RECEIVING • INSTALLATION • MAINTENANCE

INSTRUCTIONS

TYPE P S
HORIZONTAL AIR FLOW-MANUAL WASH

Westinghouse Precipitron®

THE *ELECTRONIC* AIR CLEANER

for

Industrial and Commercial Applications

115 Volts
Single Phase

60 and 50 Cycle
Alternating Current

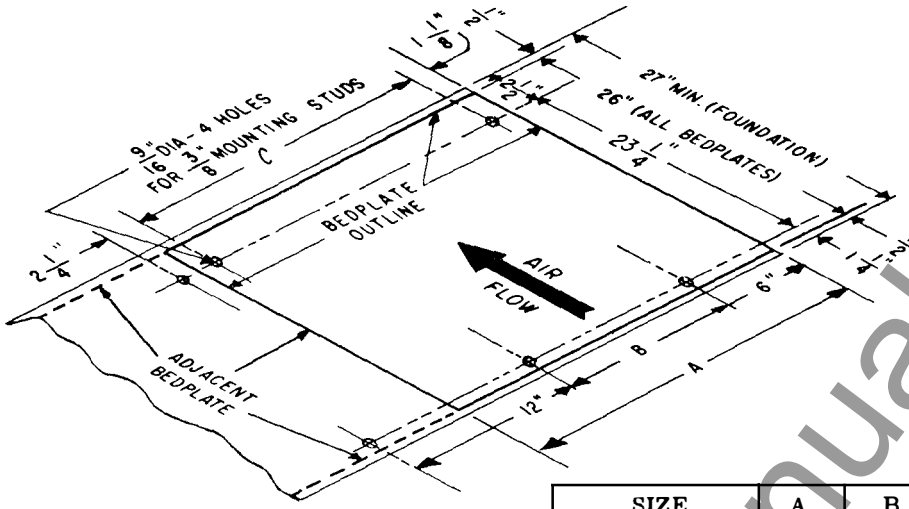
The Precipitron is an electronic air cleaning apparatus used in ventilating and air conditioning systems of industrial plants and commercial establishments to remove soot, smoke, dust, dirt and other air borne particles.

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.

SUPERSEDES I.B. 93-810-1A
EFFECTIVE OCTOBER, 1950

EFFECTIVE JULY 1, 1954



SIZE	A	B	C
2' BEDPLATE	24"	12"	21-3/4"
3' BEDPLATE	36"	24"	33-3/4"

NOTE: Bedplates should be used as templates when locating mounting studs in foundation. Be sure that adjacent bedplates butt closely together. Refer to BILL OF MATERIAL for correct number and size of bedplates supplied with the desired unit.

Fig. 3 Location of Mounting Studs for Bedplates

Water Supply capable of delivering 130-150°F water with a minimum running pressure of 30 psi, is required to properly wash the unit. Hot and cold water lines (1/2" ips min.) are recommended. Provide each line with a hand valve and then bring together with a common outlet for a hose connection. Locate the water supply close to the unit, outside the duct and between the two duct access doors. A hose long enough to reach both sides of the frame bank and an adjustable stream nozzle (ordinary garden variety) should be provided.

Drains on the inlet and outlet air sides, should be equipped with cover lids or water seals if they are tied together, to avoid leakage of dirty air into the clean air. Water seals or traps should hold enough water to prevent evaporation during the periods between cleanings.

Power Supply required is 115 volts (plus or minus 5 volts) a.c., 1 ph., either 60 or 50 cycles. If the supply varies more than rated 115 ±5 volts, the local power company or a competent engineer should be consulted and the voltage corrected to assure proper operation of the apparatus. Only 60 cycle apparatus is actually supplied, since it can also be used satisfactorily on 50 cycles.

INSTALLING THE FRAME BANK

The frame bank is easily assembled to the required size, by stacking the parts as indicated in the typical photographs. Frames, top plates, cells and most hardware are made of rugged light weight aluminum.

Be sure to install bedplates, frames and top plates in accordance with air flow direction arrows painted on these parts.

Hardware supplied for assembly is contained in cloth bags attached to the component parts. This hardware should be carefully sorted and saved until needed.

Bedplates (supplied in 36" and 24" lengths) provide proper drainage of wash water, and prevent by-passing of air under the unit. All bedplates are drilled to take 3/8" foundation bolts (not supplied with unit). See Figs. 1 & 3.

Bolt all bedplates to the foundation, making sure that they butt together closely, and are in line and level in both directions (see Fig. 4). Shim if necessary. Grout any openings under the inlet air side of the bedplates to prevent leakage of air under the bedplates.

Frames (supplied in 36" and 24" lengths) are bolted to the bedplates. In handling, be careful not to break the ionizer wires.

Start with one end, and set frames on all bedplates the full length of the bottom row. Bolt the frames together horizontally first using four 3/8" x 16 x 3/4" aluminum bolts, nuts and washers be-

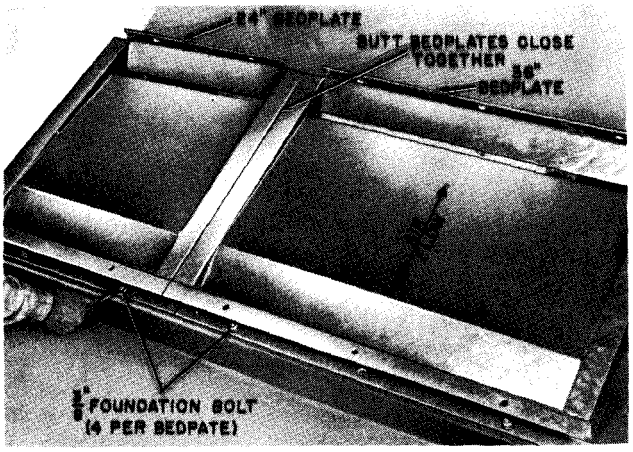


Fig. 4 Installing the Bedplates

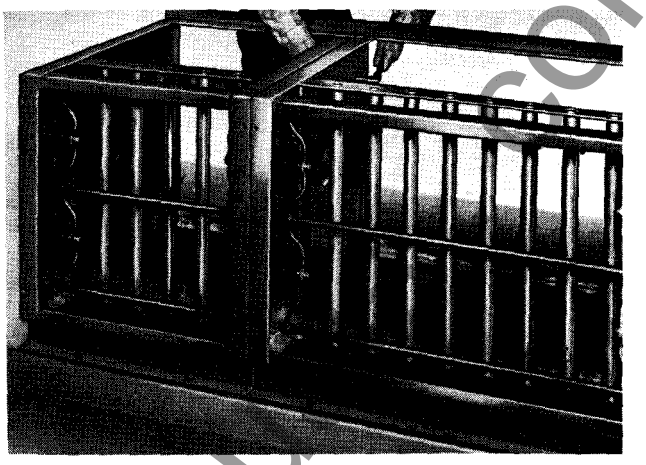


Fig. 5 Bolting the Frames Together

tween frames. (Hardware furnished in cloth bag with each frame.) See Fig. 5.

Next bolt the frames to the bedplates on the outlet air side. Install the long 3/8" bolts (supplied with filter hardware) in the two outer holes at the turned up flange of each frame. See Fig. 6. Bolt heads should be inside with a flat washer next to the bolt head. These long bolts must be tightened in place with a nut (no washer) on the outside of the frame. Install 3/8" x 16 x 3/4" aluminum bolts in the remaining holes on the inlet and outlet air side to securely bolt the frames to the bedplates.

Check this row for levelness and plumbness and shim if necessary. Continue in this manner until all rows of frames are installed, being sure each row is plumb and level. See Figs. 6 & 7.

Top Plates (supplied in 36" and/or 24" lengths) are installed as illustrated by Fig. 8. Remove the cover from the wiring raceway on the outlet air side prior to installation. Top plates should be securely attached to the frames with sheet metal screws. Fasten ends of wiring raceway together with small bolts and nuts. Screws, bolts and nuts are included in the bag with each top plate. Top plate covers should be installed after installation of high voltage wiring.

