

PROFESSIONAL STATIC CONTROL PRODUCTS

Contents for Instruments Contained in the Following

BASIC RESISTANCE KIT

PMK-151

Copyright © 2011 by Prostat[®] Corporation. All rights reserved. Printed in the United States of America. No part of this manual may be used or reproduced in any manner whatsoever without written permission. For information contact Prostat Corporation, 1072 Tower Lane, Bensenville, IL 60106 USA

Prostat is the registered trademark of Prostat® Corporation

Thank you for purchasing a PROSTAT[®] Electrostatic Auditing Kit

Your kit may have empty spaces that contain options not purchased. Should you require these options at a later date, please contact your Prostat[®] Representative.

Some instruments in your kit contain the same serial number. These instruments have been tested and calibrated together. For accurate measurements, DO NOT INTERCHANGE INSTRUMENTS WITH DIFFER-ENT SERIAL NUMBERS.

The Batteries for your instrument are located in the kit. Please read the operators manual prior to installing batteries.

Your instruments are accompanied by a calibration sheet with your operators manual. The date when the instruments were put into service is the date to go by when requesting calibration services. Prostat® recommends calibration after each year in operation. For information on calibration contact your Prostat® Representative.

All Prostat[®] instruments are designed to help you audit to current industry standards. A list of some of the source for standards follows.

Your Prostat [®] Kit has been designed with instruments to help you meet current industry Standards and specifica- tions. Copies of Standards can be obtained from the following:			
ESD Association Inc. 7902 Turin Road, Suite 4 Rome, NY 13440-2069 Phone: 315-339-6937 Fax: 315-339-6793 (All ESD Association Standards)	American National Standards Institute 105-111 South State Street Hackensack,NJ 07601 Phone: 212-642-4900 Fax: 212-302-1286 (ISO-9000 and others)		
Department of Defense Single Stock Point 700 Robbins Ave. Bldg. 4D Philadelphia, PA 19111-5094 Fax: 215-697-1462 Phone: 215-697-2667/2179 (Most Federal & Military Related Standards	Electronics Industry Associates (EIA) 2500 Wilson Boulevard Arlington, VA 22201-3834 Phone: 703-907-7500 Fax: 703-907-7501 (EIA-541 and others)		
Institute for Interconnecting and Packaging Electronics Circuits (IPC) 7380 N. Lincoln Ave. Lincolnwood, IL 60646-1705 Phone: 847-677-2850 Fax: 847-677-9570 American Society for Testing Materials (ASTM) 1916 Race Street Philadelphia, PA 19103-1187 Phone: 215-299-5585 (General Test Information) Fax: 215-977-9679	National Fire Protection Association 1 Batterymarch Park, P.O. Box 9101 Quincy, MA 02269-9904 Phone: 1-800-344-3555 Fax: 617-770-3500		

Obtaining copies of current industry and government standards will assist you and your customer meet audit and control requirements.

INSPECTION AND WARRANTY INFORMATION

I. UNPACKING AND INSPECTION

- A. Examine the shipping carton for obvious signs of damage.

 - 2. If damage is noted, notify the carrier and supplier immediately.
- B. If Instruments appear to be in good condition:
 - 1. Read the Operator's Manual in its entirety.
 - 2. Check that all items are included with the Kit

IV. WARRANTY INFORMATION

A. Prostat[®] Warranty

Prostat[®] Corporation expressly warrants that for a period of one (1) year from the date of purchase, that Prostat instruments will be free of defects in material (parts) and workmanship (labor). If Prostat receives notice of such defect during the warranty period, Prostat will replace at its expense such parts which it determines to be defective. Any defective part must be returned to PROSTAT postage prepaid with proof of purchase date. Warranty Exclusions -- THE FOREGOING EX-PRESS WARRANTY IS MADE IN LIEU OF ALL OTHER PRODUCT WARRANTIES, EXPRESS AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE SPECIFI-CALLY 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 PROSTAT or any seller be responsible or liable for special, incidental, or consequential losses or damages, under any legal theory including but not limited to contract, negligence, or strict liability. Fulfillment by PROSTAT of its express warranty obligations described above will be purchaser's exclusive remedy and will be PROSTAT's and seller's limit of liability for any breach of warranty or otherwise.

- B. Shipping of Warranty Returns
 - www.prostatcorp.com/RMA
 - vided by Prostat's customer service department.

NOTE DO NOT RETURN ANY ITEM WITHOUT HAVING FIRST RECEIVED A RETURN AUTHORIZATION NUMBER FROM PROSTAT.

For Detailed Shipping Instructions and Return Authorization, Contact:

1. If damage is suspected, open the carton and inspect the instrument for possible damage.

3. Then conduct a series of familiarization tests as instructed in the operations manual.

1. Obtain a Return Authorization Number and shipping address from Prostat's website at

2. Pack the Instrument carefully and ship it prepaid and insured to the proper destination pro-

Prostat[®] Corporation **Calibration Department** 1072 Tower Lane, Bensenville, IL 60106 USA

Toll-Free: (855) 782-8421 Phone: (630) 238-8883 Fax: (630) 238-9717 Website: http://www.prostatcorp.com/RMA

C. Shipping of Non-warranty Returns

Any product returned for non-warranty repair should be packaged as described previously and shipped to the address provided by Prostat Calibration Department.

The following information must be included with the returned product:

- 1. Description of the problem
- 2. Purchase Order number & Prostat Return Authorization Number
- 3. Name and phone number of contact individual who can provide information
- 4. Complete return address

ESD STANDARDS

For ESD Related Standards Information, Please Review the Following:

ESD STANDARDS	
ANSI/ESD S20.20	Development of ESD
ANSI/ESD S1.1	Wrist Straps
ESD STM2.1	Garments
ANSI/ESD STM3.1	lonization
ANSI/ESD SP3.3	Periodic Verification
ANSI/ESD S4.1	Worksurfaces - Resis
ANSI/ESD STM4.2	ESD Protective Work
ANSI/ESD STM5.1	Human Body Model
ESD STM5.2	Machine Model - Co
ANSI/ESD STM5.3.1	Charged Device Mod
ANSI/ESD S6.1	Grounding
ANSI/ESD S7.1	Flooring
ANSI/ESD S8.1	Symbols - ESD Aware
ANSI/ESD S9.1	Footwear
ANSI/ESD SP10.1	Automated Handling
ANSI/ESD STM11.11	Surface Resistance N
ANSI/ESD STM11.12	Volume Resistance N
ANSI/ESD STM11.31	Bags
ANSI/ESD STM12.1	Seating - Resistive N
ESD STM13.1	Electrical Soldering/
ANSI/ESD STM97.1	Floor Material & Foo
ANSI/ESD STM97.2	Floor Material & Foo
ESD ADV1.0	Glossary
ESD ADV 53.1	ESD protective work
ANSI/ESD S541	Packaging Materials

For further information regarding ESD Association standards or activities, contact:

ESD Association, Inc. 7900 Turin Rd., Bldg. 3 Rome, NY 13440-2069 Phone: (315) 339-6937 Fax: (315) 339-6793 Wevsite: http://www.esda.org

REF: Inspection-Warranty Manual Revision 1-12

STANDARD DESCRIPTION

D Control Program

of Air Ionizers

stance Measurements

ksurfaces – Charge Dissipation Characteristics

(HBM) - Component Level

omponent Level

del (CDM) – Component Level

eness

g Equipment

Measurements

Measurements

Neasurement

Desoldering Hand Tools

otwear - Resistance in combination with a Person

otwear - Voltage Measurement in combination with a Person

stations

DIGITAL PSYCHROMETER PHT-771

Ι.	General Operation
١١.	Display Description
III.	Taking Measurements
IV.	Wet Bulb and Dew Point measurements (no So ond Sensor)
V.	Wet Bulb and Dew Point measurements (with Second Sensor)
VI.	Minimum (MIN) Maximum (MAX) Function
VII.	Data Hold Function
VIII.	Automatic Power Off Feature
IX.	Lo Battery Indicator
Х.	Error Messages
XI.	Maintenance
	General Specifications

	9
	10
	10
ec-	11
1	11
	11
	12
	12
	13
	13
	14
	15



I. General Operation

Meter Description

- 1. Humidity Sensor & Air Temperature Sensor
- 2. Triple LCD Display
- 3. ON/OFF button
- 4. T1-T2/Dew Point/T1 button
- 5. °F/°C select
- 6. MIN/MAX/RESET button
- 7. T2-DP/Wet Bulb/T2 button
- 8. HOLD button
- 9. T2 Probe Jack
- cover)



- B. Turn the PHT-771 on by pressing the Red ON/OFF Button.
 - indicated, allow 60 80 seconds for the unit to take a reading.
 - 2. Do not press hard.
- Centigrade/Fahrenheit scale.
- D. Condensation will not affect the meters accuracy.
- E. Press the ON/OFF button briefly to turn the unit OFF
- or for storing unit.

Rev. D / January 2012



A. Gently turn the sensor cover towards the "Open" position until it stops. (Do not try to remove the



1. Press and hold the ON/OFF Button approximately one second. Unit will perform a short selftest when turned on. The unit is ready to function when the humidity and temperature is

C. Press and hold the °C/°F key for approximately 2 seconds to convert the reading to the desired

Temperature, Relative Humidity and Wet Bulb will display simultaneously, or Relative Humidity, Dew Point and Wet Bulb will display simultaneously by pressing

F. Gently turn the sensor cover towards the "Close" position until it stops when the unit is not in use

II. Display Description

- 1. Relative Humidity %
- 2. T1
- 3. T1-T2
- 4. Dew Point
- 5. Wet Bulb
- 6. T2-Dew Point
- 7. °C/°F
- 8. T2
- 9. Maximum
- 10. Minimum
- 11. Low Battery/Hold



NOTE

The PHT-771 may be used with an optional second sensor (not provided). For general temperature, humidity, wet bulb and dew point measurements a second sensor is not necessary.

III. Taking Measurements

- A. Turn the unit ON and hold the probe in the area to be tested.
- B. Allow approximately 60 to 80 seconds for readings to stabilize.
- C. The Relative Humidity measurement appears in the top display.
- D. Pressing the **TR** button toggles the lower left display between DP (Dew Point) and T1 (Ambient Temperature).
- E. Wet Bulb (Wb) is displayed in lower right display.
- F. If second sensor is installed, pressing the total button toggles the lower right display between T2-DP (external temperature-Dew Point), WB (Wet Bulb), and T2 (external temperature).



NOTE Note: If an external probe is not connected, T1-T2, T2-DP, and T2 measurements will not be displayed.

IV. Wet Bulb and Dew Point measurements (No Second Sensor)

- than the ambient Temperature T1 measurement.
- the temperature at which moisture in the air will condense.

V. Wet Bulb and Dew Point measurements (With Second Sensor)

lower right display. Wet Bulb temperature is now displayed in °C or °F.

NOTE An external probe must be connected to activate the AMB, button.

lower left display. **DP** is displayed in °C or °F.

