Bierer METERS
Safety is number one.

Phasing Ranger 2™
Long Distance
Phasing System
Operating Instructions

Patent No. 6,617,840 and 6,734,658

CE

MADE IN USA

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For Training, Support, or Any Questions Concerning the use of the Phasing Ranger 2 or the Information In This Manual Feel Free to call us at (803)786-4839

Limitation of Warranty and Liability

Bierer & Associates Inc. warrants this product to be free from defects in workmanship and material, **under normal use and service conditions** for a period of one year from date of shipment.

Due to continuous product improvement and development, Bierer & Associates Inc. reserves the right to modify product designs and specifications without notice.

It is impossible to eliminate all risks associated with the use of high voltage electrical devices including this device. Risks of serious injury or death are inherent in working around energized electrical systems. Such risks include but are not limited to variations of electrical systems and equipment, manner of use or applications, weather and environmental conditions, operator mentality, and other unknown factors that are beyond the control of Bierer & Associates Inc.

Bierer & Associates Inc. do not express or imply to be an insurer of these risks, and by purchasing or using this product you **AGREE TO ACCEPT THESE RISKS.** IN NO EVENT SHALL Bierer & Associates Inc. BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT.

SAFETY MESSAGE DEFINITIONS per ANSI Z535

These instructions contain important safety messages to alert the user to potentially hazardous situations, how to avoid the hazard, and the consequences of failure to follow the instruction.

The safety alert symbol  identifies a safety message. The signal word following the symbol indicates:

 **DANGER** A hazardous situation which, if not avoided, **will** result in death or serious injury and equipment damage.

 **WARNING** A hazardous situation which, if not avoided, **could** result in death or serious injury and equipment damage.

 **CAUTION** A hazardous situation which, if not avoided, **could** result in minor or moderate injury and equipment damage.

NOTICE Important safety message relating to equipment damage only.

PRODUCT SAFETY INFORMATION

⚠ WARNING

1. Meter assembly, interconnect cable assembly, and live line tool adapters shall be considered **non-insulating**. Do not let live line tool fittings come in contact with energized or grounded conductors. **The live line tool adapters, fittings, and handles supplied with meters shall not be used on any other devices.**
2. Use appropriate length live line tools for voltage being worked and maintain minimum approach distances as outlined in OSHA 1910.269, Table R-6.
3. All Phasing Meters and Voltage Detectors manufactured during and after 2007 will have a limit mark engraved on the high voltage probe(s) 2.5 inches from the tip to indicate to the user the physical limit that should not be exceeded when approaching and contacting an electrical conductor or other electrical test points. Zero Ohm insulated adapters (81280IE) should be used if limit mark will be exceeded.
4. This equipment should be used only by qualified employees, trained in and familiar with the safety-related work practices, safety rules and other safety requirements associated with the use of this type of equipment.
5. These instructions are not intended as a substitute for adequate training, nor do they cover all details or situations which could be encountered when operating this type of equipment.
6. Before operating this equipment, read, understand and follow all instructions contained in this manual. Keep instructions with equipment.

INSPECTION & MAINTENANCE BEFORE USE

⚠ WARNING

1. Prior to using any high voltage test equipment a careful inspection should be made to ensure the unit is free from any contaminants such as dirt, grease, etc. and that there are no apparent physical damages.
2. High voltage probe assemblies shall be wiped clean prior to each use with a silicone impregnated cloth and kept clean and free of contaminants. This will prevent tracking on the outside of the probe and meter error.
3. Always confirm internal battery voltage before and after each use.
4. Unit shall be tested before and after each use on a known voltage source. Failure to do so could result in false negative indications

Design and Function

⚠WARNING

Limit Mark -see “Product Safety Information”, item 3, page 4.

