**STB ELECTRICAL TEST EQUIPMENT, INC.**

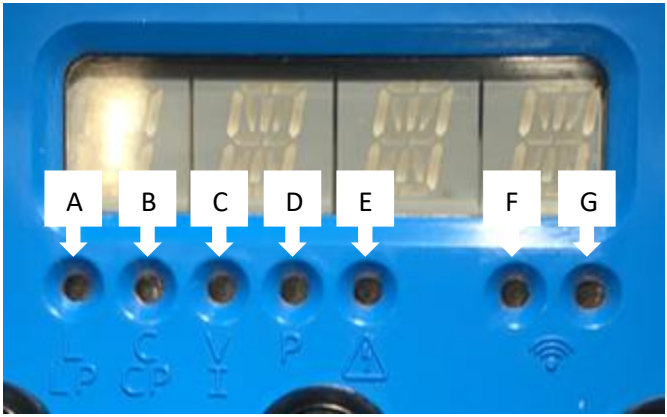
# Operating Instructions for Wireless Phasing Voltmeter


910-A5025-00-REV01

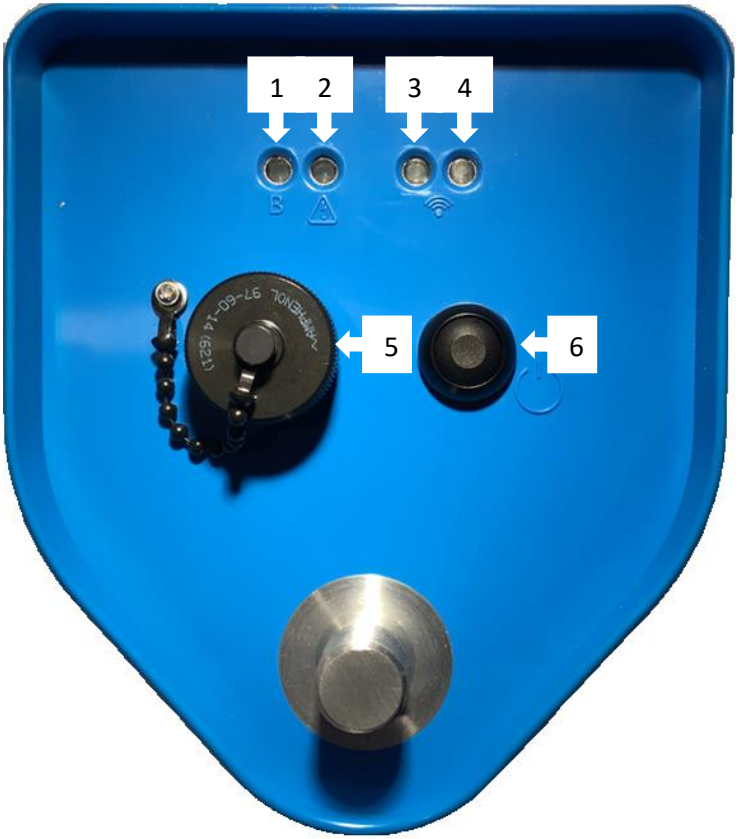
**STB ELECTRICAL TEST EQUIPMENT, INC.**

# Operating Instructions for Wireless Phasing Voltmeter


1. Alphanumeric Display
2. Mode Indication LED's
3. Communication Status (Wireless/Wired)
4. On/Off Button
5. Mode Select Button
6. Peak Hold Arm/Display Button
7. Wired Communication Port




A. ON Green: Line Sensing (Mode 1)
   BLINKING Green: Line Phasing (Mode 2)
B. ON Green: Capacitive Tap Sensing (Mode 3)
   BLINKING Green: Capacitive Tap Phasing (Mode 4)
C. ON Green: Proximity Line Sensing (Mode 5)
   BLINKING Green: Current Sensing (Mode 6) [**TO BE IMPLEMENTED**]
D. ON Green: Line Phasing Degrees (Mode 7)
E. ON Amber: Sensed Voltage exceeds 500VAC
F. ON Green: Phasing Probe Communication Valid
   OFF: Phasing Probe Communication Disabled or Not Valid
G. BLINKING Red: Phasing Probe Communication Not Valid
   OFF: Phasing Probe Communication Disabled or Valid