VI. Minimum (MIN) Maximum (MAX) Function

- est humidity and temperature reading in memory.
 - 1. If I is in Dew Point mode, the MIN Dew Point (DP) will be displayed.
 - 2. If **T** is in Temperature mode, the MIN Temp. (**T1**) will be displayed.
 - 3. The minimum Wet Bulb (**Wb**) will be displayed.
- C. maximum humidity and temperature readings in memory.

A. The PHT-771 default is to display Wet Bulb Wb in the lower right display. Wb is displayed in °C or °F. The Wet Bulb measurement is an indication of evaporative cooling and will be lower (cooler)

B. To read the Dew Point measurement, press the **ATTP** button in until the symbol DP appears in the lower left display. DP is displayed in °C or °F. The Dew Point measurement is an indication of

A. To read the Wet Bulb measurement, press the Aug button until the symbol Wb appears in the

B. To read the Dew Point measurement, press the **ATTOP** button in until the symbol **DP** appears in the

A. The MIN/MAX mode allows the user to view only the lowest (MIN) or highest (MAX) readings.

B. Press the **EXAMPLE** button once and MIN appears on the display. The display is now showing the low-

Press the **EXAMPLE** button again and MAX appears on the display. The display is now showing the

PHT-771 Digital Psychrometer

- 1. If I is in Dew Point mode, the MAX Dew Point (DP) will be displayed
- 2. If **TR** is in the Temperature mode, the MAX Temp. (T1) will be displayed.
- 3. The maximum Wet Bulb (Wb) will be displayed.
- D. To exit the MIN/MAX mode, press the **MUN** button again and the MIN and MAX icons disappear.
- E. To clear the current min/max readings in memory, press and hold the **button** for more than two seconds.

VII. Data Hold Function

- A. Press the HOLD button momentarily to freeze the displayed reading.
 - 1. The current reading is now being held and will not change until Hold (HLD) function is canceled.
 - 2. To cancel the Hold (HLD) function, press the HOLD button momentarily
- B. The 'HLD' icon will appear on the upper right-hand side of the display.
- C. Press the **HOLD** button again to return to normal operation.

VIII. **Automatic Power Off Feature**

- A. The meter automatically shuts off after a programmed period of time
- B. The default time is 10 minutes.
- C. To modify the Automatic Power Off timing period:
 - 1. Press the HOLD button while turning the meter ON using the ON/OFF button.
 - 2. Continue to hold down both HOLD and ON/OFF buttons and the meter will cycle through the selectable power-off times: n, 2, 5, 10, 20, 40 or 60 minutes. "n" disables the auto power off function.
 - 3. When the desired power-off time appears in the display, release both buttons to select the displayed time.
 - 4. When both HOLD and ON/OFF buttons are released, the unit returns to normal operation.

IX. Automatic Power Off Feature

- A. When the battery power falls low, the symbol will appear on the LCD
- B. Replace the two (2) 1.5 'AAA' batteries by removing the rear battery compartment cover and accessing the battery compartment.
- C. Observe polarity when placing the batteries in the compartment.
- D. Ensure that the compartment cover is securely fastened when finished.

NOTE: Remember Low Batteries will tend to give inaccurate readings. Make sure you have good batteries at all times.

> CAUTION! DO NOT IMMERSE PROBE INTO LIQUIDS. IMMERSING IN LIQUIDS WILL CAUSE PERMANENT DAMAGE TO THE SENSOR!

X. Error Messages

An error message will appear on the display if the meter fails an internal diagnostic test.

- A. ER1: Relative Humidity failure. Repair/replacement is necessary.
- B. ER2: Internal temperature failure. Repair/replacement necessary.
- C. ER3: Reference resistance failure. Repair/replacement necessary.
- D. ER4: Internal temperature is out of range.
- E. ER5: External temperature is out of range.







PHT-771 Digital Psychrometer Specifications

Function	Range and Resolution	Accuracy
Humidity	0.0 to 100.0% RH	±3% RH (10 to 90%) @ 23°C
Temperature (internal)	-4.0 to 122.0°F (-20 to 50°C)	±1.8°F (±1°C)
Temperature (external)	-4.0 to 158.0°F (-20 to 70°C)	±1.8°F (±1°C)

Display:	Triple LCD
Sensor Type:	Humidity: Precision Temperature: Thern
Response Time:	60 seconds typical
Dew Point:	-90.4 to 122.0°F (-68 measurements)
Wet Bulb:	-6.88 to 122.0°F (-22 measurements)
Operating Conditions:	-4 to 122°F (-20 to 5
Storage Conditions:	-40 to 185°F (-40 to
Power Supply:	2 x 1.5V 'AAA' batter
Battery Life:	Approx. 80 hours
Dimensions / Weight:	7 x 1.9 x 1" (178.5 x

XI. Maintenance

Cleaning and storage

A. The meter should be cleaned with a damp cloth and mild detergent when necessary. Do not use solvents or abrasives.

Store the meter in an area with moderate temperature and humidity (refer to the operating and storage range in the specifications chart).

i capacitance sensor mistor

58 to 50°C) (calculated from RH and Air temperature

21.6 to 50°C) (calculated from RH and Air temperature

50°C); < 99% RH non-condensing

o 85°C); <99% RH non-condensing

eries

48.8 x 25.2mm); 4.9 oz. (140g)

RESISTANCE SYSTEM PRS-801

Ι.	Introduction & Description
II.	Cautions & Warnings
III.	Controls, Connections & Indicators
IV.	Battery Installation and Replacement
V	Setup & Calibration
VI.	Instrument Operation
VII.	Instrument Maintenance
VIII.	Warranty Information
	General Specifications
	Instrument Controls



I. Introduction & Description



The PRS-801 Resistance System is capable of precision resistance measurements from 0.1 up to 2.0x10¹⁴ ohms with an overall measurement tolerance of ±5%. Its wide range and close tolerance make it the ideal instrument for measuring resistance to a variety of ESD and general industry specifications. It is operated by microprocessors that control the instrument's measurement process, resistance auto ranging, test voltage selection, electrification periods, and display functions. It can be operated in either fully automatic or manual modes, or a combination of automatic and manual modes.

The PRS-801 is unique in that it stores up to 80 resistance measurements in its non-volatile memory. Its software transfers stored data to Excel[®] spreadsheets.

Its accuracy is based on its ability to make and process several thousand measurements per second, averaging them until a stable set of eight consecutive measurements, all within 5% of each other are obtained. Typically, measurements at less than 1 ohm are within 5% of tolerance, and those between 1.0 and 1.0x10¹² ohms are within 0.5% of laboratory references. Measurements from 1.0x10¹² to less than 2.0x10¹⁴ ohms are within 5% tolerance using shielded cables, to a maximum of ¼ decade deviation from a laboratory reference (<40% tolerance) depending on cables and procedures employed by the operator.

Figure 1: PRS-801 during power up

While quite sophisticated in design, the PRS-801 Resistance System is easy to use and extremely helpful in making accurate ESD auditing measurements, or general resistance and continuity checks.

To avoid electrical shock or damage to the PRS-801 Resistance System, read this manual completely before installing batteries or using the instrument.

A. Measurement Applications

The PRS-801 Resistance System is designed to measure resistance characteristics of electrostatic discharge (ESD) control materials and products to current ESD industry standards, including:

Wrist Straps (ANSI/ESD S1.1) Flooring (ANSI/ESD STM7.1) ESD CP Grounds (ANSI/ESD S6.1) Footwear (ANSI/ESD STM9.1) Equipment (ESD SP10.1) Material Handling Containers

Note: Additional fixtures and electrodes supplied separately are required for many of these measurement.

B. PRS-801 Resistance System Components:

Rev. D / January 2012



CAUTION

Garments (ESD STM2.1) Worksurfaces (ANSI/ESD S4.1) Carts & Seating (ANSI/ESD STM 12.1) Workstations **Production Aids & Hand Tools** Packaging (ANSI/ESD STM11.11, ANSI/ESD STM11.12 & ASTM 257), and Other ANSI/ S20.20 ESD Program Control Elements

PRS-801 Resistance System

The PRS-801 Resistance System includes the following items:

1. PRS-801 Resistance System Instrument with 2 each 9V alkaline batteries.



- 2. Two 10-foot leads (PRS-800LB & PRS-800LR) for general audit measurements up to 1.0x10¹² ohms.
- 3. One set (PRS-801SSL & PRS-801TVL) high resistance measurement leads, including: one shielded 42 inch sensing lead; and, one 42-inch power lead for precision measurements above 1.0x10¹² ohms.
- 4. Prostat Utility Software (PRS-801CSW) enabling data transmission from the PRS-801 to Windows Excel spread sheets.
- 5. One RS-232 output cable (PRS-801CIC) for connection to a nine-pin computer COM port. You may also purchase a USB adapter, sold separately.
- 6. One heavy duty, black "Bulldog" clip (PRS-801BC)
- 7. Two Metal Alligator Clips (PSI-870MAC)
- 8. One Insulated Test Plate (PRS-800INS)
- 9. One Metal Test Plate (PRS-800MTL)
- 10. One calibration shunt for low range adjustment (PRS-801CC)

Optional accessories are available for the PRS-801 Resistance System. www.prostatcorp.com for additional information.

C. PRS-801 Basic Description & Functions

The PRS-801 Resistance System has several test, display and data logging functions:

1. The PRS-801 six basic measurement modes are described in the following table

MODE	DISPLAYED UNITS	INDICA- TION	RESIST. RANGE	TEST VOLTS	TEST FUNCTIONS	
AUTOMATIC 1 [Default]	1.0EXX IND Ω - ΤΩ	AUTO	AUTO.	AUTO.	AUTOMATIC RESISTANCE RANGE, TEST VOLTS, ELECTRIFICATION,	
AUTOMATIC 2	ΟΗMS Ω - ΤΩ	AUTO	AUTO.	AUTO.	DISPLAY HOLD SEE TABLE NOTE #1	
MANUAL 1 SELECT DECADE	1.0EXX IND Ω - ΤΩ	MANUAL	MAN	MAN. or AUTO	TEST ONLY; NO DISPLAY HOLD UL= UNDER DECADE LEVEL	
MANUAL 2 SELECT DECADE	ΟΗMS Ω - ΤΩ	MANUAL	MAN	MAN. or AUTO	SEE TABLE NOTE #2	
MANUAL/ AUTOMATIC 1 MAY SELECT STARTING DECADE	1.0EXX IND Ω - ΤΩ	AUTO & MANUAL	MAN. Start AUTO Run	AUTO.	MANUAL SETUP STARTING DECADE, AUTO ADJUST RANGE, TEST VOLTS, ELECTRIFICATION	
MANUAL/ AUTOMATIC 2 MAY SELECT STARTING DECADE	ΟΗMS Ω - ΤΩ	AUTO & MANUAL	MAN. Start AUTO Run	AUTO.	DISPLAY HOLD SEE TABLE NOTE #3	

TABLE NOTES:

#

#

#

1 AUTOMATIC:	RESISTANCE F	RANGES
	@<10V:	0.1 TO
	@ 10V:	1.0E+C
	@100V:	1.0E+0
2 MANUAL:	RESISTANCE F	RANGES
	@<10V:	0.1 TO
	@ 10V:	1.0E+0
	@100V:	2.0E+0
3 AUTO-MANUAL:	(Same as AUT	ΓΟΜΑΤΙΟ
	RESISTANCE	RANGES
	@<10V:	0.1 TO
	@ 10V:	1.0E+0
	@100V:	1.0E+0

the table, above:

<10 Volts 10 Volts 100 Volts

In AUTOMATIC and AUTOMATIC/MANUAL modes the instrument automatically controls voltage and resistance range based on resistance characteristics of materials being measured. In the **MANUAL** mode the operator may select test voltage and and resistance range. Note that the most efficient mode of operation in **AUTOMATIC/MANUAL** for maximum battery life.

