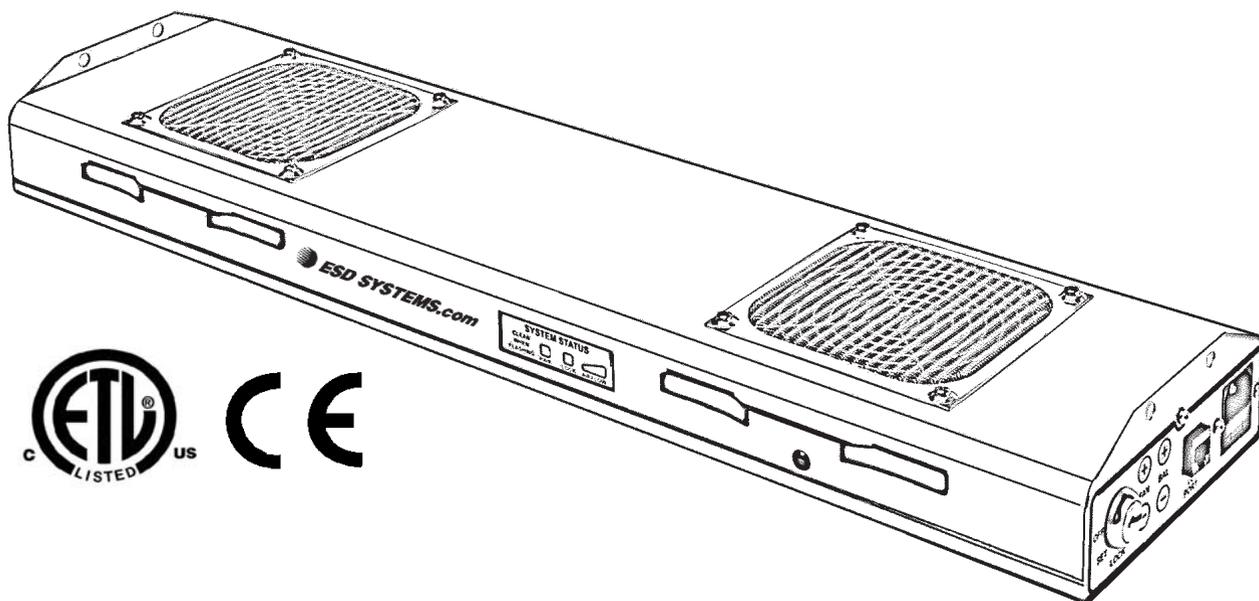




 **ESD SYSTEMS.com**

CRITICAL ENVIRONMENT (C/E) SERIES OVERHEAD IONIZER OWNER'S MANUAL



Made in America

Description

Ionizers are useful in preventing electrostatic charge generation, ElectroStatic Discharge, ElectroStatic Attraction, as well as preventing equipment latch-up and safety related shock. ANSI/ESD S20.20 Paragraph 6.2.3.1 Protected Areas Requirement states: "Ionization or other charge mitigating techniques shall be used at the workstation to neutralize electrostatic fields on all process essential insulators if the electrostatic field is considered a threat." Ionization is used to neutralize charges on process necessary insulators and isolated semiconductors. Some examples of process necessary insulators are: the PC board itself, plastic test stands, plastic housing where a PCB may be mounted, as well as computer monitor screens and regular cleaning wipes. Examples of floating or isolated conductors are: loaded PCB mounted in a stand where the pins are not contacting the dissipative workstation. Ionization is not effective on items that have large capacitance, like people and carts; however, ionizers should be considered as a method for charge neutralization in cases where grounding cannot be achieved.

Air ionization can neutralize the static charge on insulated and isolated objects by producing separate charges in the molecules of the gases of the surrounding air. When an electrostatic charge is present on objects in the work environment, it will be neutralized by attracting opposite polarity charges from the ionized air. Note that ionization systems should not be used as a primary means of charge control on conductors or people. (Reference: IEC 61340-5-2:1 paragraph 5.2.9).

The ESD Systems.com's Critical Environment overhead ionizers are NIST calibrated and are available in four models:

- 43461**
C/E Ionizer 24", 120 Volt
- 43462**
C/E Ionizer 48", 120 Volt
- 43467**
C/E Ionizer 24", 220 Volt
- 43468**
C/E Ionizer 48", 220 Volt
- 43466**
Replacement Emitter Cassette

The 43461 and 43467 are 24" long units with 2 fans, and the 43462 and 43468 are 48" long units with 4 fans. All models have the same features permitting the user to select the best size for the application. Since our introduction of the first overhead ionizer in the market, we have continued to enhance our offerings with the most advanced features available.

