commercial establishments to remove soot, smoke, dust, dirt and other air borne particles.

Type PC PRECIPITRON cabinet units include facilities for washing off the collected dirt and applying adhesive with movable nozzles which are operated from outside the cabinet.

In order to produce the results expected of the Precipitron, it must be properly installed and maintained. Whether installed by itself or in conjunction with air conditioning equipment, this instruction book gives the correct steps and precautions to be taken.

WESTINGHOUSE ELECTRIC CORPORATION
HYDE PARK • STURTEVANT DIVISION • BOSTON 36, MASS.
Printed in U.S.A.

NEW INFORMATION
EFFECTIVE APRIL 1, 1955

RECEIVING AND HANDLING

An instruction package is forwarded separately to the customers' shipping address for each PRECIPITRON unit. This package includes a bill of material, an instruction booklet and an operation chart. Contents of this package should be carefully preserved because it is needed for receiving, installation and operation of the unit.

To facilitate handling and erection, most internal parts of the cabinet, except the collector cells, are shipped assembled whenever possible. The collector cells and certain other items which mount outside the cabinet are shipped in separate containers. The bill of material (see instruction package) may be checked with the shipping notice forwarded with every shipment.

Upon receipt of shipment, any evidence of damage or loss should be reported immediately to the last carrier for inspection by an agent of the transportation company. A claim should be filed by the customer against the carrier to cover any shipping damage or loss.

Handle the equipment carefully to prevent breakage or damage. Handle the cabinet, with a lift or slings under the bottom channel legs only.

Except for the initial inspection, store the parts until needed in the original shipping containers in a clean dry location protected from the weather. Do not remove shipping straps or retainers until the parts are ready for installation.

INSTALLATION

Westinghouse Supplies necessary basic parts for a complete PRECIPITRON installation as listed in the Bill of Material. Westinghouse also supplies such items as: special hardware, high voltage cable and special electrical connectors.

Customer Supplies regular construction items which are not included in the Bill of Material, such as duct work, mounting supports and bolts, conduit, low voltage wiring, and plumbing. The following installation instructions give further details as to the source of individual items.

Installation and Operating Requirements. Successful installation and operation of the PRECIPITRON unit requires consideration of the following points, both before and during installation:

1. Proper air flow and duct connections.
2. Sufficient space for cabinet, including access clearances.
3. Suitable mounting supports.
4. Adequate drain, hot water and electrical facilities.

Air Flow Requirements. The PRECIPITRON unit is sized to clean a specified quantity of air (cfm) with an effective efficiency of 90%. To obtain this efficiency, the cfm through the cabinet should not exceed the rated cfm. Overall cleaning efficiency also depends a great deal on uniform air flow throughout the cabinet. The air velocity through any part of the cabinet should therefore not exceed the rated velocity of 333 f.p.m. by more than 10%. Air filters supplied help to equalize the air flow. However, sharp bends and irregularities in the ducts may cause uneven air flow. Where this is unavoidable, splitters, turning vanes or baffles ahead or behind the cabinet may be necessary to assure uniform air flow.

Outside Air Intake should be sized generously to minimize any dirt that might be sucked in by high air velocities. It should be located so that they will not bring in high concentrations of heavy dirt, corrosive fumes or electrically conductive particles, and should be orientated away from the prevailing winds. Most important, the intake should be equipped with weather louvres or dampers to prevent entrance of rain or snow, plus a cleanable screen of 8 to 16 mesh to keep out leaves, insects, etc. It is a good practice to locate the PRECIPITRON cabinet at least three feet down stream from the outside air intake to provide a settling space for the larger particles.

Lint. Where recirculated air is brought into the cabinet, presence of excessive quantities of lint may necessitate some sort of lint screen across the duct opening. Lint tends to collect on ionizer wires and holders and will generally interfere with the proper functioning of the PRECIPITRON.

Space Requirements. Exact overall dimensions and clearances are shown on Dimension Sheet 1425 supplied with the order. It is important to allow clearance space in front of the access panel located at the side of the cabinet. This space is needed for operation, inspection and removal of the internal parts. Note: The access panel may be supplied on either side of the cabinet as specified on the order.

Mounting the cabinet is relatively easy since practically all internal parts except the cells are assembled prior to shipment. (Install cells after cabinet is mounted.) The cabinet may be either floor, platform or ceiling mounted. 1/2" holes are provided in the channel legs for lagging the cabinet to the floor or platform. (Mounting bolts not supplied.) See Fig. 3 for suggested ceiling suspension. Regardless of the type of mounting, the cabinet must be supported only from the channel legs - not from the cabinet itself.

For platform or ceiling mounting, provision should be made for convenient and safe access to

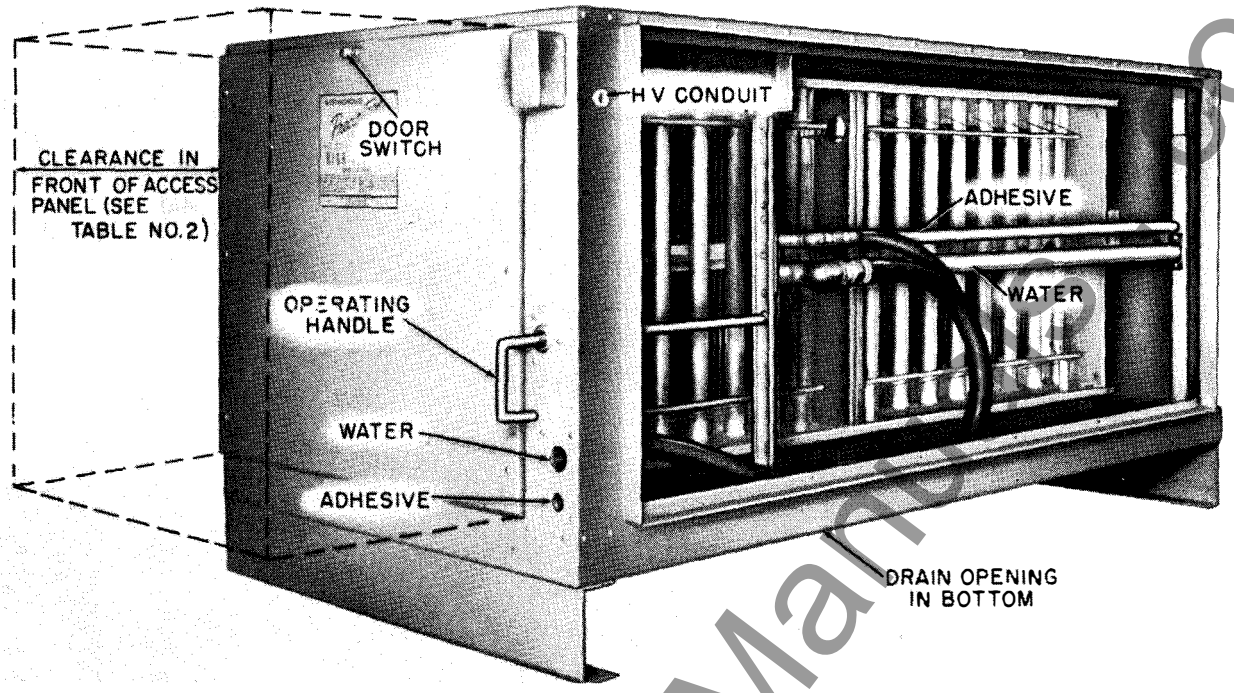


Fig. 1 Typical Cabinet (Inlet Air Side)

the panel side of the cabinet. This is needed for moving the operating handle and for servicing the internal parts.

