

### 1. About this release

LEICA Geo Office (LGO) is the office software, which accompanies the LEICA GPS and TPS System 1200. It supports all measurement types (TPS, GPS and level data) and is the ideal tool to view, process, quality-check and archive data before exporting it to virtually any format required by subsequent mapping or engineering software packages.



LEICA Geo Office is the perfect partner for GPS1200 and TPS1200 instruments, and in addition also supports the existing range of instruments including GPS System 300 and 500, the TPS series 300, 400, 700, 800, 1000 and 1100 as well as the BUILDER and DNA instruments.

Version 4.0 further improves the strengths of LGO, includes the combined processing of GPS and GLONASS data, supports the latest improvements of System 1200 firmware and adds new functionality to manage and process your GPS, TPS or Level data in an integrated way. It includes a new Design to Field component with graphical support and many more new features:

- **GNSS Processing (GPS and GLONASS)**

With LGO version 4.0 combined GPS and GLONASS data collected with a System 1200 GX1230 GG or ATX1230 GG receiver can be imported and processed. GLONASS satellites are fully supported during processing, data analysis, processing reports, RINEX Import and Export as well as for Precise Ephemeris. Processing combined GPS and GLONASS data is simple, but yet results in reliable solutions, when geometry is poor, if using only GPS satellites.

- **New Satellite Availability**

LGO version 4.0 adds a completely new Satellite Availability component, which allows to plan your survey providing numerical and graphical information about the constellation of GPS and GLONASS satellites. Sites and obstruction masks can be defined, and a series of graphical outputs including an HTML report are provided.

- **New Design to Field**

The Design to Field component of LGO is used to convert data from various design packages into a System 1200 onboard job. It includes control points, background maps, digital terrain models and road, rail and tunnel design data for use with the RoadRunner suite of applications. With version 4.0 a graphical view has been added to visualize the data before the job is finally created. Tools are available to select layers for display and export. For cross-section based road designs the Connection Editor allows to graphically check and modify the connections for the stringlines to be created.

- **Level Improvements**

LGO version 4.0 adds more functionality to manage your Level data. Level lines can now be split or joined, and the level track connecting the turning points of the line can be displayed in View/Edit. The functionality to edit the standard deviations of level staff readings has been added during Import and in the Level Booking Sheet, which results in an automatic re-calculation of the standard deviations for the measured point heights and for the total height difference.

- **TPS Improvements**

Using LGO version 4.0 it is now possible to display and edit the atmospherical PPM values for TPS observations. Modifying the atmospherical PPM will automatically change the measured slope distances and the coordinates of the connected target points.  
For BUILDER instruments the upload of a second language has been added. Additionally BUILDER instruments are now also supported in the TPS Configuration Manager tool.

- **GPS Improvements**

Among the GPS improvements of LGO version 4.0 is the ability to save modifications of antenna height readings to the backup of System 1200 raw data and to set the interpolation method for geoid model field files.

- **Export Improvements**

LGO version 4.0 adds a new format to the existing range of export formats. It is now possible to export projects to the FBK (fieldbook) format, which can directly be imported into AutoDesk LandDesktop™. TPS observations, RTK rover coordinates and line/area information are included in the file.  
For the various ASCII Exports new functionality has been added to export a user-configurable selection of point classes.

- **Format Manager**

The new version of the LEICA Format Manager that is included with LGO version 4.0 supports various new variables and export strings available with System 1200 Firmware version 4. For the System 1200 Office template the variable allowing the export of atmospheric PPM information is now supported in all TPS setup export strings.

- **Scripting enhancements**

Since version 1.1 of LEICA Geo Office you can access the database and the most important functionality through a scripting interface. LGO version 4.0 adds more useful functionality to the scripting, including the ability to re-calculate TPS setups. The functionality of the new Satellite Availability component to calculate satellite constellations and DOP values is also available through the Scripting interface.

## **2. New Features and Enhancements**

This section describes the new features in more detail. Please read the following sections carefully, as they contain important information about this new release. For full information please also refer to the updated Online Help System.

## 2.1 GNSS Processing

LGO version 4.0 supports full **GNSS processing**, including data from **GPS** and **GLONASS** satellites. Using LGO version 4.0 GLONASS satellites are now supported in various components of LGO:

### 2.1.1 Data Import

Combined GPS and GLONASS data collected with a GX1230 GG or ATX1230 GG instrument can be imported using the System 1200 raw data import. GLONASS data is stored to the project database and the **GNSS type** is displayed in various places in LGO to show, if data was collected using GPS only or combined **GPS/GLONASS** instruments. Additional columns are available in the View/Data panel of the Assign dialog, in the GPS-Processing tabbed view (see below) and in the Results Manager report view.



