Precipitron®
THE ELECTRONIC AIR CLEANER

INSTRUCTION BOOK
1460-3

MODEL PA FIELD ASSEMBLED UNITS

for

Commercial Applications

RECEIVING • INSTALLATION • MAINTENANCE

INSTRUCTIONS

HORIZONTAL AIR FLOW — MOVABLE NOZZLE WASHING AND ADHESIVE APPLICATION

120 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 commercial establishments to remove soot, smoke, dust, dirt and other air borne particles.

Model PA PRECIPITRON unit includes facilities for washing off the collected dirt and for applying adhesive with motorized moving nozzles, controlled from outside the duct.

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
STURTEVANT DIVISION • HYDE PARK • BOSTON 36, MASS.
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HEADER DRIVE CABLE should be installed as shown in Figure 15. Before stringing the cable, remove the cover from the drive assembly and completely back-off the tension arm screw. Also place the spray header at the center of the cell bank and loosen the cable clamps. Starting at the lower cable clamp, thread the cable around the track pulleys, first through the top clamp and then around the drive mechanism pulleys returning to the bottom clamp. Pull the cable tightly by hand and snub it around the header pipe while the bottom clamp is tightened. Allow at least 6 inch ends (which should be tied around the header) before cutting off surplus cable.

Tighten the cable tension screw by hand until the slack disappears. (See Figure 16) and tighten locknut. *NOTE:* Do not tighten cable enough to bend the track pulleys. Save final adjustment until header is operating, and then *tighten only enough* so that the header travels without faltering. Align the spray header vertically before tightening the top cable clamp.

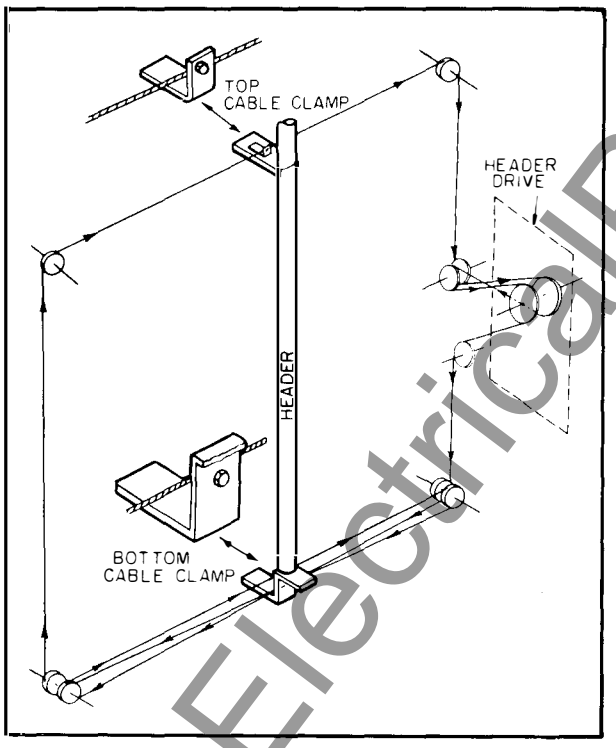


Fig. 15 — Stringing Drive Cable

INLET SCREEN installation is identical to the procedure for a bank of panel filters. Sectional 20″ x 25″ holding frames are furnished together with necessary tinner's rivets or bolts for joining adjacent frames together. The inlet screens are furnished in 20″ x 25″ panels to be inserted in the frames when installation is completed.

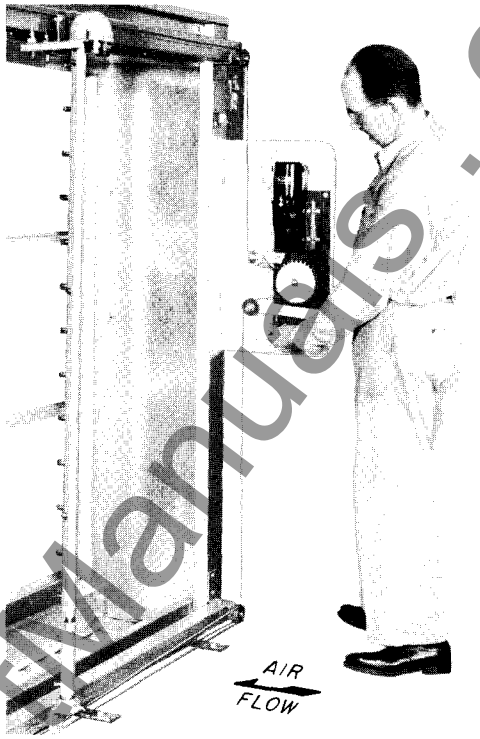


Fig. 16 — Adjusting Cable Tension

To provide space for bracing and adjustment to inside duct dimensions, the overall height and width of the inlet screen bank are 10 inches less than the overall height and width of the PRECIPITRON unit. While not mandatory, it is good practice to elevate the bottom row of frames above the curb or foundation level. A formed or structural channel, 4 to 6 inch web, is suitable for this purpose and provides ready means for securing the bottom row of frames. The entire framework should be centered on this base channel (not furnished) so there will be equal spaces between the ends of the framework and the duct walls. These spaces as well as the space from the top of the framework to the duct ceiling are finally to be sealed or flashed with sheet metal.

Holding frames are all to be stacked with the 25″ dimension horizontal and the 20″ dimension vertical. Select enough frames for one *vertical* section and lay these out on a flat level surface. Rivet together. Continue in this manner until the column is completed. If not too tall, the second column may be assembled along with the first, otherwise move the first in final position and bolt the others up with #10-32 x 3/8″ screws as the work progresses.

Depending upon installation conditions, banks over 5 frames and 6 frames wide may require supplemental bracing. This may be a flat strip of metal bolted between frames or a light angle attached to frames along a junction line.

When all frames are in place, the fasteners furnished should be installed. Two fasteners are used with each frame. The screen panels may then be installed. It is unnecessary to caulk joints as for a filter installation, but all openings above and around the inlet screen should be sealed off to prevent air by-passing.

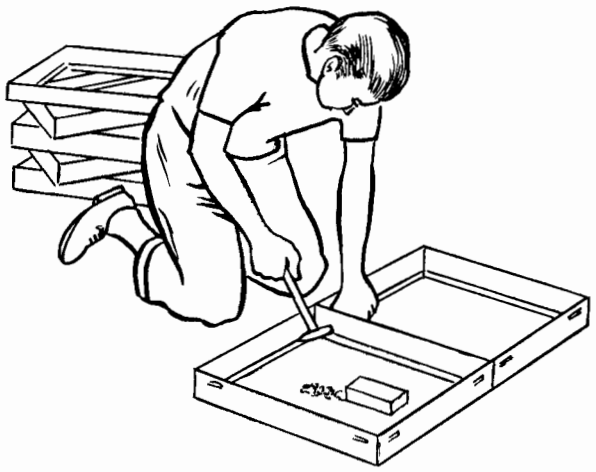


Fig. 17 -- Frame Assembly

CONTROL PANEL AND POWER PACKS should be installed outside the duct adjacent to the power end sheet (and duct doors). For smaller size units these items may be mounted directly on the power end sheet as shown in Figure 18. For larger size units equipped with two or more power packs and the larger size SCP Control, best layout will be to locate these items on an adjacent building wall or a suitable mounting stand. Power packs should be grouped together to facilitate service and inspection. Allow at least 6″ space vertically between power packs if mounted one above the other. Be sure the power packs are not mounted too far away from the power end sheet. Additional high voltage cable will be required if cable run to the power end sheet exceeds 25 ft.

