SECTION B.5: FLORIDA TRIMBLE DiNi DIGITAL LEVEL

The use of the Trimble® DiNi Digital Level can greatly improve the efficiency of collecting and processing survey data. Survey data can be electronically recorded and stored for downloading to a computer for processing.

The following set of procedure describes surveying with the Trimble DiNi Digital Level. However, this procedure only explains features that a NRCS field office will typically use when surveying. For additional information about the instrument, read the *Trimble DiNi Digital Level User Guide* located in the appendix. This procedure will detail the user on how to setup the Trimble® DiNi Digital Level conduct a field survey. See Figures 1 for an illustration of the Trimble® DiNi Digital Level.

Figure 1: Trimble® DiNi Digital Level


I.   SETUP OF TRIMBLE DiNi INSTRUMENT

A. Take care in setting up the tripod legs in a matter which ensures stability of the device. See Figure 2.

1.   Note: Setting the legs wide enough can compensate stability for heterogeneous surfaces, e.g. one leg on asphalt with the other two on soil. If something prevents the legs of the tripod from being spaced sufficiently apart then the tripod can be lowered to increase stability.

Figure 2: Tripod Setup

B. Tighten all of the screws on the tripod and tribrach. Ensure that they have no play.

C. Take into account the ambient temperature. The digital level must adjust to the new temperature for high precision measurements. Temperature difference in degree Celsius (C) x 2 = approximate duration in minutes required for the instrument to adjust to the new temperature.

Figure 3: Tripod Setup
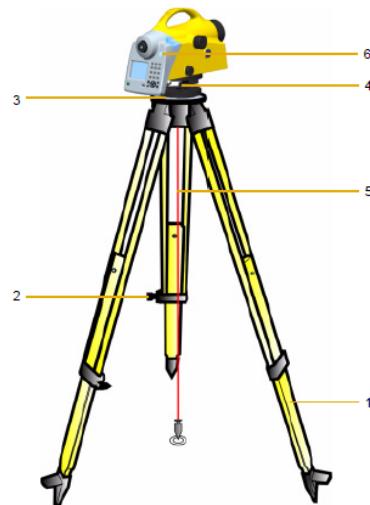
D. Adjust the tripod legs (1) such that the digital level is at a comfortable level for observation. Once this is done fix the legs using the tripod locking screws (2). See Figure 3.

E. Screw the central tripod/head plate screw (3). The tribrach screws (4) should be in mid-position. See Figure 3.

F. Need plumb line and coarse leveling?

G. Roughly level the circular bubble (6) by adjusting the length of the tripod legs. See Figure 3.

H. Fine-tune the circular bubble level using the tribrach screws. See Figure 4.

 1. To test if the level is set properly turn the instrument so that it faces you; ensure the circular bubble is still within the level tolerance (inner circle on the bubble level).

Figure 4: Leveling the Instrument
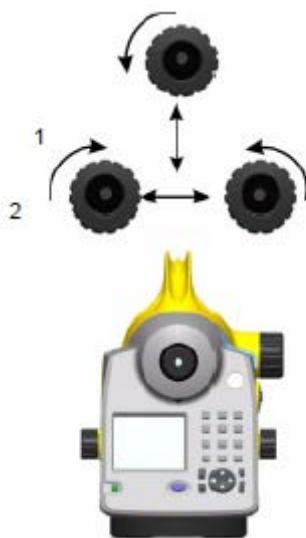
I. Adjust the tribrach on the tripod head plate until the plumb line is hanging directly over the ground mark. Repeat leveling as necessary.

J. Aim the sights at a bright, evenly colored surface and turn the telescope eyepiece until the line patter is sharply defined.

 1. WARNING: Do not point the sights at the sun or strong light source. Irreparable eye damage could be caused if this isn't followed.

K. Turn the focusing unit for the telescope until the target point is sharply defined.

L. Press the power button on the left side of the control panel to turn the instrument on. See Figure 5.

 1. *Note: There are two (blue) trigger keys that may be used to start taking a measurement. For high precision measurements, it is recommended that the trigger key on the right side of the*

instrument (the one that is located away from the control panel) is used. The placement of this trigger key is intended to minimize the influence of any vibrations caused by touching the instrument when pressing the trigger key.