Point Id	Point Class	GNSS Type	
ref100	Reference	GPS/GLONASS	
-	-	GPS/GLONASS	
-	-	GPS	

**RINEX** files including GLONASS satellites can also be imported and used for processing. When importing a RINEX observation file (\*.??O) the corresponding GLONASS navigation file (\*.??G) is automatically included from the same folder.

**Precise Ephemeris** files including GLONASS satellites can also be imported and used for processing.

### 2.1.2 Data Processing

A new setting in the GPS-Processing Parameters General page is available to select the **GNSS type** for processing. The system default **Automatic** will automatically process either GPS only or combined GPS/GLONASS data depending on the observation and ephemeris data available. All other processing parameters are equally valid for a combined GNSS processing run.

**Configure GPS-processing Parameters**

General | Strategy | Extended Output | Auto. Processing

Cut-off angle: 10 °

Ephemeris: Broadcast

Solution type: Automatic

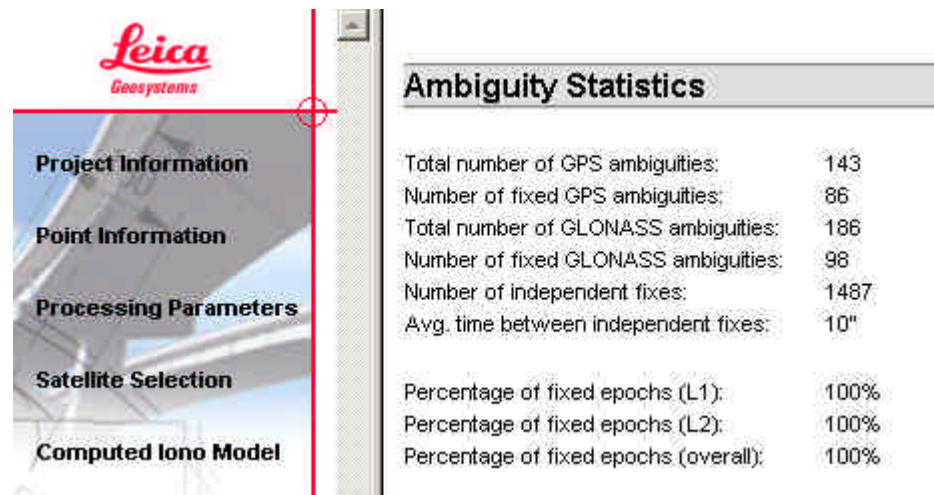
GNSS type: Automatic

Automatic  
GPS and GLONASS  
GPS only

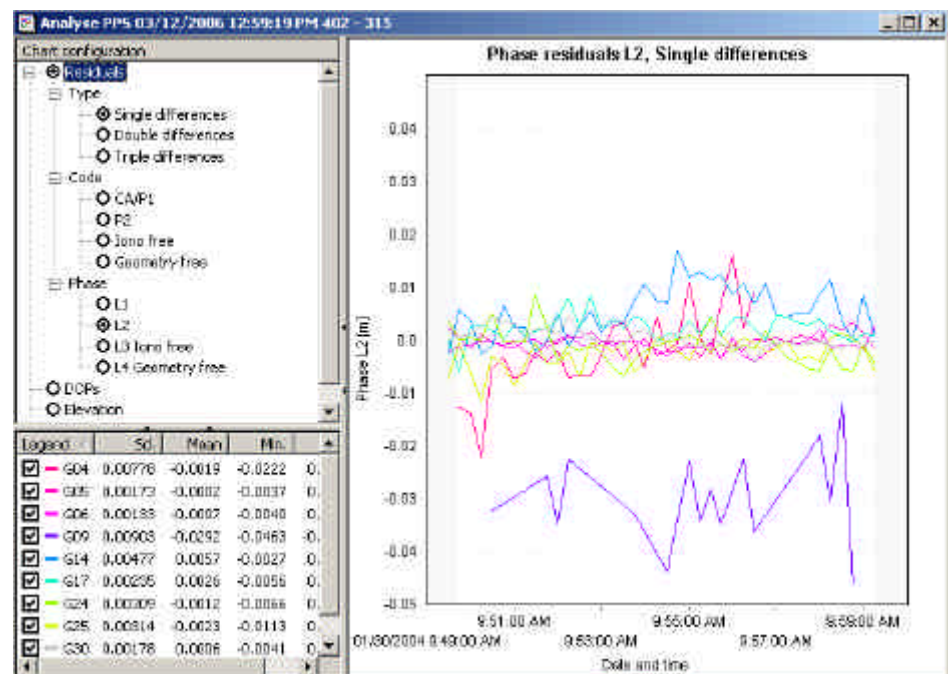
### 2.1.3 Processing Results

Throughout the processing results, in the HTML Reports and when selecting satellites or satellite windows GPS satellites are denoted with “G” and GLONASS satellites are denoted with “R”.

