

Electro-air®

ELECTRONIC AIR CLEANERS

Installation & Service Manual ST-100-A

SLIM TWIN ELECTRONIC AIR CLEANER MODELS ST-14-A, ST-20-A

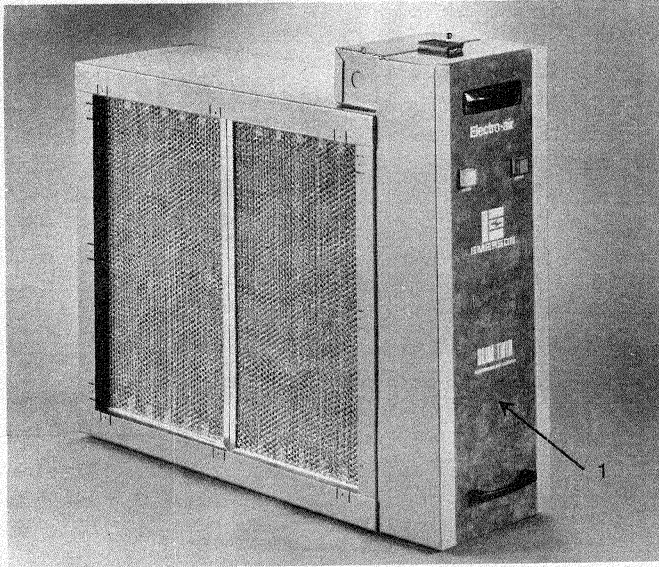


FIG. 1

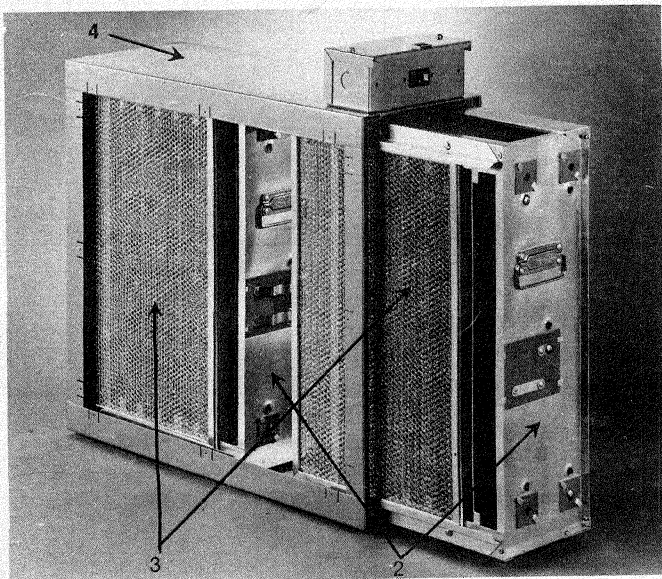


FIG. 2

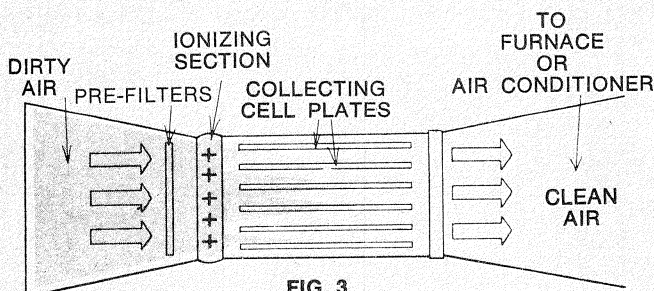


FIG. 3

A. APPLICATION

The electronic air cleaner is designed to provide air cleaning in applications where a multi-return ducted system is employed. The unit is installed in the return air duct in a location common to all of the branch ducts.

The unit is available in 2 models:

ST-14-A designed for an air volume of up to 1,400 CFM (2 380 M³/HR.).

ST-20-A designed for an air volume of up to 2,000 CFM (3 400 M³/HR.)

The unit can be installed with horizontal airflow left-to-right (fig. 6) or right-to-left (fig. 7), or can be installed with airflow vertically up (fig. 8) or vertically down (fig. 9).

B. MAJOR COMPONENTS

1. Power Pack—(Fig. 1) This component houses the electronic circuitry necessary to develop the high voltage electrostatic field.

2. Collecting Cells (2)—(Fig. 2) These all aluminum components consist of an ionizing section that contains fine tungsten ionizing wires suspended between electrodes; and a collecting section that contains a series of parallel aluminum plates.

3. Pre-filters (2)—(Fig. 2) These filters are designed to keep lint and large particles out of the collecting cell.

4. Cabinet—(Fig. 2) Constructed of 18 gauge galvanized steel to resist rust and corrosion. Tabs are provided to facilitate mounting to a collar on the air handling equipment.

C. OPERATION (Fig. 3)

Particles suspended in the air stream are carried through the return duct to the electronic air cleaner. They receive a strong positive electrical charge in the ionizing section of the cells and are then attracted to the aluminum plates in the collecting section of the cells, where they adhere. Periodic washing of the collecting cells is necessary to wash away the collected dirt particles.

