

# Honeywell

THE F50 ELECTRONIC AIR CLEANER PROVIDES ALL THE COMPONENTS NEEDED TO ADD ELECTRONIC AIR CLEANING TO A FORCED AIR HEATING OR COOLING SYSTEM.

THE AIR CLEANER IS MOUNTED IN THE RETURN AIR DUCT TO REMOVE AIRBORNE PARTICLES SUCH AS DUST, SOOT, POLLEN, BACTERIA, AND TOBACCO AND COOKING SMOKE FROM THE AIR CIRCULATING THROUGH IT.

□ The F50 includes a cabinet which mounts in the duct, two electronic cells, a high voltage power supply, a junction box, two protective screens, and an access door.

□ The F50A power supply and junction box are mounted on top of the cabinet.

□ The F50B power supply and junction box are connected to the cabinet by a flexible conduit. This allows the cabinet and electronic cells to be mounted in a relatively inaccessible or restricted location and, at the same time, keeps the power supply in a location convenient for control and indication.

□ Efficiency ranges (see curves on page 2) are measured by the National Bureau of Standards Dust Spot Method using atmospheric dust, and American Society of Heating, Refrigerating and Air Conditioning Engineers Standard 52-68.

□ High voltage power supply is self-regulating, so performance is not affected by moderate fluctuations in line voltage.

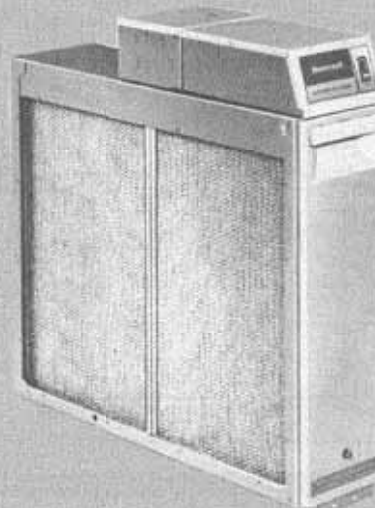
□ Opening cabinet door shorts out high voltage.

□ Power supply requires no fusing or additional interlocks to protect either personnel or equipment. Even a dead short across the high voltage output will not damage the power supply.

□ Electronic cells may be installed for airflow in either direction.

H.A.  
REV. 7-75 (.087)

## ELECTRONIC AIR CLEANER



## F50A,B

Residential Div. Form Number

60-2067-5

# SPECIFICATIONS

## MODELS:

F50A Electronic Air Cleaner—includes cabinet, access door, power supply, junction box, 2 electronic cells, and 2 protective screens.

F50B Electronic Air Cleaner—includes cabinet, access door, power supply, junction box, 2 electronic cells, 2 protective screens, remote mounting bracket, and 10 foot [3 meter] flexible conduit.

## ELECTRICAL RATINGS:

Voltage and Frequency—separate models for 120V, 60 Hz; 240V, 60 Hz; and 220/240V, 50 Hz.

Current—0.4 amp at 120V, 60 Hz.

0.2 amp at 240V, 60 Hz.

0.2 amp at 220/240V, 50 Hz.

Power Consumption—50 watts maximum.

## UNDERWRITERS LABORATORIES INC. LISTED:

File No. E30954, Guide No. AGGZ.

## CANADIAN STANDARDS ASSOCIATION CERTIFIED:

F50A,B—File No. LR19060—L;

F50A—File No. LR20633—L.

## TEMPERATURE RATINGS:

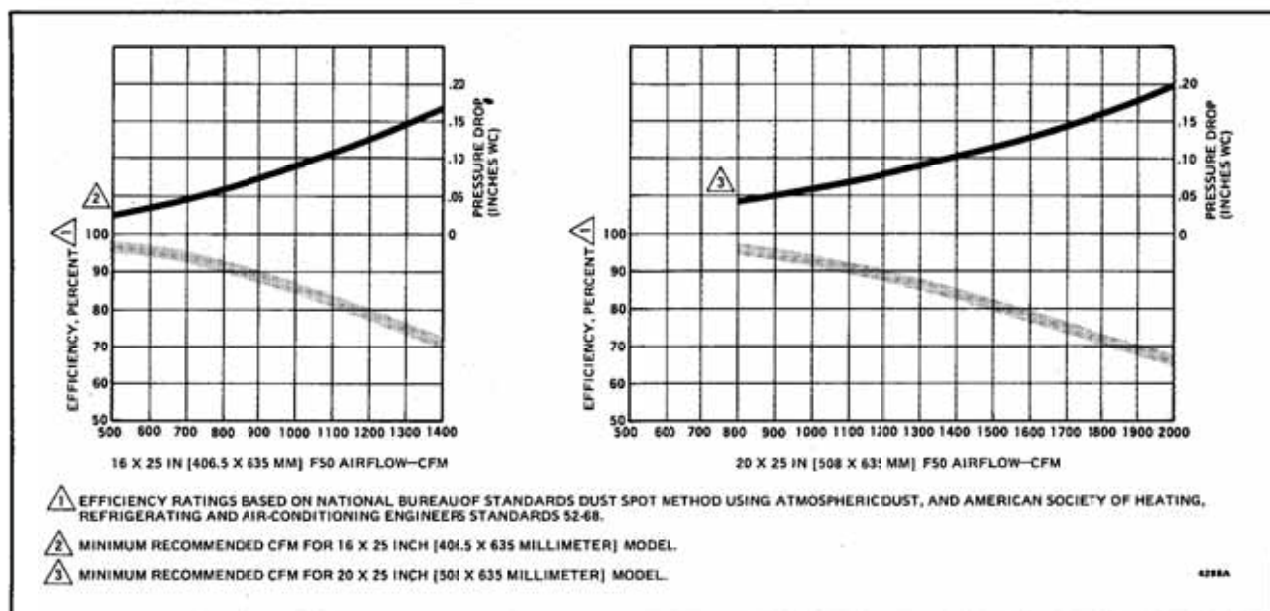
Operating Ambient—40 to 125 F [4 to 52 C].

Temperature of Airflow Through Cells—40 to 125 F [4 to 52 C].

Maximum Cell Washing Temperature—220 F [104 C].

Storage and Shipping (entire unit)—minus 40 to plus 140 F [minus 40 to plus 60 C].

## CAPACITY AND EFFICIENCY:



(continued on page 3)

# ORDERING INFORMATION

WHEN ORDERING REFER TO THE TRADELINE CATALOG OR PRICE SHEETS FOR COMPLETE ORDERING SPECIFICATION NUMBER, OR . . .

SPECIFY—

1. MODEL NUMBER.
2. SIZE, 16 X 25 OR 20 X 25 INCHES [406.5 X 635 OR 508 X 635 MILLIMETERS].
3. VOLTAGE AND FREQUENCY.

ORDER FROM—

1. YOUR USUAL SOURCE, OR
2. HONEYWELL  
1885 DOUGLAS DRIVE NORTH  
MINNEAPOLIS, MINNESOTA 55422  
(IN CANADA—HONEYWELL CONTROLS LIMITED  
740 ELLESMERE ROAD  
SCARBOROUGH, ONTARIO)  
INTERNATIONAL SALES AND SERVICE OFFICES  
IN ALL PRINCIPAL CITIES OF THE WORLD.



WEIGHT:

	16 X 25 IN. MODEL (LB)	406.5 X 635 MM MODEL (KG)	20 X 25 IN. MODEL (LB)	508 X 635 MM MODEL (KG)
Electronic Cell (each)	8	3.6	9-1/2	4.3
Installed F50A (cells included)	41	18.6	46	20.9
F50A Shipping Weight	49	22.2	54	24.5
Installed F50B (cells included)	45	20.4	50	22.7
F50B Shipping Weight	53	24	59	26.8

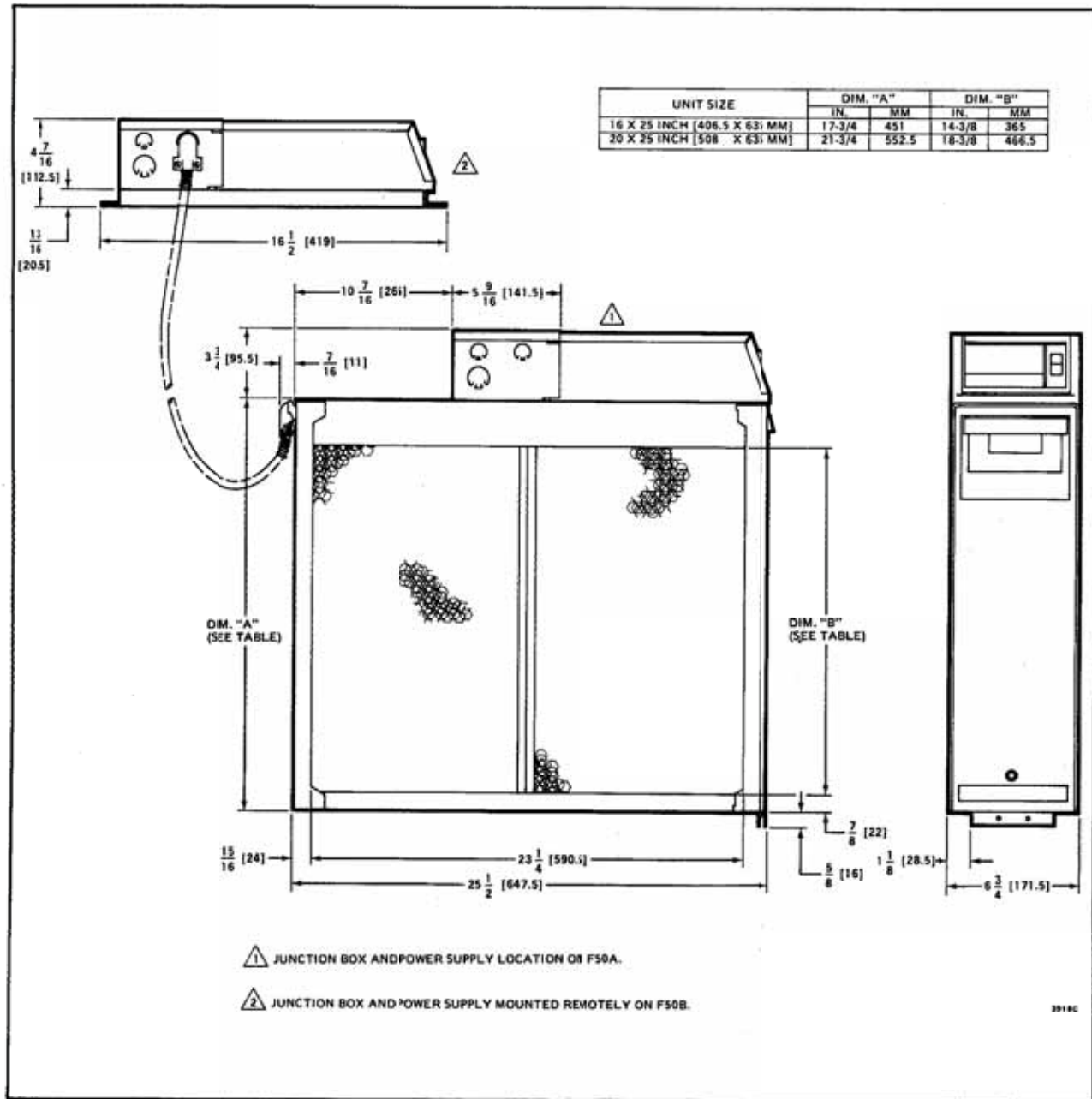


FIG. 1—INSTALLATION DIMENSIONS, IN INCHES [MILLIMETERS SHOWN IN BRACKETS], OF THE F50 ELECTRONIC AIR CLEANER.

## GENERAL INFORMATION

### UNPACKING

All components of the F50 Electronic Air Cleaner are packed in a single carton. After opening the carton, be sure to inspect all packing materials before discarding.

### APPLICATION

The F50 should be installed where all of the air circulated by the system will pass through it. The best location is in the return air duct close to the blower compartment. This location provides the most even airflow distribution across the face of the electronic cells and also allows the air cleaner to keep the blower and motor clean. Even more important, this will keep the the evaporator coil clean in a cooling system. Turning vanes are required if an abrupt transition or turn in the duct is adjacent to the electronic air cleaner.

When it is not possible or economically feasible to mount the air cleaner in the return duct, a discharge duct installation may be considered. When planning such an installation, give special consideration to the following factors.

