

Leica Viva Unleveled Setup

v5.0, 2013

Unleveled Setup Manual for SmartWorx Viva Application

- when it has to be **right**

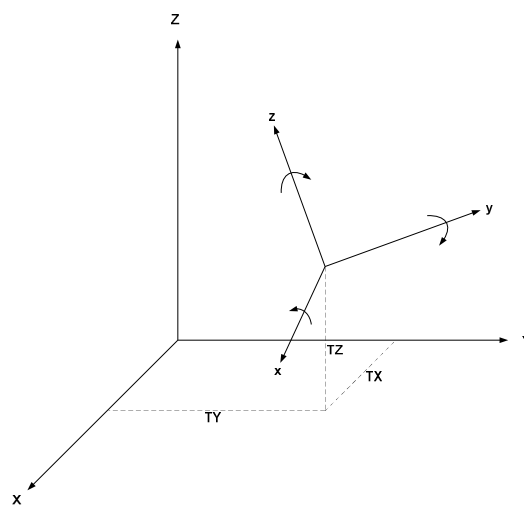
Leica
Geosystems

1- Unleveled Setup Application

About this application

The Unleveled Setup application allows a survey to be completed with a total station that is not leveled and which could be in unstable environments such as on a ship. The application computes the transformation parameters (3 shifts, 3 rotations and 1 scale) from at least 3 measured control points. Thereafter it's possible to survey or stake points in the coordinate systems as defined by the transformation parameters.

The transformation is a 3D Conformal Transformation (also known as 3D Helmert Transformation) which defines the 7 parameters to transform the points measured in the instrument coordinate system (x, y, z) into the object coordinate system (X, Y, Z).



Before you start

The following items need to be completed before the operation of Unleveled Setup can take place:

- The user must have installed SmartWorx Viva version 5.0 firmware or higher on their instrument
- The user must have installed SmartWorx Viva Unleveled Setup application version 5.0 or higher on their instrument

If you do not have the above firmware or application, please contact your local sales representative or visit myworld.leica-geosystems.com.

2- Using the Unleveled Setup Application

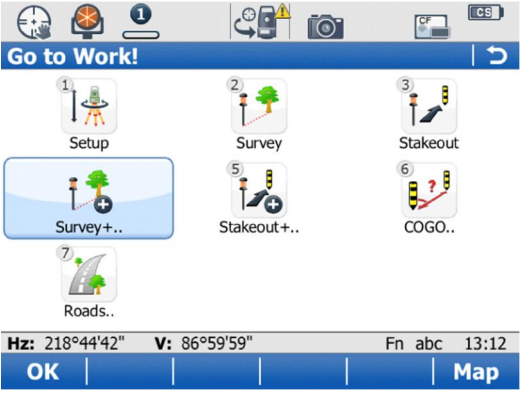
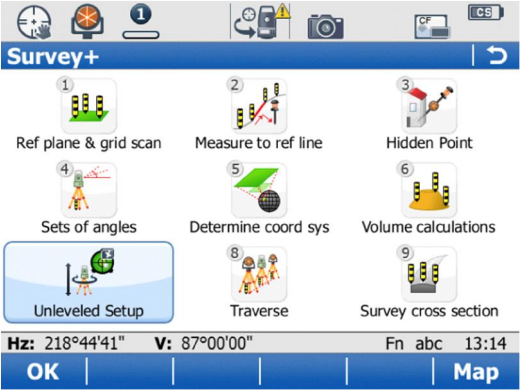
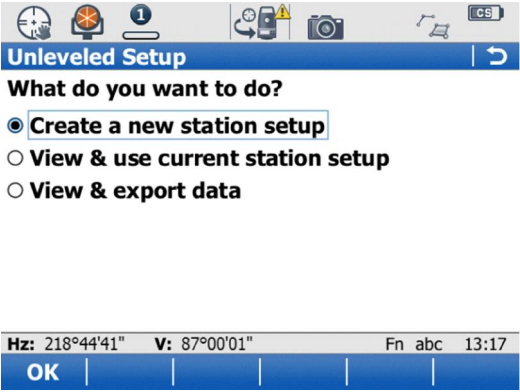
Preparing the memory card

