

# Digital Surface Resistance/Resistivity Test Kit Operation and Maintenance

## Description

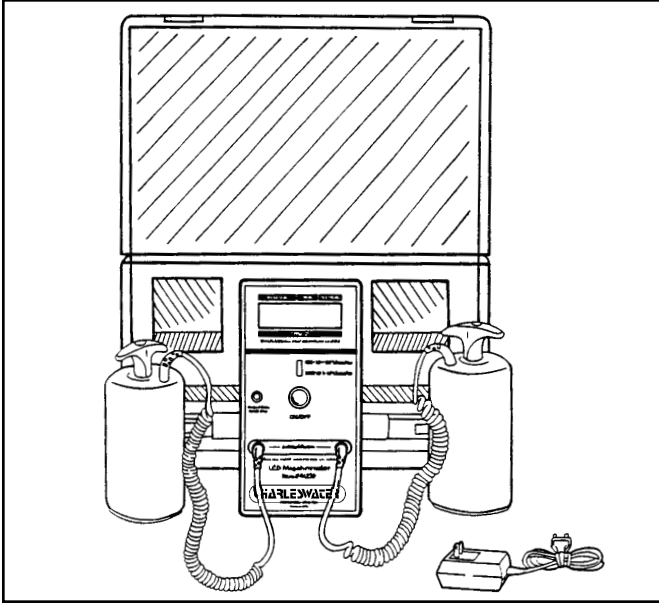


Figure 1. Charleswater Item No. 19770

The Digital Surface Resistance/Resistivity Test Kit is a portable instrument designed to measure resistance between two points (RTT), surface to ground (RTG), and surface resistivity in complete accordance with EOS/ESD Association Standard S-4.1. This unit is suitable for evaluating the electrical properties of ESD protective work surfaces and flooring products.

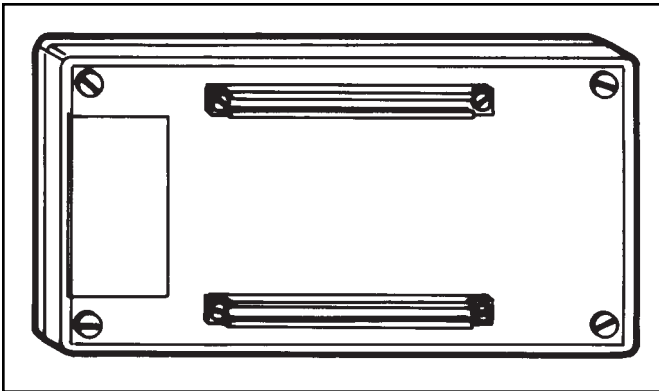


Figure 2. Parallel Resistivity Electrodes on bottom of meter.

The meter has two parallel probes on the bottom of the case which measure surface resistivity. These parallel electrodes allow for quick and easy testing of a variety of surfaces and materials without the use of external probes.

## Recommended Literature

Charleswater recommends that you read the following standards from the ESD Association:

Description	Charleswater Item #
EOS/ESD-ADV1.0 — Glossary of Terms	10151
EOS/ESD-S4.1 — Worksurfaces	10154
EOS/ESD-S6.1 — Grounding	10156
ESD-S7.1 — Floor Materials	10157
ESD-S11.11 — Surface Resistivity	10161

These documents are available from Charleswater and they can also be obtained directly from the ESD Association, 7902 Turin Road, Suite 4, Rome, NY 13440-2069, (315) 359-6937.

In addition to the Association Standards listed previously, anyone testing the electrical properties of ESD protective surfaces should also obtain copies of:

MIL-HDBK 263A	EIA-IS-5-A	ASTM-F-150
ASTM-D257	EN 100015	

These standards are available from the agencies who produce them. If you need help in obtaining these documents contact our customer service department at 781-821-8370.

## Inspection

Remove the meter from the carton and inspect for damage. Each unit should include the following:

- 1 Protective carrying case
- 1 LCD display meter
- 2 Test leads
- 2 5-pound weighted electrodes
- 1 Grounding clip
- 1 AC adapter/charger
- 1 PP-5032 Tech Brief
- 1 Rechargeable battery

Properly store the meter and component assemblies when not in use. Do not charge battery unless it is fully discharged. Doing so will reduce the life of the battery.

## Features

**A. Scale:** 1/2" high digital LCD display provides easy to read resistivity/resistance measurements. Values are expressed with a mantissa and exponent power as shown in Figure 3. Display shows  $1.7 \times 10^5$  Ohms/sq.

**B. Test Button:** This button turns on the power to the meter. When released the measured reading will remain illuminated for 10-20 seconds.