1. Even distribution of airflow across the electronic cell may be more difficult to achieve. Use turning vanes and transitions where necessary.

2. If at all possible, put the air cleaner upstream from the coil in a cooling system. The electronic air cleaner will help to keep the coil clean, reducing maintenance costs. Also, air coming off a coil will frequently be near 100 percent relative humidity.

3. The airflow temperature must be within 40 to 125 F [4 to 52 C].

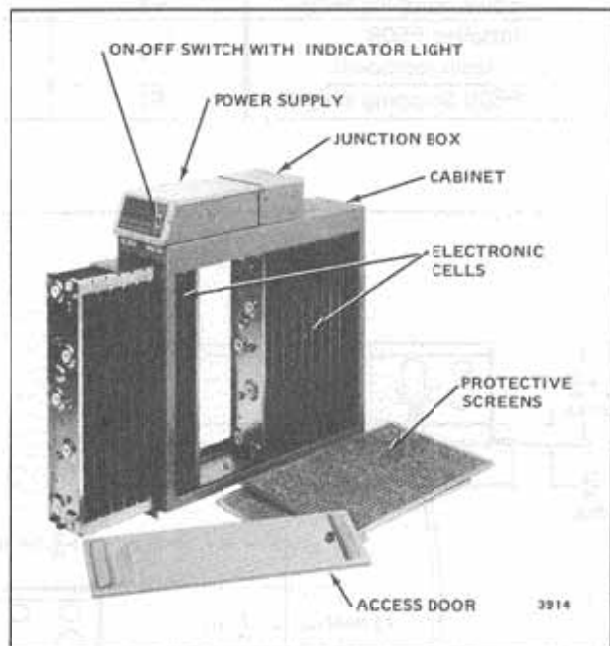


FIG. 2—COMPONENTS OF THE F50 ELECTRONIC AIR CLEANER.

## PLANNING THE INSTALLATION

### LOCATION

Because air handling systems vary greatly in arrangement and style, factors such as accessibility, ambient temperature ratings, transitions, and other requirements must be carefully considered.

The unit must be readily accessible for periodic inspection and cleaning of the protective screens and electronic cells to maintain maximum efficiency and trouble-free operation. A minimum of 13 inches [330 mm] of clear area should be left in front of the F50 for cell and protective screen removal.

Access to the junction box and power supply is gained from the top of the unit. Leave sufficient room above the power supply so that the components can be serviced with the unit in operation.

The air cleaner must be installed where the temperature will not exceed the ratings given in the SPECIFICATIONS section.

### AIR CONDITIONING

Whenever possible, install the F50 upstream of the cooling coil (see GENERAL INFORMATION).

### HUMIDIFIERS

Location of the system humidifier is important to the operation of the air cleaner.

When an evaporative type humidifier is used, it may be installed between the furnace warm air duct and the return air duct without affecting the electronic air cleaner.

An atomizing type humidifier should be installed downstream from the air cleaner. If the atomizing type humidifier is installed upstream, high humidity, salts and minerals may decrease the efficiency of the electronic cell and cause service problems.

If the atomizing type unit must be used upstream from air cleaner, the following precautions should be taken.

1. It must be installed as far from the air cleaner as possible.

2. A standard, disposable furnace filter should be installed between the humidifier and the air cleaner to trap water droplets and mineral salts.

3. The electronic cell must be washed frequently to prevent a mineral deposit buildup.



## OUTDOOR AIR

When outdoor air is added to the return air duct, sufficient heat must be added to maintain the return air temperature at 40 F [4 C] minimum. Lower temperatures can cause ionizer wire failure under certain conditions. Two methods are recommended—

1. Mixing baffles or vanes. When outdoor air is added, make certain that it is far enough ahead of the air cleaner to be mixed and warmed properly. If not, baffles must be installed to force mixing of the air.

2. Preheat coil. If a large amount of outdoor air is used, it must be heated. A thermostat should be used to control the heating medium (such as a strip heater or hot water coil).

## REMOVE FILTER AND CLEAN BLOWER COMPARTMENT

Before starting installation, remove and discard the old filter (if used). Thoroughly clean the blower compartment. The air cleaner cannot remove dirt from the blower chamber and distribution ducts.

## ACTIVATED CARBON FILTER

An activated carbon filter may be added to an air handling system to remove some gaseous (nonparticulate) contamination from the circulating air. A common residential application is the removal of odors. Normally an air cleaner does not remove odors; the activated carbon filter will. Precautions must be taken to assure that the high voltage power in the electronic air cleaner does not contact the carbon filter. Some carbon filters are combustible and contact with high voltage could result in smoke or fire.

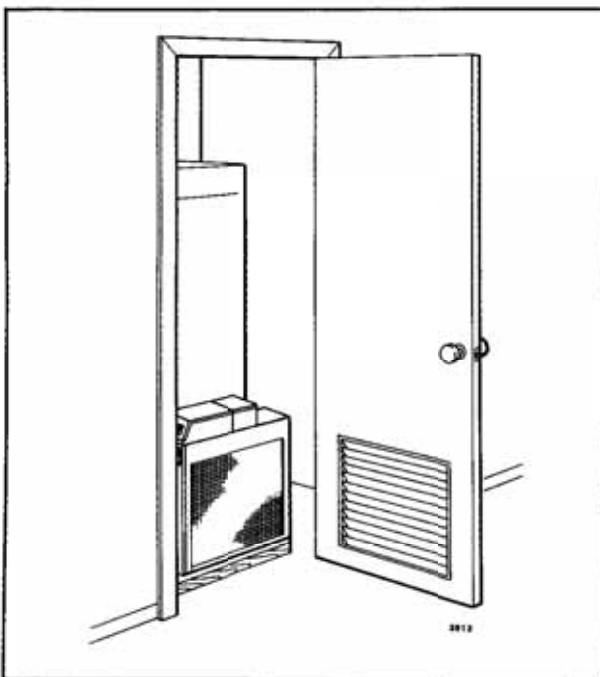


FIG. 4—CLOSET INSTALLATION. MOUNTED VERTICALLY ON FURNACE BETWEEN FURNACE AND LOUVERED CLOSET DOOR OPENING.

### CAUTION

Do not install a carbon filter in an upflow system where carbon particles can fall directly into the electronic cells. If a carbon filter is desired and electronic air cleaner contact with carbon particles will be a problem, install a furnace filter between the activated carbon filter and the electronic cells.

## TYPICAL MOUNTING POSITIONS

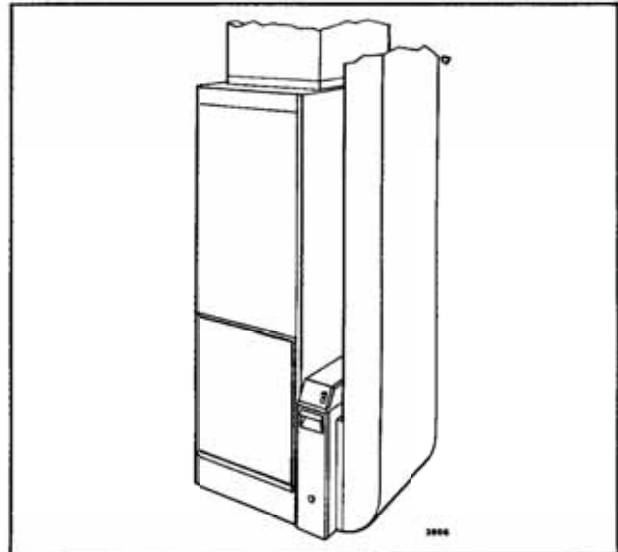


FIG. 3—HIGHBOY FURNACE. SIDE INSTALLATION. AIR CLEANER IS MOUNTED VERTICALLY WHERE RETURN ENTERS SIDE INLET OF FURNACE.

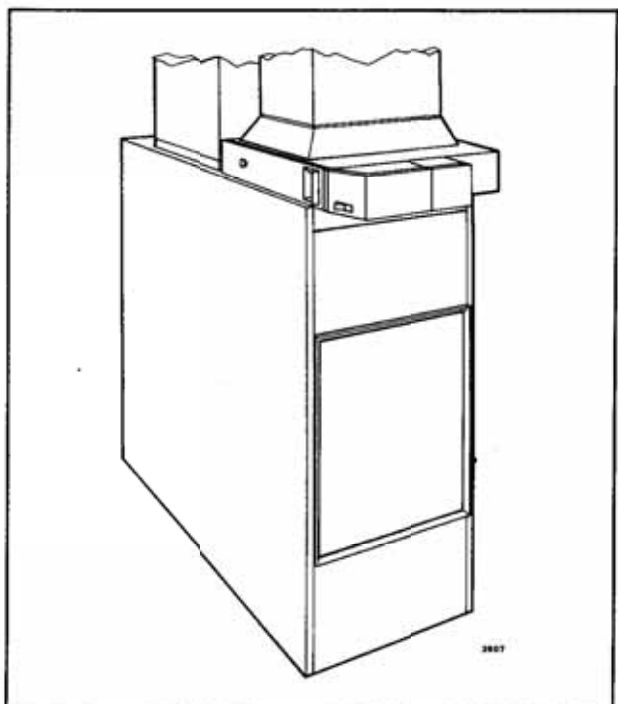
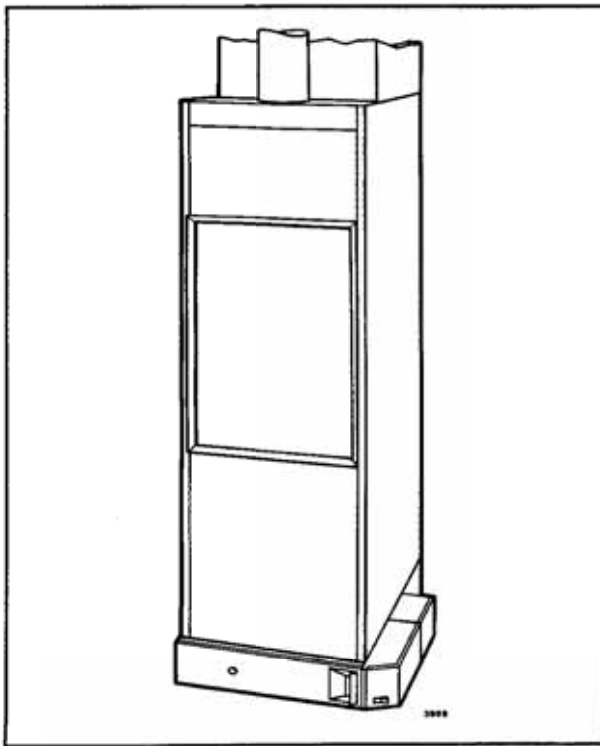
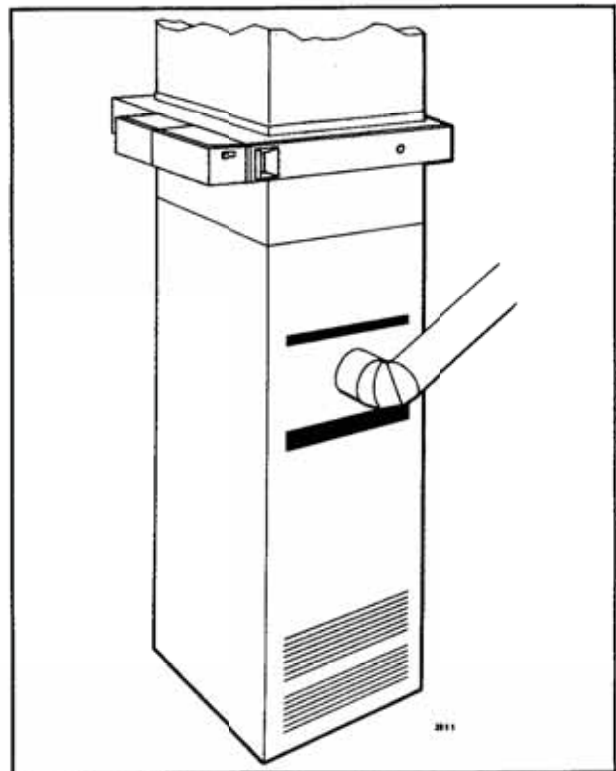


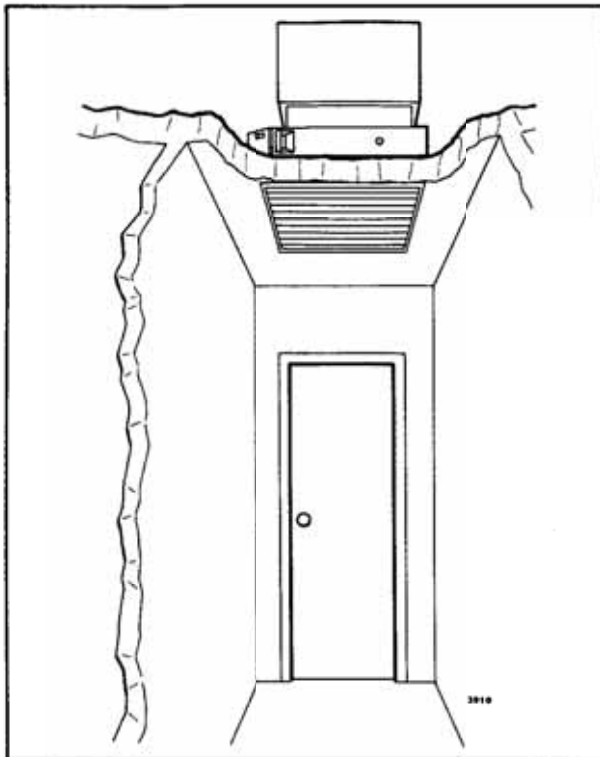
FIG. 5—LOWBOY FURNACE. MOUNTED HORIZONTALLY IN RETURN PLENUM JUST ABOVE FURNACE, OPPOSITE HEATING PLENUM.