In the **Processing Reports** the number of ambiguities is separately displayed for GPS and GLONASS satellites and all observation statistics show the figures both, for GPS and GLONASS satellites.



In the **Analysis** tool code and phase residuals are displayed for GPS and GLONASS satellites for all frequencies and linear combinations, and the GLONASS satellites are included in the calculation of the DOP values.



### 2.1.4 PZ-90 parameters

The PZ-90 is the reference frame for the coordinate system, in which the ephemeris of the GLONASS satellites are given. The transformation parameters between the **WGS 84** and the **PZ-90** coordinate systems are defined under

**Tools Options** in a new **PZ-90** dialog page. The parameters can also be transferred to a System 1200 instrument using the **SendTo...** command, or they can be transferred from an instrument or from another LGO installation using the **Import...** functionality on the page.

**Options**

General Units Default Parameters Internet Linework **PZ-90**

PZ-90 Parameters

dx: 0.0 m Rx: 0.0 "

dy: 0.0 m Ry: 0.0 "

dz: 0.0 m Rz: -0.33 "

SF: 0.0 ppm

Send to... PC/CF-Card

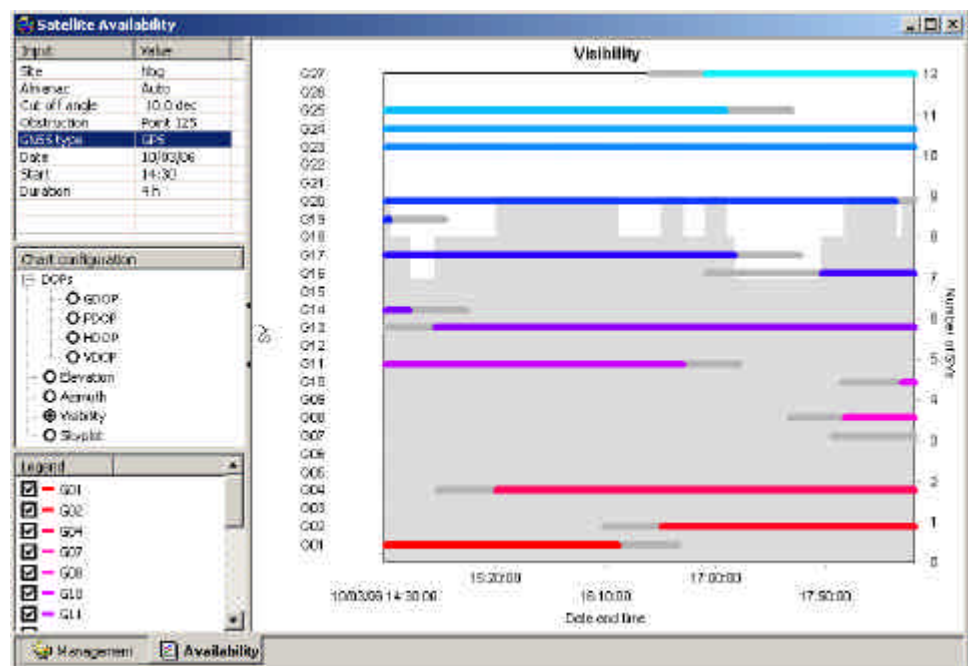
Import...

A **Default** button is available to re-call the installation defaults. In practice it will seldom be necessary to change the PZ-90 parameters.

## 2.2 Satellite Availability



LGO version 4.0 adds a completely new **Satellite Availability** component, which allows you to plan your survey providing numerical and graphical information about the constellation of **GPS** and **GLONASS** satellites. The component can be launched from the Tools main menu or from the Management list bar and opens as a stand-alone window consisting of two tabbed views.



