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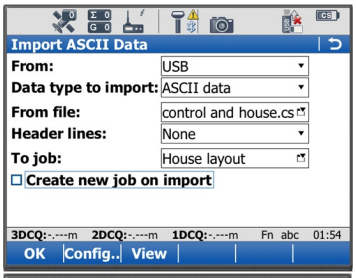
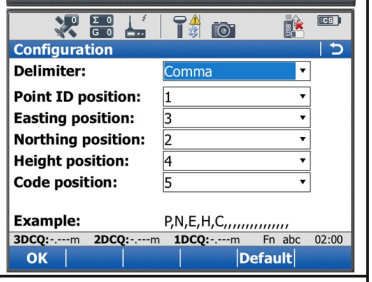
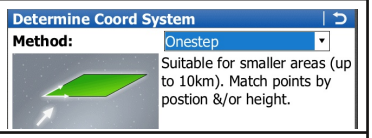
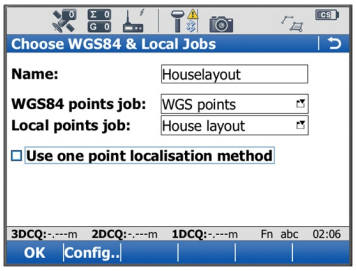
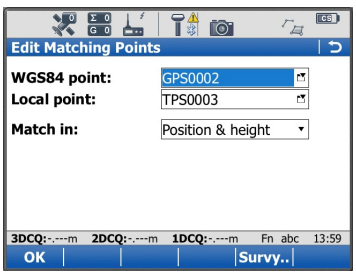
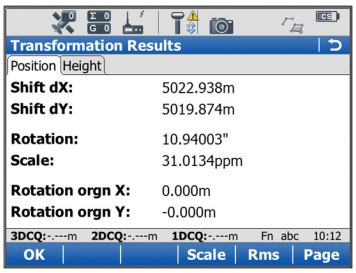
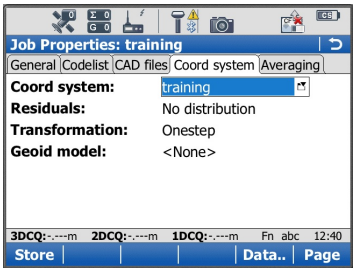
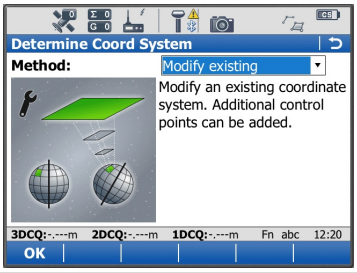
One-Step, multiple point localization in Leica Smartworx VIVA

When using Leica Viva GNSS, the surveyor is sometimes required to work in a local coordinate datum (to represent a CAD plan for instance), rather than a predefined UTM coordinate system included in SmartWorx Viva. The application 'Determine Coordinate System' allows the user to create a localized coordinate system for use on any job. This quickstart guide covers the 'one-step localization', which should be used for projects smaller than 10km*10km.

Step	Sceeen Menu		
1.	Background	***Deciding on the control points to use*** • Try to include at least 4 control points in the localization, this will ensure enough redundancy to locate and remove erroneous control points from the localization if necessary. It is also important to select control points which are evenly distributed throughout the project (including control on the outer perimeter is ideal).	
2.	Import ASCII	***Importing the control coordinates.*** Control (or 'local points') can come from a variety of sources. - Manually entered into a 'control job' - Imported from a dxf via the tap-map. - Imported from an ASCII file. - Taken from an existing job. In this guide, we'll take our control from an ASCII text file (containing point no, Northing, Easting, Elevation) which has been placed in the 'DATA' folder of the USB storage device and inserted into the bottom of the Viva controller. To import the data. From the 'main menu' go to 'Jobs & Data', then 'Import data', and then 'Import ASCII data'. Then define... - The location of the ASCII file - The name of the ASCII file - Any header lines in the file By selecting 'create new job on import' we can automatically place these points in a new job which will use the same name as the ASCII. ***An important step*** is to ensure that the columns in the ASCII match the fields for import. Pressing F3 will allow you to view the selected ASCII on the screen, then F2 or CONFIG will allow you to select the fields. In this example, we will need to set the Northing as column 2, and the Easting as column 3. This is where the delimiter is defined as well. Press OK to import.	 
3.	Determine Coordinate System	***To open the application*** Go to the Survey+ menu, then 'Determine coord sys'. •The method needs to be selected as 'one-step', and then press OK to continue.	
4.	Choose WGS84 & Local Jobs	•As the coordinate system will be stored in the controller for use with any job, this is where we are able to name the coordinate system. A good idea might be to name it as the project which you are working on. •For the 'WSG84 points job', either select an existing job with surveyed points in it, or if localizing 'on the fly' select the empty field then press F2 or 'NEW' to create a new job to store the new points in. •For the 'Local points job', select the job created with the ASCII import. •Make sure 'Use one point localization method' is unchecked then press OK to progress. ***Note:*** Pressing F2 or CONFIG will allow you to access the localization settings to alter the accuracy settings and transformation model (default is Bursa-Wolf). Changing these settings is not usually required.	
4.	Choose Height Mode & Geoid Model.	•Select height mode as Orthometric, then press OK to progress. •Leave geoid model set to <none>, then press OK to progress	
5.	Match Points	This screen is where we match the surveyed points to the control points. If the control points have point IDs identical to the surveyed points, pressing F6 or 'Auto' will automatically match all points. If the point IDs are different, or if the control points are to be surveyed 'on the fly', press F2 or 'New' to create a new match. In the 'Choose Matching Points' screen, select the 'local point' to match. By selecting this field, then going to the 'map' tab, you are able to graphically select the desired point, or you can just select it from the list. Then in the WGS84 tab, select the surveyed point to match, or if the point is yet to be surveyed, press F5 or Survy to enter the survey screen to measure the corresponding point. Once surveyed, the measured point will appear in the WGS84 point field. It is possibly in this screen to select whether to match in position or height only (or both). Usually we would use both.	

Step	Sceeen Menu		
6.	Check Residuals	When satisfied with the number of matches, press F1 or Calc. The residuals will be displayed, Use the residuals to identify errors in the matching process or isolate bad control points. In a typical situation, the residuals should be under 30mm, but will depend on the quality of the control or survey observations. Pressing F5 or 'More' will show the height residuals. If there are any points showing errors, pressing 'back' will allow you to return to the match page, to either edit or remove the erroneous point. Press Calc again to re-check the transformation.	
7.	Finalizing the localization	Pressing F3 or 'Result' will display the transformation results, then pressing OK will provide a summary of the new coordinate system. Pressing store in this screen will store the coordinate system/localization and apply it to the WGS84 points job, and then take you back to the main menu.	
8.	Working with the localization	Press 'go to work', then the desired application to continue working in the localized coordinate system. To attach the localization to a new job, go to 'Jobs & Data', then 'Choose Working Job', select the job then press F2 or EDIT, and then go to the coordinate system tab and change the coordinate system to the newly created one. It is important to stake out some additional control before commencing the survey (and at the start of each day) to ensure that the system is working correctly.	
9.	Modify the localization	It is possible to modify a localization (for example if you had found additional control during the survey), by returning to 'determine coord sys' then in the first screen, selecting 'Modify existing' insead of 'one step'. Continue through the screens making changes as required.