D. INSTALLATION

General—To insure maximum filtration efficiency, even air distribution must be maintained across the full face of the cells. This can be accomplished through the use of gradual transitions in the ductwork. Transitions connected to the inlet or outlet side of the air cleaner should maintain an expansion or contraction rate of 1 in 3, approximately 20°, (see fig. 4). For mechanical specifications of unit refer to fig. 21.

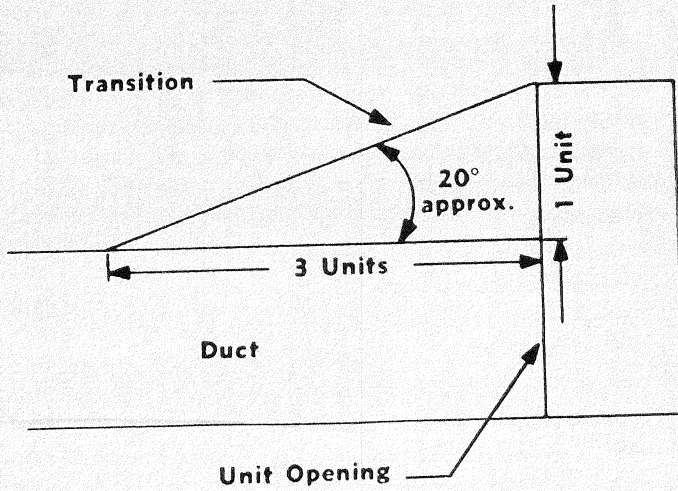


FIG. 4—DUCT TRANSITIONING

Where an ell is attached to the air cleaner and the distance between the radius of the ell and the air cleaner cabinet is less than two feet, turning vanes should be used. (See fig. 5).

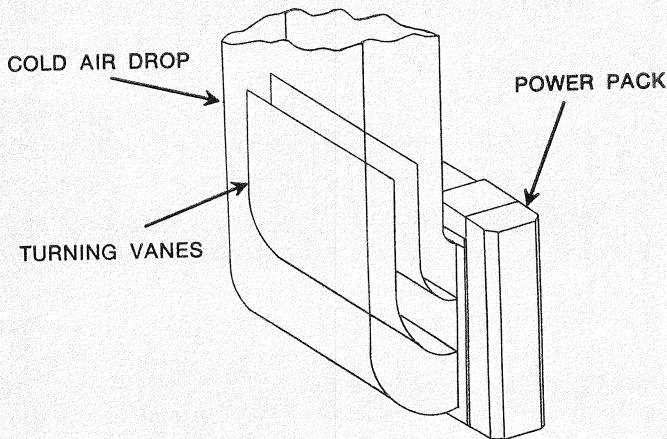


FIG. 5—TURNING VANES

E. UNIT LOCATION

The electronic air cleaner must always be installed in the return air ductwork. The air cleaner may be installed downstream from the humidifier unless the humidifier is of the type that injects raw vapor into the air stream. Consideration must also be given to

maintaining a minimum clearance of 18" (457,2 mm) from the front of the air cleaner for cell removal.

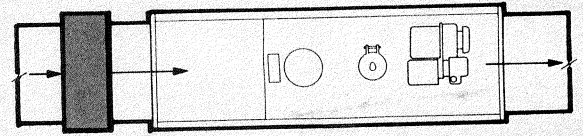


FIG. 6—HORIZONTAL AIRFLOW, LEFT-TO-RIGHT

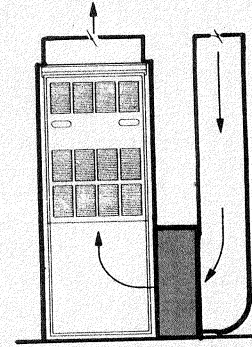


FIG. 7—HORIZONTAL AIRFLOW, RIGHT-TO-LEFT

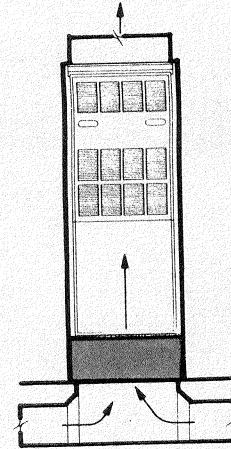


FIG. 8—AIRFLOW VERTICALLY UP

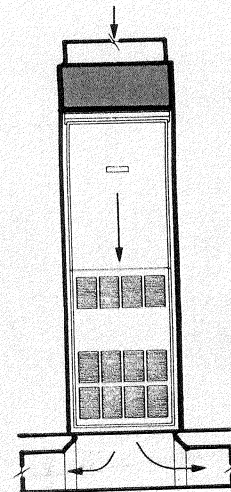


FIG. 9—AIRFLOW VERTICALLY DOWN

F. DUCT CONNECTION

Remove the power pack, the cells and the pre-filters. If the unit is to be flush mounted (See fig. 7), drill holes into the air handling cabinet, using the holes in the sidewalls of the air cleaner cabinet as a template, with an $\frac{1}{8}$ " (3,175 mm) drill bit. Secure the air cleaner cabinet to the air handling cabinet using #8 screws. The screws must be installed first through the air cleaner cabinet and then into the air handling cabinet, such that the points of the screws project into the air handling cabinet and not into the air cleaner cabinet.

