RECEIVING • INSTALLATION • MAINTENANCE

INSTRUCTIONS

MODEL PG CABINET UNITS

AIR DISTRIBUTING UNIT, SERIES 1600
PRECIPITRON AIR CLEANER SECTION

HORIZONTAL AIR FLOW-MOTORIZED TRAVERSE
WASHING AND ADHESIVE APPLICATION

Westinghouse
Precipitron®
THE *ELECTRONIC* AIR CLEANER

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.

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 handling 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 JUNE, 1958

RECEIVING AND HANDLING

An Instruction Package containing a Bill of Material, Instruction Book and Spare ionizer wires and fusetron is forwarded to customer's shipping address, for each PRECIPITRON unit. Contents should be retained for use as needed when receiving, installing and operating the unit.

To simplify handling, the cabinet with most internal parts is shipped assembled. Collector cells and certain other items which mount outside the cabinet are shipped separately. The bill of material (see instruction package) may be checked as shipments are received.

Immediately upon receipt of a shipment, carefully inspect for possible loss of damage. If any damage is detected or suspected, customer's representative should note damage on the delivery receipt before signing. Also, report findings to the nearest Westinghouse-Sturtevant Division Sales Office for filing a claim against the final carrier, railroad or trucking company.

Except for the initial inspection, store all parts in their original shipping container in a clean, dry location, protected from the weather until ready for installation.

INSTALLATION

NOTE: When installing the Precipitron as part of a Series 1600 Air Distribution Unit System, be sure to consult the instruction sheet packed with the fan section. This gives necessary assembly procedures.

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, water and electrical facilities.

Air Flow Requirements. The PRECIPITRON unit is sized to clean a specified quantity of air (cfm) at a stated efficiency. 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 by more than 10%. Air filters supplied help to equalize the air flow. However, sharp bends and irregularities in the ducts may cause uneven airflow. 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 it 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 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. Standard lint screen sections are available from Westinghouse.

Space Requirements. Exact overall dimensions and clearances are shown on Dimension Sheet 1466 supplied with the order. It is important to allow clearance space in front of the access door located at the side of the cabinet. This space is needed for operation, inspection and removal of the internal parts. Note: The access door 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, or platform mounted. 5/8" or 7/8" holes are provided in the legs for lagging the cabinet to the floor or platform. (Mounting bolts not supplied.) Unit sizes up to and including size 36/115 may also be suspended with hanger rods. See Fig. 3 for suggested mounting. Regardless of the type of mounting, the cabinet must be supported only from the legs - not from the cabinet itself.

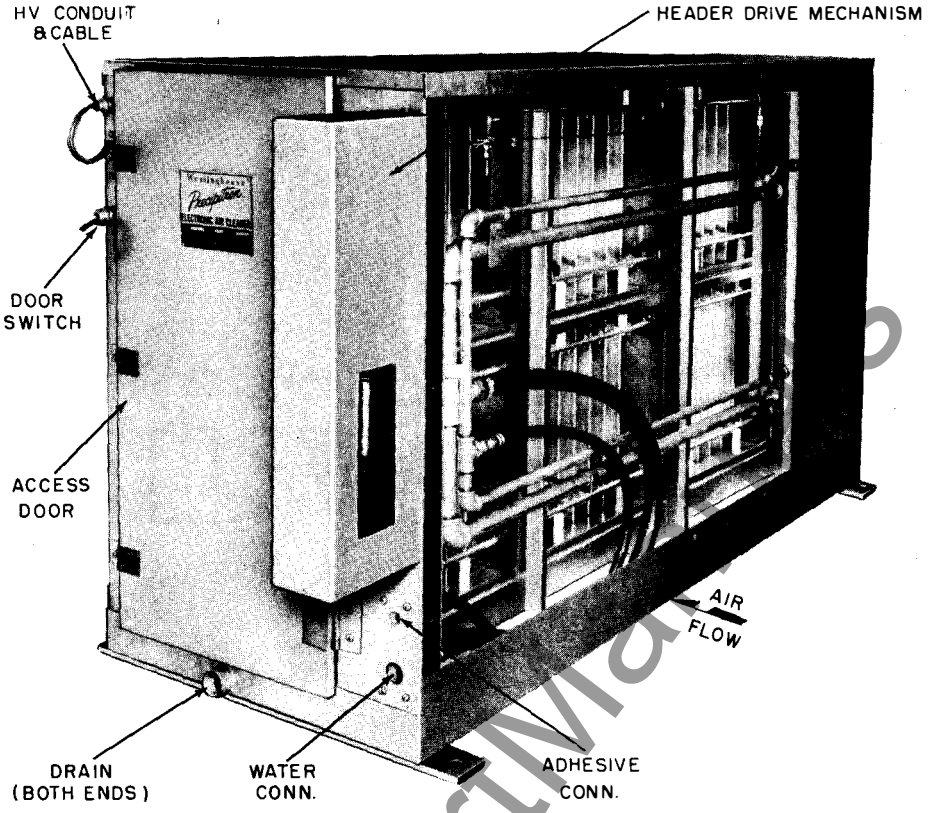


Fig. 1 Typical Cabinet (Inlet Air Side)

For platform or hanger-rod mounting, provision should be made for convenient and safe access to the access door side of the cabinet. This is needed for servicing the internal parts, and the drive mechanism.

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

Ducts are attached directly to the punched 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. Ducts should be sealed at the cabinet flanges, to insure tight construction and prevent air leaks, particularly of uncleaned air into cleaned air stream.