Be careful not to lose the remaining wire, terminals and hardware packed in the bags. These will be used later for the high voltage wiring.

Sealing the Framework For proper performance, all air to be cleaned must pass through the PRECIPITRON frame bank. This means that

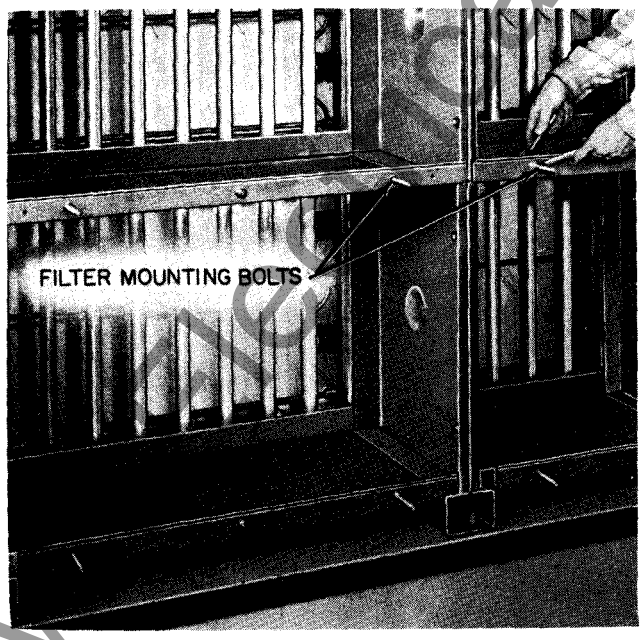


Fig. 6 Installing the Filter Mounting Bolts (Outlet Air Side)

Fig. 7 Bolting the Frame Together (Inlet Air Side)

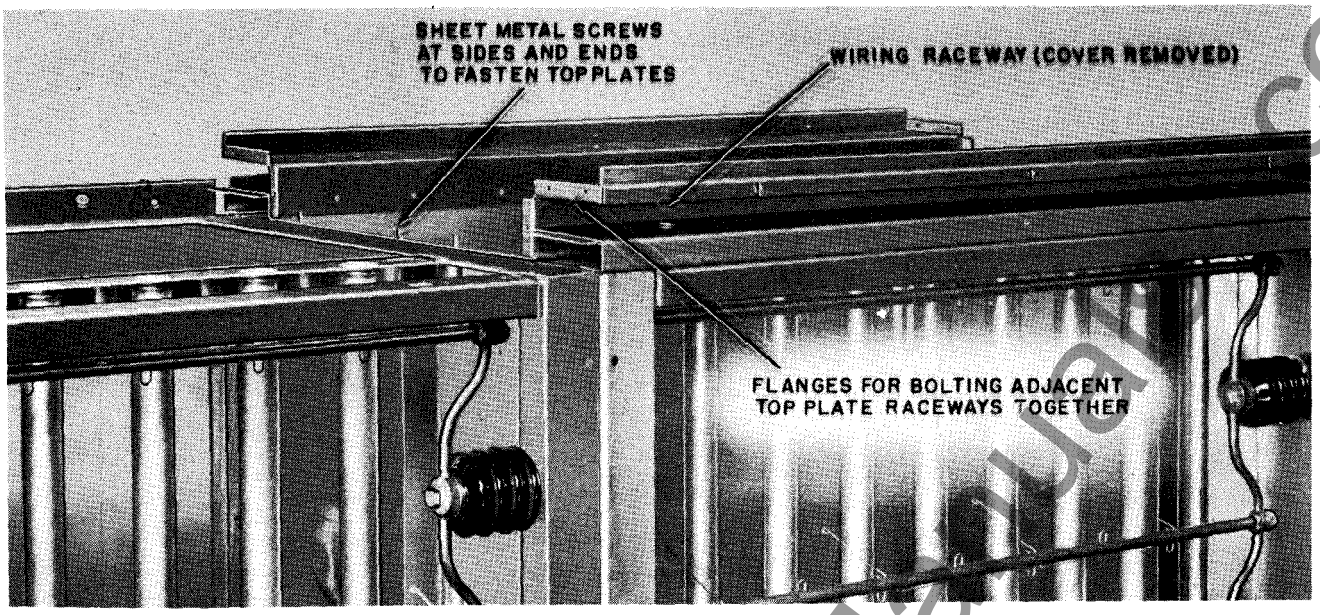


Fig. 8 Assembly of Top Plates (Shows Only One Top Plate in Place)

all spaces around or above the assembly must be sealed.

Air is prevented from by-passing under the frame bank by air baffles built into the bedplates. Top plates have a turned up edge on both inlet and outlet air sides for attaching safe-off or sealing strips between the top of the unit and the duct or plenum ceiling. Drill the turned up edge only, and attach the seal-off strip with sheet metal screws (See Fig. 9).

Sealing between ends of the unit and duct or plenum walls may be accomplished in several ways. It is always better to attach the duct or plenum walls directly to the ends of the unit, using the existing bolt holes in the frame. If the space is very narrow, caulking compound (Minnesota Mining & Mfg. Co. EC-801) or felt strips may be used. Otherwise seal with metal strips as illustrated in Fig. 9.

Cells should be handled by the end frames to prevent damage. Remove and discard the shipping braces from the ends of the cells. These braces will cause a short circuit if not removed. See Fig. 10. Also remove the tier connectors which are taped on the cells, but save them for high voltage connections later. Carefully inspect all cells to be sure plates are evenly spaced and undamaged. Install cells with the connector posts pointing toward the outlet air side. See Fig. 11. Push cells into frames as far as they will go.

Cell Clamp Angles should be installed to hold the cells in place. See Fig. 17. Use 3/16" x 16 x 3/4" bolts, thin nuts, washers, and clamp angles supplied in bag with each frame.

LOW VOLTAGE WIRING

Typical low voltage wiring diagram is shown in Fig. 14. The 115 volt supply to the power packs should be run in conduit. All low voltage wiring inside the duct should be installed in conduit and made watertight.

Power Packs should be mounted outside the duct, either on the duct wall, if sufficiently braced to withstand the weight, on an adjacent building wall, or on a suitable mounting stand. Four 3/8" mounting bolts (not supplied with unit) are required for each power pack. Power packs should be grouped together for inspection purposes and clearance should be allowed for opening the front door. Also allow 12" space vertically between power packs if mounted one above the other for service access. Refer to the instruction leaflet, packed inside the power pack for further details.

NOTE: Locate power packs close to the frame bank. Additional high voltage cable is required if the cable length between the power packs and the nearest top plate exceeds 15 feet. See "High Voltage Wiring".

Magnetic Contactor is supplied only when more than two power packs are furnished. It should be mounted outside the duct adjacent to the power packs as shown in Fig. 14.

Red Pilot Lights (supplied with accessories) should be installed above the two duct access doors. (See Fig. 14). These lights glow when power is connected to the power packs.