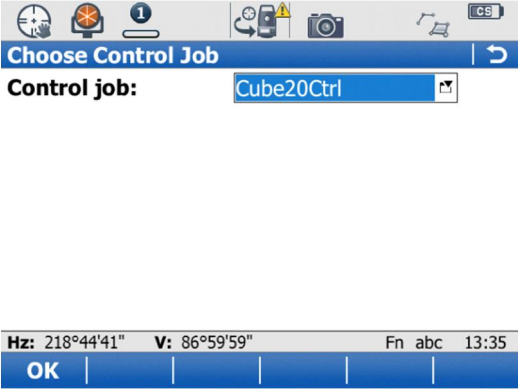
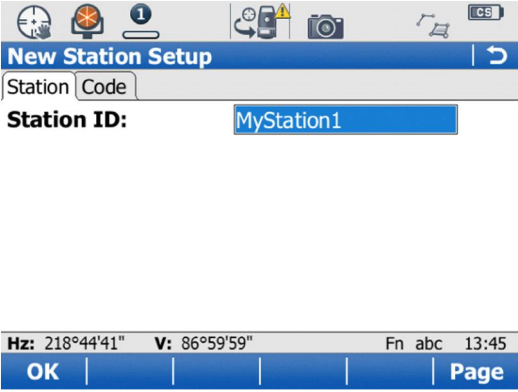
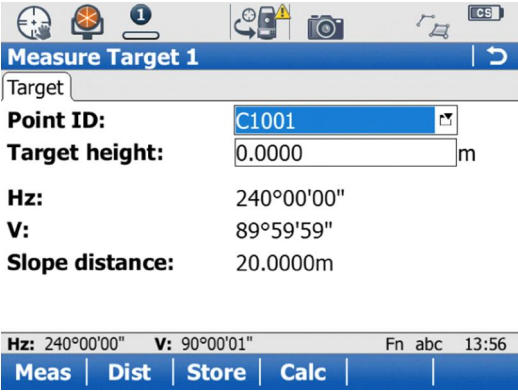
Before using this application, it is desired to have all known control points stored in a specific job which will be used as the control job.

Creating a new setup

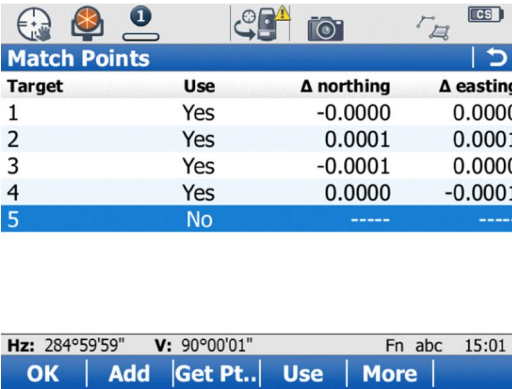
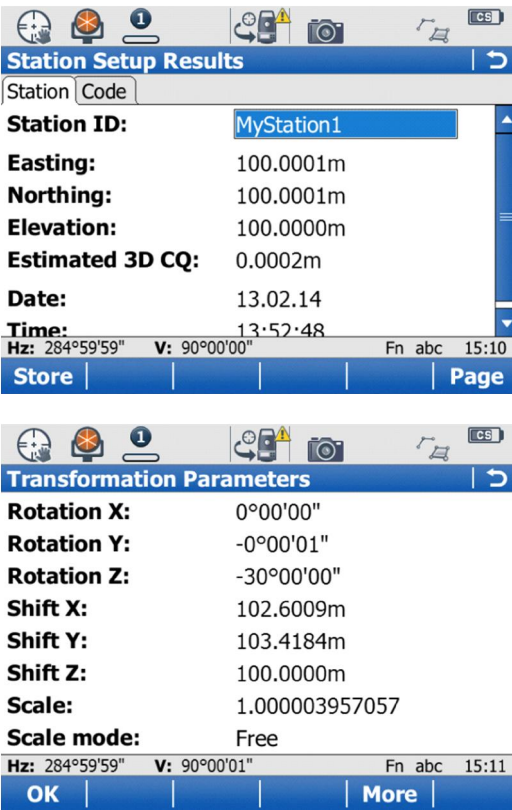
The following steps will guide the user through the creation of a new unleveled setup.