IONIZER SELECTION

ANSI/ESD S20.20 paragraph 6.1.1.2. ESD Control Program Plan Guidance states: "The Plan should include a listing of the specific type of ESD protective materials and equipment used in the Program." When selecting an ionizer life cycle costs should be considered including: equipment cost; installation cost; and operation and maintenance cost.

The C/E series offers many design improvements, most notably, our patent-pending "Emitter Cassette" (see figure 1).

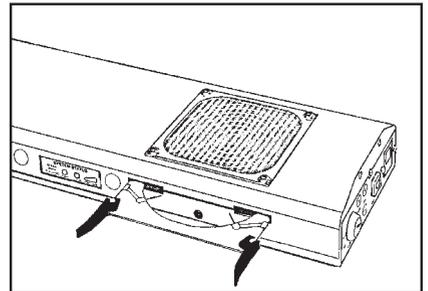


Figure 1. Removable emitter cassette

While other manufacturers attempt to simplify or automate the cleaning of the emitter pins, what remains is one major flaw in the process - unless the ionizer is removed to another area, the contamination ends up on the workstation and on any product that happens to be nearby.

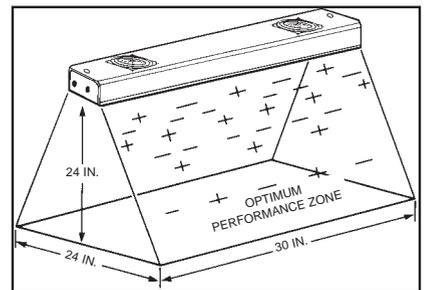


Figure 2. Area of optimum charge neutralization for 43461 and 43467

*U.S. Patent #6,137,670

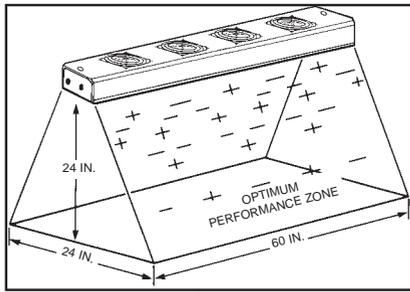


Figure 3. Area of optimum charge neutralization for 43462 and 43468

The C/E series solves this problem. When the emitters need to be cleaned, the cassettes are easily removed from the unit and taken to another area to be cleaned. This takes the dirt away from the workstation and product. To eliminate downtime, a spare set of clean emitter cassettes can be dropped in. The others can be cleaned when convenient. This concept is so unique, that we have been awarded a patent on it.

Features

- Removable emitter cassettes allow you to minimize contamination of the work area.
- Closed-loop feedback electronic balance system continuously monitors output for optimal performance.
- I/O port allows auto- calibration and remote status monitoring.
- Sealed plenum chamber around each fan minimizes contamination.
- Non-volatile adjustments for balance and fan speed are maintained in the absence of power.
- Lockout key with distinctive front panel indicator prevents unauthorized adjustment.
- Balance is individually adjustable at each fan zone.
- Flashing front panel signal indicates when cleaning is needed.
- IEC input and output connectors allow daisy-chaining of up to 2 units.
- Stainless steel and powder-coated aluminum construction for durability and long life.

Specifications

Input Power:

- 120VAC, 250mA, 24" model
- 120VAC, 400mA, 48" model
- 220VAC, 250mA, 24" model
- 220VAC, 400mA, 48" model

IEC Outlet:

Allows a second unit to be daisy-chained

Fuse:

5x20mm 3 amp time lag

Air Flow:

- 80-170 CFM, 24" model
- 160-340 CFM, 48" model

Emitters:

100% Tungsten, replaceable

Ionization Type:

Steady-state DC

Balance:

0±10 volts at set-up at 24" above charged plate analyzer

Weight:

- 6.2 lbs. (24" model)
- 11.1 lbs. (48" model)

Size:

- 2" x 6" x 24"
- 2" x 6" x 48"

Mounting:

- (2) ¼" mounting holes each end

Installation

The ESD Systems.com C/E ionizer is designed to mount above the work area, providing even coverage without using valuable work surface area. Mounting is a matter of personal preference, and may be accomplished with brackets attached to a shelf, or the unit may be suspended by chain. Whatever method is used, care should be taken to insure that the mounting is secure and capable of supporting the weight of the unit. The power cord should be supported as well to provide protection against any hazard to the operator.