Do not lose the spare ionizer wires and hardware packed in a bag inside the cabinet.

The cabinet must be mounted level so that water will flow from the drain pan.

Ducts are easily attached to the cabinet using the flanges provided on the inlet and outlet air sides. See Figs. 1 & 2. Ducts should be pitched toward the cabinet for drainage of any liquid which might splash or carry over. It is recommended that the ducts extend inside the cabinet flanges, to insure tight construction and prevent air leaks; particularly of uncleaned air into cleaned air stream.

Sharp bends in the ducts near the cabinet should be avoided to assure uniform air flow throughout the cabinet. Where duct sizes are different than the flanged openings on the cabinet, the connections should taper as gradually as space limitations will allow. For uniform air flow, this taper should not be greater than one foot in three feet of duct length.

Drain. A drain pipe is required to carry off the wash water. This pipe should be at least as

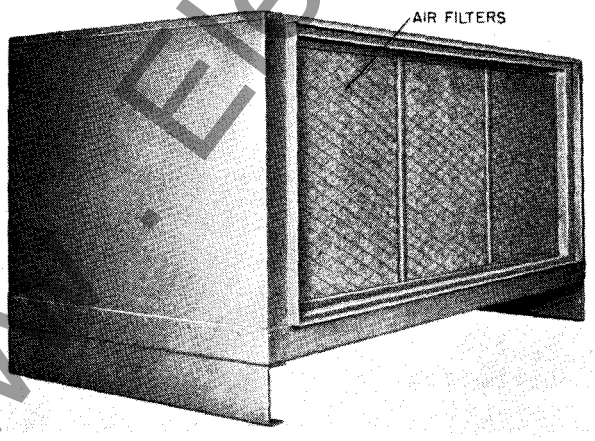


Fig. 2 Typical Cabinet. (Leaving Air Side)

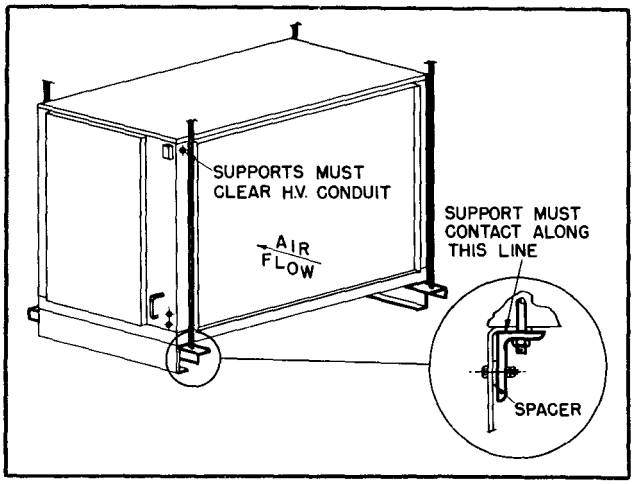


Fig. 3 Typical Ceiling Mounting

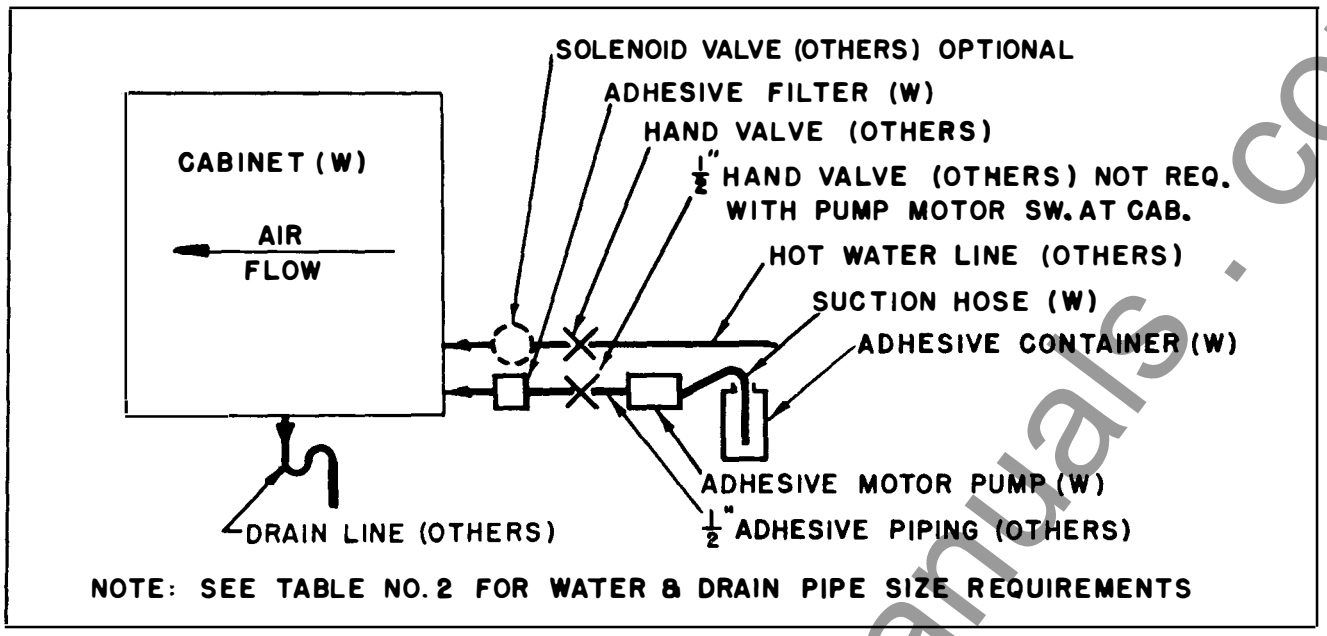


Fig. 4 Typical Water, Adhesive and Drain Piping

large as the female connection at the bottom of the drain pan. See Fig. No. 4. The drain pipe should be connected to the sewer in accordance with applicable plumbing codes.

Water Supply capable of delivering 130-150°F. water with a minimum running pressure of 40 to 60 psi at the cabinet is required to properly wash off the collected dirt. See Table No. 2 for water flow requirements. A clean water supply is essential to prevent clogging of the nozzles. Where the supply is dirty, strainers or other filtering means (not supplied) are required.

Water Piping. The hot water supply should be piped to the female fitting provided at the access panel side of the cabinet. See Fig. 4. Keep piping clean during installation. A hand operated water valve (not supplied) is required to control the water flow. As an added convenience, an electrically operated water valve (not supplied) may be installed in the water line as shown in Fig. 4. See "Low Voltage Wiring" for connections. Piping and valves should not obstruct the clearance required at the access panel.

Winter Operation. As a precaution against freezing temperatures, all water piping should be installed so that it may be drained. A union fitting is provided inside the cabinet for draining the flexible hose.

