

# SMOKEMASTER

THE MODEL F66V IS A SELF-CONTAINED ELECTRONIC AIR CLEANER FOR USE IN SOURCE CAPTURE APPLICATIONS IN INDUSTRY. THE AIR CLEANER HAS CASTERS THAT PROVIDE PORTABLE OPERATION, ALLOWING MOVEMENT TO THE CONTAMINATION SOURCE. THE MODEL F66V USES A MECHANICAL ARM WITH FLEXIBLE HOISING AND HOOD FOR CLOSE CONTAMINATION CAPTURE.

## OWNER'S MANUAL For INDUSTRIAL ROLL-AROUND ELECTRONIC AIR CLEANER

- o Modular construction provides either single pass or double pass and one or two flexible arm and hose configurations of the Model F66V.
- o Adjustable blower circulates up to 1300 cfm of air in single stage unit; 1200 cfm of air in a two stage unit.
- o Specifically designed for source capture of contaminants using flexible hosing and hood.
- o Unique roll-around feature allows movement of the air cleaner directly to the contaminant source.

- o Choice of operational power source:

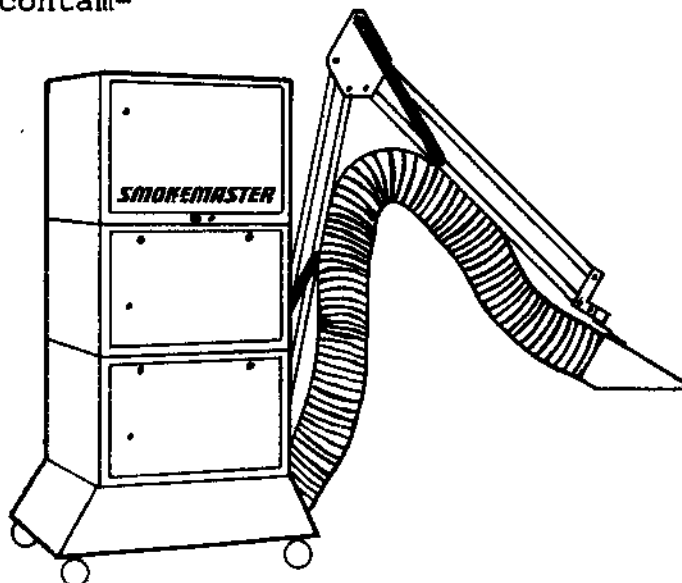
Single phase 60 Hz operating power:

120 VAC, 11.4 Amp, 864 Watts  
240 VAC, 6.0 Amp, 932 Watts  
208 VAC, 4.0 Amp, 900 Watts

Three phase 60 Hz operating power:

208 VAC, 4.0 Amp, 900 Watts  
230 VAC, 3.7 Amp, 1024 Watts  
460 VAC, 2.0 Amp, 1100 Watts

- o Electronic cells are easily removed for cleaning.
- o System indicator lamps provide collector operation status.
- o Adjustable belt-drive blower with sealed bearings provides reduced maintenance.
- o Safety interlock switches prevent operation when cell access doors are open.
- o Test button diagnostics give status of collector section.
- o All internal electrical circuits and wiring are factory installed and operationally checked.



This unit is to be used exclusively for source control in industrial applications in California.

## F66V

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**IMPORTANT**

THE SPECIFICATIONS GIVEN IN THIS PUBLICATION DO NOT INCLUDE NORMAL MANUFACTURING TOLERANCES. THEREFORE, THESE UNITS MAY NOT MATCH THE LISTED SPECIFICATIONS EXACTLY. ALSO, THIS PRODUCT IS TESTED AND CALIBRATED UNDER CLOSELY CONTROLLED CONDITIONS, AND SOME MINOR DIFFERENCES IN PERFORMANCE CAN BE EXPECTED IF THOSE CONDITIONS CHANGE.

SERIAL NO. _____			
MODEL	F66V1113	F66V2212	F66V1513
No. Electronic Cleaning Stages	1	2	1
Volts - Phase	120 VAC, 1PH	240 VAC, 1PH	230 VAC, 3PH
Amps - Watts	11.4A, 864W	6.0A, 932W	3.5A, 1050W
Airflow (w/o added inlet restrictions) cfm (cmm)	1300 (36.8)	1200 (34)	1300 (36.8)
Shipping Weight lbs (kg)	463 (210)	595 (270)	472 (214)
Installed Weight lbs (kg)	406 (184)	530 (240)	412 (187)
Number of FC53A1012 Industrial Cells	2	4	2
Height Dimension Inch (mm)	57.25 (1454)	76.25 (1937)	57.25 (1454)

POWER SUPPLY: Ferroresonant iron core transformer with voltage doubler board

MOTOR: TEFC, 1 Hp, Ball Bearing

AVAILABLE 60 Hz VOLTAGES AND PHASES:

120 VAC-1 Ph, 240 VAC-1 Ph, 208 VAC-1 Ph, 208 VAC-3 Ph,  
230 VAC-3 Ph, 460 VAC-3 Ph

CELL WEIGHT: 32 lbs (14.5 kg) EACH

CELL AREA: 218 Square Feet (20.2 Square Meters)

CROSS SECTION DIMENSIONS (all units): 27.12 Inches (689 mm) deep x  
26.50 Inches (673 mm) wide (see Height Dimension above)

AMBIENT TEMPERATURE RATING:

Operating - 40 deg F (4.4 deg C) to 125 deg F (51.7 deg C)

Shipping/Storage -20 deg F (-29 deg C) to 150 deg F (65.6 deg C)

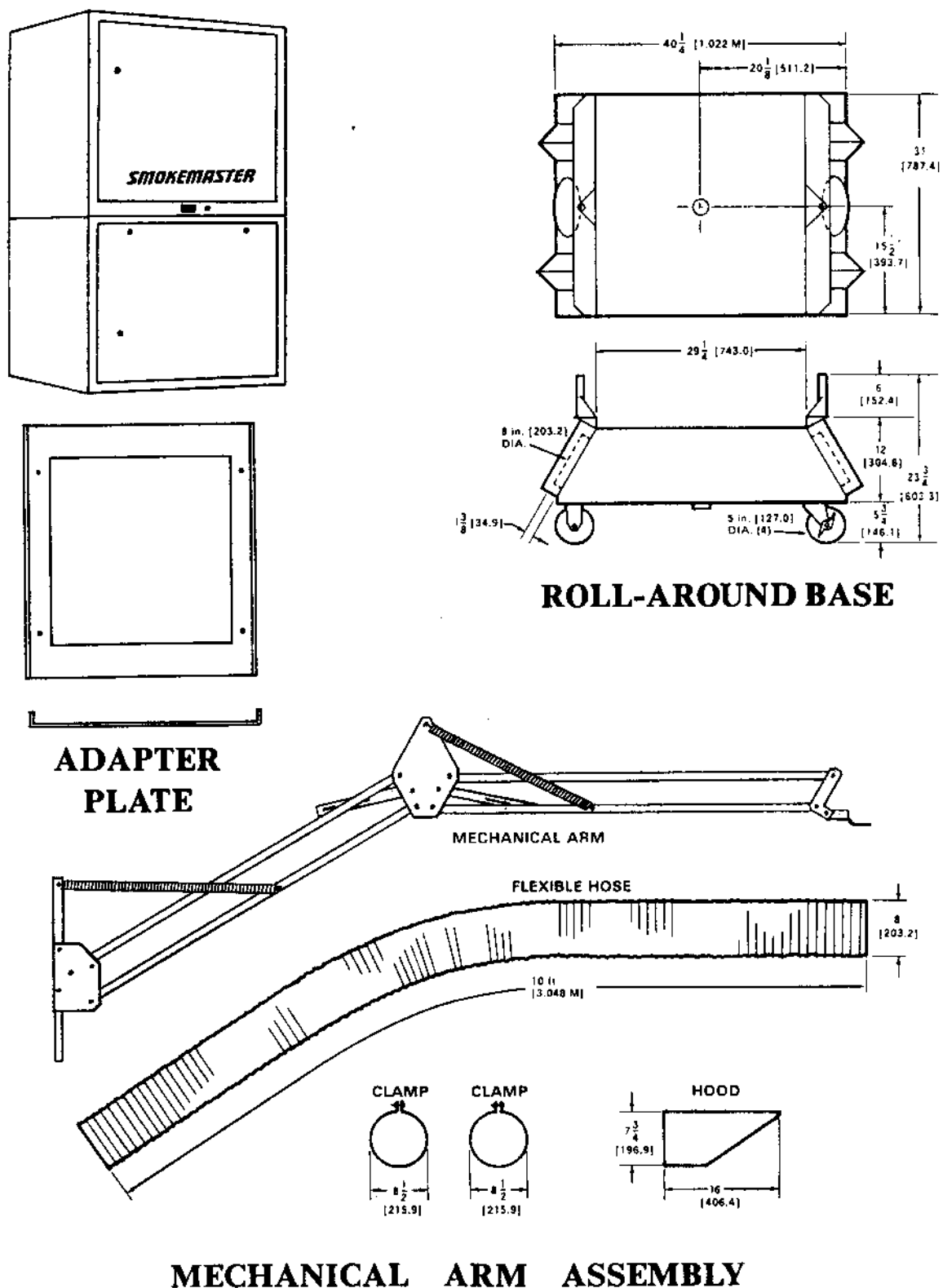


Figure 1. F66V Roll-Around Base and Mechanical Arm Assembly Component Dimensions

# PLANNING THE INSTALLATION

## WARNING

The F66V industrial roll-around Electronic Air Cleaner is NOT explosion proof. It must NOT be located or used where there is any danger of gas, vapor or dust explosion.

## SIZING

Sizing is the process of determining the amount of air cleaning necessary for an application. Since the F66V is primarily a source capture air cleaner with either a single or dual source capture hood, sizing is determined by the amount and type(s) of contaminant to be cleaned from the air. The determination of the contaminant application provides a choice of a single or double pass configuration of the F66V.

## LOCATION

Since the F66V is a source capture air cleaner, the source capture hood(s) should be placed as close to the contaminant source as possible. The maximum distance between the contaminant producer and the capture hood should not exceed 18-inches (457.2 mm). Therefore, when locating the F66V, be sure that the mechanical arm F66E is capable of extending the capture hood to within the specified distance of the contaminant source. When locating the F66V, be sure that the clean air discharge is compatible with the airflow patterns of the cleaning area. As an example, Do Not locate the air cleaner in a position that allows discharge directly into a hot air outlet. Be careful to locate the F66V where it will not obstruct movement paths of people, machinery, product or material. After the F66V is located in the desired position, set the caster brakes to prevent movement of the unit.

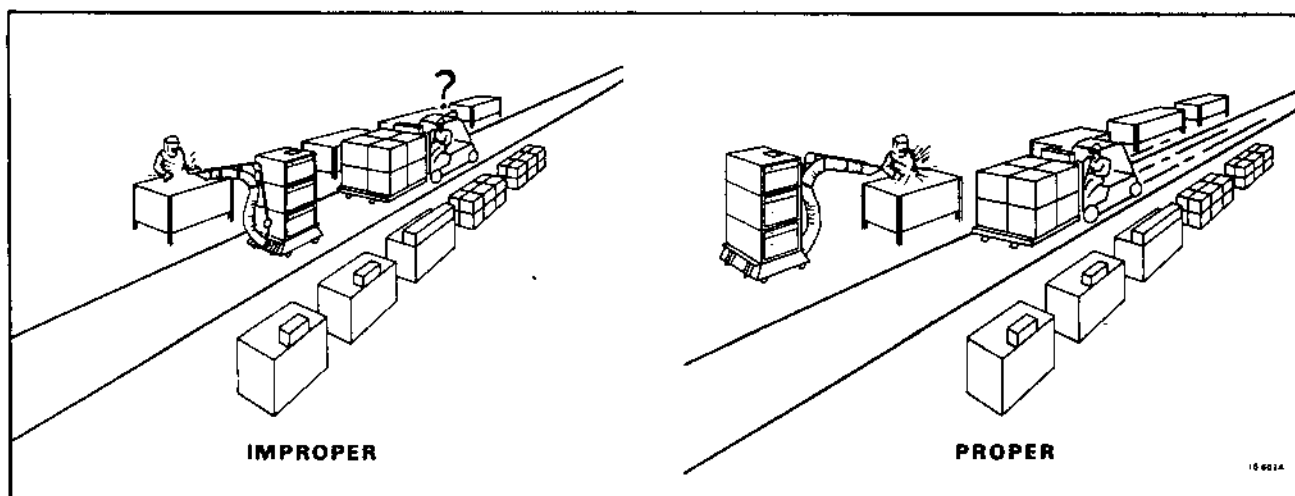


Figure 2. Examples of Proper and Improper F66V Location

# ASSEMBLY

## WHEN ASSEMBLING THIS PRODUCT .

1. Read these instructions carefully. Failure to follow instructions could damage the product or cause a hazardous condition.
2. Check all of the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Assembler must be a trained, experienced service technician.
4. After assembly is complete, check out product operation as provided in these instructions.

