Horizontal Angle Menu

As shown in Figure #16, the Horizontal Angle Menu includes options that affect compass operation: Declination Menu and Horizontal Angle Compass Calibration Menu.
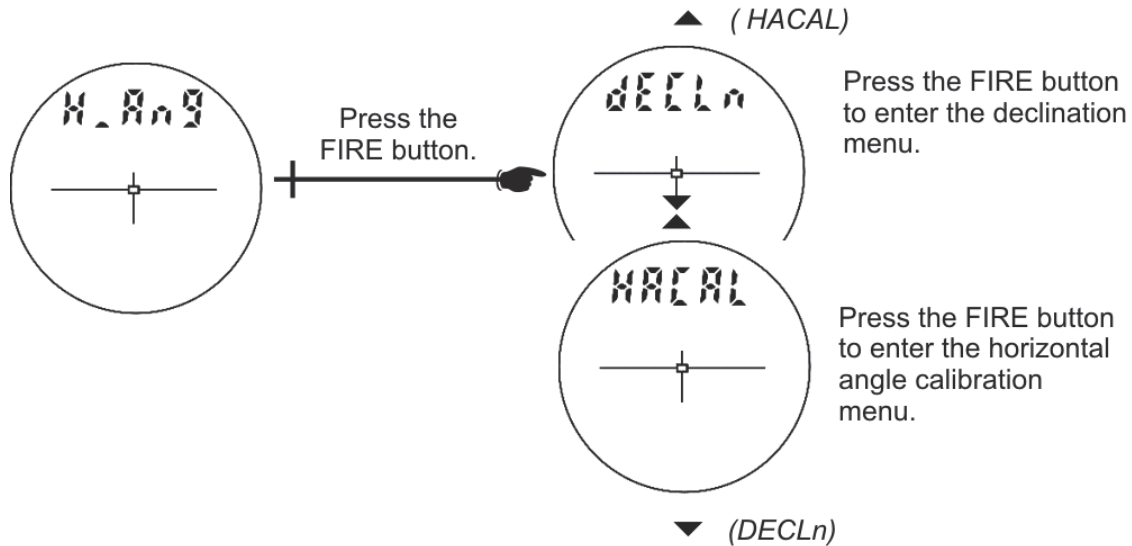

Figure #16

Declination Menu

1. From the Measurement Mode, press ▼ for 4 seconds to access the System Setup Mode. "UnitS" will appear in the Main Display.
2. Press ▼ to display the "H_Ang" option.
3. Press 🔘 to select the "H_Ang" option. The message "dECLn" appears in the Main Display.
4. Press 🔘 to select the "H_Ang" option. The message "no" "dECLn" appears in the Main Display and the display should look similar to Figure #17 .
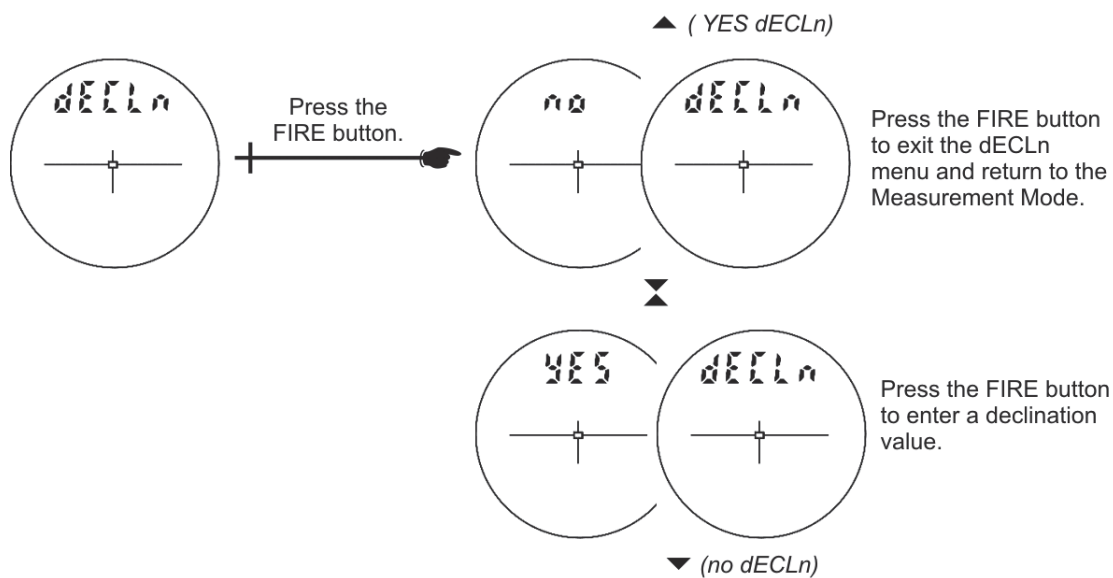
Figure #17