Door Interlock Switches (supplied with accessories) are provided for installation on the two duct doors as a positive means of de-energizing

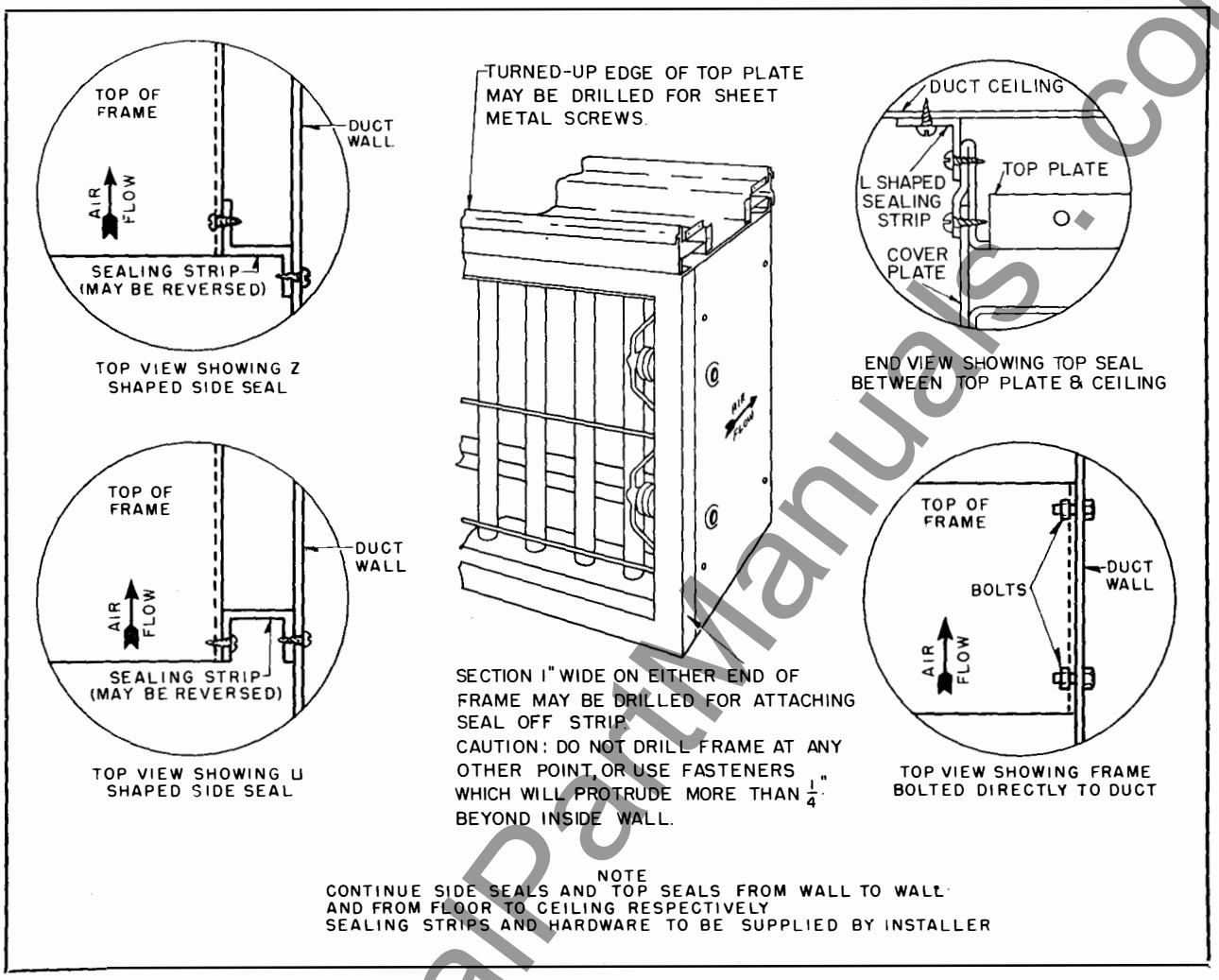


Fig. 9 Sealing the Framework

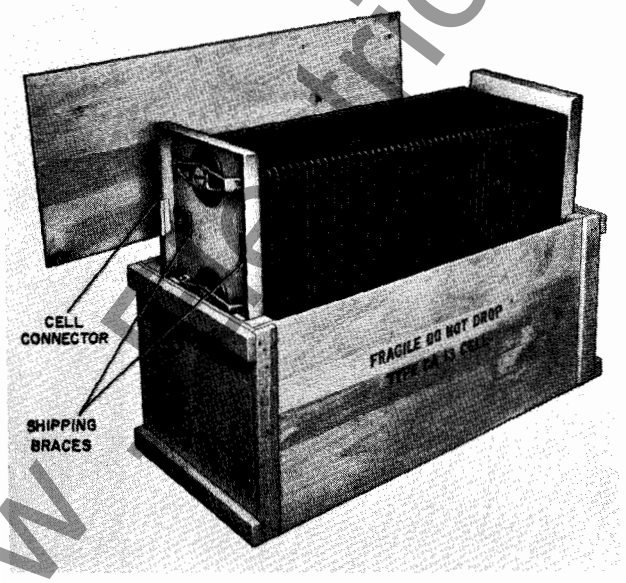


Fig. 10 Details of Cell Packing

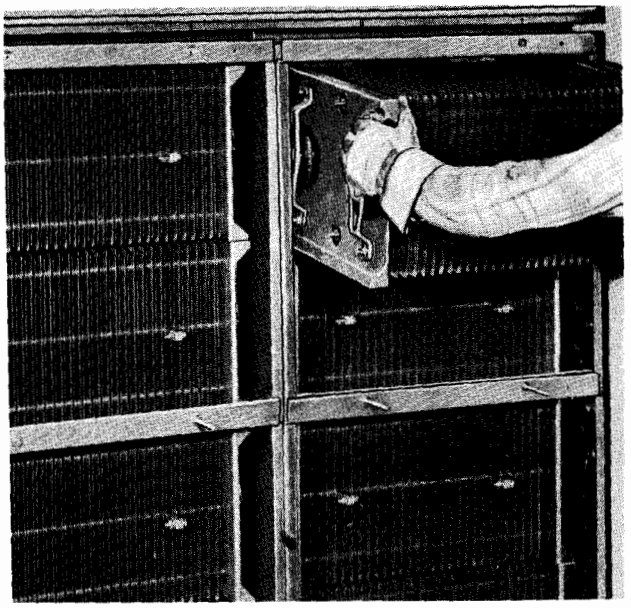


Fig. 11 Installing the Cells

the PRECIPITRON before the plenum may be entered. See Figs. 12 & 14.

NOTE: Any other access doors to the PRECIPITRON plenum must be positively locked (or equipped with additional interlock switches) to prevent unauthorized entry to the high voltage parts.

Manual Switches (supplied with accessories) are to be installed inside the duct adjacent to the two duct doors as shown in Fig. 14. These permit the operator to disconnect the 115 volt supply and prevent power from being accidentally turned on while he is inside the plenum.

Duct Lights (supplied with accessories) are to be installed at the ceiling on each side of the frame bank to facilitate inspection and servicing. See Fig. 14.

Ductlight Switch and Pilot (supplied with accessories) should be installed as shown in Fig. 14 to control the duct lights and indicate when they are lighted.

HIGH VOLTAGE WIRING

High Voltage Cable is supplied with the unit in 50' coils. Remove all top plate covers so that raceways will be accessible for installing the high voltage cables.

