

TRION ELECTRONIC AIR CLEANER



INSTALLATION OPERATION SERVICE

**MODEL 49 TYPE IMP
INDUSTRIAL MIST PRECIPITATOR**



TRION, INC.

SANFORD, NORTH CAROLINA 27330

Phone: (919) 775-2201

INSTALLATION - OPERATION - SERVICE

INDUSTRIAL MIST PRECIPITATOR

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I. PRINCIPLE OF OPERATION & GENERAL DESCRIPTION

The Trion Industrial Precipitator is a tandem, two stage, dual voltage, electronic cleaner designed to remove particulate matter from gas. The matter may be a product contaminant or an air pollutant and may or may not be a salvageable item.

In the first stage of operation, the particles to be collected, pass through an ionizer where they are electrically charged, by a corona discharge, regardless of their size. In the second stage of operation, these charged particles pass into a collector where they are electrically attracted and collected. Although these first two stages are relatively efficient, any penetration that may occur is then passed through a second ionizing-collecting section identical to the first where the process is repeated.

The ionizer consists of electrically charged, 24 Ga. stainless steel blades supported between grounded electrodes. The collector consists of a series of parallel plates arranged so that each alternate plate is electrically charged with each inter-leaving plate electrically grounded. The charged plates are of the same polarity as the ionizing blades and charged particles so that they repel, while the grounded plates, being of opposite polarity, attract.

Primarily, collected matter falls within one of two categories; solid or liquid. The liquid particles are, to a large degree, self cleaning in that when agglomerated into droplets of adequate weight, they roll off the vertically positioned collector plates to a drain pan where the accumulated collection is piped away, either as refuse or a salvageable item.

When the precipitator is applied to solid matter, cleaning is effected by other means, as outlined in special or additional instructions, with the method of cleaning and frequency being dependent upon the amount and type of contaminant to which the unit is subjected.

The ionizing-collecting cells are primarily constructed of aluminum with Galfan® end plates and supports, have a handling weight of approximately 121 lbs. each, and are mounted on slide rails in a welded steel cabinet. Mechanical filters, serving as air distribution baffles and protective screens, are located on both the inlet and outlet of the cabinet. Both cells and filters are accessible through a single access panel which is electrically interlocked with the primary input to the power supply. The access panel weighs approximately 40 lbs. and is gasketed against leakage with oil resistant material.

The cabinet bottom serves as a drain pan, is pitched toward one side and fitted with a 1" drain nipple. Two mounting support channels run the entire width of the cabinet bottom. Refer to Drawing 141934, Page 12, for installation weight and dimensions.

Internally the following materials are exposed and subjected to the gas flow through the cabinet:

Aluminum	Nylon
Stainless Steel	Silicone Rubber
Mild Steel	Teflon
Cadmium	Nickel
Galfan	Glass Reinforced
Zinc Oxide	Polyester

The Power Supply is contained in a weather tight steel housing with a hinged door and inter-access panel that is electrically interlocked with the primary input power. It is designed for remote mounting with mounting holes located in the rear of the housing. The Power Supply converts 120 VAC, 60 Hz input into the high voltage direct current necessary to energize the ionizing-collecting cell. The primary circuit contains a circuit breaker, an electrical interlock, and a pilot light. In addition to the necessary high voltage components, the secondary contains a meter to indicate the secondary current and, when specified, will provide high and low contact closure (and opening) for remote signaling control. Refer to Drawing 141935, Page 13, for installation weight and dimensions.

Two high voltage leads are furnished with the unit to connect the power supply to the ionizing-collecting cells.

Two distinct functional components comprise the complete cleaner:

1. The Ionizing-Collecting Cells to ionize and collect the particulate matter from the gas.
2. A Power Supply to furnish the high voltage direct current to energize the ionizing-collecting cells.