**C. Test Range Voltage Switch:**  
 10 Volts for  $1 \times 10^3 - 1 \times 10^{11}$  ohms  
 100 volts for  $1 \times 10^6 - 1 \times 10^{12}$  ohms

**D. Jacks:** 2.5mm mini phone plugs will fit the meter jacks. Banana plugs will fit the test probes. Banana plugs will not fit the meter jacks.

**E. AC-Battery Charger Adapter:**  
 12 volts DC - 200mA.

**F. 9 Volt Battery Compartment.**

**G. Parallel Electrodes:** For surface resistivity measurements only.

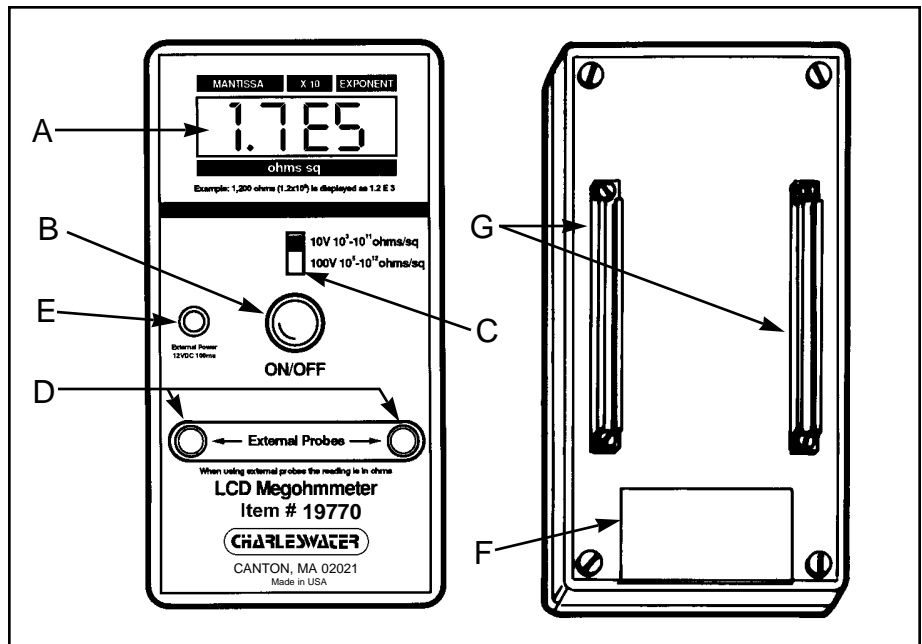


Figure 3. Features of the Digital Surface Resistance/Resistivity Meter

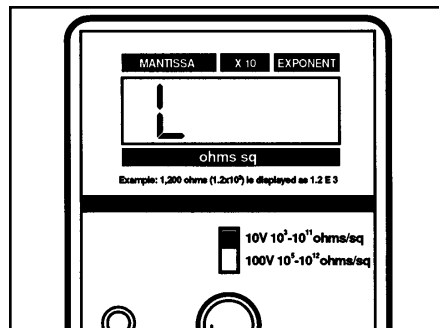


Figure 4.

If the value of the measurement is below 1000 Ohms on the 10 volt scale or  $1 \times 10^6$  on the 100 volt scale an "L" will appear on the LCD display.

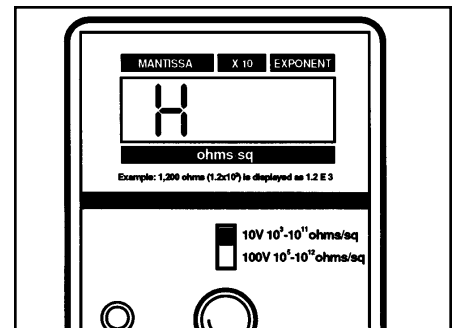


Figure 5.

If the value of the measurement is over  $5 \times 10^{12}$  Ohms an "H" will appear on the LCD display.

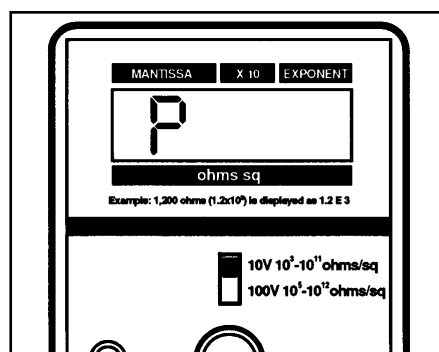


Figure 6.

A "P" will appear on the LCD display if there is too much electrical 60Hz noise in the area or if a test is performed on a high open resistance.

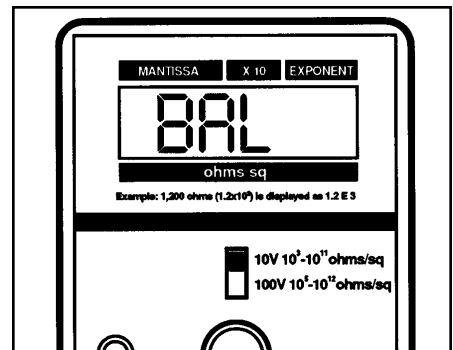


Figure 7. Low Battery Indicator

When the unit's batteries need recharging a "BAL" will appear on the LCD display as the meter is being operated. To maximize the life of the battery do not recharge until a low battery "BAL" is displayed.