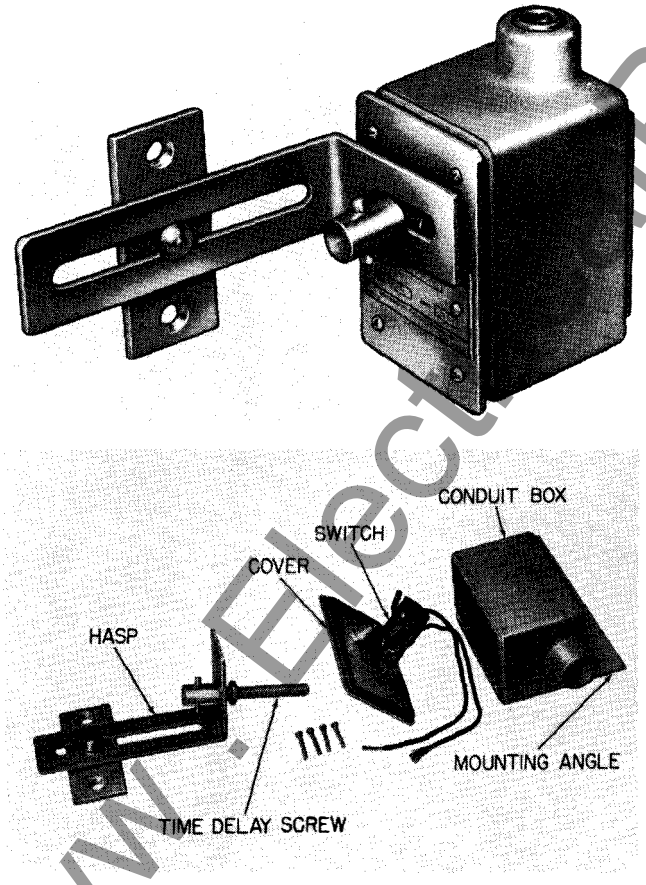


Fig. 12 Door Interlock Switch

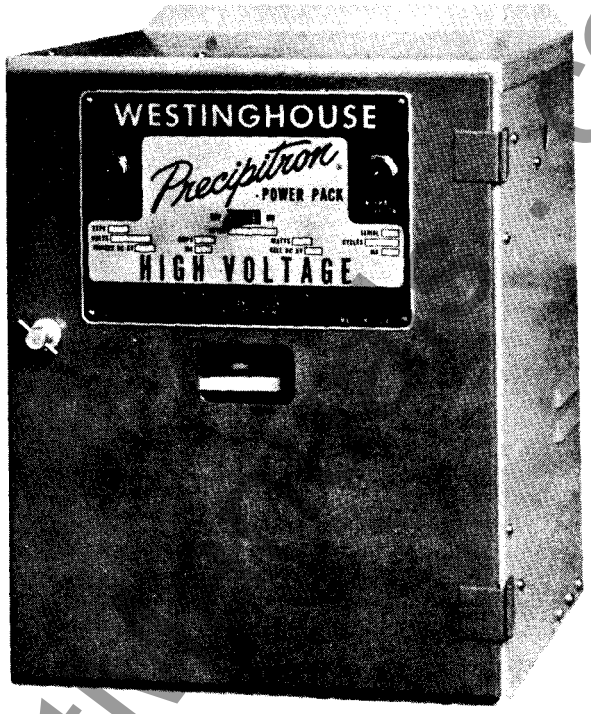


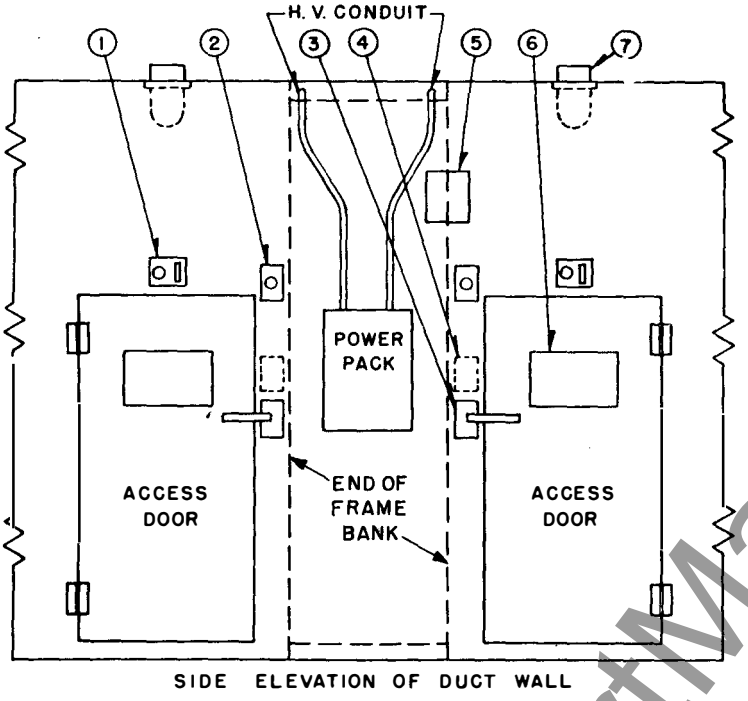
Fig. 13 Power Pack

Two lengths of high voltage cable are required from each power pack. See Fig. 15. These cables should be installed in conduit between the power packs and the top plate raceways. The cables are then extended through the raceways to the top cells and ionizers. Cable holes are provided in the bottom of the top plate raceways. The raceway on the inlet air side is for ionizer cables (13 KV) and the outlet raceway is for cell cables (6 KV).

The extreme ends of the top plate raceway assembly should be covered tightly either by the plenum walls or by sheet metal plates fabricated on the job. Terminate conduits from the power packs at the plenum wall on fabricated plates or pull boxes, using conduit bushings.

Enough high voltage cable is supplied to permit 15' lengths between power packs and nearest top plate, plus lengths required through raceways to the top cells and ionizers. If power packs are located farther away, additional cable will be required. Only high voltage cable supplied by Westinghouse Sturtevant Division is recommended. Plan the cutting of cables so that continuous lengths can be installed.

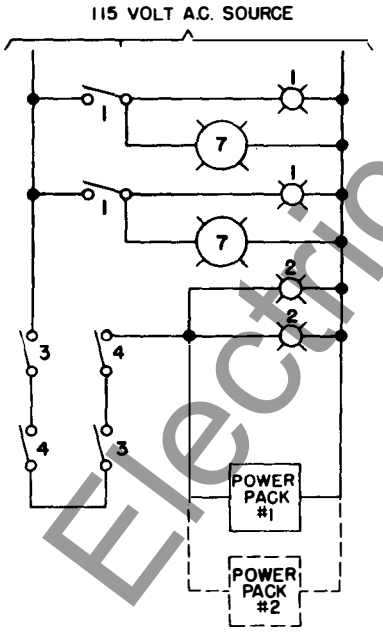
High Voltage Connections to the cells and ionizers enter only at the top of each column of frames. All cells and ionizers within columns are interconnected vertically with tier connectors. See Fig. 15.



TYPICAL LOCATION OF ACCESSORIES ON OUTSIDE OF DUCT

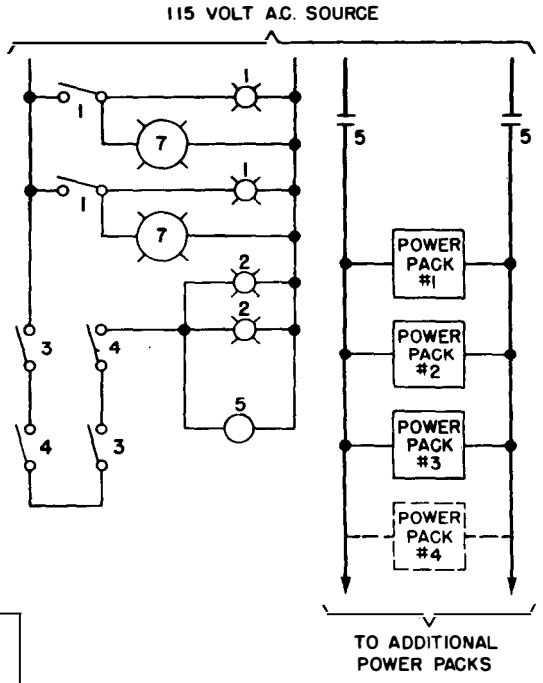
TABLE OF ACCESSORY ITEMS SHOWN ON LAYOUT AND SCHEMATIC DIAGRAMS			
ITEM	DESCRIPTION	REQ.	SUPPLIER
1	Amber Pilot Light & Switch	2	W
2	Red Pilot Light	2	W
3	Door Interlock Switch	2	W
4	Manual Switch	2	W
5	Contactor (when required)	1	W
6	Nameplate & H. V. sign	2	W
7	Duct Lights	2	W
8	Conduit Fixtures and Wiring	To Suit	Others

NOTE:-Only one Power Pack may be mounted on side of unit without additional supports. For Multiple Power Pack Units, Power Packs may be located elsewhere within 15 feet of the unit.



1 OR 2 POWER PACKS

MAX. CURRENT CONSUMPTION PER POWER PACK 4 AMPS.