## 2.2.1 Managing Sites, Almanacs and Obstructions

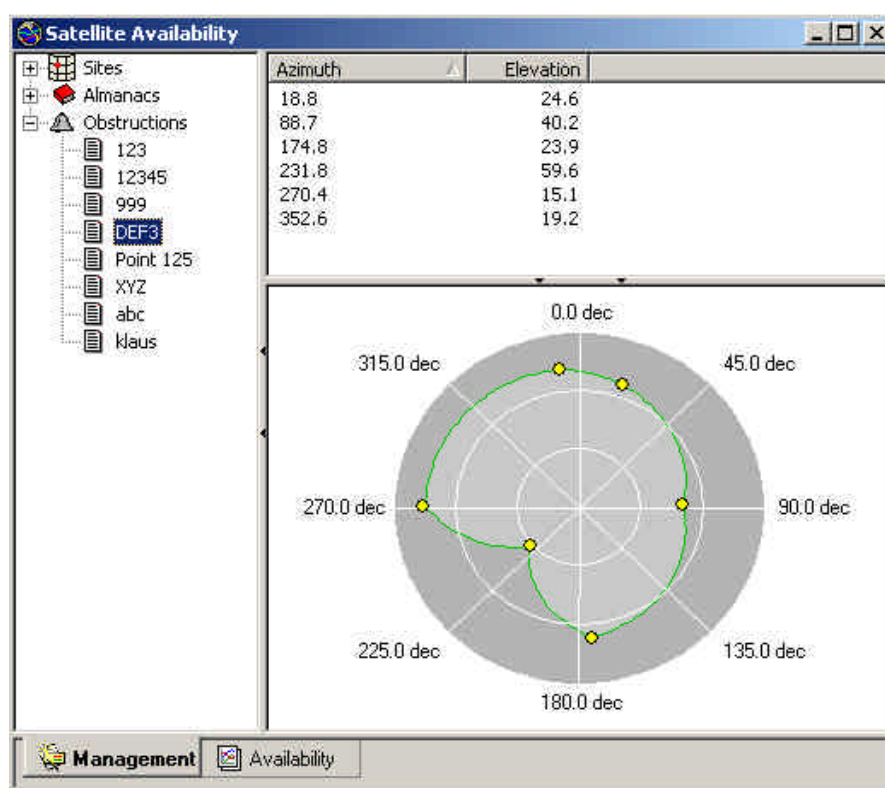
In the **Management** view Sites, Almanacs and Obstructions can be defined.

**Sites** specify the coordinates including the time zone for the area of interest.

Sites can be manually entered or can be copied from a project using copy and paste.

**Almanacs** are automatically added during GPS raw data import, but can also be manually imported from System 200, 300, 500 or 1200 raw data files. YUMA almanacs, which are also supported in the **Internet Download** tool of LGO version 4.0, can also be imported and used. Almanacs can also be removed from the database. The Almanacs report view additionally displays whether only GPS satellites are included or whether GPS/GLONASS predictions can be made.

**Obstruction masks** can be defined graphically and can then be used for the calculation of the availability. Obstructions can be saved to an ASCII file or can be imported from such files.



Note, that Sites, Almanacs and Obstructions, which have been stored in the previous external Satellite Availability tool of LGO version 3 are taken over into the new component.

## 2.2.2 Calculating Satellite Availabilities

In the **Availability** tabbed view you can specify the **Input** details for the calculation in the upper left part of the view. Select Site, Almanac, Cut-off angle, Obstruction mask, GNSS type and define Start time and Duration. Selecting **Auto** for the almanac will automatically use the almanac closest to the requested start date.

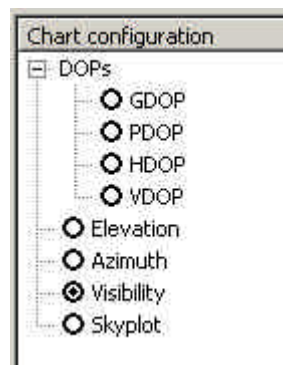


Input	Value
Site	hbg
Almanac	Auto
Cut off angle	10.0 dec
Obstruction	Point 125
GNSS type	GPS/GLONASS
Date	10/03/06
Start	14:30
Duration	4 h

Please note, that the almanac must not differ too much from the requested date for a successful availability calculation.

In the **Chart Configuration** you can select to display one of the following plots to be displayed on the right-hand side:

- DOP values (GDOP, PDOP, HDOP or VDOP)
- Elevation
- Azimuth
- Visibility
- Skyplot