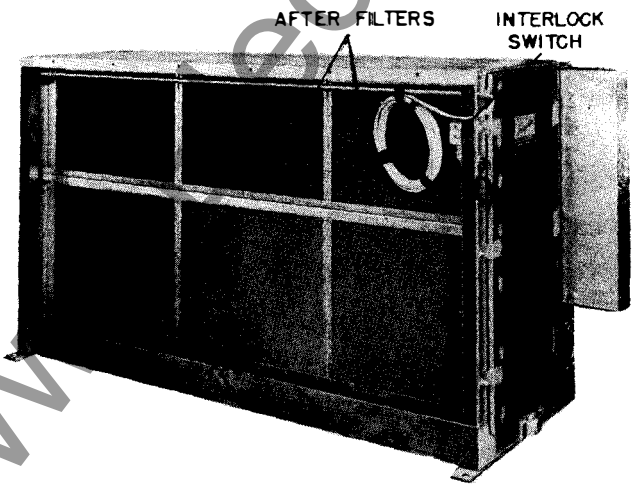
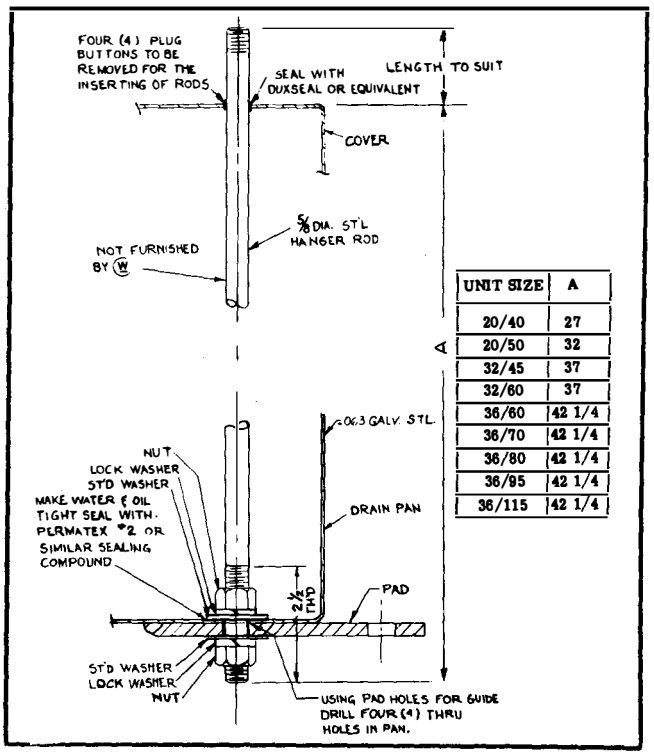


Fig. 2 Typical Cabinet. (Leaving Air Side)

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.



UNIT SIZE	A
20/40	27
20/50	32
32/45	37
32/60	37
36/60	42 1/4
36/70	42 1/4
36/80	42 1/4
36/95	42 1/4
36/115	42 1/4

Fig. 3 Hanger Rod Mounting

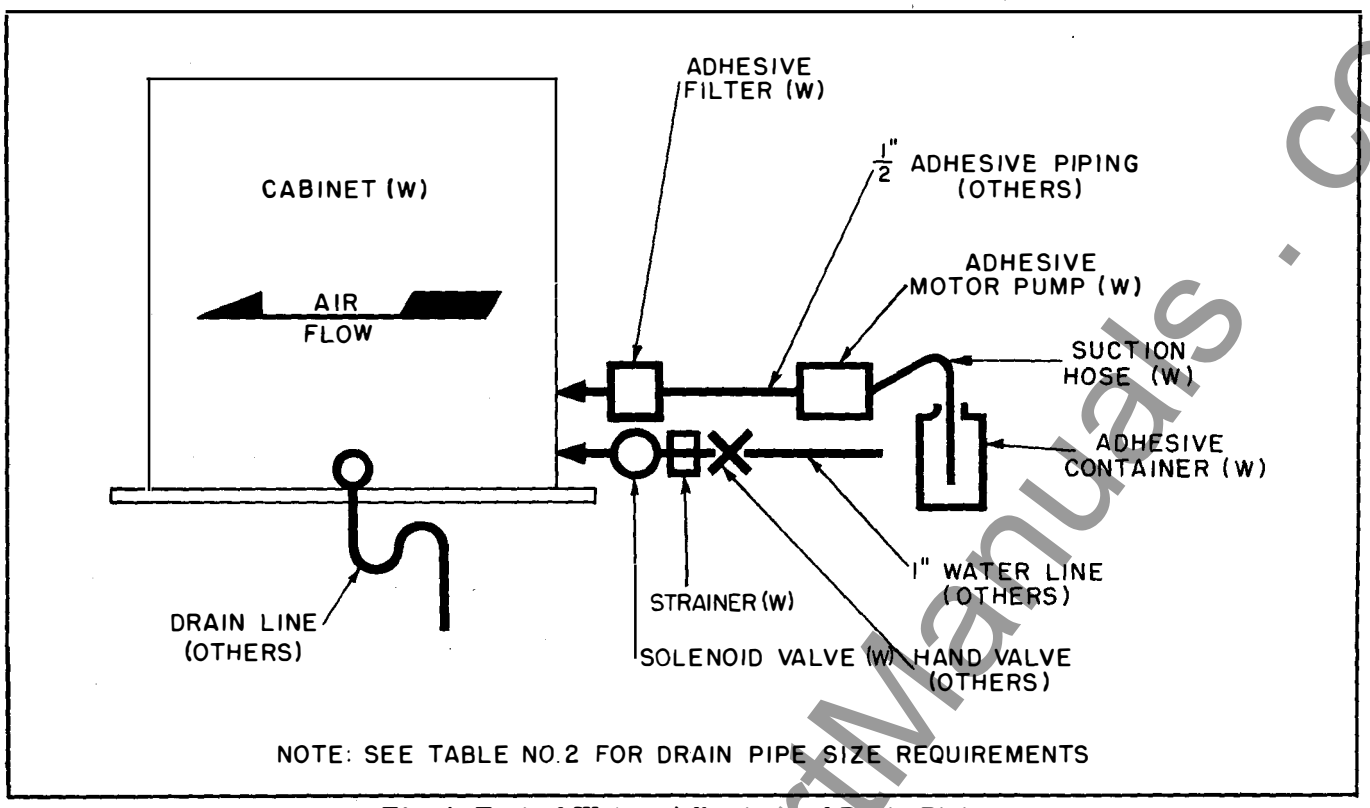


Fig. 4 Typical Water, Adhesive and Drain Piping

Drain. A drain pipe is required to carry off the wash water. This pipe should be at least as large as the female connection at the drain pan. See Fig. No. 4. The drain pipe should be connected to the sewer in accordance with applicable plumbing codes. Either one or both drain fittings may be used as desired.

Water Supply Clean cold water at tap temperature (not to exceed 100°F) and running pressure from 25 psi min. to 60 psi max. is required for successful washing. See Table 2 for GPM requirements.

Water Piping. Keep piping clean. Water should be piped through the strainer and electrically operated solenoid valve to the female water connection on the access side of the cabinet. A hand shut-off valve (not supplied) is required to control the water flow. Piping and valves should not obstruct the clearance required at the access door and drive mechanism.

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.

