

**Operators' Manual  
Monroe Electronics, Inc.  
Model 288B  
Charge Plate Monitor**

P/N 0340174  
288-1/100  
V2.01  
060109

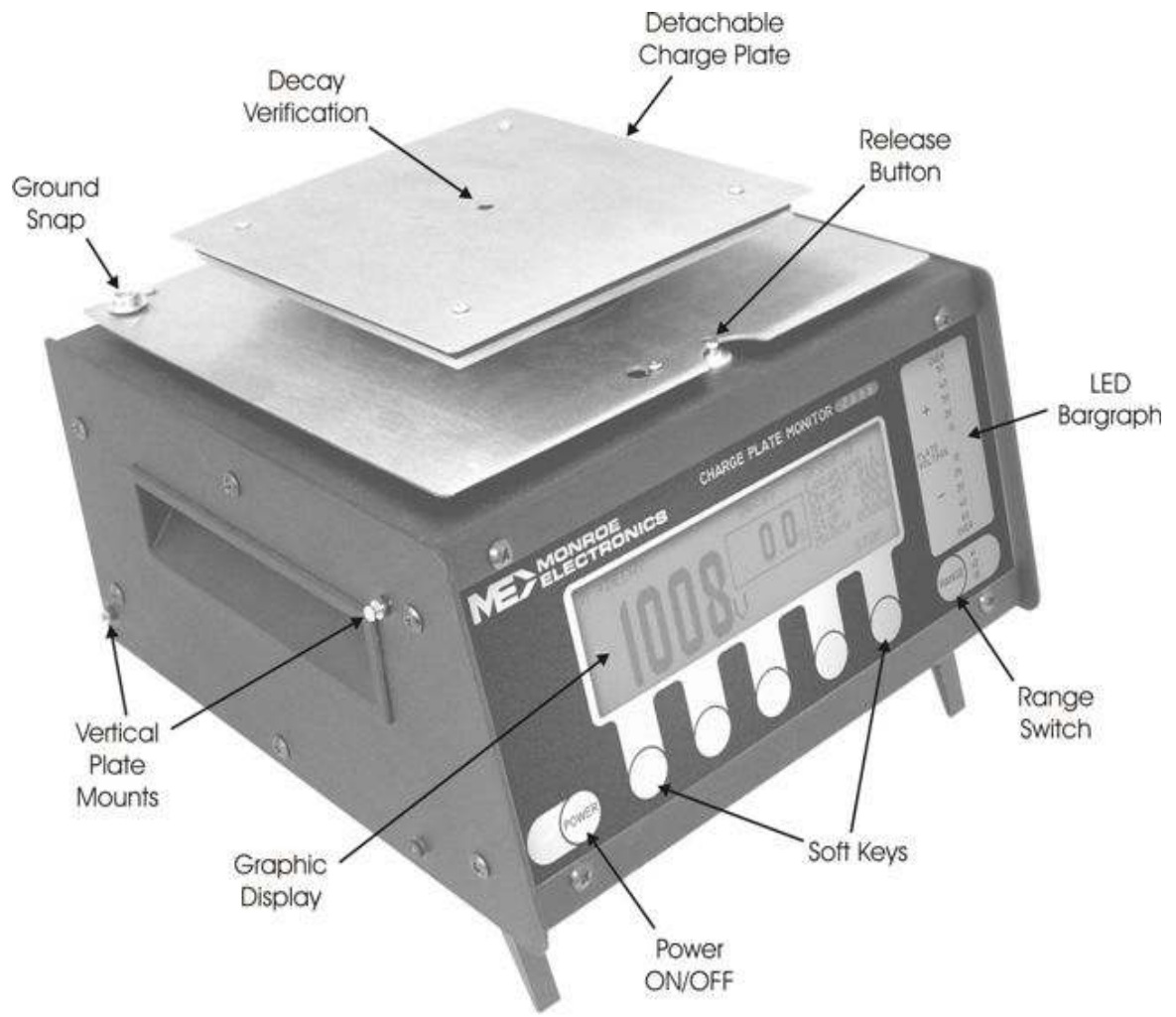


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Specifications and procedures subject to change without notice