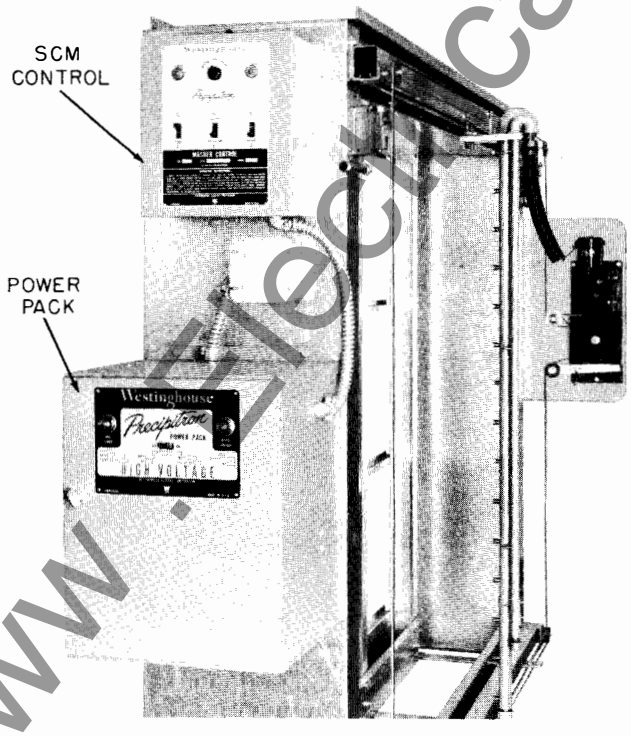


Fig. 18 -- Control and Power Pack Mounting (Small Units)

HOSES. One inch (1″) water hose and 1/2″ oil resistant DUSTIK hose are furnished with fittings at each end. *Position the header at the center of the cell bank before connecting these hoses.* If hoses and pipe are dirty, flush them out thoroughly with clean water. See that hoses are not twisted, but drape naturally when installed. See Figure 19.

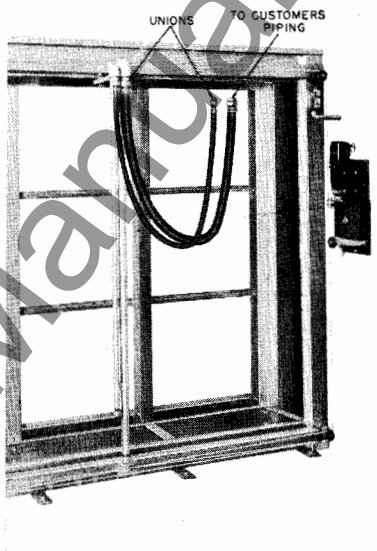


Fig. 19 — Installation of Hoses

DUSTIK PUMP (Figure 20) should be installed outside the duct on the floor adjacent to the power end sheet. See Figure 24. The hose is for drawing DUSTIK adhesive from a container to the pump. Pump includes a built-in adjustable pressure regulator and a check valve in the discharge line. The liquid inlet and outlet ports of the pump are clearly labelled.

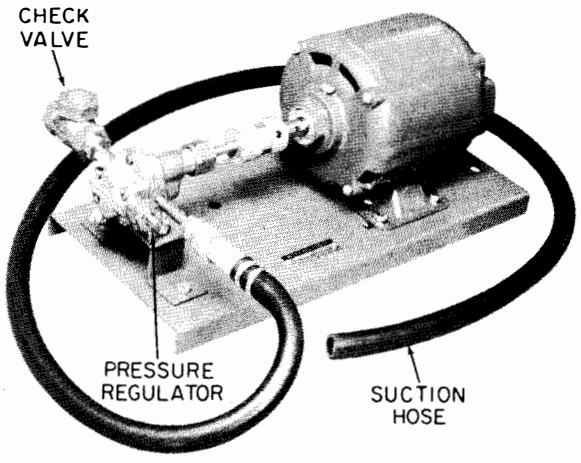


Fig. 20 — DUSTIK Pump

DUSTIK PIPING (not supplied) is installed as shown in Figure 21. Clean line thoroughly before installation. Install the DUSTIK filter as shown.

WASH WATER should be clean and at ordinary tap temperature. The source should be capable of supplying required quantity (g.p.m.) at sufficient *running pressure* to satisfy the spray header water requirements. See Figure 21 for the g.p.m. flow required for units of various heights and the header pressure limitations for correct nozzle operation. Where water may contain some dirt, strainers or other filtering means (not furnished) must be provided to prevent clogging of nozzles.

WATER PIPING (not supplied) is shown schematically in Figure 21. Piping should be at least 1" ips. If water source pressures are low, or lines are long or *vacuum breakers* must be installed to meet local codes, larger pipe should be used to minimize pressure losses. Water piping should include a hand operated shut-off valve located convenient to the unit control center. See Figure 21. *Keep water lines clean during installation.*

COLD WEATHER PRECAUTIONS. As a precaution against freezing temperature, water and DUSTIK lines should be pitched and provided with drain cocks. The header union fittings may be disconnected for draining hoses.

WATER SOLENOID VALVE. A 1-1/4" ips solenoid valve is supplied with SCP Control. (See CONTROL PANEL). This valve may also be supplied as optional equipment, when specified, for SCM Control. When supplied, this valve should be installed on the discharge side of the hand valve to control the wash water automatically, as shown in Figure 21.