The Phasing Ranger 2 is designed to operate in conjunction with the Cordless PD800W Meter Probe only. The unit consists of two main devices; a Send Unit and a Receive Unit. The Send Unit plugs into a standard 115V AC wall outlet and a land line telephone outlet via a standard telephone cord (provided). The Receive Unit is power by rechargeable batteries and a cell phone via an audio cable or the more convenient Bluetooth Connection using you Bluetooth enable phone. There is an ac power or dc power cable to charge the battery when it is low for either in a building or out on the road in a truck. The Receive Unit talks directly to the Meter Probe to provide the correct phase angle. The Phasing Ranger 2 is useable from 120/208 V to 800kV at a tested distance of 1000 miles.

Each unit has an On-Off switch, a red Power light, a red charging light (Field unit only), and a white Data light. A Solid red power light indicates power supply voltage is good, a Blinking red power light indicates power supply voltage is low, and No red power light indicates too low or no power supply voltage. A solid red charging light indicates the unit is plugged in to a good charging source ad charging the batteries. No Red charging light indicates there is no charging voltage present. A Solid white light indicates satellite data and phase angle data is good, a slow blinking (1 pulse per second) white light indicates satellite data is good but phase angle data is not present, and No white light indicates data is not available.

PD800W Meter Probe (DEG Position ONLY)

DEG – Phase angle measurement in degrees for use on Secondary, URD and Overhead. Direct contact from 240V to 69kV **(including capacitive test points).** Non-contact from 69kV to 800kV.

T – Tests basic meter function and displays the internal 9V battery voltage.

0 degree light - indicates an in-phase condition relative to send unit

120 degree light - indicates out-of-phase condition of 120 degrees.

240 degree light - indicates an out-of-phase condition of 240 degrees.

Yellow "DY" - blinking light indicates a Delta/Wye transformation (30 degree or greater phase shift) in conjunction with one of the other three phase indicator lights.

NOTE1: A reading less than 07.0 in the test position indicates low battery. Replaceable 9V battery is located behind the live line tool attachment threaded into the meter housing just below the battery label on the display side of the meter.

⚠WARNING

Unit shall be tested before and after each use on a known voltage source. Failure to do so could result in false negative indications.

METER PROBE SET-UP & TESTING:

⚠WARNING

See “Product Safety Information”, page 4.
See “Inspection & Maintenance”, page 4.

The Meter Probe completes a self-check each time the selector switch is moved from one position to another. It displays the number 510 and blinks 0, 120, 240 phase sequence indicator lights followed by a blinking **D/Y** (Delta/ Wye Transformation) indicator light. The internal 9V battery voltage should be checked by turning the rotary selector switch to the **T** position and holding for several seconds until the indicator lights stop blinking. If the battery voltage displayed is less than 7.0 volts, shown on the meter as 07.0, the battery should be replaced. A standard 9-volt battery is located behind the live line tool attachment just below the battery label.

⚠WARNING

Unit shall be tested before and after each use on a known voltage source. Failure to do so could result in false negative indications.

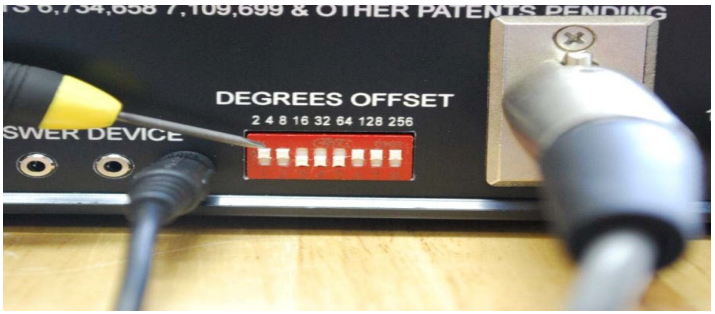
TESTING PD800W METER PROBE ON KNOWN VOLTAGE:

1. Turn the unit to the test position and verify a god battery voltage level.
2. Turn the selector switch back to URD position.
3. Turn on the known voltage source, Bierer offers several options, but we’ll be using the 3kV power supply and Handheld Power Supply for this.
4. Attach appropriate length live line tool attachment.
5. If using the 3kV power supply, with the tip of the meter, depress the plunger switch.
6. If using the Handheld Power Supply, hold down the power button and make contact with the metal disc at the end of the tester.
7. An indication above 3kV on either tested indicates the unit is good. Readings will vary depending on proximity to ground sources.
8. Turn the power supply off and return to their storage containers.
9. Meter is now ready for use.