Step	Action	Display
1	Before using Unleveled Setup, insure that the Working Job is properly defined through the Jobs & Data menu	
2	From the main menu Tap on the Go to Work! or press the 1 key or use a hot key	

Step	Action	Display
3	<p>From the Go to Work! menu</p> <p>Tap on Survey+ or press the 4 key</p>	
4	<p>From Survey+ menu</p> <p>Tap on Unleveled Setup</p>	
5	<p>Select Create a new station setup.</p>	

Step	Action	Display
6	<p>Select the Control job.</p> <p>Job that contains the control points to match the measured target points for transformation parameters computation.</p>	
7	<p>Enter the Station ID at new setup.</p>	
8	<p>Select the first control point then measure target 1.</p> <p>Press the Meas key or the Dist and Store keys to record measurement data.</p>	

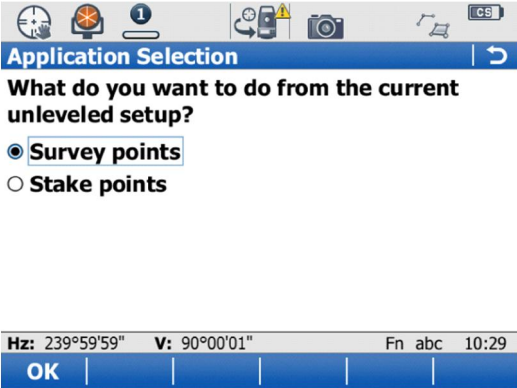

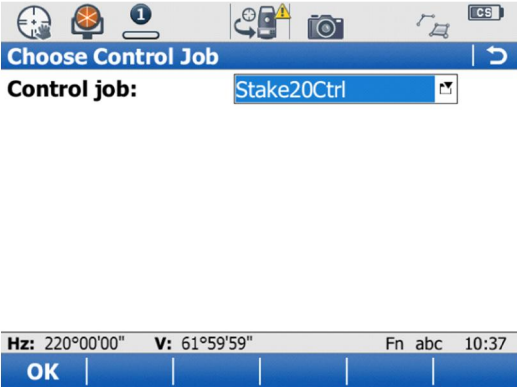
Step	Action	Display																																										
9	<p>Select the second control point then measure target 2.</p> <p>Do the same for the third and following control points. The application needs at least 3 targets, and it can go up to 20 targets.</p> <p>Once all targets are measured then press Calc to trigger the transformation parameters computation.</p>	<p>Measure Target 2</p> <p>Target</p> <p>Point ID: C1002</p> <p>Target height: 0.0000 m</p> <p>Hz: 329°59'59"</p> <p>V: 90°00'01"</p> <p>Slope distance: 20.0000m</p> <p>Hz: 329°59'59" V: 90°00'00" Fn abc 14:21</p> <p>Meas Dist Store Calc</p>																																										
10	<p>The Match Points table displays target points status and related delta values.</p> <p>Points out of tolerance are identified with an exclamation mark (!).</p> <p>Use the More key to see additional information.</p> <p>Additional targets can be measured by pressing the Add key.</p> <p>In case of a mismatch, use the Get Pt.. to match a measured target point onto another known point.</p>	<p>Match Points</p> <table border="1"> <thead> <tr> <th>Target</th> <th>Use</th> <th>Known point</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Yes</td> <td>C1001</td> </tr> <tr> <td>2</td> <td>Yes</td> <td>C1002</td> </tr> <tr> <td>3</td> <td>Yes</td> <td>C1003</td> </tr> <tr> <td>4</td> <td>Yes</td> <td>C1004</td> </tr> <tr> <td>5</td> <td>! Yes</td> <td>C1005</td> </tr> </tbody> </table> <p>Hz: 284°59'59" V: 90°00'00" Fn abc 14:58</p> <p>OK Add Get Pt.. Use More</p> <p>Match Points</p> <table border="1"> <thead> <tr> <th>Target</th> <th>Use</th> <th>Δ northing</th> <th>Δ easting</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Yes</td> <td>-0.0006</td> <td>0.0013</td> </tr> <tr> <td>2</td> <td>Yes</td> <td>-0.0009</td> <td>0.0005</td> </tr> <tr> <td>3</td> <td>Yes</td> <td>-0.0004</td> <td>-0.0001</td> </tr> <tr> <td>4</td> <td>Yes</td> <td>-0.0004</td> <td>0.0004</td> </tr> <tr> <td>5</td> <td>! Yes</td> <td>0.0023</td> <td>-0.0021</td> </tr> </tbody> </table> <p>Hz: 285°00'00" V: 89°59'59" Fn abc 14:57</p> <p>OK Add Get Pt.. Use More</p>	Target	Use	Known point	1	Yes	C1001	2	Yes	C1002	3	Yes	C1003	4	Yes	C1004	5	! Yes	C1005	Target	Use	Δ northing	Δ easting	1	Yes	-0.0006	0.0013	2	Yes	-0.0009	0.0005	3	Yes	-0.0004	-0.0001	4	Yes	-0.0004	0.0004	5	! Yes	0.0023	-0.0021