Press ▲ or ▼ to display the previous or next "dECLn" option.

If "no" "dECLn" is displayed, press 🔘 to exit the "dECLn" menu and return to the Measurement Mode.

If "YES" "dECLn" is displayed, press 🔘 to enter a declination value .

About Magnetic Declination

The magnetic poles are not located at the same place as the geographic North and South poles. Moreover, they move in a predictable direction by a small amount annually. A compass always points toward the magnetic pole. The direction that the compass points is called a magnetic meridian. True North, or geographic North, relative to magnetic North varies somewhat depending on your location on the surface of the earth. Declination is the value of the variation between Magnetic North and True North, expressed in degrees or degrees west of True North.

It is important that you determine the correct declination value for the area that you are working in and enter this value into the TruPulse 360. You need to know your local latitude and longitude in order to determine the magnetic declination. This must be done prior to using the instrument for azimuth measurements.

Example Declination Value

Magnetic declinations are east (positive) if the compass measures east of true North, and west (negative) if the compass measures west of true North.

ⓘ At the time this manual was published, Denver, Colorado, which is in the western part of the continental US, had a declination value of 9°9′ east, which is represented as a positive value. The zero declination line runs generally north and south somewhere west of Chicago.

<u>**Online Declination Software**</u>

NOAA's National Geophysical Data Center (NGDC) website includes online declination software that computes the estimated declination for your location. You only need to enter the location (US zip code) and date of interest.

(i) At the time this manual was published, the website address was: http://www.ngdc.noaa.gov/geomagmodels/Declination.jsp.

- Although the software is setup for US zip codes, it also provides a link for locations outside of the USA.

Entering a Declination Value

When the Declination Menu is displayed and "YES dECLn" appears in the Main display, press 🔥 to enter a declination value.
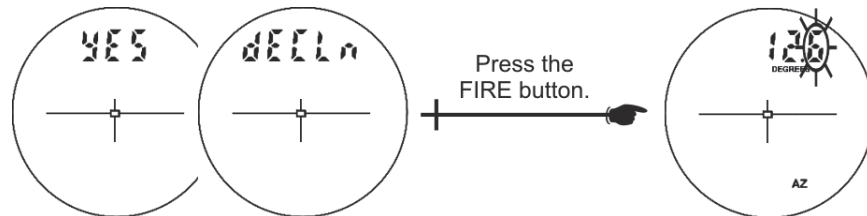

Figure #18

(i) The declination value can be aborted at any time during the procedure with a long press of ▲ or ▼. If the value is aborted, the unit restores the previously stored declination value.

1. The right-most digit flashes, indicating that it can be edited.
   Press ▲ /▼ to increase/decrease the flashing digit.
2. Press 🔥 to accept the digit edit and move the edit to the next significant digit.
3. After the 3rd significant digit is edited, the entire value flashes.
   Note: The edit range is ±39.9 degrees.
4. Press ▲ /▼ to toggle the value from positive (+) to negative (-).
5. Press 🔥 to accept the final value.