# Section 1

## Specifications

*All specifications are referred to plate voltage unless otherwise specified.*

Display	240 x 64 character/graphic
Voltage -	3½ digit display (Decay and Peak reading)
Accuracy	±0.1% of reading ± 1 lsd
Resolution	1 volt for readings > 99 volts 0.1 volt for reading < 100 volts
Time -	4 digit display
Accuracy	0.1% of reading ± 1 lsd
Resolution	0.1 second for readings < 1000 seconds 1 second for reading > 999 seconds
Electrometer	
Dynamic range	±1200 volts
Follower error	< 10 mV
Speed of Response	< 10 msec for 1 kV to 0 volts (90% - 10%)
Bandwidth	-3db @ 1Khz 20V <sub>p-p</sub> -3db @ 10Hz 2000V <sub>p-p</sub>
Noise	<12 mV <sub>rms</sub>
Monitor output	Divide by 200
Accuracy	0.1% of reading ± 12 mV
Output Impedance	1 kΩ
Start Voltages	1000 volts ±0.3% Standard
Range	±10 to ±1000 volts.
Resolution	settable to 1 volt
Accuracy	0.3% of setting ± 2.5 volts
Stop Voltages	100 volts ±3% Standard
Range	0 - ±995 volts
Resolution	settable to 1 volt
Accuracy	0.3% of setting ± 2.5 volts
Charge voltage	
Range	10 to 100 volts above the start voltage
Resolution	settable to 1 volt increments
Accuracy	0.3% of setting ± 2.5 volts

Charge Plate	
Capacitance	20 pF ±10%
Zero Drift	< 100 mV /sec (no incident ion flow)
Self Discharge	< 200 mV/sec
Peak Detector	
Balance Test	
Bandwidth	<10HZ
Temperature Sensor	
Range	0 - 50°C
Accuracy	±2°C typ
Humidity Sensor	
Range	10% - 80% RH @ 25°C
Accuracy	±5% typ
Operating	
Temperature	5°C to 35°C
Humidity	to 80%, non condensing
Battery life	6 hours
Charge time	< 8 hrs to > 90% capacity
Power	
Voltage	90 – 250 VAC 50/60 Hz
Wattage	< 12 watts operating
CPM	
Size	11" x 9" x 6" (280 x 229 x 152 mm)
Weight	12 ½ lb (5.7 kg)

**Accessories Included:**

CD containing: 288B Operator's Manual  
288B Data Sheet  
288COM Software  
288COM Software Operator's Guide  
288B Graph Data Sheet

110V Line Cord  
220V Line Cord  
DB9 M/F Straight-Thru Cable  
Ground Cable w/snap  
5ft Plate Ext Cable  
Patch cord w/alligator clip & boot

## What this instrument does —

This instrument is a charged-plate monitor for evaluating the performance of ionization systems. As such, it performs positive and negative decay tests, and balance (offset voltage) tests to determine if an ionization system is operating effectively. It can be used to test all types of ionization systems as described in ESD Association Standard ANSI/ESD STM3.1 Ionization.

Over the years new technologies have placed new demands on both ionization systems and on the capabilities and features of the charged-plate monitors used to evaluate them. Monroe Electronics has responded to these needs by incorporating many additional and improved features in the Model 288 Charged-Plate Monitor. The original Model 288 provided the following important capabilities for people evaluating ionization systems:

- Replacement of the fieldmeter normally used to monitor the plate voltage with a high-voltage follower amplifier to increase accuracy and reduce zero drift
- Wider bandwidth to evaluate AC ionization systems
- The ability to automate commonly-repeated sequences of tests and store their test results for future review
- Adjustable start and stop voltages for decay tests
- A serial interface and applications software to control ionization tests from a computer

The Model 288B has been improved to provide the following capabilities:

- The ability to resolve the plate voltage with 100 mV resolution
- Applications software to graphically display decay and balance waveforms in real time
- The ability to measure the performance of the latest high-frequency AC ionization systems

## Section 2

### GENERAL INFORMATION

Model 288 performs manual or automatic decay and balance tests for qualification and periodic verification of ionization equipment. It then stores the results and balance averages for manual tests and complete automatic test sequences up to a maximum of 1500 tests. Temperature and relative humidity are displayed real-time and recorded with the test data.

All instrument functions are controlled by five key pushbuttons.

In DECAY mode a built-in high voltage generator charges the plate to a voltage specified by the user – up to 1100 volts. During the test the plate will discharge toward zero in the presence of ionization. The elapsed time of decay between a selected start voltage and a selected stop voltage is displayed.