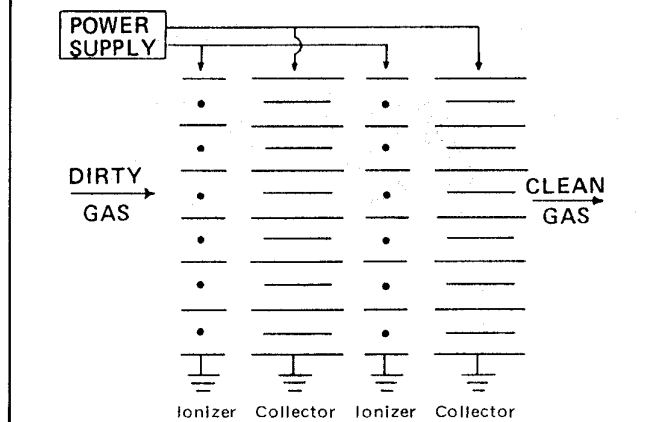


Fig. 1 Schematic of Typical Cleaner

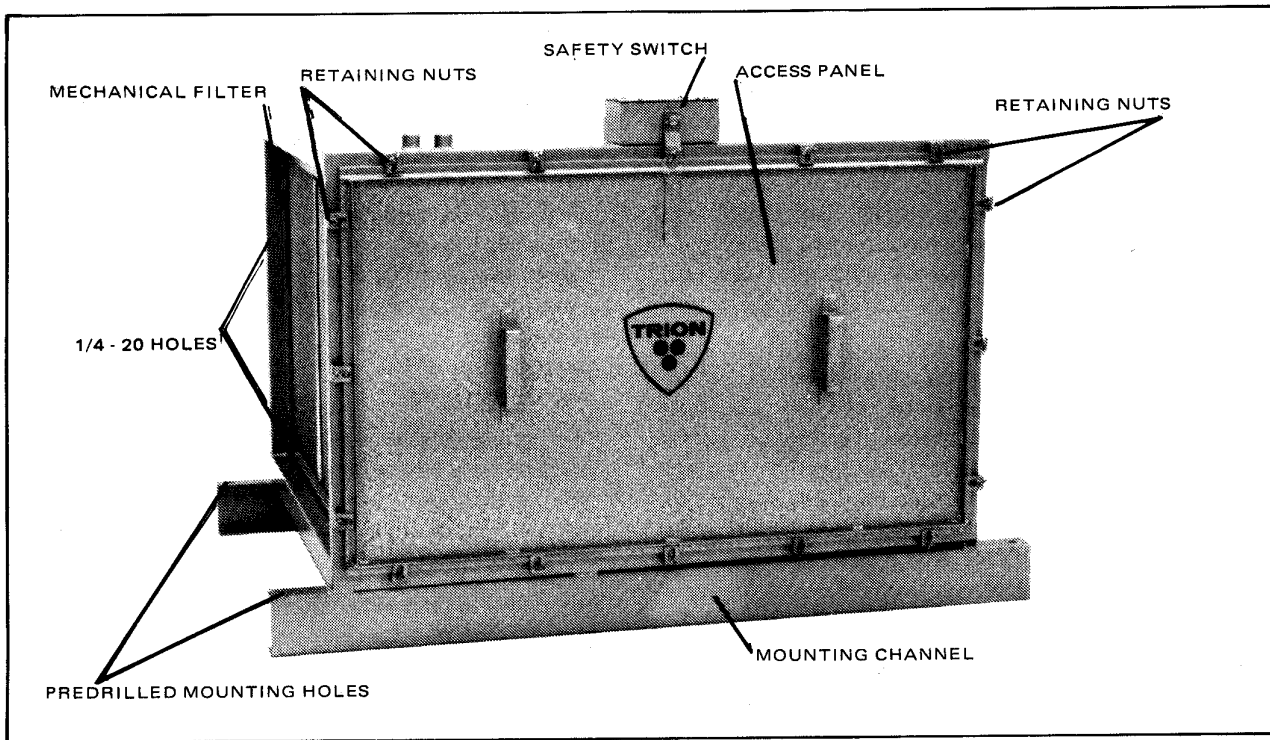


Fig. 2 Model 49 Type IMP

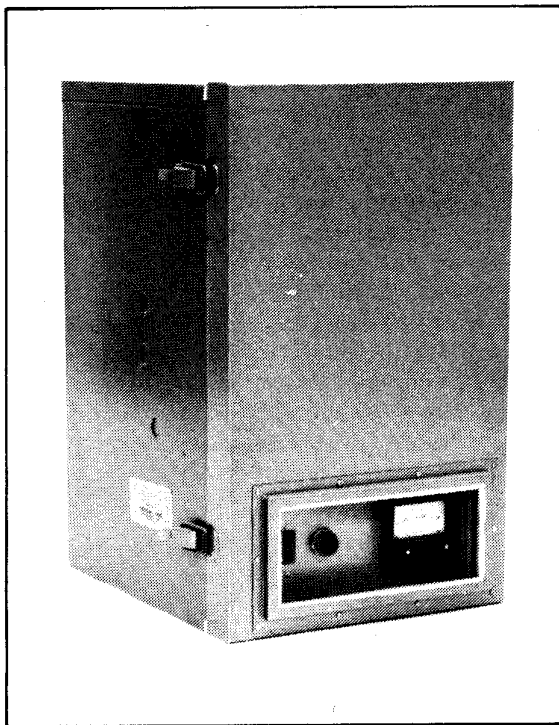


Fig. 3 Power Pack

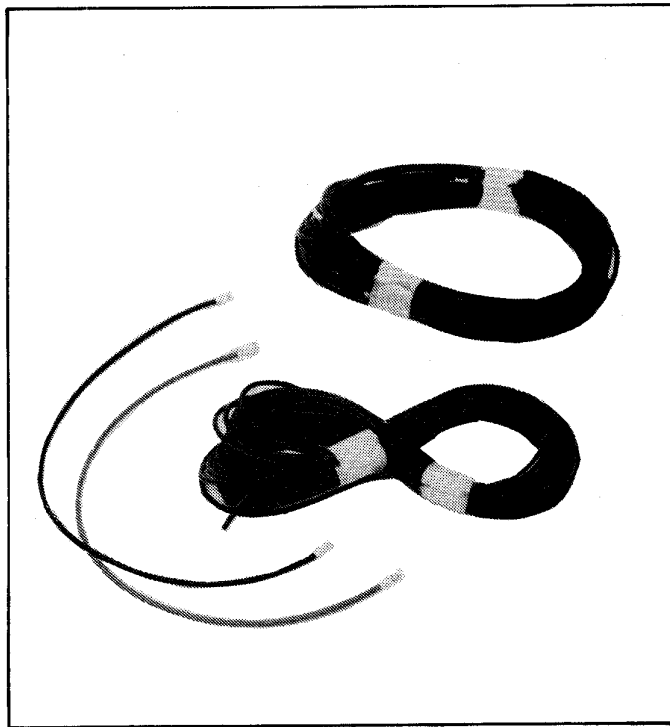


Fig. 4 High Voltage Leads

II. INSTALLATION

A. UNPACK

Normally, the shipment includes one container. The power pack; high voltage leads (See Figures 3 & 4); instructions; and, the precipitator cabinet, complete with mechanical filters and ionizing-collecting cells. (See Figure 2)

Any shipping damage noted upon receipt should be immediately referred directly to the carrier and a claim filed. When receipt has been cleared, all crating and blocking used in shipment should be carefully removed.