If the unit is to be connected to a collar on the air handling cabinet, bend the tabs located in the sidewalls of the air cleaner cabinet outward 90° from the opening in the cabinet (See fig. 10). Using an $\frac{1}{8}$ " (3,175 mm) drill bit, drill holes into the collar using the holes in the tabs as a template. Secure the cabinet to the collar using #8 screws.

The tabs located in the sidewalls of the air cleaner cabinet may also be used to facilitate securing the duct-work to the inlet of the air cleaner cabinet.

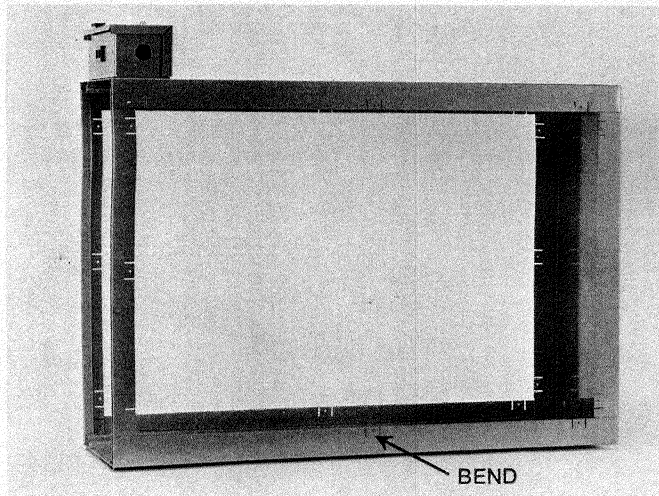


FIG. 10

G. ELECTRICAL CONNECTIONS

Two wires are provided in the junction box located on the top front of the air cleaner cabinet. (Fig. 18)

Connect the two wires located in the junction box to the 120 volt AC supply. **IMPORTANT:** The 120 volt AC supply must have a third wire to insure proper grounding of the equipment. (The third wire must be securely connected to the air cleaner cabinet in some manner.)

It is recommended that the fan in the air handling system be wired to operate continuously. This is explained in Section J, "The Importance of Continual Fan Operation."

If the fan is not wired to operate continuously, the air cleaner should be wired to operate only when the fan is operating.

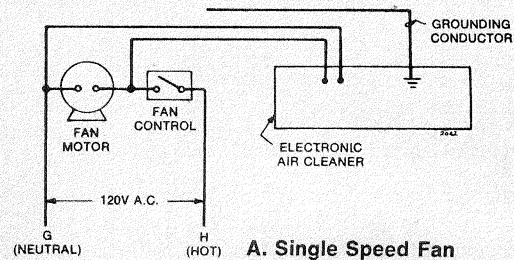
Suggested methods of connecting the air cleaner to operate with the fan are illustrated in figure 11.

Figure 11-A illustrates a single speed fan operation, using the fan switch to control the operation of the air cleaner.

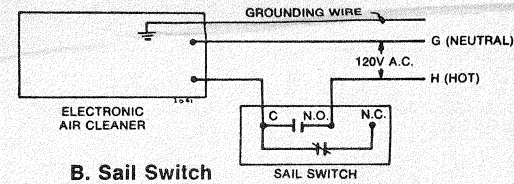
Figure 11-B illustrates an alternative method of connecting the 120 volt supply to the air cleaner. This method may be used with either single speed or multi-speed fan operation.

Figure 11-C illustrates a two speed fan operation using a double pole, double throw relay to control the operation of the air cleaner.

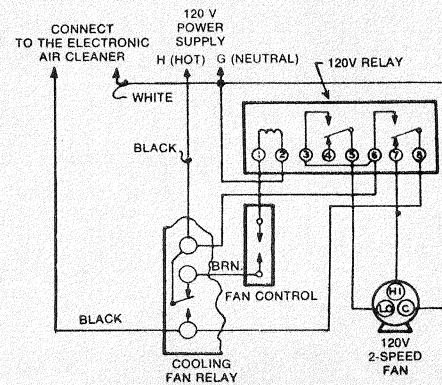
Figure 11-D illustrates a single speed fan operation for heating and cooling applications.