In the BALANCE mode, the plate is first grounded then released from ground and allowed to float to any voltage in response to air ion imbalances. It displays the plate voltage, test duration, and minimum and maximum peak voltages. (Nearby charge sources will also induce a voltage on the floating plate.)

Self-tests include battery check and tests for functional errors.

Memory is non-volatile. Setup and data are retained during storage.

#### CAUTION

**When charged, the plate voltage can be in excess of 1100 volts with respect to ground. Although the charges and potentials are below those that are normally detected by human senses, A SHOCK HAZARD EXISTS.**

- **If you are handling the plate assembly or conducting a test, which involves touching the plate, expect a shock.**
- **Do not charge large capacitors with this device.**

## Section 3

### SETUP

#### First things first

Upon power up, you are presented momentarily with an identification screen, which includes the software revision level and serial number of your unit.

Within a few seconds, the MAIN screen (Figure 1) is presented. This screen should show current date and time, ambient factors, power source information and current test number and prompt the operator to "Select Operation". The test-numbering scheme begins with 1500 and displays the number of remaining tests.

**Figure 1. Main Screen**

```
MAIN  288B  2.00      06/18/08 11:23:02A
      S/N 012345    AC Power   28C 36%RH

      Select Operation   Test Avail. 1500

MANUAL  AUTO      DATA      SETUP
```

One of the menu options is **SETUP**. Once significant programming has been done and data taken **the SETUP mode should not be tinkered with!** There is no BACK button. Thus, **SETUP** is probably the first thing the user should become familiar with. Press the "SETUP" key.

**Figure 2. Setup Screen**

```
SETUP      06/18/08 11:23:02A
           AC Power   28C 36%RH

SYSTEM  MANUAL  AUTO  OPTION  MAIN
```

The present menu is identified in the upper left corner of the screen as "SETUP".

Menu items are: SYSTEM, MANUAL, AUTO, OPTION and (back to) MAIN. Select SYSTEM to go to the SETUP SYSTEM menu.

Press the "SYSTEM" key.

### SETUP SYSTEM Menu:

**Figure 3. Setup – System:**

```
SETUP      06/18/08 11:23:02A
           AC Power   28C 36%RH

CLOCK  HUMI/TEMP  RAM/EE  S/N  RETURN
```

**CLOCK** – Sets the system's real time clock. This should be set to the present local date and time in order for all future tests to be properly stamped. Once new data (if any) has been entered, press EXIT and elect to SET the clock to the time shown on the SETUP

SYSTEM CLOCK screen or EDIT to change the settings or CANCEL to change nothing and return to the MAIN menu.

**HUMI/TEMP** – Simply displays the present temperature and relative humidity. These can only be changed via connection to a PC.



**RAM/EE** – The first screen under this option asks, “Clear all test data – Y/N?” A “Y(es)” response will permanently erase all accumulated test data from memory. The next two windows prompt a similar decision for whether to restore defaults to Group/Location names and test setups. These decisions should not be taken lightly as deletions are irreversible.

**S/N** – Displays software revision number and instrument serial number. These cannot be modified.

**RETURN** – Returns to SETUP Menu

## SETUP for Manual Test Menu:

**Figure 4. Setup – Manual Screen:** In the Setup screen (Figure 2), press “MANUAL” key.

The first three setups can be modified. M.Setup 1 is current selected as default setup for use.

```
SETUP M.TEST
D> M.Setup 1
  M.Setup 2
  M.Setup 3
  Factory
  Test

NEXT  DISPLAY  DEFAULT  SETUP  MAIN
```

This screen displays a list of five user selectable manual test options. Three of them; M.Setup 1, M.Setup 2 and M.Setup 3 may be modified. The “Factory” option uses “standard” settings and the “Test” option has settings used during factory testing of each unit. These two may not be changed.

The parameters of any of the manual tests may be viewed or those of the first three edited to meet user requirements by highlighting the test and pressing the **DISPLAY** key. To change these parameters, see **Programming Features for Manual Tests**.

A symbol “D>” indicates which one is selected as the default test. To change the default, scroll to highlight one of the options using the **NEXT** key and press the **DEFAULT** key. The selected test will remain the default test until re-selected. Previously stored test results are not affected by a new default setting but all subsequent tests will be made with the new default until changed by this method.