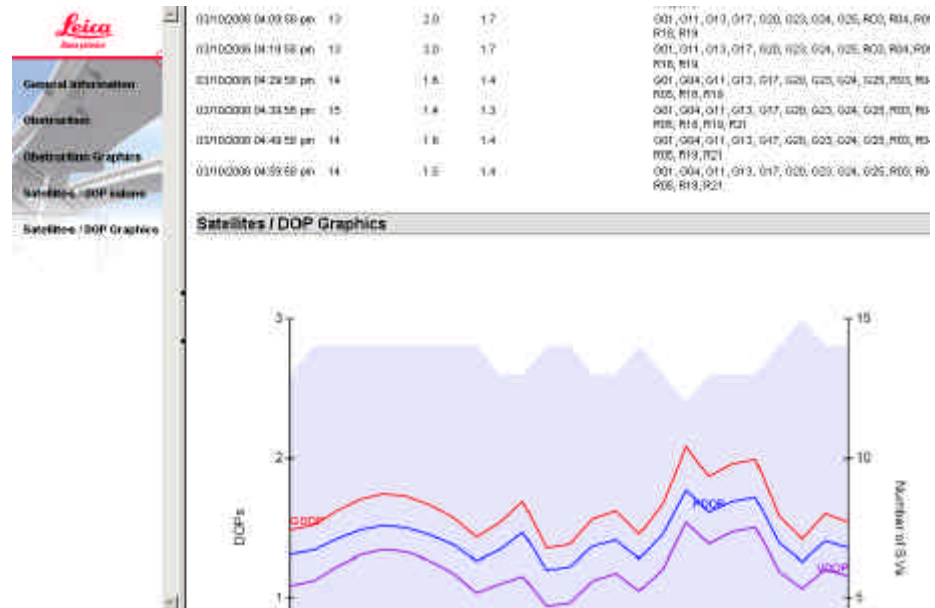


In the **Legend** you can de-select specific satellites. GPS satellites are denoted with “G”, whereas GLONASS satellites are denoted with “R”. Changing the satellite selection enforces a re-calculation of the DOP values.

Obstructed satellites or satellites below the cut-off angle are indicated with gray bars in the Visibility view and with dashed lines in the other charts. Note, that charts can be saved to a file or copied to the clipboard for use in other applications.

### 2.2.3 Satellite Availability Report

A modern and professional HTML report can be created for the selected Satellite Availability calculation. The report includes numerical information as well as graphical displays. A report template can be used to define the contents and the layout for each of these reports. You can even include your own logo in the report. A default report template is available, and you can store your own templates defining content and layout of your personal report.



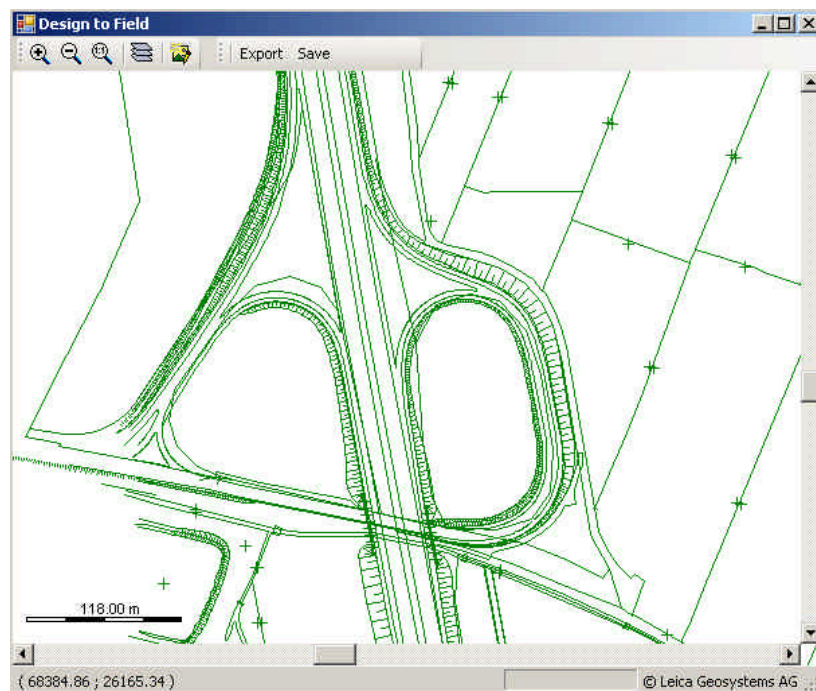
## 2.3 Design to Field



**Design to Field** is the tool that allows different data types to be converted and prepared for use on-board a System 1200 instrument. These data types include control points, background maps, digital terrain models and road, rail and tunnel design data for use with the **RoadRunner** suite of applications.

Data may be imported using the industry standard formats LandXML or DXF or from a number of additional formats using converters that are available on the LGO CD or in the downloads area of the Leica Geosystems website.

LGO version 4.0 offers an improved workflow when converting data. After selecting the **Job type** and the corresponding **Importer** the data is converted to a preliminary LandXML format, which can be viewed in a new graphical window.





### 2.3.1 Design to Field Graphical Editor

Inside the Design to Field graphical view the following functionality is available:

- You can **pan** the view or **zoom** in or out or to all extents using the toolbar buttons.
- You can invoke the **Graphical Settings** to switch on or off various descriptions for the view.
- You can invoke the **Layer** tool from the toolbar. This tool may be used to turn-on or turn-off layers in the graphical view, to include or exclude layers from Export to the System 1200 database and also to view a single layer of the data.



- When displaying road jobs based on **stringlines**, you can right-click on a line and use the context-menu to include or exclude a line from the **Export**, to move a line onto another **Layer**, to create **new layers** and to select the line as a **centerline**.
- When displaying cross-section based road designs you can invoke the **Connection Editor** from the corresponding toolbar button. See section 2.3.2 for details.
- To save the data to a LandXML file click the **Save** button. This file may be imported into Design to Field again to continue editing later.
- When you are satisfied with the data, click the **Export** button to create the final System 1200 onboard job.

