

Leica FAQ

Question Can I work in orthometric heights in the field when I'm working with RTK using a GPS1200 receiver?


Background Geoid separations are needed to compute orthometric heights. Geoid separations are derived from geoid models. The relationship between ellipsoidal and orthometric height is given by

$$\text{Ellipsoidal Height (h)} = \text{Orthometric Height (H)} + \text{Geoid Separation (N)}$$

Your GPS receiver will provide the ellipsoidal heights and the geoid model will provide the geoid separations. With a geoid model attached to a coordinate system, orthometric heights can be computed.

Answer **Yes** you can work in orthometric heights. First you must create a geoid model field file in LGO (LEICA Geo Office) and then transfer it to the compact flash (CF) card. Then create a geoid model on you GPS1200 receiver using the newly created geoid model field file and attach it to an existing coordinate system.

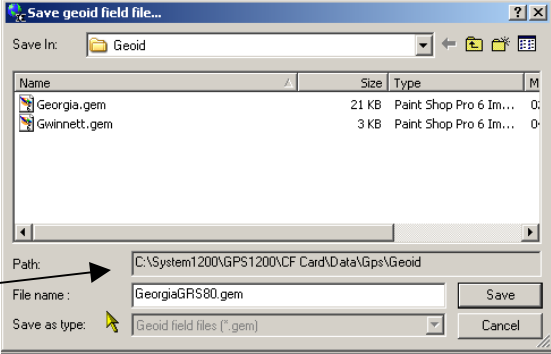
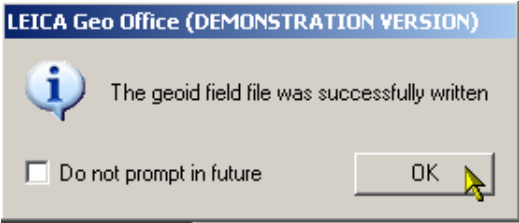
This FAQ assumes you already have a geoid model created in LGO. If you do not, please see the LGO help menu to create one or see the *More Information* section at the end of this document.

| Step | Action | Display |
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| 1 | From the main menu in LGO: <ul style="list-style-type: none"> • Select Tools from the pull-down menu at the top of the screen. • Select Create Geoid Model Field File... from the drop-down list. This opens the Geoid field file generation window. |  |

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| Step | Action | Display |
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| 2 | <p>In the Geoid field file generation window:</p> <ul style="list-style-type: none"> • Select a geoid model from the Geoid Model list. In this example we are using Geoid03 GRS80. • Decide on how you wish to describe the dimensions of your geoid model field file. In this example we are going to use the Centre & radius method. • Enter the latitude and longitude of the centre point of the geoid model. Remember to change the E to W in the longitude field. • Enter the spacing of the geoid model grid. <p>Note: It is futile to make you grid spacing any smaller than 1850 metres (6080 feet) because Geoid03's grid spacing is no tighter than that. Making the grid spacing smaller than 1850 metres will not improve the accuracy of your field file but just makes your geoid model field file larger than necessary.</p> <ul style="list-style-type: none"> • Enter a radius that will encompass your work area. In this example we are creating a 100-kilometre field file. • Notice the size of your new field file. • Press the Save button to create your field file. <p>This opens the Save geoid field file... window.</p> | |

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| Step | Action | Display |
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| 3 | <p>In the Save geoid field file... window:</p> <ul style="list-style-type: none"> Choose a destination folder in the Save in: field. <p>Note: In this example, the RTK rover's CF card was in the computer's PCMCIA card reader so the destination "Local Disk (F:)\Data\Gps\Geoid" was navigated to and the field file was saved directly to the CF card.</p> <ul style="list-style-type: none"> Enter a name for the field file. The file must have the .gem extension. In this example we are creating the "GeorgiaGRS80" geoid field file. Press the Save button. <p>This saves the geoid model field file on the CF card.</p> <p>When the file has been successfully created, an alert pop up message appears alerting you of this.</p> <ul style="list-style-type: none"> Press the OK button. <p>This closes the alert pop up, "Save geoid field file...", and "Geoid field file generation" windows.</p> <p>Note: There are other ways to transfer a geoid model field file to the CF card. For example you can use the Sensor Transfer function in LGO. See the LGO help menu for more information on this topic.</p> |   |

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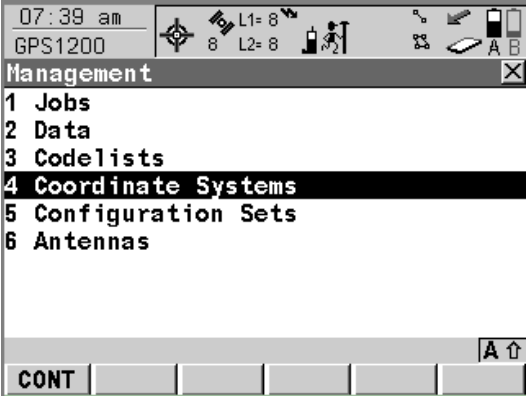
Switching to the receiver

The geoid model field file is now on the CF card. In the receiver we must create a geoid model and attach it to a coordinate system.