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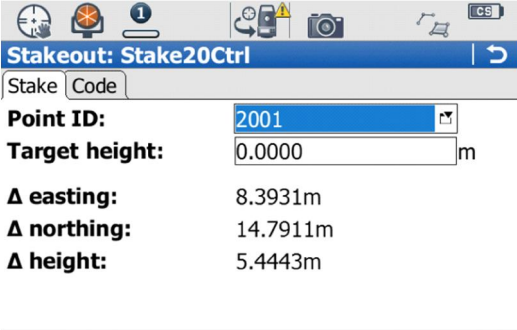
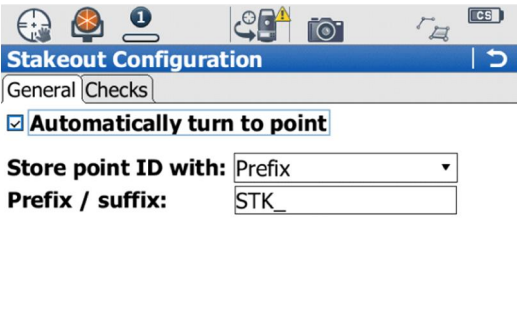
Step	Action	Display																								
11	<p>Press Use key to deactivate erroneous point from the computation. A new transformation is automatically computed and the delta values are updated.</p> <p>Press OK to accept the transformation.</p>	 <p>The screenshot shows the 'Match Points' screen with a table of points and their corresponding 'Use' status and delta values. The table is as follows:</p> <table border="1"> <thead> <tr> <th>Target</th> <th>Use</th> <th>Δ northing</th> <th>Δ easting</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Yes</td> <td>-0.0000</td> <td>0.0000</td> </tr> <tr> <td>2</td> <td>Yes</td> <td>0.0001</td> <td>0.0001</td> </tr> <tr> <td>3</td> <td>Yes</td> <td>-0.0001</td> <td>0.0000</td> </tr> <tr> <td>4</td> <td>Yes</td> <td>0.0000</td> <td>-0.0001</td> </tr> <tr> <td>5</td> <td>No</td> <td>-----</td> <td>-----</td> </tr> </tbody> </table> <p>Below the table, the screen displays 'Hz: 284°59'59" V: 90°00'01" Fn abc 15:10' and a bottom menu with 'OK', 'Add', 'Get Pt..', 'Use', and 'More' buttons.</p>	Target	Use	Δ northing	Δ easting	1	Yes	-0.0000	0.0000	2	Yes	0.0001	0.0001	3	Yes	-0.0001	0.0000	4	Yes	0.0000	-0.0001	5	No	-----	-----
Target	Use	Δ northing	Δ easting																							
1	Yes	-0.0000	0.0000																							
2	Yes	0.0001	0.0001																							
3	Yes	-0.0001	0.0000																							
4	Yes	0.0000	-0.0001																							
5	No	-----	-----																							
12	<p>Once the transformation is accepted, the instrument coordinate values and estimated 3D CQ are shown.</p> <p>Press Store key to activate and save the instrument position.</p> <p>If needed, the user can see the transformation parameters by pressing the Param.. key on the shift level.</p>	 <p>The first screenshot shows the 'Station Setup Results' screen with the following data:</p> <ul style="list-style-type: none"> Station ID: MyStation1 Easting: 100.0001m Northing: 100.0001m Elevation: 100.0000m Estimated 3D CQ: 0.0002m Date: 13.02.14 Time: 13:52:48 <p>The second screenshot shows the 'Transformation Parameters' screen with the following data:</p> <ul style="list-style-type: none"> Rotation X: 0°00'00" Rotation Y: -0°00'01" Rotation Z: -30°00'00" Shift X: 102.6009m Shift Y: 103.4184m Shift Z: 100.0000m Scale: 1.000003957057 Scale mode: Free <p>Both screenshots show the same header information: 'Hz: 284°59'59" V: 90°00'00" Fn abc 15:10' and '15:11' respectively. The bottom menu for the first screenshot includes 'Store' and 'Page' buttons, while the second includes 'OK' and 'More' buttons.</p>																								

Viewing and using a setup

The following steps will guide the user to survey and stake points from an unleveled setup.