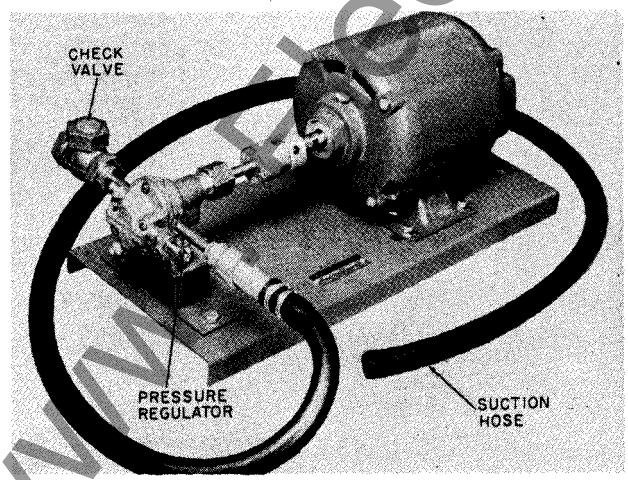


Fig. 5. DUSTIK Pump

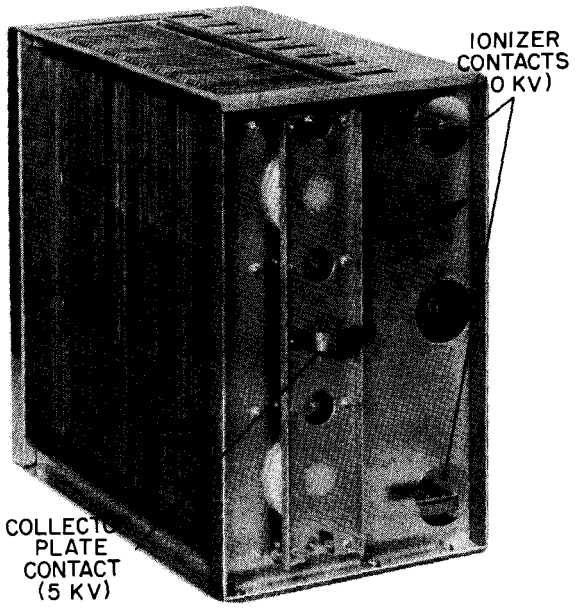


Fig. 6 Cell

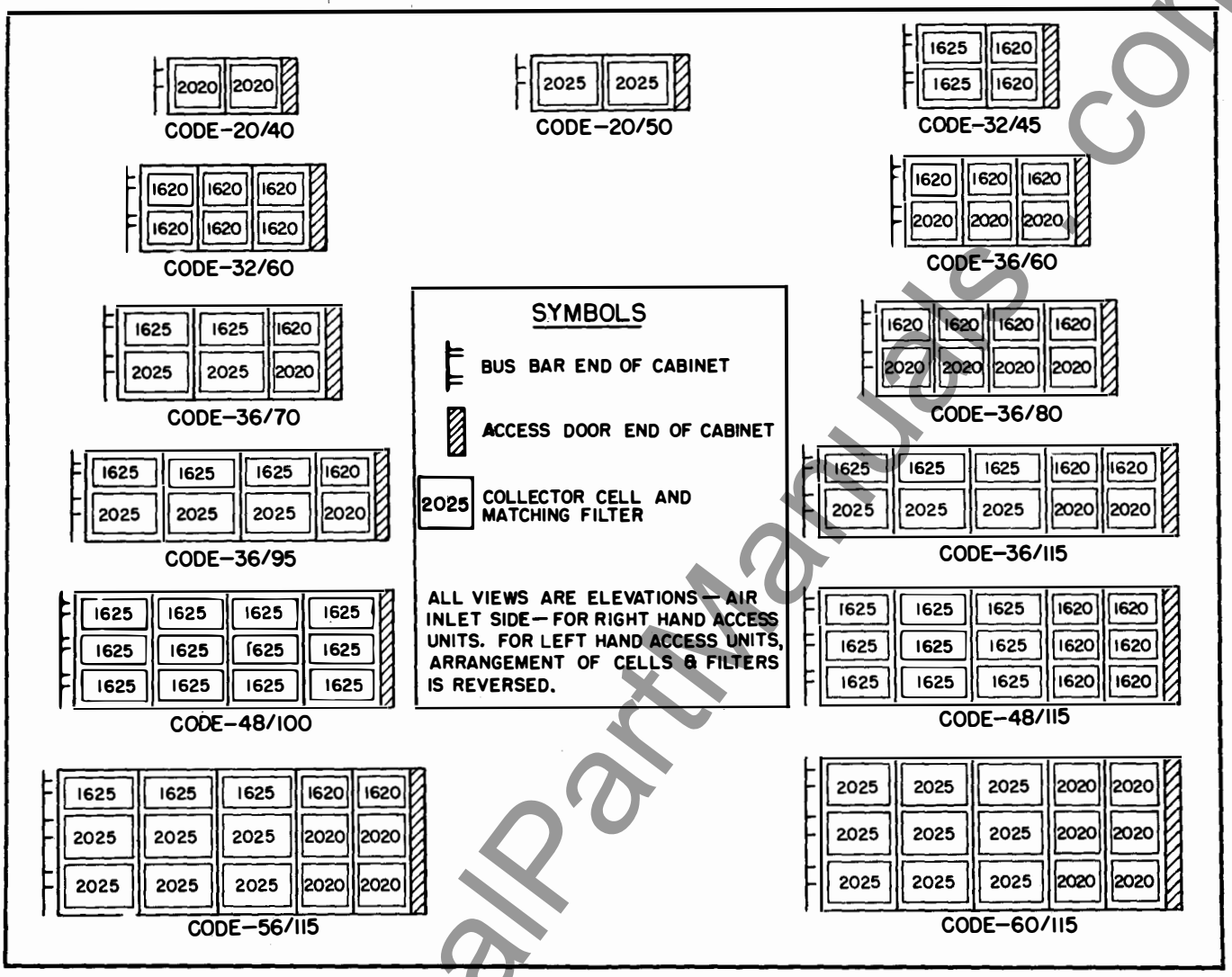


Fig. 7. Arrangement of Cells and After-Filters Inside Cabinets

Adhesive Pump. A motor driven gear pump, with check valve, 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. 5. Be careful not to distort the base. Be sure the pump does not obstruct the clearance required in front of the cabinet panel. See Fig. 9 for wiring connections.

Several feet of suction hose are 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 40 psi. This will provide a good spray pattern for the average unit. See "Header Maintenance" for adjustment of pressure.

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.

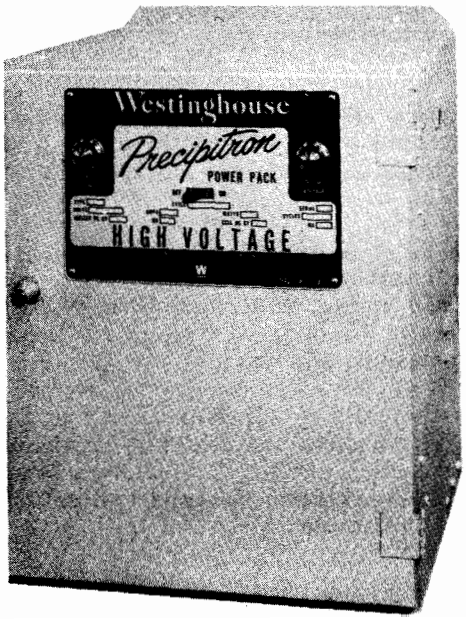


Fig. 8 Power Pack

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.