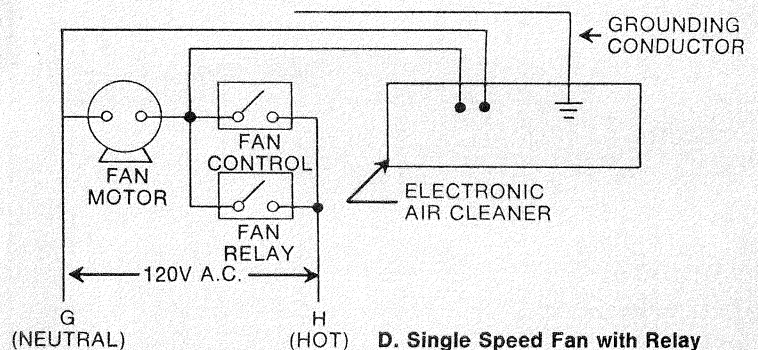
A. Single Speed Fan



B. Sail Switch



C. Two Speed Fan with Relay



D. Single Speed Fan with Relay

FIG. 11—ELECTRICAL WIRING VARIATIONS—INTERLOCKING AIR CLEANER WITH SYSTEM FAN

H. RE-ASSEMBLY

The air must enter the sides of the cells where the fine tungsten wires are located. Airflow arrows indicate the proper direction of airflow through the cells.

The unit is shipped from the manufacturer with airflow from left to right.

To reinstall the cells in the cabinet on an installation with airflow from left to right, insert the first cell so that the end of that cell goes into the cabinet first and the side of the cell with the fine tungsten wires is on the left. Insert the second cell so that the center of that cell goes into the cabinet first and the side of the cell with the fine tungsten wires is on the left. If the cells are properly installed the red contact board located on the end of the cell will be offset from center to the left. (See fig. 12).

To reinstall the cells in the cabinet on an installation with air flow from right to left, insert the first cell so that the end of that cell goes into the cabinet first and the side of the cell with the fine tungsten wires is on the right. Insert the second cell so that the center of that cell goes into the cabinet first and the fine tungsten wires are on the right. If the cells are properly installed the red contact board located on the cell will be offset from center to the right. (See fig. 13).

I. ELECTRICAL OPERATION

The ON/OFF switch located on the front of the power pack activates the unit. The switch also in-

cludes an amber indicator light which gives a visual indication whenever the switch is in the "on" position, that 120 VAC is being supplied to the unit.

The red service light also located on the front of the power pack indicates, by flashing on and off, whenever there is a malfunction in the power supply or the collecting cells.

J. THE IMPORTANCE OF CONTINUAL FAN OPERATION

An electronic air cleaner can remove only the contamination that is brought to it. Obviously a well ducted house, with adequate supply and return registers will receive the best electronic air cleaning.

Constant fan operation is recommended to achieve the best air cleaning results possible. The furnace fan should be set to operate continuously at a slow even speed. This will result in temperatures remaining balanced throughout the home, reduced heating and cooling fuel costs and most important a continual flow of dirt laden air to be cleaned by the air cleaner.

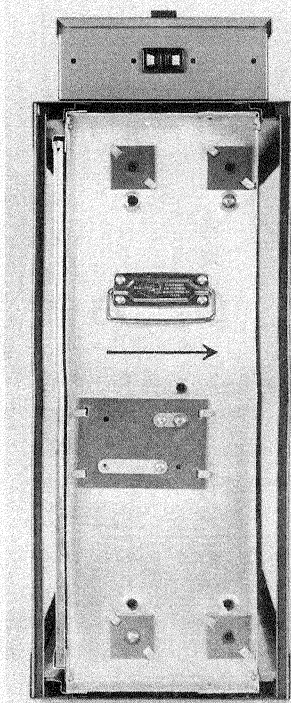
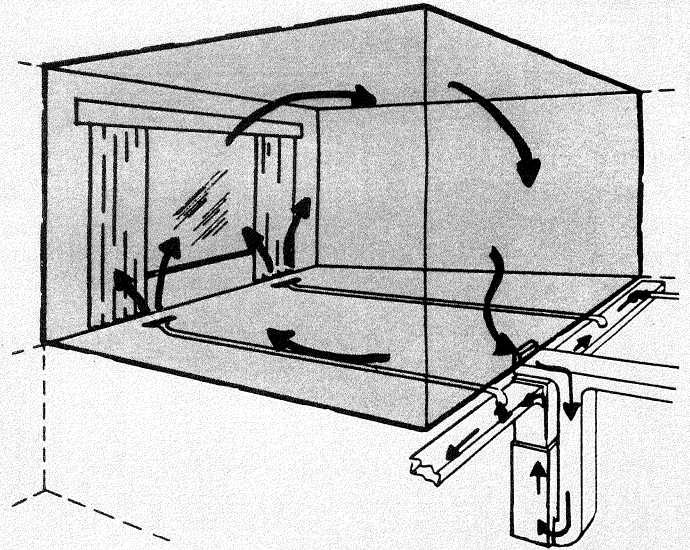