IN AUTO 0.1Ω TO <2.0E+14 Ω as follows <1.0E+04Ω (0.1Ω - < 10KΩ) 04 TO <1.0E+06Ω (10KΩ - < 1MΩ) 06 ΤΟ <2.0Ε+14Ω (1ΜΩ - <200ΤΩ)

IN MAN 0.1Ω TO <2.0E+14 Ω as follows <1.0E+05Ω (0.1Ω - <100KΩ) 03 TO <1.0E+09Ω (1KΩ- <1GΩ) 05 TO <2.0E+14Ω (200KΩ-< 200TΩ)

IN AUTO-MANUAL 0.1Ω TO <2.0E+14 Ω as follows <1.0E+04Ω (0.1Ω - < 10KΩ) 04 TO <1.0E+06Ω (10KΩ - < 1ΜΩ) 06 ΤΟ <2.0Ε+14Ω (1ΜΩ - <200ΤΩ)

2. The PRS-801 provides three separate test voltages for resistance measurements as indicated in

- 3. The PRS-801 displays resistance Measurements in several ways:
 - a. 14 individual operator programmable LED's each representing one order of magnitude from <10³ to >10¹⁴ ohms. The operator may select from three colors, or **OFF** for each LED, including:

```
GREEN
RED
YELLOW/ORANGE
OFF (Blank)
```

- b. The large Liquid Crystal Display (LCD) includes an analog (1 10) scale and X1, X10 and X100 multiplier indication for measurement in Ω , K Ω , M Ω , G Ω and T Ω .
- c. Digital measurements are provided using integers and Ω , K Ω , M Ω , G Ω , T Ω indicators, or in exponential format (1.0EXX) with Ω -T Ω indicators.
- 4. The PRS-801 includes data logging (storage) capabilities for up to 80 data points when **RECORD** is selected. The instrument will provide access to the memory register, calculate and display Minimum, Maximum and Average of all measurements in the instrument's memory whenever **RECALL** is selected.

Using the Prostat Utility Software, the PRS-801 can transfer all data points stored in its non-volatile memory to a Windows[®] Excel[®] computer spreadsheet via its RS-232 port for detailed analysis and record maintenance. (Windows[®] 95, 98, 2000, ME, XP, Visa, 7 and NT based computer system using an Office Suite[®] 95, 97, 2000, 2007 and 2010 Excel[®] spreadsheet program)

A USB adapter may be purchased from Prostat if your computer does not have a RS-232 COM port. Please contact Prostat or visit www.esdcheck.com to purchase one.

II. Cautions & Warnings

As with any electrical device, use proper safety precautions and safe measurement procedures to avoid personnel shock and arc discharge.

- A. The PRS-801 Resistance System is battery operated and delivers test voltages up to 100 volts. **IMPORTANT:** Only use alkaline batteries in the PRS-801.
- B. The instrument is current limited for safety, however, if improperly used it may be capable of delivering an annoying shock to a person touching conductors energized by the PRS-801, particularly at 100 volts.
- C. While current limited, a hazard exists in personnel reaction to a potential shock.
- D. To avoid personnel shock, follow the General Operations instructions at all times. Do not touch energized electrodes or fixtures when power is applied except as specifically described in this and accessory instructions.
- E. Do not operate or store the instrument in damp environments or wet conditions.

CAUTION Storage or use of this instrument in high humidity, damp or wet conditions may cause damage to the instrument's electronic circuits, effect performance and can increase the possibility of personnel shock or arc discharge.

F. Do not use the PRS-801 in combustible or explosive environments

WARNING Improper handling and use of energized circuits may cause arc discharge, which in turn may cause the ignition of combustible materials or fumes. Do not use exposed energized circuits in flammable areas.

- G. Do not attempt to measure energized circuits with the PRS-801
- H. Do not use the PRS-801 if it becomes damaged in any way
- J. Other Safety & Operating Considerations

 - iar with the use and handling of devices containing power supplies.

CAUTION The PRS-801 Contains Electrostatic Discharge Sensitive (ESDS) components and includes precision alignment of circuit elements. Only Prostat trained and ESD Qualified instrument repair personnel should perform service.



Only Prostat trained instrument personnel should attempt to service or repair the PRS-801

1. This manual displays cautions and warnings alerting the user to hazardous operation and servicing conditions. CAUTION or WARNING headings throughout this publication flag this information, where appropriate. Follow all caution and warning instructions at all times.

2. The PRS-801 is a precision instrument and should be operated by experienced personnel famil-

3. The PRS-801 contains Electrostatic Discharge Sensitive (ESDS) components. Qualified personnel should service it only at ESD Controlled workstations. Do not attempt to dismantle the PRS-801 without Prostat's authorization and expert supervision. The instrument contains exceptionally

clean circuits that are aligned and adjusted in a precise manner for optimal operation and accurate performance. Unauthorized opening of the PRS-801 housing will void the instrument's warranty.

WARNING Unauthorized opening of the PRS-801 case or dismantling in any manner WILL VOID THE INSTRUMENT'S WARRANTY.

- 4. Read this manual in its entirety before installing batteries or using the PRS-801.
- 5. Do not drop or cause unnecessary mechanical shock to your PRS-801 instrument.
- 6. Store the instrument in a clean, dry environment. Do not expose the instrument to wet, extremely hot or cold conditions.
- 7. If the unit is stored in a cold environment, allow it to stabilize at room temperature before powering up the unit. This will prevent damage due to condensation that may accumulate on the instrument's circuit boards.

III. Controls, Connections & Indicators

Before operating the PRS-801 instrument become familiar with each control and display function. A thorough understanding of the instrument's operation will make its use a pleasant experience, enhance measurement accuracy, avoid mistakes and prolong the life of the instrument.

PRS-801 CONTROLS:

[1] FUNCTION/ MODE	Toggles Through Six Operation Modes
--------------------	-------------------------------------

(1) AUTO: (AUTOMATIC) displays data in exponential format 1.0EXX

NOTE: AUTO in exponential format, e.g., 1.3E05, is the Default start up mode when the instrument is turned ON.

(2) AUTO: (AUTOMATIC) displays data in Ω , K Ω , M Ω , G Ω and T Ω . The instru ment controls resistance ranges, test voltage and electrification periods in AUTOMATIC mode.



Figure 2: PRS-801 Controls & Display Indicators

- (3) MANUAL: displays data in exponential format 1.0EXX
- (4) MANUAL: displays data in Ω , K Ω , M Ω , G Ω and T Ω
- In **MANUAL**, the operator selects resistance range in single decade increments. Test voltage may be selected by the operator, or allowed to function automatically based on resistance range selected. The operator determines electrification period in seconds (SEC) using the displayed timer in the center of the LCD.
- (5) AUTO-MANUAL: displays data in exponential format 1.0EXX
- (6) AUTO-MANUAL: displays data in Ω , K Ω , M Ω , G Ω and T Ω
- In **AUTO-MANUAL** the operator may select the initial resistance range in decade increments. Once set, the PRS-801 starts the measurement process from the preset resistance decade, rather than re-zeroing itself for each measurement. This feature saves measurement cycle time and extends battery life. In this mode the instrument automatically controls test voltage, range and measurement electrification period.

[2] RESISTANCE RANGE SELECTION	Two Triangular Arrows Bu Measurement Range in si AUTOMATIC/MANUAL me	ttons, UP (个) and DOWN (↓), select Resistance ngle orders of magnitude while in MANUAL or odes		lf RE(LCD when T I	CALL is not pressed, a EST is next pressed. T return
[3] TEST VOLTS	Manual Selection of <10, voltage. MANUAL Test Vo	10 or 100 volts in MANUAL selects initial test tage & Resistance Limits are as follows:	- [5] S	END	Transmits data in
	@<10V: 0.1 to <1.0E	+05Ω (0.1Ω - <100KΩ)	[6] C	LEAR	In normal operat recent measuren
	@ 10V: 1.0E+03 to	<1.0Ε+09Ω (1ΚΩ - <1GΩ)			a. When in any
	@100V: 2.0E+05 to minium me	<2.0E+14Ω (200KΩ - <200TΩ) NOTE: Optimal asurement in MANUAL using 100 volts is 2.0E+05.	Ĩ		CLEAR will er
[4] RECORD/RECALL	If REC is not displayed in t RECALL once turns Memo LCD]. If REC is ON and me RECORD/RECALL once will	he lower left corner of the LCD, pressing RECORD / ry Register ON [REC will then be displayed in asurement data is stored in memory, pressing I provide access to the memory register. Pressing yelv will calculate and sequentially display.		The pi Registe	rocess of turning the r of all stored data. B pressir
	Minimum [MIN], Maximu Memory Register. If memo RECALL will provide the fo	m [MAX] and Average [AVG] of data stored in the ry is ON and register contains stored data pressing llowing information:			b. If a measurer pushing CLEA Memory. Oth
	First Press RECALL:	Provides access to data in Memory			c If reviewing c
	NOTE: MEM XX Flashes in register and the last meas (个) displays other data po shown in the MEM XX sec	LCD indicating number of data points in the urement is displayed. Pressing DOWN (↓) and UP ints and their respective position in the register is tion of the LCD.			c. In reviewing c pressing CLE Memory Reg the discarded
	Second Press RECALL:	Displays MIN Data Point in Memory			d. When in any CLEAR will en will disble the
	Third Press RECALL:	Displays MAX Data Point in Memory			powered up a
	NOTE: When displayed, OL [C than (>) 2.0x10 ¹⁴ ohms PRS-801.	Over Level] indicates a measurement greater 5, which is beyond the measurement capability of the	[7] C	N/OFF	Turns instrument tests, turns instru
	Fourth Press RECALL:	Displays AVG of all Memory Data Points	[8] B	ATT. TEST	Displays GOOD o measurements, c
	NOTE: OL [Over Level] measu displayed average (AV	rements [>2.0x10 ¹⁴ ohms] are not included in G) calculation.			ment.
	Fifth Press RECALL:	Returns System to normal operations	[9] R	ESET	Saves measurem measurement int LCD display betw
	NOTE: If in RECALL mode, pre measurement operation	essing RESET will return the instrument to normal ons.	[10]	TEST	Begins measuren
			[11] BUS	BATTERY S CUT OFF	Battery buss cut- instrument's circ

NOTE

a fifth time **OOPS** will be displayed in the To Clear **OOPS**, press **RESET**. The instrument will to normal operations.