The cells are equipped with spring contacts at both ends. See Fig. 6. Be sure that they project 1/8" beyond the end frame. These contacts connect high voltage between adjacent cells in a horizontal direction. Note AIR FLOW arrow on cells.

Fig. 9. View Looking into Cabinet

To install cells in the cabinet, open the access door and remove the cell retainer angles - see Fig. 10. Save these for re-installation after all cells are in place.

Cells must be loaded in the cabinet in precisely the order shown in Fig. 7 (or reversed as required for left hand units). Failure to obtain proper alignment of spring contacts will result in "dead" cells with zero cleaning efficiency.

Push the cells in carefully as far as they will go. All cell contacts are designed to depress 1/8" when in proper position. To maintain the spring pressure on the contacts, re-install all cell retainer angles and tighten sécurely.

Mount the Power Pack close to the access door 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

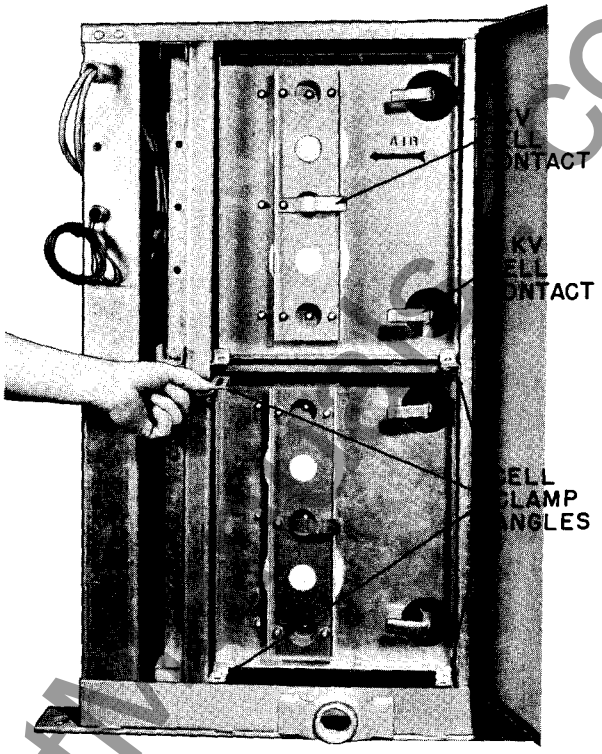


Fig. 10. Installing Cell Retainer Angles

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. Note: Additional high voltage cable will be required if the distance between the power pack and the cabinet exceeds 20 ft. See high voltage wiring.

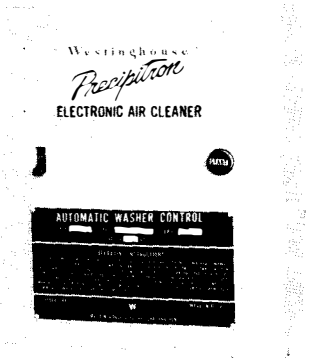


Fig. 11. Sequencing Controller

Sequencing Controller. should be located conveniently near the access side of the PRECIPITRON unit and power pack. This is the "center" for all electrically controlled operations. From this, there will be conduit connections to the 120 volt line, power pack, DUSTIK pump motor, solenoid water valve, header drive motor, fan motor starter and possibly a Type EC Time Control unit. Careful planning of the routings for these conduits before final mounting of the controller will greatly simplify final wiring. Be sure that electrical conduits do not obstruct full access to the cabinet, header drive mechanism or power pack.

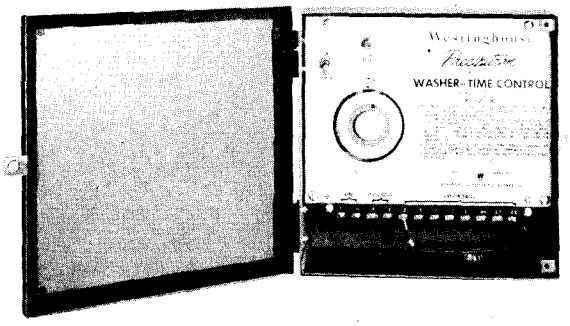


Fig 12. Type EC Time Control

EC Time Control. when specified, will operate in conjunction with the sequencing controller and should therefore be mounted close by.

LOW VOLTAGE WIRING

Power Supply required is 120 volts (plus or minus 5 volts) ac., 1 ph., either 50 or 60 cycles. 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. 13 shows typical wiring connections required. The access door interlock switch is wired in series with the power pack to the 120 volt supply. The interlock is for the safety of the operator. It must disconnect the 120 volt supply before the cabinet access door can be opened.

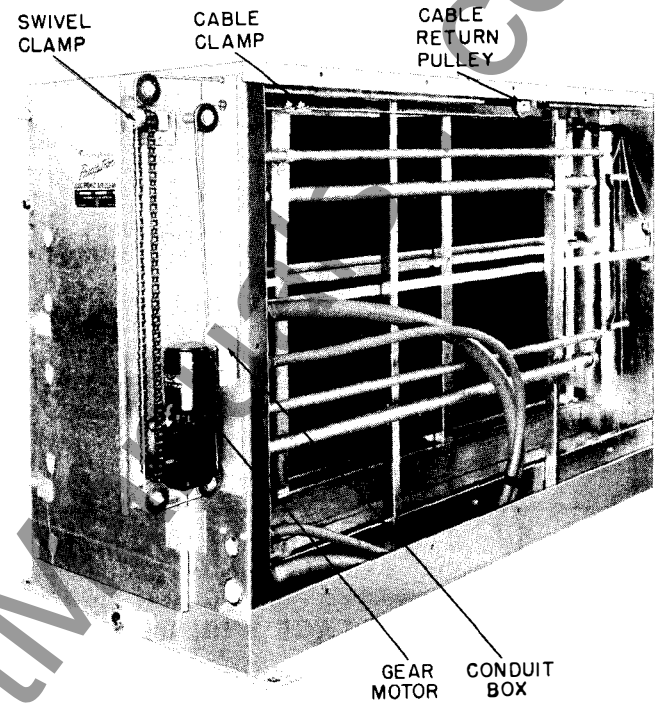


Fig 14. Typical Header Drive Mechanism

Connections to the motor on the header drive mechanism must come in from the top.