## CAUTION

1. Do Not connect the power source until the air cleaner is completely assembled. This will prevent electrical shock and equipment damage .
2. The air cleaner motor is equipped with an automatic thermal overload. Should the motor become overloaded, it will stop automatically. It will also automatically start after cooling for a sufficient period of time (several minutes to an hour). Therefore, be sure to turn off or disconnect the air cleaner prior to servicing.
3. When the air cleaner must be powered on for an electrical check be extremely careful to avoid electrical shock. Also, take care when working near the air cleaner's moving parts.

## UNPACKING

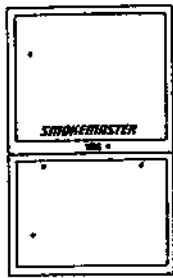
All component parts that make up the F66V Air Cleaner are assembled and packed in separate boxes. Check all the components carefully when unpacking. Remove all shipping cardboard and cell retainer, inside and outside of the air cleaner components. Be sure to inspect packing material carefully before discarding.

## ASSEMBLING THE F66V

The F66V cleaner is made up of a self contained blower module (05283) and one or two electronic air cleaner (EAC) modules (05276), roll-around base module (00041) with adapter plate, and one or two mechanical arm assemblies (00112). The second mechanical arm assembly is an accessory to provide the capability of collecting from two contaminant sources simultaneously. Assembly is easily completed by bolting the air cleaner unit, the base with adapter plate and the mechanical arm assembly units together. Figure 3 illustrates the assembly process.

## WIRING

The single-phase F66V has no special wiring requirements. It is equipped with a 6 ft. (1.8 m) cord and plug. The power source must be compatible with the voltage and frequency of the F66V. The three-phase F66V requires an appropriate connector plug and the power source must be compatible with the voltage and frequency of the F66V. The F66V is shipped from the factory wired for 230 VAC, 60 Hz, 3-phase. To change the operating voltage to 460 VAC, 60 Hz, 3-phase, remove and replace jumper wires per instructions on blower motor terminal strip.



**STEP 1**

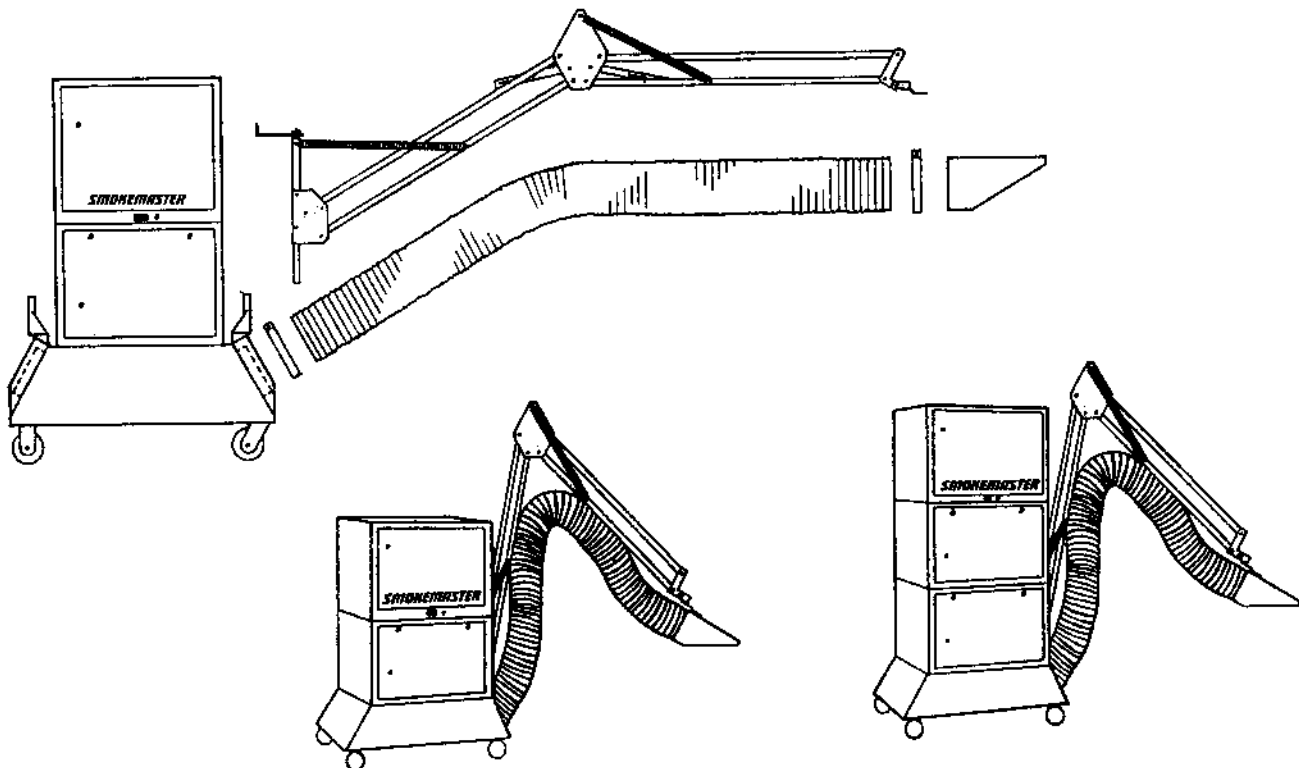
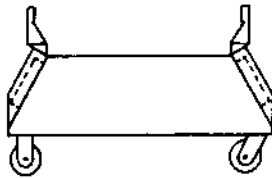
Attach adapter plate to F66V cell module using bolts and captive nuts.

**STEP 2**

Attach F66V to source capture plenum using bolts and nuts.

**STEP 3**

- a. Connect the mechanical arm to the socket provided on the roll-around base.
- b. Attach the stabilizer bracket to the side of the air cleaner with bolts provided.
- c. Attach the four counterbalance springs to the mechanical arm, two at the shoulder joint and two at the elbow joint.
- d. Bolt the hood to the outboard end of the mechanical arm with the bolts and nuts provided.
- e. Slip hose and clamp over opening flange on the roll-around base and tighten clamp.
- f. Tie the hose to the mechanical arm using the three provided straps.



**Figure 3. Assembling The F66V Air Cleaner**

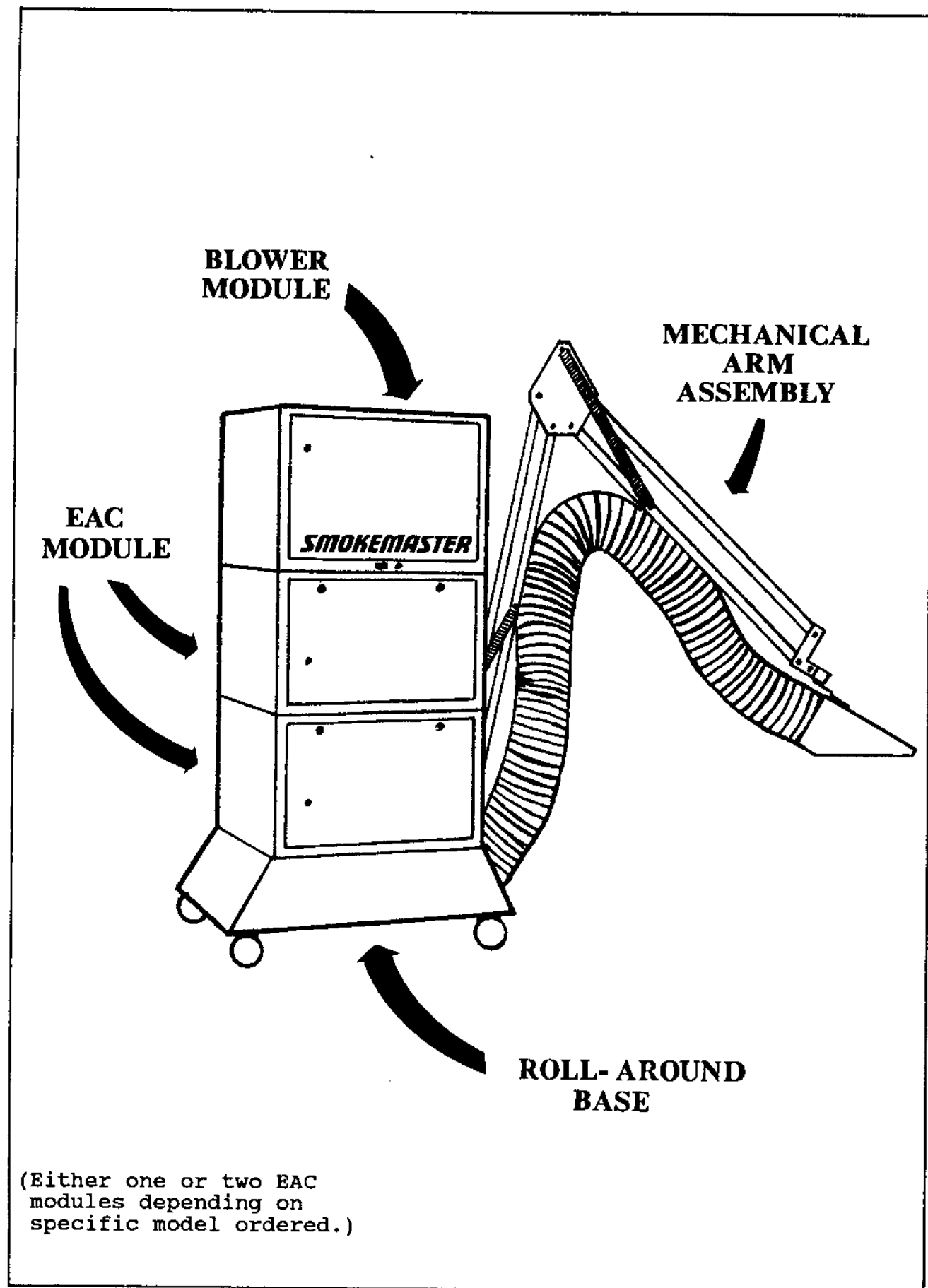


Figure 4. F66V Air Cleaner Components



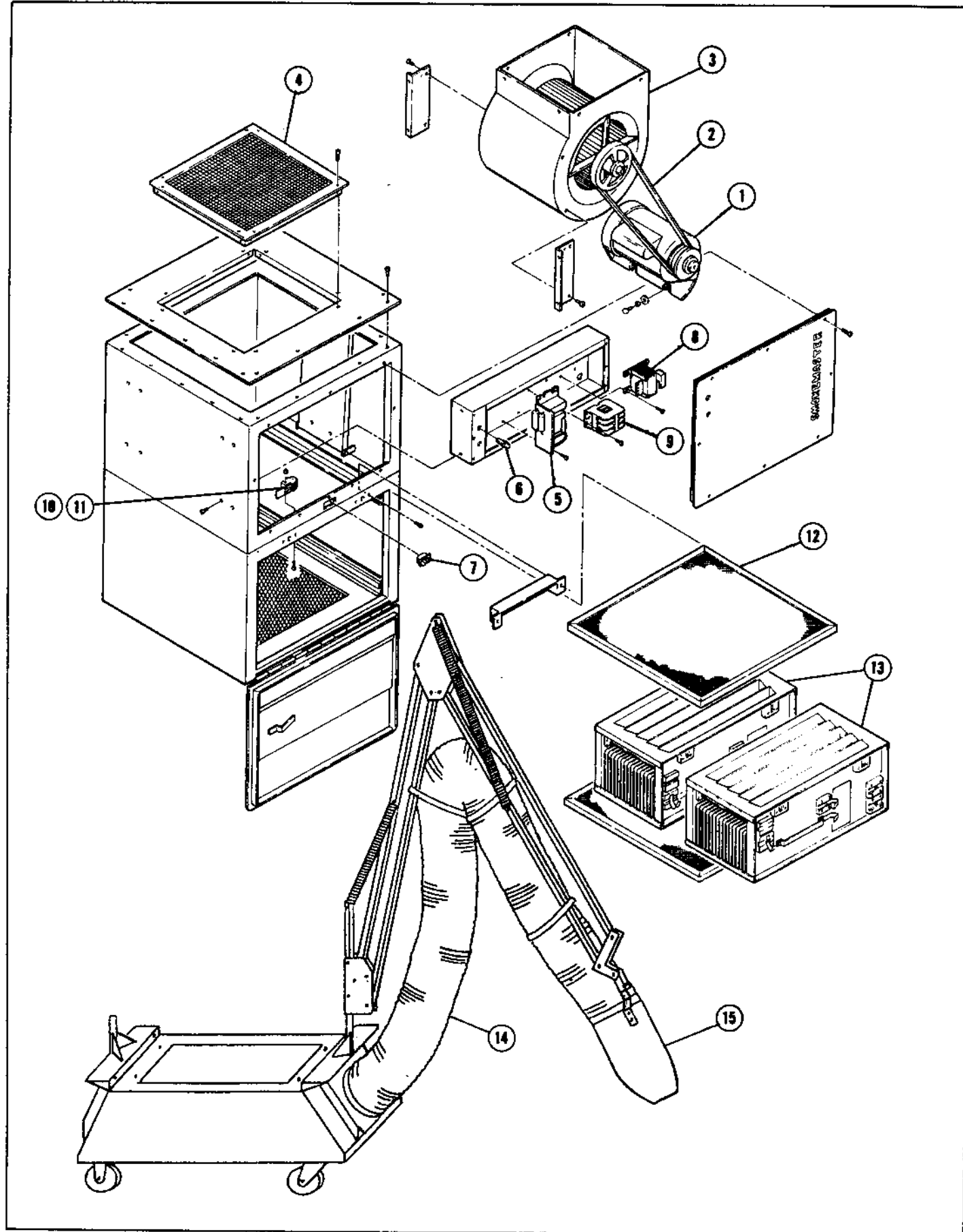


Figure 5. Exploded View Of F66V Air Cleaner Components. Parts Keyed To Parts List (next page).