## SETUP for Auto Sequence Menu:

The Auto Sequence Setup screen works the same. It displays a list of five user selectable manual test options. Three of them; A.Setup 1, A.Setup 2 and A.Setup 3 may be modified. The “Factory” option uses “standard” settings and the “Test” option has settings used during factory testing of each unit. These two may not be changed.

**Figure 5. Setup – Auto screen:** In the Setup screen (Figure 2), press the “AUTO” key.

```
SETUP A.TEST
D> A.Setup 1
  A.Setup 2
  A.Setup 3
  Factory
  Test

NEXT  DISPLAY  DEFAULT  SETUP  MAIN
```

The parameters of any of the manual tests may be viewed or those of the first three edited to meet user requirements by highlighting the test and pressing the **DISPLAY** key. See **Programming Features for Auto Sequence Tests** later in this manual.

A symbol “D>” indicates which one is selected as the default test. To change the default, scroll to highlight one of the options using the **NEXT** key and press the **DEFAULT** key. The selected test will remain the default test until re-selected. Previously stored test results are not affected by a new default setting but all subsequent tests will be made with the new default until changed by this method.

## SETUP - OPTION Menu:

Options are for display backlighting, power off, and beep settings. The first two options will apply when the 288 unit is running on battery.

**Figure 6. Setup – Option**

```
SETUP OPTION
      Backlight
      Auto DC Power Off
      Beep On Test & Key
NEXT      EDIT      EXIT
```

The first two options apply to when the 288 unit is using battery power.

Highlight and press EDIT to view further options.

**Figure 7. Setup – Option - Backlight**

```
Backlight DC
      Continuous
A> Auto Shut Off (5 minutes)
      Off
NEXT      ACTIVE      EXIT
```

The (A>) symbol indicates the current choice. Highlight desired choice and press ACTIVE. Then press EXIT change.

The backlight of the display can be set to continuous lighting or shut off in 5 minutes when it is using battery.

**Figure 7b. Setup – Option – Auto DC Power Off**

```
Auto DC Power Off
      Continuous
A> Auto Shut Off (15 minutes)
NEXT      ACTIVE      EXIT
```

When the 288 unit is running on battery, it can be set to run Continuously or auto shut off in 15 minutes.

Highlight the option by pressing the NEXT key, then press ACTIVE.

In Figure 6, highlight the option, then press the EDIT key.

The Beep has three options:

Beep On Test & Key \_\_\_ Beep when a key is pressed and mode change during the test.

Beep On Test Only. \_\_\_ Beep only during the test when the mode changed.

Beep Off.

# Section 4

## OPERATION

### MANUAL OPERATION:

From the manual screen the user can choose to run a positive decay, negative decay or balance. Also the option exists to enter the group and location screen to select the proper designation for the ionizer under test. See Figure 8 below:

**Figure 8. Manual Test Screen.** From the MAIN screen (Figure 1), press MANUAL key:

M.Setup 1 is currently set as default for use. You may select other setup from MAIN – SETUP – MANUAL.

To select other group / location, press the GRP/LOC button.

```

MANUAL                                06/18/08 11:23:02A
M.Setup 1   StartV 1000v  MaxDcy  22s
Group A     Stop V  100v   BalDur  12s
Location 1  ChrgDif 50v   StrtDly  2s
TstAvai 1500

+DECAY  -DECAY  BALANCE GRP/LOC  MAIN
          
```

Test available: how many more tests can be performed and store in memory.

**+/- Decays** – Once a decay test is selected the unit switches screens displaying the plate voltage, timer, group/location and test parameters.

