# Operator's Manual

# Charged Plate Analyzer
# Model 268A-1

MONROE ELECTRONICS

# WARRANTY

Monroe Electronics, Inc., warrants to the Owners, this instrument to be free from defects in material and workmanship for a period of two years after shipment from the factory. This warranty is applicable to the original purchaser only.

Liability under this warranty is limited to service, adjustment or replacement of defective parts (other than tubes, fuses or batteries) on any instrument or sub-assembly returned to the factory for this purpose, transportation prepaid.

This warranty does not apply to instruments or sub-assemblies subjected to abuse, abnormal operating conditions, or unauthorized repair or modification.

Since Monroe Electronics, Inc. has no control over conditions of use, no warranty is made or implied as to the suitability of our product for the customer's intended use.

THIS WARRANTY SET FORTH IN THIS ARTICLE IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESS, IMPLIED OR STATUTORY INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. Except for obligations expressly undertaken by Monroe Electronics, in this Warranty, Owner hereby waives and releases all rights, claims and remedies with respect to any and all guarantees, express, implied, or statutory (including without limitation, the implied warranties of merchantability and fitness), and including but without being limited to any obligation of Monroe Electronics with respect to incidental or consequential damages, or damages for loss of use. No agreement or understanding varying or extending the warranty will be binding upon Monroe Electronics unless in writing signed by a duly authorized representative of Monroe Electronics.

In the event of a breach of the foregoing warranty, the liability of Monroe Electronics shall be limited to repairing or replacing the non-conforming goods and/or defective work, and in accordance with the foregoing, Monroe Electronics shall not be liable for any other damages, either direct or consequential.

# RETURN POLICIES AND PROCEDURES

**FACTORY REPAIR:**

Return authorization is required for factory repair work. Material being returned to the factory for repair must have a *Return Material Authorization* number. To obtain an RMA number, call 585-765-2254 and ask for Customer Service.

Material returned to the factory for warranty repair must be accompanied by a copy of a dated invoice or bill of sale, which serves as a proof of purchase for the material.

Repairs will be returned promptly. Repairs are normally returned to the customer by UPS within ten working days after receipt by Monroe Electronics, Inc. Return (to the customer) UPS charges will be paid by Monroe Electronics on warranty work. Return (to the customer) UPS charges will be prepaid and added to invoice for out-of-warranty repair work.

**EXPEDITED FACTORY REPAIR:**

All material returned to the factory by air or by an overnight service will be expedited. Expedited factory repairs will be returned to the customer by the same mode of transportation by which the material was returned to the factory for repair (i.e., material returned to the factory by an overnight service will be returned to the customer by an overnight service).

**NOTE:** Return (to the customer) transportation expenses for expedited factory repairs will always be at the expense of the customer despite the warranty status of the equipment.

**FACTORY REPAIRS TO MODIFIED EQUIPMENT:**

Material returned to the factory for repair that has been modified will be not tested unless the nature and purpose of the modification is understood by us and does not render the equipment untestable at our repair facility. We will reserve the right to deny service to any modified equipment returned to the factory for repair regardless of the warranty status of the equipment.

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Section 1

# SPECIFICATIONS

**CHARGED PLATE/PROBE ASSEMBLY:**

- Designed to EOS/ESD Association standard
- Standard tripod mount
- Dimensions: 6” X 6”
- Capacitance: Total discharge test circuit with plate 20 picofarads, ±2 picofarads
- Plate self-discharge: Less than 10% of set voltage within 5 minutes below 50% RH at 25°C

**POWER SUPPLY:**

±7500 volts maximum output; ±1000 volts/±5000 volts charging of isolated plate available, adjustable from <±1000 to >±5000 volts

**ELECTROSTATIC FIELDMETER:**

RANGE: 0 to ±7500 volts; 0 to ±2000 volts—switch selectable

ACCURACY: Better than 2%

DRIFT: Less than 0.4% per hour non-cumulative after 10 minutes stabilization, typical