# F66V Parts List

Item	Part No.	Description
1	40013	Motor (1 0)
	40009	Motor (3 0)
2	30234	Belt
3	37012	Blower
4	30486	Outlet Grille
5	10115	Power Supply (120V)
	10116	Power Supply (240V)
	10163	Power Supply (208V)
6	10097	Indicator Lamp
7	10140	Switch, Power
8	10075	Transformer
9	10076	Relay
10	10079	Interlock Switch
11	10176	Interlock Switch w/ blade
12	41052	Pre or Postfilter
13	38003	Electronic Cell
14	30021	Flexible Hose
15	20443	Source Capture Hood

## Parts Not Illustrated

38005	Ionizer Wires
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# ELECTRICAL INSTALLATION

## CAUTION

This procedure should only be attempted by qualified electrical contractor personnel with electrical wiring installation experience. All wiring must comply with applicable codes and ordinances.

### SINGLE PHASE UNITS (Figures 6 and 10)

1. Locate an unswitched single phase power circuit with a junction box near the air cleaner location.

Be certain that the circuit voltage and frequency match the power requirements of the air cleaner.

2. Check the circuit breaker or fuse of the circuit to determine whether the amperage rating of the circuit and circuit loads will allow the addition of the air cleaner to the circuit. If not, wire in a new circuit from a circuit breaker or fuse for the air cleaner.

CAUTION: Turn OFF the building circuit at the circuit breaker or fuse to disable power prior to performing the following procedure.

3. Connect the black wires from the pigtails in the air cleaner junction box to the supply circuit.

CAUTION: The air cleaner frame must be electrically connected to the building conduit or bare grounding conductor (building ground).

4. Connect a green wire from the grounding terminal in the air cleaner junction box to the grounded conduit of the supply circuit. If conduit is not used, connect the green wire to the supply circuit green or bare grounding conductor. DO NOT connect the green grounding wire of the air cleaner to the White wire(s) of the building supply circuit.

### THREE PHASE UNITS (Figures 7, 8, 9, 11, 12 and 13)

5. Be certain that the 3-phase supply circuit voltage and frequency match the voltage and frequency requirements of the air cleaner.

CAUTION: Turn OFF the building circuit at the circuit breaker or fuse to disable power prior to performing the following procedure.

6. Wire the air cleaner into the building supply circuit breakers or fuses in compliance with applicable codes and ordinances.

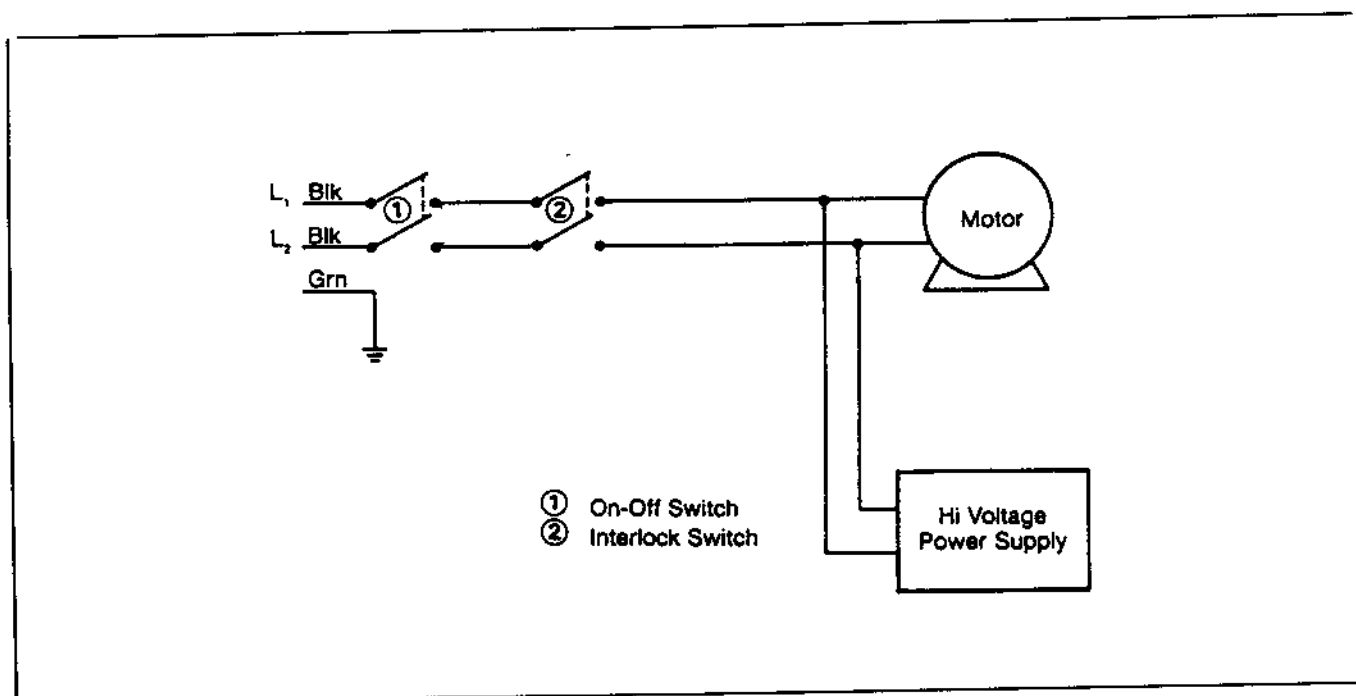


Figure 6. Schematic for Single Phase, Single Pass Air Cleaner.