"S" hooks are provided with each unit to facilitate mounting using the chain suspension method. The ideal mounting height is 24" above the work surface, although the ionizer may be located slightly higher or lower if required. For maximum performance, care should be taken to insure that the intake grills for the fans are not obstructed.

Turn the power key switch to the "OFF" position. Plug the IEC end of the cord into the ionizer and the other end into a properly wired outlet. We recommend that the outlet used by the ionizer be tested

before use and periodically checked for correct wiring and a good solid ground. The C/E ionizer depends on a good ground for proper balancing.

Safety interlock switches are provided internally on each emitter cassette. This ensures that power is cut off in the event that any cassette is removed or not fully installed.

The grills below each fan function as sensors and feed back a signal to the balance circuitry. Therefore, it is important not to hang or attach anything to the fan grills.

Controls and Functions

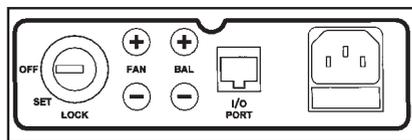


Figure 4. Control Panel

• The **CONTROL PANEL** is located on the right hand end of the ionizer. It provides controls for fan speed, balance, and a key switch to prevent unauthorized adjustment of the controls. Also located on the control panel is an I/O port that may be used for auto calibration (with optional Auto Calibration Unit, item number 43469). It also is used to provide output signals to allow remote monitoring of ionizer status.

• **OFF/SET/LOCK** key switch - this switch controls the power to the ionizer. When the SET position is selected, it allows the balance and fan speed to be adjusted. When the LOCK position is selected, a LOCK indicator is illuminated on the front panel of the ionizer. In this position, the balance and fan speed controls are disabled and the key is removable. In the OFF position, power is shut off to the ionizer and the key is removable.

• **FAN** speed adjustment switches are used to set the fan speed to the desired level that provides the best performance while minimizing operator discomfort. With the key switch in the SET position, pressing and holding the “+” symbol will increase fan speed, and the “-” symbol will decrease fan speed. Relative fan speed is displayed on the front panel indicator.

• **BAL** controls are used to adjust the balance of the ionizer and are used in conjunction with a charged plate analyzer. Pressing the “+” symbol will shift the balance offset positive, while pressing the “-” symbol will shift it negative. Adjustment should be made with a charged plate analyzer located 24" directly under the ionizer. The BAL controls, like the FAN speed, are only adjustable when the key switch is in the SET position.

• **I/O PORT** serves a dual purpose. It accepts signals from a charged plate analyzer and automatically calibrates the ionizer when the key switch is in the SET position. It also outputs ionizer status signals that can be useful for remote monitoring.

• **IEC INPUT CONNECTOR**, based on the International IEC 60320 Standard, allows the power to be disconnected at the ionizer and provides a fuse drawer for a 5mm x 20mm fuse. The fuse drawer may be opened when the cordset is removed. In addition, an IEC Outlet on the opposite end of the ionizer can supply power for a charged plate analyzer, or for up daisy-chaining a second unit.

Front Panel Display and Controls

See figure 5.

System Status is the information center on the front of the ionizer. From it, the operator can easily check the operational status of the ionizer.

• **PWR** - this indicator will normally be green when the ionizer is operating correctly. When the autobalance circuit can no longer adjust for dirty emitter pins, this indicator will turn red and begin to flash. It is normal for it to flash for

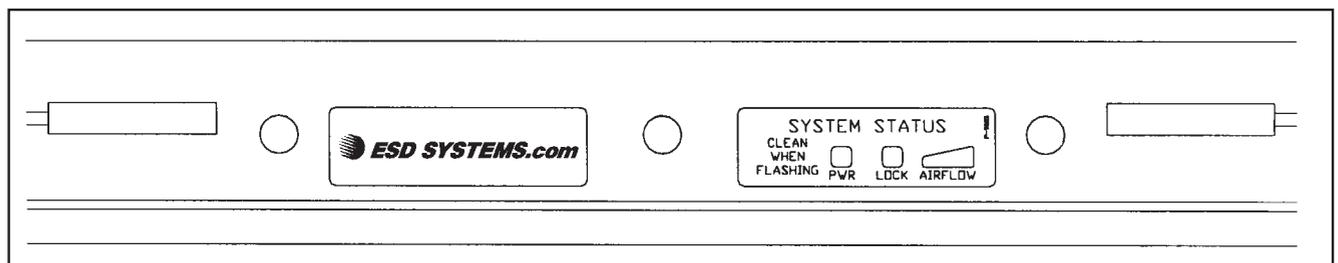


Figure 5. Front panel and controls

a few seconds each time the ionizer is turned on. This indicator will be on when the key switch is either in the "SET" or "LOCK" position.