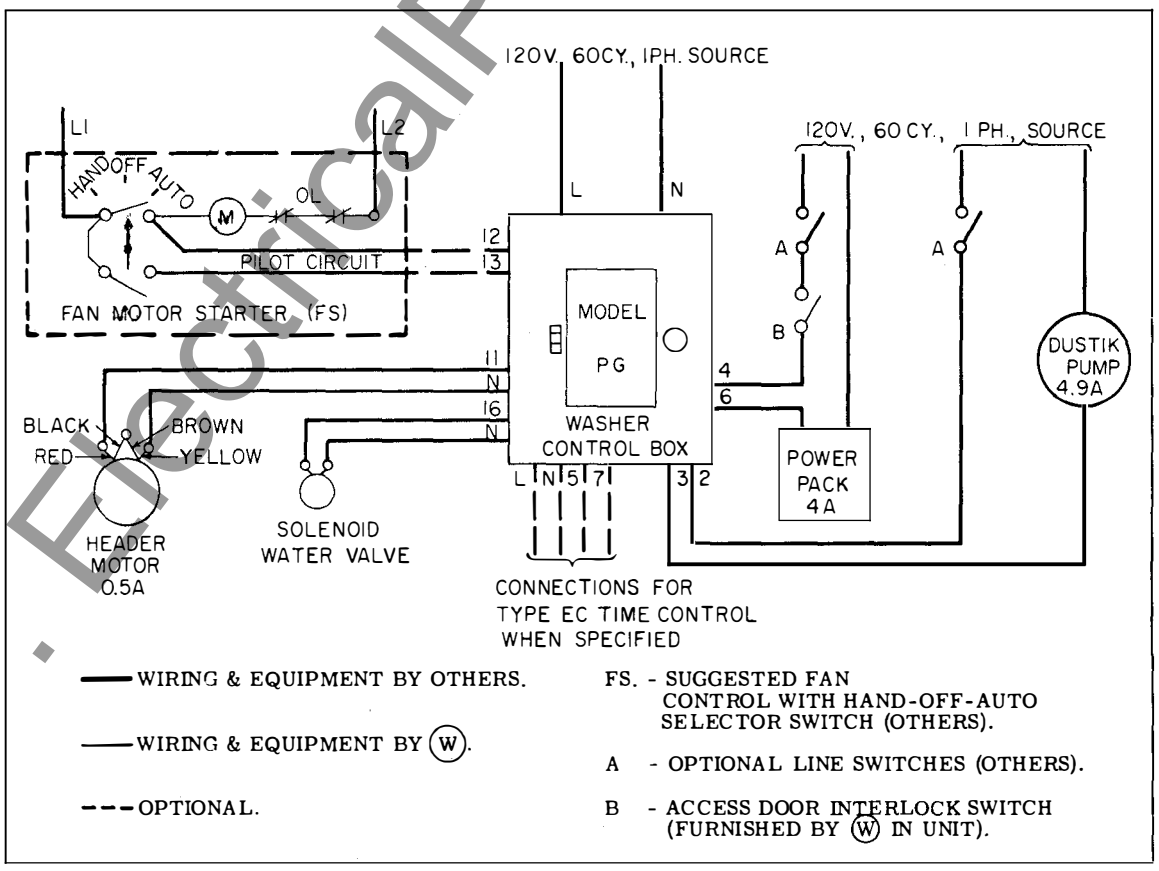
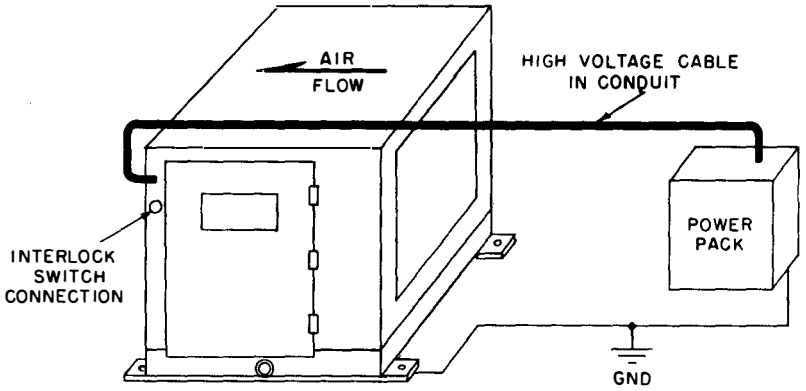


Fig. 13. Typical Low Voltage Connections



High Voltage Cable furnished by (W) is run in conduit (not furnished) from the power pack to the unit.

Fig. 15. High Voltage Conduit and Grounding

HIGH VOLTAGE WIRING

High Voltage Connections (10 KV and 5 KV) within the cabinet are automatically completed when the collector cells are correctly installed. Two (2) high voltage cables are factory connected to the bus bars and brought out in coils approximately 30' long, for connections to the power pack.

High Voltage Cables should be enclosed in 1/2" rigid conduit (not supplied) between the cabinet and the power pack. If the power pack is too remote (much over 20 ft.) new cables should be installed for the full run. (Only high voltage cable supplied by Westinghouse is recommended.)

Continuity of high voltage circuits from the power pack through all collector cells may be checked at the cell contacts which are exposed when the access door is open.

CAUTION

DO NOT ENERGIZE THE POWER PACK WITHOUT OBSERVING THE CAUTION, PAGE 13.

Electrical Grounding. High voltages are supplied from the power pack to the cells 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. 15. Connect the cabinet and power pack case to a common low resistance ground, using solid copper wire.

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 electrodes. (Replace broken wires with spares furnished with instruction package.)
3. All wiring should be in accordance with the wiring diagrams and connections should be tight.
4. All cells should be installed in correct order and all cell retainer angles in place.

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 Electronic Air Cleaners use strong electrostatic forces to draw dirt particles from the air. These forces are effective, whether the particles are large or extremely small, including smoke and fine dusts responsible for most of the smudging, soiling and dirt damage. PRECIPITRON Cleaners catch 6 to 8 times more dirt than regular filters. Because of this high operating efficiency, frequent washing is needed to dispose of the increased collection of dirt.

Model PG PRECIPITRON Units incorporate a system for automatically moving water spray nozzles to flush dirt from the collector cells. These are mounted on a header which is moved back and forth within the cabinet to obtain full spray coverage. Water is piped to the header through an electric solenoid valve.

To insure retention of collected dirt, collector cells are sprayed with a water soluble adhesive fluid identified as Dustik Type B Adhesive. The thin film washes off with the accumulated dirt and a fresh coating is applied for the next air cleaning cycle. Dustik Adhesive is sprayed from the moving header in the same manner as the wash water, but through nozzles with smaller orifices. Necessary pressure is produced by the Dustik pump.