FIG. 12—LEFT-TO-RIGHT AIRFLOW

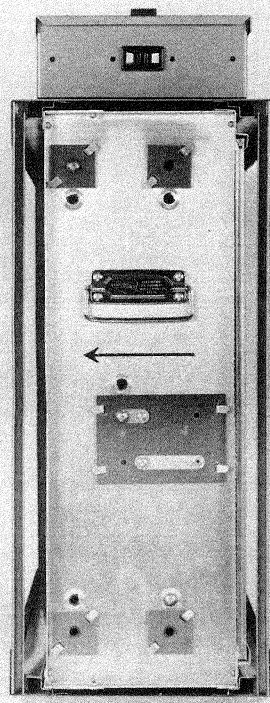


FIG. 13—RIGHT-TO-LEFT AIRFLOW

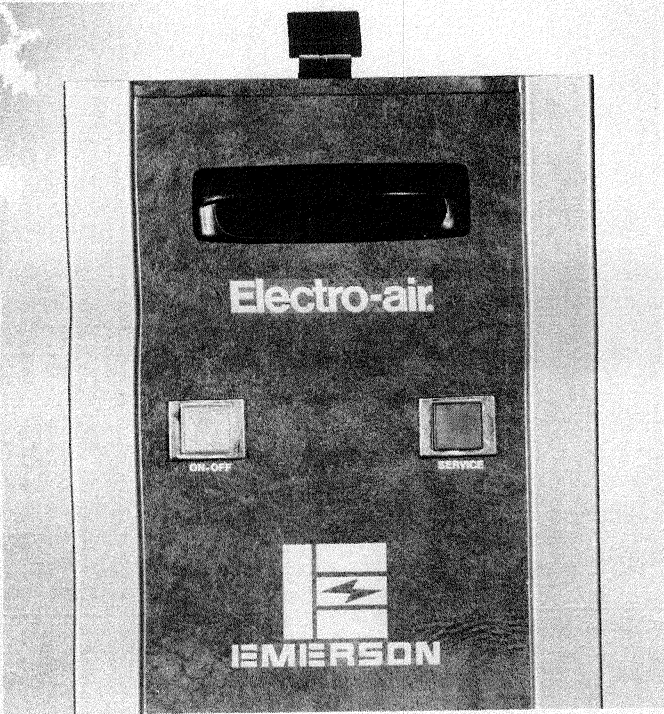
K. MAINTENANCE

Owner maintenance of the air cleaner will insure maximum filtration at all times. The maintenance consists of periodically washing the collecting cells and the pre-filters.

Frequency of maintenance will vary depending upon the application and the dirt load to which the collecting cells are exposed.

It is recommended that after the first thirty days of operation the collecting cells and pre-filters be removed and washed.

After the electronic air cleaner cleans up the dust which accumulated in the home and the duct system before the air cleaner was installed, the frequency of maintenance may be adjusted to the point that the collecting cells and pre-filters need only be washed once every three months.



L. MAINTENANCE PROCEDURE

1. Push the lighted (amber) ON-OFF switch located on the air cleaner power pack to the "off" position.
2. Turn the switch on the air handling system "off."
3. Remove the power pack by lifting and disengaging the latch located on the top of the power pack, grasp the two handles and pull the power pack away from the cabinet.
IMPORTANT: Before removing cells carefully note the direction of the airflow arrows located on the end of the cells.
4. Remove the cells.
5. Remove the pre-filters from the cells.
6. Immerse the cells and the pre-filters in a solution of warm water and a non-sudsing dishwasher detergent. Permit the cells and the pre-filters to soak for approximately 15 minutes.
7. Remove the cells and the pre-filters from the solution and thoroughly rinse with warm water.
8. Permit the cells and the pre-filters to drip dry for several minutes.
9. Reinsert the cells, making sure that the arrows located on the ends of the cells correspond to the direction noted before removal. Insert the first cell so that the end of the cell goes into the cabinet first and the airflow arrow corresponds to that previously noted. Insert the second cell so that the center of the cell goes into the cabinet first and the airflow arrow corresponds to that previously noted. (The two cell ends marked center, must touch in final reassembly.)
10. Turn the fan on the air handling system "on."
11. After approximately 15 minutes drying time, push the air cleaner ON-OFF switch to the "on" position. If a slight arcing condition occurs (loud

cracking sound) the cells are probably not completely dry. There will be no damage to the air cleaner if the arcing is permitted to continue. However, if the arcing seems excessive, push the air cleaner switch to the "off" position and permit the cells to dry for an additional 15 minutes.

CAUTION: (Removal of Horizontally Mounted Cell and Power Pack). If the air cleaner is mounted in a horizontal position, on the top of the furnace, caution should be exercised in removing the power pack. The power pack should be removed by turning the handle with one hand and supporting the bottom of the power pack with the other hand. Once the handle is free, remove the power pack using both hands and set it on the floor. The power pack weighs 25 lbs. and the cells more than 9 lbs. each. Caution is necessary to prevent dropping and damaging components or incurring injuries.

M. SERVICE PROCEDURES

The electronic air cleaner is designed to give years of trouble free operation. It is possible, however, that at some time the air cleaner may require some minor service. The indicator light, located on the front of the power pack, serves as a basic guide to potential service problems. The chart printed below explains service check-out procedures that can be performed by the homeowner. If these procedures do not correct the problem, servicing by a heating and air conditioning contractor will be required. A service guide for the contractor follows the homeowners guide.