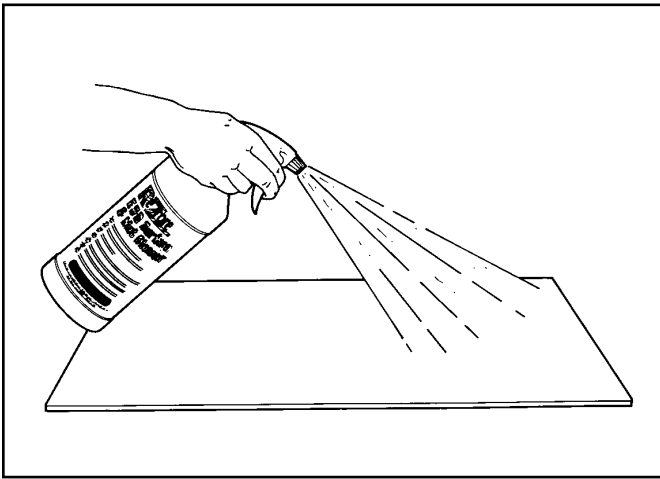


Figure 8. Clean before testing.

Work surfaces or materials to be tested should be cleaned prior to testing to ensure that surface dirt and contamination do not affect the test results. Periodically clean the built-in parallel electrodes and the two 5 lb. conductive rubber probe electrode surfaces. Use solvent-free rubber cleaners. We recommend using an antistatic cleaner like Charlewater Reztore Mat Cleaner, Part No. 10422. Be sure the surface is dry before testing.

### Power Requirements

The unit is powered by a rechargeable 9 volt DC Nickel/Cadmium battery, an alkaline battery, or a special 12 volt DC, 200mA adapter. The AC to DC adapter is also used to recharge the 9 volt battery.

### Surface Resistance Measurements (RTT)

#### Complies with EOS/ESD-S4.1

Point to point surface resistance measurements are made using the meter along with both of the 5 pound weight electrodes. This test will determine the resistance between two points, independent of a groundable point. The charge dissipation rate of all ESD protective materials is related directly to electrical resistance to ground. To perform surface resistance tests you must first determine what test procedure you will be using. The test procedure will help you to determine proper preparation of the material to be tested and the spacing of the weights. Once testing parameters are determined you can proceed with the following instructions:

- A. Connect the test leads to the meter by inserting the banana termination end of a test lead into the weighted electrode and the mini phone plug end into the meter.
- B. Place both electrodes on the material at positions determined by the procedure selected. Set the meter to the required test voltage determined by the test procedure and the resistance of the material.
- C. Press and hold the test button until the resistance value appears on the display. Record the reading and test voltage. This reading will be Ohms (resistance).

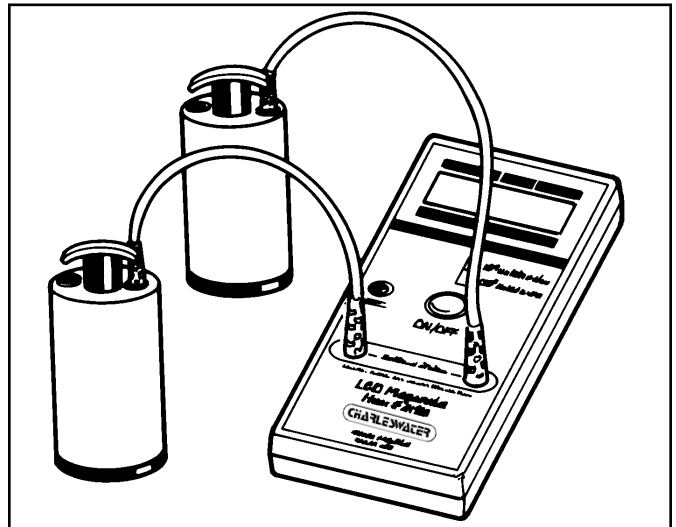


Figure 9. Setting up for RTT testing

### Surface-to-Ground Measurements (RTG) Complies with EOS/ESD-S4.1

The Surface-to-Ground measurements will indicate the surface resistance between selected locations on a work surface and a groundable point or points. Ground points are usually in the form of snaps installed on the material so that the material can be grounded via ground cords. The charge dissipation rate of all ESD protective materials is related directly to electrical resistance to ground. When making Surface-to-Ground measurements, follow this procedure:

- A. Connect one of the 5 pound electrodes to the meter using one of the test leads.