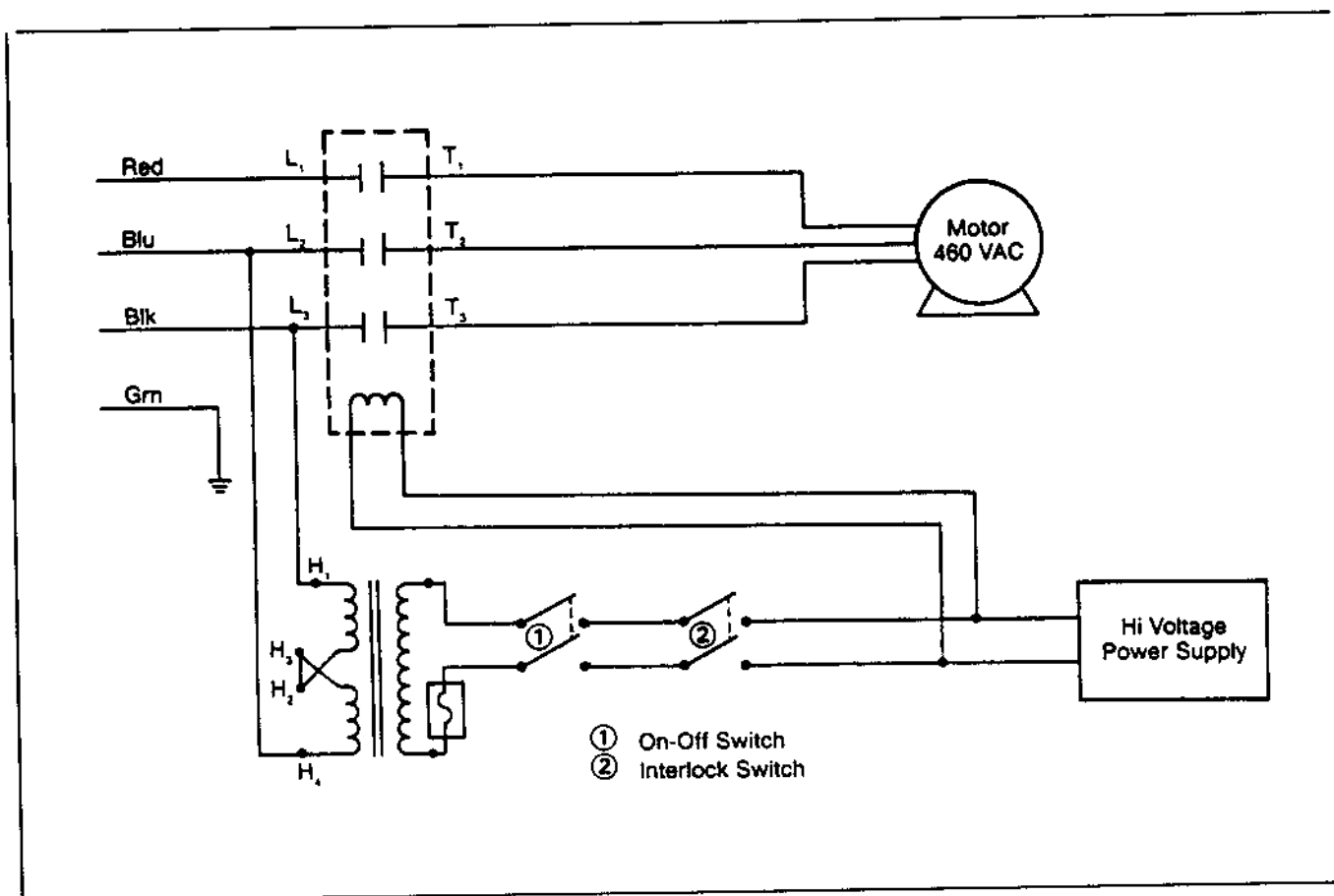


Figure 7. Schematic for Three Phase, Single Pass Air Cleaner - 460 VAC

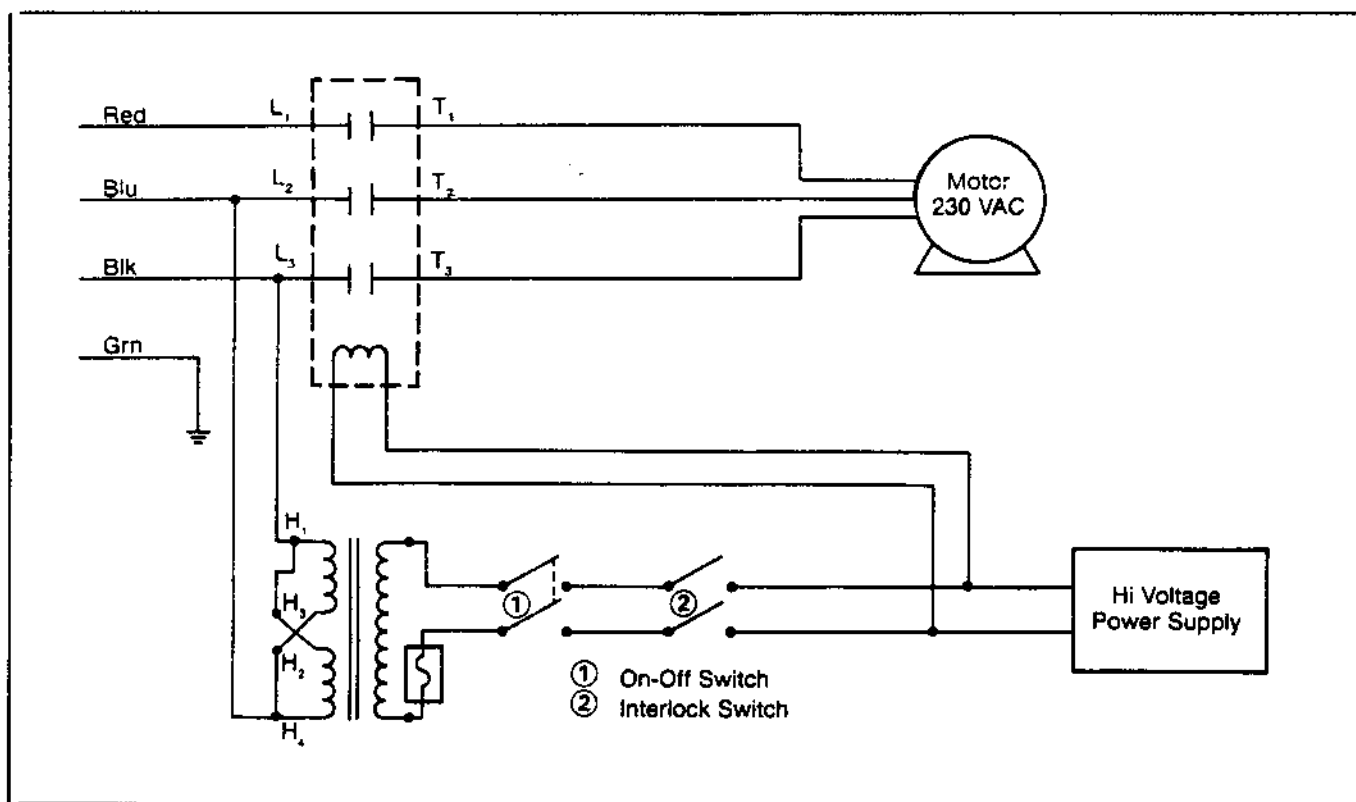


Figure 8. Schematic for Three Phase, Single Pass Air Cleaner - 230 VAC

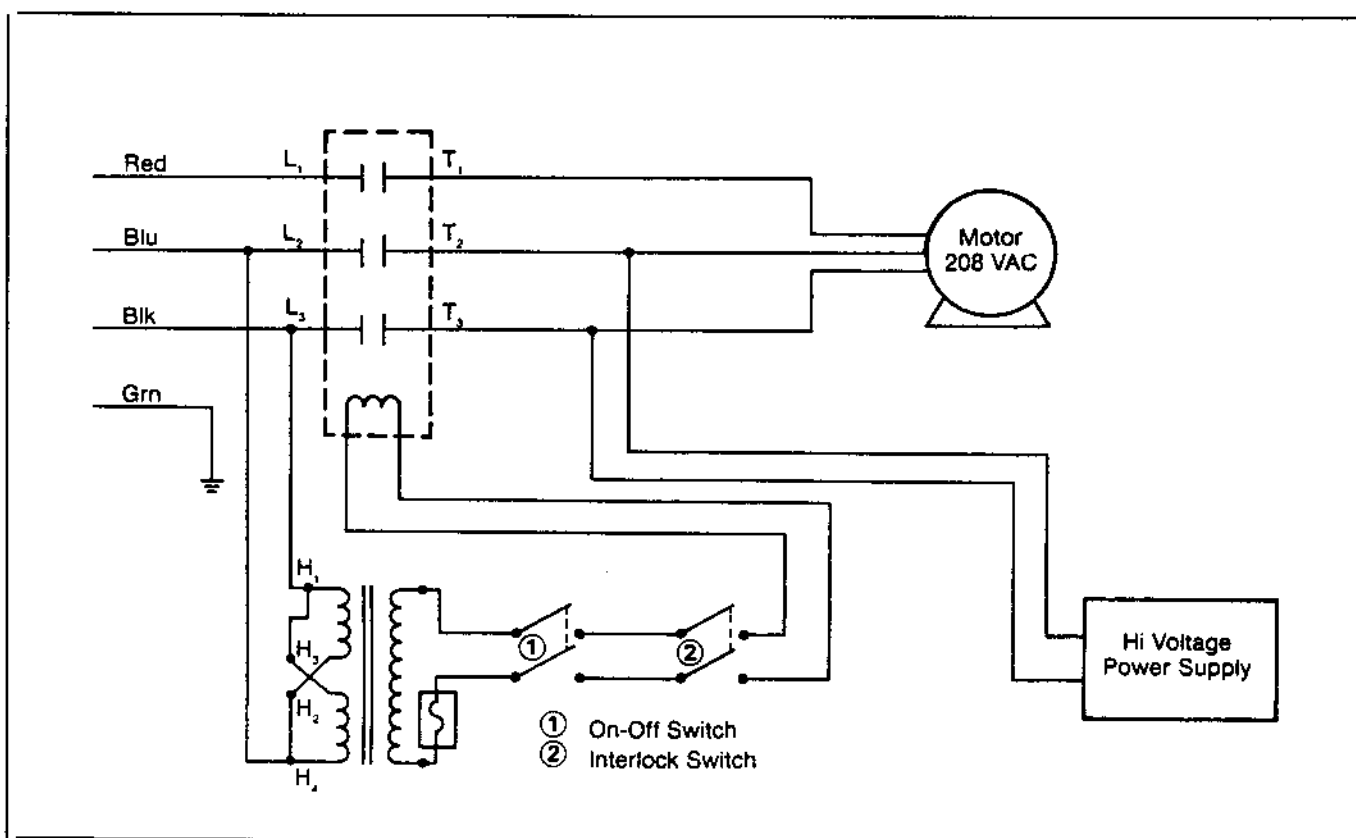


Figure 9. Schematic for Three Phase, Single Pass Air Cleaner - 208 VAC

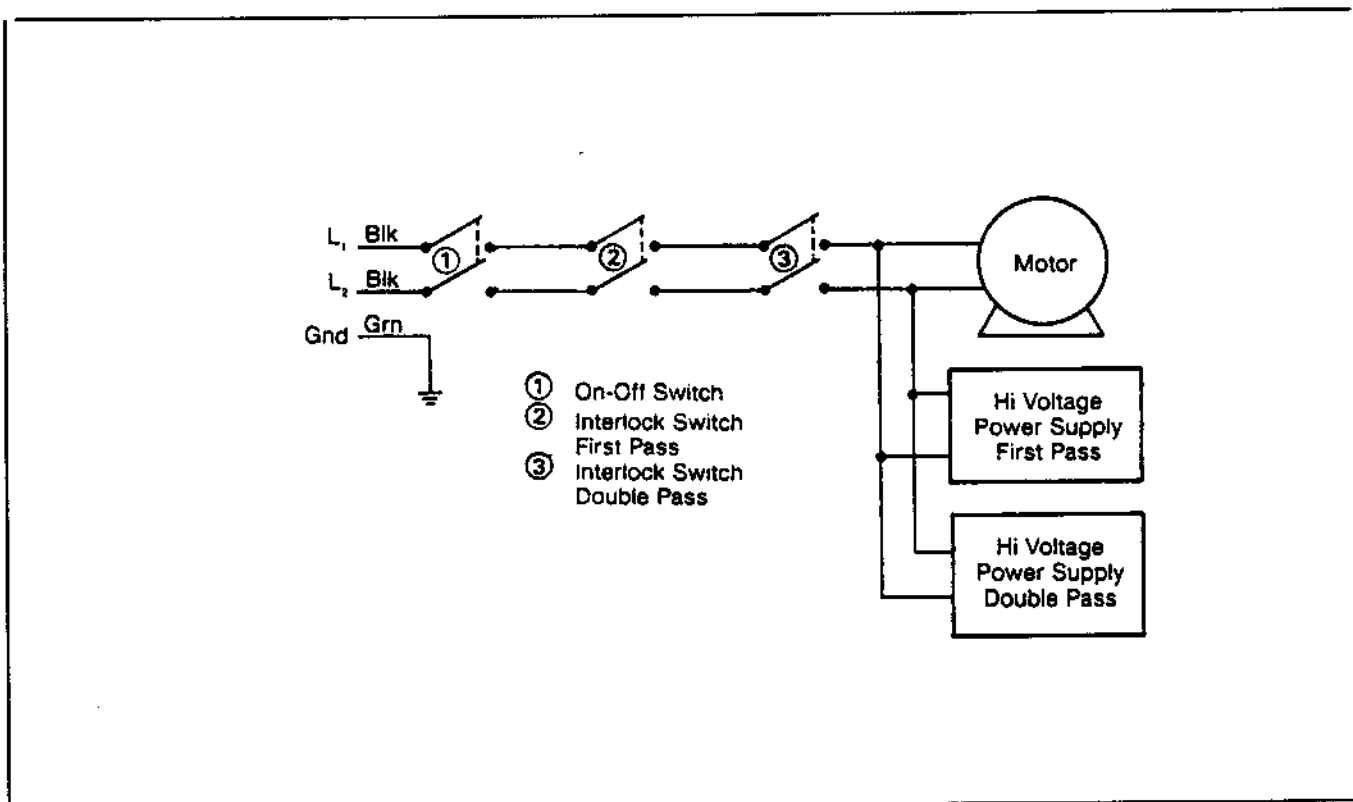


Figure 10. Schematic for Single Phase, Double Pass Air Cleaner.