3 OR MORE POWER PACKS

Fig. 14 LOW VOLTAGE SCHEMATIC WIRING DIAGRAMS

Where two or more power packs are furnished, columns are combined to proportion the load as shown in table No.1.

Example: Unit Code PS-5023 is an assembly 5 frames high with 2-2ft. and 3-3ft. wide columns. 3 power packs supplied are connected as follows:

Pack No. 1-Columns 1 & 2 (2 ft. wide)
Pack No. 2-Columns 3 & 4 (3 ft. wide)
Pack No. 3-Column 5 (3 ft. wide)

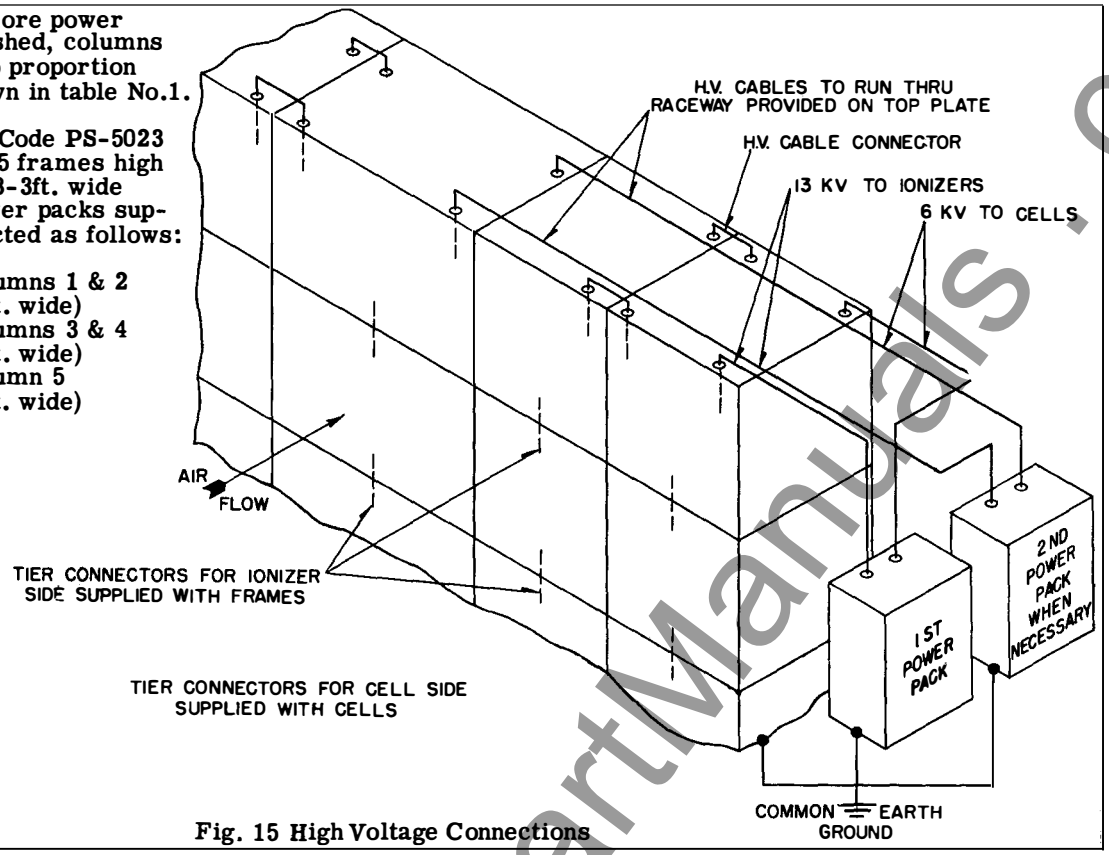


Fig. 15 High Voltage Connections

Unit Code No.	Number of Columns 2 ft. Wide	Number of Columns 3 ft. Wide	Power Packs Qty	Power Pack Load Div. By Columns 1st Power Pack	Power Pack Load Div. By Columns 2nd and Succeeding Power Packs
PS-1010	1	0	1	All Columns	-
1001	0	1	1	All Columns	-
1020	2	0	1	All Columns	-
1011	1	1	1	All Columns	-
1002	0	2	1	All Columns	-
1021	2	1	1	All Columns	-
1012	1	2	1	All Columns	-
1003	0	3	1	All Columns	-
PS-2010	1	0	1	All Columns	-
2001	0	1	1	All Columns	-
2020	2	0	1	All Columns	-
2011	1	1	1	All Columns	-
2002	0	2	1	All Columns	-
2021	2	1	1	All Columns	-
2012	1	2	1	All Columns	-
2003	0	3	1	All Columns	-
PS-3001	0	1	1	All Columns	-
3020	2	0	1	All Columns	-
3011	1	1	1	All Columns	-
3002	0	2	1	All Columns	-
3021	2	1	1	All Columns	-
3012	1	2	1	All Columns	-
3003	0	3	1	All Columns	-
3022	2	2	1	All Columns	-
3013	1	3	2	1-2' & 1-3'	2-3'
3004	0	4	2	2-3'	2-3'
3023	2	3	2	2-2' & 1-3'	2-3'
3014	1	4	2	1-2' & 2-3'	2-3'
3005	0	5	2	3-3'	2-3'
PS-4020	2	0	1	All Columns	-
4011	1	1	1	All Columns	-
4002	0	2	1	All Columns	-
4021	2	1	1	All Columns	-
4012	1	2	2	1-2' & 1-3'	1-3'
4003	0	3	2	2-3'	1-3'
4022	2	2	2	2-2'	2-3'
4013	1	3	2	1-2' & 1-3'	2-3'
4004	0	4	2	2-3'	2-3'
4023	2	3	2	2-2' & 1-3'	2-3'
4014	1	4	2	1-2' & 2-3'	2-3'
4005	0	5	3	2-3'	2nd 2-3', 3rd 1-3'
4024	2	4	3	2-2'	2-3'
4015	1	5	3	1-2' & 1-3'	2-3'
4006	0	6	3	2-3'	2-3'
4025	2	5	3	2-2' & 1-3'	2-3'

Unit Code No.	Number of Columns 2 ft. Wide	Number of Columns 3 ft. Wide	Power Packs Qty	Power Pack Load Div. By Columns 1st Power Pack	Power Pack Load Div. By Columns 2nd and Succeeding Power Packs
PS-5011	1	1	1	All Columns	-
5002	0	2	1	All Columns	-
5021	2	1	2	2-2'	1-3'
5012	1	2	2	1-2' & 1-3'	1-3'
5003	0	3	2	2-3'	1-3'
5022	2	2	2	2-2'	2-3'
5013	1	3	2	1-2' & 1-3'	2-3'
5004	0	4	2	2-3'	2-3'
5023	2	3	3	2-2'	2nd 2-3', 3rd 1-3'
5014	1	4	3	1-2' & 1-3'	2nd 2-3', 3rd 1-3'
5005	0	5	3	2-3'	2nd 2-3', 3rd 1-3'
5024	2	4	3	2-2'	2-3'
5015	1	5	3	1-2' & 1-3'	2-3'
5006	0	6	3	2-3'	2-3'
5025	2	5	4	2-2'	2nd & 3rd 2-3', 4th 1-3'
5016	1	6	4	1-2' & 1-3'	2nd & 3rd 2-3', 4th 1-3'
PS-6012	1	2	2	1-2' & 1-3'	1-3'
6003	0	3	3	1-3'	1-3'
6022	2	2	3	2-2'	1-3'
6013	1	3	3	1-2' & 1-3'	1-3'
6004	0	4	4	1-3'	1-3'
6023	2	3	4	2-2'	1-3'
6014	1	4	4	1-2' & 1-3'	1-3'
6005	0	5	5	1-3'	1-3'
6024	2	4	5	2-2'	1-3'
6015	1	5	5	1-2' & 1-3'	1-3'
6006	0	6	6	1-3'	1-3'
6025	2	5	6	2-2'	1-3'
6016	1	6	6	1-2' & 1-3'	1-3'
PS-7022	2	2	3	2-2'	1-3'
7013	1	3	4	1-2'	1-3'
7004	0	4	4	1-3'	1-3'
7023	2	3	4	2-2'	1-3'
7014	1	4	5	1-2'	1-3'
7005	0	5	5	1-3'	1-3'
7024	2	4	5	2-2'	1-3'
7015	1	5	6	1-2'	1-3'
7006	0	6	6	1-3'	1-3'
7025	2	5	6	2-2'	1-3'
7016	1	6	7	1-2'	1-3'
7007	0	7	7	1-3'	1-3'
7026	2	6	7	2-2'	1-3'
7017	1	7	8	1-2'	1-3'
7008	0	8	8	1-3'	1-3'