Memory Register to RS-232 Output Port

tions **CLEAR** erases data in Memory Register, discards most nent, or turns the **REC** function **OFF** as follows:

operation mode, and **HOLD** is not displayed, pressing rase all data stored in Memory.

NOTE

transport.

e **REC** function **OFF** will clear the Memory Be sure that this is indeed desirable before ng the **CLEAR** button.

ment is displayed in **HOLD**, prior to pressing **RESET** buton **AR** will discard that held value and will not enter it into her data in Memory Register remains intact.

data in the Memory Register while in the **RECALL** mode, **AR** will discard the displayed data point. Other data in gister remains intact and indexes down one space to replace ed data point.

operation mode, and **HOLD** is not displayed, pressing trase all data stored in the Memory Register. Pressing **OFF** the **REC** mode and the instrument will be de-energized. When again the **REC** mode will remain disabled until **RECORD/RE**sed once.

t **ON** for normal operations, performs functional & Battery ument **OFF**.

on LCD if battery provides acceptable voltage for accurate or displays **Lo** if unacceptable and batteries require replace

nent and prepares instrument for next test cycle, i.e., enters to Memory Register if **REC** is **ON**, and clears **HOLD** and the veen measurements.

ment sequence in accordance with selected mode

-off switch is used to isolate the main batteries from the uit during battery change, instrument storage and

Switch batte	CAUTION ry buss to the OFF position before changing batteries to avoid re- verse polarity damage to the instrument.	ΜΑΧ	Displayed when REC mode. Number displ in Memory Register.
LCD DISPLAY ELEME	INTS	AVG	Displayed when REC REC mode. Number data values in Memo not included in avera
[12] Colored LED's	14 LED's across the top of the PRS-801 indicate measurement order of mag- nitude in decades from <10 ³ to >10 ¹⁴ ohms. LED's are programmable as described in PROGRAMMING LED COLORS .		Note: Either the REC pressed to return th
[13] PRS-801 Liquid Crystal Display (LCD		REC	Indicates that the M the RESET button is
Elements:	AUTO When ON Indicates instrument in AUTOMATIC mode	Ω	Ohms: Indicates me
	MANUAL When ON indicates instrument in MANUAL mode	ΚΩ	Indicates measurem
	When AUTO and MANUAL are ON , indicates instrument is in AUTO-MANUAL mode.	ΜΩ	Indicates measurem ohms
	AUTO 2 3 4 5 6 7 8 MANUAL	GΩ	Indicates measurem (9.9x10 ¹⁰) ohms
		ΤΩ	Indicates measurem 200,000,000,000,000
	8.8.8.8.8	<100 V	Indicates <10, 10 or
Analog Scale	REC O KO MO GO TO (100 V HOLD B	HOLD	Indicates measurem point in display unti
& X100 Indicator	The one decade analog scale elements darken to indicate measurement in teger. X1, X10 or X100 darken to indicate the scale multiplier. Combine the	E.	Battery indication fo
	Analog indicators with Ω , K Ω , M Ω , G Ω and T Ω symbols to obtain an analog measurement.	PRS-801 Connection	S
MEM 00	Provides the number of data points stored in the Memory Register when REC is ON and instrument is RESET in preparation for a new measurement. The Memory Persister can store up to 80 data points.	[+] Positive Terminal	Power terminal for s
	Also identifies a displayed data point's position in the Memory Register when in the RECALL mode.	[-] Negative Terminal	Sensing Terminal for under test.
00 SEC	Display's electrification period required for the measurement when in TEST during AUTOMATIC and AUTO-MANUAL measurement modes. In MANUAL , provides continuous measurement timing up to 99 seconds, then restarts at	[14] Instrument Ground Ref.	Used for connecting Reference. It is neve
		[15] RS-232 Output	Transfers data from
MIN	Displayed when RECALL button is pushed second time while in REC mode. Number displayed when MIN is indicated is the Minimum data value in Memory Register.		

- CALL button is pushed a third time (sequentially) in **REC** layed when **MAX** is indicated is the Maximum data value
- CALL button is pushed the fourth time (sequentially) in displayed when AVG is indicated is the Average of all ory Register that are less than 2.0x10¹⁴ ohms. (OL's are aging calculation.)
- **CALL** button must be depressed a fifth time or **RESET** is system to its operational, measurement mode.
- lemory Register is **ON** and is Recording data each time depressed after a **TEST** measurement.
- asurement between 0.1 and 999 ohms
- nents from 1,000 (1.0x10³) to 990,000 (9.9x10⁵) ohms
- nents from 1,000,000 (1.0x10⁶) to 999,000,000 (9.9x10⁸)
- nents from 1,000,000,000 (1.0x10⁹) to 999,000,000,000
- nents from 1,000,000,000,000 (1.0x10¹²) to 00 (2.0x10¹⁴) ohms
- 100 volts being applied as the test voltage.
- ent is complete at the end of a **TEST** cycle. Holds data l instrument is **RESET** or **CLEAR** is depressed.
- or low voltage
- supplying Test Voltage to fixture or material under test.
- r measurement of current (I) through fixture or material
- a Sensing Cable Shield to the instrument's Ground rused t oconnect the instrument to an earth ground.
- the Memory Register to an Excel spreadsheet.

Battery Compartment

Located in lower section of case, opposite LCD display. Holds two 9V-transistor batteries. Two screws secure the battery cover. Note: Use only Long Life Alkaline Batteries. Remove batteries when instrument is not in use for long periods of time.



Figure 3: Opening Battery Compartment

Figure 4: Install 2 each 9V Alkaine Batteries

IV. Battery Installation (See Figures 3 & 4)

For optimal battery life and avoid instrument damage, always replace the batteries with high energy, alkaline batteries. Failure to do so will result in a diminished battery life, measurement error and potential instrument damage that could void the warranty.

The battery caps on the instruments you have purchased are designed to fit snugly. Please follow the directions below for safe replacement of batteries.

- A. Slide battery bus switch to the **OFF** position (see figure 3).
- B. Carefully remove the battery cover from the instrument.
- C. Gently take the batteries from the battery compartment.
- D. Unwind any battery lead that is wrapped around the top of the battery terminal. Do not pull battery connection leads - this could cause instrument damage.
- E. Very carefully place a flat head screwdriver between the battery terminals and gently lift the batterv cover from the battery.

- F. Properly dispose of any old batteries.
- G. Position the new alkaline battery under the battery cover.
- H. With your thumb, press the terminals in place one at a time.
- Carefully wind any excess battery lead around the battery terminal below the cap. To avoid instru-Ι. ment damagae, do not pull battery connection leads
- Place the batteries back into position with the battery terminal covers facing the lead spurce J. within the battery case shown in figure 4.
- K. Carefully position the instrument battery cover back into place without force.
- Replace the battery cover screws. L.
- M. Slide battery buss switch to the **ON** position.

Following the above directions for battery replacement will insure that you do not damage the battery covers or wires during this process.

It is recommended to measure the voltage of each battery with a multimeter. If the voltage of one battery measures at or below 6.75 volts, replace that battery. If both batteries measure at or below 6.75 volts, replace both batteries.

V. Setup & Calibration

- A. Setting up the PRS-801 for low resistance range calibration
 - 1. Position Battery Buss Cut Off switch to OFF position
 - 9V batteries to the battery connection terminals.
 - tions. Carefully re-install battery cover and locking screws.

Do Not change batteries with the battery buss **ON**. Always switch Battery Buss Cut Off to **OFF** when changing batteries. Should the **ON/OFF** button be depressed during battery change and Battery Bus is **ON** the instrument may lock up and not function properly or be seriously damaged. In this case, simply disconnect the batteries, then re-install with Battery Buss switch in the **OFF** position.

- B. Low Resistance Range (<10 Ohms) Calibration
 - (Figure 5, below).

NOTE

2. To install batteries, remove two Phillips locking screws and cover. Attach two Long-Life, Alkaline

3. Position batteries in compartment with power leads neatly positioned above battery connec-

NOTE

1. Install the calibration shunt (PRS-801CC) across the Negative (-) and Positive (+) Lead Terminals



Figure 5: Low Resistance Range Calibration Shunt Installation

2. Press the Red **ON/OFF** power button. The instrument display should become energized, each LED will be tested in sequence, and **GOOD** will is displayed in the LCD if the batteries have sufficient test capacity (figure 10).





Figure 6: Low Resistance Range Calibration using Reference Module

Figure 7: Start the Calibration Sequence by Pressing RESET then CLEAR within ½ Second

- 3. Allow the instrument circuits to warm-up for a few minutes; approximately 2 3 minutes are sufficient, prior to completing the calibration sequence.
- 4. Press **MODE** once to shift display to ohms mode (Ω).
- 5. Press the Yellow **RESET**, then the Gray **CLEAR** button within ½ second. The message **CAL** will be displayed in the LCD. (See Figure 8)
- 6. Press the Yellow RESET button to complete low range (0.1 to 10 ohm) calibration. The CAL message will automatically be cleared when **RESET** is pressed. (See Figure 8)
- 7. Press the Green **TEST** button. Indicated resistance should be 1.02 (±0.02) ohms as shown in

PRS-801 Resistance System

Figure 8. Press **RESET** to clear the display. NOTE: If 1.02 (±0.02) ohms is not displayed, repeat the calibration process.

- 8. Remove the calibration shunt assembly from the lead terminals



Figure 8: Complete Calibration Sequence by Pressing RESET. To confirm Calibration, Press TEST to measure the Calibration Shunt resistance. Shunt resistance should display 1.02 Ohms ±0.02 Ohms

VI. Instrument Operation

A. Overview of PRS-801 Operation & Measurement Test Cycle Sequence

tance measurements.