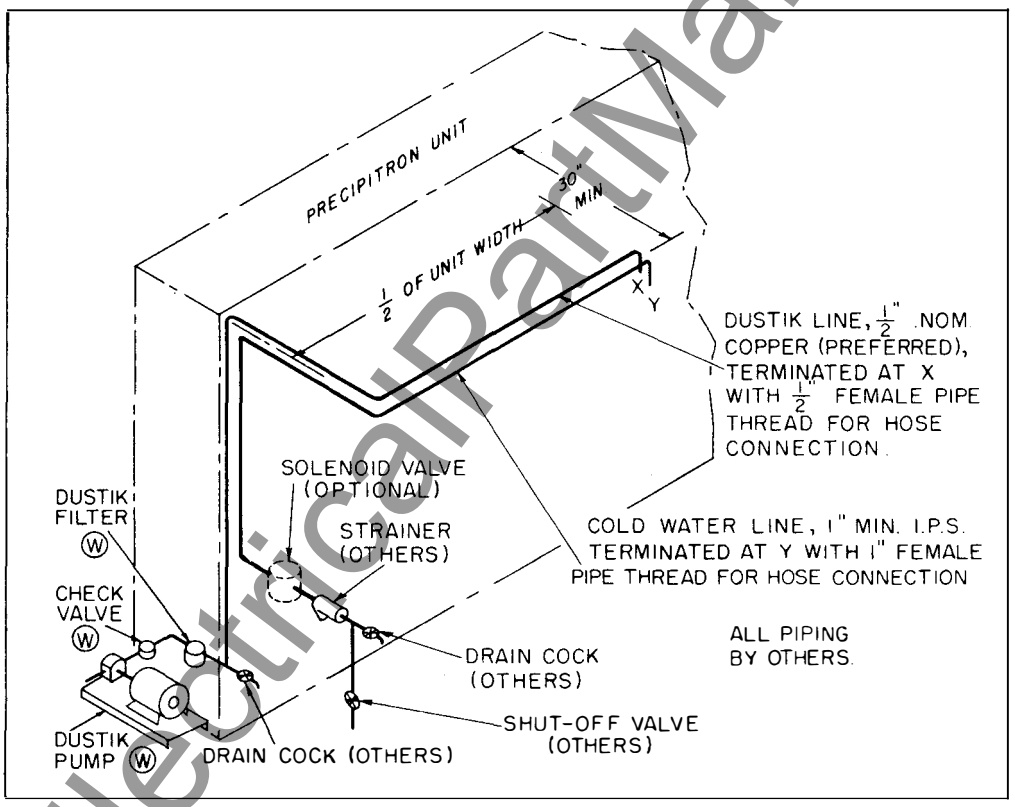


Fig. 21 — Water and Adhesive Piping

WATER REQUIREMENTS

Temp. 40-100°F
Running pressure 25 psi min., 40 psi max.

GPM Required

Height Code	40	60	80	100	120	140
30 psi	7	10	14	17	21	24
40 psi	9	12	16	20	24	28

Average washing time equals 1.2 minute per foot of PRECIPITRON width.

DUSTIK REQUIREMENTS

Temp. 40-100°F

Running pressure 30 psi

Average usage per wash equals .04 gal. per sq. ft. of PRECIPITRON face area.

Average usage per year equals 2 gal. per 1000 CFM PRECIPITRON unit capacity.

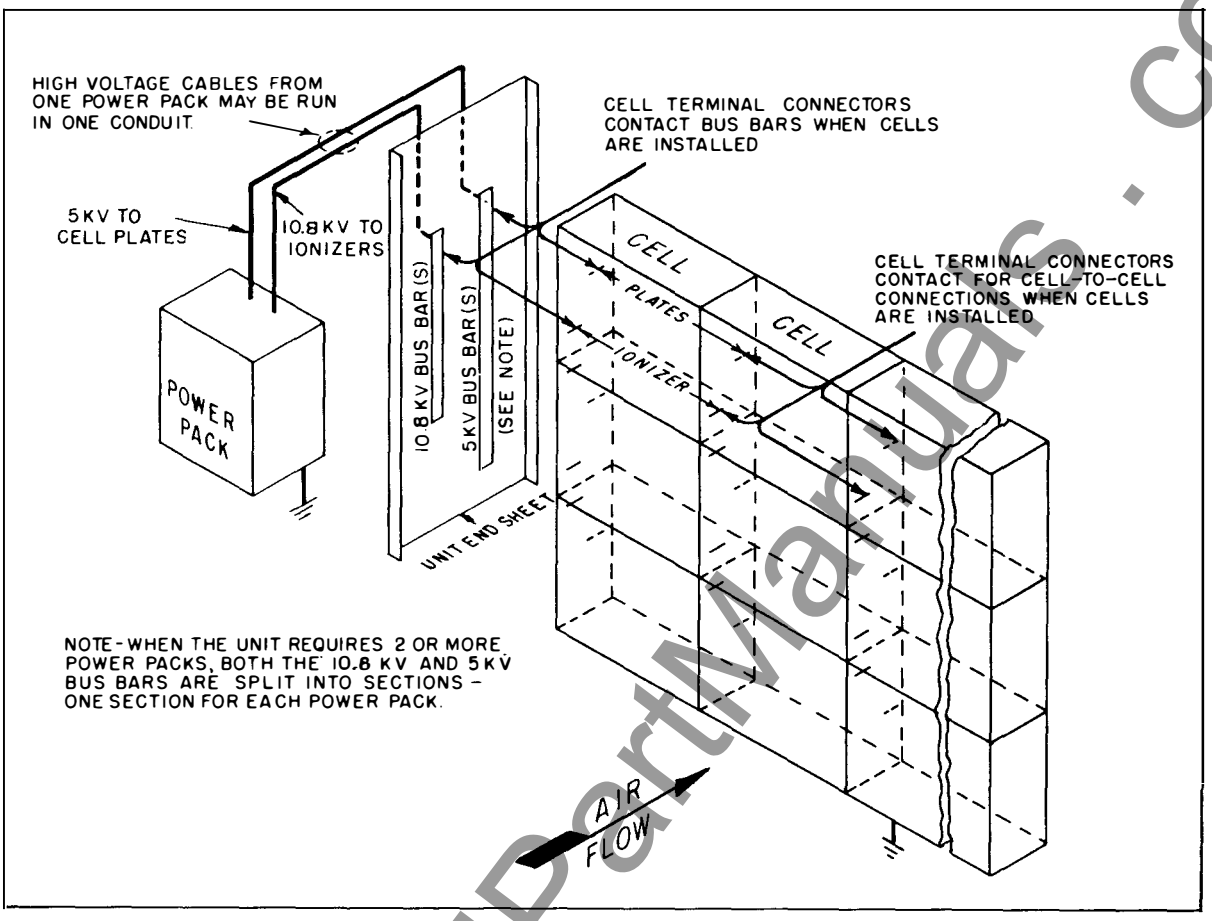


Fig. 22 — Typical High Voltage Connections

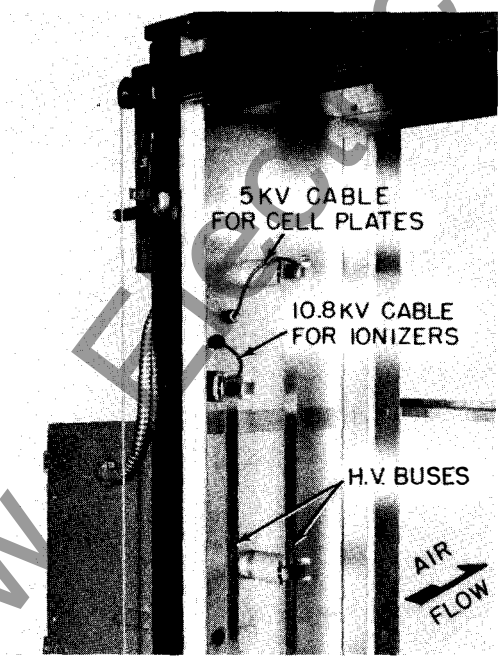


Fig. 23 — High Voltage Connections (Inside Power End Sheet)

HIGH VOLTAGE WIRING

HIGH VOLTAGE CABLE is supplied with the unit in 50 ft. coils. Two lengths of high voltage cable are required from each power pack. See Fig. 22. These cables should be installed in conduit between the power packs and the conduit box (es) on the power end sheet. The cables are then extended through the bushings provided to the high voltage bus bars. See Fig. 23. Lugs are provided for connecting the cables to the power pack terminals and the bus bar terminals. A conduit box is furnished on the power end sheet for each power pack, and when more than one power pack is required, the bus bar is sectionalized for connection to each conduit box. Notice that the bus bar on the inlet air side is for the ionizer cables (10.8 KV), and the outlet air side bus bar is for the cell cables (5 KV).