(i) When an azimuth measurement is displayed, "d" appears as the left-most character in the Main Display as a reminder that a declination value has been entered.

Local Magnetic Attractions

Local magnetic attractions are caused by objects of iron, steel, cobalt, nickel, and other ferro-magnetic materials. Electric utility lines may also affect compass readings. Direct current power utility lines will cause a fixed offset, and alternating currents will cause an unstable compass reading. The effect that local attraction has on the compass depends upon the proximity of the material to the compass and on the mass and strength of the local attraction. Small metallic objects carried on or by the operator may affect the compass reading by as much as several degrees. In some work situations, the strength of the interference could prevent the compass from providing a useful azimuth. Usually the potential for local attraction can be determined by visually inspecting the site or from local knowledge of any buried utilities.

ⓘ The following objects may potentially affect the TruPulse 360's performance and should be avoided:

- Batteries
- Data collectors or computers
- Hatchets
- Homemade yokes
- Magnetic antenna mounts
- Metal watch bands
- Tripods

- Nails
- Pin flags
- Portable radios
- Steel-rimmed eyeglasses or spring hinge
- Tripod tribrachs

It is recommended that the data collector be located a minimum of 18 inches (46 centimeters) away from the TruPulse.

Field Tests for Local Magnetic Conditions

The following simple tests can be used in the field to test for local magnetic interference.

- If you are working on a street, and you know its orientation relative to true North, aim down the street and take a measurement. Nearly 80% of the streets in the US are oriented in a north-south or east-west direction.
  - o The azimuth from the compass should match the known direction of the street.
- Choose a target at least 100 meters away (e.g., a pole) and shoot to it. Note the azimuth. Then step backwards or forwards 1 meter (or 1 yard) along the sight line to the target and shoot again.
  - o The second azimuth should be within 1/10th to 5/10ths of a degree of the first azimuth. If it is, you are very likely within an anomaly-free area.
  - o For increased confidence, repeat the test to a target at 90 degrees to the azimuth of the first target.
- This third test can be performed if you are in a questionable area. Aim and measure to your prospective next target and note the azimuth. Move to the next station and aim and measure back to the original station.
  - o The azimuths should be 180 degrees different, plus or minus a few tenths of a degree.

Horizontal Angle Compass Calibration Menu

1. From the Measurement Mode, press ⬇ for 4 seconds to access the System Setup Mode. "UnitS" will appear in the Main Display.
2. Press ⬇ to display the "H_Ang" option.
3. Press 🔥 to select the "H_Ang" option. The message "dECLn" appears in the Main Display.
4. Press ⬇ to display the "HACAL" option.
5. Press 🔥 to select the "HCAL" option. The message "no" "CAL" appears in the Main Display and the display should look similar to Figure #19.
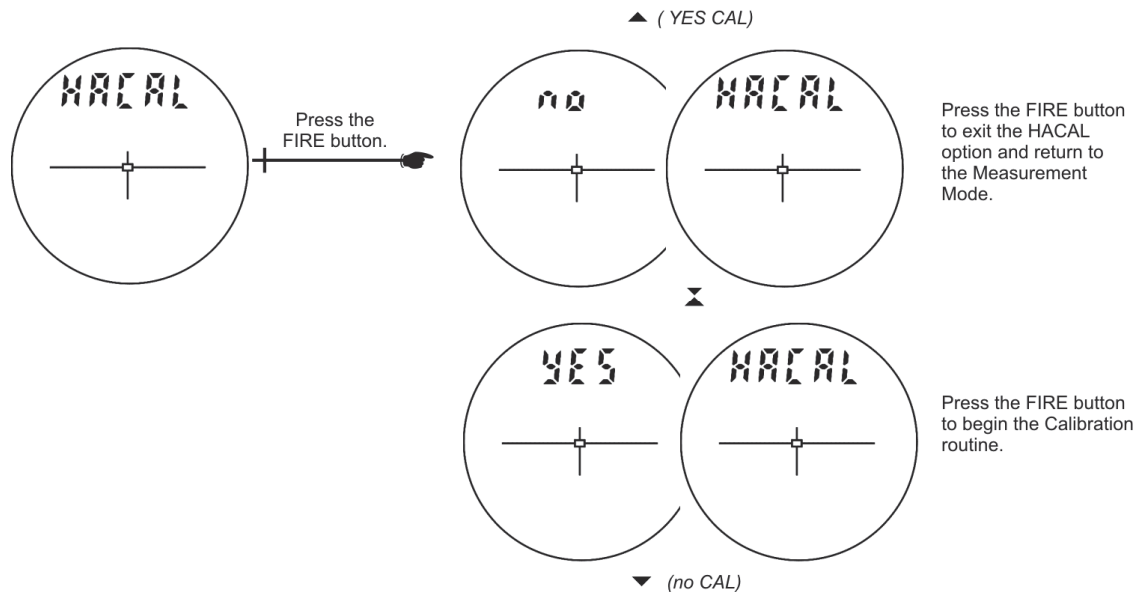