1. ON Green: Phasing Probe On, Battery Good
   BLINKING Green: Phasing Probe On, Battery Low
2. ON Amber: Sensed Voltage exceeds 500VAC
3. ON Green: Meter Probe Communication Valid
   OFF: Meter Probe Communication Not Valid
4. BLINKING Red: Wireless Communication Not Valid
   OFF: Meter Probe Communication Valid
5. Wired Communication Port
6. On/Off Button

**Proof Testing:**

ALWAYS TEST THE METER AND PHASING PROBE PRIOR TO USE

Using the STB PROOF TESTER II

Meter Probe

1. Turn on the Meter Probe and set it to Line Sensing (Mode 1).
2. Connect the STB Proof Tester II to the 6V lantern battery and turn on.
3. Make contact with the raised washer on the tester and depress.
4. Verify the tester indicator light glows and the Meter Probe Alphanumeric display reads 500V or greater.

Phasing Probe

1. Turn the Phasing Probe On.
2. Turn the Meter Probe on and set it to Line Phasing (Mode 2).
3. Wait for the Communication Status to be Valid (GREEN) on both Probes.
4. Connect the STB Proof Tester II to the 6V lantern battery and turn on.
5. With the Phasing Probe Only, make contact with the raised washer on the tester and depress.
6. Verify the tester indicator light glows and the Meter Probe Alphanumeric display reads 500V or greater.

If proof testing yields and indication less than 500V, replace the 6V lantern battery on the STB Proof Tester II and repeat. If results remain less than 500V, do not use the Meter/Phasing probes and contact STB Electrical Test Equipment, Inc. for service.

Turn the STB Proof Tester II Off, disconnect from the 6V lantern battery positive terminal, and store properly.

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**NOTE: A GREATER THAN 500V INDICATION ON THE METER PROBE ALPHANUMERIC DISPLAY DOES NOT PROVE ACCURACY OF CALIBRATION. THE METER/PHASING PROBE PAIR SHOULD BE SCHEDULED FOR ANNUAL CALIBRATION CHECKS AND INSPECTIONS FOR SAFETY AND RELIABILITY.**

**Capabilities:**

| | |
|---|---|
| Frequency | 49Hz to 51Hz, 59Hz to 61Hz |
| Line Sensing Voltage | 0 - 75kV on each Probe |
| Capacitive Tap Voltage | 0 - 35kV on each Probe |
| Maximum Line Phasing Voltage | 75kV on each Probe<br>150kV combined at 180 degree phase<br>130kV combined at 120 degree phase<br>130kV combined at 240 degree phase |
| Maximum Capacitive Tap Phasing Voltage | 35kV on each Probe<br>70kV combined at 180 degree phase<br>61kV combined at 120 degree phase<br>61kV combined at 240 degree phase |
| Maximum Proximity Voltage | 75kV on each Probe |
| Maximum Current Sensing | TO BE IMPLEMENTED |

**Live Line Testing Procedure:**

**ALWAYS** use proper safety equipment and follow your company's safety and testing procedures when making live measurements.