Plan to cut the cables so that continuous lengths may be installed from the power packs to the bus bars. *NOTE:* If power packs are located too remote, additional cable will be required. Only high voltage cable supplied by Westinghouse, Sturtevant Division, is recommended.

The high voltages are fed horizontally to each collector cell through the contacts supplied on the sides of the cells. See Figure 22.

LOW VOLTAGE WIRING

Nominal 115 volt, 60 cycle, 1 phase primary power is required. Taps are provided in the power packs for 110 volt and 120 volt primary. Stable primary voltage is important. Fluctuations beyond 3 to 4 volts must be corrected by voltage regulators or other means to insure proper operation of the PRECIPITRON. Low voltages result in reduced efficiency, and high voltages may cause excessive arcing and shortened rectifier life.

Depending on the Control used, low voltage wiring is as shown in Figure 29 or Figure 30. The 115 volts supplied to the power packs should be run in conduit. All low voltage wiring located inside the duct should be installed in conduit and made watertight. See Figure 24 for typical layout of low voltage components.

CONTROL PANEL. Wiring for the standard SCM Controller (Figs. 25 and 26) is shown in Fig. 31. Wiring for the optional SCP Controller (Figs. 28 and 29) is shown in Fig. 32.

TIME CLOCK CONTROL. When specified on the order, Type EC Time Clock Controller will be supplied to work in conjunction with the SCP Control. This should be mounted adjacent to the SCP Control and wired as shown in Figure 32.

POWER PACKS (Figure 27) should be wired as shown on the appropriate wiring diagram. See instruction book and wiring diagram included with the power pack.

HEADER DRIVE MOTOR (Figure 13) is equipped with a 1 /2″ threaded nipple for conduit and should be wired as indicated on the appropriate wiring diagrams.

DUSTIK PUMP MOTOR (Figure 20) should be wired as indicated on the wiring diagrams.

MAGNETIC CONTACTOR (supplied only with three or more power packs) should be mounted adjacent to the power packs and wired as indicated in the appropriate wiring diagram. This contactor is provided to prevent overloading of the interlock switches where three or more power packs are supplied.

RED PILOT LIGHTS (Figure 30) should be installed above the duct access doors. See Figure 24 and appropriate wiring diagrams. These lights glow when power is connected to the power packs.

DOOR INTERLOCK SWITCHES (Figure 30 — supplied with accessories) should be installed in the two duct doors as a positive means of de-energizing the power packs before the duct may be entered. Any additional doors in ductwork allowing direct access to the PRECIPITRON must also be provided with interlock switches. See Figure 24 and wiring diagrams.

MANUAL SWITCHES (Figure 30 — supplied with accessories) should be mounted inside the duct at the doors as shown in Figure 24. These permit the operator to disconnect the 120 volt supply while he is inside the duct.

DUCT LIGHTS (supplied with accessories) should be installed at the ceiling on each side of the cell bank to facilitate inspection and servicing. See Figure 24 and wiring diagrams.

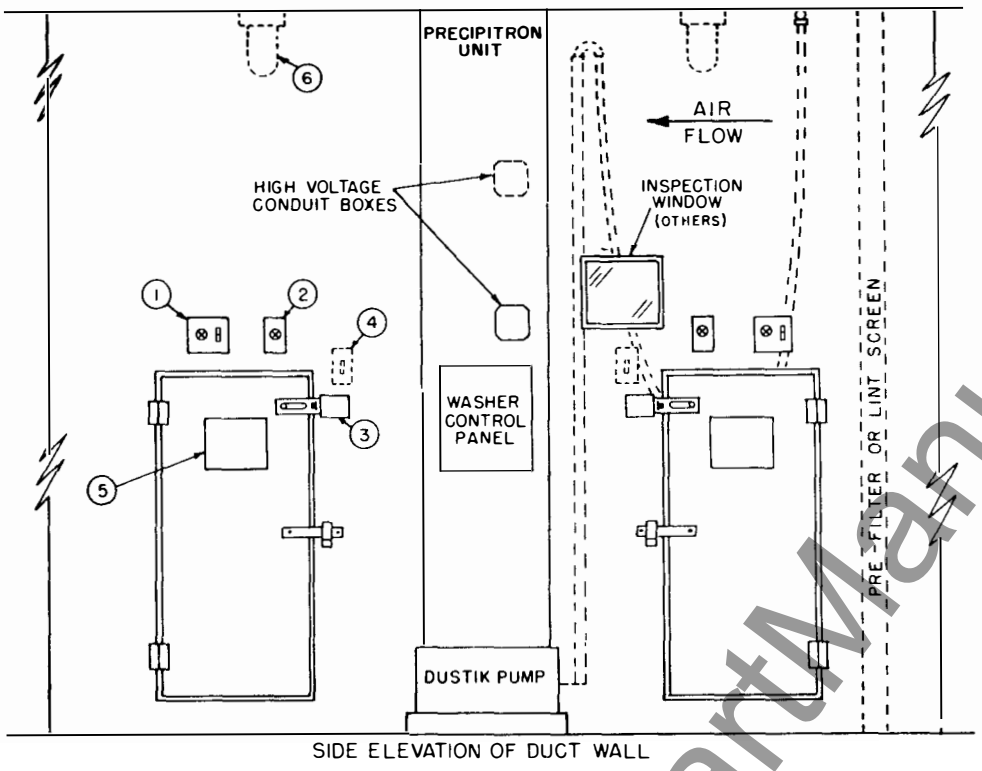
DUCT LIGHT SWITCHES AND PILOTS (Figure 30 — supplied with accessories) should be installed as shown in Figure 24 and wiring diagrams.

LIMIT SWITCHES (supplied with end sheets) should be wired as shown in the wiring diagrams.

SOLENOID VALVE (optional for SCM Control — supplied with SCP Control) should be wired as shown in appropriate wiring diagrams.

ELECTRICAL GROUNDING. High voltages are fed from the power packs to the cells and ionizers with single conductor cables. A common ground return is required to complete these circuits, as well as for safety purposes. Connect the power pack cases, the cell bank frame structure and the control boxes to a common ground using solid copper wire. If ground is a water pipe a jumper may be needed around the water meter since some meters are insulated.

NAMEPLATES (supplied in instruction package) are installed on the outside of the duct access doors. See Figure 24. They include a high voltage warning, special cleaning requirements and unit identification.



LEGEND

1 Duct light switch with amber pilot light (2 furnished by Ⓦ).
2 Red pilot light (2 furnished by Ⓦ).
3 Door interlock switch (2 furnished by Ⓦ).
4 Manual switch (2 furnished by Ⓦ).
5 Nameplate and high voltage sign (2 furnished by Ⓦ).
6 Duct lights (2 furnished by Ⓦ).
7 Conduit, fittings and wiring by others.

One power pack may be mounted on unit end sheet duct wall. Multiple power packs and contactor are best located elsewhere within 15 feet.