- 1. Slide Battery Buss Cut Off switch to ON
- 2. Press Red ON/OFF button once to power up PRS-801
 - a. Instrument performs circuit check, and tests LED's, LCD display, and battery voltage.
 - b. LCD displays GOOD if battery voltage suitable for instrument operation; displays Lo if batteries require replacement
 - c. Instrument ends startup sequence in default AUTO, Exponent Display Mode 1.0EXX
- 3. Select Function Mode if other than AUTO, Exponent Display Mode 1.0EXX is desired by pressing **MODE** button
- 4. Perform low resistance range calibration after 3 minute instrument warm-up, if desired
 - a. Install Calibration Shunt between positive (+) and negative (-) terminals

9. The PRS-801 is now ready for wide range measurements from 0.1 to 2.0E+14 Ohms



The following 10 points provide a general overview for calibrating and using the PRS-801 for resis-

- b. Press RESET then CLEAR within ½ second
- c. CAL is displayed in LCD
- d. Press **RESET** to calibrate instrument to shunt reference
- e. Press **TEST** to measure shunt resistance of 1.02 \pm 0.02 ohms (Ω)
- Press **RESET** button to prepare instrument for the next measurement f.
- Repeat calibration procedure if necessary
- h. Remove Calibration Shunt
- 5. Carefully connect test leads to positive (+) [Power] and negative (-) [Sensing] terminals. Insert right angle sleeved banana into instrument terminal, press gently while twisting into position.
 - a. Standard 10-foot test leads are used for general audit measurements, up to 1.0x10¹² ohms
 - b. Shielded 42-inch test leads are used for precision applications and bench tests employing special fixtures for measurements up to 2.0x10¹⁴ ohms.
- 6. Connect test leads to electrodes, fixture or circuit to be measured
- 7. Press Green **TEST** button to initiate Automatic measurement Test Cycle
 - a. The resistance range is reset to minimum (0.1Ω) . It is automatically adjusted in conjunction with the resistance characteristics of the materials under test, based on:
 - (1)Test voltage; and,
 - (2) Current flow.
 - b. Test Voltage is reset to <10V and automatically increased in accordance with the following material resistance characteristics:
 - (1) <10 Volts: 0.1 to less than 1.0×10^4 ohms ($0.1\Omega - <10 \times \Omega$)
 - 10 Volts: 1.0×10^4 to less than 1.0×10^6 ohms ($10 \times \Omega < 1 \times \Omega$) (2)
 - 100 Volts: 1.0x10⁶ to 2.0x10¹⁴ ohms (1MΩ 200TΩ) (3)
 - (4) When **OL** is displayed, it mean that the resistance is greater than 2.0x10¹⁴ ohms
 - c. Electrification period, i.e., the time period during which test voltage is applied to the material under test, is automatically adjusted to the PRS-801's measurement characteristics and industry standards (ANSI/ESD STM11.11). Typical electrification periods are:
 - 2 to 3 Seconds: 0.1 to less than 1.0×10^4 ohms ($0.1\Omega <10 \times \Omega$) (1)
 - 2 to 4 Seconds: $1.0x10^4$ to less than $1.0x10^6$ ohms ($10K\Omega < 1M\Omega$) (2)
 - (3) 7 to 8 Seconds: 1.0×10^6 to $> 1.0 \times 10^{12}$ ohms ($1M\Omega - > 1T\Omega$)

- 15+ Seconds: 1.0x10¹² to 2.0x10¹⁴ ohms (1TΩ 200TΩ) (4)
- the lower, right corner of the LCD.

The PRS-801 is processor controlled to obtain hundreds of measurements per second, and to make rapid adjustments in resistance range and test voltage as necessary. It will display the resistance measurement of the material under test based on the following criteria:

- measurements, each within ±5% of each other.
- trification period.
- tion period until the measurement criteria are met; or,
- - a. Enters (saves) last measurement into Memory Register

REC must be displayed in the lower, left corner of the LCD in order to enter the measurement in the Memory Register. If **REC** is not displayed, press **RECORD**/ **RECALL** once, then press **RESET** to save the data.

- **MEM 02**

8. When the PRS-801 displays and holds the final resistance measurement, HOLD is indicated in

a. A digital numeric display is the averaged result of eight (8) individual, consecutive

b. The display is continuously recalculated and updated during the measurement's elec-

c. The final displayed measurement is the averaged result of the last eight (8) individual, consecutive measurements, each within $\pm 5\%$, at the end of the electrification period.

d. If the material or test conditions vary such that eight consecutive measurements, each within ±5% of each other cannot be obtained, the PRS-801 will extend the electrifica-

e. The electrification period will automatically be terminated and the most recent averaged result of eight (8) individual, consecutive measurements will be displayed and held. NOTE: Several material measurements that vary greater than 15 to 20 percent of each other typically indicate inconsistencies in the material or test conditions.

9. To save the displayed measurement in the Memory Register and prepare the PRS-801 for the next measurement, press the Yellow **RESET** button. Pressing **RESET** causes three functions:

NOTE

b. Increases LCD displayed number of data points in the Memory Register (MEM) by one, e.g.,

c. Returns the PRS-801 to its last function mode in preparation for the next measurement

10. To make several measurements, simply press **TEST** to obtain the next measurement, and then **RESET** to save it. Repeat the **TEST** and **RESET** process for each measurement.

NOTE

Be sure to press **RESET** after your last measurement to save it in your Memory Register before turning the PRS-801 OFF. If the instrument is turned **OFF** before pressing **RESET** the last measurement will be lost.

Good Measurement Practices, specific Operational Procedures and descriptions of functional modes are covered in detail, below.

B. Good Measurement Practices

Several factors will affect precision resistance measurements. Most practitioners are aware of the importance of using care when handling instruments, proper use of connections, lead resistance, grounding, and the impact of electrical or electrostatic fields on their equipment.

As with most very precise instruments, the PRS-801 circuits and its cables are sensitive to the effects of electromagnetic and electrostatic fields. These effects are minimized by instrument and test lead design. However, good measurement practices should be exercised at all times to ensure accuracy and repeatability. Follow the recommendations below to obtain optimal performance from the PRS-801.

- 1. Instrument handling and preparation
 - a. Do not drop or cause mechanical shock to your instrument
 - b. Store the instrument in a clean, dry environment. Do not expose the instrument to wet, extremely hot or cold conditions.
 - c. If the unit is stored in a cold environment, allow it to stabilize at room temperature before powering up the unit.
 - d. Be sure fresh batteries are installed when beginning an extensive measurement sequence. Periodically check the condition of your alkaline batteries by pressing **BATT. TEST**. If **Lo** is indicated, replace your batteries.



- e. When making resistance measurements below 10 ohms, perform The Low Range Calibration Procedure. Repeat the procedure to confirm the instrument's response.
- f. During resistance measurements, stand back, away from the instrument to avoid body capacitance or fields from effecting instrument accuracy.
- To avoid body fields from interfering with instrument accuracy, wear a wrist strap attached g. to a tested ESD ground to dissipate body charges.

To prevent electrical shock, Do Not Touch energized circuits, leads or fixtures while grounded.

Use pre-tested ground connections meeting local safety codes for personnel earth grounding. Refer to National Electrical Codes and ESD Association Standard S6.1 Grounding for information and procedures. Only qualified personnel should conduct ground test measurements.

- - lead construction.
 - (1)

Do not apply excessive force when mounting leads on the terminals to prevent deformation or damage to the terminal circuit board.

- (2) measurement electrodes, fixtures or clip accessories.
- (3) the negative (-) terminals
- accuracy is required.
 - (1) banana fitting in the negative (-) sensing terminal
 - (2)
 - (3) terminal.

WARNING

2. Use only Prostat test leads, cables and accessories supplied with the PRS-801. Be sure that leads are properly connected to their respective terminals as described below.

a. The 10-foot general measurement leads are custom made of high quality, silicon rubber for maximum insulation properties and measurement accuracy. These leads are intended for general measurements up to 10^{12} ohm range. Shielding is not incorporated in the 10-foot

> When installed in the PRS-801 terminals, be sure the right angle sheathed banana connections are fully inserted and positively seated for full terminal contact.

NOTE

The straight, retractable-sheathed banana plugs are intended for connection to

The red lead should be installaed in the positive (+) terminal and the black lead in

b. The 42-inch shielded cable and power lead are designed to minimize the effect of lead impedance on measurement accuracy, and to provide additional shielding from electromagnetic and electrostatic fields in the environment. These test leads provide excellent performance for measurements up to 2.0x10¹⁴ ohms. They should be used whenever best

The shielded cable assembly must be installed with its Black right angle sheathed

The shielded cable assembly's green, male banana must be inserted in the Instrument Ground Reference receptacle located at the lower end of the PRS-801 case.

The Red 42-inch power lead must be connected to the instrument's positive (+)

PRS-801 Resistance System

 \rightarrow

 \rightarrow

 \rightarrow

Cycle once the **TEST** button is pressed:

4. During Measurement Test Cycle:

and industry standards

D. General Automatic Mode Procedures

acteristics and industry standards

tics

cation period.



Figure 9: Shielded Lead Set Connections

- 3. When making measurements in the manufacturing environment, move the instrument and test leads away from power cables and heavy electrical equipment to prevent electromagnetic interference.
- 4. If groundable fixtures are employed for material measurements:
 - a. When using 10-foot leads, attach an auxiliary lead from the fixture to the instrument ground reference.
 - b. When using the shielded cable assembly, attach the shield's green, male banana to the fixture ground. A separate ESD earth ground may also be employed in laboratory bench top testing situations.
- 5. Prior to making precision measurements, allow the PRS-801 to warm-up for 3 minutes, then perform the Low Resistance Calibration procedure. If several measurements are to be made. periodically check the instrument's calibration using the supplied calibration shunt.
- C. Operation in AUTOMATIC Modes

The PRS-801 was designed to simplify measurement standards and general rules for making wide range resistance measurements. The PRS-801's AUTOMATIC mode controls the critical aspects of Test Voltage, Resistance Range, and Electrification Period to meet ESDA Standard ANSI/ESD STM11.11 Surface Resistance, and other requirements. Most measurements can be performed in AUTOMATIC, which has two function modes:

AUTO Mode 1: Auto Exponential Display 1.0EXX plus Ω indicators AUTO Mode 2: Auto Display in Ω , K Ω , M Ω , G Ω and T Ω indicators

AUTO Mode 1 is the default functional mode when the PRS-801 is powered up. To change to AUTO Mode 2, simply press the MODE button once. The **AUTOMATIC** modes are used in measurements where the following attributes are desired:

(3) Red Power Lead to (+) Positive Test Voltage Terminal

Note: The instrument ground reference should never be connected to earth ground

NOTE

ment power up, and during battery replacement.

- Automatic Test Voltage selection and control from 0.01 to 100 volts
- Automatic resistance scale control from 0.1 ohm to 2.0×10^{14} ohms (200 T Ω)
- Automatic Electrification Period timing based on the instrument's measurement capabilities and industry standards for measurement of ESD controlled materials.
- In AUTOMATIC Modes, the PRS-801 performs the following functions during the Measurement Test
- 1. Resets the **RESISTANCE RANGE** to minimum. i.e., 0.1Ω
- 2. Sets **TEST VOLTAGE** to <10 volts (millivolts), and applies initial voltage to material under test
- 3. Resets the ELECTRIFICATION PERIOD timer to 0 seconds, then starts timer
 - a. Automatically adjusts RESISTANCE RANGE in accordance with material resistive characteris-
 - b. Automatically adjusts TEST VOLTAGE in accordance with material resistive characteristics
 - c. Automatically adjusts ELECTRIFICATION PERIOD in accordance with material resistive char-
- 5. At completion of Test Cycle, displays and **HOLDS** final resistance measurement, test voltage, order of magnitude (LED), analog scale & multiplier, and electrification time at end of electrifi-
- 1. Attach the desired test leads to the fixture, electrodes or points to be measured

NOTE

The standard Prostat 10 foot test leads are intended for measurements up to the 10¹² ohm range. The shielded test leads are intended for precision measurements above 1.0x10¹⁴ ohms.