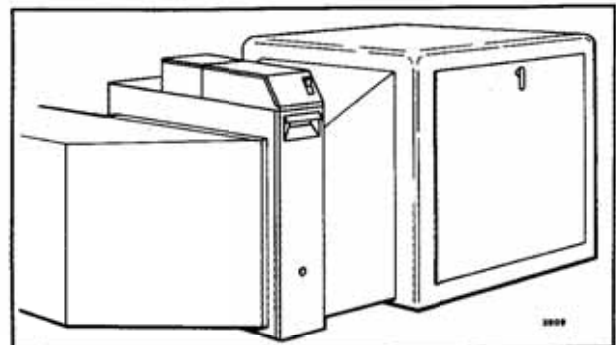
**FIG. 6—HIGHBOY FURNACE. INSTALLATION BENEATH FURNACE. UNIT MOUNTS HORIZONTALLY, WHERE RETURN ENTERS FROM BELOW. RAISE FURNACE AND INSTALL BENEATH BASE. THE CABINET WILL EASILY SUPPORT THE WEIGHT OF A FURNACE AND AIR CONDITIONING COIL.**



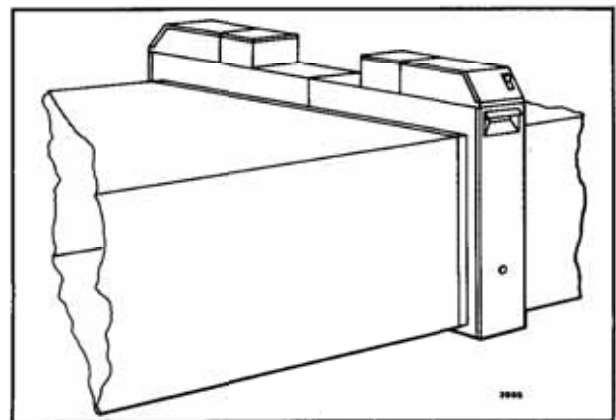
**FIG. 8—COUNTERFLOW FURNACE. MOUNTED HORIZONTALLY IN RETURN DUCT OR PLENUM, JUST ABOVE FURNACE.**



**FIG. 7—CENTRAL FAN INSTALLATION. MOUNTED HORIZONTALLY IN CENTRAL RETURN DUCT.**



**FIG. 9—HORIZONTAL FURNACE. MOUNTED VERTICALLY IN THE RETURN DUCT, NEAR FURNACE.**



**FIG. 10—TWO OR MORE F50 ELECTRONIC AIR CLEANERS MAY BE USED IN HIGH CAPACITY SYSTEMS.**

# INSTALLATION

## CAUTION

1. Installer must be a trained, experienced serviceman.
2. Disconnect power supply before beginning installation.
3. Conduct a thorough checkout after installation is complete.

## SHEET METAL INSTALLATION

The electronic air cleaner is adaptable to all forced air furnace or cooling systems used in residential work—whether on new or existing installations.

## TRANSITIONS

If the air duct does not fit the air cleaner cabinet opening:

1. Gradual transitions are recommended to reduce air turbulence through cleaner and to increase efficiency (Fig. 11).
2. Not more than 20 degrees (about 4 in. per running foot [100 mm per 300 linear mm]) of expansion should be used on each side of a transition fitting.

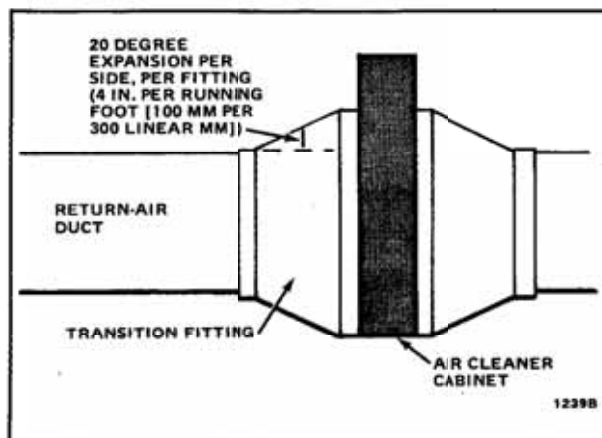


FIG. 11—WHEN NECESSARY, USE GRADUAL TRANSITIONS IN DUCT SIZE TO PREVENT EXCESSIVE TURBULENCE.

## TURNING VANES

If the air cleaner is installed adjacent to an elbow or angle fitting, add turning vanes inside the angle to improve the air distribution across the face of the air cleaner (Fig. 12).



FIG. 12—TURNING VANES INSTALLED IN A BEND HELP TO DISTRIBUTE THE AIRFLOW EVENLY OVER THE FACE OF THE ELECTRONIC CELL.

## OFFSET

If duct connection to furnace allows less than 7 inches [178 mm] for mounting air cleaner cabinet, shorten the lateral trunk or attach an offset to the elbow (Fig. 13).

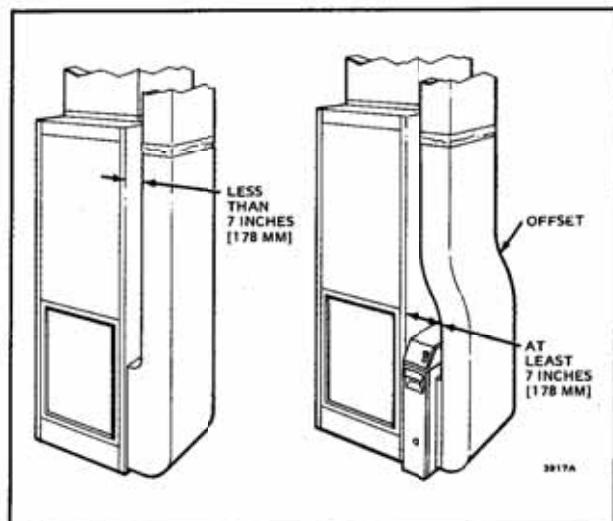


FIG. 13—TYPICAL USE OF DUCT OFFSET TO MATCH AIR CLEANER OPENING.



## INSTALLING THE CABINET

The following steps describe a typical "side" installation on an existing system with a highboy furnace. Alternate procedures to handle variations are also noted. Adaptations may be necessary where you encounter unusual job requirements.

### STEP 1

Temporarily place the cabinet on the floor to help visualize the plan of installation. If a horizontal installation, lay cabinet on its side. Insert and remove each component to better visualize the relative location of all parts of the unit.

Bear in mind the air cleaner's dimensions (Fig. 1), clearance, and accessibility before selecting the location.

The turning vanes, necessary for this installation, are fabricated in the shop, and installed in the 90 degree transition elbow that attaches to upstream side of air cleaner cabinet.

### STEP 2

Attach the air cleaner cabinet securely to the furnace inlet. It can be attached directly, as shown, or a starting collar can first be fitted in the furnace inlet. A butt or slip joint can be used. Structural characteristics of the furnace and space limitations will determine which procedure to take.

Use blocks under cabinet, if necessary, for rigid mounting. A mounting foot on the cabinet hinge plate provides the minimum 5/8 inch [16 mm] clearance for all installations.

#### INSTALLATION HINT

Use locking pliers to hold the air cleaner cabinet in place while drilling holes for screws or rivets (Fig. 14).

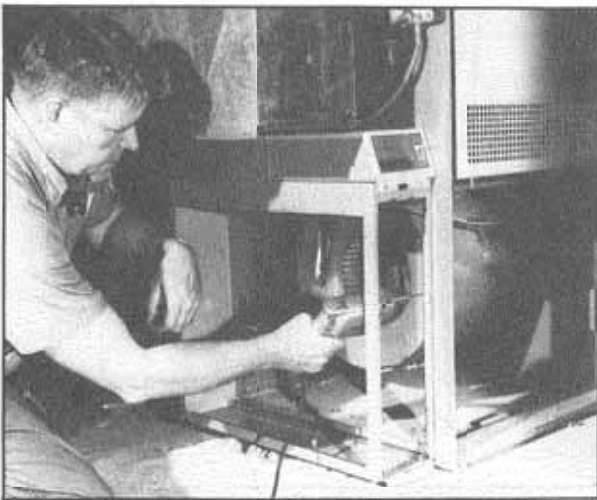


FIG. 14—FASTEN CABINET TO THE FURNACE.

**NOTE:** If the return duct limits access to the top of the junction box, it may be desirable to make field wiring connections before installing the return duct.

### STEP 3

Because this installation uses an abrupt 90 degree transition elbow attached directly to the air cleaner cabinet, two turning vanes are installed in elbow.

These help distribute air equally over the full surface of the upstream side of the air cleaner.

### STEP 4

Attach elbow to upstream side of air cleaner cabinet.

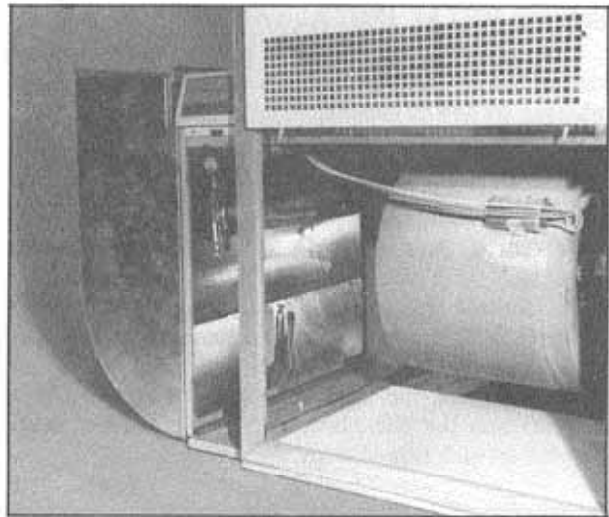


FIG. 15—CONNECT DUCTWORK TO AIR CLEANER.

### STEP 5

Connect the vertical duct section to the elbow. If the vertical drop of the duct is less than 7 inches [178 mm] from the side of the furnace, shorten the lateral trunk or attach an offset fitting to the elbow (Fig. 13). When proper alignment has been made, connect vertical duct to lateral trunk.

## SEAL JOINTS

All joints in the return air system between the air cleaner and the furnace should be sealed to prevent dust from entering the clean airstream.

#### IMPORTANT

If the old filter has not yet been removed, do it now, and clean dirt from fan chamber and return duct.





FIG. 16—COMPLETE THE DUCT INSTALLATION.

#### STEP 6

Crimp the end of the unused (downstream) protective screen guide to prevent incorrect screen installation at a later date.



FIG. 17—CRIMP END OF UNUSED CHANNELS.

#### F50B—MOUNT REMOTE POWER SUPPLY

Select a readily accessible location for the power supply. Consider routing of the flexible conduit when choosing a spot. The remote mounting base should be mounted so that the switch and light on the power supply are accessible and visible.