- **LOCK** - when the key switch on the end of the ionizer is set to lock, this indicator will display a distinctive blue light. This makes it readily apparent that the ionizer has its settings locked, preventing unauthorized adjustment.

- **AIRFLOW** - this display indicates relative airflow output from the fans. If the key switch is in the "SET" position and the "+" or "-" button are pressed and held, the fan speed will increase or decrease with a corresponding change in the AIRFLOW display. As fan speed is increased, the display will move to the right.

- **MINOR ADJUSTMENTS**

ACCESS - each fan zone may be balanced separately. The adjustments are designed for minor corrections to balance one fan to another. Overall balance adjustments should be done with the "BAL" switches on the end panel.

- **VR6, VR5, VR2, and VR1** - are the zone balance adjustments for the zones 1 through 4 respectively. Zone 1 is closest to the right end. 24" models will only have VR6 and VR5 adjustments. These adjustments are covered in the section titled "Calibration Instructions".

- **VR3 and VR4** - are adjustments to center the alarm and to change the alarm sensitivity. These adjustments

are covered in the section titled "Calibration Instructions".

- **ALARM SWITCH** - this switch provides an audible alarm to supplement the flashing red PWR light when the unit needs cleaning.

Operation

After the unit is mounted securely and connected to a properly wired outlet, turn the key switch to the set position. The performance of the ionizer is directly related to the airflow on the area to be protected. Generally, try to use the highest setting possible without disturbing the operator or the work in process.

After allowing the unit to run for several minutes, a charged plate analyzer can be used to check the balance and performance. We recommend doing this at the time of the initial installation, so that data can be collected and saved for future reference. Place the charged plate analyzer directly under each fan and record the float (balance) voltage. If all fans are offset slightly in the same direction, the "+" or "-" BAL buttons can be used to correct the offset. If the balance varies from a positive offset to a negative offset between fans, the individual fan zone controls can be touched up slightly as required.

It is not uncommon to find differences between ionizers from bench to bench or even between fans on ionizers during initial setup. This is often caused by the presence of objects on or around the bench.

Large metal objects nearby or machines or equipment on the bench

will often cause a shift in the offset voltage at that area. The individual zone controls of the C/E ionizers allow this to be compensated for during initial setup.

After balance offsets have been checked, the decay performance of each fan should be measured and recorded. This information will be useful to establish a maintenance schedule. When decay times begin to increase significantly, or if the red PWR light begins to flash, emitter cleaning is usually indicated. By recording the time intervals between the first few cleanings, a maintenance schedule can be developed. After initial setup and testing has been done, the key switch can be set to the LOCK position and normal workstation use resumed.

If the ionizer is used in a manner not specified by the manufacturer, the protection provided by the ionizer may be impaired.

Maintenance

"As with all ionizers, periodic maintenance will be needed to provide optimum performance." (Reference: IEC 61340-5-2:1 paragraph 5.2.9).

The frequency of monitoring ionizers really depends on how and where they are used. Since the majority of them use a fan to transport the ions to the working area, the cleanliness of the air directly affects their performance over time and how often the emitters should be cleaned.

EIA-625 recommends checking ionizers every 6 months, but this may not be suitable for many

programs particularly since an out-of-balance may exist for months before it is checked again. ANSI/ESD S20.20 paragraph 6.1.3.1 Compliance Verification Plan Requirement states: "Test equipment shall be selected to make measurements of appropriate properties of the technical requirements that are incorporated into the ESD program plan." And paragraph 6.1.3.2. Compliance Verification Plan Guidance states: "In addition to internal audits, external audits (Organization and supplier of ESDS items) should be performed to ensure compliance with planned requirements. Verifications should include routine checks of the Technical Requirements in the Plan. The frequency of verification checks should be based on the control item usage, its durability and associated risk of failure."

Under normal conditions the ionizer will attract dirt and dust (especially on the emitter and fan guards). To maintain optimum performance, cleaning must be done on a regular

basis. The electrodes should be cleaned at least every 6 months. However, more frequent cleaning may be required if used in environments with more contaminants.

This was a major factor in the design process of the C/E ionizer. The Replacement Emitter Cassette can be removed to another area, and the emitters are then very accessible. Although we could not eliminate the maintenance, we have made it far easier and much cleaner than ever before.