### 2.3.2 Design to Field Connection Editor

The **Connection Editor** allows cross-section based road data to be converted to three-dimensional stringlines for use on-board System 1200 instruments. When cross-section data is imported from the original data files, the cross-section vertices are joined together in order to create stringlines using a series of criteria such as the distance of the vertex from the centerline and the relative position of the vertex along the cross-section. The stringlines may be viewed and, if required, edited using the Connection Editor.

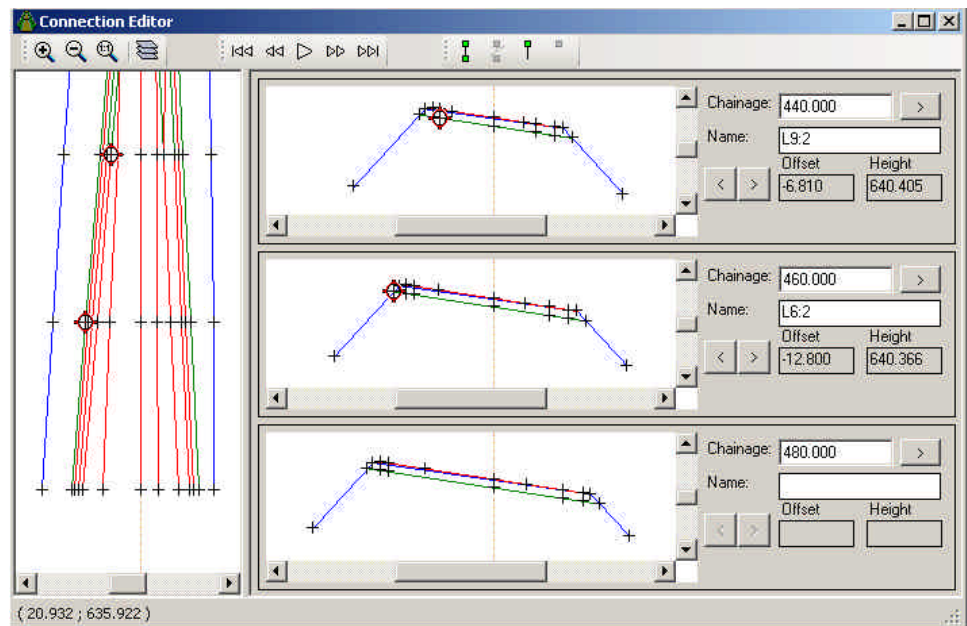
The Connection Editor opens in a stand-alone window with a tri-pane view, which visualizes a **Plan view** panel, a **Cross-section view** panel and the **Cross-section data** panel. At any instance three consecutive cross-sections are displayed.

Inside the Design to Field Connection Editor the following functionality is available:

- You can **select layers** and allow connecting across the centerline.
- You can **navigate** through the cross-sections using the navigation tools

or you may use the **Chainage** field in the cross-section data panel to display a cross-section at a given chainage.

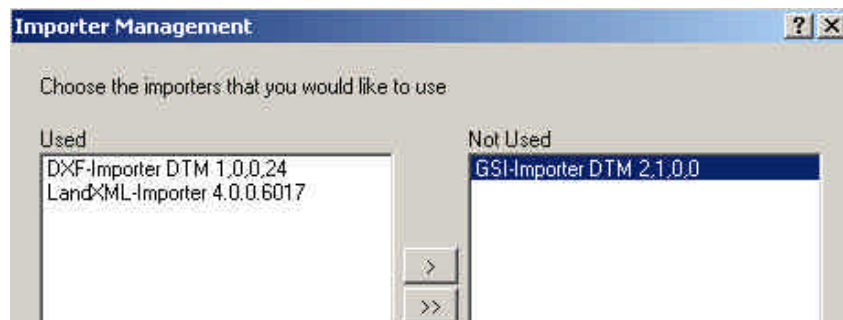
- You can navigate through the vertices of a cross-section. A vertex may be selected graphically in either the plan view panel or the cross-section panel.
- The **Connection tools** of the Connection Editor may be used to connect or disconnect points in a cross-section if they have been connected erroneously. It is also possible to continue a stringline to the next cross-section instead of joining a vertex to another vertex.



### 2.3.3 Installing additional importers

Design to Field supports the creation of Points/Lines/Areas, DTM, Road, Rail and Tunnel jobs. For each of these types **importers** can be registered. After an installation of LGO only the LandXML importers and the GSI-Road Importer will be installed. All additional importers including the DXF importers for DTM and PLA jobs can be installed from the LGO version 4.0 CD or can be downloaded from the Leica Geosystems website.