Fig. 24 Typical Location of Low Voltage Components

Fig. 25 SCM Control

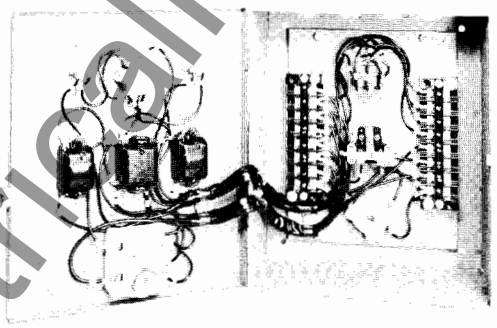


Fig. 26 SCM Control Inside View

Fig. 27 RC Power Pack

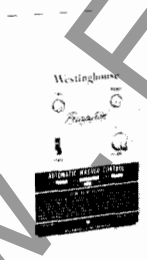


Fig. 28 SCP Control

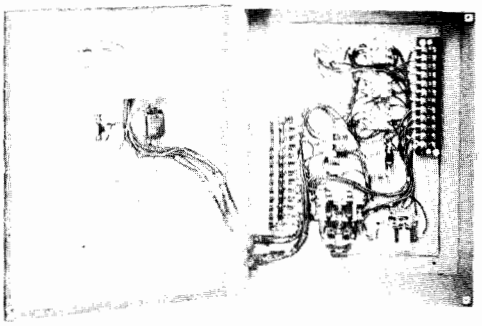


Fig. 29 SCP Control Inside View

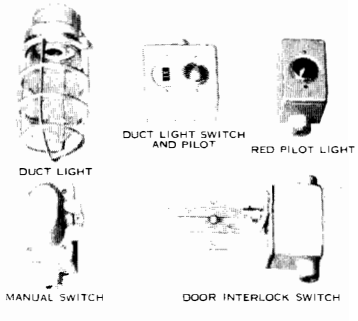
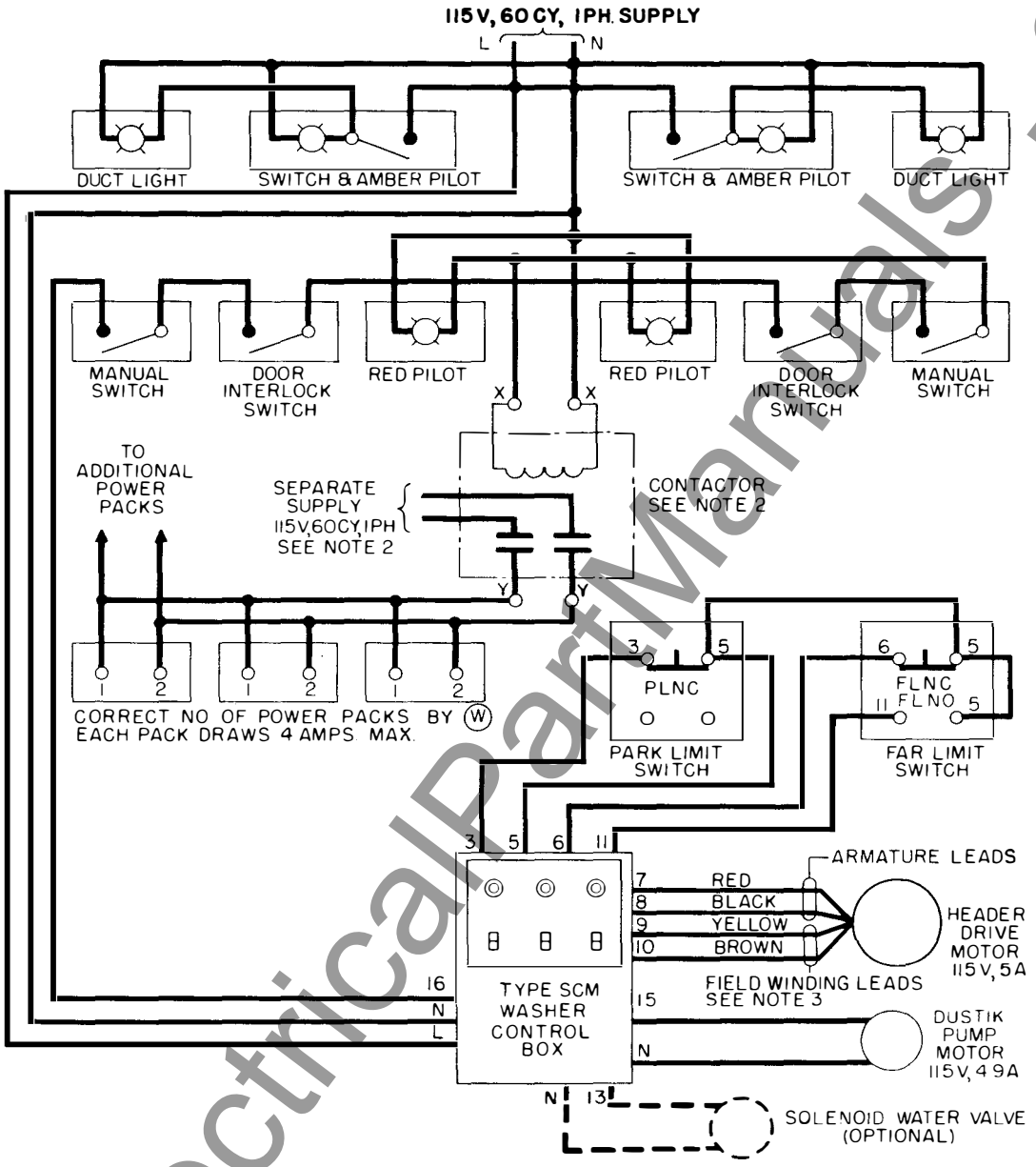