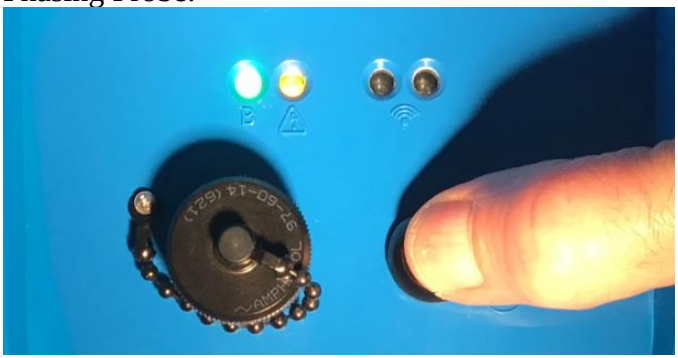
**Turning the Unit On:**

Meter Probe:


Press and hold the On/Off Button until the above indication is displayed. Upon release, the meter probe will progress through the following steps:

1. All LED's turn off and display clears.
2. "STB INC" scrolls across the display.
3. All LED's and Decimal Points turn On and internal software revision is displayed for 2 seconds.
4. Left 3 and rightmost LED's change to BLINKING for 2 seconds.
5. All LED's turn off and display clears.
6. All Display Digit Segments Turn On and Piezo Buzzer sounds for 1 second.
7. Piezo Buzzer turns off and display clears.
8. Mode 1 (Line Sensing) LED turns on and "0" displayed.

Phasing Probe:



Press and hold the On/Off Button until the above indication is displayed. Upon release, the phasing probe will progress through the following steps:

1. All LED's turn On for 1 second.
2. Leftmost and rightmost LED's change to BLINKING for 1 second.
3. Center two LED's turn Off and leftmost LED turns to On while waiting for Communication from Meter Probe.
4. If Communication is established, then the Green Communication LED will turn On and the BLINKING Red Communication LED will turn OFF.

**Turning the Unit Off:**

Meter Probe:

Press and hold the On/Off Button until all LED's turn Off and the Alphanumeric Display go Blank. This may take up to 5 seconds if the Phasing Probe Communication is in an Invalid State.

Phasing Probe:

Press and hold the On/Off Button until all LED's turn Off. This may take up to 5 seconds if the Meter Probe Communication is in an Invalid State.

**Inactivity Auto Off:**

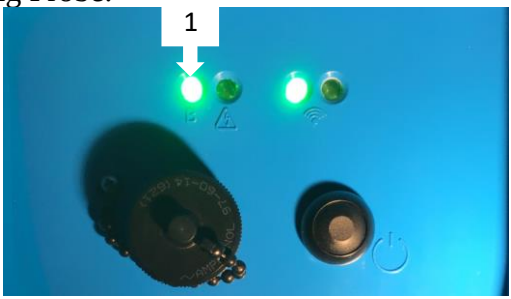
Both the Meter and Phasing Probes will automatically power off after approximately 5 minutes of inactivity. The probe set is considered inactive if voltage measured on either probe does not exceed 50VAC. If the Phasing Probe is communicating with a Meter Probe, then its idle time will begin once the Meter Probe has turned off or its mode has been set to 1, 3, 5, 6 or 7.

**Low Battery Indicator:**

Meter Probe:


When the Meter Probe Battery Level gets low, "LOW BAT" will scroll across the Alphanumeric Display 1 time and the rightmost decimal point(A) will remain illuminated as long as the Low Battery condition exists. The probe will continue to provide accurate measurements but will turn off without warning when the Battery Level drops to its minimum allowable level.

Phasing Probe:

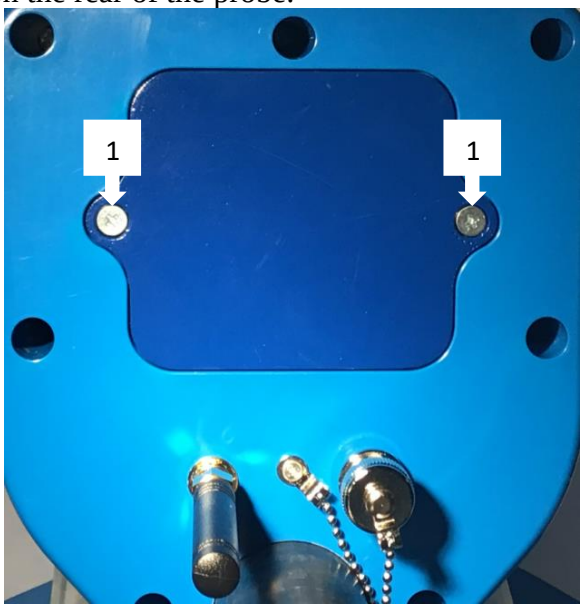



When the Phasing Probe Battery Level gets low, the leftmost LED (1) will change from "ON Green" to "BLINKING Green" and will continue Blinking as long as the Low Battery condition exists. The probe will continue to provide accurate measurements but will turn off without warning when the Battery Level drops to its minimum allowable level.