- Turn the key switch to the OFF position.
- Grasp the Replaceable Emitter Cassette ejector levers at the center and pivot outward about 90 degrees.
- Grasping the right and left corners, pull the Replaceable Emitter Cassette straight out of the ionizer.
- The Replaceable Emitter Cassettes

can then be replaced with a spare cassette or removed to another area for cleaning.

- Cleaning of the Replaceable Emitter Cassette can be accomplished with a stiff brush or lint-free swab and isopropyl alcohol or other residue-free cleaning solvent.
- The Replaceable Emitter Cassettes or the individual removable tungsten emitters can also be cleaned in an ultrasonic cleaning tank.

Calibration

See figure 6.

We recommend re-calibration every 12 months maximum. However, most users will often choose a much shorter interval, especially if the product being worked on is very sensitive. On very sensitive product, we recommend checking the calibration any time an emitter cassette is removed and replaced.

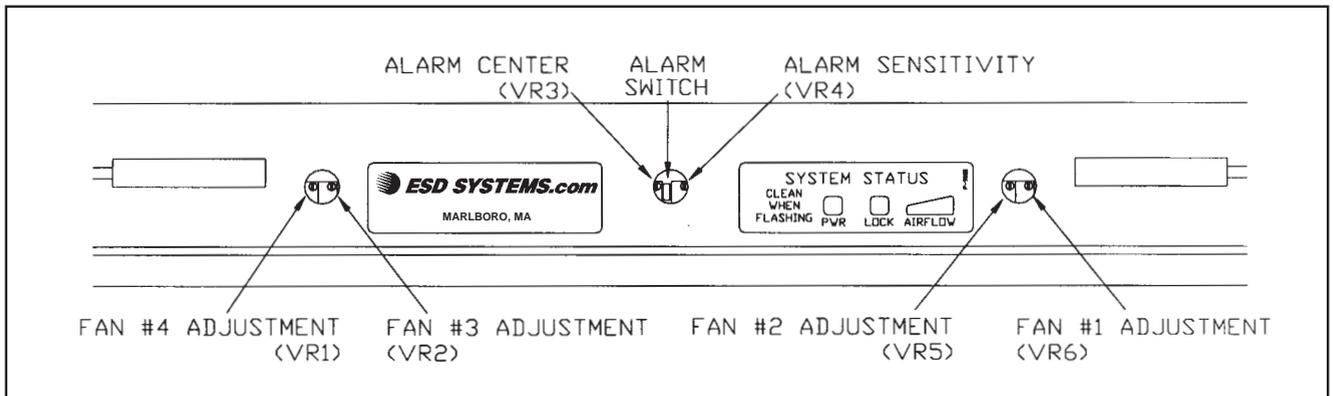


Figure 6. Calibrating C/E Ionizer

Warning! Do not attempt to calibrate this unit without proper equipment such as a charged plate analyzer. Adjustments to the calibration controls should be performed by authorized trained personnel only.

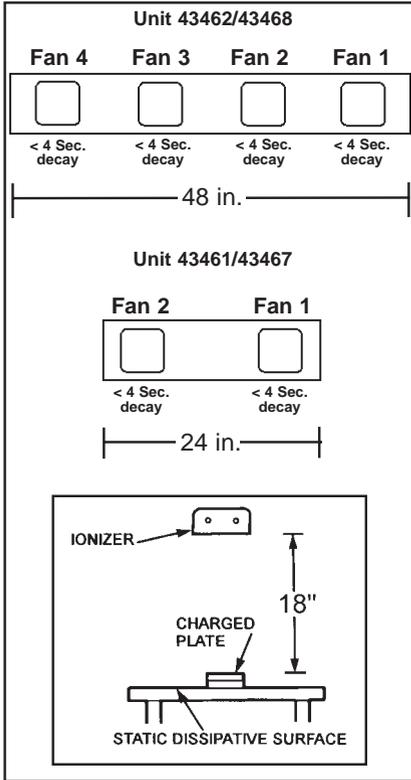


Figure 7. Balance under < 10 volts. When set under lab conditions, 5 volts is attainable.

Balance Adjustment

Using a charge plate analyzer, check each fan's balance. Use the "BAL" switches to zero the unit. If the fans are a little out of balance with each other use the fan adjustment pots to equalize them. VR5,6 and VR1,2 on 48" model.