**Figure 9. +Decay test**

M +DECAY

98.6v

DecayTime

6.8s

Group A  
Location 1

Start 1000v  
StopV 100v  
MxDcy 300s  
Fltr= 500Hz

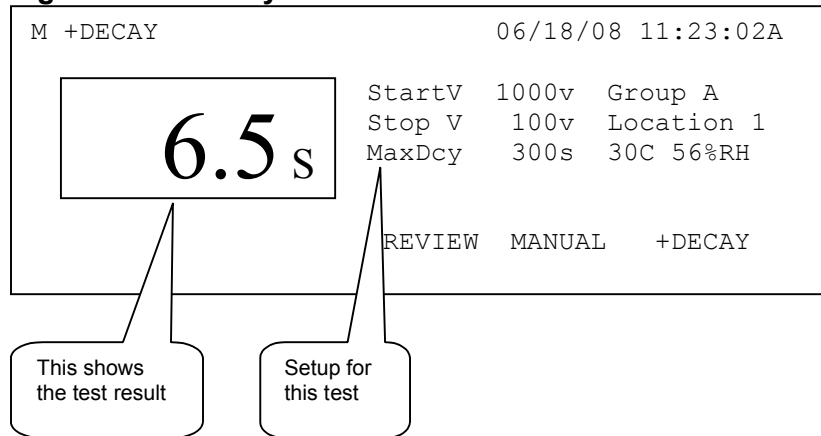
SKIP          STOP

**SKIP:** Allows user to skip test delay time.

**STOP:** abort the test. Or When the decay test ends, the plate voltage reading will be continuously shown until the STOP key is pressed.

Once the test is complete a summary screen appears displaying the time of decay, test parameters, time, date, temperature, humidity and test number. From the summary screen another decay test can be run, test data history screen can be accessed or a return to the manual test screen can be selected.

**Figure 10. +Decay Test Result:**



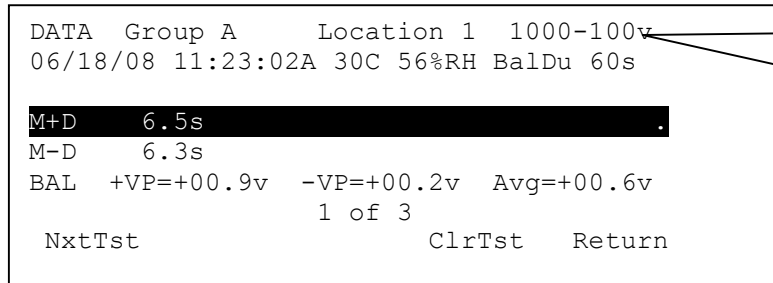
**REVIEW:** review the test results.

**MANUAL:** go back to MANUAL screen.

**+DECAY:** start a +Decay test.

**REVIEW:** displays the manual test results and settings as in Figure 11.

**Figure 11. Review manual**



This shows the Setup for the highlighted test: StartV=1000v, StopV=100v. Balance duration=60sec. Date and time of the test, Temperature and humidity reading.

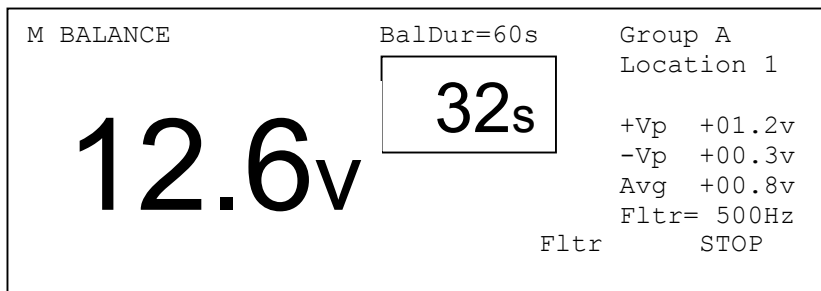
**NxtTst:** scroll down to highlight the next test.

**ClrTst:** delete the highlighted test data.

**Return:** to MANUAL screen.

**Balance –** During the balance test the screen displays the plate voltage, test time, group/location, test parameter, average voltage and positive/negative peak voltage readings. Once the test is completed the summary screen appears with the same type of data and options available in the manual decay summary screen.

**Figure 12. Balance test:**



**Fltr:** Low pass filter. Press this button to select: 500Hz, 80Hz, 40Hz or 30Hz.

**STOP:** Abort the test.

**Confidence Test** – One of the major weaknesses in all CPM's has been the inability to properly verify the main function of these devices, DECAy. In all the existing instruments it is possible to test the plate voltage, timer performance and other parameters but not the actual decay function. In the 288 charge plate (available in the 6 x 6 plate only) there is a test hole in the center of the plate. Simply remove the knurled thumbscrew from the back panel of the unit and insert it into this hole making sure that the head of the screw is making contact with the plate. Then run a +Decay test and a –Decay test in a non-ionized environment. Both decays should be within a 4 to 6 second range, typical. By performing this test periodically the user can be assured the unit is operating correctly.