**Changing Batteries:**

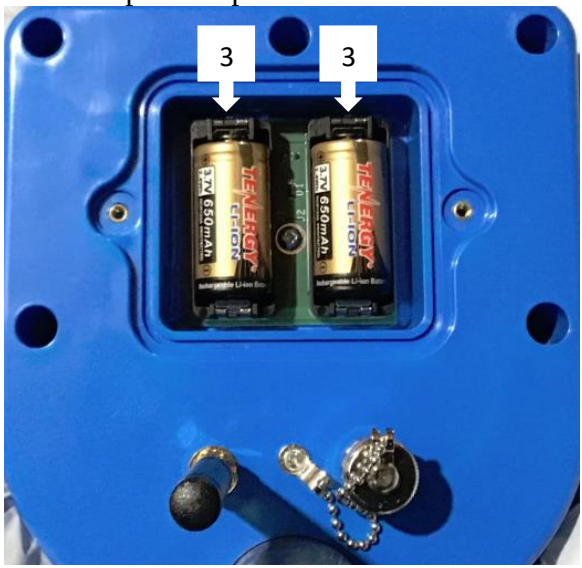
The Meter and Phasing Probes operate on 2 each Tenergy Rechargeable RCR123A or 2 each One-Time-Use CR123A batteries. Each probe set is supplied with Tenergy Rechargeable RCR123A batteries and an external charger. The external charger has a 120VAC adapter as well as a 12VDC Automobile adapter. The two batteries installed in each probe must be of the same type, manufacturer and part number. To change the batteries:

1. Using a #1 Phillips screwdriver, remove the battery cover on the rear of the probe.




2. Remove both batteries.

3. Install fresh batteries with the positive of each oriented to the top of the probe.




4. Re-install the battery cover Using a #1 Phillips screwdriver taking care to not overtighten the battery cover retention screws.

**NOTE:** *Changing battery types from RCR123A Rechargeable type to CR123A One-Time-Use type will cause the Low Battery Condition to be falsely indicated at first power on. The Meter or Phasing probe will correct for this false indication after about 30 minutes of continuous operating time. If depleted CR123A One-Time-Use batteries are replaced with new CR123A One-Time-Use batteries, this false Low Battery indication should not repeat. If depleted CR123A One-Time-Use batteries are replaced with fully charged RCR123A Rechargeable batteries, the Low Battery Indication threshold will be immediately set to the RCR123A level when the Meter/Phasing probe is powered on. Due to its reduced power consumption, the*

*Phasing probe will generally take longer than the Meter probe to correct for this condition.*

*To minimize the occurrence of this false Low Battery Indication:*

1. *Always replace depleted batteries with fully Charged RCR123A or brand new CR123A batteries*
2. *Once rechargeable RCR123A are changed to One-Time-Use CR123A batteries, continue replacing depleted batteries with One-Time-Use CR123A batteries. Changing back to fully charged RCR123A batteries will reset the Battery Low Indication threshold to the RCR123A level when the Meter/Phasing probe is powered on.*