Figure 5: Triggers and Power Button

II. CONFIGURING THE DINI

A. Choose **"Configuration"** from the main menu. See Figure 6.

**Figure 6:** Main Menu

B. Select **"Input"** from the **"Configuration Menu"**. See Figure 7.

Figure 7: Configuration Menu
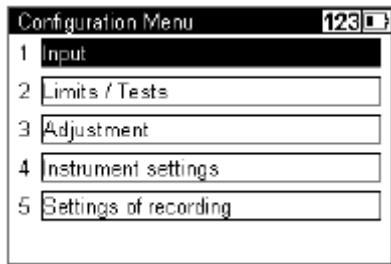
1. Fill in the resulting screen as appropriately and accurately as possible. See Figure 8.

    a. Enter the **"Refraction coeff." – 0.130**

   b. Enter the **"Addition const.(R)" – 0.000ft**

Figure 8: Input

2. Press the enter key to store the information.

C. Select **"Limits / Tests"** from the **"Configuration Menu"**. See Figure 9.

Figure 9: Configuration Menu
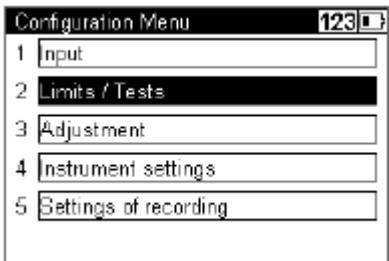
D. Enter **"Max. sighting dist." –** 300.00ft

E. Enter **"Min. sighting height" –** 1.640ft

F. Enter **"Max. sighting height"**.- 9.500ft

G. Press the enter key to access page 2.

H. Use the drop-down list to select the "Difference"- Select "Measurement"

I. Enter the "Max. Difference" – 0.0033ft See Figure 10 for screen caption

J. The "Check 30cm" should be checked

Figure 10: Limits/Tests Settings
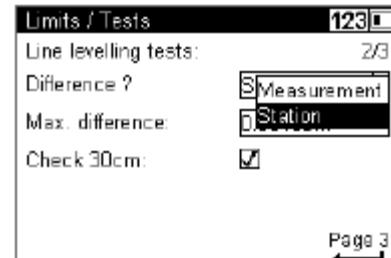
K. Press the enter key to access page 3.

L. Enter the **"back to fore"** (max. distance of choice for a station: 0ft-16.0ft) – 16.0ft

M. Enter the **"total back to fore"** (max. distance for the whole line: 0ft-328ft). – 328ft See Figure 11 for screen caption.

Figure 11: Limits/Tests Settings
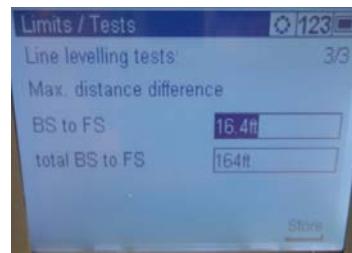
N. Press the enter key to save the information.

O. Select **"Adjustment"** from the **"Configuration Menu"**. See Figure 12.

Figure 12: Configuration Menu
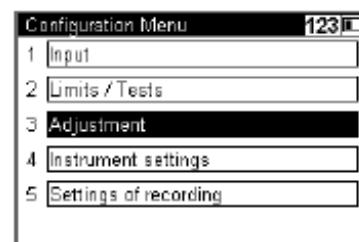
P. The old adjustment values and info will be shown. Select the **"Curvature corr."** and/or

"Refraction corr." box(es) to turn the selection(s) on or off. See Figure 15.

Figure 15: Adjustment Settings
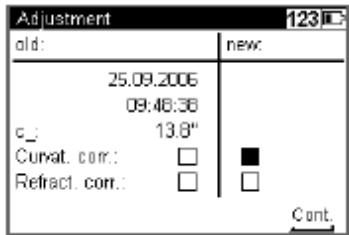
Q. Press the enter key to continue.

R. Select **"OK"** to continue or **"Cancel"** to abort the adjustment. See Figure 16.

Figure 16: Adjustment Settings
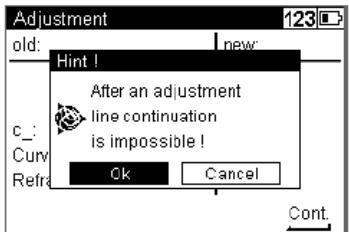
S. Select the "Forstner Method" as the desired adjustment method. See Figure 17.