CAUTION: Some installations may result in the air cleaner being accessible, while in operation, if the furnace door is removed. Always turn the air cleaner off before making access to the furnace.

SERVICE GUIDE FOR HOMEOWNERS

Service Indication	Corrective Procedure
Amber Light ON Red Light OFF	120 VAC is being supplied to the unit and the power supply is functioning properly.
Amber Light OFF Red Light OFF	120 VAC is not being supplied to the unit. A. Power packs ON/OFF switch may be in the "off" position. B. Fuse may be blown in the 120 VAC supply to the air cleaner. C. If the unit is wired to operate with the fan, check to see if the fan is operating.
Amber Light ON Red Light FLASHING	Foreign object may be caught in one of the collecting cells, touching the plates or the fine wires in the face of the cells. A. Remove the collecting cells, visually inspect to locate object. B. Remove the object and thoroughly wash the collecting cells as outlined in the maintenance section of this manual.

SERVICE GUIDE FOR THE CONTRACTOR

If the red indicator light located on the front of the power pack flashes or the amber light does not light and the procedures outlined in the homeowners service guide do not eliminate the problem, the servicing contractor may use the following procedure as a guide to locating the problem.

The electronic air cleaner can be serviced using the following tools and test equipment.

- 2—Well insulated screwdrivers.
- 4—Jumper wires with alligator clips at each end.
- 1—Test light (used to check for 120 VAC).
- 1—Kilovoltmeter capable of measuring 0-10,000 VDC.
- 1—AC voltmeter capable of measuring 0-120 VAC.

A. Check that 120 VAC is being supplied to the air cleaner.

1. Check the fuse in the 120 VAC supply line.
2. Check for 120 VAC at the receptacle located in the junction box on the air cleaner cabinet. If the unit is wired to operate with the fan, the fan must be operating whenever this check is made.
3. Check that the air cleaner's ON/OFF switch is in the "on" position.
4. If 120 VAC is being supplied and amber light does not light, replace light assembly.

B. Determine whether the problem is in the power pack or the collecting cells.

1. Push the ON/OFF switch to "off" position.
2. Remove the power pack from the air cleaner cabinet.
3. Remove the collecting cells from the cabinet, replace the power pack.
4. Push ON/OFF switch to "on" position.
5. If the red service light flashes, the problem is in the power pack.
6. If the red light does not flash, the problem is in one of the collecting cells.
7. Push ON/OFF switch to "off" position.

C. Collecting cell check-out.

1. Connect the power pack to one cell using the jumper wires as illustrated in figure 14.
2. Energize the power pack.
3. If the red light flashes, thoroughly wash and dry collecting cell and inspect for broken ionizing wires, cracked ceramic insulators, bent collector plates, or a foreign object lodged between the plates.

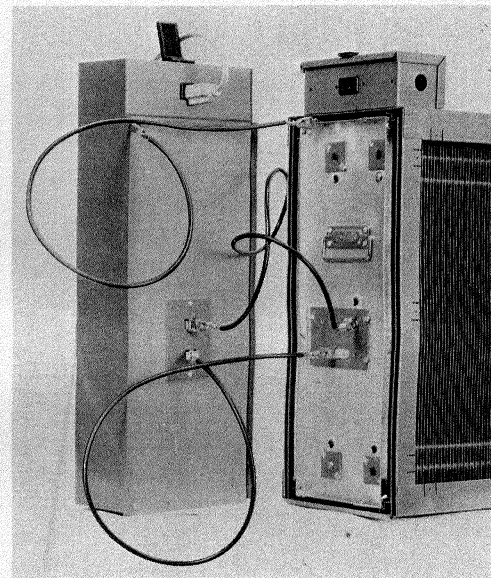


FIG. 14—COLLECTING CELL CHECK-OUT

4. If the red service light does not flash, the cell is functioning properly and the problem must be located in the second cell.
5. Repeat the above procedure on the second collecting cell.

D. Power pack check-out.

1. Connect a 120 VAC supply to the power pack using power cord as illustrated in figure 15.
2. Connect the jumper wires from the power pack to the collecting cells as illustrated in figure 15. (Note—Make sure rear cell is making proper contact with front cell.) Push the ON/OFF switch to the "on" position.
3. Using a kilovoltmeter capable of measuring 0-10,000 VDC, measure the voltage at the ionizer and the collector contacts (See fig. 15).
The voltage at the ionizer contact should be approximately 8,000 VDC.
The voltage at the collector contact should be approximately 4,000 VDC.
4. If the voltages measured agree with the rated voltages, and the red service light flashes, replace the service light sensor board.
5. If both the ionizer and collector voltages are excessively low or zero, push the ON/OFF switch to the "off" position, remove the jumper wires and proceed to step E.

E. Check-out of the primary section of the power pack.

1. Remove the four screws located in the panel on the back of the power pack and remove panel.
2. Supply 120 VAC to the power pack using a power cord. (Caution: The power pack must be grounded once it is isolated from the cabinet.)