Note: if your PD800W meter probe is part of a PD800W set, you can also a Dual Phase Power Supply to perform this test. See the PD800W Instruction Manual page 6 for that test.

SEND UNIT SET-UP & TESTING:

1. Permanently place satellite receiver (GPS) where there is a clear view of the sky, i.e. a window sill (non-tinted), preferably outside on the building structure with a minimum distance of 16 inches from the wall.
2. Attach Auto Answer Device to Send Unit labeled “TO AUTO ANSWER DEVICE” via audio cable then attach Auto Answer Device to a telephone outlet.
3. Plug in wall adapter into any 115 VAC standard outlet and plug other end into Send Unit labeled “AC IN 15V MAX”. It is **Very** important that this adapter is not removed or rotated from this outlet, this is your Reference Phase information. If the unit is ever moved or you notice your measurements have shifted, repeat his procedure to align your base unit again.
4. Turn switch to the ON position, both lights will alternatingly blink between red and white and then the red light (Power) should remain on. The white may remain on for a few seconds but then go out again.
5. Within several minutes the white light (1PPS Data) should go solid.
6. The Send Unit is now ready to receive calls.
7. Now set-up the Receive Unit before continuing to step 8.
8. Turn on the Meter Probe (PD800W) and turn to the “DEG” position ONLY.
9. Make Direct contact with a known phase, i.e. “A, B or C” phase, “1, 2, or 3” phase.
10. If a 120-degree reading is expected while making direct contact but the Meter Probe displays something different, you will need to adjust the “Degrees Offset” binary switches (All defaulted UP) by switching down the degrees to subtract from your current reading. For example, if you expected 120 but got 200, you would switch down the 64 and 16 switches. If you expected 120 but got 90, you would switch down the 256, 64, 8, and 2. Some small adjustments may have to be made till you get the desired reading. Now your base unit is set-up to phase.



RECEIVE UNIT SET-UP & TESTING:

⚠WARNING

See “Product Safety Information”, page 4.
See “Inspection & Maintenance”, page 4.

1. Place the Field Unit in a location where there is a clear view of the sky (dashboard of automobile is suitable).
2. Turn switch to the ON position, both lights (Red Power and White 1PPS Data) should blink momentarily and then the red light (Power) should remain on. If the red light continues to blink or does not stay on, batteries are low and you will need to either plug it in to use or plug it in to charge before use.
3. Within several minutes the white light (1PPS Data) should begin blinking at 1 pulse per second. This will indicate a clear satellite signal is synced.
4. Using a cellular phone, connect to the unit with either an audio cable or through your phones Bluetooth. In order to link via a Bluetooth connection, ensure your phone has its Bluetooth turned on. From the dropdown menu of available devices, you will connect to one called pr1datalink. Access code is 7425.
5. Once connected, switch your audio to speaker mode and dial your base unit number. After a few rings (number of rings vary depending on phone systems) the auto-answer device should pick up and you should begin to hear and audible set of tones sounding like a fax machine tone.
6. Once a tone is received, switch to either headphone, or to your Bluetooth connection. Once the connection is made, turn your Bluetooth volume all the way up and the blinking white light should become solid with a slight dimming pulse.
7. If not completed already, return to the Send unit set-up procedure from here to complete its set-up. If this has already been done, continue to the next step
8. If a “Degree Offset” is necessary in the field, i.e. Transmission to Distribution readings (30 degree offset), working in another utility system (storm damage, new construction), then the binary dip switches can be manipulated anywhere from 0-360 degrees in the same manner as setting up the Send Unit. See step 10 of the send unit set-up for instructions.