Figure 17: Adjustment Settings
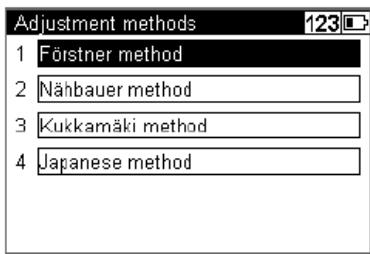
T. Select **"Instrument Settings"** from the **"Configuration Menu"**. See Figure 18.

Figure 18: Configuration Menu
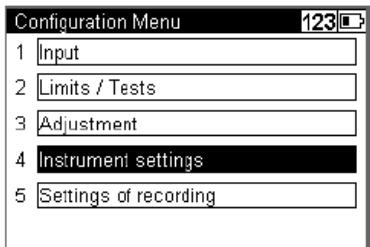
U. Select the preferred unit for the height (US Survey foot(*?*)). See Figure 19.

Figure 19: Instrument Settings
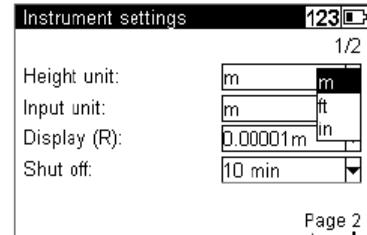
V. Select the preferred unit for value input into the device. See Figure 20.

Figure 20: Instrument Settings
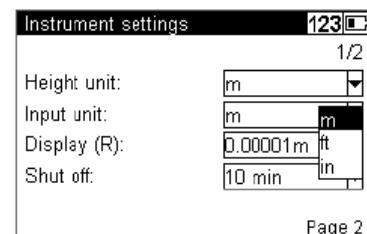
W. Select the number of decimal places you wish to be displayed. See Figure 21.

Figure 21: Instrument Settings
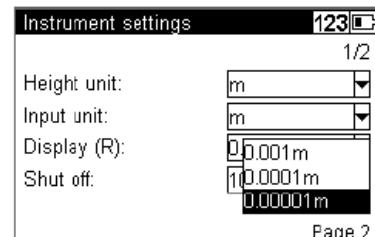
X. Select 10 min for **"Shut off"** to have the instrument automatically shut off after 10 minutes of sitting idle. See Figure 22.

Figure 22: Instrument Settings
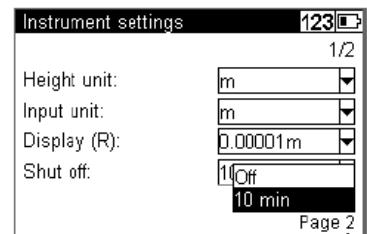

Y. Press enter to access page 2.

Z. Use the "Sound" check box to turn instrument sound on or off. See Figure 23.

Figure 23: Instrument Settings

AA. Make sure the "Language" is set to English.

BB. Set the date format desired.

CC. Set the time format desired.

DD. Select **"Settings of Recording"** from the **"Configuration Menu"**. See Figure 24.

Figure 24: Configuration Menu
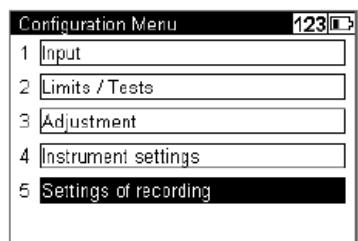
EE. Use the "Recording" check box to turn recording on or off. See Figure 25.

Figure 25: Recording Settings
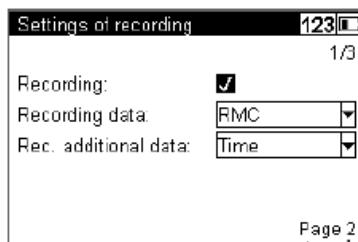
FF. Set the method in which the data will be recorded. "RM" saves the measured values only, "RMC" includes calculations as well as the measured values.

GG. Select addition data (time or temp.) to include in the data using the "Rec. additional data" dropdown menu.

HH. Press the enter key to access page 2.