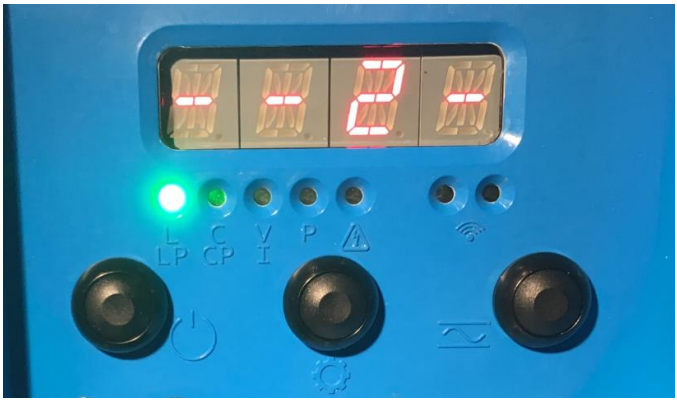
**Changing Measurement Modes:**


The Measurement mode is Set/Changed on the Meter Probe using the "Mode Select Button (A)" in conjunction with the "Alphanumeric Display (B)" and the "Mode Indication LED's (C)". To change the Measurement mode:

1. Press and hold the "Mode Select Button (A)" until "--#-" (# = 1 through 7) appears on the "Alphanumeric Display (B)". Release the button as soon as "--#-" appears, the value displayed will increment ["--1-" goes to "--2-" and so on] and the

corresponding "Mode Indication LED (C)".


2. Press and release the "Mode Select Button (A)" until the desire mode is selected.




3. The Meter Probe will return begin to take measurements about 3 seconds after the last press/release of the "Mode Select Button (A)".
4. Pressing and Holding the "Mode Select Button (A)" for about 3 seconds will Jump directly to Mode 1 from any other mode.

**Using Peak Hold and Peak Display:**

The Meter Probe can store and display the last 3 peak measurements. To utilize this function, the Meter Probe must be armed to store a measurement. In order for the measurement to be meaningful, the following must be true:

1. The Meter Probe must be in Modes 1, 2, 3 or 4
2. If the Meter Probe is in Mode 2 or 4, it must have established a valid communication link with the Phasing Probe.
3. The Meter Probe must be in contact with the Line or Capacitive Tap before the measurement store process begins.
4. If the Meter Probe is in Mode 2 or 4, the Phasing Probe must be in contact with the Line or Capacitive Tap before the measurement store process begins.
5. The Meter Probe and Phasing Probe (if applicable) must remain in contact with the Line or Capacitive Tap until the measurement store process completes.

To Arm the Meter Probe Peak Hold and Store a Peak measurement:

1. Power Meter Probe on and Set Mode.
2. If a phase measurement is to be stored, turn Phasing Probe on and wait for communications status to show valid (GREEN).
3. If making a phased measurement (Mode 2 or 4), connect Phasing Probe to Line or Capacitive Tap.

4. Press and Hold the "Peak Hold Arm/Display" button until "PKH5" is displayed, then Release.


5. While the Alphanumeric Display is counting down "PKH4..PKH3..PKH2..PKH1", connect the Meter Probe to the Line or Capacitive Tap. The Piezo Buzzer will sound while "PKH1" is displayed.


6. The Meter Probe and Phasing Probe (if applicable) MUST remain in contact with the Line or Capacitive Tap until "PKH0" displays and then clears. The Piezo Buzzer will sound while "PKH0"

is displayed.


**WARNING: If the Meter (Mode 1, 2, 3 or4) or Phasing (Mode 2 or 4) Probes are not connected to the Line or Capacitive Tap before "PKH1" disappears or "PKH0" appears, then the stored peak measurement cannot be considered accurate.**

To display stored peak measurements:

1. Press and Hold the "Peak Hold Arm/Display" button until "PKD1" is displayed, then Release.


2. The most recent stored peak measurement will be displayed.
3. Press and Hold the "Peak Hold Arm/Display" button until "PKD2" is displayed, then Release. The second most recent stored peak measurement will be displayed.
4. Press and Hold the "Peak Hold Arm/Display" button until "PKD3" is displayed, then Release. The third most recent stored peak measurement will be displayed.
5. After completing step 1, if the "Peak Hold Arm/Display" button is Pressed and Held, the display will continuously toggle from the first to the second to the third to the first and so on stored peak measurements.
6. The Meter Probe will return to measurement mode if the "Peak Hold Arm/Display" button isn't pressed for about 3 seconds. Pressing and releasing the "Mode Select Button" will immediately return the

Meter Probe to measurement mode. "PKD0" is displayed when the Meter Probe returns to measurement mode.