B. SELECT MOUNTING LOCATION

Consideration must be given to five main points when selecting the mounting location.

1. Temperature:

The temperature of the gas through the precipitator must not exceed +180 degrees F and also be low enough so that all vapors and/or mists have fully condensed into particulate matter. The unit's purpose may be defeated if warm materials pass through the unit in a gaseous state, then condense into a mist downstream from the collector elements. Adequate duct runs between the contaminant source and precipitator, or a chill means, must be provided to lower the gas temperature to a satisfactory point. The minimum temperature to which the precipitator should be exposed is -40 degrees F.

The power supply should be located and mounted within 100 feet of the precipitator cabinet. It should not be located in an ambient temperature above +80 or below +40 degrees F to obtain desired component life. The maximum range to which the power supply should be exposed is +40 to +160 degrees F.

2. Flow Distribution:

Gas flow to the precipitator from either a single or multiple source must be evenly distributed over the entire face of the entering side. Both of the mechanical pre and after filters provide some resistance to the gas flow to aid in even distribution of flow, but sufficient space for normal expansion, turning vanes, louvers, distribution plates or other means must be provided, if necessary, to effect even flow distribution. Uneven flow distribution will result in reduced efficiency.

3. Leveling:

The unit is basically designed for horizontal flow, especially when applied to liquid type collection, and the precipitator cabinet should be installed level on its mounting channel to facilitate proper drainage, both from internal vertically arranged collector plates and the pitched drain pan.

Although not as critical as the precipitator cabinet, the power supply should be level within reason from the standpoint of appearance and ease of service.

4. Flow Direction:

The unit, as shipped, has the ionizing-collecting cells installed for gas flow from left to right when facing the access panel. The direction of flow, however, can be easily changed to right to left during installation. Select the air flow direction which will give the most satisfactory ducting to and from the unit.

5. Service Access:

Adequate space should be provided in front of the power pack and precipitator cabinet for component removal and service. Refer to Drawing 141934 and 141935, Pages 12 and 13, for space required.

C. INSTALLATION OF PRECIPITATOR

- (a) Loosen retaining nuts and remove access panel.
- (b) Remove both ionizing-collecting cells and temporarily store them on a flat, clean surface in a safe location.
- (c) Remove the mechanical filters from both sides of the cabinet.
- (d) Mount the cabinet in a level position in the selected location on the mounting channel. Refer to Drawing 141934, Page 12, for the pre-drilled mounting hole location.
- (e) Attach adjoining duct work. As the cabinet is ambidextrous with respect to gas flow, the intake may be connected to either side. The cabinet openings on both sides contain rows of 1/4-20 holes, spaced as shown on Drawing 141934, Page 12, for attaching ducts; however, any mechanical means is satisfactory as long as the seams are tight to prevent leakage. If mechanical fasteners are employed, in lieu of welding, the seam joints should be gasketed or caulked with materials impervious to and compatible with the gas flow and particulate matter being collected. Depending on the application, it may be advantageous to slope the bottom of the inlet duct run toward the drain pan so that any liquid impingement on the duct walls will run toward the unit.

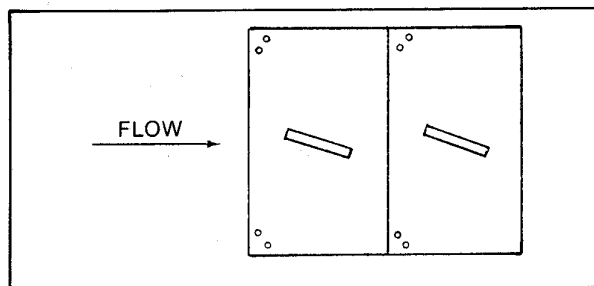


Fig. 5 Standard Flow - Left to Right

- (f) The cabinet drain is next connected depending on the type and condition of materials collected. If the materials are salvageable, it may be piped to a reservoir or sump, but if not salvageable and is discharged directly into sewers, it should be done in accordance with governing plumbing codes. In either event, the drain line should be trapped to prevent by-pass and if the drain is not employed for any reason, the drain fitting should be closed off.
- (g) Reinstall the mechanical filters and ionizing-collecting cells. If the gas flow through the unit was set up from left to right, install the cells in the same position within the cabinet as received. If the flow through the unit is from right to left, simply rotate both cells 180°.

(When the direction of flow has been set for either one of the two possible directions, be sure the flow goes through ionizers before the collector plates when the cells are installed.)

When the cells are rotated 180° to change direction of air flow, the high voltage spring clip connectors must be removed from their mountings and moved to the opposite end of the cell. (See Figure 8)

- (h) Do not replace the access panel until the high voltage wiring has been completed.