TABLE NO. 1, POWER PACK LOADING

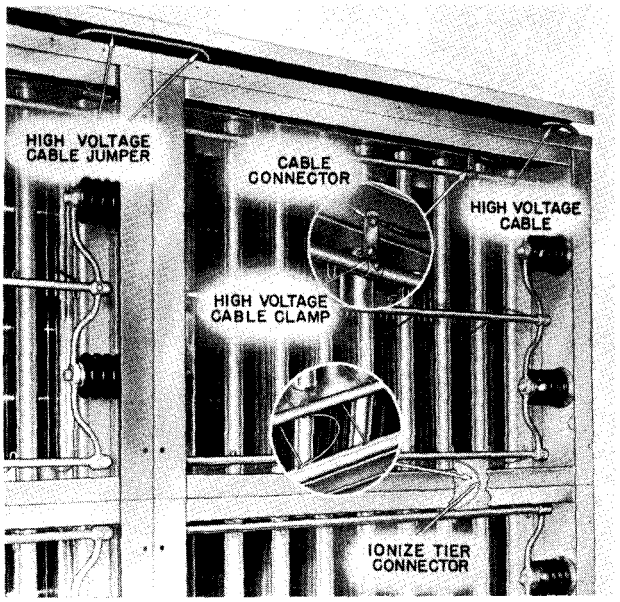


Fig. 16 High Voltage Connections To Ionizers

Where one power pack is sufficient for more than one column of frames, additional columns are added with high voltage jumper cables threaded through the top plate raceways. Cable connectors are furnished in bags supplied with the top plates. See Fig. 15.

When two or more power packs are furnished, columns are combined to proportion the load as shown in table No. 1. It is important to make connections as specified in this table to prevent overloading individual power packs.

Ionizer Tier Connections are furnished in the bags supplied with the frames and are installed as shown in Fig. 16. One connector is required vertically between each frame.

Cell Tier Connectors are furnished (taped to each cell) and are installed as shown in Fig. 17. One connector is required vertically between each cell.

Grounding the Equipment High voltages are supplied from the power packs to the cells and ionizers with single conductor cables. A common ground return is required for these circuits as shown in Fig. 15. Also, this grounding is necessary for safety purposes because of the high voltages involved.

Connect the duct, power pack cases and frame structure to a common low resistance ground, using solid copper wire. If ground is a water line, it may be necessary to install a jumper wire around the water meter, since some meters are insulated electrically.

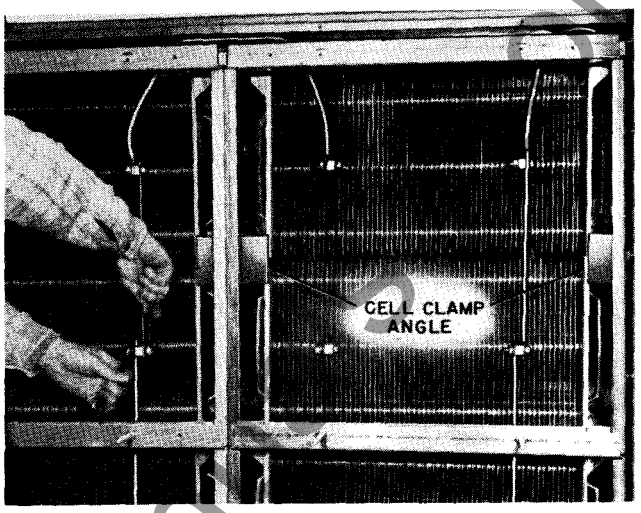


Fig. 17 Installing the Cell Tier Connectors

Filter Clamps are installed during assembly of the top plate covers. Install the filter clamps ("Z" shaped) on the outlet air side of the top plate covers, using the long sheet metal screws. Clamps and screws are supplied with the filter hardware. See Fig. 19.

Filters (nominal 3' x 2' and 2' x 2' cleanable type) are supplied to cover the outlet air side of the frame bank - one filter per frame. Hardware for attaching filters is supplied in a separate package marked "Filter Hardware". The Z clamps and long bolts should have been installed during installation of the frames and top plate covers. (See Fig. 19.)

Install the top row of filters first, with the top edge inserted under the "Z" clamps. Bend these clamps, if necessary to make a snug fit.

Push the filter against the frame allowing it to be supported on the studs below.

Loosely screw on the wing nuts (supplied with filter hardware) below these filters and tighten after the lower row of filters are installed. The lower filters are held in place by wing nuts.

Baffle Doors are not normally supplied with the apparatus. To meet specific customer requirements, baffle doors may be specified instead of filters or in addition to filters. There are two baffle doors for each 36 in. frame and one for each 24 in. frame. They are constructed of perforated aluminum and are attached to the ionizer side of the frame by two bolts and nuts provided.

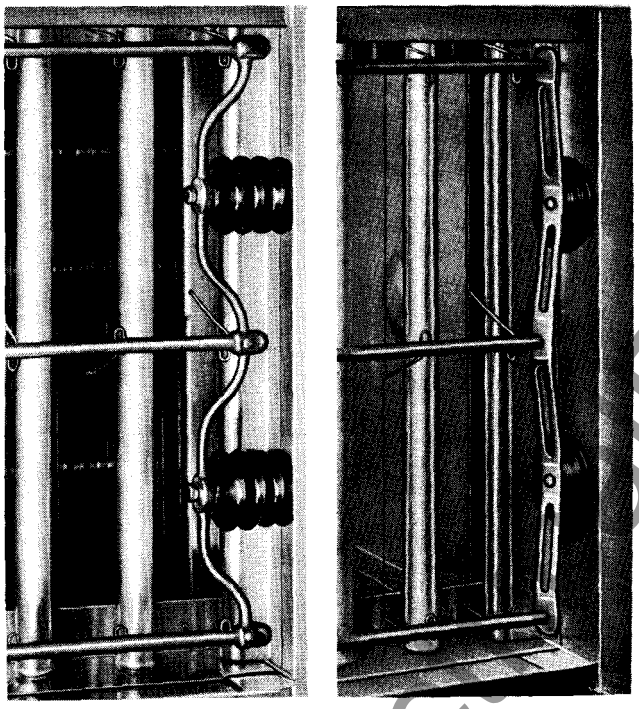
Name Plates (supplied in the "Instruction Package") are installed on the outside of the two duct doors. These name plates include a high voltage warning, special cleaning requirements and unit identification.

Operation Chart is supplied in the Instruction Package''. This chart includes maintenance hints and should be prominently attached adjacent to the unit. See Table No. 2.

CHECKING THE INSTALLATION. The following items should be carefully checked by the installer prior to energizing the PRECIPITRON.

Electrical Inspection

1. All cell plates should be evenly spaced and undamaged.
2. All ionizer wires should be under a slight tension and midway between the ground tubes. Replace broken wires with the spare spool of wire supplied with the accessories.
3. All wiring should be installed in accordance with the wiring diagrams and connections should be tight.