Adhesive Pump. When adhesive facilities are specified on the order, a motor driven gear pump is supplied to apply adhesive. It is recommended that this motor-pump be lagged to the floor close to the panel side of the cabinet. See Fig. 4. The holes provided for the carrying handle may be used for lagging. Be careful not to distort the base. Be sure the pump does not obstruct the clearance required in front of the cabinet panel.

Several feet of suction hose is provided for drawing adhesive from a container to the pump. An adjustable by-pass regulator is built into the pump which is factory set to deliver 60 psi. This will provide a good spray pattern for the average unit. See "Maintenance" for adjustment of pressure.

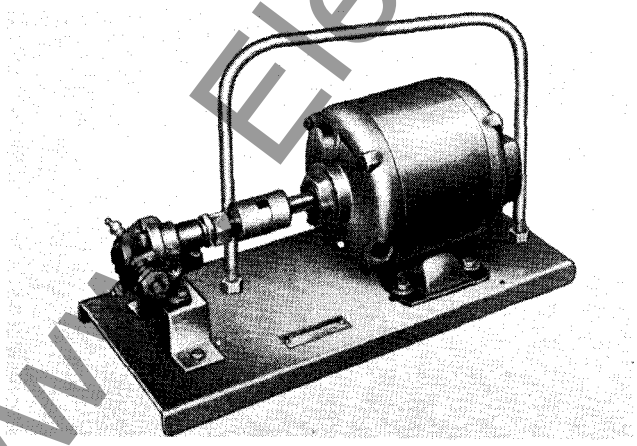


Fig. 5 Adhesive Pump

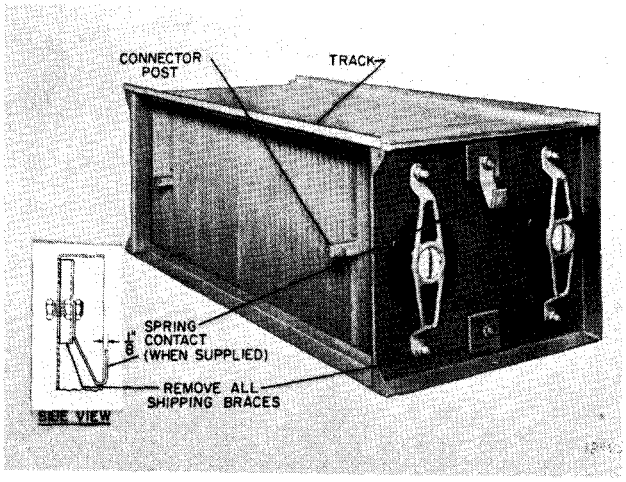


Fig. 6 Cell

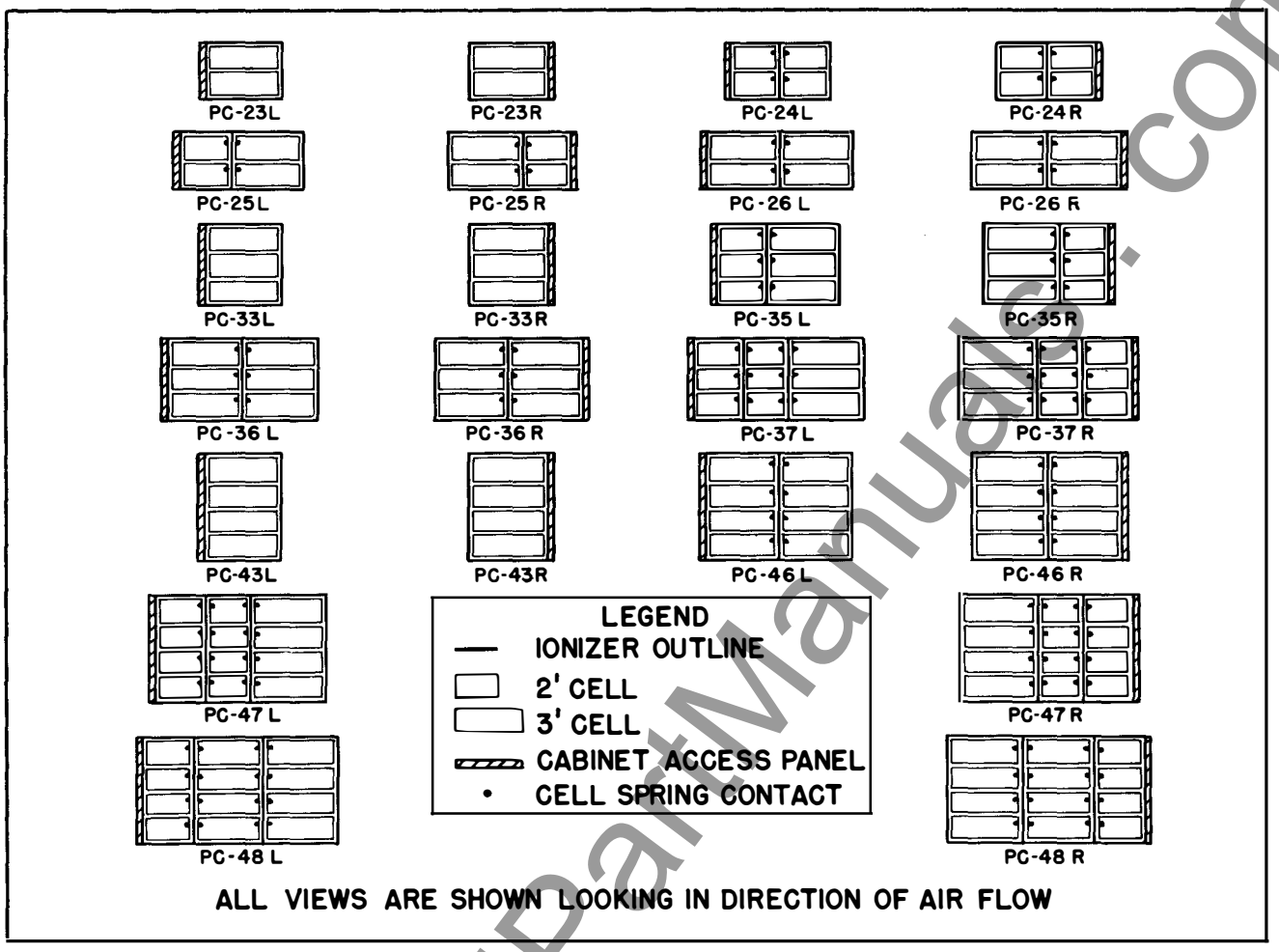


Fig. 7 Location of Cells and Ionizers Inside Cabinets

Adhesive Piping. The adhesive discharge line (not furnished) from pump to cabinet should be 1/2" ips, steel, brass or 1/2" nominal copper tubing. This line should be clean when installed.

Install the adhesive filter in the discharge line close to the cabinet. See Fig. 4. This replaceable element filter is to prevent dirt from clogging adhesive nozzles. Piping and filter must not obstruct clearance space at access panel.