D. INSTALL POWER PACK

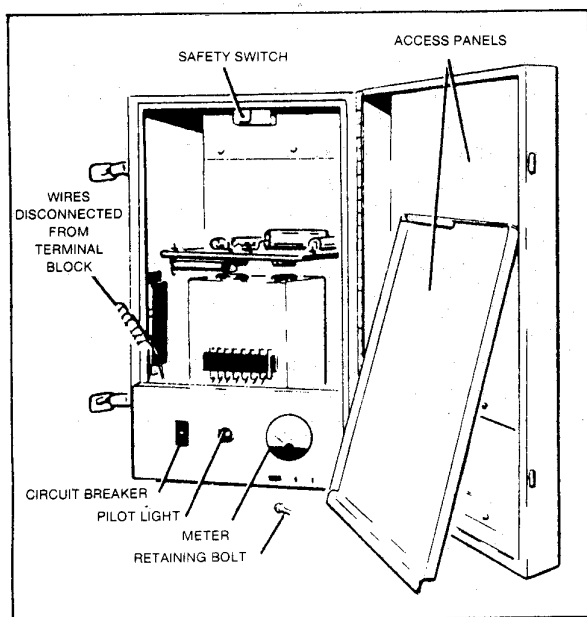


Fig. 7 Power Pack

- (a) Open the access panels and remove the power supply on its chassis from the housing. This is accomplished by disconnecting the wires connected to the terminal block and removing the retaining bolt(s) located in the front of the bottom chassis and retaining brackets located at the top of the rear upright chassis. The retaining brackets, used for shipping purposes only, may be discarded.
- (b) Mount the housing in the selected location within 100 feet from the precipitator cabinet. Refer to Drawing 141935, Page 13, for mounting hole location.
- (c) Reinstall the Power Supply in the housing, replace the retaining bolt and reconnect the wiring to the terminal block.

E. WIRING

1. High Voltage:

NOTE: DO NOT SPLICE HIGH VOLTAGE CABLE

Two sets of high voltage cables are furnished for the installation. (See Figure 4)

One set, approximately two feet in length, interconnects the two ionizing-collecting cells. Both ends of the cables are fitted with ring terminals. WHEN THE CONNECTION TO EACH CELL HAS BEEN MADE, BE SURE THE CABLES ARE SECURED IN THE HANGER (See Figure 8) LOCATED AT THE CABINET TOP BETWEEN THE CELLS. Refer to Connection Diagram 141936, Page 14.

The other set of cables connect the power supply to one of the cells. Each cable is to be run through a separate flexible or rigid metallic conduit. Adequate slack should be maintained at the cell ends and any excess cable that may exist should be cut off at the power pack end. When installed, the space between the cable and conduit where it enters the cabinet should be sealed with a silicone rubber sealant such as RTV or similar material.

Be sure the lead (blue) to the ionizing blades is connected to the terminal marked "12 KV" and the lead (black) to the collector plates is connected to the terminal marked "6 KV" inside the power pack.

Both power pack housing and precipitator housing must be grounded to earth ground.

Refer to Connection Diagram 141936, Page 14.

2. Primary Supply:

Refer to Connection Diagram 141936, Page 14. Note that the safety switch on the Precipitator Cabinet interrupts the hot supply line. The power pack safety switch is factory wired.

3. Remote Alarm:

When specified, the power supply is equipped with a double set point meter relay which is factory wired to the terminal board. If for any reason, the precipitator goes above or below the normal operating range set into the meter, a set of contacts will close (or open) to energize any alarm system to which it is connected. Refer to Wiring Diagram 141937, Page 15.

III. OPERATION

NOTE:

EXERCISE THE NORMAL PRECAUTIONS WHEN WORKING WITH HIGH VOLTAGE.

1. Be sure both safety switches, power pack and precipitator access panels are closed. (See Figures 2 and 7)
2. Turn circuit breaker on power pack "ON". The power pack meter should register and the pilot light should glow. (See Figure 7)

If the meter does not register and the light does not glow, check each safety switch with a test light to be sure that it is closed and that supply line power is being supplied to the power pack.

If constant arcing is heard within the ionizer-collector cells, or an erratic meter reading is noted, turn the circuit breaker "OFF" and check to see that the high voltage leads between the pack and the cells are properly connected. The blue lead to the ionizer must be connected to the pack terminal marked "12 KV" and the black lead to the collector plates must be connected to the terminal marked "6 KV".

If the connections are correct and arcing or erratic meter reading still exists check the cells to be sure the ionizing blades are centered and aligned between the ground electrodes and that the collector plates are not bent or deformed and that no large particles of foreign material are lodged between them.

3. Check safety switch operation. With the unit energized, back each safety screw out several turns while observing the pilot light on the front of the power pack. The light should go out when the screws permit the switches to open and then come on when the screws close the switches.
4. When provided with the equipment, set meter relay alarm. The alarm control set points can be adjusted to monitor the operating range of the unit. It is recommended that the low set point be 5 ma and the high set point be 15 ma as the optimum operation of the unit is at 10 ma. These settings will eliminate alarms that are initiated by any slight out of range movement which may be due to occasional agitation, such as line voltage fluctuation, etc. A five second time delay relay is incorporated in the high alarm contacts of the meter relay circuit to prevent any nuisance alarm alerts by any momentary movement beyond the set point. Adjustment to both the low and high set points is made with the concentric knobs on the face of the meter.
5. The unit is now ready to place into operation by turning the circuit breaker "ON".
6. If collected material is to be salvaged, and a great degree of cleanliness is required, initial quantities of collection should be drained off and discarded until drain pan lines and other components are "rinsed" clean.