II. Enter the rate at which you wish to increase the point numbers in the "PNo. Increment" field. See Figure 26.

Figure 26: Recording Settings
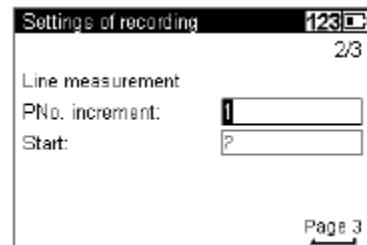
JJ. Enter the initial point number in the "Start" field.

KK. Press enter to access page 3.

LL. Repeat steps GG-HH, however this time the information is regarding numbering for single point measurements and intermediate sights.

MM. Press the enter key to store the info.

III. FUNCTIONS OF THE TRIMBLE DINI

At any time the Trimble Functions menu can be reached by pressing the Trimble icon key *(picture?).* Note: The functions available at any given time are related to the selected program. *Any of these functions can be chosen using the designated number pad selection number (See Figure 28) in lieu of using the enter key.*

A. Press the Trimble icon key. See Figure 27.

Figure 27: Control Panel

B. The Trimble functions menu will open. See Figure 28.

Figure 28: Trimble Functions
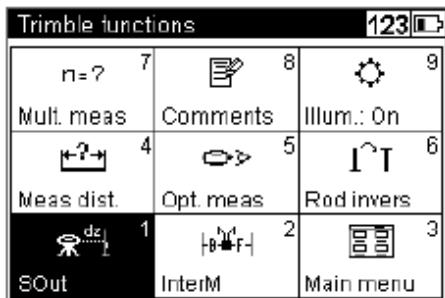
1. Choose **"SOut"** to stake out a point. See Figure 28.

2. Choose **"InterM"** to measure a single point during line leveling. See Figure 28.

3. Choose **"Main Menu"** to access the main menu. See Figure 28.

4. Choose **"Meas dist."** to measure the distance to the staff before doing a final measurement. This is necessary for functions such as line leveling. This function is only able to measure the distance to a point. See Figure 28.

5. Choose **"Opt. meas."** to take a measurement using a metrical staff. This function is used for cases where the digital measurement cannot be taken and allows the optical measurement reading to be keyed in for a point. See Figure 28.

   a. Choose **"distance"** for manual input using the horizontal distance, "HD", reading and the rod reading, "R". See Figure 29.

Figure 29: Visual Measurement
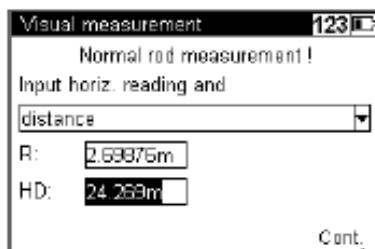
   b. Choose **"stadia reading"** for manual input using stadia readings (the readings from the upper and lower Reichenbach stadia lines) and the rod reading. See Figure 30.

Figure 30: Visual Measurement
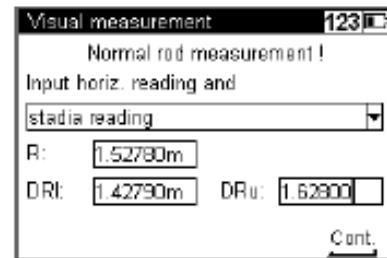
6. Choose **"Rod invers"** and select yes to confirm inverted staff setting and to take inverted measurements. This type of shot may be needed for work underground and inside buildings. Note: This setting will remain active until changed and an arrow pointing downwards will be shown in the lower right hand corner of the display when it is active. See Figure 31.

Figure 31: Rod Inversion Symbol
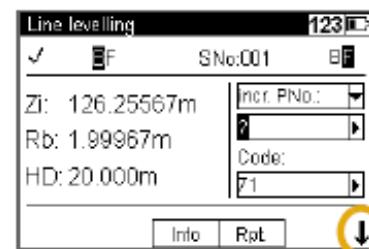
7. Choose **"Mult. Meas."** to take repeated measurements. With this function you can set the desired standard deviation (mR) and the number of measurements (nM) for the instrument to take. The process can be stopped once the desired deviation has been met; however, this may incur some vibrations by touching the instrument. The mean staff reading and distance and the standard deviation are displayed after each measurement.