2. Slide the Battery Buss Cut Off to the ON position. This connects the 9V batteries to the instrument's circuitry.

Slide the Battery Buss Cut Off to the **OFF** position when the instrument is not in use, particularly during storage and transport to prevent unintentional instru-



- 3. Press the Red **ON/OFF** button to power up the instrument.
- 4. The instrument will conduct a self-test, check its LCD display and LED lights, and test the batteries. If Batteries are acceptable **GOOD** will be displayed in the LCD (Figure 10).



Figure 10: PRS-801 Power Up tests display circuits, LED indicators and batteries

- 5. **AUTO** is displayed in the LCD.
 - a. The default Mode for the PRS-801 is Automatic Resistance Measurement in exponential format (1.0EXX).
 - b. If measurements are to be displayed in Ohms press the Gray **MODE** button once.
- 6. If **REC** is not displayed in the lower left corner of the Liquid Crystal Display (LCD), press Gray **RECORD/RECALL** button once to display **REC** in LCD. This activates the Memory Register, enabling data storage.
- 7. Press the Green TEST button to begin the AUTOMATIC measurement sequence. The instrument will automatically set the resistance range to 0.1 Ohms (1.0E-01), and select <10 volts to be applied to the Positive (+) Lead Terminal. The electrification timer will start counting seconds.
- E. Measurements Less than 10,000 ohms (<1.0x10⁴ ohms):
 - 1. When the resistance measurement is less than 1.0×10^4 ohms, test voltage will remain at <10V, the resistance range will be adjusted automatically and a stable resistance measurement will be obtained within 2.0 to 3.0 seconds.
 - 2. Once a stable measurement is confirmed and displayed by the instrument, HOLD will be energized in the LCD and the electrification timer will stop.
 - 3. An LED corresponding to the measurement's order of magnitude will be energized



Mode after the same low resistance measurement.

- F. Measurements from 1.0x10⁴ to less than 1.0x10⁶ ohms:
 - 1. When the resistance measurement is greater than 1.0x10⁴ ohms test voltage will automatically be increased to 10 volts, and the resistance range will be adjusted as necessary.
 - 2. A stable resistance measurement will be obtained within 2.0 to 4.0 seconds.
 - 3. Once a stable measurement is confirmed and displayed, **HOLD** will be energized in the LCD and the electrification timer will stop.
 - 4. An LED indicating the measurement's order of magnitude will be energized



Figure 12: Test Voltage at 10 Volts from 1.0E+04 to <1.0E+06 Ohms in Auto

Figure 11: Comparing PRS-801 Display in Automatic Ohms Mode and Automatic Exponential

Electrification Remains 2.0 - 3.0 sec. on Measurements <1.0E+06 Ohms

- G. Measurements from 1.0x10⁶ to less than 1.0x10¹² ohms:
 - 1. When the resistance measurement is greater than 1.0x10⁶ ohms the test voltage will automatically be increased to 100 volts, and electrification (Test Period) is automatically adjusted to >7.5 seconds.
 - 2. Unless there are variations in the material or object being measured, a stable resistance measurement will be obtained in approximately 8.0 seconds.

Electrification Period Automatically shifts to 8.0 sec. @ 1.0E+06 Ohms



Figure 13: Test Voltage at 100 Volts from 1.0E+06 to 1.0E+14 Ohms in Auto

NOTE

The PRS-801 can obtain an accurate resistance measurement within 2.5 seconds up to 1.0x10¹² ohms, depending on material characteristics. An additional 5.0 seconds of electrification is applied in accordance with ESD Association S11.11 Surface Resistance Standard.

- 3. Once a stable measurement is confirmed and displayed by the instrument, **HOLD** will be energized in the LCD and the electrification timer will stop.
- 4. An LED corresponding to the measurement's order of magnitude will be energized
- H. Measurements from 1.0×10^{12} to 2.0×10^{14} ohms:
 - 1. When the resistance measurement is greater than 1.0×10^{12} ohms, the test voltage will remain at 100 volts and the instrument will continue to automatically adjust the resistance range.
 - 2. The instrument's ELECTRIFICATION PERIOD is extended to a minimum of 15 seconds. Typically, a stable measurement will be obtained in 15.0 to 20.0 seconds.
 - 3. Once a stable measurement is confirmed and displayed by the instrument, HOLD will be dis-

played in the LCD and the electrification timer will stop.

- I. Measurements Greater Than 2.0x10¹⁴ ohms:
 - the resistance range will be adjusted until the upper range is exceeded.
 - 2. OL (Over Level) will be displayed in the LCD, and the >14 LED will be energized.
 - range **OL** will be displayed.
- J. Resistance Measurements in MANUAL MODE of Operation

To select MANUAL in either Exponential (Mode 3) or Ohms (Mode 4) Display, use the FUNCTION **MODE** button to toggle through choices. Manual is used for a variety of applications where one desires to override Automatic functions:

- \rightarrow
- \rightarrow When an extended electrification period may be desired
- \rightarrow

The following summarizes MANUAL MODE Operations and assumes test leads are installed

- 1. Slide Battery Buss Cut Off switch to **ON** position
- 2. Press Red **ON/OFF** button once to power up the instrument.
- - ting the desired decade. The <3 LED will be illuminated.
- sistance Limits are defined below.

IMPORTANT: Exceeding these limits may affect measurement accuracy.

<10V: 0.1 to <1.0x10⁵ ohms

4. An LED corresponding to the measurement's order of magnitude will be energized

1. If the measurement is greater than 2.0×10^{14} ohms, the test voltage will remain at 100 volts and

3. Once the instrument confirms a stable measurement, if any, **HOLD** will be displayed in the LCD and the electrification timer will stop. If a stable measurement cannot be obtained at this

Measurement series where magnitude is in a defined decade and test voltage is fixed.

Manual selection of test voltage for measurements not used with Automatic settings

3. Select MANUAL MODE by pressing the MODE button until MANUAL appears in the LCD.

a. Pressing **MODE** button two (2) times selects **MANUAL** Exponential display (1.0EXX)

b. Pressing the **MODE** button three (3) times selects **MANUAL** display in Ohms.

4. Set **RESISTANCE RANGE SELECTION** using the UP (\uparrow) and DOWN (\downarrow) arrow keys.

Range selection is made in one-decade increments and indicated with colored LED's.

b. For resistance ranges below <E3, use the LCD displayed decimal point (.) as a guide for set-

5. Set test voltage by pressing MANUAL SELECT TEST VOLTS button until the desired voltage is displayed in lower right portion of LCD, i.e., <10, 10 or 100 Volts. MANUAL Test Voltage & Re-

 $(0.1\Omega - < 100K\Omega)$

PRS-801 Resistance System

10V: 1.0x10³ to <1.0x10⁹ ohms $(1K\Omega - < 1G\Omega)$

100V: 2.0x10⁵ to 2.0x10¹⁴ ohms (200KΩ - 200TΩ)

NOTE If a test voltage is not manually selected, test voltage control will default to Automatic Mode limits, switching higher or lower in accordance with resistance range selection.

- 6. Press **TEST** to begin the Measurement Test Cycle.
 - a. The instrument will:
 - (1) Apply and display the selected Test Voltage, or automatically default to and display the appropriate voltage for the selected resistance decade
 - Self adjust the measurement resistance range to the selected decade (2)
 - (3) Start the electrification period timer
 - b. If resistance is within the selected decade, the measurement and the electrification time will be displayed continuously in the LCD.
 - c. Pressing **RESET** will stop the Measurement Test Cycle, and simultaneously:
 - Turn Test Voltage power supply OFF (1)
 - Save the displayed measurement in the Memory Register (2)
 - (3) Add one data point to the MEM XX counter and display total number of data points in the Memory Register, e.g., MEM 05
 - Prepare the instrument for the next measurement using the same Manual settings. (4)
 - (5) Pressing **TEST** will start a new Measurement Test Cycle
- 7. If the resistance you are measuring is higher than the selected decade, **OL** (Over Level) will be displayed. To move the selected resistance range up to a higher decade:
 - a. Press **RESET** once to stop the Test Cycle. This does not add **OL** to Memory.
 - b. Press MANUAL RESISTANCE RANGE SELECTION up arrow (\uparrow) to select the desired decade; the appropriate LED will illuminate indicating the current selection
 - c. Press **TEST** to restart the Test Cycle
 - d. Repeat the **RESET**, Resistance Range adjustment and TEST sequence until a stable measurement is displayed
- 8. If the resistance is lower than the selected decade, **UL** (Under Level) will be displayed. To move the selected resistance range down to a lower decade:

- Press RESET once to stop the Test Cycle. This does not add UL to Memory.
- b. Press MANUAL RESISTANCE RANGE SELECTION down arrow (\downarrow) to select the desired decade; the appropriate LED will illuminate indicating the current selection
- c. Press **TEST** to restart the Test Cycle
- d. Repeat the RESET, Resistance Range adjustment and TEST sequence until a stable measurement is displayed
- K. Resistance Measurements in the AUTOMATIC/MANUAL MODE of OPERATION

reset-to-minimum functions. It is intended for applications where:

- \rightarrow Multiple Measurements where magnitude is expected within a range of two or three de cades, and test voltage must vary with actual resistance measurements.
- When **AUTOMATIC** electrification period and Test Voltage control must be maintained to \rightarrow current industry (and Automatic Mode) settings

measurement Otherwise, it is used similar to the **AUTOMATIC** Mode.

are properly connected.

- 1. Slide Battery Buss Cut Off switch to **ON** position
- 2. Press Red **ON/OFF** button once to power up the instrument.
- 3. Select AUTOMATIC/MANUAL MODE by pressing the MODE select button until AUTO and MANUAL appear in the LCD display.
 - a. Pressing the **MODE** button four (4) times selects **AUTOMATIC/MANUAL** Exponential display (1.0EXX).
 - b. Pressing the MODE button five (5) times selects AUTOMATIC/MANUAL display in Ohms.
- 4. Set RESISTANCE RANGE SELECTION using the UP (\uparrow) and DOWN (\downarrow) arrow keys.
 - Range selection is made in one-decade increments and indicated with illuminated LED's.
 - b. For resistance ranges below <E03, use the LCD displayed decimal point (.) for setting the desired decade. The <3 LED will be illuminated.
- 5. Press the Green **TEST** button to begin the **AUTOMATIC/MANUAL** Measurement Cycle.