IV. MAINTENANCE

NOTE:

1. EXERCISE NORMAL PRECAUTIONS WHEN WORKING WITH HIGH VOLTAGE.

2. For convenience, it may be advantageous to disconnect the alarm system if alarm is installed, when performing maintenance.

1. PERIODIC INSPECTION & CLEANING

A. To Remove Precipitator Components

- (a) Turn Power Pack circuit breaker off and tag "DO NOT TOUCH. HIGH VOLTAGE. MEN WORKING".
- (b) Remove precipitator access panel.
- (c) Carefully disconnect and completely remove the high voltage inter-cell connecting cables and place them aside in a safe location.
- (d) Carefully disconnect and secure the high voltage cables leading from the power supply away from the cells so they do not interfere with cell removal.
- (e) Ionizing-Collecting Cells and mechanical filters may then be pulled from the cabinet.
- (f) Reinstall by reversing the procedure. NOTE: WHEN INSTALLING THE INTER-CELL CONNECTING CABLES, BE SURE THEY ARE SECURED IN THE HANGER LOCATED AT THE CABINET TOP, BETWEEN THE CELLS. Refer to Connection Diagram 141936, Page 14.

B. Ionizing-Collecting Cells

The precipitator, when applied to liquid particulate matter, is self cleaning to a degree. The continual runoff of collected material provides a cleaning action. Periodically, however, the cells should be cleaned with special attention given to the ionizing blades and insulators.

Coatings of contaminant building up on the blades and insulators can normally be removed with a small amount of solvent applied with a cloth.

When necessary, after prolonged use, the collector plate section and other components may require a good manual cleaning. Care should be taken in handling throughout the operation. High pressure commercial spray devices (such as a car wash) usually do a good job.

When initially placed into operation, the cleaning frequency for the particular application is best determined by visual examination until a routine maintenance schedule is established.

C. Pre and After Filters

When the ionizing-collecting cells are examined, the mechanical filters should also be checked, a cleaning frequency established and cleaned accordingly.

D. Drain Pan

Whenever the ionizing-collecting cells are pulled, the drain pan should be examined and any sludge deposits removed and the pan wiped clean.

E. Power Pack

Malfunction or failure of the power pack components (as well as precipitator components) will be indicated by the meter or meter alarm. When employed, the alarm should be periodically checked to be sure it is functioning properly. To check the alarm, simply turn the circuit breaker on the power pack "OFF", then "ON". To check the high set point, turn the meter knob controlling the high set point down to the reading indicated on the meter, then back to the original high set point.

The alarm circuit should energize when the two meter pointers close and de-energize when the high set point is returned to its original setting.

Periodically, the surfaces of the components within the pack should be wiped clean and the securing of connections checked.