Cabinet. The factory-assembled cabinet encloses the collector cells, after-filters and wash and adhesive headers. All internal parts are accessible and removable through the access opening. The header driving mechanism is mounted on the outside of the cabinet for ease of inspection and servicing.

Collector Cells trap airborne dirt by electrically charging the particles, causing them to precipitate on metal plates of opposite polarity. Particle charging takes place in the ionizer portion of the assembly; dirt collects in the parallel plate portion.

Ionizers comprise a set of fine wires spaced between flattened tube electrodes at ground potential. When 10 KV d.c. voltage is applied to the wires, a charging zone is created between the wires and ground tubes.

Cell Plates are arranged in two sets; one supported by insulators and the other grounded. When 5 KV d.c. voltage is applied to the insulated set, a strong electrical field causes charged particles to collect on the grounded plates.

Power Pack furnishes high voltages for operation of the ionizer and cell plate portions of the collector cells. Indicating lamps on the cover signal the operator when the unit is properly energized.

Header Drive Mechanism consists of a fractional (1/10) horsepower gear motor driving a short loop of roller chain. One chain link carries a swivel clamp which grips a steel cable attached to the moving header. As the chain travels around its loop, it pulls the cable first one way and then the other to move the header back and forth within the cabinet.

Sequencing Control programs the complete washing-adhesive application cycle. Pressing the push button starts a timer which carries out the following schedule:

1. Stops fan and shuts off power pack.
2. Starts header mechanism and turns on solenoid valve for 10-minute wash period, then turns both off.
3. Allows 20 minutes for water to drain.
4. Starts header mechanism and Dustik pump for 8-second adhesive spray, then turns both off.
5. Allows 40 minutes for adhesive to drain.
6. Re-starts fan and power pack.

EC Time Control (when specified) starts the sequencing controller at a pre-set day and hour. Adjustments permit selection of any hour of the day, at intervals of 2, 3, 5, 7, 10, 14, 17 or 21 days between washings.

After-Filters are mounted in tracks in the cabinet on the leaving air side. These guard against splashing of water downstream from the unit. They also help equalize air flow through the collector cells and serve as a back stop filter during shut-down or in the event of a power failure.

Protective Devices for safety of the operator include screw operated (time delay) switches at the power pack door and the cabinet access door. These open the 120 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. Regular use of Westinghouse Type B Dustik adhesive is recommended. Adhesive serves two functions: (a) binds the collected dirt to the collector plates as it is precipitated and (b) renders the deposit 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. Both indicator lights should glow steadily.

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

Frequency of Washing depends upon how much dirt is in the air at the particular location. Average time between washings is every 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, 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 washing. 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. Open the access door 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 suggest broken ionizer wires, missing high voltage connections or uneven air distribution. This can also be caused by plugged spray nozzles.

Washing the Unit With electrical connections as shown in Fig. 13, Typical Low Voltage Connections, operation of the "Start" push button on the controller automatically stops the fan, turns off the power pack, starts the header mechanism and opens the electric solenoid valve. The timer in the controller maintains this arrangement for the 10 minute washing cycle.

It should be recognized that successful washing is completely dependent on water being available at the correct temperature and pressure and all water nozzles being open and free to develop the correct spray pattern. See "Header Maintenance."

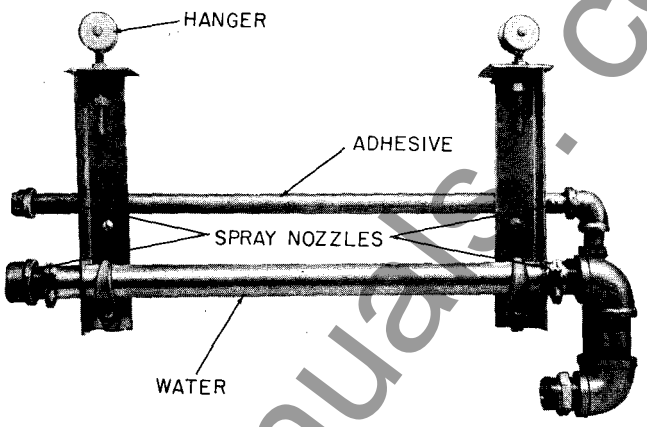


Fig. 16. Typical Spray Header (Looking Upstream)

Header Maintenance. It is good practice to periodically check operation of the spray nozzles (open access door) during washing and adhesive application. This is particularly important when the unit is first installed, to be sure that installation dirt has not clogged the nozzles. If clean water is used, there should be little trouble with the water nozzles.

Water nozzles should spray in a vertical fan pattern approximately 80° wide. The pattern is controlled by water pressure. Pressures too high cause undesirable misting; pressures too low reduce the angle of spray with consequent loss of coverage and penetration necessary for good washing.

Adhesive nozzles should also spray in a vertical fan-shaped pattern approximately 90° wide. Again, proper pressure is important. Adhesive pressure may be controlled by adjustment of the pressure regulator on the Dustik pump. See Fig. 5. Turn the regulator stem 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 cells to service the nozzles. Unscrew and remove the nozzles to clean. When replacing or adjusting a nozzle, be sure that the slot is in a vertical position. See Fig. 15. Note: If it is necessary to enter the cabinet with the cells removed, be sure to place boards on the drain tank to support the workman's weight.

Cold Weather Operation. Washing should not be attempted when the unit and associated piping may be at or below freezing temperature. Generally, washing schedules may be temporarily adjusted to take advantage of "breaks" in the weather. Where an EC Time Control is used, a complete wash sequence may be skipped by pressing the Day Reset button on this control just prior to the time automatic washing is scheduled. During cold weather, Type B Adhesive should be stored at temperatures above 60°F for 24 hours before using.

Applying Adhesive. Following the wash cycle, the sequencing controller allows 20 minutes time for water drainage before applying adhesive. The controller then starts the header mechanism and the Dustik pump. The pump should operate only for approximately 15 seconds before being shut off by the Dustik Timer Relay. The header mechanism continues to run until shut off by the main timer switch #6.

Successful adhesive application depends upon there being ample fluid in the container, proper pump pressure (40 psi) and no restrictions in the filter, piping or nozzles. Use only Westinghouse Dustik Type B Adhesive. Do not dilute.

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

Ionizer Maintenance. To replace broken ionizer wires, the cells may be pulled out through the access space. All broken pieces of ionizer wire should be carefully removed and discarded outside the cabinet. Spare ionizer wires are supplied with the cabinet and additional wires may be purchased when needed. The wires are equipped with 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.

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 "Build-Up of Dirt." Cell plate spacing should be uniform. Be sure to replace the cells in the correct order. See "Installation of Cells."