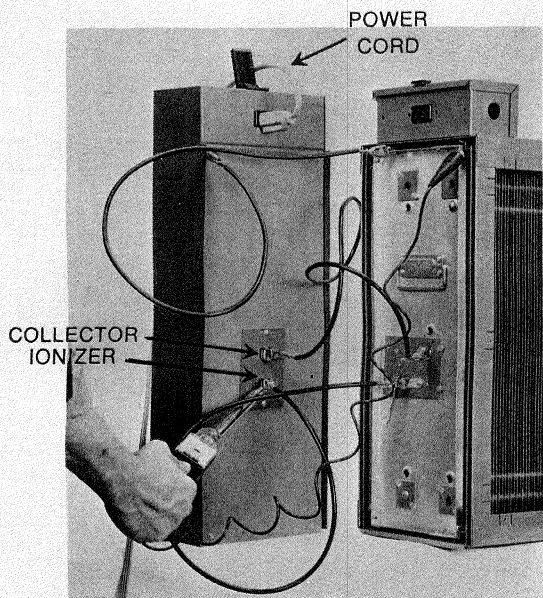


FIG. 15—MEASURING OF IONIZER AND COLLECTOR VOLTAGES

3. Push the ON/OFF switch on the power pack to the "on" position.
4. With an AC voltmeter, or a test light, check from the output terminal on the ON/OFF switch to ground. If no reading is observed, replace ON/OFF switch.

F. Check-out of the high voltage secondary section of the power pack.

1. Push the ON/OFF switch on the power pack to the "off" position.
2. Remove the two screws that hold the high voltage component board.
3. Remove the red and yellow transformer leads from the high voltage component board.
4. Push the ON/OFF switch to the "on" position.

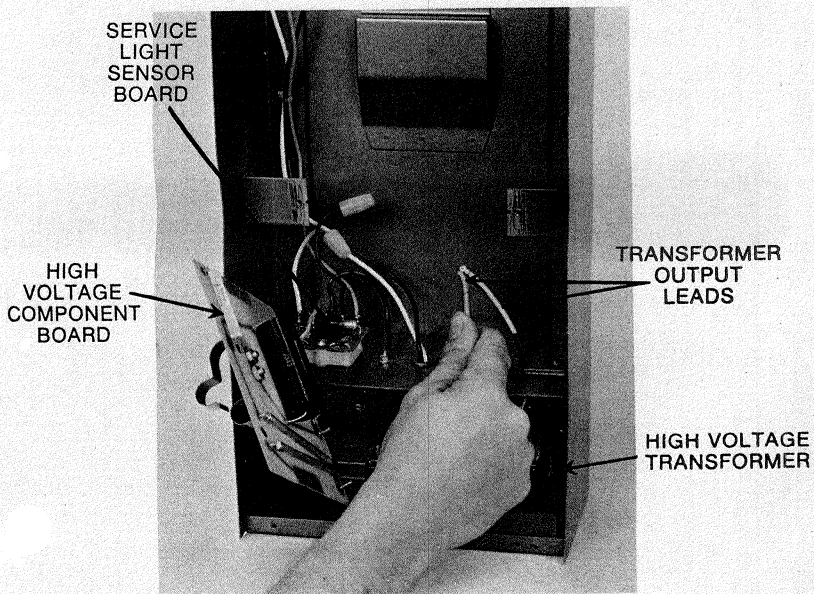
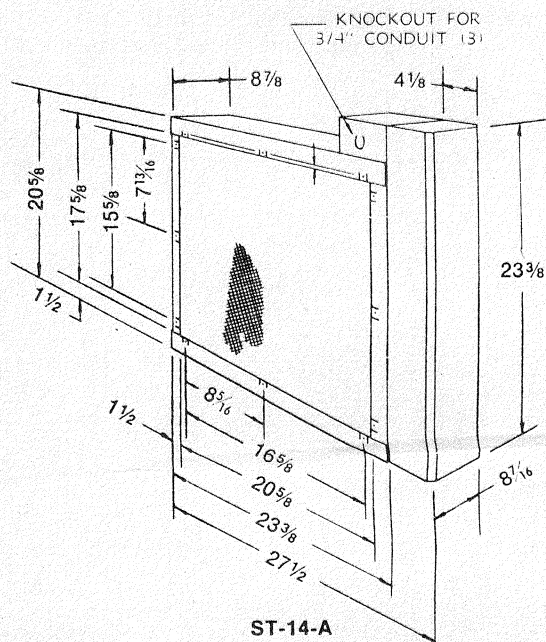
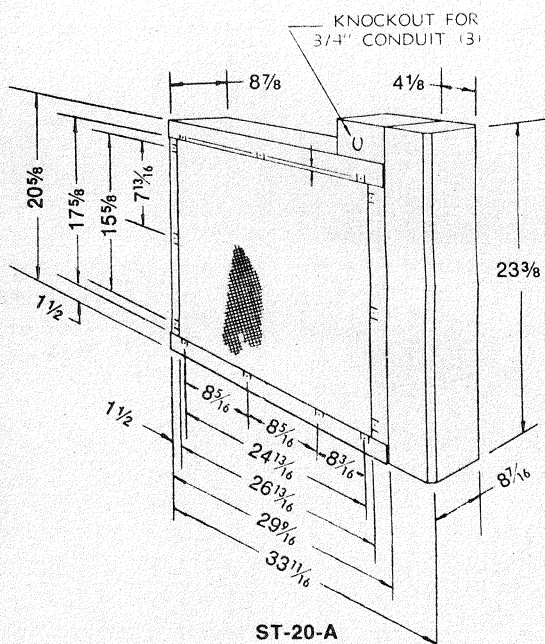