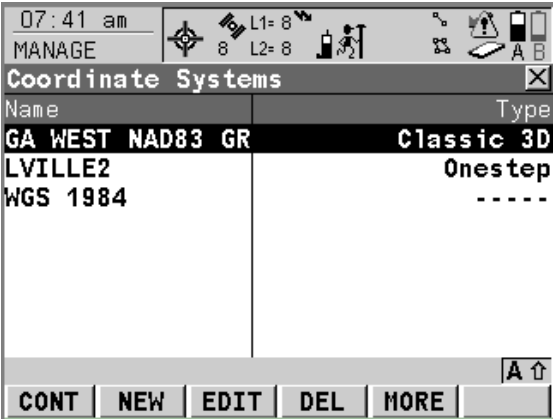
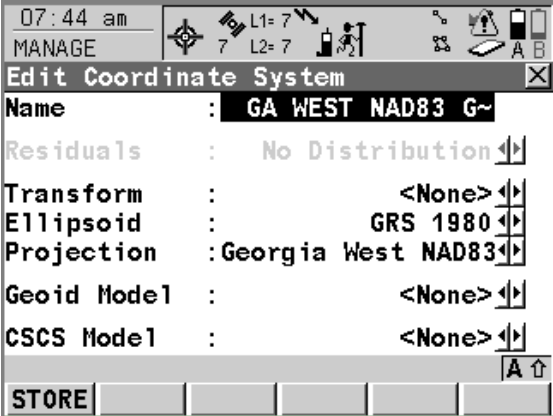
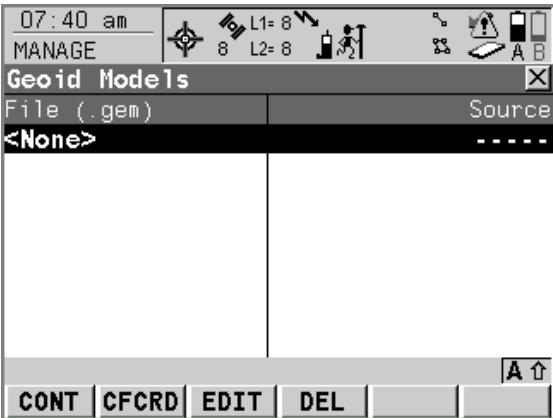
Place the CF card into the GPS1200 receiver and turn the receiver on.

Note: You have the option of either transferring the geoid model field file to the receiver's system ram or letting it remain in the card. The GPS1200's system ram is 1MB and if your geoid model field file is greater than 500KB then it is advisable to leave the geoid model field file on the card. If your geoid model field file is less than 500KB, it is advisable to transfer it into the system ram of the receiver using the Transfer Objects tool. To learn more about transferring objects, consult the GPS1200 Technical Reference manual.

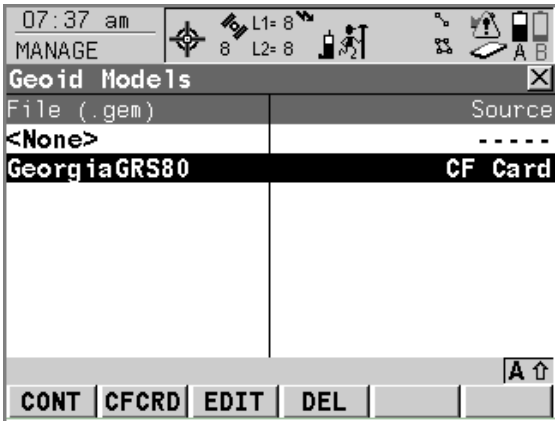
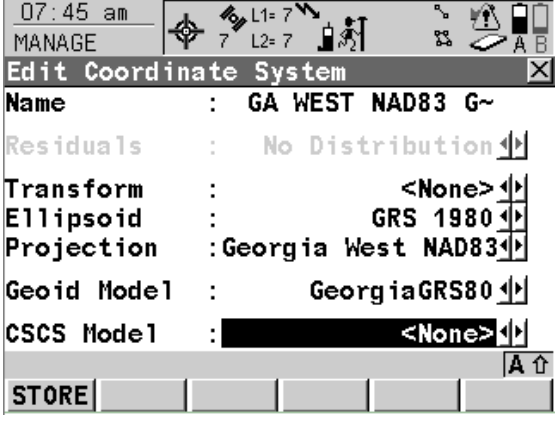
Remember: If you leave the geoid model field file on the card and you do a full format of the card, the geoid model will be deleted!