If the pump is controlled by plugging in the extension cord, a hand operated valve should be installed in the adhesive discharge line near the control panel to control the adhesive flow. Note: Do not run pump longer than one minute with this discharge valve closed - the motor may overheat. A better way to control the adhesive flow is to install an On-Off switch for the motor at the cabinet. See "Low Voltage Wiring." (Discharge valve not needed if On-Off switch is provided.)

Installation of Cells. After unpacking, inspect the cells to be sure that all plates are evenly spaced and undamaged. Lift or handle the cells only by the end frames.

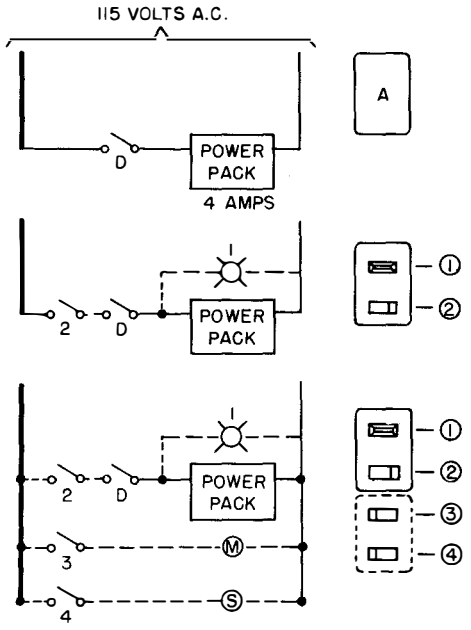
Remove the shipping braces and brace nuts, located at both ends of each cell. See Fig. 6. These braces will cause a short circuit if not removed.

For a cabinet having more than one cell wide, the cells are equipped with spring contacts at one or both ends. See Fig. 6. Where supplied, reinstall these contacts after removing the shipping braces. Be sure that they project 1/8" beyond the end frame. These contacts connect high voltage between adjacent cells in a horizontal direction.

It is essential that the cells be loaded in the cabinet precisely as shown in Fig. 7. Failure to obtain proper alignment of the spring contacts will result in "dead" cells with zero cleaning efficiency.

The terminal posts on one side of the cells must point toward the leaving air side. See Fig. 6.

Fig. 8 Power Pack



Wiring for basic unit with equipment as furnished. Unit turned on-off with switch on power pack. Water control by hand valve. Adhesive pump started and stopped by plugging into utility outlet (not furnished).

ALTERNATE

Where power pack is remote replace blank cover with pilot light and switch combination. Adhesive pump started and stopped by plugging into utility outlet (not furnished).

ALTERNATE

For convenience, mount additional box on unit and add switch 3 and/or 4 to control all functions from one position.

Sym	Description	Source
A	Box and Cover on Unit	Ⓦ - Built-in
D	Access Door Interlock Switch	Ⓦ - Built-in
1	Red Indicating Light	Others
2-3-4	10 Amp S.P.S.T. Toggle SW	Others
M	Motor on Adhesive Pump	Ⓦ - Built-in
S	Water Solenoid Valve	Others

Fig. 9 Low Voltage Connections

Remove the access panel, and slide in one vertical column of cells. The cells include interlocking tracks at the edges. (A little grease applied to the tracks will help in sliding). Push this column of cells into the cabinet as far as it will go, using a reasonable amount of force. Install the remaining cells column by column.

Mount the Power Pack close to the access panel side of the cabinet on an adjacent building wall or on a suitable mounting stand. Four 3/8" mounting bolts (not supplied) are required. Allow clearances for opening the power pack door and 6" minimum under the pack for service access. The power pack should not obstruct the access space at the cabinet panel. Note: Additional high voltage cable will be required if the cable length between the power pack and the cabinet exceeds 20 ft. See high voltage wiring.

LOW VOLTAGE WIRING

Power Supply required is 115 volts (plus or minus 5 volts) ac., 1 ph., either 50 or 60 cycles.

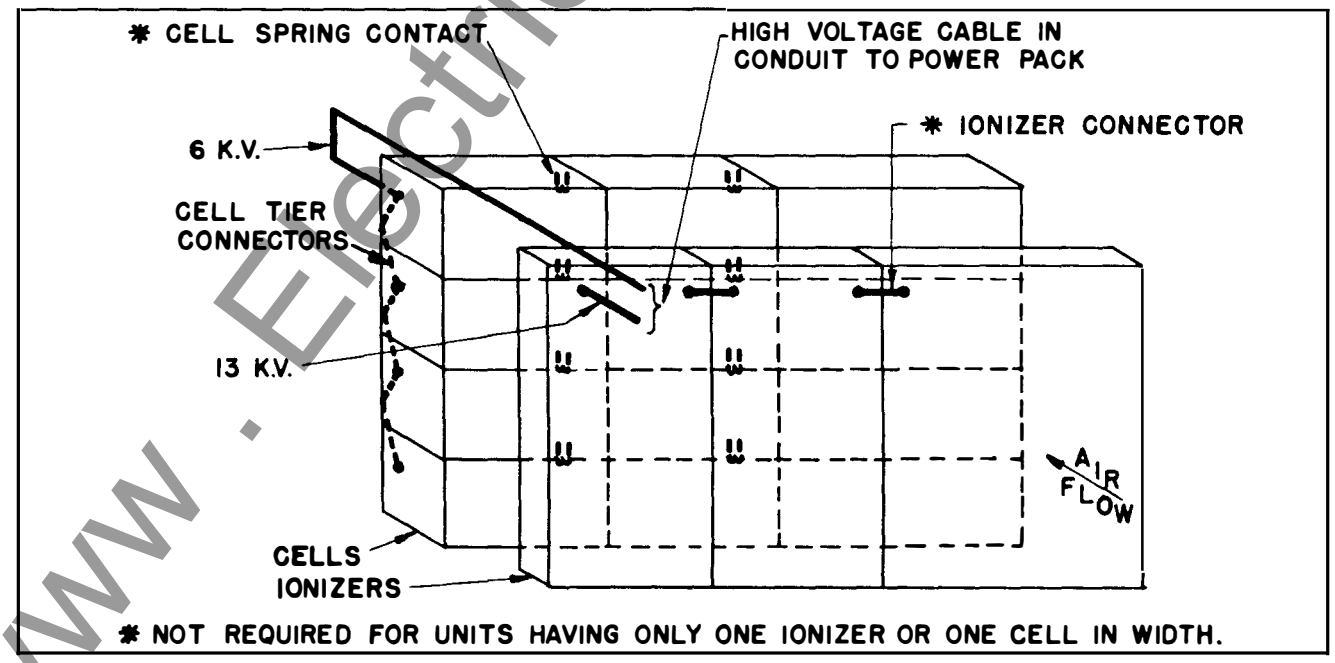


Fig. 10 Typical High Voltage Connections

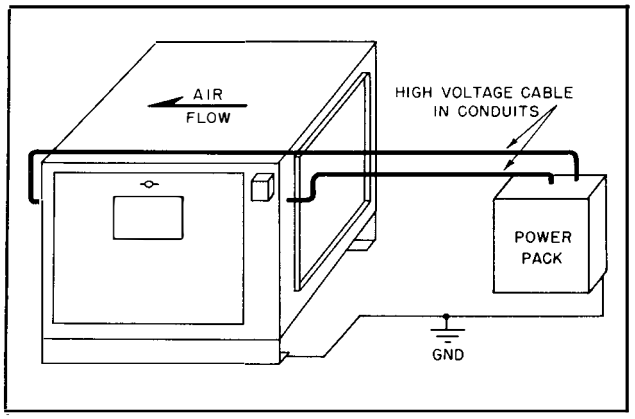


Fig. 11 High Voltage Conduits and Grounding

If the supply varies more than ±5 volts, the local power company or a competent engineer should be consulted and the voltage corrected to assure proper operation.