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 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 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.

Power Pack Maintenance When properly adjusted, the power pack maintains correct voltages for the ionizer and plate sections of the collector cells. The "output voltage" indicating light glows continuously for normal operation. See the Power Pack Instruction for detailed maintenance and repair procedures.

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

Lint Screen Maintenance If the optional lint screen section is installed up-stream from the cell bank, it should be inspected regularly for excessive accumulation of lint and dirt (clogged screens will block air flow to the PRECIPITRON). The screens may be removed for cleaning.

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. See Figs. 7 & 17.

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

Header Drive Mechanism Inspect occasionally to be sure that cable moves with the chain to drive the header properly. Do not tighten cable excessively. Once a year, oil the swivel link lightly with medium weight motor oil.

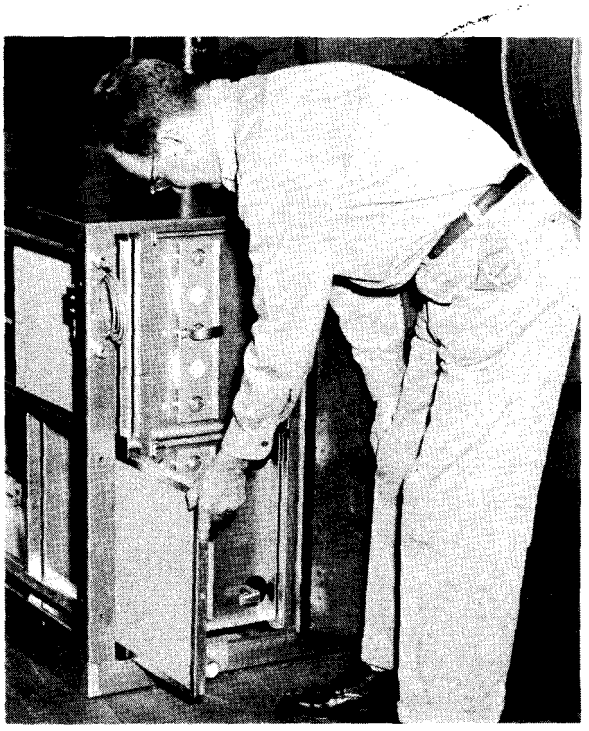


Figure 17. Installing After-Filters

Sequencing Controller. Properly connected, there should be little maintenance required. Internal and external electrical connections are shown in Fig. 18.

To allow for possible time adjustments, the timer motor runs 90 minutes for one revolution of the cam shaft. However, only 75 minutes are required for the complete washing - Dustik application sequence. Timer cams are factory set and should not be changed without consultation. Cam settings may be checked by loosening the knurled screw at the left end and rotating the cam shaft forward, by hand. The switches (No. 1 being nearest the motor) should operate as follows at positions indicated by the percent dial.

Switch No.	CAM SETTING VS PERCENT OF CYCLE					
1	Closed 0-82%	Open	82-99%			
2	Open 0-1%	Closed	1-83%	Open	83-100%	
3	Closed 0-2%	Open	2-15%	Closed	15-100%	
4	Closed 0-3%	Open	3-14%	Closed	14-100%	
5	Closed 0-35%	Open	35-38%	Closed	38-100%	
6	Closed 0-36%	Open	36-37%	Closed	37-100%	

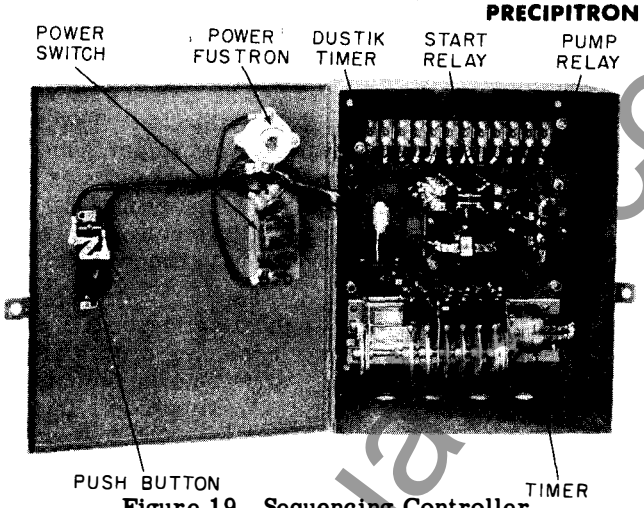
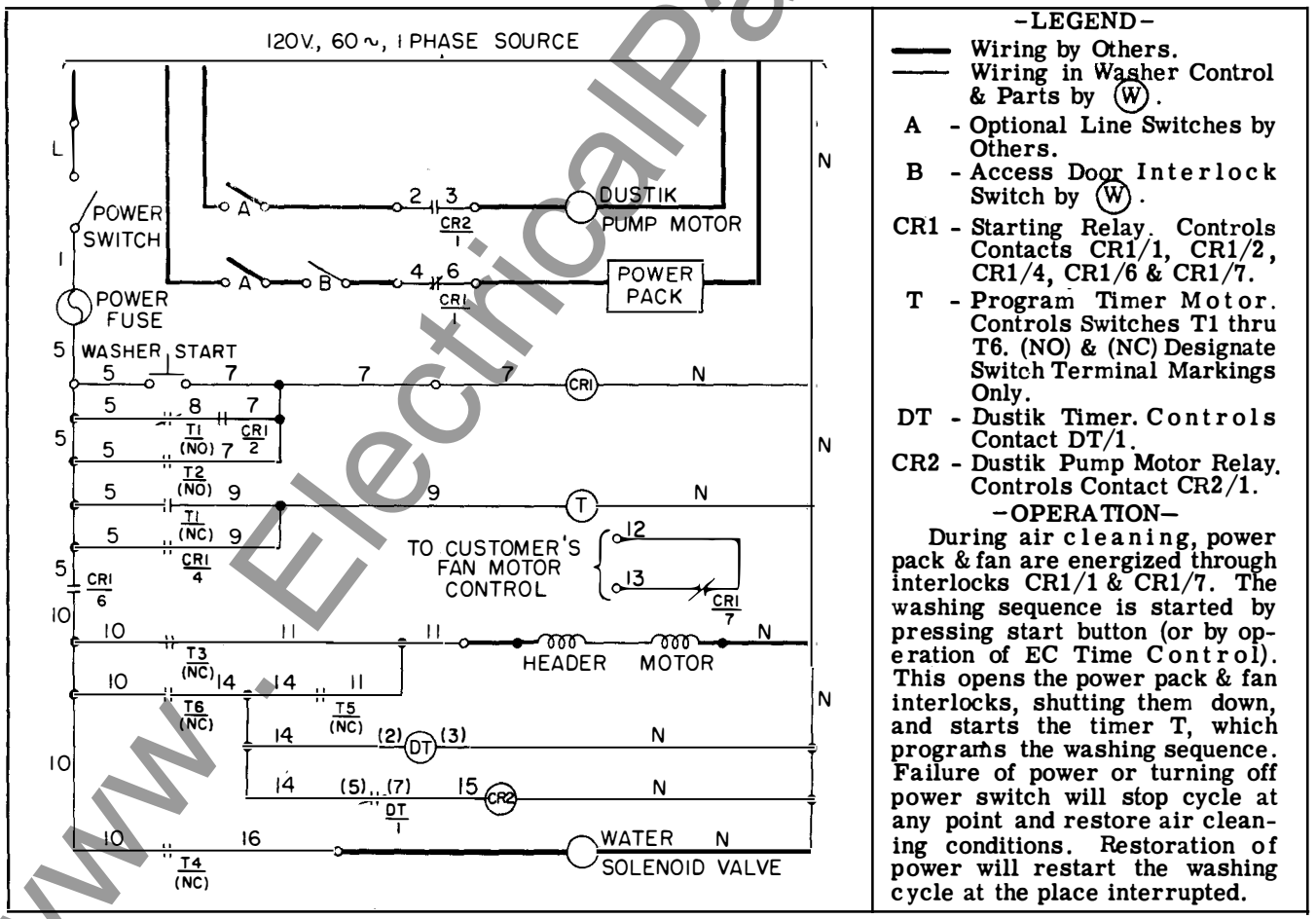