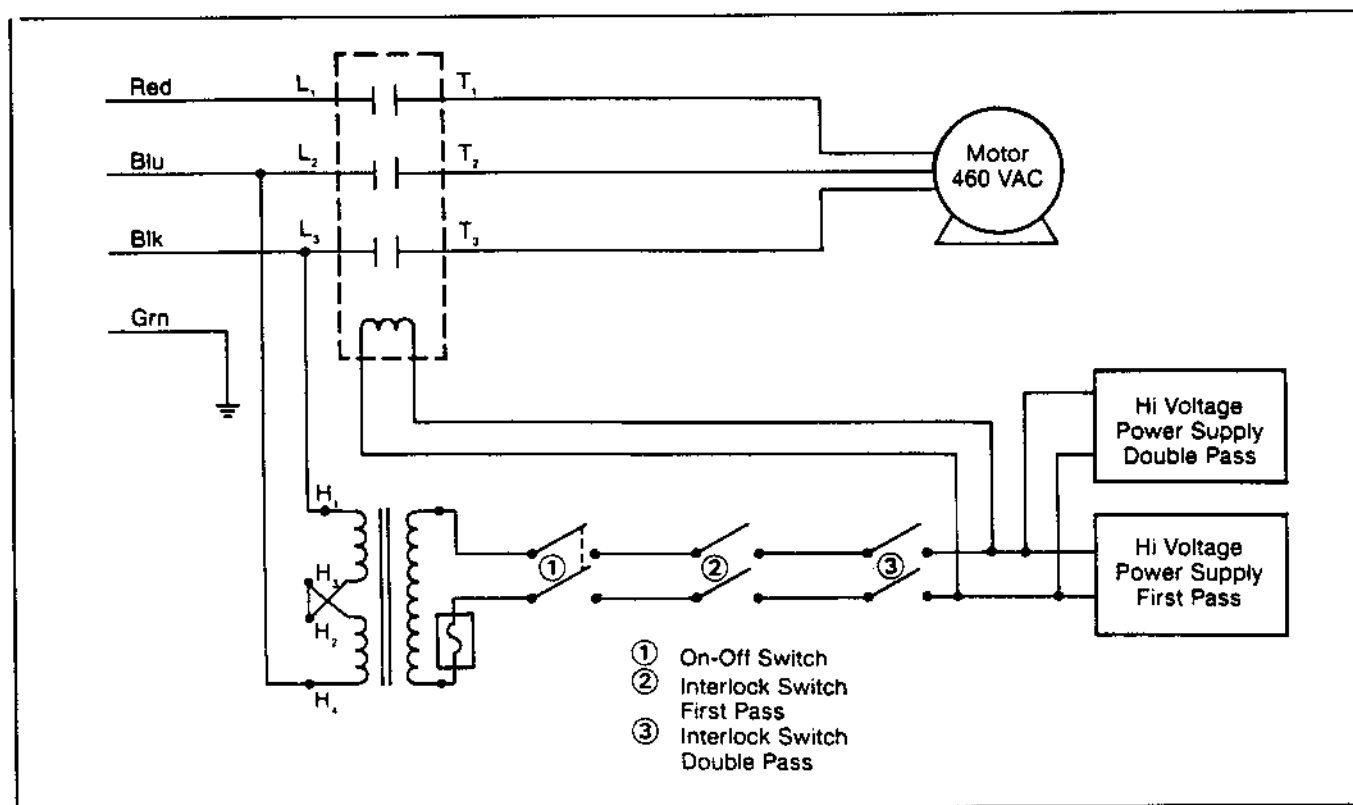


Figure 11. Schematic for Three Phase, Double Pass Air Cleaner - 460 VAC

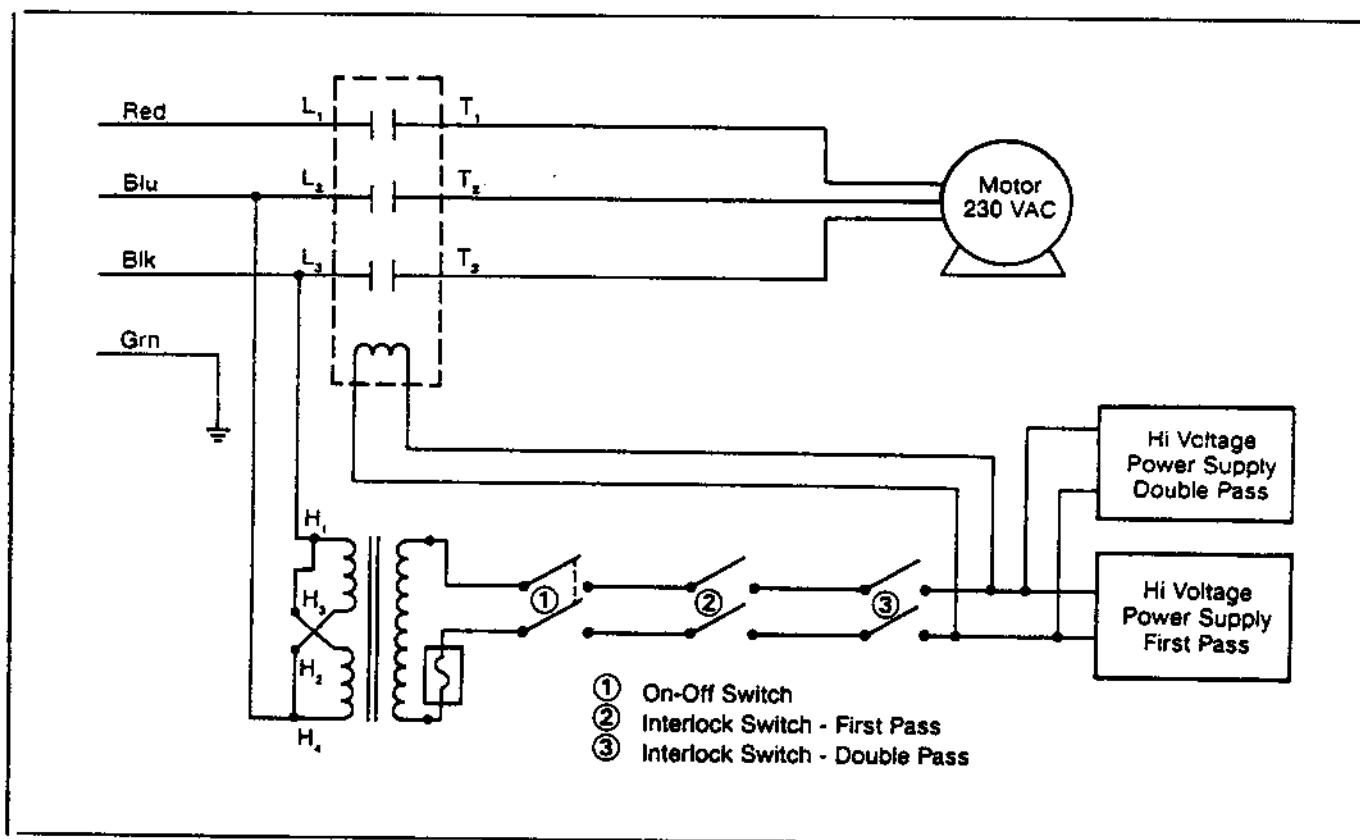


Figure 12. Schematic for Three Phase, Double Pass Air Cleaner - 230 VAC

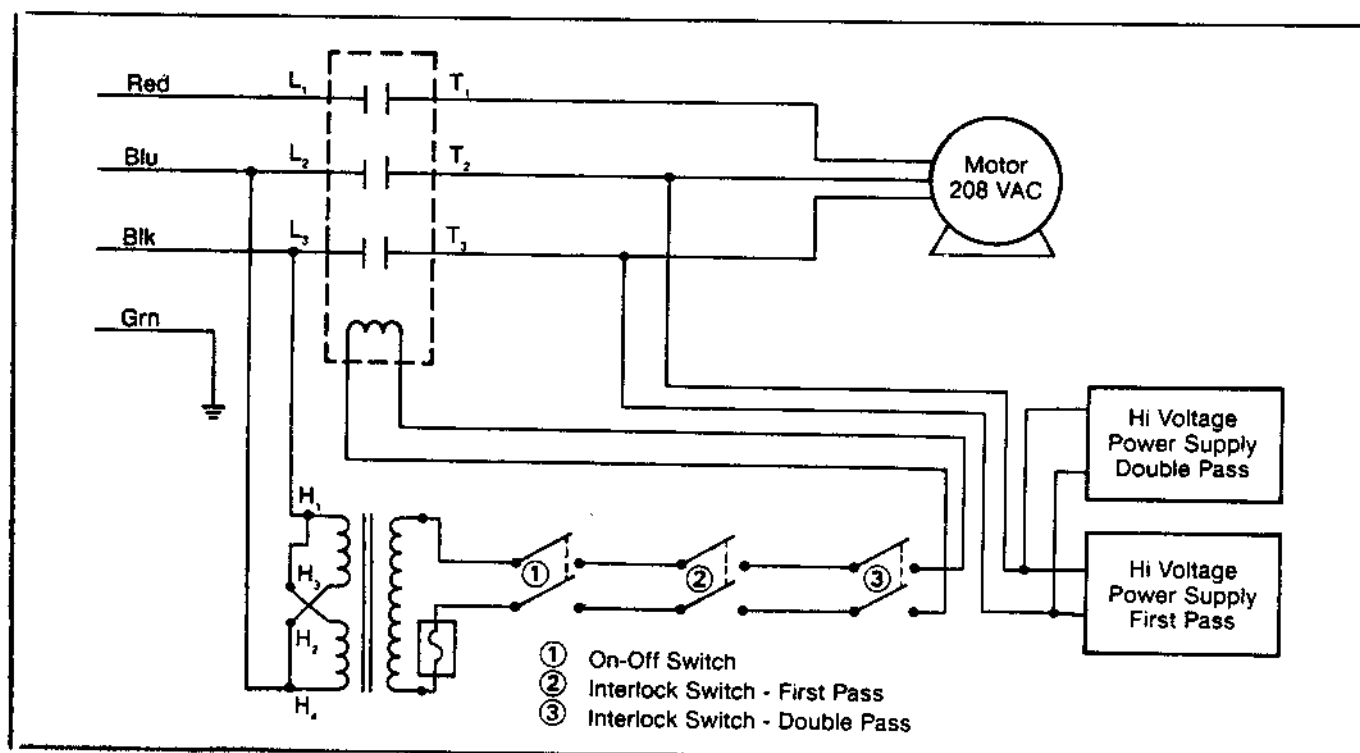


Figure 13. Schematic for Three Phase, Double Pass Air Cleaner - 208 VAC

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# CHECKOUT AND OPERATION

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## CHECKOUT

Before operating the F66V, check out the installation using the following procedure:

1. Observe that the air cleaner is oriented for good air circulation where it will not interfere with personnel and material traffic. Keep out of fire lanes and away from overhead cranes.
2. Note that the access doors can be easily opened.
3. Check that the F66V casters are securely locked in a stable position.
4. Check that the electronic cell(s) are correctly oriented; airflow arrows are pointing toward the blower and handles are near the access door hinges.
5. Observe that the pre-filter and postfilter screens are properly in place.
6. Check and adjust belt tension if necessary.
7. Make sure the junction box cover has been reinstalled.
8. Clean up the inside and the outside of the cabinet.



# CHECKOUT AND OPERATION

## IMPORTANT

Check for correct blower rotation on 3-phase models. See Figure 14. Correct by interchanging any 2 of the power supply connections.

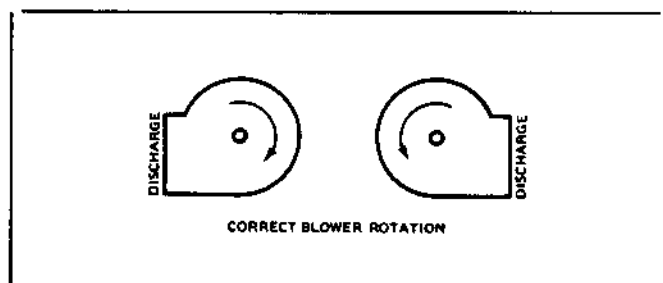


Figure. 14 3 Phase Blower Rotation.

## OPERATION

When the electronic air cleaner is energized, the blower produces an airflow velocity which conveys contaminated air into the air inlet. Particles that are too small to be caught by the prefilter screen are given an intense electrical charge in the ionizing section of the electronic cell. As the air carries these charged particles into the collecting section of the electronic cell, they are hurled against metal plates by the force of a powerful electrical field. These particles cling to the metal plates and the air passes through a postfilter screen, the blower compartment, and re-enters the building space as cleaned air.

Start up the air cleaner with the access doors properly closed. Put the rocker arm switch in the ON position. Check for the following:

1. The blower should be providing a strong discharge airflow. On three phase models, the blower should be rotating in the direction shown in Figure 14. If it isn't, correct rotation by interchanging any 2 power supply leads.
2. The performance indicator light should be On when the blower is running.
3. Opening access doors should stop the blower and turn Off the performance indicator light. Do Not place a ladder against the air cleaner.

NOTE: If the F66V does not appear to operate correctly, refer to the TROUBLESHOOTING section.

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# ADJUSTMENTS

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Adjust the bidirectional louvers of air cleaner discharge so that the discharge airflow does not produce discomfort or a possible hazard to personnel and equipment.

The blower capacity of the F66V is factory set. This capacity may be adjusted (see SPECIFICATIONS for adjustment range). Before adjusting the blower capacity make sure that the On-Off switch is in the Off position. To adjust the blower capacity:

1. Turn the air cleaner Off and open the access door to the blower and motor section of the air cleaner.
2. Loosen the two bolts locking the end of the motor rail in position. Remove the belt.
3. Loosen the Allen setscrew on the face of the motor sheave.
4. Rotate sheave into a position which gives the desired blower capacity.

NOTE: When the sheave is rotated all the way into the shaft, the blower capacity is at its maximum. When the sheave is rotated 5 turns out on the shaft, the blower capacity is at its minimum. DO NOT ROTATE THE ADJUSTABLE SHEAVE MORE THAN 5 TURNS OUT ON THE SHAFT. The sheave may already be adjusted one or more turns out on the shaft.

5. Make sure that the sheaves are in line. If not, loosen the motor and blower sheaves and align them properly. Tighten sheaves securely.
6. Replace the belt and retighten bolts in motor rail. The belt should be tightened enough to prevent slippage but not so tight that vibration occurs. The correct tension results in a 3/4 to 1 inch (19.1 to 25.4 mm) deflection when a 10 lb (4.5 kg) force is applied to the center of the belt span.
7. Close the access door and energize the air cleaner.

NOTE: For some blower adjustments, it may be necessary to use a smaller belt instead of the existing belt to achieve proper tension. Generally, a 1 inch (25.4 mm) shorter belt will be required.

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## SERVICE

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### CLEANING ELECTRONIC AIR CLEANER

The Model F66V removes a variety of contaminants from the working area air. In the process of cleaning the air, however, parts of the air cleaner will become dirty, reducing the cleaning efficiency. In order

to maintain a high standard of reliability and efficiency, it is necessary to perform periodic maintenance on the F66V. Periodic maintenance consists of cleaning the collector cells and inspecting the F66V both visually and with test instruments. Service will be required if the F66V appears to be damaged, or is performing below specification efficiency.

The manufacture recommends regular cleaning using an alkaline detergent solution. The exact schedule is a matter of experience, since each air cleaning application is different. Actual experience will dictate the periods between cleanings.

If an excessive buildup of captured contaminants can not be removed using the alkaline detergent solution, the use of a physical force (such as high pressure air, water or steam) or an acid detergent solution may be required.

The roll-around plenum and base of the F66V is liquid tight to a liquid depth of about .5 inches. Liquids collected by the collector sections will drain and collect in the base. Remove the drain plug from the base periodically to drain the collected liquids.

### CAUTION

1. Be extremely careful when working with the F66V cells and filters. The edges of the cells, filters, collection plates and the ionizing wires of the cell may be sharp.

When cleaning the cells and filters, be sure to wear the appropriate protective gear, especially goggles and gloves. Skin contact with either alkaline or acid detergent solutions must be avoided.

### REMOVING ELECTRONIC CELLS AND PREFILTERS

Before the electronic cells and prefilters can be cleaned they must be removed from the F66V. Be careful NOT to place a ladder or other heavy object against the F66V unit, cells or prefilters. Electronic air cleaners and their components are susceptible to damage.

### CLEANING PREFILTER

Cleaning the prefilters on an F66V is a simple procedure. Remove the prefilter and shake the accumulated contaminants from it. Excessive physical force may damage the prefilter. If this does not appear to be adequate, a vacuum cleaner can be used or the prefilter can be soaked in an alkaline detergent solution. DO NOT soak the prefilter in an acid detergent solution.

## CLEANING THE ELECTRONIC CELLS

### ALKALINE DETERGENT SOLUTION CLEANING METHOD

1. Acquire a container large enough to hold an electronic cell and a prefilter.
2. Fill the container with an alkaline detergent and hot water solution (per container instructions) sufficient to cover the electronic cell and prefilter.

NOTE: Be careful to avoid splashing the solution in your eyes. Wear goggles and use gloves to avoid skin contact with the solution.

3. Soak the cells and prefilters in the solution for approximately 15 minutes. The solution should be agitated by either stirring the solution or moving the cells or prefilters.