Step	Action	Display
13	Select View & use current station setup.	
14	<p>The coordinate values at the instrument position are shown for confirmation.</p> <p>Press Check key to perform a check on control points.</p> <p>Press M Pts.. key to view the target match points defining the current instrument position.</p> <p>Press OK to accept and use the current instrument setup position.</p>	

Step	Action	Display
15	<p>Once station setup is established, points can be either surveyed or staked.</p> <p>Select Survey points to survey points.</p> <p>Select Stake points to stake points.</p>	
16	<p>Survey option.</p> <p>Press the Meas key or the Dist and the Store keys to record measurement data. The application stores the original TPS measurements but applies the transformation before recording point positions.</p> <p>Measure more points.</p> <p>Press Done key when finished.</p>	
17	<p>Stakeout option.</p> <p>Select the job that includes design points to be staked.</p>	

Step	Action	Display
18	<p>Select the design point to be staked.</p> <p>Press the Dist key to measure a distance and to display new delta values.</p> <p>Press the Meas key or the Dist and the Store keys to record measurement data.</p> <p>Stake more points.</p> <p>Press Done key when finished.</p> <p>If needed, press Config.. key on shift level to access the stakeout configuration dialog.</p>	 <p>Stakeout: Stake20Ctrl</p> <p>Stake Code</p> <p>Point ID: 2001</p> <p>Target height: 0.0000 m</p> <p>Δ easting: 8.3931m</p> <p>Δ northing: 14.7911m</p> <p>Δ height: 5.4443m</p> <hr/> <p>Hz: 110°00'00" V: 80°00'01" Fn abc 10:38</p> <p>Meas Dist Store Done Page</p>  <p>Stakeout Configuration</p> <p>General Checks</p> <p><input checked="" type="checkbox"/> Automatically turn to point</p> <p>Store point ID with: Prefix</p> <p>Prefix / suffix: STK_</p> <hr/> <p>Hz: 110°00'01" V: 79°59'59" Fn abc 11:13</p> <p>OK Page</p>

Viewing and exporting data

The following steps will guide the user to review and export data recorded from an unleveled setup.

Step	Action	Display
19	Select View & export data .	
20	<p>Each point can be viewed by pressing the Edit.. key.</p> <p>Press the More key to view additional information.</p> <p>Press the Exprt.. key to export all points data.</p>	

Step	Action	Display
21	<p>Points can be exported to an XML file, to a CSV file or to another Job.</p> <p>Suffix or Prefix can be added to the exported points.</p>	

3- Notes

Instrument position

The computed instrument position is stored in the measurement job with an ADJ point class.

Point	3D CQ	Class
TPS0003	0.0021	Meas
TPS0002	0.0021	Meas
STK_2003	0.0021	Meas
MyStation1	0.0002	Adj
C1005	0.0000	Ctrl
C1004	0.0000	Ctrl
C1003	0.0000	Ctrl
C1002	0.0000	Ctrl

Surveyed and staked points

The surveyed and staked points are stored in the working job.

Each point is recorded with 2 point classes: NONE and MEAS.

The untransformed position is stored in the NONE point class while the transformed position is stored in the MEAS point class.

This way, transformed points are immediately available in the job, and can be used with COGO by example.

Point	3D CQ	Class
STK_2002	0.0022	Meas
TPS0006	0.0022	Meas
TPS0005	0.0021	Meas
TPS0004	0.0021	Meas
TPS0003	0.0021	Meas
TPS0002	0.0021	Meas
STK_2003	0.0021	Meas
MyStation1	0.0002	Ardi

Point filtering

By setting the **Filter** to **Highest class**, the measured points of class NONE will not be displayed and the points of class MEAS have priority.

Sort by:	Filter by:
Backward time	Highest class