Use 2 screws to fasten the junction box to the remote mounting base. Plug the power supply into the junction box and secure it with 2 screws.

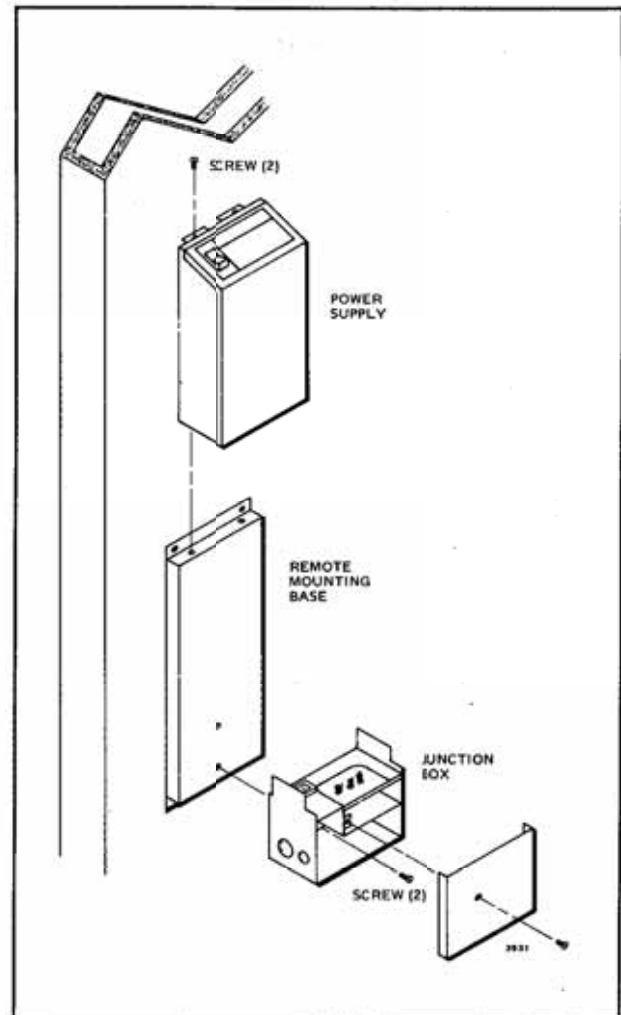


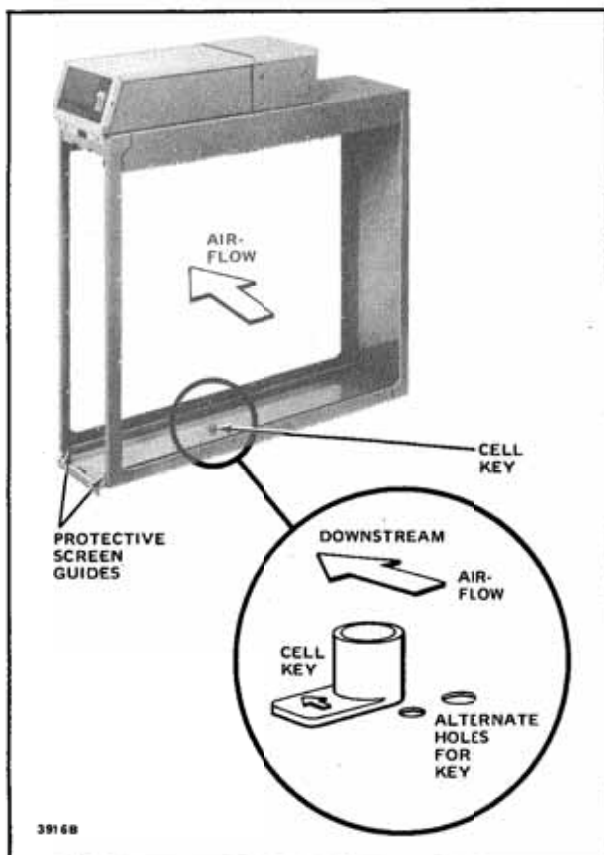
FIG. 18—JUNCTION BOX AND POWER SUPPLY MOUNT ON SPECIAL BASE.

#### ASSEMBLY PROCEDURE

##### AIRFLOW DIRECTION

The F50 is adaptable to airflow in either direction. However, the electronic cell must be inserted into the cabinet in only one direction—to match the direction of airflow. The location of the key on the bottom of the cabinet determines how the cell must be oriented.

The ionizer section of the electronic cell must always be on the upstream side of the cabinet.



**FIG. 19—POSITION OF CELL KEY DETERMINES ORIENTATION OF CELL. INSTALL THE CELL KEY ON THE UPSTREAM SIDE OF THE CABINET.**

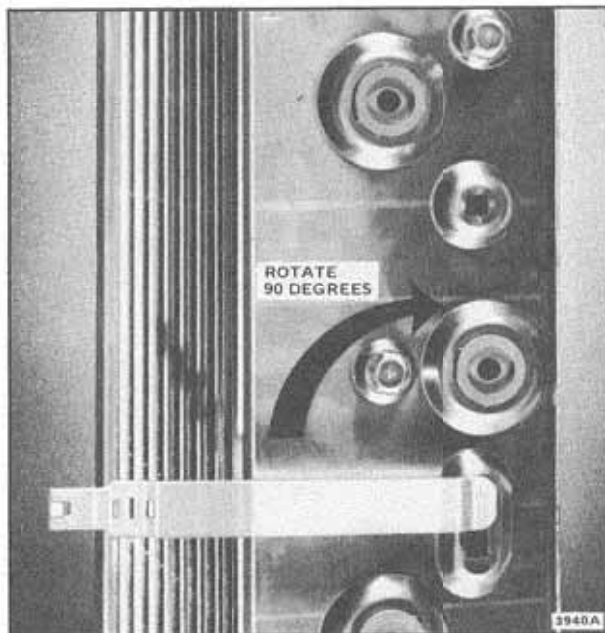
To change the air cleaner for airflow in the opposite direction, proceed as follows:

1. Remove both electronic cells.
2. Remove the screw holding the cell key in place (Fig. 19).
3. Pivot the key so that the screw will fit in the opposite hole. The cell key must be mounted with the arrow pointing in the direction of airflow.
4. Insert the electronic cells. The ionizing section will now be on the upstream side of the cabinet.

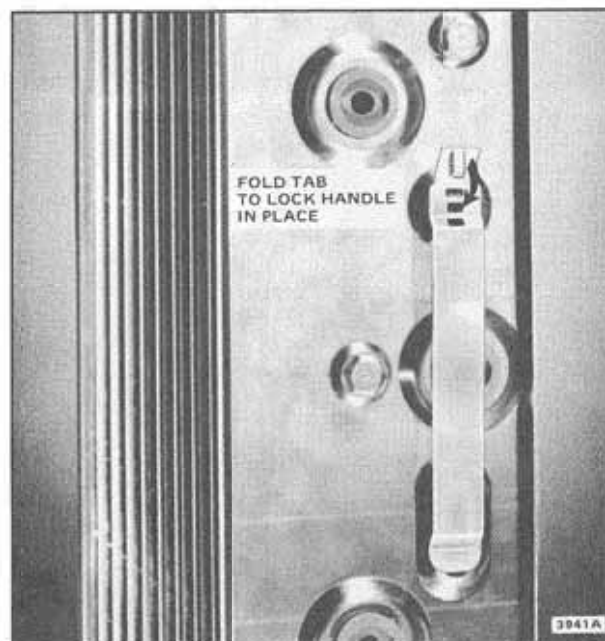
### ATTACH CELL HANDLES

The plastic cell handles must be attached to the outside (closest to access door) end of the cell. The handles are used to remove and carry the cells.

1. Orient the cells as they will be when installed.
2. Install the sliding end of the handle in the rectangular slot on the end of the cell. Hold the handle sideways, insert it into the slot, and rotate it 90 degrees to line up the other tab with the square hole.
3. Insert the other tab into the square hole and lock in place by bending back the wedge part and inserting it into the tab.



**FIG. 20—FASTEN SLIDING END OF HANDLE IN SLOT.**



**FIG. 21—FASTEN FIXED END OF HANDLE TO THE SQUARE HOLE.**



## INSTALL PROTECTIVE SCREENS AND ELECTRONIC CELLS

The electronic cells must be installed with the contacts up (toward the power supply) and with the airflow arrows matching the airflow. The cell key must be positioned to allow the cells to be inserted for proper airflow. See preceding section—Airflow Direction on page 9.

The protective screens slide into the guide on the upstream side of the cell.

After checking to be sure the cells and screens are properly oriented, install the access door. Insert the tab on the bottom of the door into the slot in the cabinet, and then close the door.



FIG. 22—ACCESS DOOR ACTUATES SHORTING INTERLOCK WHEN CLOSED.

### CAUTION

1. Disconnect line voltage before wiring to prevent electrical shock and equipment damage.
2. All wiring must comply with applicable electrical codes and ordinances.
3. Line voltage power supply to this device must coincide with the voltage and frequency stamped on the air cleaner nameplate.
4. The access door is connected to a shorting mechanism that discharges the high voltage power supply when it is opened. Always turn off the switch and open the access door before touching any internal parts.

The F50 Electronic Air Cleaner must be wired to operate only when the system fan is running. This can be done in 2 ways:

1. If the system blower is driven by a single speed, single phase motor, it probably will be most convenient to wire the air cleaner into the fan circuit (Fig. 23). Select an air cleaner to match the supply voltage and frequency.

2. If the system blower is driven by a 3-phase, variable speed, or a 2-speed motor, it is recommended that the air cleaner be controlled by a sail switch mounted in the return air duct. The air cleaner will be energized only when air is being circulated (Fig. 24).

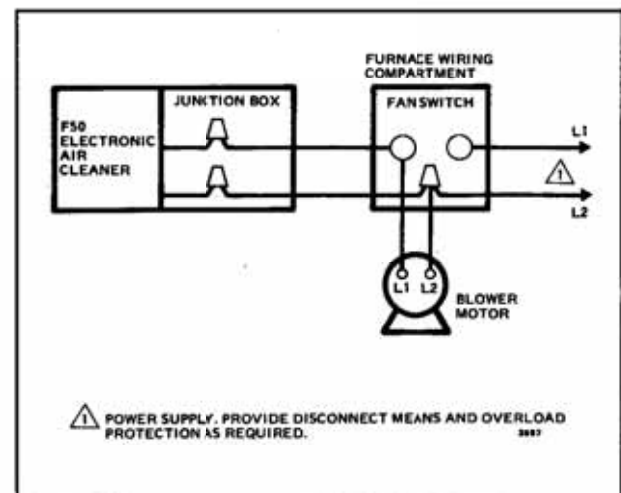


FIG. 23—F50A ELECTRONIC AIR CLEANER WIRED INTO THE SYSTEM FAN CIRCUIT.

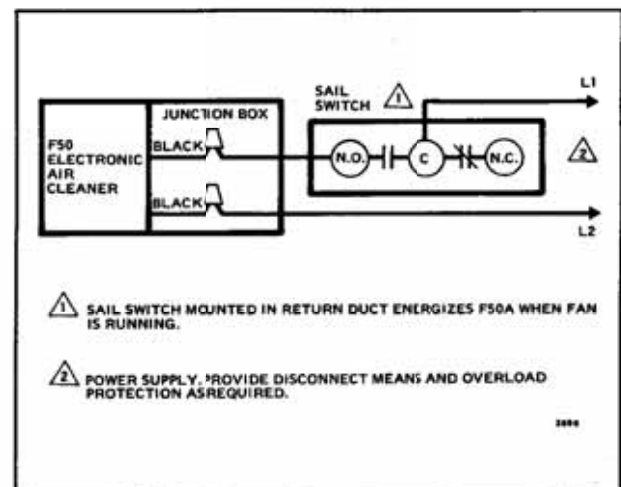


FIG. 24—F50A ELECTRONIC AIR CLEANER CONTROLLED BY A SAIL SWITCH.

# ADJUSTMENTS

## OZONE ODOR

The odor of ozone may be noticeable during operation of an electronic air cleaner. A somewhat higher ozone generation rate during the first week or two of operation may be caused by sharp edges on some of the new high voltage parts. Normal use dulls these sharp edges in a short time.