**Using Wired Communication:**

Wired communication between the Meter and Phasing probes for phased measurements may be used at any time. This may be needed if interference from other RF sources or obstacles that block RF communication prevent the Meter and Phasing probes from communicating via their Wireless communication interface. Wired communication can be used between Meter and Phasing probes that have NOT been linked together. To use wired communication, do as follows:

1. Verify the Meter and Phasing probes are both turned Off.

2. Connect the Meter probe to the Phasing probe using the Coil Communication Cable supplied as shown:


3. Turn the Phasing probe on first.
4. Turn the Meter Probe On and wait for it to complete its Power On Self-Test.
5. Set the Meter Probe to Line Phasing (Mode 2), Capacitive Tap Phasing (Mode 4) or Line Phasing Degrees (Mode 7).
6. Once measurements are complete, turn the Meter/Phasing probes off, then remove and store the Coil Communication Cable.

**WARNING: The Coil Communication Cable should NOT be connected to the Meter Probe if Line Sensing (Mode 1), Capacitive Tap Sensing (Mode 3), Proximity Line Sensing (Mode 5) or Current Sensing (Mode 6)[To Be Implemented] are used.**

**Linking the Meter Probe with Phasing Probe:**

The wireless communication interface on the Meter and Phasing probe are Linked to each other at the factory to form a pair. Occasionally it may be necessary to re-link a Meter/Phasing probe pair. To do so, perform the following:

1. Verify the Meter and Phasing probes are both turned Off.
2. Connect the Meter probe to the Phasing probe using the Coil Communication Cable supplied.

3. Turn the Phasing Probe On.
7. Turn the Meter Probe on, then Press and hold "Peak Hold Arm/Display" button before the Piezo buzzer begins to sound during the power on self-test.


8. Release the "Peak Hold Arm/Display" button after the Piezo buzzer sound stops and the Alphanumeric display shows "RFCF". The LED pattern on Meter/Phasing probes will appear as follows:



9. Linking wireless communication interface of the Meter/Phasing probe as a Pair is complete when "DONE" is displayed on the Alphanumeric display and the LED pattern on the Meter/Phasing probes is

as shown below:


4. Turn the Meter/Phasing probes Off, then remove and store the Coil Communication Cable. The Meter/Phasing probe may now be used normally as a linked pair.
5. If the linking process ended with anything else displayed on the Alphanumeric display or LED's, then it did not complete successfully. Turn the Meter/Phasing probes Off, verify the Coil Communication Cable connections are correct and secure, the batteries are freshly charged, and restart the process from the beginning.

**Browsing with Phasing Probe:**

The Phasing Probe can be used to detect voltages greater than 500VAC (Line Sensing) or 5000VAC (Capacitive Tap or Proximity Sensing) without the use of the Meter Probe. These voltage indications are for general guidance only and only apply if the Phasing Probe Communication Status is invalid (BLINKING Red) and the Coil Cable is NOT Connected.

**Troubleshooting:**

| Issue: | Action(s): |
|---|---|
| Probe will not turn On | 1. Continue to press/hold On/Off button until proper indication is shown on LED's and Alphanumeric display<br>2. Replace batteries with 2 freshly charged RCR123 or 2 NEW CR123 batteries |
| Probe will not turn Off | 1. Continue to press/hold On/Off button until all LED's turn off and the Alphanumeric display goes blank.<br>2. Remove and Re-install the batteries.<br>3. Contact STB for further troubleshooting and service if this condition persists. |
| Probe unexpectedly turns Off | 1. Replace low batteries with 2 freshly charged RCR123 or 2 NEW CR123 batteries.<br>2. Contact STB for further troubleshooting and service if this condition persists. |