Figure #19

Press ⬆ or ⬇ to display the previous or next "HACAL" option.

If "no" "dECLn" is displayed, press 🔥 to exit the "HACAL" menu and return to the Measurement Mode.

If "YES" "CAL" is displayed, press 🔥 to begin the horizontal angle compass calibration routine. The message "C1_Fd" appears in the Main Display.

Horizontal Angle Compass Calibration Routine

Figure #20 shows the steps required to complete the Horizontal Angle Compass Calibration Routine. To begin the routine, you should be holding the TruPulse and facing North. The instructions are on the next page.
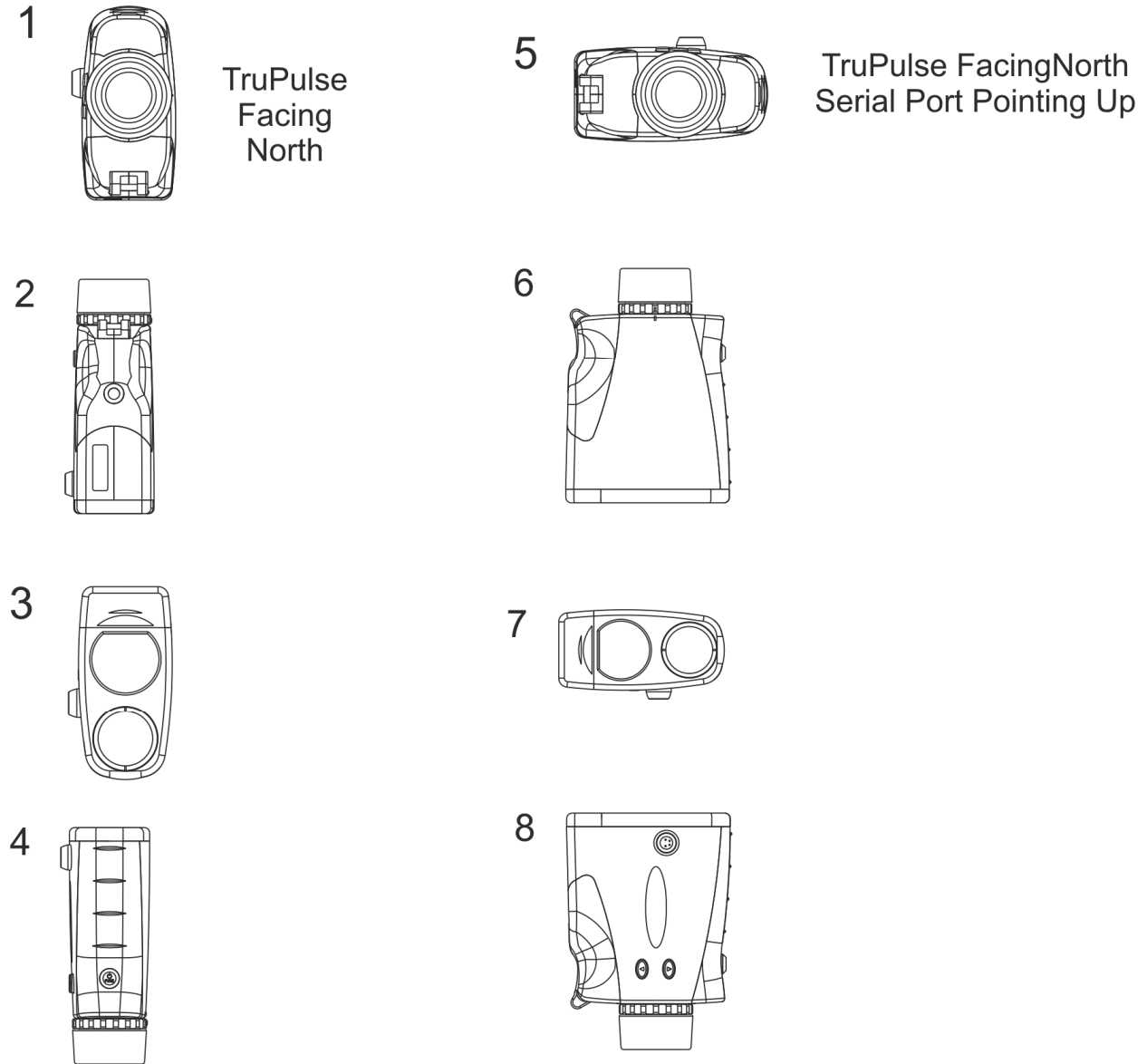