The odor of ozone is detectable by an average person at levels as low as 0.003 to 0.010 parts per million (PPM). The concentration of ozone produced in a home by an electronic air cleaner ranges from 0.005 to 0.010 PPM. Average concentrations of ozone in the air of major cities range from 0.020 to 0.040 PPM and even higher. This is well above the level produced by an electronic air cleaner.

The U.S. Food and Drug Administration (FDA) has recommended that the ozone concentration indoors shall not exceed .050 PPM. The electronic air cleaner produces only 10 to 20 percent of this maximum safe level.

If desired, the ozone odor can be reduced in one of the following ways.

1. Install an activated carbon filter on the downstream side of the air cleaner (see page 5).

2. Interchange the yellow and blue leads to the resonant winding of the high voltage transformer, reducing the high voltage output. Proceed as follows:

- a. Turn off power.
- b. Open access door on the front of the air cleaner.

### CAUTION

On the F50B, be sure to open the access door before removing the power supply to discharge the electronic cells and power supply capacitors.

Remove the 2 screws holding the power supply to the cabinet (or to the remote mounting bracket) and remove the power supply.

- c. Remove the 2 screws holding the cover on the power supply and take off the top

d. Cut both the blue and yellow wires about 2 inches [51 mm] from the resonant winding terminals. Strip about 1/4 inch [6 mm] of insulation from the ends of the wires.

e. Use a wire nut to connect the blue wire from the transformer to the yellow wire leading to the switch.

f. Use another wire nut to connect the yellow wire from the transformer to the blue wire leading to the resonant capacitor.

g. Tape these connections.

h. Reinstall the power supply box and return the air cleaner to normal operation.

3. The blue and yellow wires can also be switched by unsoldering them from the resonant winding. If this method is selected, use extreme care to avoid melting the coil form or loosening the fine wire from the terminals.

NOTE: Switching these two leads can reduce air cleaning efficiency by 3 to 8 percent, depending on air volume.

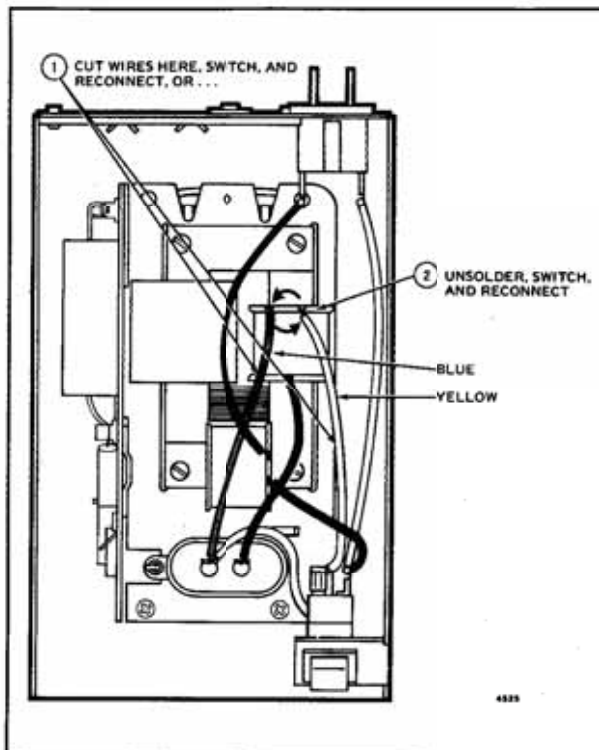


FIG. 25—CHANGES IN RESONANT CIRCUIT TO REDUCE OZONE PRODUCTION.



# CHECKOUT

## IMPORTANT

Before putting the F50 Electronic Air Cleaner into service, check through the following items to be sure it is properly installed.

1. If an atomizing type humidifier is installed upstream from the air cleaner, salts and minerals may decrease the efficiency of the electronic cell and cause service problems. The following precautions should be taken: (a) The humidifier must be placed as far from the air cleaner as possible, (b) A standard furnace filter should be installed between the humidifier and the air cleaner, and (c) The air cleaner cell must be washed frequently to prevent a mineral deposit buildup.
2. If outdoor air is used, care must be taken to prevent direct delivery of cold outside air across the electronic cell. Preheat the air in some manner, or mix with return air.
3. Check over the installation for correct sheet metal and electrical work.
4. Turning vanes should be used in duct elbow to provide even air distribution across cell.
5. When it is necessary to change duct size close to the air cleaner, use gradual transitions to reduce turbulence.

## GENERAL COMPONENT INSPECTION

1. Open the access door and check for proper contact of the electronic cell with the power supply electrical connectors.

2. Check for proper orientation of the electronic cells and protective screens. Airflow arrows must point downstream (Fig. 19). Protective screens must be on the upstream side of the electronic cells. Cell handles should be on the outside of the cells.

3. Be sure that the electronic cells and protective screens are clean, dry, and free of foreign objects.

## CHECK JUNCTION BOX CONNECTIONS

Check the junction box connections to make certain they are correct and complete. Refer to the hookup diagrams on page 11.

## CHECK ELECTRONIC CELLS AND POWER SUPPLY

With all components in place and the access door closed, energize the system fan and turn on the electronic air cleaner.

The indicator light in the ON-OFF switch should be on whenever the air cleaner is energized. This shows that the high voltage power supply is working properly. If it is off, refer to the ELECTRICAL TROUBLESHOOTING section for additional checks.

When pushed, the TEST BUTTON on the front of the access door shorts the hot side of the cell's collector section to ground.

With the air cleaner energized, pushing the TEST BUTTON should produce a snapping noise in the electronic cell. One or more snapping arcs may be heard. This indicates that the air cleaner is working properly.

If no snapping noise is heard refer to the ELECTRICAL TROUBLESHOOTING section for additional checks.

# SERVICE

## CAUTION

Use care when handling the electronic cells. The metal edges can be sharp. Use of rubber gloves is suggested during tub washing. The detergent is very strong and the water should be hot. When washing in a dishwasher, the cell may be hot if removed during or right after the dry cycle.

## WASHING THE ELECTRONIC CELLS

For optimum performance, the electronic cells and protective screens must be washed regularly to remove the dirt cleaned from the air.

The required frequency of cell washing varies from one installation to another, depending on a large number of variables. In nearly all cases, the correct period is between 1 and 6 months. Where infiltration and internal generation of particulate contamination is light, as in a smaller home occupied by one to three non-smokers, washing every 5 or 6 months may be adequate. With a heavy dirt loading of cooking and tobacco smoke, dust, and soot in the air, more frequent washing will be required. A home with several active children, heavy

cooking and laundry, and frequent entertaining may cause cells to load and require washing monthly.

If a very heavy buildup of dirt is found on the collector plates, or the cell is still not clean after washing, it should be washed more frequently. On the other hand, if only light dirt loading is noticed, the period between washings can probably be lengthened.

The WASH REMINDER SCHEDULE should be posted in a prominent place near the electronic air cleaner where it will be seen regularly. Use it to record the date on which the cells are washed and to establish the correct schedule for cell washing.

The electronic cells and protective screens may be washed in a number of different ways, depending on homeowner preference. Perhaps the most convenient way is in an automatic dishwasher. They may also be washed manually or with the hand sprayer at a do-it-yourself coin-operated car wash.

## CAUTION

Before removing the electronic cells, be sure to de-energize the system fan to avoid any possibility of injury to your hands from the moving fan belt.



## AUTOMATIC DISHWASHER

The easiest and most convenient way to remove the accumulated dirt from the electronic cells is to wash them in an automatic dishwasher. The dishwasher automatically provides the correct cycle of wash, rinse, and dry to clean the cell. The cell has been designed to withstand the high temperatures encountered in a dishwasher.

1. Take out the protective screens and remove the lint from them by using a vacuum, rapping them on a sheet of newspaper, or spraying with a garden hose. The protective screens may then be washed at the same time as the electronic cells, but they should be placed where they will not deflect the water spray away from the electronic cells.

2. Place the electronic cells on their sides with the ionizer section down (airflow arrows pointing up), on the lower rack of the dishwasher.

NOTE: In some dishwashers it may be necessary to remove an upper rack to allow both cells to fit properly into the dishwasher. If both cells do not fit properly at one time, wash each cell separately.

### CAUTION

Use care to avoid damage to the collector plates when placing the cells in the dishwasher.

3. Use detergent in accordance with the dishwasher manufacturer's instructions.

4. Allow the dishwasher to run through its complete wash cycle. You may also allow it to run through the complete dry cycle, although this is not necessary.

### CAUTION

The electronic cell will be very hot at the end of the dishwasher's cycle. Allow it to cool or wear protective gloves when handling it. Hot water may accumulate in the tubes supporting the collector plates. Tip the cells so that these tubes will drain.

5. Check the electronic cells for broken wires and bent collector plates. The cells may then be installed in the cabinet and energized. The indicator light may remain off or the test button may not produce a snapping noise during the normal 2 hour drying period. If annoying arcing occurs during this period, the electronic air cleaner may be switched off.

6. With some dishwashers it may be necessary to rerun the complete cycle or the rinse cycle after the cells are removed if the homeowner notices dirt stains or residue inside the dishwasher.

## MANUAL WASHING

The electronic cells may be washed manually by soaking them in a solution of electric dishwasher detergent.

1. Provide a suitable container, large enough to hold one or both of the cells. A large plastic dishpan, trash container, or laundry tub should work well.

2. Select an automatic dishwasher detergent that dissolves readily in hot water. Tests have shown major

brands such as ALL, FINISH, and ELECTRA SOL perform very well. Depending on local water conditions, some brands may form a precipitate or scum. If a noticeable scum floats to the surface, try another brand. The brand that the homeowner finds to give best results in his electric dishwasher will probably give best results in washing the electronic cells.

### CAUTION

Do not splash the detergent solution in eyes, and avoid prolonged contact with skin. Keep detergent and solution out of reach of children.

3. Before placing cells in washing container, pour in the detergent. Use approximately 3/4 of a cup per cell if the container is about the size of the cell, or proportionately more if the container is larger. Add enough very hot water to cover the cell or cells.

4. After the detergent has completely dissolved, place the electronic cell (or cells) in the container.

5. Soak the cells for 15 to 20 minutes, slosh several times, and remove.

6. Next, wash the protective screen by sloshing it several times in the detergent solution. Drain the wash container. The protective screen can be washed off with a garden hose or vacuumed, if more convenient than washing in the detergent solution.

### IMPORTANT

Do not put the electronic cells into the detergent solution after washing the protective screens in it. Lint from the protective screens may get caught in the cells.

7. Rinse the cells and screens with a fine spray.

8. Fill the wash container with clean hot water and soak the cells and screens for 5 to 15 minutes.

9. Remove the cells and screens and let the water drain from them. If the water draining from them feels slippery, detergent still remains. Repeat the rinsing until the water from them no longer feels slippery. Inspect for cleanliness.

10. When both cells and screens have been washed and rinsed, check cells for broken wires and bent collector plates, replace them in the air cleaner cabinet, and return the system to normal operation. No drying period is required.

NOTE: The indicator light may not come on and the test button may not produce a snapping noise during the normal 2 hour drying period. If annoying arcing occurs during this period, the electronic air cleaner may be switched off.

## IONIZING WIRE REPLACEMENT

The fine tungsten ionizing wires, in the charging section of the electronic cell may break or become damaged. Inspect the cell from the upstream side after washing to make sure that none of the wires are broken or out of position. During operation, a broken or deformed wire generally causes a short to ground, possibly with visible arcing or sparking. This condition, or any other short in the ionizing section of the cell, will cause the indicator light to go out.



Broken wires must be replaced as soon as possible. Remove all parts of the broken wire. If necessary, the cell may be temporarily used with one wire missing. See PARTS LIST, page 22, for part number of the replacement wire. Wires come cut to length with eyelets at each end for easy installation in the electronic cell.

1. Use care to avoid damage to the spring connector or other parts of the cell during the installation.

2. Hook one end of the ionizing wire over the spring connector at one end of the cell.

3. Hold the opposite eyelet with a needle-nose pliers and stretch the wire the length of the cell. Depress the opposite spring connector and hook the eyelet over it.