Early Design Late Design
Fig. 18 Types of Ionizer Insulators

Mechanical Inspection

1. Check the plenum and ducts, for air leakage or bypassing of dirty air around the frame bank.
2. Check the air distribution through the unit, and make sure the rated cfm of the PRECIPITRON is not exceeded. (See Air Handling Requirements.)
3. Nameplates and maintenance chart should be installed conspicuously.

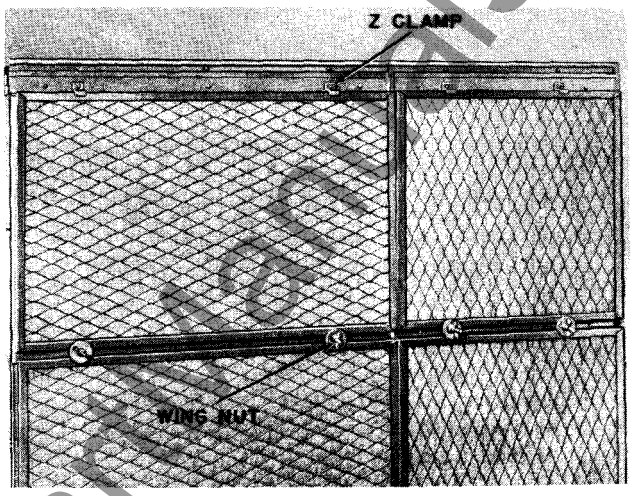


Fig. 19 Installation of Filters

4. Wash the frame bank thoroughly to remove dust and dirt which may have accumulated during installation. (See ''Maintenance'' for washing procedure.)

Starting the Unit When the system is complete and ready to be placed in service, a Westinghouse Service Representative should be requested to check and start the PRECIPITRON. Representatives of all erecting contractors should be present to facilitate any necessary corrections. A representative of the operating department should also be present to receive operating instructions. The adhesive applicator, initial supply of adhesive, and all instruction books supplied should be available during this start-up inspection.

OPERATION

PRECIPITRON is an electronic air cleaner - not an air filter. Strong electrostatic forces draw the dirt particles from the air and are equally effective on both the large and extremely small ones. Because of this, PRECIPITRON will remove from 6 to 8 times more dirt from the air 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 in removing dirt from the air, frequent washings are needed to dispose of the increased amount of collected dirt. PRECIPITRON is designed to permit this dirt to be easily flushed out of the equipment with ordinary water.

PRECIPITRON removes the dirt particles from the air by first giving them an electrostatic charge, and then forcing the charged particles to deposit on charged plates. See Fig. 20. To insure that

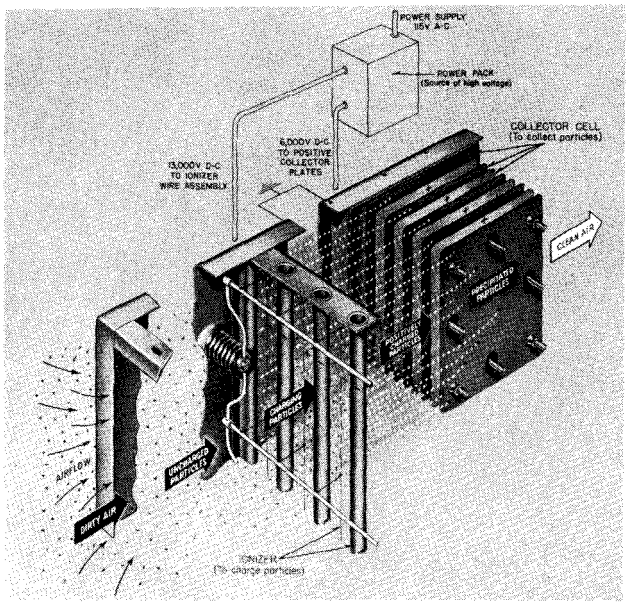


Fig. 20 Principle of Operation

the dirt will be held after it is thus removed from the air, the collecting surfaces are coated with a water washable adhesive fluid. This washes off with the accumulation of dirt, and a fresh coating is applied for the next air cleaning cycle.

Ionizers When high voltage d.c. (12.5 to 13.3 KV) 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 electrostatic charge.

Collector Cells are an arrangement of two sets of flat metal plates, one of which is grounded and the other supported from insulators. When high voltage d.c. (5.5 to 6.0 KV) is applied between the two sets of plates it provides a strong electrical field which forces the charged dirt particles to deposit on the surfaces of the plates.

Power Pack furnishes the voltage applied to the ionizers and the collector cells using 115 volt, 1 phase, 60 or 50 cycle power source. Power packs include indicating lights to warn the operator when the unit is not functioning properly. An "on-off" circuit breaker is also included to protect the internal elements and to provide a convenient means of shutting off the pack.

Filters minimize splashing of water and adhesive into the outlet duct when the unit is being serviced. They also act as a back stop to catch some dirt should the PRECIPITRON become de-energized or too heavily loaded with dirt.

Protective Devices are included for the safety of the operator. Screw operated (time delay) switches are provided in the power pack and for the duct access doors. These switches 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 in turning the screw may seem unnecessary. Red warning lights outside the ducts show when power is connected to the power packs. Manual switches inside the duct permit the operator to disconnect all power packs and prevent power from being accidentally turned on while he is inside the duct. Signs on the duct doors include a warning of high voltage. Duct lights are included to facilitate inspections and maintenance.

Adhesive serves two functions: (a) to bind the 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. 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 packs is recommended to assure that the unit is on while the 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 on how much dirt there is in the air at the particular location. It averages every 2-3 weeks. To set a washing schedule, inspect a new job frequently. The unit needs washing when the plates on the inlet air side appear to be 1/8" thick. However, the unit should not be allowed to go unwashed longer than a month. See "Dirt Build Up". Based upon the time determined by the initial inspections, a time 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.

Adhesive Requirements Westinghouse adhesive should be ordered to replace the initial

Fig. 21 Manual Adhesive Applicator

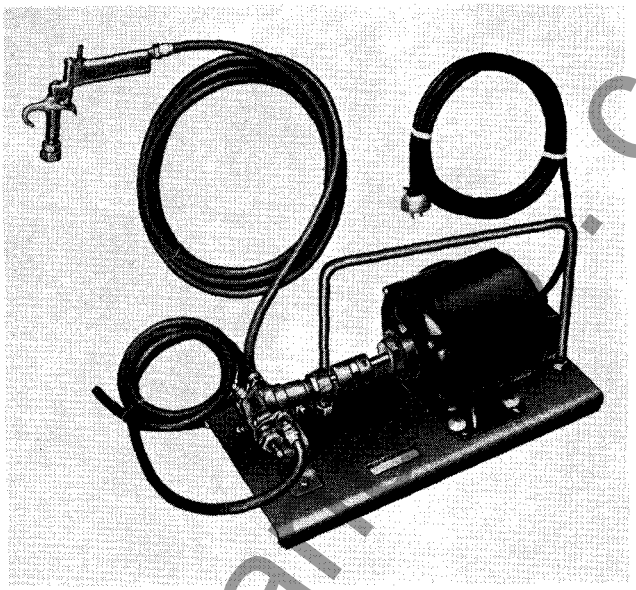


Fig. 22 Electric Adhesive Applicator

supply furnished with the unit. Allowing for unavoidable waste, the following quantities will be required per application for each 1000 cfm of PRECIPITRON capacity:

Adhesive	Requirements	Remarks
Type T-675	0.12 gal./1000 cfm	Standard adhesive. See Note 1.
Type F	0.02 gal./1000 cfm	"Fire-Retardant" adhesive. See Note 2.

Note 1: Use undiluted. During cold weather, warm the adhesive to at least 70°F, not higher than 160°F - otherwise adhesive gets too viscous to apply.

Note 2: Use diluted. Add one part adhesive to two parts clean warm water. Solution will thicken if water is added to the adhesive.

Manual Adhesive Applicator is supplied with most units. It holds about 2-1/2 gallons. 15 strokes of the pump will give a good spray pattern for normal length of time. See Fig. 21.