Figure 19. Sequencing Controller

The Dustik Timer has no adjustments and should allow the pump to operate approximately 15 seconds. Any large deviation from this interval requires replacement of the ustik Relay (tube).

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.



-LEGEND-

——— Wiring by Others.
——— Wiring in Washer Control & Parts by (W).

A - Optional Line Switches by Others.

B - Access Door Interlock Switch by (W).

CR1 - Starting Relay. Controls Contacts CR1/1, CR1/2, CR1/4, CR1/6 & CR1/7.

T - Program Timer Motor. Controls Switches T1 thru T6. (NO) & (NC) Designate Switch Terminal Markings Only.

DT - Dustik Timer. Controls Contact DT/1.

CR2 - Dustik Pump Motor Relay. Controls Contact CR2/1.

-OPERATION-

During air cleaning, power pack & fan are energized through interlocks CR1/1 & CR1/7. The washing sequence is started by pressing start button (or by operation of EC Time Control). This opens the power pack & fan interlocks, shutting them down, and starts the timer T, which programs the washing sequence. Failure of power or turning off power switch will stop cycle at any point and restore air cleaning conditions. Restoration of power will restart the washing cycle at the place interrupted.

Figure 18. Sequencing Control iagram

High voltage short circuits which cannot be located by visual inspection of the cells may be localized as follows: Remove all cells from the cabinet, close access door, and turn on the power pack. The "output voltage" light on the power pack should glow, unless there is trouble in the high voltage wiring or the pack itself. Disconnect high voltage cables and recheck. If the "output voltage" light still fails to glow, trouble is in the power pack. Consult the power pack instruction book for detailed correction procedures.

If the high voltage circuits are clear up to the bus bars, re-install cells one by one, closing the access door each time to note any change in the "output voltage" indicating light on the power pack. If the light goes out, trouble is in the last cell installed.

Cell voltages or continuity of the high voltage circuits through the cells may be checked with power on, if the access door switch is temporarily blocked closed. See CAUTION. Use only a high quality meter suitable for high voltage dc measurements. Tests should be made at the terminals of the nearest cells.

CAUTION

Observe caution in all tests where parts connected to high voltages are exposed. Always turn off power pack when power is not required, allowing at least 1/2 minute before touching the high voltage parts. This time delay allows the residual charge in the cells and power pack capacitor to bleed to a safe value. It is also good practice to "ground" the part with a suitable ground prod after each test and before the part is touched.

TABLE NO. 1, OPERATION CHART

NORMAL OPERATION	FAULT INDICATION	PROBABLE CAUSES
Circuit breaker switch on. Input power lamp lit. Output voltage lamp lit.	Input power lamp not lit. Circuit breaker switch on. Output voltage 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.
	Output voltage lamp out. Circuit breaker switch on, or breaker has tripped and output voltage 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.
	Circuit 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.
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 (10 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.	20/40	20/50	32/45	32/60	36/60	36/70	36/80	36/95	36/115	48/100	48/115	56/115	60/115
Matching Air Distr. Unit	1605	1608	--	1611	--	1616	--	1622	1628	--	1636	1642	1648
Capacity C.F.M. @ 90% Effy.	2780	3440	5000	6670	7500	8750	10000	12400	14400	16600	19200	22300	24000
Pressure Drop ins.wg.@ 500 fpm	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19
Dimensions													
Height	26	31	36	36	41-1/4	41-1/4	41-1/4	41-1/4	41-1/4	55-1/4	55-1/4	63-3/8	70-7/8
Width	48	57	50	64	65	75	85	101	123	108	123	123	123
Depth	25-1/2	25-1/2	25-1/2	25-1/2	25-1/2	25-1/2	25-1/2	25-1/2	25-1/2	25-1/2	25-1/2	25-1/2	25-1/2
Water - GPM @ 40 psi	3.2	3.2	6.4	9.6	9.6	9.6	12.8	12.8	16.0	14.4	18.0	18.0	18.0
GPM @ 30 psi	2.8	2.8	5.5	8.3	8.3	8.3	11.0	11.0	14.0	12.5	15.5	15.5	15.5
Adhesive - qts. per application (average)	1.0	1.2	1.7	2.2	2.5	2.9	3.3	4.1	4.8	5.5	6.1	7.4	8.0
Piping Connections													
Water	1	1	1	1	1	1	1	1	1	1	1	1	1
Adhesive	1/2	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 (z)	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	2	2	2	2	2	2	2
Electrical 120 v-60 cy-1 ph													
Power Pack Input Watts	90	120	150	185	190	210	230	250	280	300	320	350	370
Adh. Pump Motor H.P.	1/3	1/3	1/3	1/3	1/3	1/3	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Header Gearmotor H.P.	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10
Weights approx. net lbs.													
Unit less P.P. and Pump	140	200	340	500	530	570	680	790	950	1090	1220	1440	1590
Power Pack	130	130	130	130	130	130	130	130	130	130	130	130	130
Pump	32	32	32	32	32	32	40	40	40	40	40	40	40
Add 35% to unit weight for water during washing													