To select AUTOMATIC/MANUAL in either Exponential (Mode 5) or Ohms (Mode 6) Display, use the FUNCTION MODE button to toggle through choices. AUTOMATIC/MANUAL is used for a variety of applications where one desires to reduce Measurement Test Cycle time by overriding Automatic

- This mode prevents the PRS-801 from resetting the Test Voltage and Resistance Range to Minimum at the beginning of each Measurement Test Cycle. In this mode, measurements start at the resistance range selected by the operator, and its commensurate Test Voltage, or the value of the last
- The following summarizes AUTOMATIC/MANUAL Mode Operations and assumes that test leads

- a. The instrument will automatically start the Test Cycle from the selected resistance range decade.
- b. Initial Test Voltage for the selected resistance decade will be applied. For example if the 10⁶ ohms decade was selected, initial Test Voltage will be 100 Volts.
- c. At this point the PRS-801's **AUTOMATIC** Mode takes control of the Measurement Test Cycle:
 - (1) Automatically re-adjusts **RESISTANCE RANGE** in accordance with material resistive characteristics
 - (2) Automatically re-adjusts TEST VOLTAGE in accordance with material resistive characteristics and industry standards
 - Automatically re-adjusts **ELECTRIFICATION PERIOD** in accordance with mate (3) rial resistive characteristics and industry standards
 - (4) At completion of Test Cycle, displays and **HOLDS** final resistance measure ment, test voltage, order of magnitude (LED), analog scale & multiplier, and electrification time at end of electrification period.
- CHANGING LED INDICATOR COLORS

Either the operator or the Supervisor can program this handy feature in the field. The programmable LED colors are GREEN, RED, YELLOW/ORANGE, or OFF (Blank). The 14 LED colors can be changed as follows:

- 1. Press the Yellow **RESET** button, and within ½ second press the grav **RECORD/RECALL** button. The LCD will display **SETUP**.
- 2. Use the UP (\uparrow) arrow key to toggle through all LED lights until the <3 LED is illuminated.
- 3. Press the DOWN (\downarrow) arrow key to toggle through the color selection. Once the color desired is illuminated for that LED, press the UP (\uparrow) arrow key to move to the next LED.
- 4. The next LED will assume the same color as selected for the previous LED. If this is acceptable, press the UP (\uparrow) arrow key to move to the next LED, otherwise press the DOWN (\downarrow) arrow key to select the desired color.
- 5. Repeat the Move \uparrow and Color Select \downarrow until all LED's from are the desired colors.
- 6. Press SEND to save the new LED color program. The program is stored in non-volatile memory and will not change unless reprogrammed.
- M. The Memory Register: Data Logging, Calculation & Transmission

As previously described, the PRS-801 Resistance System will acquire and store up to 80 measurements, or data points, in its Memory Register when Record (REC) is activated. The data in memory can be reviewed for its minimum, maximum and average values, or transmitted to a Windows[®] 95, 98, 2000, ME, XP, Visa, 7 and NT based computer system using an Office Suite® 95, 97, 2000. 2007 and 2010 Excel[®] spreadsheet program.

- played in the lower left corner of the instrument's LCD display.
- lows:
- - (1)
 - (2)
 - (3)
 - (4) normal operations.

OPERATIONAL NOTE

You may return the instrument to normal operations from the RECORD/RECALL mode at any time by pressing **RESET**.

- saved in the Memory Register
- in the Memory Register

When displayed, **OL** (Over Level) indicates a measurement greater than (>) 2.0x10¹⁴ ohms, beyond the measurement capability of the PRS-801

saved in the Memory Register

OL (Over Level) measurements greater than (>) 2.0x10¹⁴ ohms are not included in displayed average (AVG) calculation. **AVG** is the calculated average of all resistance values less than (<) 2.0×10^{14} ohms, rounded to the first decimal point.

If **RECALL** is not pressed, a fifth time **OOPS** will be displayed in the LCD when **TEST** is next pressed. To Clear **OOPS**, press **RESET**. The instrument will return to normal operations.

3. Installing the Prostat Utility Software on your computer

1. To Activate the Record Mode press the grav **RECORD/RECALL** button once. **REC** will be dis-

2. To Review Data in the Memory Register press the RECORD/RECALL button four times, as fol-

a. 1st Press RECORD/RECALL: Provides access to data points in the Memory Register

Use UP (\uparrow) and DOWN (\downarrow) arrow keys to scroll through data.

You may select a data point and eliminate it by pressing **CLEAR**. All other stored data will shift one slot in the register to replace deleted data.

Min, Max and Average of remaining data in Memory will be recalculated.

Press **RECORD/RECALL** to proceed, or **RESET** to exit Memory Register and return to

b. 2nd Press RECORD/RECALL: LCD Displays MIN and the lowest recorded resistance value

c. 3rd Press RECORD/RECALL: Displays MAX and the highest recorded resistance value saved

NOTE

d. 4th Press RECORD/RECALL: Displays AVG and the average of all recorded resistance values

NOTE

e. 5th Press **RECORD/RECALL**: Returns PRS-801 System to normal operations

NOTE

The Prostat Utility Software is included with the PRS-801. Properly installed, the Utility Software allows data stored in the PRS-801 Memory Register to be transmitted to your computer and inserted in an Excel spreadsheet. In effect, the connectivity program performs a standard "cut and paste" function in Excel. It is compatible with all Windows/Office Suites 95, and later Excel versions. (Includes Windows® 95, 98, 2000, ME, XP, Visa, 7, 8 and NT based computer system using an Of-

fice Suite[®] 95, 97, 2000, 2007 2010 and 2013 Excel[®] spreadsheet program)

CAUTION

Cable connections to your computer should be made with the computer shutdown. You may wish to connect your PRS-801 cable to your computer's COM Port before starting your computer and running the Prostat Utility Software.

Install the Prostat Utility Software as follows:

- a. Insert the Utility Software CD-ROM into your CD-ROM Drive.
- b. Open the CD-ROM Drive folder in your windows program
- c. Double click on SETUP.EXE
- d. Follow the instructions on the screen

If you do not have a CD-ROM Drive, you can download the utility Software from our website at www.prostatcorp.com.

- 4. To Start Utility Software with Excel, follow this instruction sequence:
 - a. Assuming you started your machine in Windows, and no other programs are presently running, start your **EXCEL** program.
 - b. Once a blank worksheet is displayed, MINIMIZE your Excel program

BACKUP TEXT FILE

The Backup Data File and Backup Data File Entry Description sub-windows are helpful for backing up all data transferred from the PRS-801 to the computer. It allows entering brief notes into a PROSTAT backup *.txt file associated with each set of data, or single entries. The Backup Text File identifies, dates, and time-stamps each data transfer event.

Enter a description in the Backup Data File Entry Description sub-window and that note will be included in the backup *.txt file each time data is transferred, until the description is changed. Thus, several measurements transfer to your computer, and your backup file will identify those measurements. For example, "WORKSTATION #43" will be appended to each backup entry in the text file. Once you begin measurements at WORKSTATION #44, you can change the description such that your backup data is correctly annotated. You can change the Backup Data File Entry Description anytime you wish before closing the file, and use as many entries as you need. The file will accumulate and maintain all your entries until you clear the file by clicking, Clear Backup Data File.

Location for the backup files can be found here:

32-bit versions of Windows: *C:\Program Files\Prostat* 64-bit versions of Windows: C:\Users\[Name]\AppData\Local\VirtualStore\Program Files (x86)\Prostat

- c. Select START, PROGRAMS, PROSTAT, or Click the PROSTAT icon to start the Utility Software.
- d. You will see a PROSTAT "OK" panel. Click on OK.
- e. The Utility Software operating window and menu will come up. It stays in the foreground (in front).
- f. Setup the PROSTAT Excel Connection for your computer as follows
 - (1) Click Setup
 - (2) Click Com Port
 - (3) Select the computer Com Port to which the PROSTAT data transmission cable is conected 1, 2, 3 or 4
 - (4) Select Number of Measurements and click on 80. In lower left corner of Prostat Window "N.M. = 80" will appear.
- g. MAXIMIZE your Excel program. You are ready to transfer information from the PRS-801 to your Excel spreadsheet. Use the blank sheet or select a file for data entry, or create a standard data format to meet your measurement needs
- 5. Bulk Data Transfer from PRS-801 to Excel Spreadsheet

Excel and Prostat Utility Software as described above.

- a. Position the Utility Software Window at a convenient position over the Excel spreadsheet, such as in the lower right hand corner of your screen.
- b. On the Utility Software Menu Click on SETUP, and confirm your Com Port number and NUMBER OF MEASUREMENTS selected is 80. or more
- c. Position the cursor in the cell where you want the data to start filling in the spreadsheet.
- d. Select "Horizontal" or "Vertical" fill format, Confirm the cursor position, if necessary
- e. Click on **CLEAR BACKUP DATA FILE** to give yourself a clean backup slate.
- f. Enter any information you wish for identifying the backup data in the Utility Software window. CURRENT MEASUREMENT DESCRIPTION
- g. Press SEND on the PRS-801
- h. Note the number of measurements sent from the PRS-801 (number shown in display as "MEM") should match MEASUREMENTS RECEIVED in the Utility Software window.
- Click on the CONNECT button in the Utility Software Window. i.
- j. Data will fill in the spreadsheet.

To transfer data from your PRS-801 to your Excel spreadsheet carefully connect the RS-232 output cable to the PRS-801. [This assumes you have connected the cable to the desired COM port on your computer before starting your computer.] Start your computer and activate your Windows

6. Single Data Point Transfer & Automatic Cell Entry

To transfer individual data points as they are obtained by the PRS-801 use the Auto Connect Data Transfer feature. It allows you to enter data on a measurement-by-measurement basis and fills each spreadsheet cell in sequence, either horizontally or vertically. It saves time and many keystrokes. This is particularly helpful for pre-constructed Excel measurement formats used for routine guality control, audits and other applications where all data must be documented.

- a. Clear the PRS-801 memory
- b. Select AUTO CONNECT in the Utility Software Window
- c. Select HORIZONTAL or VERTICAL FILL
- d. Check the current cell position in Excel and click on **OK**
- e. Make your first measurement and press **RESET** on the PRS-801. This saves the data point in the memory register. The LCD will display MEM 01
- f. Press **SEND** to transfer the single data point to the spreadsheet. It will fill the selected cursor location.
- Press **CLEAR** on the PRS-801 to eliminate the first measurement from its memory. g.
- h. Press TEST to obtain the next measurement, RESET to enter it in memory and SEND to transfer it to the spreadsheet. Note that the next cell automatically fills. Repeat this seguence for as many measurements as you desire.
- **NOTE:** The Excel cursor remains in the first cell selected in Auto Connect mode. Subsequent cells will automatically fill until the program is reset to the bulk mode, or another Auto Connect series is initiated.

IDENTIFYING COMPUTER "NOISE" PROBLEMS

Should your computer COM PORT generate "noise" (electrical interference), it will affect the accuracy of the PRS-801 at resistance ranges above $1G\Omega$ (10⁹ ohms). To determine if noise is a problem, simply compare two high resistance measurements. Make one with the PRS-801 connected to your computer, and the same measurement without connection to your computer. They should be almost identical, within ±25% of each other, if computer electrical interference is not a problem.