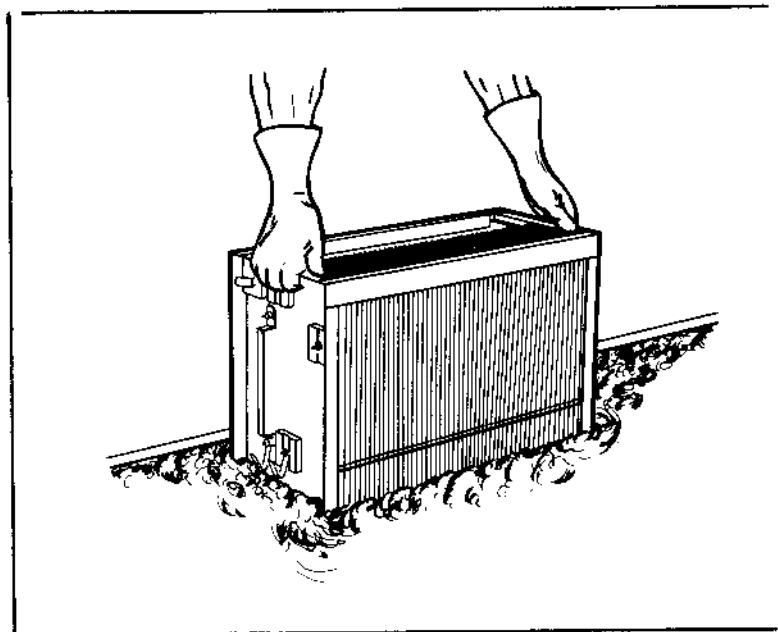


Figure 15. Agitate Water While Soaking Cell

4. Remove the cells and prefilters from the alkaline solution and place them in another container of hot clean water (150 to 170 degrees F or 66 to 77 degrees C) for rinsing. The cells and prefilters should be rinsed for 5 to 10 minutes.
5. Remove the cells and prefilters from the rinse water. Allow the cells and prefilters to drip dry before reinstalling them into the F66V.

The collection plates of the cells MUST be checked for an detergent residue. If there is any residue, rinse it off. Detergent residue may affect the efficiency of the F66V.

## CLEANING THE ELECTRONIC CELLS (Continued)

### ACID DETERGENT SOLUTION CLEANING METHOD

Acid detergent is commercially available. However, acid cleaners should only be used after cleaning with alkaline detergent proves inadequate. Acid cleaner tests have proven that they are corrosive and thus decrease the useful life of the cells. Use a weak solution of acid detergents. NEVER attempt to clean filters or prefilters in an acid solution.

#### IMPORTANT

Acid cleaners must always be properly handled. Refer to the acid detergent container label for instructions. Wear protective clothing, rubber gloves and goggles (See Figure 16). If acid comes in contact with exposed skin, flush and wash with water immediately. If acid comes in contact with eyes, flush with water immediately. If acid comes in contact with eyes, flush with large amounts of water immediately and then consult a physician.

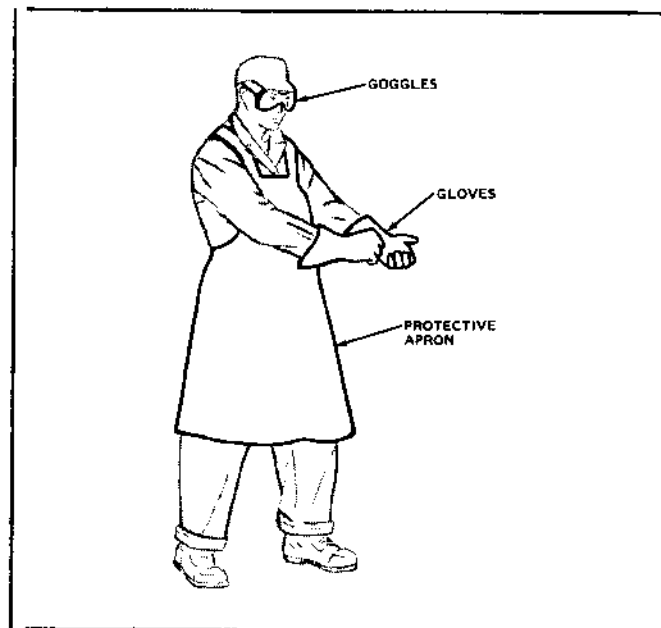


Figure 16. Wear protective clothing, gloves and goggles

**CAUTION:** Provide adequate ventilation when using acid detergent solutions.

After the cleaning process is completed, the acid detergent solution must be neutralized according to the U.S. Environmental Protection Agency, state and local pollution control guidelines and requirements. Soda ash is one neutralizer

1. Use a polyethylene or type 316 stainless steel container large enough to hold the electronic cell. Other types of containers should be avoided since the acid detergent may react with the container material.

## CLEANING THE ELECTRONIC CELLS (Continued)

**CAUTION:** Acid cleaning of any electronic air cleaner cells containing metal oxide contaminants must be performed using room temperature or cold water. NEVER add acid detergent to hot water.

2. Following the instructions for temperature of the water and the amount of acid detergent used, prepare the acid detergent solution. The amount of detergent and the soaking time is determined by the amounts and type of contaminants captured by the cells together with the difficulty encountered in their removal. The usual mix for acid solution is 2 ounces (56.0 g) of acid detergent to 1 gallon (59.2 mL to 3.8 L) of water.

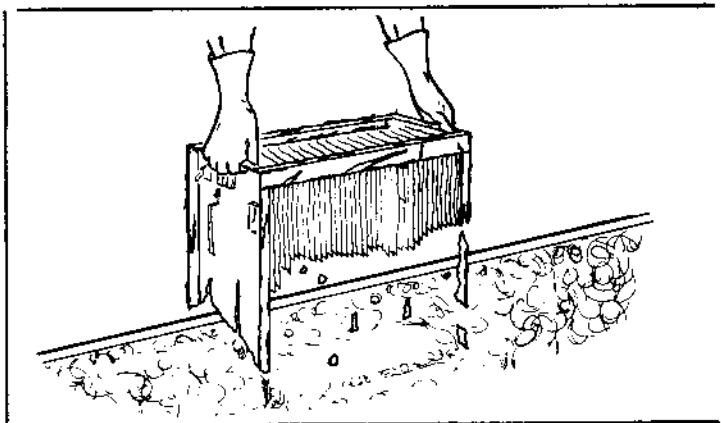


Figure 17. Excessive time in acid solution will harm the electronic cell

3. Be sure to observe the cleaning operation when the cells are placed in the acid detergent solution. The strength of the acid detergent solution should be reduced by the addition of water if large amounts of bubbles are released in less than 30 seconds after immersion of the cells. The cells must NOT remain in the acid detergent solution more than 30 seconds after vigorous reaction begins. Remove the cells and inspect the cleaning action. If contaminants remain, return the cells to the solution.

### IMPORTANT

After contaminants are removed by the acid detergent solution, any additional time the cells remain in the solution only serves to decrease their life (See Figure 17).

4. Rinse the cells in plain water after removing them from the acid detergent solution thoroughly for at least 15 minutes.
5. Allow the cells to drain and dry before reinstalling them in the air cleaner.

## STAINING

After the cleaning process the cell may seem stained. If the stain is dark or black, it is probably detergent residue which has not been rinsed off. Re-rinse the cell immediately. Detergent residue may affect the electronic air cleaner's efficiency.

## CLEANING THE ELECTRONIC CELLS (Continued)

Yellowing of the cells is a stain that the acid detergent solution will remove. However, a yellowing stain does not affect air cleaner efficiency.

### PHYSICAL FORCE METHODS

The following physical force methods may be required to clean some contaminants from the cells. DO NOT use these methods to clean filter screens.

**CAUTION:** Never use an acid detergent solution under pressure unless approved by the equipment manufacture and without exercising extreme care to prevent injury to personnel.

1. High pressure air or water should be adequate. However, care must be taken to avoid physically damaging the cells. If air or water are not adequate, an alkaline detergent solution may be used if allowed by the pressure equipment manufacture (See Figure 18).
2. Steam may be used with extreme care being exercised to avoid warping or bending the collector plates of the cells or causing any other damage. Use insulated gloves to handle cells after steam cleaning. The cells will be hot and care must be taken to avoid burning personnel.

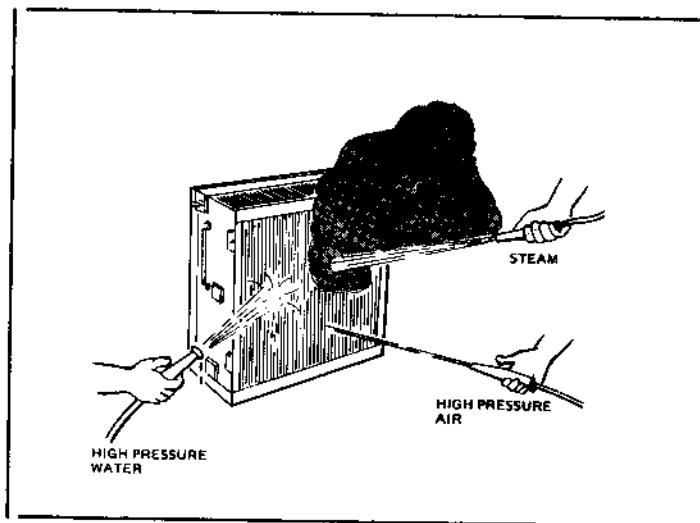


Figure 18. Using physical force to remove collected contaminants.

## CONTAMINANTS AND CLEANING METHOD

CONTAMINANT	CLEANING PROCEDURE
Animal Hair	Alkaline Solution
Cabosil	Alkaline Solution High Pressure Air
Carbon: (carbon black, soot, lamp black, graphite, charcoal dust, etc.)	Alkaline Solution High Pressure Air High Pressure Water
Cooking Oils: Vegetable (soybean, peanut.etc.) Animal (lard, butter, etc.)	Alkaline Solution Steam
Cotton fibers	Alkaline Solution
Dust (silicon dioxide and calcium carbonate and mineral type compounds)	Alkaline Solution
Flour Dust	Alkaline Solution
Linseed Oil	Alkaline Solution
Lubricants	Alkaline Solution High pressure water
Metal oxides	Alkaline Solution
Metals	Alkaline Solution
Mineral oil (petroleum base, diesters, and silicone)	Alkaline Solution High pressure water
Paper products	Alkaline Solution
Paint: oil base water base	Alkaline Solution Alkaline Solution
Pine tar resins	Alkaline Solution Steam
Polyethylene	Alkaline Solution
Polyphenyleneoxide	Alkaline Solution



## CLEANING THE ELECTRONIC AIR CLEANER (Continued)

CONTAMINANT	CLEANING PROCEDURE
Polypropylene	Alkaline Solution
Rubber moulding accelerators	Alkaline Solution
Soaps	Alkaline Solution
Sodium chloride	Alkaline Solution
Sugars (includes molasses)	Alkaline Solution Steam
Talc	Alkaline Solution High pressure steam
Tobacco tars and smoke	Alkaline Solution
Varnishes	Alkaline Solution
Waxes (all types)	Alkaline Solution Steam
Welding fumes	Acid Solution
Wood products	Alkaline Solution

(Cleaning procedures are listed in order of preference.)

### REPLACING ELECTRONIC CELLS AND PREFILTERS

Prior to replacing the electronic cells, visually check the cells for bent or damaged collector plates and broken ionizing wires. Bent or warped collector plates may be bent back into their proper shape.

Broken or damaged ionizing wires must be replaced to provide top efficiency. Remove all parts of a broken or damaged wire. Replacement wires are cut to length and ready for installation. Replace wires using the following procedure:

1. During removal and installation use care to avoid damaging the spring connector or other parts of the cell (See Figure 19).
2. Remove broken ionizing wires by removing hook "T" end of the wire from keyhole slot at one end of the cell and the hook "C" end at the other end of the cell.
3. Install new ionizing wires by connecting the hook "T" end of the wire to the keyhole slot at one end of the cell and using needlenose pliers pull down the wire and insert the hook "C" end at the other end of the cell.

## REPLACING CELLS AND PREFILTERS (Continued)

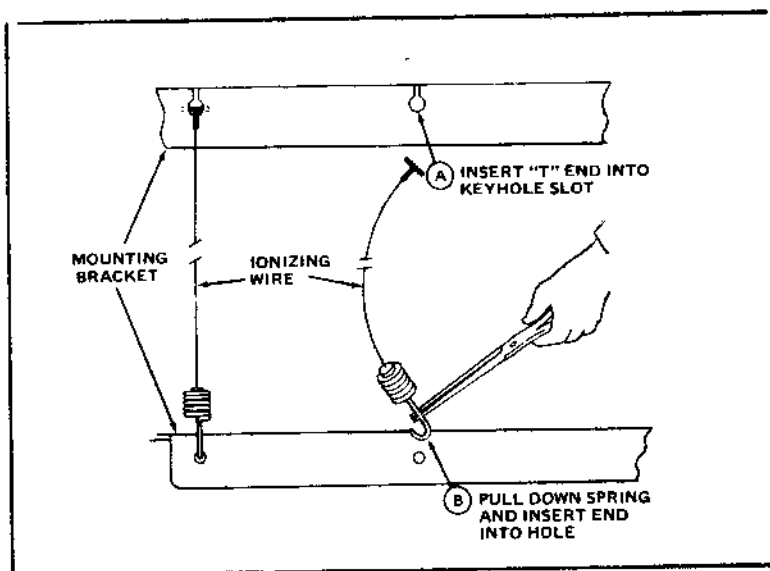


Figure 19. Replacing Ionizing Wires.