## Programming features for Manual Test:

**Start Voltage** – Range of 10V to 1000V, adjustable in 1V increments

**Charge differential** – This is the difference between the start decay voltage and how much over charge the unit puts on the plate. It ranges from 10V to 100V and is adjustable in 1V increments.

**Stop voltage** – Range of 0V to 995V, adjustable in 1V increments

**Test Start Delay** – Range of 0sec to 15sec, adjustable in 1sec intervals. This is the time delay from when you push the start key and when the test actually begins. This allows the user to exit the area to minimize their impact on the readings.

**Max decay time** – Range 10sec to 9999sec adjustable in 1sec intervals. If the unit does not reach the stop voltage within this time the unit will abort the test. This timer can be turned off.

**Balance Duration** – Range of 10sec to 9999sec, adjustable in 1sec intervals. This can also be set for continuous readings with no time out.

From the MAIN Screen (Figure 1), press SETUP – MANUAL. Then highlight the M.Setup 1, press DISPLAY. The following screen will appear:

**Figure 13. SETUP – MANUAL – M.Setup 1:**

SETUP M.TEST				
M.Setup 1	StartV	1000v	MaxDcy	22s
Last enter	Stop V	100v	BalDur	12s
06/12/08	ChrgDif	50v	StrtDly	2s
10:20A				
NEXT	PREV	EDIT	CANCEL	SAVE

Press NEXT or PREV to highlight the item, then press EDIT to make changes.

When finish, press SAVE to store the new settings. Or press CANCEL to discard the changes.

## AUTOMATIC OPERATION:

Once the desired test parameters are set up, the user simply selects the “start” button to begin the tests. All the parameters are shown in the automatic screen.

**Figure 14. Auto Sequence Test** \_\_\_\_ From the MAIN screen, press AUTO:

This shows the current Setup. To change/edit the setup, Press MAIN-SETUP-AUTO.

Group & Location. If you want to change another location, press Grp/Loc.

TstAvai: How many more test can be performed and stored.

AUTO		06/18/08			
11:23:02A					
A.Setup 1	StartV	900v	MaxDcy	300s	
Group A	Stop V	90v	BalDur	20s	
Location 2	ChrgDif	50v	StrtDly	1s	
TstAvai 1500	#DecayCyc	3	CycDelay	3s	
	DcySeq	+-+	Bal (Y/N)	Y	
Start Grp/Loc Cont					MAIN

**Start:** to start the auto sequence tests.

**Grp/Loc:** to select another group and location.

**Cont:** Perform auto sequence test Continuously. This will prompt for time interval between each auto sequence tests.

**MAIN:** back to MAIN screen.

As soon as the start button is pushed the screen switches to the auto test screen and proceeds to run the prescribed number of decays and balance (only if balance is set to run via the setup). The unit moves automatically from one test to another until it has completed the programmed sequence. At the end of the tests the screen changes to display, individual decay times, average decay time, balance results, including +/- peaks and average voltage, as well as date, time, temperature, humidity, group/location. From this point you can select to run another test sequence or return to the automatic screen.

As in the manual mode, the group/location button will allow you to select the appropriate label for the ionizer under test.

**Figure 15. Auto sequence tests:**

This shows the current test is +decay, Cycle 1 of 3.

AUTO	+ 1 of 3		DecayTime	Group A	
1008 <sub>v</sub>			6.2s	Location 1	
				Start	1000v
				StopV	100v
				MxDcy	300s
			SKIP	STOP	

**SKIP:** Allows user to skip start delay time.

**STOP:** stop the test.

When the auto sequence tests are finished, data will be shown as follows:

**Figure 16. Auto Sequence Test Review:**

Group A Location 2 06/22/08 03:32:56P 30C 62%RH  NxtCyc	3	+Decay	EndV	-Decay	EndV
	1	6.5s		6.5s	
	2	6.5s		6.5s	
	3	6.4s		6.5s	
	Av	6.5s		6.5s	
		+Vp=+22.6		-Vp=-12.3 Vav=+04.5	
		MAIN		AUTO	

**NxtCyc:** highlight the next data row.

**MAIN:** back to MAIN screen.

**AUTO:** start another auto sequence test.

## Programming features for Auto Sequence Test:

**Start voltage** – Same as manual

**Charge Differential** – Same as manual

**Stop voltage** – Same as manual

**Test Start Delay** – Same as manual

**Max Decay Time** – Same as manual

**Balance Duration** – Same as manual

**Decay Cycle** – Range from 1 to 10, adjustable in increments of 1. This is the number of + and – decays the unit will run in an automatic sequence.

