Bierer METERS
Safety is number one.

Phasing Ranger I™

Operating Instructions

CONTENTS

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 and live line tool adapters shall be considered **non-insulating**. Do not let live line tool fittings come into contact with energized or grounded conductors. **The live line tool adapters, fittings and handles supplied with meters shall not be used with any other device.**
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 (part# 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 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 does it 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 no apparent physical damage.
2. High voltage probe assemblies shall be wiped clean prior to each use with a silicone impregnated cloth and kept clean and free of any contaminants. This will prevent tracking on the outside of the probe and meter. Always confirm internal battery voltage before and after each use.

DESIGN and FUNCTION

WARNING

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

The Phasing Ranger 1 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 plugs into a 12VDC power outlet and a cell phone using a 2.5mm headphone cable (also provided). The Receive Unit talks directly to the Meter Probe to provide the correct phase angle. The Phasing Ranger 1 is useable from 120/208 V to 800kV at a tested distance of 1000 miles.

Each unit has an On-Off switch with a red Power light and a white Data light.

A **Solid** red light indicates power supply voltage is good, a **Blinking** red light indicates power supply voltage is deteriorating, and **No** red light indicates too low or no power supply voltage.

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.

Note 1: For best results, always position the Meter Probe **perpendicular** to the conductors being tested and **away** from all other conductive surfaces such as adjacent phases, neutrals and grounded structures. Maintain a **minimum** distance of two feet between the body of the probes and all other conductors or grounded surfaces. Maintain a **minimum** distance of two feet between your hands and the body of the probe regardless of the voltage being tested. **Never** hold the tester with rubber gloves when in use.

Note 2: When phasing on **URD** transformer bushings use 8128TBALB Bushing Adapters on the Meter Probe.

BATTERY REPLACEMENT

The threaded live line tool fitting on the face of the meter probe is furnished with two flat edges for use with a wrench or slip joint pliers to remove and install the fitting from the meter housing. To remove, turn the live line tool fitting in a counterclockwise direction and install in a clockwise direction.

METER PROBE SET-UP & TESTING:

The Meter Probe completes a self check each time the selector switch is moved from one position to another. It displays the number 510 +/ - 5 (full scale) 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 8 volts, shown on the meter as 080, the battery should be replaced. A standard 9 volt battery is located behind the live line tool attachment.

WARNING

- **When in operation the selector switch on the Meter Probe must be in the DEG position. Failure to do so could produce false readings, resulting in equipment damage and/or personal injury.**

WARNING

- See “Product Safety Information”, page 3.
- See “Inspection & Maintenance”, page 3.

SEND UNIT SET-UP & TESTING:

1. Permanently place satellite receiver (GPS) where there is a clear view of the sky, i.e. 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 **land line** telephone outlet. If the phone line goes through an internal phone system some system programming may need to be required to make unit operational.

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.

4. Turn switch to the ON position, both lights (red and white) should blink momentarily and then the red light (Power) should remain on.

5. Within several minutes the white light (1PPS Data) should begin blinking rapidly (1 pulse per second) indicating the GPS is working correctly.

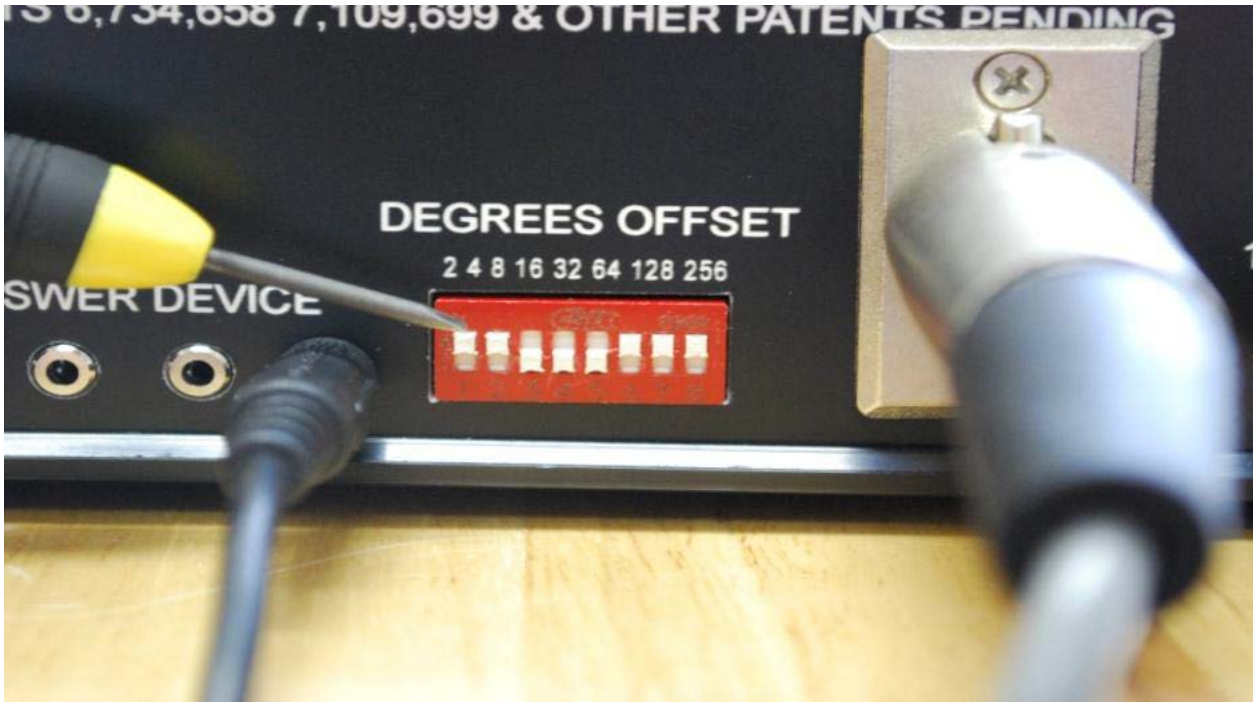
6. The Send Unit is now ready to receive calls.