4. Prior to replacing the electronic cells, check the cell for a short circuit. Checking for a short circuit is accomplished by using an ohmmeter to check the resistance between the frame and both the ionizer wires and the collector contacts of the cell. In both cases the ohmmeter reading should be an open circuit (infinite resistance).
5. The electronic cells can only be installed the correct way since the air cleaner has a cell key preventing replacement incorrectly.

When installing the cell, if it seems to resist or be stuck, check the cell and air cleaner key to be sure it is in the correct attitude for installation. Avoid using excessive force to prevent damaging the cell or air cleaner.

Cells installed while wet will not function and the air cleaner indicator light will not light until the cells are dry.

6. Replacing the prefilters with cleaned or new filters is just a matter of inserting the filters into their holder in the air cleaner.

### SUMP PAN CLEANING

Periodically inspect and clean the sump and the drain. This is normally accomplished by removing the 8 inch diameter hose(s), opening the dampers and manually cleaning the sump. If a large quantity of liquid is found, remove the drain plug in the bottom of the sump and drain into a drain pan. The use of scrapers, rags and vacuum cleaners may be in order to effectively clean the sump.

# TROUBLESHOOTING

## CAUTION

1. During troubleshooting, dangerous line voltage circuits are exposed. Use extreme care to avoid electrical shock and to prevent equipment damage.
2. Although not normally lethal, the air cleaner power supply high voltage can cause serious injury. Use extra caution when working in this area of the equipment.
3. To prevent injuries that can be caused by the air cleaner motor and fan always turn the air cleaner power Off using the front panel control switch before opening the access doors.
4. Do NOT place any heavy object, such as a ladder, against the air cleaner.

## TROUBLESHOOTING PROCEDURE

This procedure presumes that the aircleaner is assembled correctly. If there is any doubt recheck "Assembly" procedure in this manual.

Follow each step of this procedure to insure the quick detection and proper repair of any malfunction in the air cleaner.

### Troubleshooting Test Equipment And Tools

- o Test Meter - Simpson Model 248 Volt ohmmeter or equivalent.
- o Neon Test Lamp - commercially available.
- o Silicon Diode - spare unit.
- o Screwdrivers - long shank with insulated handles.
- o Pliers - needlenose or long nose with insulated handles.
- o Soldering Iron - Weller Model 8200 100/140 Watts or equivalent.

## TROUBLESHOOTING (Continued)

Prior to troubleshooting a problem with the air cleaner, observe the flowchart shown in Figure 20. The numbered boxes indicate the sequence and describe actions to perform. The responses outside of each block indicate the directions to follow. Un-numbered boxes are the tasks to be performed after each numbered sequence block. Complete the troubleshooting procedure by performing the following procedures.

**NOTE:** If the F66V is a double-pass unit, all cell and high voltage power supply troubleshooting procedures must be repeated for each of the two stages.

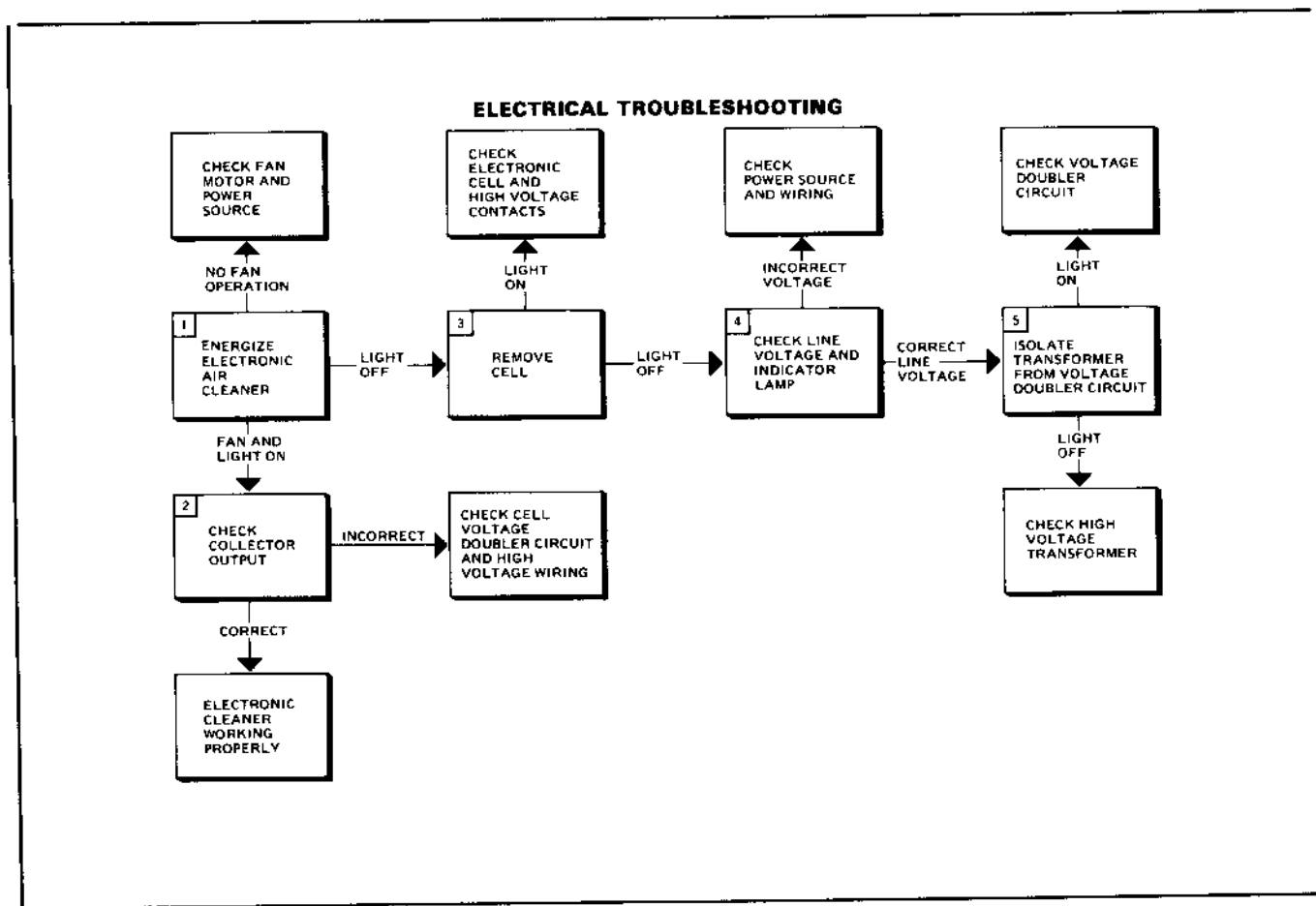


Figure 20. F66V Troubleshooting Chart

## DIAGNOSTIC CHECKS

### 1. ENERGIZE ELECTRONIC AIR CLEANER

a. Check that the electronic cleaning cells are properly installed. The airflow arrow should be pointing to the fan. The cells should be clean and dry. (Although wet cells may be placed into the air cleaner while wet, the cleaner will not operate until the cells are dry.)

- b. Check that the filters are installed correctly.
  - c. Close the access door properly and turn the air cleaner control switch On.
  - d. If there is airflow and the light is On, proceed to step 2.
  - e. If there is No airflow, proceed to step 5.
  - f. If the light is Off, proceed to step 6.
2. CHECK COLLECTOR OUTPUT VOLTAGE
- a. Turn the air cleaner Off and open the access door to the cleaning cells.
- NOTE: The belt may be removed from the motor to prevent airflow.
- b. Operate the interlock safety switch with the power switch On.
  - c. Using voltmeter set to the 5000 Vdc range, measure the voltage from the collector contact to ground (See Figure 21). Collector voltage should be approximately 4600 Vdc (reading may vary from 3950 to 4800 Vdc).
  - d. Using voltmeter set to the 10000 Vdc range, measure the voltage from the ionizer contact to ground (See Figure 21). Ionizer voltage should be approximately 9200 Vdc (reading may vary from 8400 to 9600 Vdc).
3. CHECK CELLS, VOLTAGE DOUBLER CIRCUIT AND HIGH VOLTAGE TRANSFORMER
- a. Turn Off the air cleaner and release the safety interlock switch. Short circuit the collector and ionizer contacts by placing a screwdriver to the collector contact-to-ground and the ionizer contact-to-ground (See Figure 21). This will bleed off high voltage still present in the power supply after air cleaner is turned Off.
- NOTE: The belt may be removed from the motor to prevent airflow.
- b. Remove the cleaning cells and actuate the safety switch with the power switch On.
  - c. Using voltmeter set to the 5000 Vdc range, measure the voltage from the collector contact-to-ground (See Figure 22). Collector voltage should be approximately 4700 Vdc (reading may vary from 4250 to 4900 Vdc).
  - d. Using voltmeter set to the 10000 Vdc range, measure the voltage from the ionizer contact to ground (See Figure 22). Ionizer voltage should be approximately 9400 Vdc (reading may vary from 8600 to 9600 Vdc).
  - e. If the voltage measurements are correct, check the electronic cells per step 7. If the voltage measurements are not correct, check the high voltage circuit wiring to the power supply per steps 9, 10, 11 and 12.

4. ELECTRONIC AIR CLEANER IS WORKING PROPERLY

- a. Release the actuated interlock safety switch.
- b. Read the SERVICE section to learn how to clean the electronic cells, if required.

5. CHECK FAN, MOTOR, AND POWER SOURCE

- a. Turn Off air cleaner and open the access door to the fan and motor.
- b. Examine the motor for evidence of overheating and physical damage. Make sure that the motor can rotate freely. Repair or replace worn or damaged parts as required.

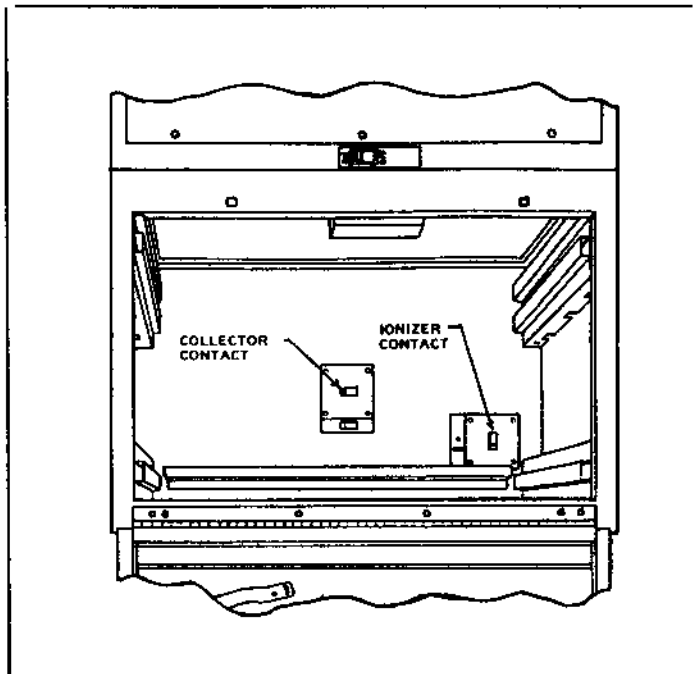


Figure 21 Cell Insulators & Contacts

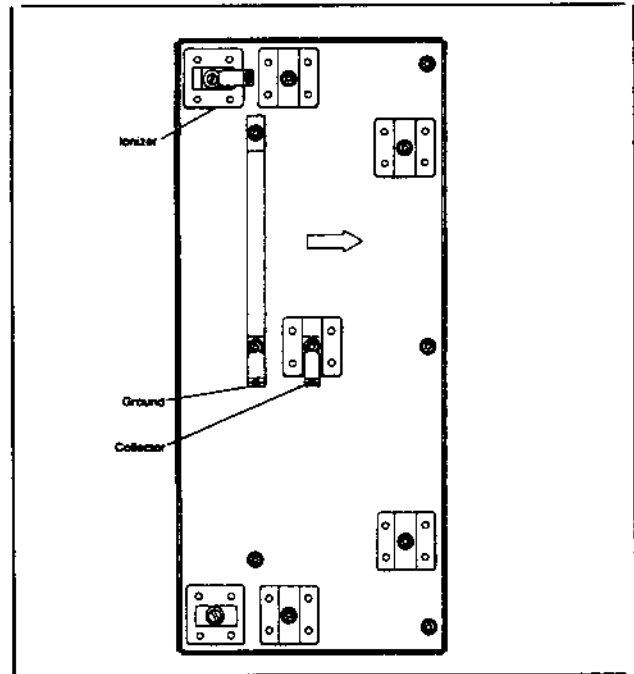


Figure 22 Cell Input Voltage Measuring Points.