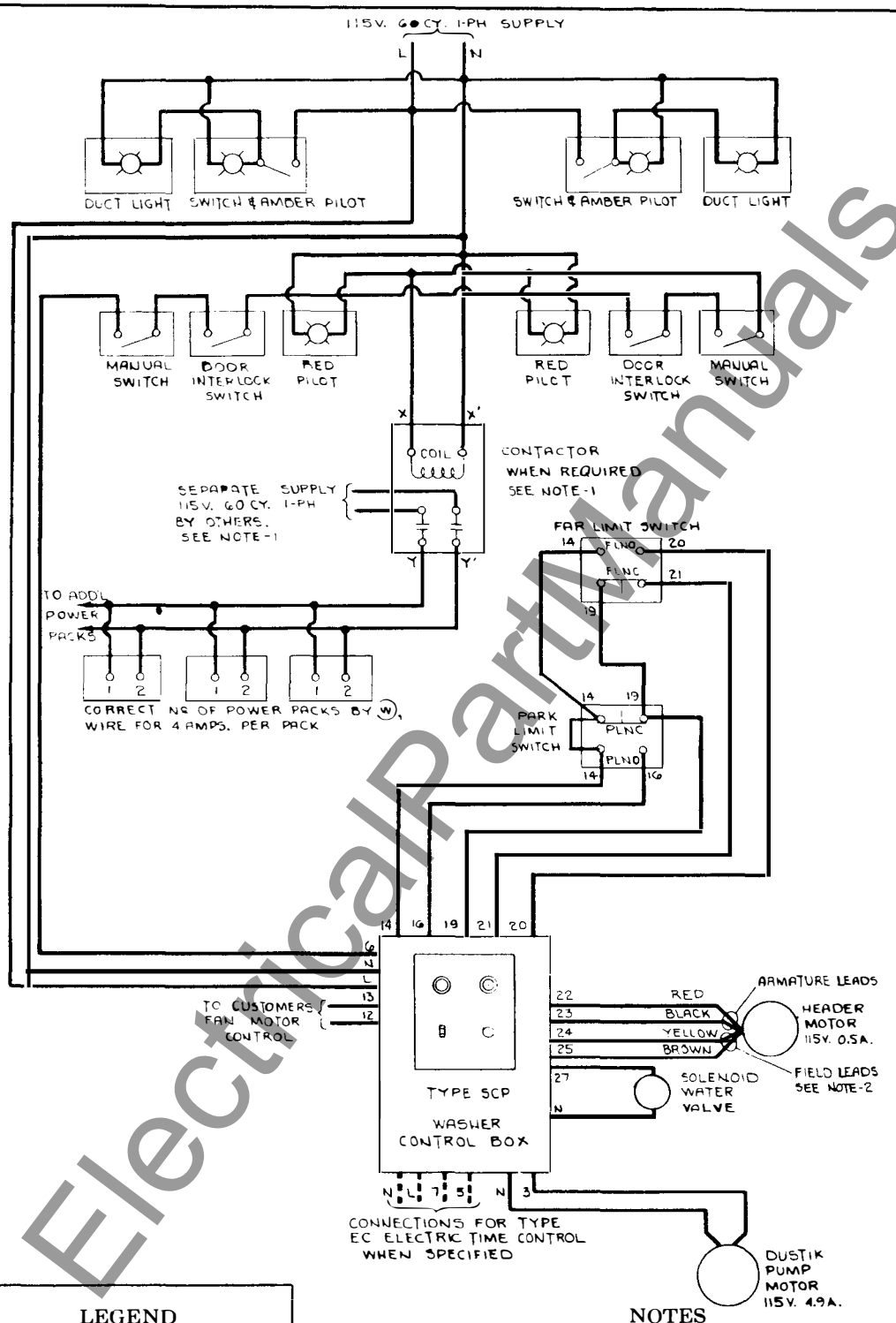
Fig. 30 Electrical Accessories



NOTES

1. Manual switches are mounted inside the duct.
2. For units with 1 or 2 power packs, connect terminals x-x to y-y. (Contactor and separate supply circuit are not required.) For 3 or more power packs, install contactor and separate supply circuit as shown.
3. Limit switches are shown in free position. For normal operation, header parks against park limit switch holding contact PLNC open. Rotation of header motor must be such that the header. Moves away from the park limit switch when started. Rotation of header motor may be reversed by interchanging the yellow and brown field leads.

Fig. 31 — SCM Control Wiring Diagram



LEGEND

- Wiring by Others.
- Wiring & Equipment by Ⓦ.
- Optional.

NOTES

1. For units with 1 or 2 power packs, connect leads x-x′ to y-y′. (The contactor & separate supply are not required.) For 3 or more power packs, install contactor & separate supply as shown.
2. Limit switches are shown in free position. For normal operation, header parks against park limit switch, holding PLNC open and PLNO closed.
3. Rotation of header motor must be such that the header moves away from the park limit switch when started. Rotation of header motor may be reversed by interchanging the yellow and brown field leads.

Fig. 32 — SCP Control Wiring Diagram

INSTALLATION OF CELLS. Sufficient cells are furnished to fill the inlet air side of the cell bank. See Fig. 33. *Handle the cells carefully,* being sure not to break ionizer wires or sidtort the plates. Notice that cells have spring type contacts built onto each side for high voltage connections. When installing it is important to *slide* the cell *horizontally* into the cell bank. This is to be sure that these contacts do not catch and become distorted.

Starting with the lower tier, install the cells from both ends. Slide the center cell in last. Install cell tie rods in the slotted holes of the vertical channels as shown in Fig. 34. Install the next tier in a similar manner. Finally, tighten the wing nuts to hold cells firmly in place.

Fig. 33 — Installing the Cells

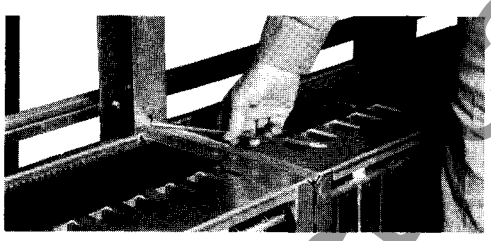


Fig. 34 — Installing Cell Tie Rods

ELECTRICAL INSPECTION:

1. All cell plates must be evenly spaced and undamaged.
2. All ionizer wire should be under slight tension and midway between the grounded plates.
3. All cell and ionizer contacts (located at sides) should make positive contact between cells and at the high voltage bus bars.
4. All wiring should be installed in accordance with the appropriate wiring diagrams and connections should be tight.

MECHANICAL INSPECTION:

1. Check ducts for air leakage or by-passing of dirty air around the cell bank.
2. Check air distribution through the cell bank and make sure that rated cfm of the PRECIPITRON is not exceeded, and that high or low velocity areas do not vary from rated velocity by more than 10%.

OPERATIONAL CHECK OF WASHING AND DUSTIK SYSTEM. After installation is complete, the system should be given an operational check; first without water and DUSTIK and then with full use of these facilities. During the "dry run" turn off the hand water valve and do not use DUSTIK Adhesive. Follow operating instructions included on the controller nameplate. These instructions are considerably different depending upon the type of controller supplied.

1. The POWER pilot light should glow when the POWER switch is turned on. With the SCM Control, the red pilot lights at the duct doors should glow when the WASHER-PRECIPITRON switch is turned to PRECIPITRON position. With SCP Control, these lights should glow when the power switch is turned on. Use the test switches inside the SCP panel to check functions manually during the "dry run."
2. Check that header runs in right direction. Cable should slip at drive pulley with wrong rotation of motor which should be corrected by inter-changing the motor leads as shown in the wiring diagrams, *NOTE:* Operation may be stopped completely at any time simply by turning off the POWER switch.
3. Check that header travels smoothly on tracks with no binding, that hoses drape naturally and that limit switches are actuated properly at each end of travel.

After the "dry run" is complete, full operation should be tested using water and DUSTIK, following operating instructions on front of panel. This will assure that the cell bank is clean and coated with DUSTIK. Check the following points during this test:

1. All water and DUSTIK nozzles should give full spray pattern over all cells.
2. The slots in the nozzles should be vertical.
3. Check header travel to be sure that cells at the ends of the cell bank receive a thorough spray.

Refer to wiring diagram included with Type EC Time Clock Control for operational check.

STARTING THE UNIT. When the system is complete and the above checks have been made, a Westinghouse Service Representative should be requested to check and start the PRECIPITRON. Representatives of all erecting contractors and the owner should be present to facilitate any corrections and to receive operating instructions. The initial supply of DUSTIK adhesive and all instruction books should be available for this inspection.