Connections. Fig. 9 shows typical wiring connections required. The access panel interlock switch is wired in series with the power pack to the 115 volt supply. A wiring box is supplied on the cabinet for this purpose. The interlock is for the safety of the operator. It must disconnect the 115 volt supply before the cabinet access panel can be removed. A 115 volt convenience outlet and flexible cord are required for the adhesive pump motor. Alternate wiring methods are shown in Fig. 9. Red light (Sym. 1) and switch (Sym. 2) are recommended if power pack must be located remote or out of sight from cabinet access area. Conduit and wiring (not supplied) should not obstruct the clearance space in front of the cabinet panel.

HIGH VOLTAGE WIRING

All connections to the cells and ionizers are accessible through the cabinet access panel.

High Voltage Cable. Install two separate 1/2" rigid conduits (not supplied) between the power pack and cabinet. See Figs. 10 & 11. A 50 foot coil of high voltage cable is supplied for installing one length of cable in each 1/2" conduit. The cable entering the inlet air side of the cabinet carries 13 KV for the ionizer. The outlet air side cable carries 6 KV for the cells.

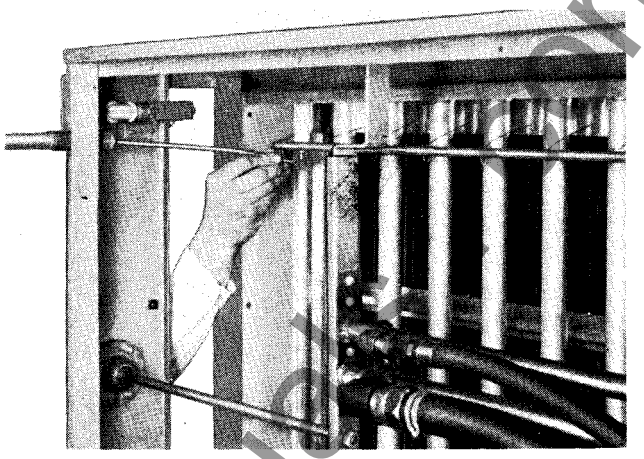


Fig. 12 Ionizer Cable Connections

If the power pack is located too remote from the cabinet, additional high voltage cable must be procured. (Only high voltage cable supplied by Westinghouse is recommended).

Ionizer Connections. One cable connector is supplied with the cabinet hardware for connection to the ionizer. See Fig. 12. Where more than one ionizer is supplied, a short piece of cable with two such connectors is supplied for connections between each ionizer. See Fig. 13. Be sure these connectors are in place.

Cell Connections. One cable lug is supplied with the cabinet hardware for connection to the cells. This is connected to the terminal post of the upper most cell nearest the cabinet access panel. See Fig. 14. In addition, all cells (directly under this cell) must be connected with a tier connector supplied with the cabinet hardware.

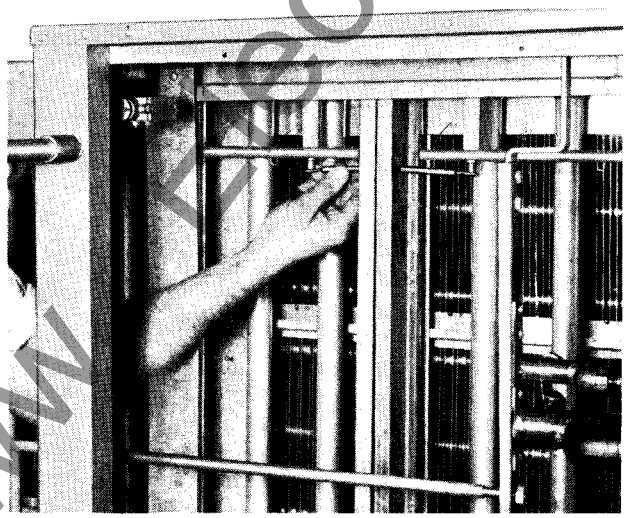


Fig. 13 Connections Between Ionizers

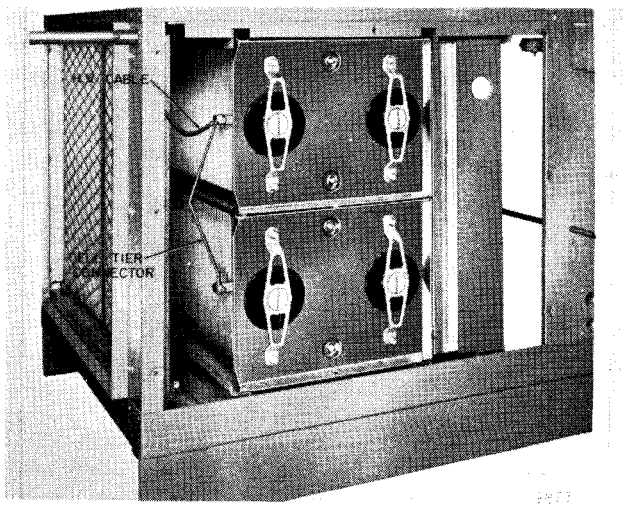


Fig. 14 Typical Cell Connections

Electrical Grounding. High voltages are supplied from the power pack to the cells and ionizers with single conductor cables. A common ground return through the cabinet to the power pack is required to complete the circuit and for safety purposes. See Fig. 11. Connect the cabinet and power pack case to a common low resistance ground, using solid copper wire.

Operation Chart supplied in the "Instruction Package" includes maintenance hints. It should be prominently attached adjacent to the cabinet.

Checking the Installation. The following items should be carefully checked by the installer prior to energizing the PRECIPITRON unit:

Electrical Inspection.

1. All cell plates should be evenly spaced and undamaged.
2. All ionizer wires should be under slight tension and midway between the ground tubes. (Replace broken wires with spares furnished with cabinet.)
3. All wiring should be in accordance with the wiring diagrams and connections should be tight.

Mechanical Inspection.

1. Check operation of adhesive pump and be sure that all nozzles give a good spray pattern.
2. Check that all water nozzles give a strong stream.
3. Check ducts for air leaks.
4. Check fan speed to be sure that air volume does not exceed rated cfm.

Starting the Unit. When the installation is complete and ready to be placed in service, a Westinghouse Service Representative should be requested to check and start the PRECIPITRON unit. Representatives of the contractor and the customer should be present to facilitate necessary corrections and to receive operating instructions. The adhesive and instruction books should be available at this time.