5. CHECK FAN, MOTOR, AND POWER SOURCE(Continued)

- c. Activate the interlock safety switch and measure the motor voltages (Refer to "Model Number Key" and nameplate for proper motor voltages).
- d. If the voltage measured is correct, check the motor capacitor, motor circuit wiring and fan motor for evidence of overheating or physical damage.

6. REMOVE CELLS AND ENERGIZE ELECTRONIC AIR CLEANER

- a. Turn Off the electronic air cleaner power and open the access door of the cleaning cells.

b. Release the safety interlock switch. Short circuit the collector and ionizer contacts by placing a screwdriver to the collector contact-to-ground and the ionizer contact-to-ground (See Figure 21). This will bleed off high voltage still present in the power supply after air cleaner is turned Off.

c. Remove the electronic cells, close the access door and turn the electronic air cleaner On.

#### 7. CHECK ELECTRONIC CELLS

a. Turn the electronic air cleaner Off.

b. Visually inspect the cleaning cells for bent collector plates. Bent collector plates may be straightened using needlenose pliers. If the cell is damaged beyond repair, replace the cell.

c. Remove dirt accumulated on the insulators and on both the ionizer and collector contact tabs (See Figure 21).

d. Make sure the cell contact tabs are making good contact with the air cleaner contacts.

e. Replace broken or damaged ionizing wires (See SERVICE section).

f. Using an ohmmeter set to the highest range check the resistance between the outside frame of the cleaning cell and both the ionizer and collector contacts. The ohmmeter reading should be an open circuit (infinite resistance).

#### 8. CHECK INDICATOR LIGHT AND LINE VOLTAGE

a. Turn the air cleaner Off and open the cell access door. Remove the panel to gain access to the indicator light.

b. Actuate the interlock safety switch and turn the air cleaner On.

c. Set the voltmeter to the 150 Vac range and measure the voltage across the indicator light terminals. If the voltage is about 120 Vac, replace the light.

d. If the voltage at the terminals is NOT CORRECT, use the voltmeter to check the power supply input voltage at terminals L1 and L2 on the control switch. If the power supply input voltage is NOT CORRECT, proceed to step 9.

e. If the power supply input voltage is CORRECT, proceed to step 10.

#### 9. CHECK WIRING AND POWER SOURCE

a. Check the wiring and connectors from the power supply circuit board to the power source. Repair or replace defective wiring or connectors.

b. Using voltmeter set to the 10000 Vdc range, measure the voltage from point R to Ground and point Y to Ground on the power supply circuit board (See Figure 23). The power supply circuit board schematic diagram is shown in Figure 24.

c. If the voltage is NOT CORRECT (the same as the voltages measured in Step 3), turn Off power and using an ohmmeter check the continuity of the wire(s) from the cell contacts and circuit board terminals R and Y.

d. If the voltage is CORRECT (same as the cell contacts), unplug the 2 quick-connectors on the diodes (See Figure 23), and proceed to Step 11.

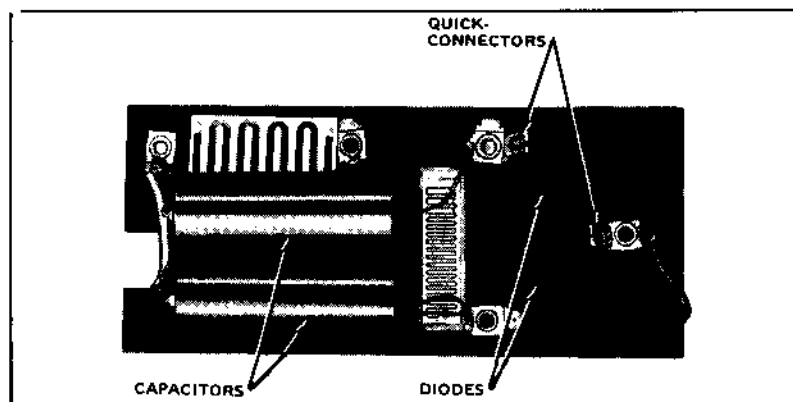


Figure 23. Power Supply Circuit Board.

#### 10. ISOLATE TRANSFORMER FROM VOLTAGE DOUBLER CIRCUIT

a. Turn Off the air cleaner.

#### CAUTION

Hazardous voltages may be present. Electrical interlocks may not disconnect air cleaner power with the access panels removed. Use extreme care to avoid electrical shock and to prevent equipment damage.

b. Remove the blower access door to gain access to the power supply.

c. Unplug the 2 quick-connectors on the diodes mounted on the power supply circuit board (See Figure 23). These quick-connectors connect the voltage doubler circuit and the high voltage transformer.

d. Turn the air cleaner On.

e. If the light comes On, go to Step 11.

f. If the light remains Off, go to Step 12.



## 11. CHECK VOLTAGE DOUBLER CIRCUIT

### CAUTION

1. Be sure the air cleaner is Off before connecting or disconnecting any component.
2. Use a plastic or rubber handled screwdriver to discharge the capacitors by shorting their leads to ground.

- a. Turn Off the air cleaner and inspect the voltage doubler circuit components for any sign of overheating or physical damage.
- b. Connect the free end of diode 2 to termination point Y (See Figure 23). Leave diode 1 disconnected at termination point W.
- c. Turn the air cleaner On. Diode 2 and Capacitor 2 are good if they meet the following requirements:
  - a) the voltage across Capacitor 2 (point Z to ground) is over 3500 Vdc.
  - b) when discharging the capacitor to ground with a plastic or rubber handled screwdriver, a moderate, blue, snapping spark is observed.
- d. If the procedure in step c indicates a defective component, unplug diode 2 and temporarily substitute a known good diode. Repeat step c. A good check confirms diode 2 is at fault; replace diode 2. If a good check is Not obtained, replace capacitor 2.
- e. Turn Off the air cleaner and disconnect diode 2. Reconnect diode 1.
- f. Turn the air cleaner On. Diode 1 and Capacitor 1 are good if they meet the following requirements:
  - a) the voltage across Capacitor 1 (point Z to ground) is over 3500 Vdc.
  - b) when discharging the capacitor to ground with a plastic or rubber handled screwdriver, a moderate, blue, snapping spark is observed.
- g. If the procedure in step f indicates a defective component, unplug diode 1 and temporarily substitute a known good diode. Repeat step c. A good check confirms diode 1 is fault; replace diode 1. If a good check is Not obtained, replace capacitor 1.
- h. If a good check is still Not obtained, go to Step 12.

## 12. CHECK THE HIGH VOLTAGE TRANSFORMER

a. Check the resonant capacitor (located under the power supply circuit board) for any sign of electrical or physical damage, such as burning, leaking oil, or damaged insulators. If damaged, replace the capacitor and clean up any leaking oil.

b. If the resonant capacitor is good, replace the high voltage transformer.

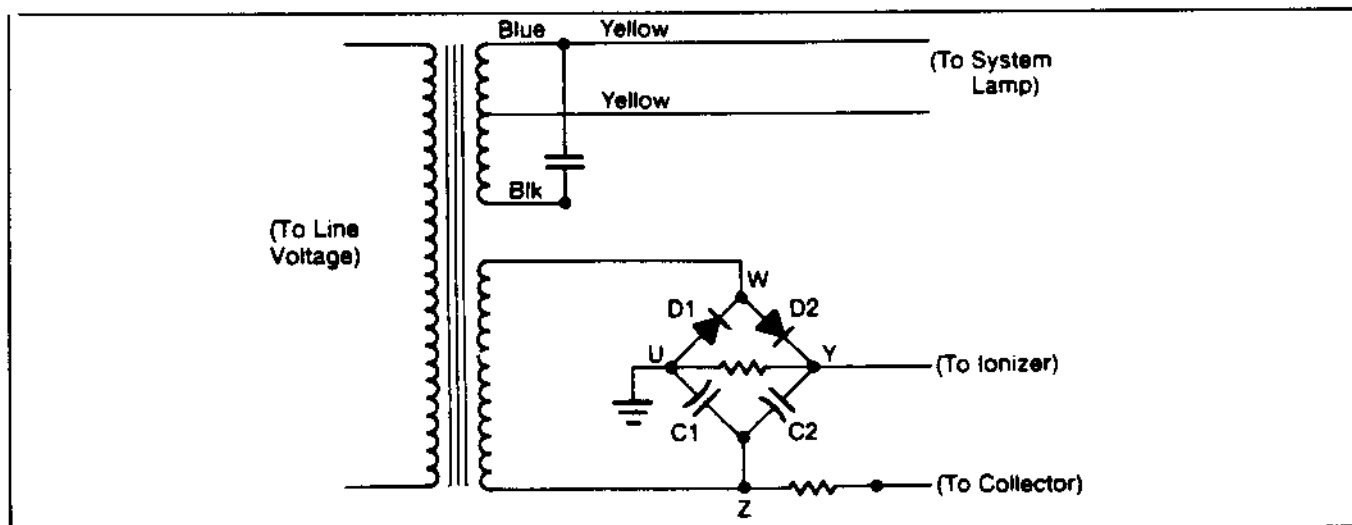


Figure 24. High Voltage Power Supply Schematic.

## MODEL NUMBER KEY

F indicates electronic air cleaner	F	66	V	1	2	13	Airflow (100's cfm) 13 = 1300
66 indicates model line		66					Power requirements
V = vertical Airflow Direction		V					1 = 120 VAC 1 PH 2 = 240 VAC 1 PH
							3 = 208 VAC 1 PH 4 = 208 VAC 3 PH
							5 = 230 VAC 3 PH 6 = 460 VAC 3 PH
							Number of cleaning passes
							1 = single pass
							2 = double pass

Figure 25. Model Number Key

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# GUIDE SPECIFICATIONS

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## MODEL F66V

**Scope:** The following describes a self-contained, industrial grade, electronic air cleaning device mounted on a movable, roll-around base with integral, adjustable, source capture ducting.

### Description:

1. Single phase powered units shall be provided with integral cord and plug assemblies.
2. High voltage power supply design shall limit short circuited output current to less than 5 ma.
3. Standard collection cells (2) to weigh no more than 33 pounds each to facilitate manual handling during service.
4. Voltage gradient within collector section to be over 20,000 volts per inch.
5. Unit shall have a total electronic cell plate area of at least 218 ft<sup>2</sup>.
6. Roll-around base assembly shall be liquid tight with a means for draining any accumulated liquid.
7. Roll-around base shall have two air intake locations, both 8" diameter and both capable of being individually dampered closed.
8. Source capture arm shall be self supporting and able to be positioned by hand and then remain stationary.
9. Unit shall have 4-way diffuser grille at exhaust of blower.
10. Unit shall have variable sheave drive from motor to blower providing for blower speed adjustment.
11. Blower motor shall be of TEFC construction with ball bearings.
12. Design of air cleaner shall limit production of noxious ozone to within OSHA approved levels.
13. Unit shall include 1" metal mesh prefilter and postfilter.
14. Unit shall have test button and system lamp to indicate proper operation of high voltage power supply.
15. Metal cabinet to be 16 gauge steel.

# CERTIFICATE OF WARRANTY

## LIMITED ONE YEAR SMOKEMASTER WARRANTY

Air Quality Engineering, Inc. warrants the SmokeMaster Electronic Air Cleaners to be free from defects in workmanship or materials, under normal use and service, for a period of one (1) year from the date of purchase by the consumer. If, at any time during the warranty period, the product is defective or malfunctions, Air Quality Engineering, Inc. shall repair or replace it (at Air Quality Engineering's option) within a reasonable period of time.

If the product is defective,

(i) return the unit or defective component with a bill of sale or other dated proof of purchase, to the retailer from which you purchased it, or

(ii) package the unit or component, along with proof of purchase (including date purchased) and a short description of the malfunction, and mail or ship, postage or freight prepaid, to the following address:

**AIR QUALITY ENGINEERING, INC. Customer Service, 3340 Winpark Dr., Minneapolis, MN 55427**

The repaired or replaced part or unit will be shipped by Air Quality Engineering, Inc. to the purchaser, freight collect, with the purchaser to be responsible for all freight charges. The warranty on any repaired or replacement part shall be for a duration of time no longer than the remaining or unexpired term of the original warranty. This warranty does not cover any labor or other service charges incurred by the purchaser.

This warranty shall not apply if it is shown by Air Quality Engineering that the defect or malfunction was caused by damage which occurred while the product was in the possession of a consumer.

Air Quality Engineering's sole responsibility shall be to repair or replace the product within the terms stated above. AIR QUALITY ENGINEERING SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY, EXPRESS OR IMPLIED, APPLICABLE TO THIS PRODUCT. Some states do not allow the exclusion or limitation of consequential damages, so this limitation may not apply to you.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY EXCLUDED BEYOND THE ONE YEAR DURATION OF THIS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

**AIR QUALITY  
ENGINEERING**

AIR QUALITY ENGINEERING, INC.  
3340 WINPARK DRIVE  
MINNEAPOLIS, MINNESOTA  
55427-2083

MANUFACTURER & WORLDWIDE DISTRIBUTOR OF AIR CLEANING SYSTEMS