⚠WARNING

Unit shall be tested before and after each use on a known voltage source. Failure to do so could result in false negative indications.

PHASE ANGLE MEASUREMENTS

Direct Contact from 120/208V to 69kV including Capacitive Test Points

⚠WARNING

See “Product Safety Information”, page 4.
See “Inspection & Maintenance”, page 4.
See “Send Unit Set-up and Testing”, page 8.
See “Receive Unit Set-up and Testing”, page 9.

1. Attach the Meter Probe to the appropriate length live line tool for the voltage being tested. Minimum 2 feet **(See Note 1 Pg. 5)**
2. Set the selector switch to the **Deg** position.
3. Using the meter probe, contact the energized conductor.
4. If the conductor is in phase, the Meter Probe should indicate near zero degrees on the digital display and show a White zero degree indication light.
5. If the conductors are out of phase, the Meter Probe will indicate either of the following:
   a. Nominal 120 degrees and a 120 degrees indicator light or
   b. Nominal 240 degrees and a 240 degrees indicator light.

Note: Delta/ Wye Transformation:
The PD800W provides an additional feature of flagging a Delta Wye Transformation with a blinking yellow indicator light labeled "DY". Expected phase angles when phasing a three-phase system are 0 degrees, 120 degrees, and 240 degrees. The PD800W continuously monitors all phase angles between the Reference Probe and the Meter Probe when used in either the **Deg, URD,** or **OH** mode. If the phase angle deviates more than +/ - 20 degrees from any of the three expected values of 0, 120, or 240 degrees the **Yellow** "DY" light will blink.

⚠WARNING

Unit shall be tested before and after each use on a known voltage source. Failure to do so could result in false negative indications.

PHASE ANGLE MEASUREMENTS

Non-Contact from 69kV and above.

⚠WARNING

See “Product Safety Information”, page 4.
See “Inspection & Maintenance”, page 4.
See “Send Unit Set-up and Testing”, page 8.
See “Receive Unit Set-up and Testing”, page 9.

1. Attach the Meter Probe to the appropriate length live line tool for the voltage being tested. Minimum 2 feet **(See Note 1 Pg. 5)**
2. Set the selector switch to the **Deg** position.
3. Using the meter probe, bring the meter to minimum approach distance as described in OSHA standard 1910-269, table R-6. You can also use the Bierer Support Hooks. Use a 2 foot hook for voltages from 69kV to 300kV and use the 4 foot support hook for voltages above 300kV.
4. If the conductor is in phase, the Meter Probe should indicate near zero degrees on the digital display and show a White zero degree indication light.
5. If the conductors are out of phase, the Meter Probe will indicate either of the following:
   a. Nominal 120 degrees and a 120 degrees indicator light or
   b. Nominal 240 degrees and a 240 degrees indicator light.

Note: Delta/ Wye Transformation:
The PD800W provides an additional feature of flagging a Delta Wye Transformation with a blinking yellow indicator light labeled "DY". Expected phase angles when phasing a three-phase system are 0 degrees, 120 degrees, and 240 degrees. The PD800W continuously monitors all phase angles between the Reference Probe and the Meter Probe when used in either the **Deg, URD,** or **OH** mode. If the phase angle deviates more than +/ - 20 degrees from any of the three expected values of 0, 120, or 240 degrees the **Yellow** "DY" light will blink.

⚠WARNING

Unit shall be tested before and after each use on a known voltage source. Failure to do so could result in false negative indications.

TESTING PHASE SEQUENCE

⚠WARNING

See “Product Safety Information”, page 4.
See “Inspection & Maintenance”, page 4.
See “Send Unit Set-up and Testing”, page 8.
See “Receive Unit Set-up and Testing”, page 9.