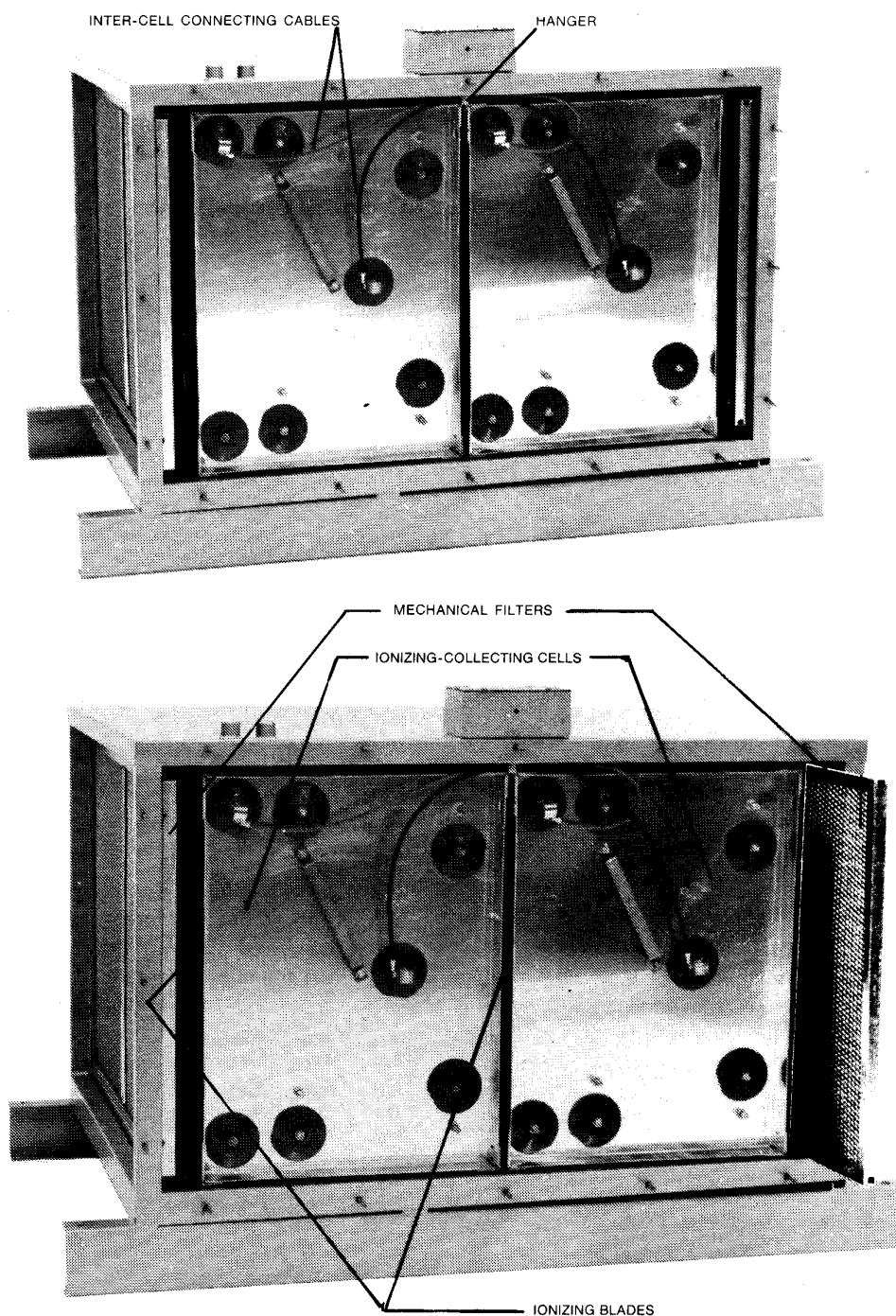


Fig. 8 Precipitator Components

V. TROUBLESHOOTING

NOTE:

1. EXERCISE THE NORMAL PRECAUTIONS WHEN WORKING WITH HIGH VOLTAGE
2. For convenience, it may be advantageous to disconnect the alarm system, if alarm is installed when troubleshooting.

1. LOW OR REDUCED EFFICIENCY

- A. Dirty ionizing-collecting cell components. Refer to cleaning instructions, Page 8, covered under IV Maintenance, B. Ionizing-Collecting Cells.
- B. Increase in gas flow above the unit rating. Reduce flow.
- C. Increase in particulate concentration above the unit rating. Reduce flow and/or concentrations.
- D. Change in ducting, flow or concentrations causing uneven distribution of velocity across the entering side of unit. Install vanes, baffles, straighteners or re-arrange ducting to provide even distribution.
- E. Low secondary voltage. Refer to Item 4, this page, Low Meter Reading.

2. POWER PACK PILOT LIGHT OFF

This condition may be accompanied by an indication on the alarm system if the installation is so equipped and is an indication of loss of primary power.

- A. If power pack circuit breaker (See Figure 7) is "OFF" reset breaker. If breaker immediately trips "OFF" after resetting, refer to 3 below, Circuit Breaker Tripping. If breaker remains "ON" after resetting, the problem was probably caused by a temporary short in the ionizing-collecting cells that cleared itself.
- B. Primary power not being supplied to power pack or open safety switch. Refer to Wiring Diagram 141937, Page 15. With trouble light, check to see that primary power is being supplied from its source to the circuit and that both safety switches are electrically closed. If a safety switch is mechanically closed but electrically open, the switch is defective and must be replaced.
- C. Defective pilot lamp. Replace lamp.

3. CIRCUIT BREAKER TRIPPING

When the circuit breaker (See Figure 7) trips immediately after reset, it is an indication of a short circuit

which may be located in any one of three major components. The power supply, the hi-voltage leads (or inter-cell connector), or the ionizing-collecting cells.

The short can be isolated to the major component in the following manner.

- A. Turn power pack circuit breaker "OFF", open access panel and disconnect the high voltage leads. Then close the safety switch and energize the power pack. If the circuit breaker remains "ON" (the meter should read zero as the normal load has been removed), the power pack is OK and the short is then isolated to the high voltage leads or the ionizing-collecting cells.
- B. Turn the power pack "OFF", and reconnect the high voltage leads. Open the precipitator access panel and disconnect both high voltage leads, secure the terminal ends away from any point of contact, close the safety switches and energize the power pack. If the circuit breaker remains "ON", the leads are OK. If the breaker trips the short is in the leads and may be further isolated to one or the other by disconnecting one at a time from the power pack and repeating the process.
- C. If the power pack and hi-voltage leads are OK, the short is then indicated as being in either one of the two cells and either in the ionizer or the plate section of the cells. By energizing each cell and each ionizer and each plate section of each cell separately using the same process as described above, the short can be isolated to a relatively small area so that it can be easily located.
- D. The most common causes for short circuits in the ionizing-collecting cells are as follows:
 - (a) Bent or misaligned ionizing blades. Blades should be centered vertically and laterally between ground electrodes. Replace bent blades immediately.
 - (b) Bent or deformed collector plates or large pieces of foreign material lodged between them. Straighten bent plates carefully. If plates are deformed to the point where they cannot be reasonably straightened, the bent plates or complete plate section (depending on the model) should be replaced.
 - (c) Broken insulators. Replace.
- E. Faulty hi-voltage leads causing short circuits should be replaced.
- F. If the short circuit is isolated to the power supply, refer to Wiring Diagram 141937, Page 15, for circuit data and troubleshooting information.