SPEED OF RESPONSE: Less than 100ms for 10% to 90% of full scale either range

OUTPUT: Divide input by 1000, impedance 100Ω

**TIMER:**

Full scale 999.9 sec. (>16 min.), 0.1 sec. Resolution

**POWER REQUIREMENTS:**

117 or 220 volts ±10% (factory preset), 50/60 Hz, 5 watts

**SIZE AND WEIGHT:**

Height 6¾”, Width 6¾”, Depth 9½”; 5.5 lbs.
(17 x 17 x 24 cm, 2.3kg)

Section 2

# GENERAL INFORMATION

The Charged Plate Analyzer Model 268A separates into two components connected by a ten-foot cable. The top part with the plate attached contains the fieldmeter portion of the instrument and may be placed at the measurement site. The bottom part with the controls and indicators may be placed in a convenient operating location remote from the detector. To separate the two components, release the two over-center latches near the rear of the unit and lift up at the rear of the top section.

A ¼-20-threaded receptacle is provided inside of the top section for convenient tripod mounting.

Two foldout legs are provided underneath the bottom of the control unit to elevate the front of the cabinet to permit easy viewing of the meters.

Switches on the front panel are alternate action push-push type with the exception of the three used for “plate control”. These are mechanically interlocked so that only one function can be selected at a time.

Controls are grouped by function.

The three pushbutton switches directly beneath the “PLATE VOLTAGE” meter relate to meter range and function.

The three switches at the lower center of the panel labeled “PLATE CONTROL” affect the charge/discharge condition of the plate.

The “HV” control knobs, the “HV ON” indicator and the “POLARITY” pushbutton switch relate to the polarity and magnitude of the initial charge voltage on the plate.

The “TIMER LIMIT” switch sets the start/stop voltage limits for the timer.

The “OUTPUT” BNC connector (on the back panel) allows an oscilloscope or recorder to be connected to the output of the fieldmeter. The signal here is 1/1000th of the actual voltage on the plate—regardless of the settings of the meter range and function switches.

Two small holes are provided in the plate for the attachment of standard or miniature banana plugs, useful for measuring induced charge or decay rate on personnel.

# IMPORTANT NOTE

In order to maintain proper operation of the floating plate, it is essential that the support insulators be kept scrupulously clean. Consider the following:

- Do not touch or handle the insulators.
- Do not wrap the line cord around the insulators.
- Store the instrument in its protective case when not in use. Store in a clean dry location.
- Clean the insulators according to the directions given in the MAINTENANCE section when self-discharge exceeds 10% of the set voltage within 5 minutes at relative humidity of less than 50%. At high humidity surface leakage currents increase and air ionizes readily and self-decay time can be expected to decrease regardless of how clean the insulators are.

The Charged Plate Analyzer Model 268A meets test equipment requirements of the EOS/ESD Association's EOS/ESD STANDARD NO. 3.1 "STANDARD FOR PROTECTION OF ELECTROSTATIC DISCHARGE SUSCEPTIBLE ITEMS: IONIZATION".

Monroe Electronics, Inc. does not supply copies of standards.

Copies of the standard are available from:

EOS/ESD Association, Inc.
7902 Turin Rd.
Bldg 3 Suite 2
Rome, NY 13440-2069
Phone (315) 339-6937
Fax (315) 339-6793
eosesd@aol.com