| **Issue:** | **Action(s):** |
|---|---|
| Communication link remains Invalid | 1. Verify phasing probe is turned On.<br>2. Verify meter probe is turned On.<br>3. Verify meter probe is set to Modes 2, 4 or 7<br>4. If using the Wireless Communication interface, verify the Coil Communication Cable is NOT connected to both the Meter and Phasing Probes.<br>5. If using the Wired Communication interface, verify the Coil Communication Cable Marked End is connected to the Meter Probe and Un-Marked End is connected to the Phasing probe. |
| Phasing Probe Green Communication LED remains on while Red LED is BLINKING | 1. Phasing Probe has not been linked to a Meter Probe. Follow the steps listed in the "Linking the Meter Probe with Phasing Probe" section of this manual.<br>2. Contact STB for further troubleshooting and service if this condition persists. |

| **Issue:** | **Action(s):** |
|---|---|
| Meter Probe shows "RF99" on the Alphanumeric display and the Red Communication LED is BLINKING | 1. Meter Probe has not been linked to a Phasing Probe. Follow the steps listed in the "Linking the Meter Probe with Phasing Probe" section of this manual.<br>2. Contact STB for further troubleshooting and service if this condition persists. |

| **Issue:** | **Action(s):** |
|---|---|
| Probe Wireless Communication appears unreliable | 1. RF interference in your area may be preventing reliable communication between the Meter/Phasing probes. Use Wired communication while this interference exists.<br>2. Obstacles may be blocking the communication between the Meter/Phasing probes. Remove these obstacles or use the Wired communication while these obstacles exist.<br>3. Contact STB for further troubleshooting and service if this condition persists. |

| **Issue:** | **Action(s):** |
|---|---|
| Probe Linking Procedure does not complete with "DONE" on the Alphanumeric display | 1. Make sure both Probes are turned Off before connecting the Coil Communication Cable.<br>2. Make sure the Marked end of the Coil Communication Cable is connected to the Meter Probe and the Unmarked end is connected to the Phasing Probe.<br>3. Make sure to turn the Phasing probe on before the Meter probe is turned on.<br>4. Make sure the "Peak Hold Arm/Display Button" is not released until after the Piezo Buzzer sound stops and the Alphanumeric display goes blank.<br>5. Contact STB for further troubleshooting and service if this condition persists. |

| **Issue:** | **Action(s):** |
|---|---|
| Meter Probe Displays "CM-5" counting down to "CM-1" | 1. The Meter Probe has inadvertently entered a calibration mode reserved for the factory. Turn both probes off and back on.<br>2. Contact STB for further troubleshooting and service if this condition persists. |
| Meter Probe Displays "CP-5" counting down to "CP-1" | 1. The Phasing Probe has inadvertently entered a calibration mode reserved for the factory. Turn both probes off and back on.<br>2. Contact STB for further troubleshooting and service if this condition persists. |
| The Meter Probe Displays "M0P0" | 1. The Meter and Phasing Probes have inadvertently entered a calibration mode reserved for the factory. Turn both probes off and back on.<br>2. Contact STB for further troubleshooting and service if this condition persists. |

| **Issue:** | **Action(s):** |
|---|---|
| Then Meter Probe Displays "M1P0", "M0P1" or "M1P1" | 1. Calibration content store by the factory may have been corrupted for the Meter or Phasing Probes. Contact STB for troubleshooting and service for this condition. |
| Low Battery Condition indicates when batteries are changed from Rechargeable RCR123A to One-Time-Use CR123A type batteries | This is an expected condition; it will clear/reset itself after about 30 minutes of continuous operating time on each probe. Refer to the Changing Batteries section for more detail. |

# STB ELECTRICAL TEST EQUIPMENT, INC.

**Contact Information:**

STB Electrical Test Equipment, Inc. can be reached for questions, troubleshooting and any service needs at:

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