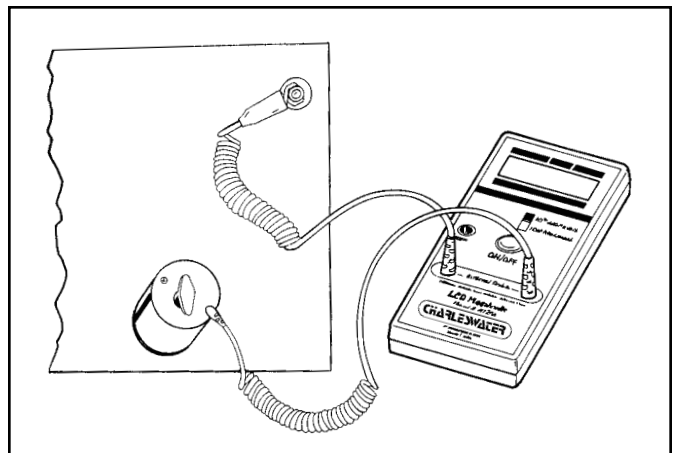


Figure 10. Setting up for RTG testing.

- B. Using the other test lead connect the mini phone plug end to the meter. Insert the grounding clip, included, onto the banana plug on the other end of the lead. Now connect the grounding clip to the groundable point on the surface to be tested.

C. Position the electrode on the material at the position specified by the procedure selected. Set the meter to the desired test voltage range. Be sure to keep the cords separated in order to prevent false readings especially when testing high resistance materials.

D. Press the red test button. Wait 15 seconds, then read the resistance value as indicated on the display. Record the reading and test voltage. This reading will be Ohms (resistance).

E. Repeat procedure on the other points on the material under test.

## Surface Resistivity Measurements - Quick Reference

### Complies with EOS/ESD-S11.11-1993

A. Using the build in external parallel probes, place the meter on the material at the position specified by the procedure selected.

B. Press the test button. Wait 15 seconds and then record the reading and test voltage indicated by the meter's display. This reading will be in Ohms/sq. (resistivity).

## Maintenance

Your Surface Resistance Test Kit will require little maintenance, and there are no user serviceable parts. If your meter requires service beyond cleaning the probes or replacing or recharging the battery, please contact the factory.

## Calibration

The 19770 Digital Surface Resistance Test Kit is calibrated to NIST traceable standards. Any units requiring calibration should be returned to the factory. Please call or fax our Customer Service Department for information on factory calibration.

In-house calibration can be performed by using 1% resistors in each of the meter ranges. Simply attach the resistors to the enclosed cords using grounding clips and recording the meter display. Keep the cords separated. Adjustments to the internal resistance pots can be done quite easily. Request this procedure from the Charleswater Customer Service Department.

## Specifications

<b>Ranges:</b>	1x10 <sup>3</sup> - 1x10 <sup>11</sup> Ohms @ 10 Volts 1x10 <sup>6</sup> - 1x10 <sup>12</sup> Ohms @ 100 Volts
<b>Power Supply:</b>	9 volt rechargeable nickel/cadmium battery and charger/adapter included. Alkaline battery optional.
<b>Battery Life:</b>	Ni-Cad - 1 hour Alkaline - 8 hours Charge Time - 12 hours
<b>Adapter Output:</b>	12 volt DC - 200mA Use only with rechargeable battery
<b>Current Electrodes:</b>	<u>Internal</u> - Two parallel conductive silicone rubber replaceable electrodes <u>External</u> - Two 5-pound weight electrodes, 2.5" in diameter, complies with EOS/ESD-S4.1
<b>Operating Conditions:</b>	60°F - 80°F, 10-50% RH
<b>Display:</b>	One six character .500" LCD display
<b>Accuracy:</b>	10 <sup>3</sup> - 10 <sup>9</sup> = ±15% at 10-90% RH 10 <sup>9</sup> - 10 <sup>11</sup> = ±20% at 10-60% RH 10 <sup>11</sup> - 10 <sup>12</sup> = ±30% at 10-50% RH
<b>Meter Weight:</b>	13 oz.
<b>Charger Weight:</b>	11 oz.
<b>Dimensions:</b>	7.5"L x 4"W x 1.75"H
<b>Power Switch:</b>	Momentary on. Releasing the switch will hold and display for >10 seconds.

## Limited Warranty

Charleswater expressly warrants that for a period of one (1) year from the date of purchase, Charleswater 19770 Test Kits will be free of defects in material (parts) and workmanship (labor). Within the warranty period, the 19770 Test Kit will be replaced at Charleswater's option, free of charge. Any unit under warranty should be shipped prepaid to the Charleswater factory, call Customer Service at 781-821-8370 for proper shipping instructions and address. Include a copy of your original packing slip, invoice, or other proof of purchase date. Warranty repairs will take approximately ten days.

## Warranty Exclusions

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

## Limit of Liability

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