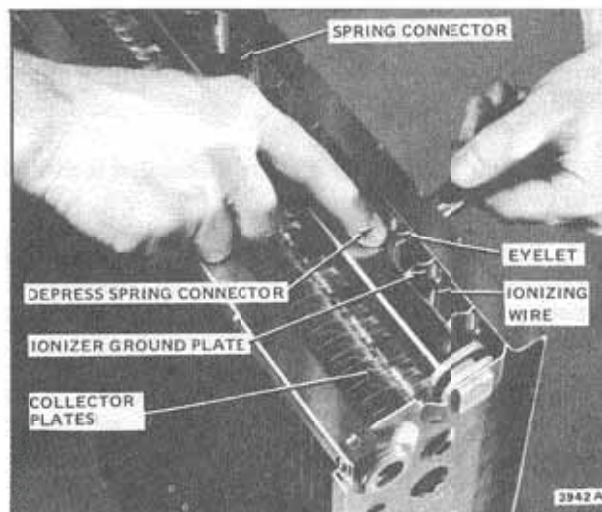


FIG. 26—INSTALLATION OF NEW IONIZING WIRES.

#### F50B—HIGH VOLTAGE FLEXIBLE CONDUIT

If necessary, the flexible conduit connecting the remote junction box to the cabinet can be replaced using the following procedure.

##### CAUTION

Before starting, disconnect power supply to prevent electric shock or damage to equipment.

1. Open the access door and remove the electronic cells and protective screens.

2. Take out the 2 screws holding the contact tray and lower the front edge of the tray to expose the wiring.

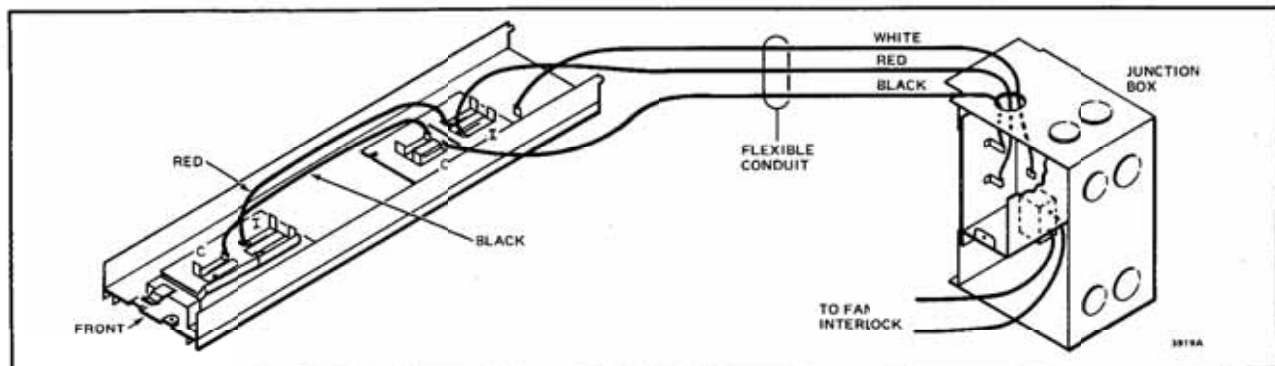


FIG. 28—CONNECTIONS FOR F50B REMOTE POWER SUPPLY.

3. Three wires (red, white, and black) in the flexible conduit connect the contact tray to the remote power supply. Unplug the quick-connects on the 3 wires from the contact tray. Unbolt the conduit connector from the cabinet.

4. Take the cover off the junction box at the other end of the flexible conduit, unplug the 3 high voltage wires, and disconnect the conduit.

5. Bolt the new conduit to the back of the cabinet and to the junction box (Fig. 27).

6. Use the quick-connects on the new wires to make the electrical connections according to Fig. 28.

7. Replace the contact tray and secure with 2 screws. Be careful not to pinch any of the wires when replacing the contact tray.

8. Reinstall the cells, protective screens, and access door; check for proper operation, and return the system to normal operation.

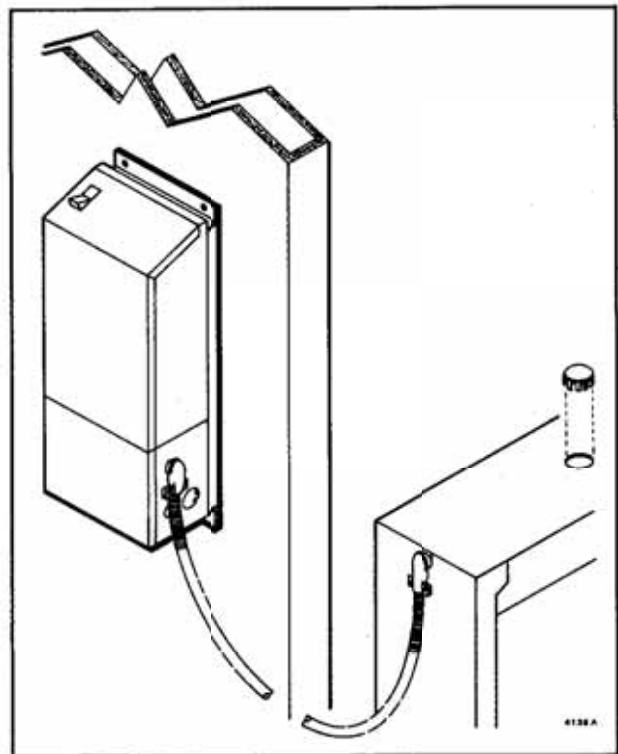


FIG. 27—FLEXIBLE CONDUIT CONNECTS AIR CLEANER CABINET TO REMOTE POWER SUPPLY.

# ELECTRICAL TROUBLESHOOTING

## CAUTION

1. During the troubleshooting procedures, dangerous line voltage circuits are exposed. Use care to avoid the hazard of electrical shock or damage to equipment.
2. Although not lethal, the high voltage output of the power supply can produce a painful shock. Use caution here too.

## TOOLS AND EQUIPMENT

Troubleshooting the F50 can be accomplished with only a few tools.

- Screwdrivers—long shank, plastic or rubber handles; two required for some arc checks.
- Needlenose pliers—for stringing ionizing wires.
- Test Meter — Honeywell W869 Electronic Air Cleaner Test Meter, or
- Simpson 260 with 25 kv dc probe.
- Soldering iron for replacing components.
- Neon test lamp for line voltage.
- A spare silicon diode.

## TROUBLESHOOTING PROCEDURE

The following troubleshooting procedure has been designed to speed the serviceman's work and insure that any malfunction in the F50 Electronic Air Cleaner is quickly detected and properly repaired.

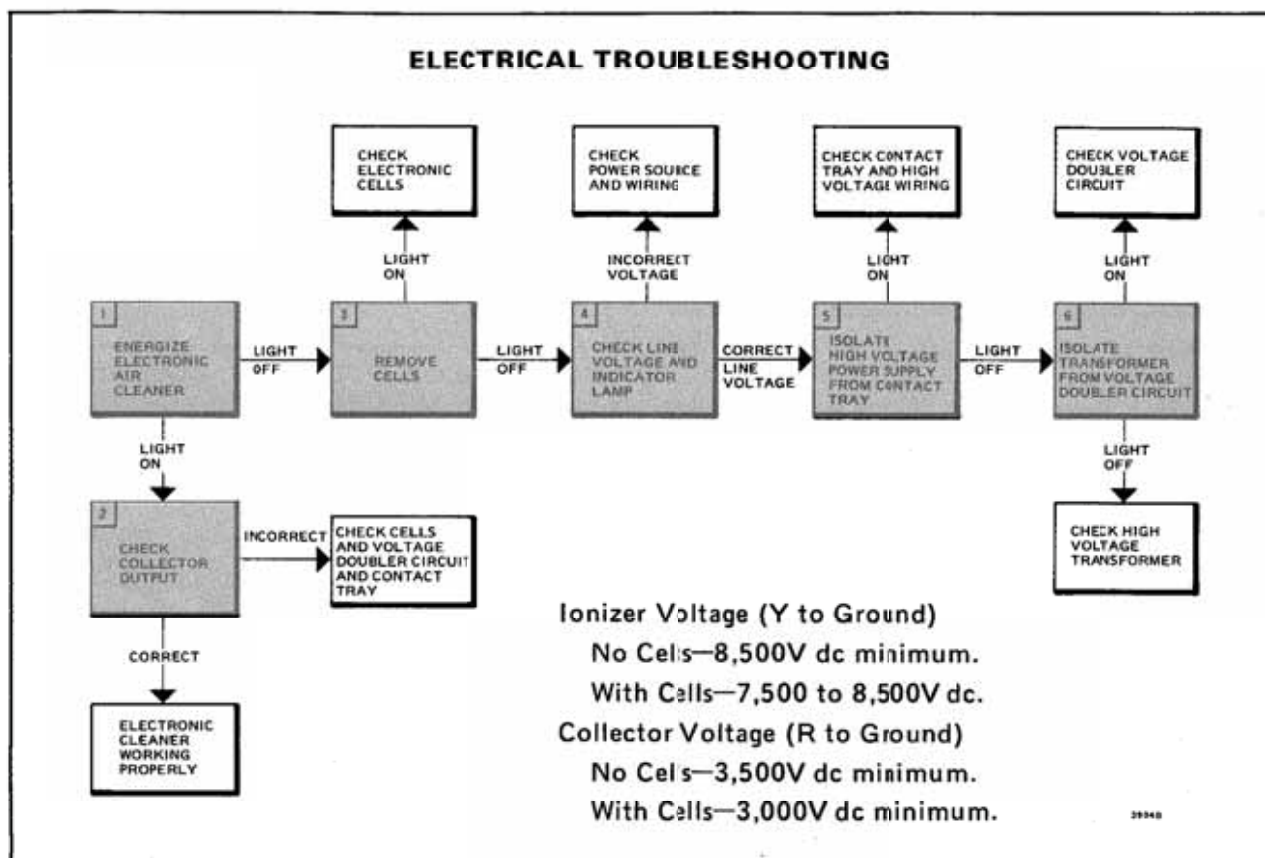
Most of the troubleshooting steps can be performed by observing the indicator light in the ON-OFF switch. This light is powered by the resonating winding on the high voltage transformer and is ON whenever the high voltage transformer is working properly.

This procedure is outlined in the flow chart below. A complete description is provided on the following pages.

The troubleshooting procedure description is divided into two sections:

1. **DIAGNOSTIC CHECKS**—The numbered steps correspond to the numbered steps on the troubleshooting flow chart. Follow this sequence of checks to locate the cause of a failure within the air cleaner.

2. **COMPONENT CHECKS**—Explains how to locate a faulty component within an assembly, or how to prove a component good or bad.





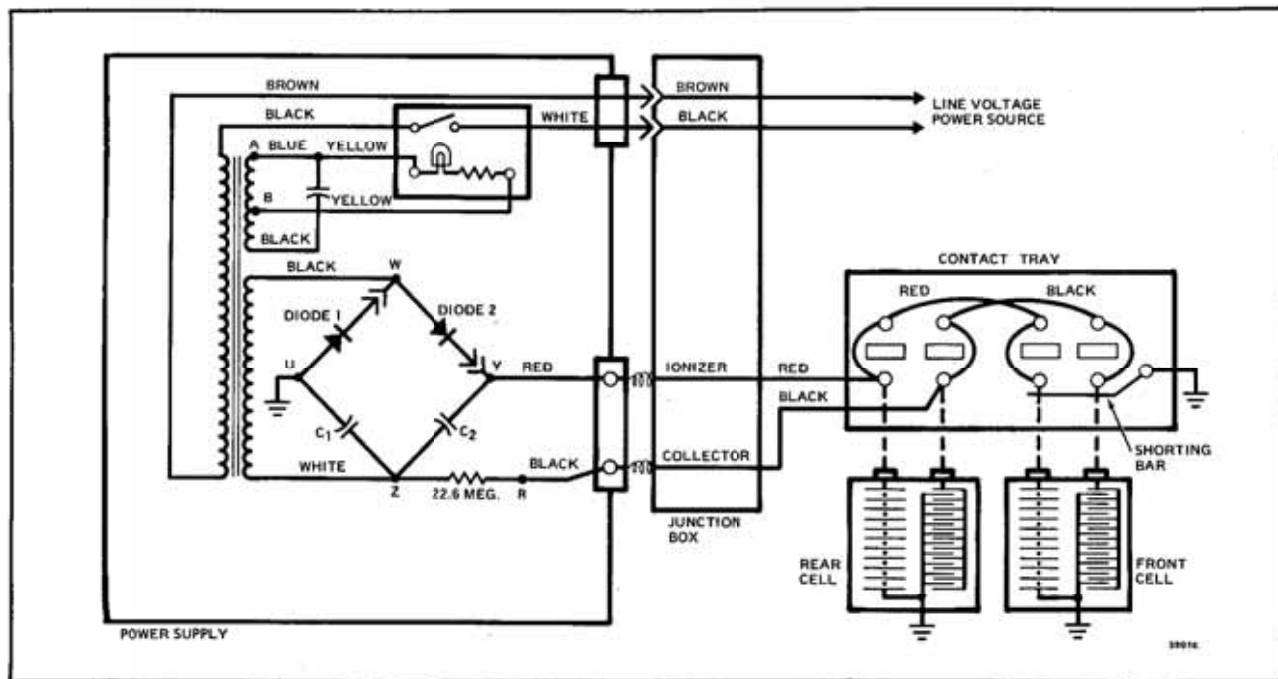


FIG. 29—F50 INTERNAL SCHEMATIC.