OPERATION

PRECIPITRON is an electronic air cleaner — not an air filter. Strong electrostatic forces draw dirt particles from the air and the PRECIPITRON will remove 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. PRECIPITRON is designed to flush off this dirt easily with moving spray nozzles.

WASH AND DUSTIK SYSTEM Both washing and adhesive spraying are performed by operation of the control panel. With the standard SCM Control, header travel, washing and applications of DUSTIK is controlled manually. With the SCP Control these functions are accomplished automatically, simply by pressing the START button. In addition, the SCP Control shuts off the power packs and shuts off the fan during the washing and DUSTIK cycles, as well as allowing adequate drain periods. The EC Clock Control (optional) will turn on the SCP Control periodically as required at predetermined intervals. These intervals are adjustable to meet varying operating and installation conditions. See MAINTENANCE for recommended frequency of washing.

It should be noted that an ON-OFF-AUTOMATIC switch should be provided at the fan motor control as indicated in the wiring diagrams. It is recommended that this switch be incorporated with the fan motor starter which requires that it be specified when the starter is ordered by the customer. If desired, this ON-OFF-AUTOMATIC switch (not supplied) may be wired to the fan motor controller at the installation site. It should be understood that the Type SCP PRECIPITRON Controller includes only an isolated electrical contact for controlling the fan starter.

With the standard SCM Control the amount of drain time after application of wash water and DUSTIK is controlled manually. These drain times are controlled automatically with the optional type SCP Control. Additional timer cams are included inside the SCP Control for use where longer drain times are required to meet special operating conditions. These cams are identified as follows:

	Total Drain Time	
Notches in Cam	After Washing	After DUSTIK
*6	20 Min.	40 Min.
3	40 Min.	80 Min.
2	60 Min.	120 Min.

* This cam installed as standard.

A key is also supplied with the SCP Controller to provide a means of preventing unauthorized operation of the START button. Also, both types of control cabinets are equipped with hasps for padlocks.

IONIZER-COLLECTOR CELLS — When high d.c. voltage (10.5 to 10.8 KV) is applied to the ionizer wires located on the inlet air side of the cell, an ionizing zone is created between the wires and the grounded plates. Dirt particles passing through this space pick up electrostatic charges. The collector plates located on the outlet air side of the cells include two sets of flat metal plates, one grounded and the other supported by insulators. When high d.c. voltage (4.9 to 5.1 KV) is applied between the two sets of plates, a strong electrical field is set up which forces the charged dirt particles on to the plates.

POWER PACK furnishes proper high d.c. voltages to the collector cells using 115 volts, single phase, 50/60 cycle power. Indicating lights are included to show the operating status of the PRECIPITRON and warn the operator when the unit is not functioning properly. An "ON-OFF" circuit breaker is included to protect the internal elements.

INLET SCREENS are provided to prevent trash and coarse dirt from reaching the ionizer-collector cells where it would interfere with proper operation.

AFTER-FILTER BAFFLES minimize splashing of water and DUSTIK into the duct during servicing and help to equalize the air flow through the unit. They also serve as a back-stop to catch some dirt should the PRECIPITRON become de-energized or too heavily loaded with dirt.

PROTECTIVE DEVICES include screw operated (time delay) switches in the power pack and at the duct access doors. These open the 120 volt supply and delay access to the high voltage parts until the charge in the capacitor has drained off to a safe value. *These switches should not be tampered with* even though the time consumed in turning the screw may seem unreasonable. Red warning lights show when power packs are energized. Manual switches permit the operator to disconnect all power packs while he is inside the duct. Signs on the duct doors include a warning of high voltage. Duct lights facilitate safe inspection and maintenance.

DUSTIK ADHESIVE, Type B serves two functions: (a) to bind the dirt to the cell plates as it is precipitated and (b) to render the deposit completely washable with cold water. Westinghouse adhesives are compounded to provide the proper balance between dirt binding qualities and washability. Keep adequate stocks on hand, and do not use any other type of adhesive oils.

MAINTENANCE

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

INSPECTIONS. A simple daily inspection of the power pack indicating lights is recommended to assure that the unit is energized while air is flowing through the cell bank.

INSPECTION BEFORE WASHING when the cells are coated with dirt will indicate the overall operation of the PRECIPITRON.

1. Dirty after-filter baffles indicate too infrequent washings, excessive air velocity or operation with the cells de-energized.
2. Some after-filter baffles dirtier than others suggest broken ionizer wires, open high voltage connections or uneven air distribution.
3. Dirt streaks at sides and top of the frame bank indicate by-passing or leakage of uncleaned air

WASHING AND DUSTIK APPLICATION

FREQUENCY OF WASHING depends upon how much dirt is in the air at the particular location. Average time between washings is every 1 to 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 1/16" thick. However, even though the unit does not appear too dirty, it is strongly recommended that it be washed at least *once a month*. This is to prevent the possibility of dirt becoming hardened on the cell plates. Based upon the initial inspections, a schedule should be set up for regular washings. This will assist the scheduling of maintenance work and will assure that the unit does not become too dirty. The fan must be off during the wash cycle.

With standard SCM Control washing is accomplished by operating the switches as specified on the instruction nameplate. Wash water is turned on and off manually with the hand control valve. When the HEADER switch is turned on (header pilot light glows), the spray header will travel back and forth across the cell bank. When the switch is turned off, the header will continue moving until it comes to rest in the PARK position.

(a) At start of washing, observe all spray nozzles to be sure that they give a full spray pattern. See HEADER MAINTENANCE if pattern is poor.

(b) At completion of washing (HEADER switch off, header pilot out) turn water off and allow at least 20 minutes for water to drain from the cells.

(c) Inspect ionizer and cell parts for cleanliness and repeat washing if not thoroughly clean.

(d) After washing, apply a coating of DUSTIK Type B Adhesive as follows:

1. Insert suction hose (from DUSTIK pump) into adhesive container.
2. With switch in DUSTIK position, the pump will start when the header switch is turned on. Observe all DUSTIK nozzles to be sure they are giving a good spray. One cycle of the header (back and forth) is adequate to coat the cell bank. Once the header has started to travel, turning the HEADER switch to the off position will allow spraying and header travel to continue until both are stopped automatically when the header reaches PARK position.

(e) Allow at least 15 minutes for excess DUSTIK to drain. Then move switch to PRECIPITRON position. This turns on the power packs (some arcing may occur at the cell plates but this is harmless if it subsides in a few minutes). During drain time remove suction hose from the DUSTIK container and replace cover.

(f) Turn fan on and check power pack lights to be sure PRECIPITRON is energized.

With optional SCP Control, washing and DUSTIK application is accomplished automatically simply by pushing the START button. This initiates the following sequence of operations:

1. Fan and power pack(s) shut down.
2. Pilot light glows.
3. Header makes one or two "dry runs".
4. Header sprays water for ten cycles.
5. Drain timer allows 20 minutes drain time.
6. Header sprays DUSTIK for one cycle.
7. Drain timer allows 40 minute drain time.
8. Fan and power pack(s) are turned on.
9. Control and pilot light shut off.

(a) Before pressing the START button, turn on hand water valve, and insert the suction hose from DUSTIK pump into the DUSTIK container.