After executing the installation program "Design to Field Importers.EXE" the importers selected for installation will already be registered in the Design to Field component. Additional importers can always be manually registered using the **Importer Management**, which is available from the Design to Field start dialog.



## 2.4 Level Improvements

LGO version 4.0 adds some more functionality to manage your Level data. The following improvements have been added:



### Join or split level lines

Existing level lines can now be split using the context menu in the booking sheet for the turning point, at which the line shall be split. A new line will then be created for the remaining part of the line inside the same job.

Level lines can also be joined. Invoke the functionality from the Lines report view and select the lines, which shall be merged.

Line Name	Method	Staff Id 1	Staff Id 2	Start Point I
1	BF	28959	1	

Line Name	Method	Staff Id 1
2	BF	28959

Heights are automatically re-computed. The level observations for the total height differences of the lines, which are used for network adjustment computations, are also immediately updated.

### Display of Level Tracks

The **level tracks** connecting the turning points of a level line can now be displayed in View/Edit. This can be activated using the Graphical Settings of the View/Edit tabbed view. Only turning points, which have position information stored can be displayed.

### Edit level standard deviations

The functionality to edit the standard deviations of level staff readings has been added during **Import** and in the **level booking sheet**. Changing the standard deviations for staff readings results in an automatic re-calculation of the standard deviations for the measured point heights and for the total height difference.

## 2.5 TPS Improvements

LGO version 4.0 includes the following improvements for TPS instruments:

### Atmospheric ppm calculations

Using LGO version 4.0 it is now possible to display and edit the atmospherical ppm values for TPS observations. For TPS 1200 observations the atmospherical ppm values are imported from the instrument. To modify the values select

**Calculate atmospheric ppm** from the context menu of the TPS-Processing report views or from the Observations view. The values can be directly entered or can be calculated from meteorological data. Note, that the units and the type of meteorological measurements can be modified via in-line editing.



Option	Setting	Unit
Temperature	20.0	°C
Atmospheric Pressure	1013.3	mbar
Relative Humidity	60.0	%
Atmospheric PPM	7.9	

OK Cancel

Modifying the atmospherical ppm will automatically change the measured slope distances and the coordinates of the connected target points.

### BUILDER instruments

For BUILDER instruments the upload of a second language has been added. In the Software Installation wizard you can select to either install **System Firmware & Languages** or to install **Only Languages**.

### Software Upload

**Software Installation - Current selection**

The Software Wizard will now guide you through the Software Installation on your instrument.

Select the Software components you want to install

- ☐ System Firmware & Languages
- ☐ Only Languages
- ☐ EDM Firmware
- ☐ ATB Firmware

Click Cancel to quit the Software Installation Wizard.  
Click Next to continue with the Software Installation Wizard.

< Back Next > Cancel

When selecting **System Firmware & Languages** you will be prompted to optionally specify a second language for the upload. When selecting **Only Languages** you can upload one or two new languages to your instrument. If you only want to add a new second language, select **Skip First System Language** in the installation wizard.

☐ Skip First System Language

Additionally BUILDER instruments are now also supported in the TPS

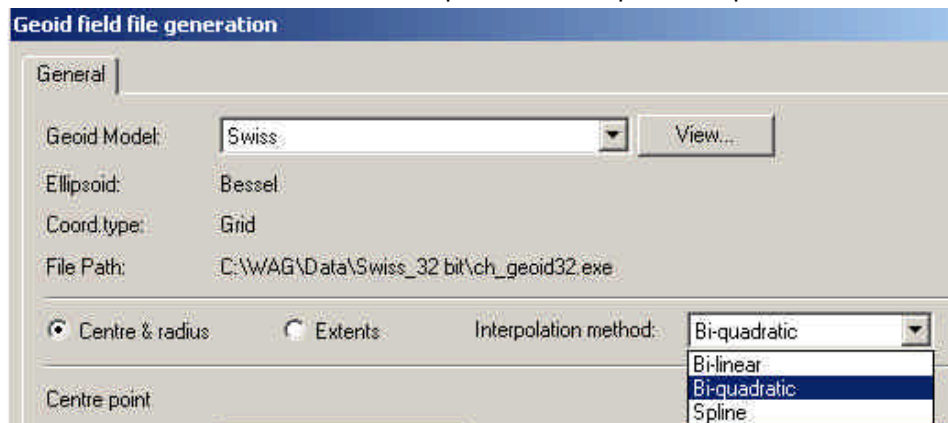
**Configuration Manager** tool included with the LGO version 4.0 installation. This tool can be used to up- and download configuration files to and from BUILDER instruments.