OPERATION

PRECIPITRON is an electronic air cleaner - not an air filter. Strong electrostatic forces draw the dirt particles from the air. These forces are equally effective on both large and small particles. Because of this, PRECIPITRON will remove from 6 to 8 times more dirt than a conventional filter. Moreover, it removes the extremely small particles which pass right through a regular filter - and it is these tiny particles which are the principal cause of smudging, soiling and dirt damage.

Because of this high efficiency, frequent washings are needed to dispose of the increased amount of collected dirt. Type PC PRECIPITRON units are designed to easily flush off the collected dirt with a system of moving water spray nozzles which are controlled from outside the cabinet.

To insure that the dirt will be held after it is removed from the air, the collecting surfaces are coated with a water soluble adhesive fluid. The adhesive washes off with the accumulated dirt, and a fresh coating is applied for the next air cleaning cycle. Adhesive is also applied with moving nozzles which are controlled from outside the cabinet.

Cabinet. The factory assembled cabinet encloses the wash and adhesive header, ionizers, cells and after filters. All internal parts are easily accessible from the side access panel and may be slid out for inspections or servicing.

Moveable Nozzle Header is mounted in the inlet air side of the cabinet. This consists of a frame supporting two separate nozzle pipes which are connected to flexible hoses. One pipe is for wash water and the other for adhesive. Rollers and guides ride in tracks for easy movement of the frame in a horizontal direction. The frame is attached to a handle

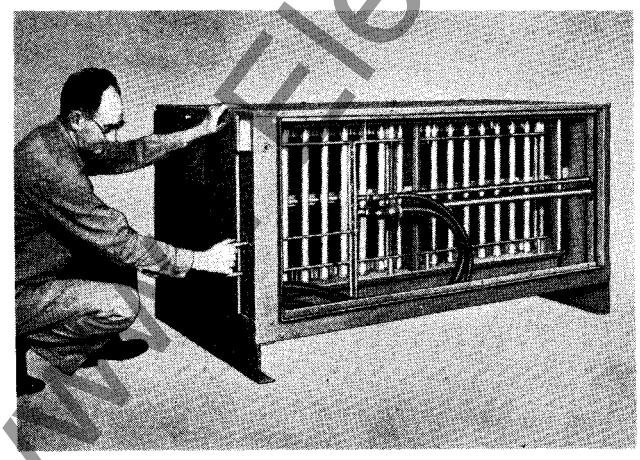


Fig. 15 Moving the Header Handle

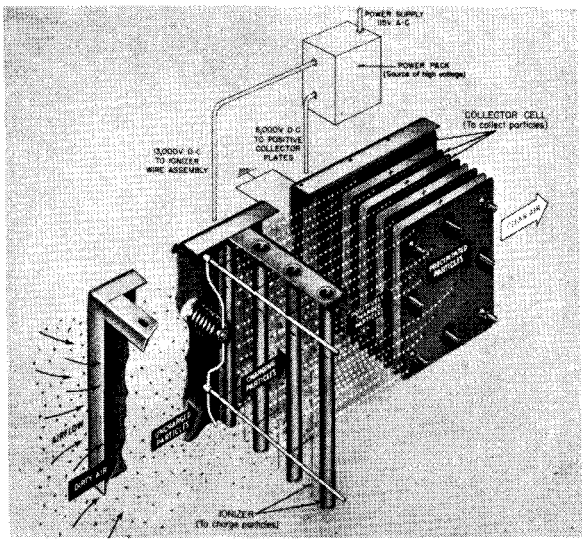


Fig. 16 Principle of Operation

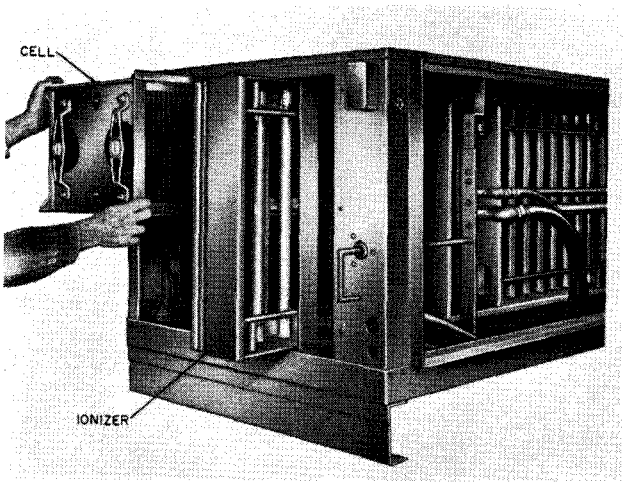


Fig. 17 Cell and Ionizer (Partially Removed)

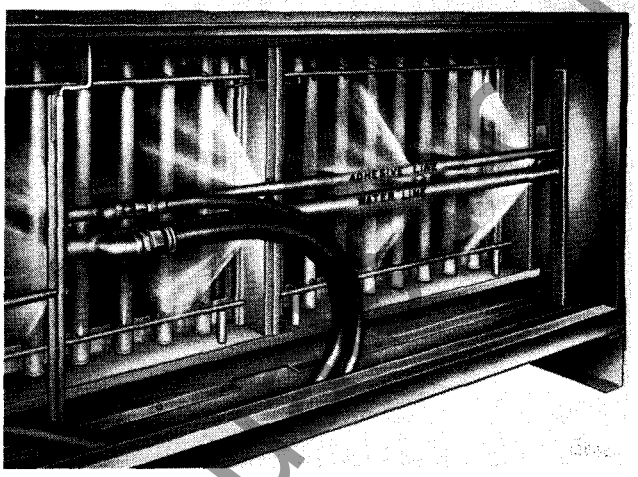


Fig. 18 Water Spray During Washing

which projects through the side of the cabinet. Slow, steady movement of the handle during spraying directs a head-on stream to all collector parts assuring complete and thorough washing or adhesive application.

Ionizers are supplied in one or more sections. They mount in tracks at the inlet air side of the cabinet. When 12.5-13.3 KV, d.c. voltage is applied to the ionizer wires, an ionizing zone is created between the wires and the grounded metal tubes. Dirt particles passing through this space pick up an electrostatic charge. Anti-vibration beads on the ionizer wire prevent wire vibration - lengthening wire life and providing more uniform particle charging.

Cells include interlocking tracks to permit sliding them into the cabinet without damage to the plates. Cells are an arrangement of two sets of flat metal plates, one of which is grounded and the other supported by insulators. When 5.5-6.0 KV, d.c. voltage is applied between the two sets of plates, a strong electrical field is set up which forces the charged dirt particles onto the plates.

Air Filters are mounted in tracks in the leaving air side of the cabinet. These guard against splashing of water into the down stream duct. They also help equalize the air flow through the cabinet, and serve as a back-stop air filter during shut downs or in the event of power failure.

Power Pack furnishes high voltages to the ionizers and collector cells, using a 115 V, 1 ph. source. The power pack has indicating lights to warn the operator when the unit is not functioning properly. An On-Off circuit breaker protects the internal elements.

Protective Devices for safety of the operator include screw operated (time delay) switches at the power pack door and the cabinet access panel. These open the 115 volt supply circuit and delay access to the high voltage parts until the charge in the capacitor has drained off. These switches should not be tampered with even though the time consumed to turn the screw may seem unnecessary.