Section 3

# OPERATION

## BASIC OPERATION - DISCHARGE MODE:

1. Separate sections and position as necessary. Connect to the proper power source and press "**|**" on the power switch to apply instrument power. The displays will indicate that power is on.
2. Select a polarity. For discussion purposes, we will select positive. Press the POLARITY pushbutton in to lock.
3. Select a range. We will use 5kV as an example. Release the 5kV/2kV pushbutton under the PLATE VOLTAGE meter.
4. Select NORMAL mode by releasing the NORM/PK pushbutton (under the meter).
5. Select TIMER LIMIT. Release the TIMER LIMIT pushbutton to set limits to 5kV and 500 volts. In general, the setting of this function should concur with the meter range selected.
6. Zero the plate by pressing the ZERO button. This removes all voltage from the plate. (It connects the plate to ground through a 10k-ohm resistor.)
7. Charge the plate. Press the CHARGE button. The HV light indicates that the high voltage is on. The PLATE VOLTAGE meter will indicate some voltage. Adjust the voltage to a minimum of approximately 5kV +3% (5150 volts).
8. Allow the plate to decay. Press the DECAY pushbutton. In the absence of ions, the plate will decay very, very slowly. In a balanced ion field, the plate will decay at a more rapid rate.
9. As the plate voltage crosses the +5000 volt level, the timer will start. As the plate crosses the +500 volt level, the timer will stop and indicate the elapsed time interval between these two levels. Whenever the plate is recharged, the timer will be reset for the next test.

**BASIC OPERATION - PEAK MODE:**

Peak mode is useful for checking balance in pulse ionizing systems. The timer is not associated with these measurements. The internal high voltage charging source is not normally used.

The switches used in making peak measurements are the three selector switches under the PLATE VOLTAGE meter and the ZERO and DECAY switches.

1. Select a meter range using the 5kV/2kV switch.
2. Zero the plate by depressing the ZERO switch.
3. Select desired peak (+ or –).
4. Select PEAK mode by depressing the NORM/PK switch into the PK position.
5. Allow the plate to "float" by depressing the DECAY button. This ungrounds the plate. The meter will now indicate the highest peak voltage attained by the plate in the selected polarity. The –PK/+PK switch may be shifted to the opposite position to read the highest peak voltage attained in that polarity.

   To balance your ionization system or blower, adjust until both positive and negative peak readings are the same.
6. Anytime the NORM/PK button is released to the NORM position; the peak detector is automatically reset.
7. The plate will continue to float until the ZERO button is pressed. Thus, the ZERO switch and the RESET function of the NORM/PK switch are normally used in conjunction with each other.

Section 4

# MAINTENANCE

## GENERAL:

Field maintenance of Model 268A should be limited to cleaning of the insulating standoffs, cleaning of the case and occasional field-meter zero adjustment.

Further repairs and adjustment require special equipment and are beyond the scope of this manual.

Factory service is advised.

## CLEANING, INSULATORS:

The insulating standoffs (supporting the measuring plate) are specifically designed to minimize the effects due to contamination of their outer surfaces. Leakage paths created by the skin oils in fingerprints, tobacco smoke, dust, etc. will eventually degrade their performance such that the self-decay rate of the plate will exceed 10% over a five-minute period, indicating the need for cleaning.

**IMPORTANT!**

**DO NOT USE SOAP, DETERGENT OR TAP WATER**

**TO CLEAN THESE INSULATORS**

Clean the exposed surfaces of the insulators with mixture of 70% clean technical grade isopropyl alcohol and 30% distilled water, using a soft toothbrush. The unit should be inverted while doing this to minimize the amount of liquid entering the case.

The insulators should then be allowed to air-dry.

## CLEANING, CASE:

General cleaning of the case for aesthetic reasons is best done with a clean lint-free cloth or wiping pad dampened in the alcohol/water solution noted above.

## FIELDMETER ZERO:

Airborne contaminants entering the sensitive aperture of the fieldmeter probe may cause a zero shift, which will affect the accuracy of measurement.

A multi-turn potentiometer is provided on the upper section of the instrument to adjust fieldmeter zero. Adjust for an indication of zero volts on the 2000 volt meter range with the ZERO button pressed in.