Phase sequence will be either: **(1 - 2 - 3) or (3 - 2 - 1)**
(A - B - C) or (C - B -A)

Phase sequence is the order in which the voltages of a three phase system rise and fall. Only two sequences are possible, sometimes referred to as Clockwise or Counter Clockwise rotation. However, three different physical connections are possible to achieve each sequence. Any one of the phases of a three-phase system may be assigned the status of leading phase. This convention is currently left to the discretion of the electric utility.

Sequence: **(1 - 2 - 3) or**	**(A – B – C)**	**A - B - C -** A - B - C - A - B - C
	(B – C – A)	B - C - **A - B - C** - A - B - C - A
	(C – A – B)	C - A - B - C - **A - B - C** - A - B
Sequence: **(3 - 2 - 1) or**	**(C – B – A)**	**C - B - A** - C - B - A - C - B - A
	(B – A – C)	B - A - **C - B - A** - C - B - A - C
	(A – C – B)	A - C - B - A - **C - B - A** - C - B

1. Attach the Meter Probe to the appropriate length live line tools for the voltage being tested.
2. Set the selector switch to the **Deg** position.
3. Touch or approach “1" ("A") phase with the Meter Probe indicated by a near zero degrees and a 0 degree light. Send unit must be attached to known “1” (“A”) phase.
4. Touch or approach "2" ("B") phase with the Meter Probe.
5. Sequence (1 - 2 - 3) (A - B - C) will be indicated by a nominal 120 degrees on the digital display and a 120 degree indicator light.
6. Sequence (3-2-1) (C - B -A) will be indicated by a nominal 240 degrees on the digital display and 240 degree indicator light.

⚠WARNING

Unit shall be tested before and after each use on a known voltage source. Failure to do so could result in false negative indications.

FCC INSTRUCTIONS TO THE USER

This equipment (Reference Probe) has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not used in accordance with this instruction manual may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the equipment.
2. Increase the separation between the equipment and the radio service that is experiencing the interference.
3. Consult the dealer or an experienced radio technician for help.

The user is cautioned that changes or modifications made to the equipment or antenna could void the user's authority to operate this equipment.

FCC COMPLIANCE INFORMATION STATEMENT

Trade Name:	Cordless Phasing Tester
Model Number:	Bierer PD800W
Compliance Test Report Number:	B31202D2
Compliance Test Report Dates:	12/01/03 & 12/02/03
Responsible Party:	Bierer & Associates, Inc.
Address:	10730 Farrow Rd., Blythewood, SC 29016
Telephone:	803-786-4839

This equipment (Meter Probe) has been tested and found to comply with limits for a Class B, RF Receiver pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular situation. If the unit does cause harmful interference to radio or television, please refer to the three steps listed above under “FCC Instructions to the User”.

PARTS & ACCESSORIES

PART NO.	DESCRIPTION
8128TBALB	15 -25kV Bushing Adapter
8128LHM	Hook Probe Adapter
8128LPM	Straight Probe Adapter
3403	Quick Change to Universal Adapter
3402	Quick Change to Grip All Adapter
10022CHL	Handle w/Threaded Ferrule and Cap (2 required*)
10022HHSL	Handle w/Threaded Ferrule and Ferrule w/Stud (2 or 4 required*)
PD800ANT	Antenna for Reference or Meter Probe
PD800SH2	Support Hook 2 ft., 51kV to 300kV
PD800SH4	Support Hook 4 ft., above 300kV

*Nominal one inch in diameter and two feet in length; handle assemblies may be two, four or six feet in length.

Limit Mark

All Phasing Meters and Voltage Detectors manufactured after 2007 will have a limit mark engraved on the high voltage probe(s) 2.5 inches from the tip to indicate to the user the physical limit that should not be passed when approaching and contacting an electrical conductor or other electrical test points.

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Notes_____


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Thank You!