FIG. 16—HIGH VOLTAGE TRANSFORMER CHECK-OUT

5. Momentarily touch the red transformer lead to the yellow transformer lead, if an arc approximately $\frac{1}{4}$ " is not drawn replace the transformer. (Fig. 16).
6. If an arc is drawn replace the entire high voltage component board.
7. The high voltage board is a solid state component. Do not attempt to replace individual components. The entire board must be replaced.



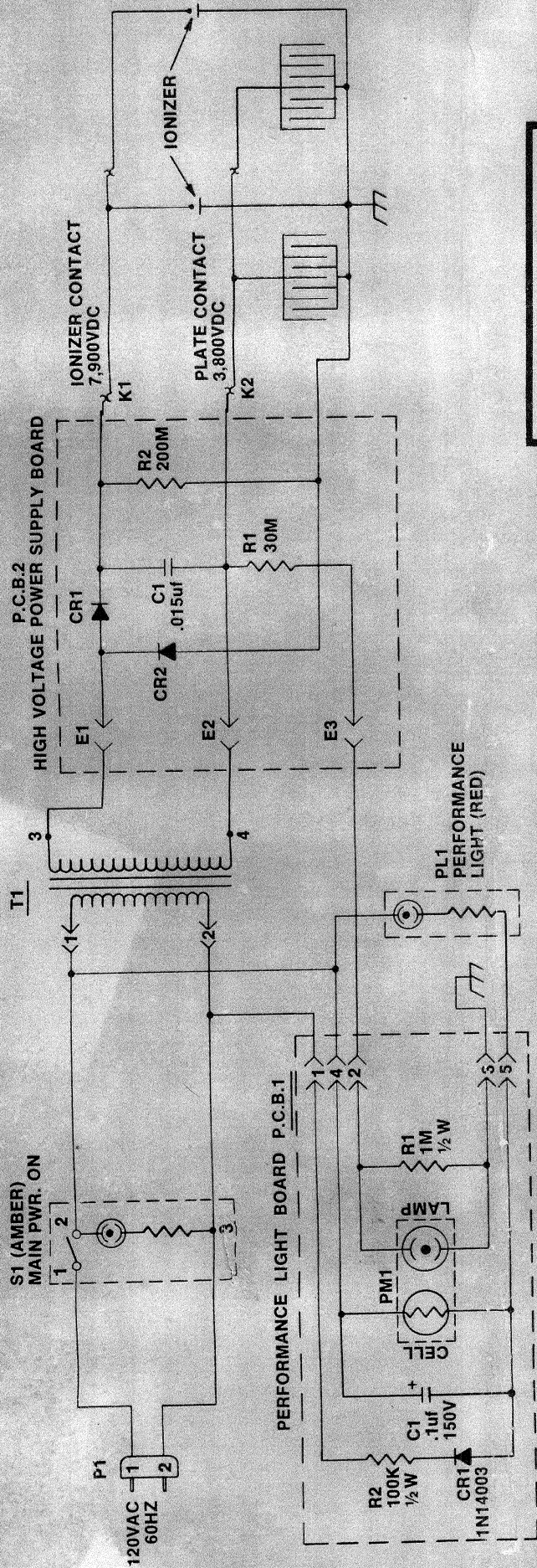
ST-14-A



ST-20-A

FIG. 17

ELECTRICAL/MECHANICAL SPECIFICATIONS



WIRING DIAGRAM

FIG. 18

LIMITED WARRANTY

PARTS GUARANTEE TO ORIGINAL PURCHASER

All Electro-air Slim Twin electronic air cleaners are guaranteed to the original purchaser against defects in materials and workmanship for two years from date of manufacture. The electronic air cleaner must be installed by a competent heating and/or air conditioning contractor, operated within their listed capacity, and not moved from the original installation site. NO OTHER GUARANTEE, WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY, APPLIES. No employee, agent, dealer, or other person is authorized to give any guarantees on behalf of Electro-air.

Return any defective part, freight prepaid, to your Electro-air dealer or distributor and he will give you a replacement at no charge. Electro-air's liability is limited to replacement of defective parts and does not include the cost of labor, other expenses in servicing the unit, or incidental and consequential damages.

Continuous product improvement is a policy of this manufacturer. All models and specifications are subject to change without notice.