## DIAGNOSTIC CHECKS

### 1. ENERGIZE ELECTRONIC AIR CLEANER

- Be sure that the electronic cells and protective screens are clean, dry, and properly installed in the cabinet.
- Energize the electronic air cleaner.
  - Put the F50 switch in the ON position.
  - Energize the blower.
- Check for indicator light operation.
  - If light is OFF, there is a failure in the electronic air cleaner—go to step 3.
  - If the light is ON—go to step 2.

### 2. CHECK COLLECTOR OUTPUT

The TEST BUTTON on the bottom of the air cleaner access door provides a simple, easy-to-use method of checking for correct collector voltage in the electronic cell. When pushed, it shorts from one of the hot collector plates to ground. From the sound of the resulting arc, the serviceman may determine whether or not the high voltage is supplied to the collector.

- Turn on the electronic air cleaner and energize the system fan to power the electronic air cleaner.
- Push TEST BUTTON. Snapping sounds indicate that the air cleaner is working properly.
- If no arcing noise is heard, check for continuity through the resistor, and then check for a failure in the electronic cells, voltage doubler circuit, or contact tray.

### 3. REMOVE CELLS

- Turn off the line voltage disconnect to stop the fan, and remove both electronic cells.
- Close the access door and re-energize the power supply.

- If the light comes on now, check the electronic cells (page 19).

#### CAUTION

Before attempting to remove the power supply or its cover, turn off the power and remove the access door from the cabinet. This will de-energize the power supply and discharge the electronic cells and power supply capacitors.

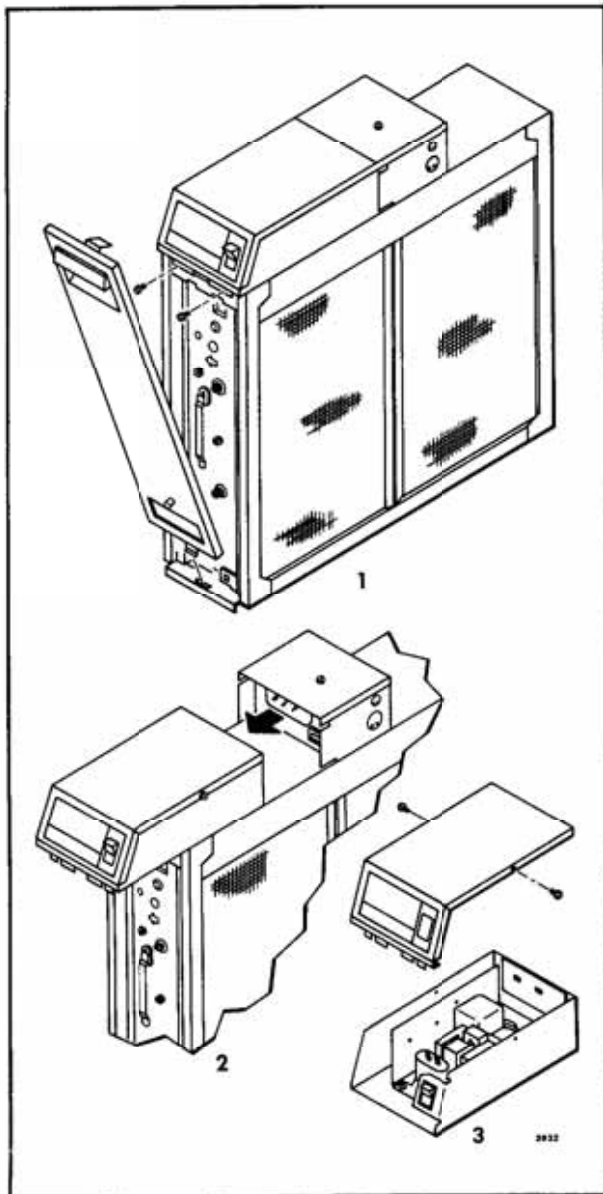
- If the light does not come on, check the line voltage power supply and indicator light, step 4.

### 4. CHECK LINE VOLTAGE POWER SUPPLY AND INDICATOR LAMP

- Open the power supply enclosure as follows:
  - Turn off power.
  - Open the access door and loosen the 2 screws holding the power supply in place.
  - Remove the power supply from the cabinet and take out the two screws that hold the cover on. Remove the cover.
  - Remount the power supply, with the cover off, on the cabinet.

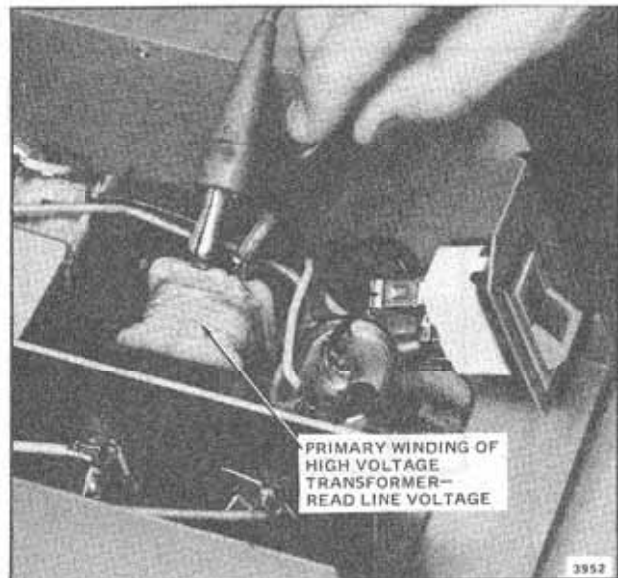
#### CAUTION

When remounting power supply, rest the power supply case on the air cleaner cabinet and push straight toward the junction box. Do not bend spring contacts sideways.



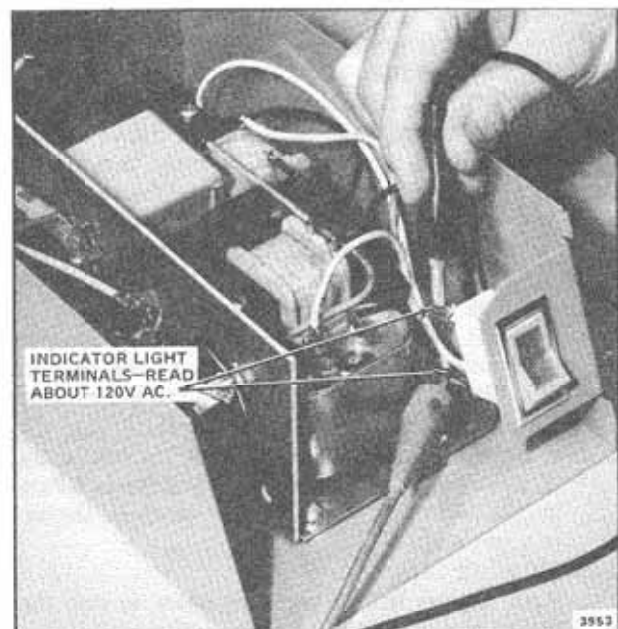
**FIG. 30—DISMOUNT THE POWER SUPPLY TO REMOVE THE COVER.**

- b. Energize the power supply with the access door closed.
- c. Use a neon test light or a voltmeter to check line voltage on the primary of the high voltage transformer.
- d. If correct line voltage is present, continue with the checkout (step 5).
- e. If the correct line voltage is not measured on the primary of the high voltage transformer, check backwards through the switch and wiring to the power source until the problem can be located and corrected.



**FIG. 31—CHECK LINE VOLTAGE WITH A TEST LIGHT OR VOLTMETER.**

- f. Check the voltage on the indicator light.
  - If the voltage is correct (about 120V ac) but the light is out, replace the switch-light assembly.
  - If there is no voltage, or less than 100V ac, continue the checkout (step 5).



**FIG. 32—MEASURE VOLTAGE ON INDICATOR LIGHT.**



## 5. ISOLATE HIGH VOLTAGE POWER SUPPLY FROM CONTACT TRAY

- Be sure power is OFF. Discharge power supply by opening access door.
- Unplug the black wire from the quick-connect at point R and the red wire from point Y on the power supply.
- Re-energize the power supply and observe the indicator light.
  - If the light is on, check for a problem in the contact tray or high voltage wiring.
  - If the light is off, continue with step 6 below.

### CAUTION

Be sure to reconnect these wires before putting the air cleaner back into service.

## 6. ISOLATE TRANSFORMER FROM VOLTAGE DOUBLER CIRCUIT

- Turn off power and discharge power supply.
- Unplug the 2 quick-connectors on the diodes. This disconnects the voltage doubler circuit from the high voltage transformer.
- Energize the power supply.
  - If the light comes on, check for a problem in the voltage doubler circuit (page 20).
  - If the light still does not come on, check for a problem in the high voltage transformer (page 20).

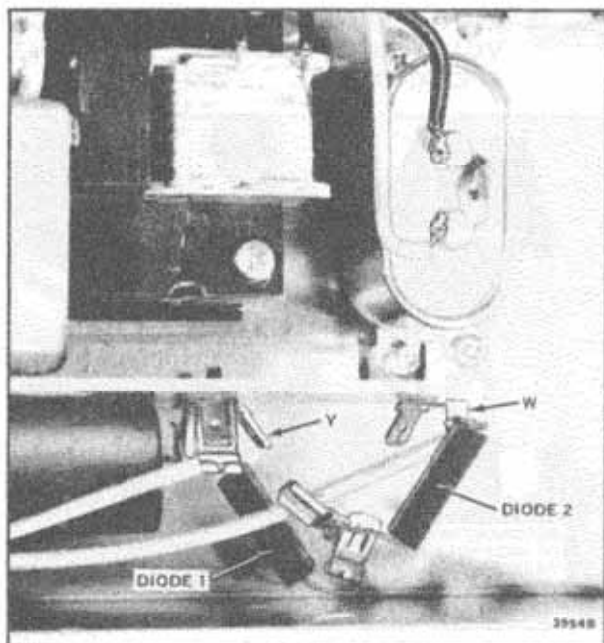


FIG. 33—UNPLUG THE DIODES FROM THE CIRCUIT BOARD.

## COMPONENT CHECKS

### CHECK ELECTRONIC CELLS VISUAL INSPECTION

Carefully examine both of the electronic cells. Look especially for—

- Bent collector plates.
- Broken ionizing wires.
- Dirt accumulation on insulators.
- Contact tabs—ionizer and collector damage.

### CHECK FOR SHORT CIRCUITS

Use an ohmmeter to check resistance between the outside frame of the cell and both the ionizer and collector contacts. In each case the resistance should be infinite (open circuit).



FIG. 34—USE AN OHMMETER TO CHECK THE ELECTRONIC CELLS FOR SHORT CIRCUITS.

### CHECK CONTACT TRAY AND HIGH VOLTAGE WIRING

This check is intended to detect shorts and prove continuity in the contact tray and associated wiring.

### CAUTION

Disconnect power to the air cleaner before performing this check.

### CHECK FOR SHORT CIRCUITS

The power supply should be in place on the air cleaner with the cover off and the power disconnected. Close the access door.

1. Use an ohmmeter to measure the resistance between the red wire (ionizer lead unplugged from the circuit board) and ground. Momentarily open the access door.

2. Repeat the same procedure for the black wire (collector lead).

3. In each case the resistance should be infinite and go to zero when the access door is opened.

### CHECK FOR CONTINUITY

1. With the power off, clip one lead of an ohmmeter to the ionizer contact on the contact tray.
2. Close the access door far enough to actuate the interlock shorting device and check for continuity to the red wire that was unplugged from the circuit board.
3. Repeat the procedure for the collector contact and the black wire.
4. In each case the resistance should be zero.