While typically not a concern, if electrical noise is a problem simply make all your measurements without being connected to the computer. Save your data in the PRS-801's Memory Register, then connect and transfer the data after each measurement set is completed (bulk download).

- 7. To Turn the Recording Mode (**REC**) **OFF**, perform the following sequence:
 - a. With the unit ON, press CLEAR
 - b. Then press the Red ON/OFF button to turn the instrument OFF
 - c. Press the Red ON/OFF button to power up the instrument
 - d. Note that **REC** is no longer displayed in the lower, left corner of the LCD

VII. Instrument Maintenance

- A. Calibration & Repair
 - 1. Instrument Calibration should be performed annually
 - 2. Only Prostat Corporation or their authorized instrument laboratory should perform PRS-801 calibration or repair.
 - 3. Before shipping your instrument to Prostat Corporation for service, contact Prostat calibration & customer service for a Return Material Authorization (RMA) tracking number by the following means: See WARRANTY INFORMATION, below, for further instructions.
- B. General Handling & Maintenance
 - 1. Cleaning
 - a. Wipe case and LCD with clean, low linting damp cloth
 - b. Do not use solvents for cleaning case or LCD
 - 2. Handling
 - a. Store the instrument in a clean, dry environment. Do not expose the instrument to wet, extremely hot or cold conditions.
 - b. Do not drop or cause mechanical shock to your instrument
 - c. If the unit is stored in a cold environment, allow it to stabilize at room temperature before powering up the unit.
 - d. Remove batteries before storing the instrument for long periods.
 - e. Be sure fresh alkaline batteries are installed when beginning an extensive measurement sequence. Periodically check the condition of your batteries by pressing **BATT. TEST.** If **Lo** is indicated, replace your batteries.

Warranty Information VIII.

A. Prostat Corpoation Warranty

postage prepaid with proof of purchase date.

theory including but not limited to contract, negligence, or strict liability.

- Prostat Corporation expressly warrants that for a period of one (1) year from the date of purchase, that Prostat instruments will be free from defects in material (parts) and workmanship (labor). If Prostat receives notice of such defect during the warranty period, Prostat will replace at its expense such parts that it determines to be defective. Any defective part must be returned to Prostat
- Warranty Exclusions THE FOREGOING EXPRESS WARRANTY IS MADE IN LIEU OF ALL OTHER PRODUCT WARRANTIES, EXPRESS 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 Prostat or any seller be responsible or liable for special, incidental, or consequential losses or damages, under any legal

Rev. D / January 2012

PRS-

Fulfillment by Prostat of its express warranty obligations described above will be purchaser's exclu-
sive remedy and will be Prostat's and seller's limit of liability for any breach of warranty or other-
wise.

- B. Shipping of Warranty Returns
 - 1. Obtain a Return Materials Authorization (RMA) number and shipping address from Prostat customer service. Pack the instrument carefully and ship it prepaid and insured to the proper destination provided by Prostat's customer service department.
 - 2. For detailed shipping instructions and Return Materials Authorization (RMA), contact:

Prostat Corporation 1072 Tower Lane Bensenville, IL 60106 Telephone: (630) 238-8883 or (855) 782-8421 Website: prostatcorp.com/rma

- C. Shipping Non-Warranty Items
 - 1. Any Prostat product returned for non-warranty repair or calibration requires a Return Materials Authorization (RMA) number and should be packaged and shipped as described above, and as directed by Prostat's customer service department.
 - 2. The following information must be included with the returned product:
 - a. Description of the problem
 - b. Customer's Purchase Order Number & Prostat's Materials Authorization (RMA) number
 - c. Name, telephone number and fax number of individual contact who can provide more information regarding the problem and related application(s).
 - d. Complete return address.

PRS-801 Resistance System				
PRS-801 Resis	tance System Specifications			
Range:	Resistance from <0.1 (1.0E- Resistivity with S11.11 conc	1) O entr		
Test Voltages:	Automatic mode Default: Constant Voltage At 10 & 100 Volts	<(1(1(
	Manual Mode:	< 1 1		

Normal Accuracy:	Overall: +_ <5% at ambient condition Approximate Range Tolerances: 1.0E-1 to 1.0E+1 ohms: ±5% Correct 1.0E+1 to 1.0E+12 ohms: ±2.0% wit 1.0E+12 to 2.0E+14 ohms: ±40% or
Display:	Multi-function 2-5/8" x 1-5/8" Liquidigits in Ohms, or 1.0EXX in expone and T Ω . Includes 19-segment analor multipliers. Number of Data Points onds), or Time required to Manually BATTERY status, MIN, MAX, AVG, RE
LED Indicators:	14 Color Programmable LED's from ANGE, or Blank/OFF) may be progra
Timer Memory:	Times measurements In Seconds up 80 data points (MEM # Displayed af
RS-232 Output:	Digital format: Exponential Power for
Response & Electrification:	Response from >0.1 to <1.0E06 Ohr Average Measurement Period from lated Electrification Period per ESD

Dimensions: 4.0" wide x 6.0" long x 2.0" deep.

<4ma @ 100 Volts

22 ounces, with batteries

Power:

Weight:

Open Circuit Current (I):

hms to 200 Tera ohms (2.0E+14 ohms). Maximum ric ring 2.0E+15 ohms/square

0.01 to 10 volts Variable 1.0E-1 to 1.0E+4 Ohms) volts ± <0.2 volts 1.0E+4 to 1.0E+6 Ohms 00 volts ± <2.0 volts 1.0E+6 to 2.0E+14 Ohms

0.01 to 10 volts Variable 1.0E-1 to 1.0E+5 Ohms 0 volts ± <0.2 volts 1.0E+3 to 1.0E+9 Ohms 00 volts ± <2.0 volts 2.0E+5 to 2.0E+14 Ohms

ons (at 23°F and 30% Rh).

ected for Test Lead Resistance th 10-foot Test Leads ±0.25 Decade using Grounded, Shielded Leads

id Crystal Display with 0.5" digit height. Displays 3-1/2 ential format. Ohms Display indicators: Ω , K Ω , M Ω , G Ω og scale (1-10 with 0.5 indication) with x1, x10, & x100 in Memory (0 – 80). Automatic Electrification Time (sec y obtain steady state measurement. Displays data HOLD, EC and Test Voltage (<10, 10, or 100 V)

<10³ to >10¹⁴ ohms. Colors (RED, GREEN, YELLOW/OR ammed in SETUP mode.

p to 99 seconds (Displayed on LCD) Register stores up to fter RESET)

followed by Integer.

ms: <2.0 seconds 0.1 ohms to 1.0E12 Ohms 2.5 Seconds. Calcu S11.11. 7.5 second 0.1 ohms to 10E+12 Ohms. Programmed Electrification >1.0E+12 Ohms: 15.0+ seconds

Two 9-VDC alkaline batteries. Nominal battery life 25 hours in AUTOMATIC mode, approximately 40 hours in AUTOMATIC/MANUAL mode.

in Memory Register.

Send	Transmits data in Memory Re
Clear	Erases data in Memory Regist
ON/OFF	Power-up, perform functiona
Batt. Test	Displays GOOD on LCD if acce
Reset	Enters (saves) data into Mem
Test	Begins measurement sequen
Battery Buss Cut Off	ON/OFF Switch isolates batte transport

FUNCTION/ MODE Toggles Through Six (6) Operation Modes:

MODE	DISPLAYED UNITS	INDICA- TION	RESIST. RANGE	TEST VOLTS	TEST FUNCTIONS
AUTOMATIC 1 [Default]	1.0EXX IND Ω - ΤΩ	AUTO	AUTO.	AUTO.	AUTOMATIC RESISTANCE RANGE, TEST VOLTS, ELECTRIFICATION,
AUTOMATIC 2	ΟΗMS Ω - ΤΩ	AUTO	AUTO.	AUTO.	DISPLAY HOLD SEE TABLE NOTE #1
MANUAL 1 SELECT DECADE	1.0EXX IND Ω - ΤΩ	MANUAL	MAN	MAN. or AUTO	TEST ONLY; NO DISPLAY HOLD UL= UNDER DECADE LEVEL
MANUAL 2 SELECT DECADE	ΟΗMS Ω - ΤΩ	MANUAL	MAN	MAN. or AUTO	SEE TABLE NOTE #2
MANUAL/ AUTOMATIC 1 MAY SELECT STARTING DECADE	1.0EXX IND Ω - ΤΩ	AUTO & MANUAL	MAN. Start AUTO Run	AUTO.	MANUAL SETUP STARTING DECADE, AUTO ADJUST RANGE, TEST VOLTS, ELECTRIFICATION
MANUAL/ AUTOMATIC 2 MAY SELECT STARTING DECADE	ΟΗMS Ω - ΤΩ	AUTO & MANUAL	MAN. Start AUTO Run	AUTO.	DISPLAY HOLD SEE TABLE NOTE #3

TABLE NOTES:

#1 AUTOMATIC:		RESISTANCE R @<10V: @ 10V: @100V:	ANGES IN AUTO 0.1Ω TO <2.0E+14Ω as follows 0.1 TO <1.0E+04Ω (0.1Ω - < 10KΩ) 1.0E+04 TO <1.0E+06Ω (10KΩ - < 1ΜΩ) 1.0E+06 TO <2.0E+14Ω (1ΜΩ - <200TΩ)
#2 MANUAL:		RESISTANCE R @<10V: @ 10V: @100V:	ANGES IN MAN 0.1Ω TO <2.0E+14Ω as follows 0.1 TO <1.0E+05Ω (0.1Ω - <100KΩ) 1.0E+03 TO <1.0E+09Ω (1KΩ- <1GΩ) 2.0E+05 TO <2.0E+14Ω (200KΩ-< 200TΩ)
#3 AUTO-MAN	NUAL:	(Same as AUT RESISTANCE R @<10V: @ 10V: @100V:	ΌΜΑΤΙϹ) ANGES IN AUTO-MANUAL 0.1Ω TO <2.0E+14Ω as follows 0.1 TO <1.0E+04Ω (0.1Ω - < 10KΩ) 1.0E+04 TO <1.0E+06Ω (10KΩ - < 1MΩ) 1.0E+06 TO <2.0E+14Ω (1MΩ - <200TΩ)
Resistance Range Select.	2 Trian Range	igular button A in single decad	rrows: UP (个) and DOWN (↓). Select Resistance les in Manual and Automatic/Manual modes
Test Volts	Manual Selection of <10, 10 or 100 volts in Manual Mode		
Record/ Recall	Turns I	Memory Regist	er ON if OFF. Provides access to all data in Memory Regis-

- ter. Calculates and Displays Minimum, Maximum and Average of data stored
 - egister to RS-232 Output Port or USB
 - ster; if in HOLD mode, discards most recent Held Value
 - al & Battery tests, Power-down if ON.
 - eptable voltage or Lo if unacceptable
 - nory Register, Clears HOLD and Display.
 - ice.
 - eries from instrument circuits for storage &

NOTES

NOTES

NOTES

NOTES