4. LOW METER READING

- A. Dirty collecting cells. Refer to cleaning instructions, Page 8, covered under IV Maintenance, B. Ionizing-Collecting Cells.
- B. Weak rectifiers. Remove and replace.
- C. Open high voltage electrical connection, between the ionizing-collecting cells. Repair or replace.
- D. Lowered supply line voltage. If condition is permanent, compensate by adjusting variable transformer setting inside power pack.

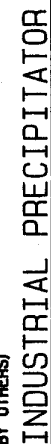
5. HIGH METER READING

- A. Dirty insulators in ionizing-collecting cells. Refer to cleaning instructions, Page 8, covered under IV Maintenance, B. Ionizing-Collecting Cells.
- B. Defective capacitor. The high reading is usually accompanied with a rapidly wavering of the meter needle and the capacitor will normally short out completely very soon. Replace capacitor. Refer to Wiring Diagram 141937, Page 15, for circuitry data.
- D. Increase in supply line voltage. If condition is permanent, compensate by adjusting variable transformer setting inside power pack.

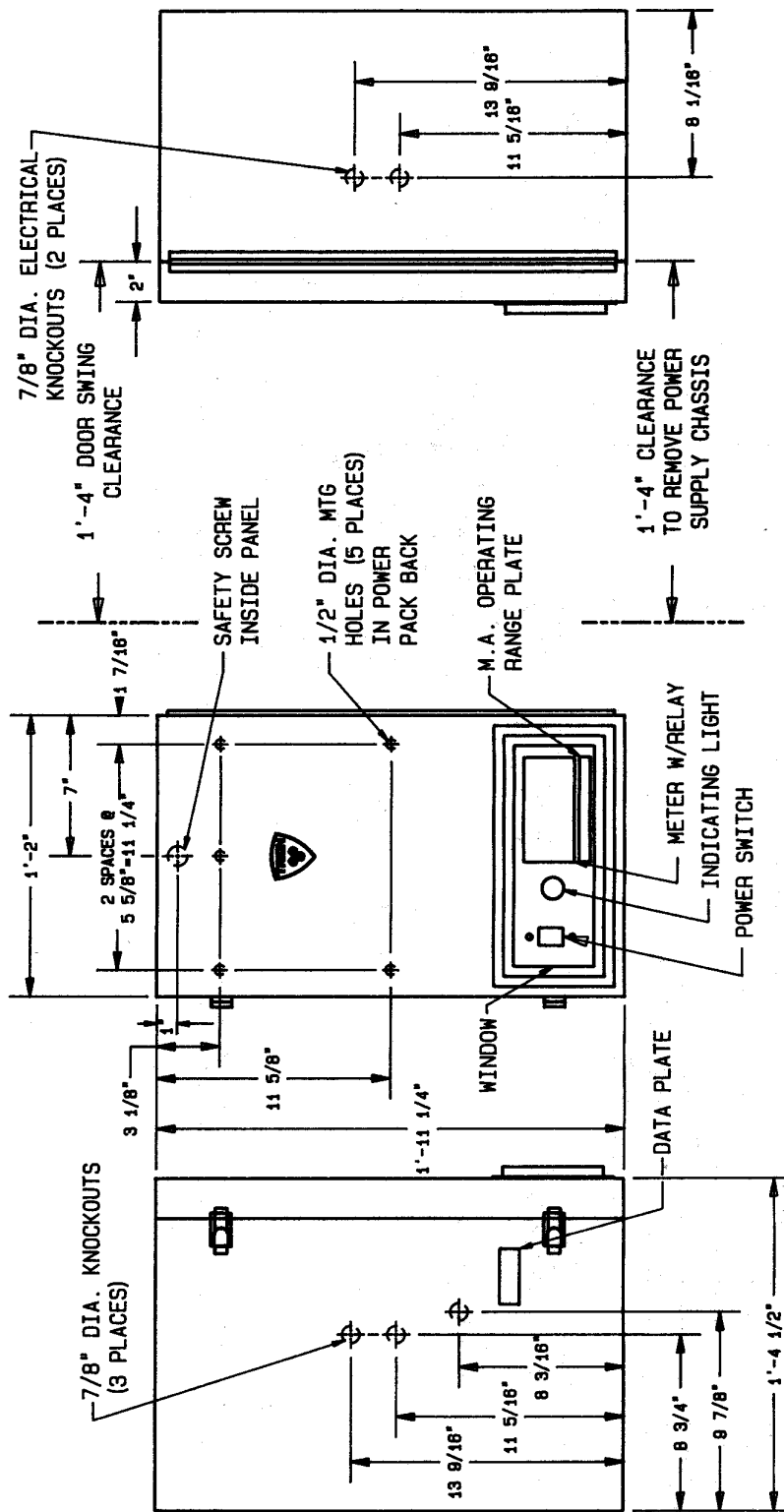
VI. RECOMMENDED SPARE PARTS

ITEM	DESCRIPTION	PART NUMBER	QUANTITY SUGGESTED
POWER PACK COMPONENTS:			
A	CAPACITOR, 10 KVAC. 03MFD	122871-001	1
B	LAMP, PILOT, 240V, 10W	121512-002	2
C	RECTIFIER	223039-001 & 002	2
D	RESISTOR 20K 100 W	221347-025	1
E	SWITCH, SAFETY	120296-001	1
F	TRANSFORMER	427051-001	1
IONIZER-COLLECTOR COMPONENTS:			
G	CABLE, JUMPER, IONIZER 12 KV	125392-026	1
H	CABLE, JUMPER, PLATE 6 KV	125392-025	1
J	INSULATOR	225734-001	6

1. ACCESS: RIGHT HAND AS SHOWN
2. INLET & OUTLET DIMENSIONS ARE IDENTICAL
3. CABINET CONSTRUCTION: 14 GA. CRS. OIL TIGHT WELDED JOINTS
4. GASKET MATERIAL: SILICONE
5. WEIGHT, POWER PACK : 100 LBS.
PRECIPITATOR: 425 LBS.
TOTAL WT. : 525 LBS.