(b) Particularly when the unit is new, check the spray nozzles just before regular washing to be sure that they are not clogged by residual or construction dirt. This may be done with the test switches located inside the panel (fan *must* be turned off manually for this test). It is further recommended that the nozzle spray patterns be checked occasionally thereafter to assure complete washing and DUSTIK during the automatic cycle.

(c) After the SCP CONTROL has completed its full sequence, it is good practice to turn off hand water valve and replace cover on DUSTIK container until ready for next cleaning.

(d) Operation of the controller may be stopped at any point in the sequence by turning off the POWER switch. When the switch is turned on again, pressing the START button will start a new sequence, from the beginning. Operation may also be temporarily stopped for inspections or nozzle cleaning by moving the AUTO-TEST switch to TEST when (but only when) the sequence has reached a water or DUSTIK drain period.

(e) Inspect ionizer and cell parts frequently and repeat washing if not thoroughly clean. This is particularly important if EC Time Clock is used to schedule the washing periods.

DUSTIK REQUIREMENTS. Use only Westinghouse *Type B* DUSTIK Adhesive.

COLD WEATHER OPERATION. Washing is not recommended when air temperature is below 34°F. Breaks in cold weather usually permit reasonably regular washings. With a recirculated air system close off the outside (cold) air during washing. Water and adhesive piping should have drain facilities to prevent freezing damage. Hoses have unions for draining. Observe any special instructions on the DUSTIK container label.

HEADER MAINTENANCE. Check the spray pattern of the nozzles at the start of the wash and DUSTIK cycles. Dirt in pipe lines may cause nozzle clogging on new units, but if clean water is used there should be little trouble. The DUSTIK filter should prevent clogging of adhesive nozzles.

Unscrew nozzles to clean. When replacing, be sure slots are vertical. Nozzles should give vertical fan sprays which should overlap to cover the cells. Pressure has much effect on the pattern. High pressure causes misting; low pressure gives poor coverage.

The pressure regulator on the DUSTIK pump should be turned clockwise to increase pressure and counter-clockwise to decrease pressure.

Inspect header drive system occasionally to be sure that cable tension is adequate to drive the header and that the limit switches function properly. Slippage of cable at the drive is usually because the cable is too slack. *Do not tighten excessively* — just enough to keep the header from faltering.

DIRT BUILD-UP. Inadequate or incomplete washing leaves a film of dirt which will give trouble if allowed to remain after each washing. If inspection discloses such a film the cause may be: (a) low water or DUSTIK pressures, (b) clogged nozzles, or (c) using other than Westinghouse DUSTIK, *Type B* Adhesive. Should build-up persist after correcting these faults, clean the cells by one of the following methods:

1. Before washing, apply DUSTIK for one cycle (using test switches for SCP Control). Allow to soak 20 minutes. Wash off thoroughly with several cycles of cold water. Allow to dry and repeat if necessary.
2. If the DUSTIK soaking method fails, a mild detergent may be used. Make a solution of about 1/2 lb. of detergent (ALL or equal) to each gallon of 100°-120°F water. Apply this solution (hot, if possible), to the dirty components and allow to soak 10 to 20 minutes. Thoroughly flush with water (warm or hot if available). Cold water may be used. Repeat if necessary to get the parts metal clean. It is best to apply the detergent with a separate spray gun to prevent clogging of the DUSTIK system. The System may be used to apply the solution, if it is thoroughly flushed and dried before DUSTIK is used again. Be sure to dry out or replace the DUSTIK filter cartridge.

LUBRICATION. Once a year, oil shaft bearings on the header drive mechanism, and grease DUSTIK pump with waterpump grease.

DUSTIK PUMP If pump vibrates or makes excessive noise, check the pump-motor alignment. Periodic tightening of the packing nut may be necessary to prevent leakage around the shaft. *Motor will overheat if packing is tightened too much.*

DUSTIK FILTER Inspect replaceable cartridge at least once a year and replace if found dirty.

AFTER-FILTERS. Inspect at least once a year. Splash during washing should keep these reasonably clean. If no duct access door is provided on the outlet air side, filters may be removed by first removing the cells. Top tier of filters slide up. Then retainer washers can be reached for removing lower tiers. Filters may be cleaned by hosing. If necessary, a mild detergent may be used. (See DIRT BUILD-UP.) Before replacing, inspect cell plates to determine effectiveness of regular washings.

INLET SCREEN Inspect regularly for excessive accumulation of lint and dirt. Screens are removable for cleaning.

LOCATION AND CORRECTION OF FAULTS

REPLACING IONIZER WIRES. Occasionally an ionizer wire may break due to careless handling or prolonged use. A box of prelooped ionizer wires is furnished with the accessories. Additional wires may be purchased when needed. Be careful not to kink the wire because it will break later at this point. Depress the spring wire holders to obtain slack when looping the wire on the holders. Also clip the wire into the center support loop. Be sure to remove all broken pieces of ionizer wire and discard outside the duct. Loose pieces can cause a short circuit and are very hard to locate.

ELECTRICAL FAULTS can usually be found by careful inspection. The complete wiring diagrams included should be helpful in analyzing possible troubles. Also refer to OPERATION and OPERATIONAL CHECKS which will aid in locating and correcting faults in the control box. Common faults and probable causes in the power pack and cell bank circuits are shown in CHECK CHART — POWER PACK AND CELL BANK FAULTS and the instruction book furnished with the power pack. The simple 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 cell bank if dirty.

Next inspect the ionizers for broken wires and cell plates for dirt bridges between plates and also for bent plates. A strong light will be helpful. Finally, follow detailed steps in the CHECK CHART if necessary.

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.

CHECK CHART — POWER PACK AND CELL BANK FAULTS

POWER PACK TROUBLE INDICATION	POSSIBLE TROUBLE	CORRECTION
1. INPUT POWER — light out.	a. Door switch at duct or power pack not closed.	Tighten time delay screws.
	b. Main power supply off.	Turn on main power supply.
	c. Faulty parts or wiring inside power pack.	Follow procedures in power pack instruction book.
2. OUTPUT VOLTAGE — light flashing.	a. Cell bank needs washing.	Wash bank or remove dislodged dirt particles between cell plates.
	b. Power pack needs adjustment to line voltage.	Follow procedures in power pack instruction book.
3. OUTPUT VOLTAGE — light out.	a. Short circuit in cells or HV cable.	Alternately disconnect 5 and 10.8 KV cables at power pack. See CAUTION. If light glows, the appropriate cell or ionizer circuits, or HV cables are short circuited. If light does not glow, fault is in power pack. See 3d. below.
	b. Short circuit in HV Cable.	If light glows in 3a. above, reconnect cables and disconnect the particular cable at bus bar inside power end sheet. If light does not glow, fault is in HV cable which should be repaired or replaced.
	c. Short circuit in cells.	If light glows in 3b. above reconnect cable and start removing cells until the faulty one is found. Inspect cell carefully to locate and correct fault. (Check especially for dirt bridges between cell plates, bent cell plates, broken ionizer wires or leaky insulators.
	d. Open circuit.	Check to see that cell and ionizer connectors make contact at HV bus bars on power end sheet.
	e. Faulty power pack.	If light does not glow in 3a. above, follow procedure in power pack instruction book.