8. Choose **"Comments"** to input additional information for a measurement. See Figure 32.

Figure 32: Comments input

Figure 33: Illumination Symbol
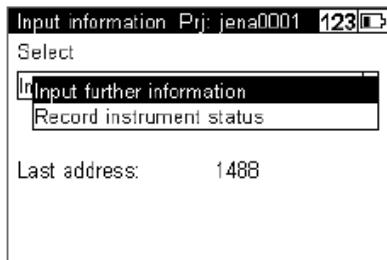
a. Select **"Input further information"** from the dropdown menu and press the enter key to input information manually *or skip to step "b."*. See Figure 33.

   i. Input alphanumeric text.

   ii. Select "Append current date" and/or "Append current time" from the dropdown menu to add current date or time.

   iii. Press the enter key to store in information.

b. Select **"Record instrument status"** from the dropdown menu to document the basic status of the instrument (measuring unit, amount of the line of sight correction, date of last adjustment, earth curvature/refraction setting and coefficient, staff offset/addition constant to quit the instrument info). See Figure 32.

9. Choose **"Illum.***: On***"** to turn the display and bubble illumination on or off using the enter key. A symbol is show if the illumination is enabled. *Note: Power safe mode will turn off the illumination after 30 seconds of the instrument sitting idle and the icon will change to that of a moon and will remain off until the next time a key is pressed*. See Figure 33.

10. Press the *dot/comma key* to display the program version and serial number

IV.   SURVEYING

Note: Some of the functions that are accessible using the function button are also found when "Survey" is selected from the main menu. These functions will be mentioned in this section; however, you should refer to the previous section for more in-depth explanation of those functions previously described.

A. Choose **"Survey"** from the main menu. See Figure 34.

Figure 34: Main Menu
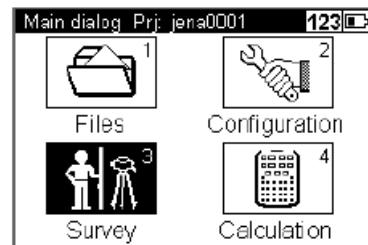
B. Choose **"Single point measurement"**, or press 1 on the key pad, to measure a single point. See Figure 35.

Figure 35: Survey Menu
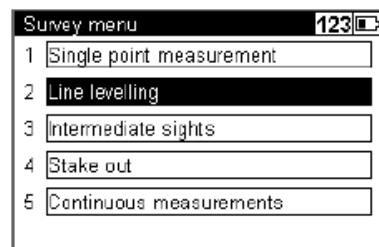
C. Choose **"Line leveling"** from the Survey menu, or press 2 on the keypad, to begin line leveling.

D. Choose **"New"** if you want to start a new line; **"Continue"** to continue an uncompleted line; or **"From project"** to select a (previously completed) line from a project. See Figure 36.

Figure 36: Line Leveling
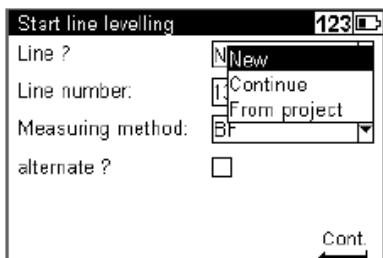
E. If you begin a new line you must now set the **"Line Number"**, **"Measuring method"**. Also, choose whether you'd like alternate enabled or disabled by using the check box next to it. See Figure 38.

Figure 38: Line Leveling
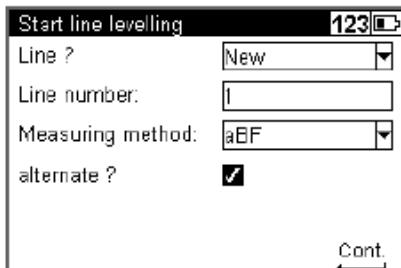
F. Press the enter key.

G. Select a **"Point number"** for the line leveling benchmark using the drop-down menu: **"Find"** will find the next free point number; **"From project"** will allow the selection of a point number in the current project; **"Other project"** allows the selection of a point number from a different project than the current. See Figure 39.

Figure 39: Line Leveling Benchmark
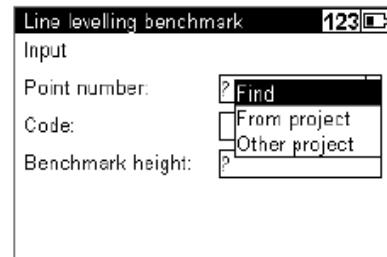
H. Choose a **"Code"** from the drop-down list or enter it using the key pad. See Figure 40.