**Decay Sequence** – Select either the decay sequence of + – + – or + + – – for the number of cycles selected in Decay Cycle.

**Cycle Delay** – Range from 2sec to 15sec, adjustable in 1sec increments. This is the amount of time from the finish of the last decay cycle to the start of the next.

**Balance (Y/N)** – Select whether or not you want a balance test to automatically run at the end of the decay cycle.

**Continuous** – This feature allows you to perform a continuous series of tests on a selectable time basis. For example, you want to run a series of decay and balance every hour for the next day. From the automatic screen select CONT, then select the desired test time interval from 1 minute to 24 hours. Once you have programmed the time, press EXIT and you will advance to the next screen. From this screen you have the option of pressing CANCEL or START. The START key begins the default automatic test sequence and will repeat that test sequence at the time interval selected. This continuous testing will continue until you stop the tests or the memory becomes full.

From the MAIN Screen (Figure 1), press SETUP – AUTO. Then highlight the A.Setup 1, press DISPLAY. The following screen will appear:

**Figure 17. Setup for Auto Sequence Test:**

SETUP A.TEST 1	StartV 1000v	MaxDcy	22s	
A.Setup 1	Stop V 100v	BalDur	12s	
Last enter	ChrgDif 50v	StrtDly	2s	
06/12/08	#DecayCyc 3	CycDelay	3s	
10:20A	DcySeq +--+	Bal (Y/N)	Y	
NEXT	PREV	EDIT	CANCEL	SAVE

Press NEXT or PREV to highlight the item, then press EDIT to make changes.

When finish, press SAVE to store the new settings. Or press CANCEL to discard the changes.



## ADDITIONAL FEATURES:

### Group and Location –

By accessing this screen the tests can be organized to reflect the ionizers' locations. There are up to 17 Groups available, with a maximum of almost 700 locations. The total number of group/locations available will vary depending on how extensive the tests are for the individual locations (i.e. how many decays are run for each ionizer). Up to 1500 tests may be run. By using a PC connected to the units RS232 port it is possible to custom label these group/locations (i.e. Building 10 - Bench 2E). Via the same link it is then possible to download all the test results stored in the unit into a spreadsheet on the PC.

**Figure 18. Select Group/Location for the test**

GRP/LOC	Default Grp/Loc Name			
	Grp#	Name	#ofLoc	AMTest
Current:	<b>1</b>	<b>Group A</b>	<b>99</b>	<b>00</b>
Group A	2	Group B	99	00
Location 1	3	Group C	99	00
MaxGrp 17	4	Group D	99	00
NEXT	NXTLOC	CANCEL	SELECT	

Group A has 99 locations. AMTest: A(uto sequence) / M(annual) test Setup for this Group:  
 0=Use Default setup  
 1=Use A/M Setup 1;  
 2=Use A/M Setup 2;  
 3=Use A/M Setup 3;  
 4=Factory  
 5=Test  
 AMTest can be set in the PC software when entering the Group/locations..

**NEXT:** to highlight the next Group.

**NXTLOC:** Select the same group, next location from the current one.

**CANCEL:** Cancel the selection.

**SELECT:** Select the highlighted group. This will lead to select location screen.

### Test Parameter Setups –

In both the Manual and Automatic Modes there are five distinct setups. Three of these are available to the user to customize as needed. The other two are the factory and test settings, which are not adjustable. Any of these can be selected as the default test setup.

### Data Storage and Review –

All test results are stored in the internal memory of the unit. They can be viewed through the screen or downloaded to a PC. Each test records the time, date, temperature, humidity and test results.

**Figure 19. Review Data: From MAIN screen (Figure 1), press DATA**

```
DATA
Group A
Location 1
TstAvai 1450

RvwMan RvwAuto GRP/LOC CLR MAIN
```

**RvwMan:** Review Manual test data. See Figure 11.

**RvwAuto:** Review Auto sequence data. See Figure 16.

**GRP/LOC:** Select group/location.

**CLR:** Erase data.

**MAIN:** Back to MAIN screen.

### **Peak Reset –**

During a manual balance test where **Balance Duration** has been disabled the M BALANCE will show *BalDur=XXXXs* which means that the test will run continuously until STOPped. Pressing the PkRst key at any time will reset the displayed peak values to zero and the timer will continue to run until it reaches 999.9s then the decimal point will shift and the display will run to 9999s (or about 2 hours and 47 minutes). Beyond that, an overrun error is displayed.