Electric Adhesive Applicator is supplied with large units. See Fig. 22. The gear type pump will suck adhesive from the container. Pump pressure for best spray pattern can be obtained by adjusting the pressure regulator. See instruction tag furnished with applicator.

Inspection Before Washing, when the cells are coated with dirt, is a good way to check overall operation:

1. Dirty outlet filters indicate too infrequent washings, excessive air velocity, or operation with the unit de-energized.

2. Some filters dirtier than others, suggests broken ionizer wires, missing high voltage connections, or uneven air distribution.

3. Dirt streaks at sides and top of the frame bank indicate bypassing or leakage of uncleaned air.

Washing the Unit (See "Water Supply" for water requirements.) The unit is washed on the inlet air side with the fans shut down and the power packs turned off.

1. Adjust the nozzle to give a strong stream of 130-150°F water.

2. Wash one frame at a time, starting at the top and working down. Don't break ionizer wires by striking them with the nozzle. Thoroughly flush each cell plate, ionizer wire, ionizer grounded tube and insulator.

3. Allow approximately twenty minutes for the water to drain and dry off before applying adhesive.

4. Inspect all parts for cleanliness and broken ionizer wires.

Applying Adhesive After washing the frame bank, a new coating of adhesive is applied only on the inlet air side, with the fans shut down and the power packs turned off. (It is good practice for the operator to wear an approved mask while applying adhesive to minimize the possibility of inhaling any adhesive in mist form which may be present.)

1. Check adhesive applicator. (Nozzle supplied for T-675 adhesive should produce fan type solid spray. Nozzle for type F adhesive should produce conical spray with very little mist.)

2. Starting with uppermost frames, coat all of the cell plates with a thin film of adhesive. (A heavy coat will drain off and be wasted). At the same time, coat the ionizer wires, ionizer grounded tubes and insulators. Avoid breaking ionizer wires by striking them with the nozzle.

3. Allow at least 15 minutes for the excess adhesive to drain before turning on the fans and power packs. Some arcing at the cell plates may occur when the power packs are turned on. This is harmless providing the arcing subsides in a few minutes.

4. Flush applicator hose, tank or pump with clean water and allow to dry. Store applicator in a clean location.

Dirt Build Up. With infrequent or incomplete washing, a non-water soluble build-up of dirt may accumulate on the cell plates, 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) incomplete application of adhesive, or (c) 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 a coating of adhesive (same type as is normally used) to the dirty parts. Allow to soak about 20 minutes. Thoroughly flush off adhesive and dirt with a strong stream of 150-180°F water. Allow unit to dry and repeat soaking if necessary to get parts clean.

(2) If the above adhesive soaking method fails to clean the parts, make a solution of about one pound of mild detergent ("ALL" recommended) to each gallon of warm water. Use adhesive applicator to apply the clear solution. Allow to soak 10 to 20 minutes. Thoroughly flush off detergent and dirt with a strong stream of 150-180°F water. Repeat if necessary to get parts metal clean. (Flush adhesive applicator with hot water and allow to dry before again using adhesive.)

Filter Inspection is recommended at least once a year. (Splash during regular washings should keep filters reasonably clean.) Remove the filters and inspect for cleanliness. They may be cleaned by hosing with hot water. If necessary, a mild detergent may be used. (See "Dirt Build-Up"). Before replacing the filters, inspect the outlet air side of the cell plates to determine the effectiveness of regular washings.

LOCATION AND CORRECTION OF FAULTS

Replacing Ionizer Wires Occasionally an ionizer wire may break due to careless handling or due to prolonged use. It is advisable to have several pre-made wires on hand to save installation time. A simple jig for this purpose may be made with two headless nails (approx. 1/16" diam.) in a board, spaced 21" apart. With the tungsten wire (spare spool supplied with accessories) make one turn around the nail and three turns around the wire itself, forming a loop on both ends of the wire. Bend off excess wire ends as close as possible. Be careful not to kink the wire because it will be weakened at this point.

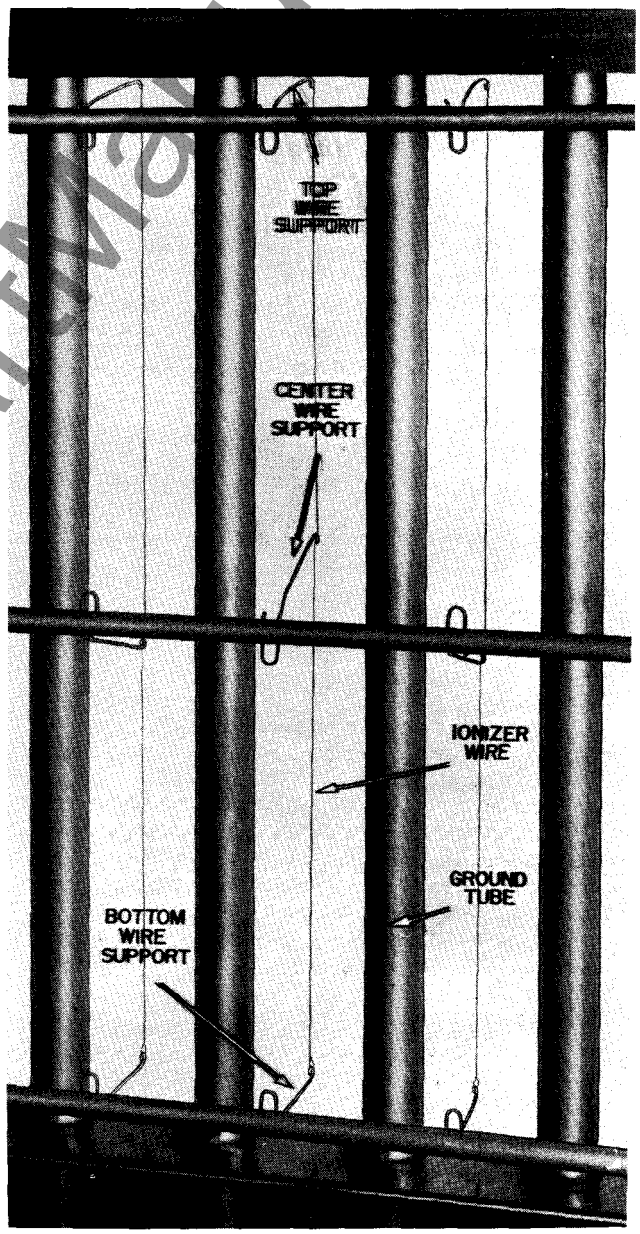


Fig. 23 Details of Ionizer

When replacing wires, be sure to remove all broken pieces and discard outside the duct. Loose pieces of wire can cause a short circuit and are very hard to locate. Install the replacement wire as shown in Fig. 23.

Electrical Faults can usually be found by careful inspection. Wiring diagrams (Figs. 13 & 14) should be helpful in analyzing possible troubles. Common faults and probable causes are shown in the "Operation Chart". 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, first thoroughly wash the frame bank if dirty. Next disconnect the cell and ionizer cables at the power pack terminals (see caution below). Close the 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 light after disconnecting these cables, the trouble is either in the cells, ionizers or the high voltage cables. This can be localized by alternately connecting one cable to the power pack and then disconnecting cell or ionizer jumper cables and tier connectors until the faulty part is located. The individual cell or ionizer high voltage section 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 packs and allow at least 1/2 minute before touching the high voltage parts. This time delay is to permit 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.

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).
Only clean air should appear on the leaving air side of the cell bank, with circuits, indicating lamps and voltages normal.	Filters excessively dirty or dirt particles on the clean air plenum floor or walls.	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) Baffles improperly placed. (b) Fan speed increased or system resistance reduced. (c) Dampers have shifted. 5. Leakage of dirty air into ductwork on clean air side of cell bank. 6. Missing or disconnected ionizer or cell connectors.

TABLE NO. 2, OPERATION CHART