Adhesive System. Although regular use of adhesive is recommended, the adhesive system may be omitted from the order if preferred by the customer. On such units, adhesive, adhesive nozzle header, adhesive filter, hose and adhesive pump will not be supplied. Should the customer desire, a kit of the above parts may be purchased and easily installed at a later date. The adhesive header is pinned at one end and bolted at the other end. See "Installation" for other parts.

Adhesive serves two functions: (a) to bind the collected dirt to the collector plates as it is precipitated and (b) to render the deposit completely washable with water. Westinghouse adhesives are compounded to provide the proper balance between dirt binding qualities and washability.

MAINTENANCE

Regular maintenance is the key to good performance and efficient operation of the PRECIPITRON unit. This includes (a) periodic inspections (b) regular washing and adhesive procedures and (c) prompt correction of any faults.

Inspections. A simple daily inspection of the power pack is recommended to assure that the unit is properly energized while air is flowing:

(a) "Normal" indicating light should glow.
(b) "Short Circuit" indicating light should not glow.
(c) Rectifier tubes should burn with a cherry red glow.

See "Correction of Electrical Faults" if the above conditions do not exist. For other occasional inspections see "Frequency of Washing", "Inspection Before Washing", "Dirt Build-Up" and "Filter Inspection."

Frequency of Washing depends upon how much dirt is in the air at the particular location. Average time between washings is every 2-3 weeks. To determine the actual interval, inspect a new installation frequently. The unit needs washing when the cell plates on the inlet air side appear to be 1/8" thick. However, the unit should not be allowed to go unwashed longer than one month. Based upon the time determined by the initial inspections, a schedule should be set up for regular washings. This will assist in scheduling maintenance work and will insure that the unit does not become too dirty.

Inspection Before Washing. An inspection of the dirt collection pattern on cells and after filters just before washing may show installation or maintenance faults. Remove the side access panel and inspect for the following points, using a flashlight or other similar light source. (It is not normally necessary to remove the internal components for this inspection.)

1. Dirty after filters indicate too infrequent washings, excessive air velocities or operation with the unit de-energized.
2. Some after filters or cells dirtier than others suggests broken ionizer wires, missing high voltage connections or uneven air distribution. This can also be caused by plugged spray nozzles.

Washing the Unit

1. Shut off fan and power pack.
2. Turn on water. (135-150°F. for T-675 adhesive.)
3. Move header operating handle back and forth at a slow steady rate for 4 or 5 minutes being sure to use a full stroke each time.
4. Shut off water and allow about twenty minutes for water to drain and dry before applying adhesive. (Drying time may be faciliated by running fan with power pack turned off.)

Adhesive Requirements. Westinghouse adhesive should be ordered to replace the initial supply furnished. Annual requirements may be estimated at 1-1/2 gal. per 1000 cfm unit capacity.

During cold weather, type T-675 adhesive should be stored at temperatures above 60°F. for 24 hours before using. Do not dilute T-675 adhesive with water. Should other types of Westinghouse adhesive be used, be sure to read the label on the container for special instructions.

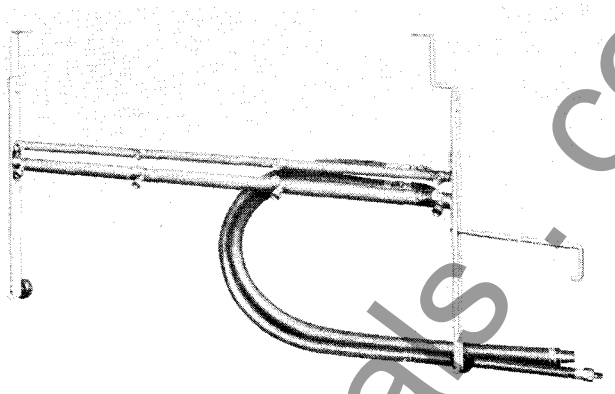


Fig. 19 Typical Spray Header (Removed)

Applying Adhesive. After washing a new coating of adhesive is applied, with the fan and power pack turned off.

1. Insert suction hose into adhesive container.
2. Turn on adhesive and immediately move header operating handle back and forth once at a slow steady rate, using full strokes. (Should take 30 to 40 seconds to apply a complete but thin coating of adhesive on cells and ionizers.)
3. Turn off adhesive and allow excess adhesive to drain from cells and ionizers for 15 minutes.
4. Turn on power pack and fan (some arcing may occur at cell plates when power pack is first turned on. This is harmless if arcing stops in a few minutes).

Header Maintenance. It is good practice to check the nozzle spray patterns (remove access panel) during washing and applying adhesive. This is particularly important when the unit is new to be sure that installation dirt has not clogged the nozzles. Cells and ionizers should also be checked for cleanliness after washing. If clean water is used, there should be little trouble with the water nozzles. Similarly the adhesive filter should stop clogging of the adhesive nozzles.

Water nozzles should provide a fan spray pattern of approximately 80° in a vertical plane. Similarly the adhesive nozzles should have a fan spray pattern of approximately 90°. Spray pattern may be controlled by pressure. High pressure causes misting while low pressure causes a reduced angle spray. Adhesive spray pattern may be controlled by the adjustment of the pump pressure regulator. Turn clockwise to increase pressure.

On smaller units, the nozzles can be serviced through the access space. For larger units, it may be necessary to remove the ionizers and then the spray header assembly to service the nozzles. Unscrew nozzle cap to clean internal elements. In

replacing or adjusting a nozzle, be sure that the slot in the disc is in a vertical position. Note: If it is necessary to enter the cabinet with the cells and ionizers removed, be sure to place boards on the cell supports to support the workman's weight.

Ionizer Maintenance. To replace broken ionizer wires, the ionizer sections may be pulled out through the access space. All broken pieces of ionizer wire should be carefully removed and discarded outside the cabinet. Four spare ionizer wires are supplied with the cabinet and additional wires may be purchased when needed. The wires are equipped with ball shaped dampeners, prelooped ends and made to the proper length at the factory. Be careful not to kink the wire because it will eventually break at this point. The ball dampeners prevent the wire from vibrating excessively. To check the effectiveness of these dampeners, pluck the wire to see that vibration dampens in one or two seconds.

To réinstall an ionizer section, simply push it into the cabinet as far as it will go and make the high voltage cable connection at the top terminal. See Fig. 12. Where more than one ionizer section is provided per cabinet, they must be connected to each other as they are pushed in place. For example, push the first ionizer in about 8 to 10 inches beyond the door. Push the next section in and make the high voltage connection as shown in Fig. 13.

Cell Maintenance. If for any reason the cells are removed from the cabinet, they should be inspected for cleanliness, damaged plates or damaged end connectors. See "Dirt Build-Up". Cell plate spacing should be uniform. Be sure to replace the cells in the correct order. See "Installing The Cells."

Pump Maintenance. Should the pump vibrate or make excessive noise, check the pump and motor alignment. It may be necessary to periodically tighten up on the packing nut to prevent leakage around the shaft. If the packing nut is too tight, the motor will overheat.

After-Filter Maintenance. If the after-filters appear excessively dirty, they should be removed and hosed off with hot water. Be sure to replace the filters in their original order.