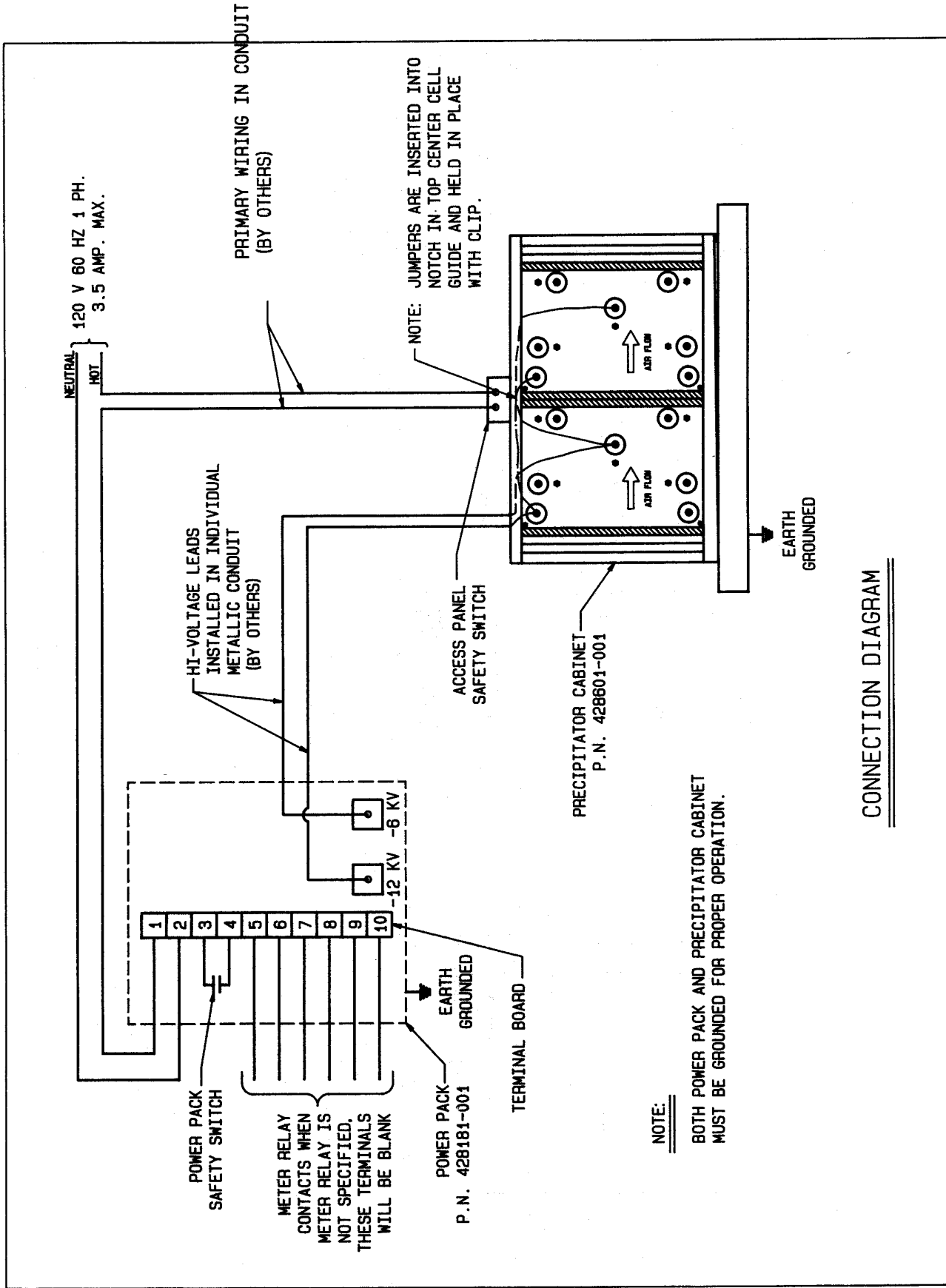
141934



NOTES:

1. OPERATING RANGE: 2.0 TO 3.0 M.A.
2. CONSTRUCTION: WEATHERTIGHT
3. WEIGHTS: POWER SUPPLY CHASSIS
W/ COMPONENTS : 52 LBS
POWER PACK CABINET : 48 LBS.
TOTAL WEIGHT : 100 LBS.

POWER PACK





TRION, INC.

SANFORD, NORTH CAROLINA 27330

101 McNeill Road, P.O. Box 760, Sanford, North Carolina 27331-0760
Phone (919) 775-2201, Telex 823143 TRION UF, Fax (919) 774-8771

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