1 — TruPulse Facing North

5 — TruPulse FacingNorth Serial Port Pointing Up

2

6

3

7

4

8

Figure #20

- At each step, wait approximately 1 second before pressing the ⊙FIRE button. Then wait another second before moving to the next position. It is import that the unit is held steady when the ⊙FIRE button is pressed.
- The Horizontal Angle Compass Calibration routine can be aborted at any time during the procedure with a long press of ▲ or ▼. If the calibration is aborted, the unit restores the previous stored calibration.

1. Holding the TruPulse and facing close to magnetic North (±15 degrees towards North). The lenses should be facing as shown in Figure #20-1. Press ⊙ to store the first calibration point.

2. Rotate the TruPulse 90 degrees, the lenses should be facing down as shown in Figure #20-2. Press ⊙ to store the second calibration point.

3. Rotate the TruPulse 90 degrees, the lenses should be facing back as shown in Figure #20-3. Press ⊙ to store the third calibration point.

4. Rotate the TruPulse 90 degrees, the lenses should be facing up as shown in Figure #20-4. Press ⊙ to store the fourth calibration point.

5. Rotate the TruPulse 90 degrees along the optical axis, the lenses should be rotated, facing forward and the serial port pointing up as shown in Figure #20-5. Press ⊙ to store the fifth calibration point.

6. Rotate the TruPulse 90 degrees, the lenses should be facing down as shown in Figure #20-6. Press ⊙ to store the sixth calibration point.

7. Rotate the TruPulse 90 degrees, the lenses should be facing back as shown in Figure #20-7. Press ⊙ to store the seventh calibration point.

8. Rotate the TruPulse 90 degrees, the lenses should be facing up as shown in Figure #20-8. Press ⊙ to store the eighth calibration point.

9. Look through the eyepiece, either a pass or fail message appears in the Main Display.

    - PASS: Press the ⊙ to return to the Measurement Mode.
    - FAiL1: Excessive motion during calibration. Unit was not held steady.
    - FAiL2: Magnetic saturation error. Local magnetic field too strong.
    - FAiL3: Mathematical fit error.
    - FAiL4: Calibration convergence error.
    - FAiL6: Orientations were wrong during the calibration.

    If a "FAiL" message appears, press ⊙. The message "no""CAL" will be displayed allowing you to do a new calibration. See step # 5 page 29. If the calibration fails, the previous calibration is restored.