# APPENDIX I

MODEL 268A-1T CHARGED PLATE ANALYZER
WITH VARIABLE TIMER OPTION

## VARIABLE TIMER OPTION

The Model 268A-1T Charged Plate Monitor with variable timer stop option has the same two timer ranges as the standard unit when set in the “FIXED” mode of operation. In the optional “VARIABLE” timer mode, timing will start at either 5000 volts or 1000 volts as selected by the user. The timer will then stop at a user-selected voltage set on the front panel mounted turns-counting dial from 0 to 1000 volts with 1-volt increments.

This option is available either factory installed at the time of purchase or as a factory installed aftermarket upgrade to the basic Model 268A-1

## VARIABLE TIMER OPTION OPERATING INSTRUCTIONS

1. Power unit on.
2. Select either **5kV** or **2kV** plate voltage level (measuring range).
3. Make sure **NORM/PEAK** button is in **NORM** position (not depressed).
4. Set timer **STOP LEVEL** (turn pot) to desired plate voltage stop level (0 to 1000 volts).
5. Press **VARIABLE** on **TIMER LIMIT** switch.
6. Select **5kV** or **1kV** timer start level on **TIMER LIMIT** switch.
7. Select appropriate (+ or –) **POLARITY** for plate voltage.
8. Press **CHARGE** button and adjust to voltage above desired start voltage level.
9. Press **DECAY** button.
10. Observe **PLATE VOLTAGE** indicator as it decays. Timer indicator **(SECONDS)** will stop when variable trip point is met.
11. For additional tests, repeat steps 8 thru 10.

**Note:** To return unit to normal operation, switch unit to **FIXED** on the **TIMER LIMIT** switch.

# APPENDIX II

## Application Note APNE-0017

# Plate Self Decay of Charged-Plate Monitors

### Introduction

Charged-Plate Monitors (CPM's) evaluate the ability of air ionizers to neutralize static charge. A CPM charges an isolated, conductive plate that is charged to a known level. Then the air ions produced by the ionizer neutralize the charge on the isolated plate, and the time required to discharge the isolated plate is measured.

In an ideal, traditional CPM, the plate is perfectly isolated from ground and represents a perfect capacitor. Once the plate is charged to a known level, it would hold that charge indefinitely. The only cause for the isolated plate to discharge would be by impingement of air ions.

In practice, other factors may exist that cause the isolated plate to discharge. In the absence of air ions, any discharge of the isolated plate is known as plate self decay or plate isolation.

### The Problem

As the isolated plate in a traditional CPM is supported from ground by one or more insulating supports, a common cause of self decay is leakage through these insulative supports.

The two major contributors to leakage across these supports are:

- High humidity, and,
- Lack of cleanliness.

Any substance (contamination) that is deposited on the surface of the insulative supports, such as salts and oils from fingers, and dust, may increase the conductivity of the support and increase the leakage from the isolated plate to ground. Moisture in the air can be absorbed into the surface layers of the support and further increase the surface conductivity of the material. Moisture may also activate ionic impurities within the insulating supports.

The ESD Association Standard Test Method STM3.1 recognizes that a small amount of self decay may be unavoidable. This test method allows a maximum self-decay rate of 10% in five minutes. Self decay shortens decay time measurements. A small amount of self decay doesn't impact a CPM decay measurement enough to matter. Higher self-decay rates present an error in decay time measurements that may be significant to your evaluations of ionizers.

## Minimizing Plate Self Decay

Relative humidity becomes a problem when it rises above 60%. Keeping your CPM clean and storing it in a warm, dry area are the most effective ways to manage plate self decay. The warm air lowers the relative humidity.

When the CPM is stored in areas with higher humidity, use a heat gun to warm the insulative supports and drive out any moisture that has been absorbed by those supports. This will offer a temporary solution if the relative humidity and plate self-decay rate are too high.

When this method seems to ineffective, clean the supports with a solution of de-ionized water and isopropyl alcohol and allow the plate to dry for 24 hours.

## Another Solution

Monroe Electronics' newer CPM, Model 288, uses a high-voltage follower (electrometer) technology that is much more resistant to the effects of high humidity. We recommend this model for high-humidity areas where CPM measurements are made.