### CHECK VOLTAGE DOUBLER CIRCUIT

This check will locate a faulty component or connection in the voltage doubler circuit.

#### CAUTION

The line voltage power is turned on and off several times in this check.

- a. Be sure that the power is off before connecting or disconnecting any component.
  - b. Discharge the capacitors after turning off the power by shorting the capacitor leads to ground with a plastic handled screwdriver.
1. Inspect the voltage doubler circuit components for any sign of physical damage.
  2. Turn off power and connect Diode 2 to point Y. Energize the power supply and check indicator light, or measure voltage or check arc across C2 (Z to Y).
    - a. Diode 2 and C2 are good if—
      - indicator light goes on (if it was off in earlier checks).
      - the voltage across C2 is over 3,500V dc.
      - the correct arc is obtained (moderate, blue snapping spark).
    - b. Diode 2 or C2 is defective if—
      - the indicator light does not come on.
      - the voltage across C2 is less than 3,500V dc.
      - the proper arc is not obtained.
    - c. If the checks show a defective component, unplug Diode 2 and temporarily substitute a good diode.
      - A good check now proves Diode 2 faulty. Replace it.
      - If a good check still can't be obtained, the capacitor (C2) is defective and must be replaced.
  3. Turn off power, disconnect Diode 2, and reconnect Diode 1. Energize the power supply. Check indicator light, or measure voltage or check for arc from point Z to ground.
    - a. Diode 1 and C1 are good if—
      - indicator light goes on (if it was off in earlier checks).
      - the voltage (Z to ground) is over 3,500V dc.
      - the proper arc is obtained (moderate, blue snapping spark from point Z to ground).
    - b. Diode 1 or C1 is defective if—
      - indicator light does not come on.
      - the voltage (Z to ground) is under 3,500V dc.
      - the proper arc is not obtained.

- c. If the checks show a defective component, unplug Diode 1 and temporarily substitute a good rectifier.
  - A good check now proves Diode 1 faulty. Replace it.
  - If a good check still can't be obtained, the capacitor (C1) is defective and must be replaced.

### CHECK HIGH VOLTAGE TRANSFORMER

1. With power off and both diodes unplugged, disconnect the black lead from the resonant capacitor. Energize the transformer and measure the resonant winding ac voltage.

- a. If this voltage is over 150 volts ac, the resonant capacitor is defective or the transformer secondary winding is open.
  - (1) De-energize the power supply and check for continuity of the secondary winding.
- b. If this voltage is under 150 volts ac, the transformer is defective and must be replaced.

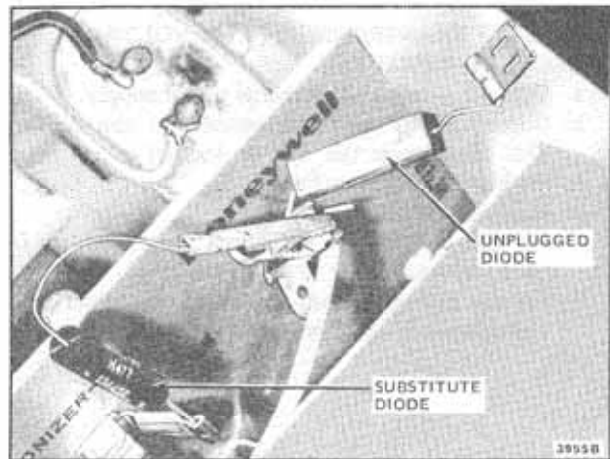


FIG. 35—USE A SPARE RECTIFIER TO CHECK FOR VOLTAGE DOUBLER CIRCUIT OPERATION.

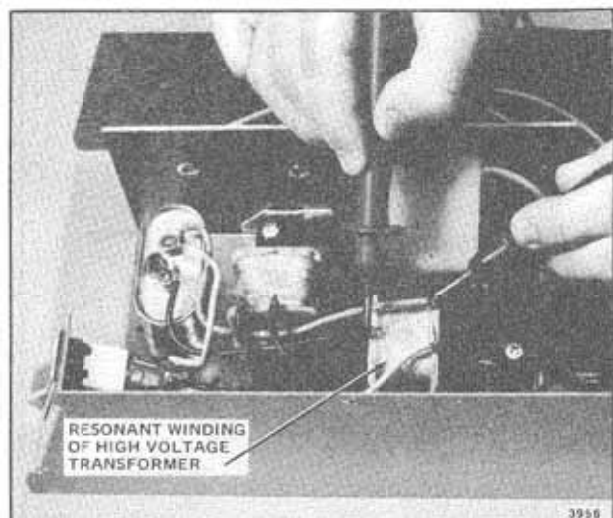


FIG. 36—CHECK TRANSFORMER BY MEASURING OPEN CIRCUIT RESONANT WINDING VOLTAGE.



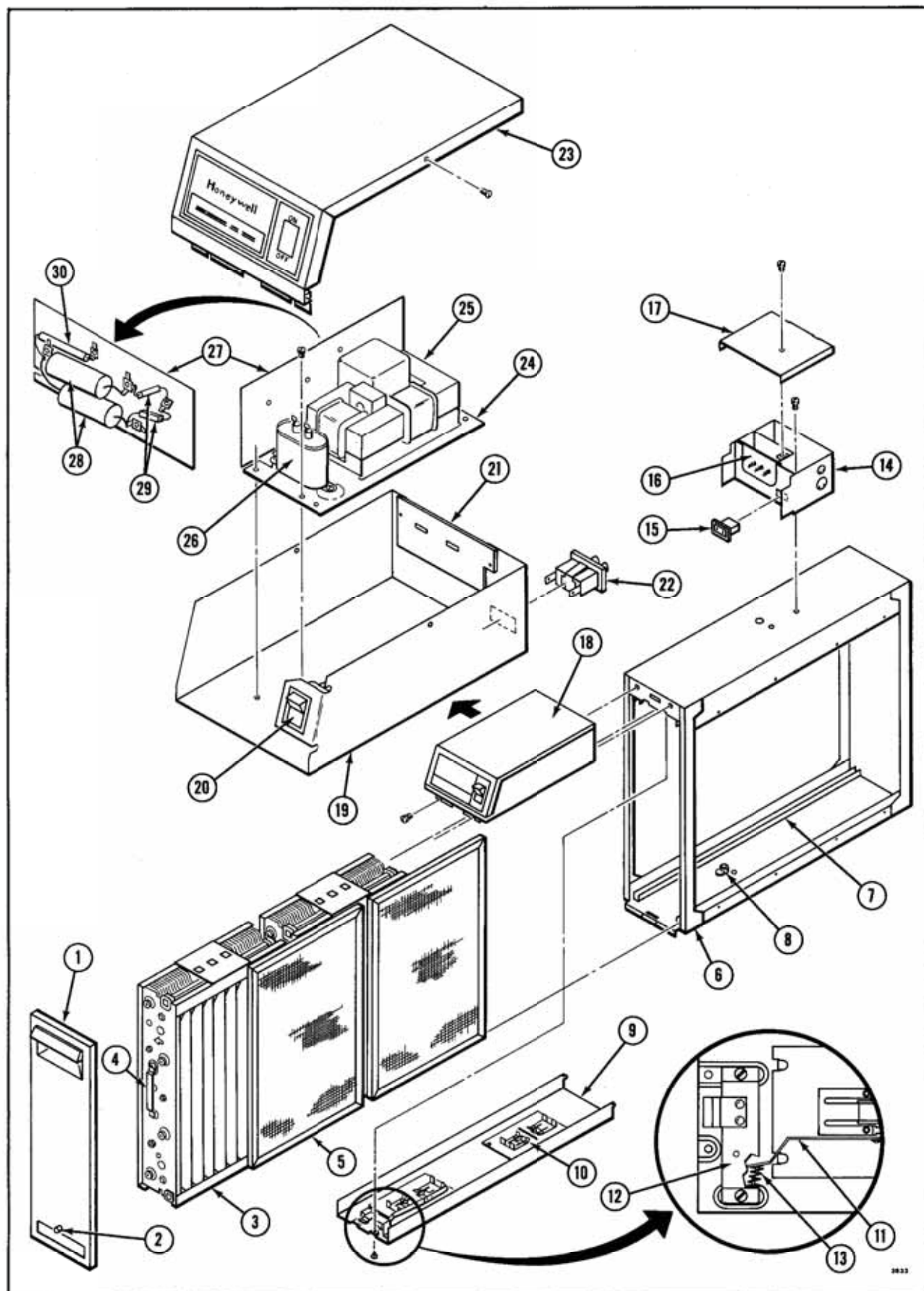


FIG. 37—COMPONENT PARTS OF THE F50A ELECTRONIC AIR CLEANER.

# PARTS LIST

DRAWING NUMBER	DESCRIPTION	PART NUMBER	
		16 X 25 IN. [406.5 X 635 MM]	20 X 25 IN. [508 X 635 MM]
1	Access Door (includes 2 below)	136393AA	136392AA
2	Test Button Assembly	137980A	137980A
3	Electronic Cell (2)	FC37A1130	FC37A1064
4	Cell Handle (2)	137266	137266
5	Protective Screen (2)	136388	136389
6	Cabinet	136403A	136402A
7	Cell Guide/Screen Channel (4)	136390	136390
8	Cell Key	136518	136518
9	Contact Panel Assembly (includes 10 through 13 below)	136399A	136399A
10	Contact Board (2)	136383A	136383A
11	Shorting Arm	136387A	136387A
12	Shorting Arm Bracket	136382A	136382A
13	Shorting Arm Spring	136517	136517
14	Junction Box Assembly (includes 15 through 16 below—less cover)	136394A	136394A
15	Electrical Connector—Female	136364	136364
16	Contact Board Assembly	136415A	136415A
17	Junction Box Cover	136386	136386
18	Power Box Assembly (includes 19 through 30 below)	136397B	136397A
	120V, 60 Hz		
	240V, 60 Hz	136397D	136397C
	220/240V, 50 Hz	136397F	136397E
19	Case Only	136397	136397
20	Switch/Indicator Light	136363	136363
21	Contact Board Assembly	136414A	136414A
22	Electrical Connector—Male	136366	136366
23	Power Box Cover	136396	136396
24	Power Supply (includes 25 through 30 below)	W919A1010	W919A1002
	120V, 60 Hz		
	240V, 60 Hz	W919A1036	W919A1028
	220/240V, 50 Hz	W919A1051	W919A1044
25	High Voltage Transformer	136572AC	136572AA
	120V, 60 Hz		
	240V, 60 Hz	136572BB	136572BA
	220/240V, 50 Hz	136572CB	136572CA
26	Resonating Capacitor (120 and 240V, 60 Hz)	136749	136749
	Resonating Capacitor (220/240V, 50 Hz)	136750	136751
27	Voltage Doubler Circuit Board (includes 28 30 below)	136596AA	136596AA
28	Capacitor (2)	136912	136912
29	Diode (2)	137073A	137073A
30	Resistor, 22.6 megohm	128675	128675

## PARTS NOT ILLUSTRATED

Ionizing Wires (package of 5)\*

For 16 inch [406.5 mm] cell—Part No. 136434BA.

For 20 inch [508 mm] cell—Part No. 136434AA.

Remote Mount Repair Kit for F50B, Part No. 136377A, includes:

Remote Mounting Base—Part No. 136377.

Conduit Assembly—Part No. 136376A.

Cabinet Plug—Part No. 136743.

Mounting Screws (4)—Part No. 136375.

\*Bulk package of 25 wires also available.



## NOTES

# TABLE OF CONTENTS

	PAGE
SPECIFICATIONS .....	2
ORDERING INFORMATION .....	2
GENERAL INFORMATION .....	4
PLANNING THE INSTALLATION .....	4
TYPICAL MOUNTING POSITIONS .....	5
INSTALLATION .....	7
SHEET METAL INSTALLATION .....	7
ASSEMBLY PROCEDURE .....	9
WIRING .....	11
ADJUSTMENTS .....	12
CHECKOUT .....	13
SERVICE .....	13
WASHING THE ELECTRONIC CELLS .....	13
IONIZING WIRE REPLACEMENT .....	14
ELECTRICAL TROUBLESHOOTING .....	16
INTERNAL SCHEMATIC DIAGRAM .....	17
PARTS LIST .....	22