### **Plate Voltage Bar graph –**

Three ranges are provided with a maximum resolution of less than 10 volts for making very fast assessments of plate voltage and polarity around zero.

### **Power –**

The unit will run on either AC or battery power. The internal rechargeable battery will supply up to six hours of operation.

### **Charge Plate –**

A 6" X 6" plate comes standard with the 288. When it is detached from the base unit it comes with the ground plane plate or can be taken off as a separate item. Mounting hardware allows the plate to be attached to the side of the unit, connected to a tripod via ¼ -20 threaded insert or put into any variety of situations to measure ionization. A 5-foot extension cable comes standard with the unit.

To release the detachable charge plate only, slide it forward. To remove the complete charge plate and ground plane assembly, press the release button with a suitable tool and swing the assembly slightly to the right.

For those space restricted applications, there are several optional plate sizes available down to 1" x 1". Consult factory for other sizes and availability.

### **Grounds –**

A ground snap is provided on one corner of the ground plane and a ground jack is provided on the back panel. The instrument chassis is normally connected to ground via the power cord during AC operation and the ground plane is connected to the chassis when the unit is assembled. Grounding is essential to proper operation.

### **Analog Output –**

An analog output jack is provided on the back panel.

## Section 5

# MAINTENANCE

### **Precautions —**

User maintenance should normally be limited to keeping the instrument clean and free from physical damage. Store the instrument in its protective carrying pouch when not in use.

### **Cleaning —**

Fingerprints and other contaminants may be removed from the case with a clean lint-free cloth dampened in a 70%/30% mix of clean technical grade isopropyl alcohol and de-ionized water. DO NOT use soap or detergent.

### **Battery —**

Battery voltage is monitored and displayed on the MAIN screen. Normal range of operation is between 10 and 15 volts. When the battery has discharged to below 10 volts, a warning message is displayed and the instrument shuts down 15 seconds later terminating any activity in progress. Battery charge life depends on type of tests being run and the settings selected in the OPTION menu. Testing may be resumed using AC power.

A complete re-charge cycle takes 4-6 hours with power off.

### **Charge State Indicator —**

While the unit is connected to an AC power line and in an inactive state, the upper half (red) of the PLATE VOLTAGE bar graph serves as a battery state-of-charge indicator with maximum being a float condition and minimum implying that the battery requires further charging. The "x1" and "x2" range lights will be lit. If the power cord becomes disconnected, the LED's will continue to report the battery status for several minutes.

### **Calibration —**

Calibration is not a user function and is beyond the scope of this manual. Calibration information is available from the factory. Monroe Electronics recommends annual calibration and/or when the instrument is damaged or repaired or where called for more often by contract. We offer repair and calibration services for a fee.

## Section 6

# REFERENCES

Documents associated with ionization:

ESD Association Standard —  
ANSI/ESD STM3.1 – Ionization

ESD Association Advisory – ESD ADV3.2 –  
Selection and Acceptance of Air Ionizers

ESD Association (Draft) Standard – ANSI/ESD SP3.3 – Periodic Verification of Air  
Ionizers

ESD Association Advisory – ESD ADV1.0 – Glossary

Are available from:

ESD Association, Inc.  
7900 Turin Rd.  
Building 3, Suite 2  
Rome, NY 13440-2069

Phone (315) 339-6937  
Fax (315) 339-6793  
eosesd@aol.com  
<http://www.eosesd.org>

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

## **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 should be accompanied by a copy of a dated invoice or bill of sale, which serves as a proof of purchase for the material. Serial numbers and date codes on our products also serve to determine warranty status. Removal of these labels or tags may result in voiding a product's warranty.

Repairs will be returned promptly. Repairs are normally returned to the customer by UPS within 10 to 15 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.

### **RETURN OF REPAIRED ITEMS:**

Factory repairs will be returned to the customer by the customer's choice of FedEx, DHL or UPS. Warranty repairs will be returned via UPS ground. The customer may request accelerated shipping via the previous mentioned carriers for both warranty and non-warranty repairs. **NOTE:** Accelerated transportation expenses for all 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 not be 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.