Figure 40: Line Leveling Benchmark
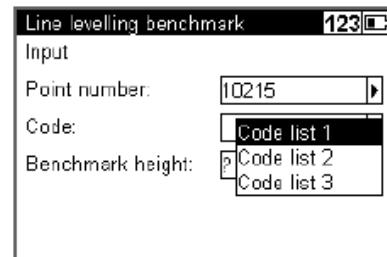
I. Enter in the benchmark height. If the point number was chosen from a list the height will be given automatically. See Figure 41.

Figure 41: Line Leveling Benchmark
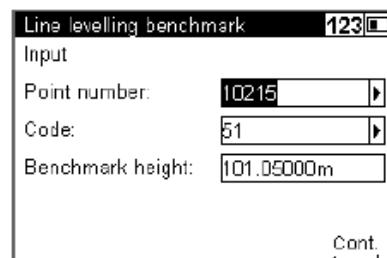
J. Press the enter key.

K. Aim and focus the instrument at the staff, and start a backsight measurement with either of the trigger keys. See Figure 42. *Note: A symbol will be displayed at the bottom right corner of the screen when the instrument is ready to take a measurement.*

Figure 42: Line Leveling

L.   The result will be displayed once the
     measurement is ready. See Figure 43.

Figure 43: Line Leveling

M.   Select incremented or individual point
     number. See Figure 44.

Figure 44: Line Leveling

N.   Select a **"Point number"** for the line
     leveling benchmark using the drop-down
     menu: **"Find"** will find the next free point
     number; **"From project"** will allow the
     selection of a point number in the current
     project; "Other project" allows the selection
     of a point number from a different project
     than the current. See Figure 45.

Figure 45: Line Leveling

O.   Select a **"Code"** list from the drop-down
     menu or enter a point number using the key
   pad. See Figure 46.

Figure 46: Line Leveling

P.   Select **"Info."**. The total sighting distances
     are know, and the next stations, Db and Df,
     are required to be such that they are almost
     identical at the end of the line.

Q.   Select "Rpt." if you wish to repeat the last
     measurement or the last station. *Note: This
     option can be used for single point
     measurements as well as line leveling.* See
     Figure 47.

Figure 47: Repeat Measurement

R.   Select the appropriate function. See Figure
     48. Repeat until the measurement is
     satisfactory. *Note: Repeated Data lines will
     be marked with "#####" and ignored for
     calculations.*

Figure 48: Repeat Measurement
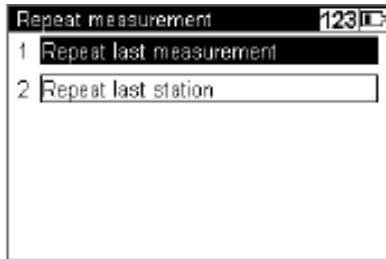
S.   After the backsight measurement (using BF and BBFF) or complete station measurement (all other methods including alternated versions) are done, thereby providing a reference height, some of the functions mentioned in section III become available.

1. Intermediate Sights: Taking the measurement works the same as taking the backsight shots for the line leveling. See section III.B.2 for more information. *Note: The program "Line Adjustment" will only calculate and improve the intermediate points in respect to the respective instrument station.*

2. Stake out: Select a point number using the dropdown menu from the current project or another project, or key in the desired point number, code, and nominal

elevation. Press the escape key to return to line leveling. *Note: The program "Line Adjustment" will not adjust and change the stakeout heights.*

T.   Select **"Lend"** to end the leveling line. For the following screen select yes for a point with a known height, no at a point with unknown height. See Figure 49.

Figure 49: Line Leveling
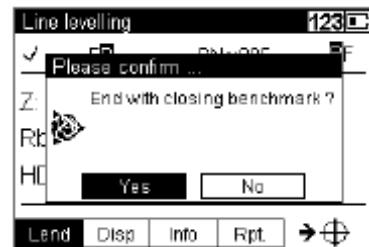
1. With a known height select the point number, code, and benchmark choice or select the point from memory with the information already stored. Highlight **"Accept"** and press the enter key.

2. With an unknown height highlight **"Accept"** and press the enter key.