| Step | Action | Display |
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| 4 | <p>The geoid model field file is stored on the CF card. In the receiver we must create a geoid model and attach it to a coordinate system.</p> <p>From the Main Menu:</p> <ul style="list-style-type: none"> • Tap on 3 Manage.... <p>This takes you to the GPS1200 Management screen.</p> |  |
| 5 | <p>In the GPS1200 Management screen:</p> <ul style="list-style-type: none"> • Tap on 4 Coordinate Systems. <p>This takes you to the MANAGE Coordinate Systems Name screen.</p> |  |

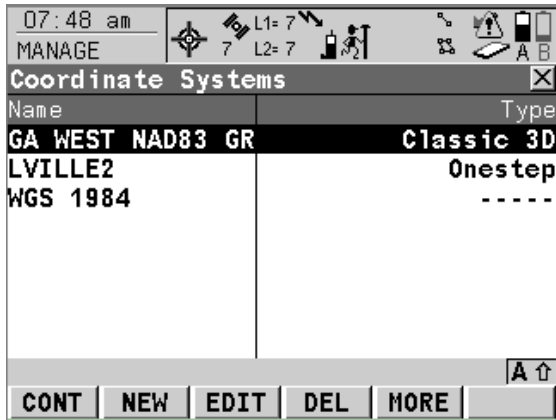
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| Step | Action | Display |
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| 6 | <p>In the MANAGE Coordinate Systems Name screen:</p> <ul style="list-style-type: none"> Select the coordinate system that you wish to add the geoid model to. In this example we are editing the coordinate system “GA WEST NAD83 GRS80”. Press the F3 (EDIT) button. <p>This takes you to the MANAGE Edit Coordinate System screen.</p> |  |
| 7 | <p>In the MANAGE Edit Coordinate System screen:</p> <ul style="list-style-type: none"> Tap on the Geoid Model field. <p>This takes you to the MANAGE Geoid Models screen.</p> |  |
| 8 | <p>In the MANAGE Geoid Models screen:</p> <ul style="list-style-type: none"> Press the F2 (CFCRD) button. <p>This displays all geoid models (gem files) stored in the Geoid folder.</p> |  |

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| Step | Action | Display |
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| <p>9</p> | <p>Continuing in the MANAGE Geoid Models screen:</p> <p>We now see the geoid model that we stored on the CF card.</p> <ul style="list-style-type: none"> <li>• Select the geoid model. <li>• Press the F1 (CONT) button. <p>This returns us to the MANAGE Edit Coordinate System screen.</p> |  <p>The screenshot shows the 'Geoid Models' screen with a status bar at the top displaying '07:37 am', 'MANAGE', and various icons. The main area shows a table with two columns: 'File (.gem)' and 'Source'. The first row is '<None>' with '----' in the source column. The second row is 'GeorgiaGRS80' with 'CF Card' in the source column. At the bottom, there are buttons for 'CONT', 'CFCRD', 'EDIT', and 'DEL', along with an 'A' button and an upward arrow.</p> |
| <p>10</p> | <p>In the MANAGE Edit Coordinate System screen:</p> <p>We now see our geoid model in the Geoid Model field.</p> <ul style="list-style-type: none"> <li>• Press the F1 (STORE) button. <p>This stores the coordinate system with the new geoid model and returns you to the MANAGE Coordinate System screen.</p> |  <p>The screenshot shows the 'Edit Coordinate System' screen with a status bar at the top displaying '07:45 am', 'MANAGE', and various icons. The main area shows a list of fields: 'Name : GA WEST NAD83 G~', 'Residuals : No Distribution', 'Transform : <None>', 'Ellipsoid : GRS 1980', 'Projection : Georgia West NAD83', 'Geoid Model : GeorgiaGRS80', and 'CSCS Model : <None>'. At the bottom, there are buttons for 'STORE', 'EDIT', and 'DEL', along with an 'A' button and an upward arrow.</p> |

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| Step | Action | Display |
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| 11 | In the MANAGE Coordinate System screen: <ul style="list-style-type: none"> Press the F1 (CONT) button to return to the Main Menu. |  |

Conclusion

A geoid model is needed to work with orthometric heights in the field during an RTK survey.

We created a geoid model field file in LGO and saved it on the CF card. We then placed the card in the receiver and created a geoid model based on the newly created field file. We then attached that geoid model to an existing coordinate system.

More Information

To learn more about installing a geoid model in LGO/SKI-Pro please follow this link:
http://www.leicaadvantage.com/support/GPS1200/GPSfaqs/LGO_SKI_Pro_Questions/GeoidLGO.pdf