Adhesive Filter Maintenance. The replaceable cartridge should be inspected at least once a year and replaced if found dirty.

Build-Up of Dirt. With infrequent or incomplete washing, a non-water soluble build-up of dirt may accumulate by allowing a film of dirt to remain after each washing. If inspection discloses such a film, the trouble may be: (a) low water temperature or pressure, (b) clogged nozzles, (c) incomplete application of adhesive or (d) using other than Westinghouse adhesive. Should the difficulty persist after checking these points, an occasional cleaning by one or the other of the following methods is recommended:

(1) Before washing apply one adhesive cycle and allow to soak about 20 minutes. Thoroughly wash off with several cycles of 160 to 180° F. water. Allow to dry and repeat if necessary.

(2) If the above adhesive soaking method fails to clean the parts, make a solution of about one pound of mild detergent ("ALL" or equal) to each gallon of 100 to 120 F. water. Apply this solution to the dirty components and allow to soak 10 to 20 minutes. Thoroughly flush with 160 to 180 F. water. Repeat if necessary to get parts metal clean. It is best to apply the detergent with a separate spray gun. The solution may also be applied through the adhesive pump and header nozzles, but the system must be flushed with hot water and thoroughly dried before adhesive is used again, being sure to replace or dry out the adhesive filter cartridge. Drying is important.

Location and Correction of Electrical Faults. Electrical faults can usually be found by careful inspection. Wiring diagrams (Figs. 9 & 10) should be helpful in analyzing possible troubles. Common faults and probable causes are shown in Table No. 1. These points should be checked first before attempting the more difficult process of elimination. If a high voltage short circuit cannot be located by inspection, disconnect the cell and ionizer cables at the power pack terminals (see caution below). Close power pack door and turn on the circuit breaker. Continued glowing of the short circuit light indicates that the trouble is in the power pack. Consult the power pack instruction book for detailed corrective procedure.

If the short circuit light does not glow after disconnecting the cables, the trouble is either in the cells, ionizers or high voltage cable. This may be localized by alternately connecting the cables at the cells or ionizers until the faulty part is located. The cells or ionizers may be removed if necessary for close examination and correction of the fault.

Caution. The above test procedure involves handling parts which are normally charged with high voltage. Always turn off the power pack and allow at least 1/2 minute before touching the high voltage parts. This time delay permits the residual charge in the capacitor and cells to drain to a safe value through the discharge resistor in the power pack. It is also good practice to ground the part with a grounded prod equipped with a suitably insulated handle.

TABLE NO. 1, OPERATION CHART

NORMAL OPERATION	FAULT INDICATION	PROBABLE CAUSES
Sentinel breaker switch on. Normal indicating lamp lit. Short circuit lamp not lit.	Normal indicating lamp not lit. Sentinel breaker switch on. Short circuit lamp not lit.	1. No power supply voltage to power pack. 2. Door switches not closed. 3. Poor contact in a door interlock switch. 4. Burned out indicating lamp.
	Short circuit lamp lit. Sentinel breaker switch on, or breaker has tripped and short circuit lamp lights as breaker is reset.	1. Foreign conducting material between cell plates. 2. Broken ionizing wire touching grounded equipment. 3. Short circuited wiring inside power pack. 4. Faulty HV transformer or capacitor.
	Sentinel breaker switch is tripped. (System otherwise normal when breaker is reset.)	1. Temporary short circuit which has cleared. 2. Momentary surge of excessive line (primary) voltage.
The tube filaments approximate a clear incandescent lamp in color, when observed through the window in the power pack door.	Blue glow around tube filament.	1. A blue glow is serious only if it is pronounced and appears to be increasing.
	Tube does not glow at all.	1. Burned out filament. 2. Open circuit in transformer filament winding. 3. Poor contact between tube prongs and socket.
Occasional arcing or crackling between cell plates is not serious, usually being due to large particles passing between the plates. Some arcing may occur after applying adhesive but should soon stop.	Continual crackling or arcing in cells.	1. Excessive dirt build-up is short circuiting cells. 2. Insulators are dirty, cracked, broken. 3. Broken ionizing wire drawn into cell. 4. Burned out tube in power pack (13 kv portion).
Cells collecting dirt and filters clean.	Filters excessively dirty.	1. Dirt on ionizer causing inefficient ionizer operation. 2. Low voltages or a defective power pack. 3. Cell plates not properly coated with adhesive. 4. Improper air distribution: (a) Fan speed increased or system resistance reduced, (b) sharp turns in ducts. 5. Missing or disconnected ionizer or cell connectors.

TABLE NO. 2, CONDENSED SPECIFICATIONS

UNIT CODE NO.	PC23	PC24	PC33	PC25	PC26	PC43	PC35	PC36	PC37	PC46	PC47	PC48
Capacity C.F.M. @ 90% Eff.	2000	2660	3000	3330	4000	4000	5000	6000	7000	8000	9230	10640
Pressure Drop w.g. @ 333 fpm	0.15"	0.15"	0.15"	0.15"	0.15"	0.15"	0.15"	0.15"	0.15"	0.15"	0.15"	0.15"
Dimensions (approx.)												
Height	35"	35"	47"	35"	36"	60"	47"	48"	48"	61"	61"	61"
Width	35"	45"	35"	57"	69"	35"	57"	69"	79"	69"	79"	91"
Length	38"	38"	38"	38"	38"	38"	38"	38"	38"	38"	38"	38"
Leg Height	5"	5"	5"	5"	6"	6"	5"	6"	6"	7"	7"	7"
Minimum Clearance to remove header, cells, and ionizers	40"	30"	40"	42"	54"	40"	42"	54"	64"	57"	66"	78"
Cells CA12	—	4	—	2	—	—	3	—	6	—	8	4
CA13	2	—	3	2	4	4	3	6	3	8	4	8
Water gpm @ 40 psi	5.5	5.5	5.5	8.0	10.5	10.5	8.0	10.5	10.5	21	21	26
Water Nozzles	4	4	4	6	8	8	6	8	8	16	16	20
Adhesive qts. per application	1	1.4	1.5	1.7	2	2	2.5	2.5	3	3.5	4.7	5.4
Piping Connections												
Water ips	3/4"	3/4"	3/4"	1"	1"	1"	1"	1"	1"	1-1/4"	1-1/4"	1-1/4"
Adhesive ips	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
Drain ips	1-1/2"	1-1/2"	1-1/2"	1-1/2"	2"	2"	1-1/2"	2"	2"	2-1/2"	2-1/2"	2-1/2"
Electrical 115 v-1 ph-60 cy												
Power Pack (1 per unit)	RA3	RA3	RA3	RA3	RA3	RA3	RA15	RA15	RA15	RA15	RA15	RA15
P.P. Input Watts	55	65	70	77	85	85	135	145	155	165	175	185
Adh. Pump Motor H.P.	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/2	1/2	1/2
Weights approx. net lbs.												
Unit less P.P. and Pump	310	360	385	445	510	470	550	660	740	810	930	1030
Power Pack	66	66	66	66	66	66	130	130	130	130	130	130
Pump	32	32	32	32	32	32	32	32	32	40	40	40