NOTE: Each fan has its own balance circuit, however the alarm circuits tie them together. If one or more of the individual fan balance circuits are offset too much from the rest it could cause the alarm not to function correctly. If more than a slight amount of adjustment is required at any individual fan zone, we recommend that the unit be reset using the "Major Reset Adjustment" instructions below.

Major Reset Adjustments - Use this procedure only if the "Balance adjustment" above does not permit proper operation.

1. Turn key to "SET" position.
2. The potentiometers in this unit have a 24-turn range. Reset all of them by turning them at least 24 revolutions counter-clockwise.
3. Set the fan adjustment pots (VR1, VR2, VR5 and VR6) to center by turning them 12 revolutions clockwise.
4. Center the "BAL" control found on the control panel on the right end of the ionizer using the following process. Place a charged plate analyzer under any of the fans, push and hold the "+" BAL switch to find its most positive point, use the "-" BAL switch to find its most negative point, calculate the midpoint and set the balance using the "BAL" buttons to that point. Example: if the most positive point is +40V and its most negative point is -10V, you would set the balance to $\pm 15V$.

5. Adjust each fan's output by placing the charged plate analyzer underneath it and using its corresponding potentiometer to zero its balance. Turn clockwise for more positive and counter clockwise for more negative.
6. Turn alarm sensitivity (VR4) 3 revolutions clockwise. Alarm center (VR3) should be turned clockwise until "PWR" light turns green. VR3 should have two full revolutions in which the "PWR" light remains green. If VR3 doesn't have two full revolutions of green turn VR4 clockwise one turn and check again. If VR3 has a lot more than two full revolutions of green turn VR4 counter clockwise and check again. Finish by setting VR3 to the midpoint of green range.

Health

There are no known health risks associated with our devices. The emitters work at about 4-6 kV and can create ozone, but there have been no significant measurement of ozone from our emitter sets, as all our existing units test well below the OSHA limit of 0.05 ppm ozone. For additional safety information, see "Dispelling an Old Myth" written by William Metz of Hewlett-Packard published in Evaluation Engineering magazine, September 2001.

TROUBLESHOOTING CHART

PROBLEM	POSSIBLE CAUSE	SOLUTION
Unit won't turn on	Key is on "off" position.	Turn key to "SET" or "LOCK" position.
	One or more emitter cassettes are not fully inserted.	Push in emitter cassette(s) completely.
	No Power	Check power cord or fuse.
Fan speed or Balance won't adjust	Key is in "Lock " Position (Blue indicator On).	Turn key to "Set" Position.
	Button depressed too quickly, or pressed too lightly.	Push and hold buttons firmly.
"PWR" light is flashing red.	Emitter pins are dirty or contaminated.	Remove emitter cassette and clean emitters.
"PWR" light is flashing after emitter cassettes have been cleaned.	Unit is out of calibration.	Refer to pages 6 and 7 for calibration instructions.
There is no audible alarm when "PWR" light is flashing red.	Alarm switch is set to off.	Refer to page 5 and 6 for switch location.

Limited Warranty

ESD Systems.com expressly warrants that for a period of five (5) years from the date of purchase ESD Systems.com CE Ionizers will be free of defects in material (parts) and workmanship (labor). Within the warranty period, a credit for purchase of replacement ESD Systems.com CE Ionizers, or, at our option, the CE Ionizer will be repaired or replaced free of charge. If product credit is issued, the amount will be calculated by multiplying the unused portion of the expected five year life times the original unit purchase price. Call Customer Service at 508-485-7390 for Return Material Authorization (RMA) and proper shipping instructions and address. Any unit under warranty should be shipped prepaid to the Desco factory. Include a copy of your original packing slip, invoice, or other proof of date of purchase. Warranty replacements will take approximately two weeks.

If your unit is out of warranty, ESD Systems.com will quote repair charges necessary to bring your unit up to factory standards. Call Customer Service at 508-485-7390 for a Return Material Authorization (RMA) and proper shipping instructions and address.

Warranty Exclusions

THE FOREGOING EXPRESS WARRANTY IS MADE IN LIEU OF ALL OTHER PRODUCT WARRANTIES, EXPRESSED AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE SPECIFICALLY DISCLAIMED. The express warranty will not apply to defects or damage due to accidents, neglect, misuse, alterations, operator error, or failure to properly maintain, clean or repair products.

Limit of Liability

In no event will ESD Systems.com or any seller be responsible or liable for any injury, loss or damage, direct or consequential, arising out of the use of or the inability to use the product. Before using, users shall determine the suitability of the product for their intended use, and users assume all risk and liability whatsoever in connection therewith.