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. For Example: If a 120 degree reading is expected while making direct contact but the Meter Probe displays 200 degrees, the following should be performed. With the "Degrees Offset" binary switches (All defaulted UP), switch down the numbers 64 and 16. This will "subtract" 80 degrees out of the original reading and now display 120 degrees. The binary switches **ONLY** subtract, they do **NOT** add. Some minor adjustments, such as a "2" or "4" may be needed due to any grid fluctuations or Meter positioning, this is normal.



11. The “Degree Offset” is a **One-time** set-up procedure, no other adjustments are ever necessary unless the Send Unit is moved to another location or the reference phase is changed.

12. Step 8 in the Receive Unit set-up is optional It is **only** necessary if the Receive Unit is used as described in Step 8 of the Receive Unit set-up.

RECEIVE UNIT SET-UP & TESTING:

1. Plug Receive Unit into a 12VDC power outlet or an 115VAC outlet using cables supplied, the “charge” red light should turn On.

2. Place unit in a location where there is a clear view of the sky (dashboard of automobile is suitable).

3. 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.

4. Within several minutes the white light (1PPS Data) should begin blinking rapidly (1 blink per second).

5. Using a cellular phone, dial the number that is attached to the Auto Answering Device. A tone similar to a fax tone should be heard over the phone line, this is your reference phase data via the Send Unit.

6. Once a tone is received, use the supplied audio cable or Blue Tooth to attach the cell phone to the Receive Unit. The white light (1PPS Data) should then be solid, indicating good data is being received.

7. **Now go to step 8 in the Send Unit set-up**.

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.

PHASE ANGLE MEASUREMENTS

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

 **WARNING** – see "Meter Set-Up & Testing", page 5.

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.

 **WARNING** – see "Meter Set-Up & Testing", page 5.

Delta/ Wye Transformation
The meter probe provides an additional feature of flagging a Delta Wye Transformation with a blinking yellow indicator light labeled "D/Y".

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 Send Unit and the Meter Probe when used in the **DEG** position. If the phase angle deviates more than +/ - 20 degrees from any of the three expected values of 0, 120, or 240 degrees the **Yellow** "D/Y" light will blink.

PHASE ANGLE MEASUREMENTS

Non-Contact from 69kV to 800kV

 **WARNING** – see "Meter Set-Up & Testing", page 5.

1. Attach the Meter Probe to appropriate length live line tools for the voltage being tested. Minimum 2 feet **(See Note 1 on pg. 5)**

2. Select the **DEG** position on the Meter Probe.

3. Bring the Meter Probe to a distance from each conductor that is close to the minimum approach distance for the voltage being tested to verify all conductors are energized. **(See OSHA 1910-269, Table R-6 for a minimum approach distance).**

4. If the conductor is the same phase, the Meter Probe should indicate near zero degrees on the digital display and show a **White** zero degree indication light.

5. If the conductor is 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

 **WARNING** – see "Meter Set-Up & Testing", page 5.

TESTING PHASE SEQUENCE

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


WARNING – see “Meter Set-Up & Testing”, page 6.

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.

FCC INSTRUCTIONS TO THE USER

This equipment (Receive unit) 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”.

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