## 2.6 GPS Improvements

With LGO version 4.0 corrections made to the **antenna height readings** of static GPS 1200 measurements without RTK coordinates can now be taken over into the **Backup**. For Realtime measurements it is recommended to change antenna heights only after assigning the data to a project, which will also update the heights of the rover points.

When processing kinematic data the automatically generated **point ID template** has been changed for **moving epochs** to guarantee unique point Ids when processing data with more than 10Hz. This change is done in the Results Manager report views, in the HTML reports and during the export of moving epochs in the SKI ASCII Export.

When creating **geoid model field files** you can now select the interpolation method that shall be used when calculating geoid separations from the field file. You can select between bi-linear, bi-quadratic and spline interpolation methods:



The different interpolation methods are applied when using either System 1200 firmware version 4 or when defining a geoid model from a GEM file using LGO version 4.0. Older files, which have no interpolation method set in the file will be using the bi-quadratic interpolation method. The GEM files created with LGO version 4.0 are backwards compatible with previous System 1200 firmware versions.

## 2.7 Export Improvements

### 2.7.1 FBK File Export



LGO version 4.0 adds a new format to the existing range of export formats. It is now possible to export projects to the **FBK** (fieldbook) format, which can directly be imported into AutoDesk LandDesktop™.

For GPS data the FBK file contains the Reference station coordinates and antenna heights as well as the measured coordinates of the rover points. For



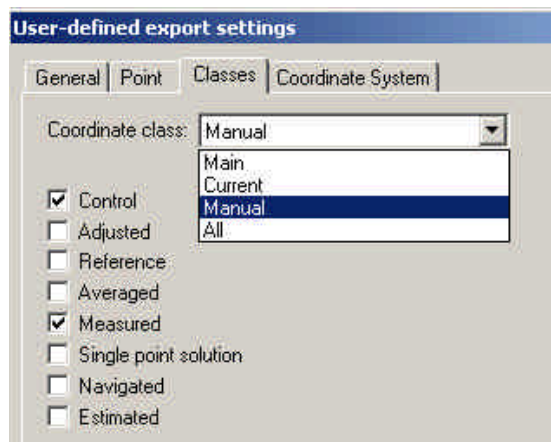
TPS data the FBK file contains instrument and setup information as comments followed by station coordinates, instrument heights and TPS observations (including the reflector heights). Lines and areas can be exported additionally.

Points will be exported with Local Grid coordinates. Alphanumeric point numbers will be replaced by numeric points numbers and the original point number will be exported as a comment.

### 2.7.2 Exporting Point Classes



For the various ASCII Exports new functionality has been added to export a user-configurable selection of **point classes**. In the various ASCII Export Settings a new dialog page has been added, where you can select the Main, the Current or a selection of point classes. Previously it was only possible to export one point class at a time.



### 2.7.3 Format Manager



The new version of the Format Manager included in LGO version 4.0 supports many new variables and export blocks that can be used with System 1200 firmware version 4. For details please refer to the Release Notes of System 1200 Firmware version 4.

For **System 1200 Office templates** the variable “Atmospheric Correction (ppm)” has been added to all TPS Setup data blocks and can be exported using the Custom ASCII Export of LGO version 4.0.

## 2.8 Scripting enhancements

### Scripting enhancements

With LGO version 1.1 the scripting interface was introduced. Using this interface you can access the database and the most important functionality through a basic scripting language. LGO version 4.0 adds the following functionality to the scripting:

- Set the flag to allow automatic updates for TPS 1200 setups
- Re-calculate single TPS setups or update all TPS setups of a project
- Import Precise Ephemeris

- Calculate Satellite Availabilities and DOP values
- Set the units and decimal digits of the Tools Options dialog



The full documentation is also updated and is embedded into the Online Help System. The **HowTo** sample scripts are also extended with new example scripts explaining the new functionality. The HowTo sample scripts are automatically installed in the Script Management.

Additionally some new sample scripts are automatically installed during the setup of LGO version 4.0. These examples include scripts to automatically install North American geoid models and to import the coordinates contained in NGS Data Sheet files into an LGO project. New sample scripts are also included to switch the linear unit setting. Use the **Tools Customize...** functionality and create a toolbar button, which will toggle between meter and US feet.

## 2.9 Updated Online Help



All changes are described in full detail in the updated **Online Help System**. The Online Help also includes **Tutorials**, which explain how to get started with LEICA Geo Office step-by-step. The sample data for all tutorials gets automatically installed during the setup process of LGO.

The Online Help also includes the full description of the LGO Scripting Object Model. Please make full use of the updated Online Help System.

The contents of the Online Help are also available as a separate **PDF file** on your LGO version 4.0 CD.

## 3. Comments on the Installation

### Before you install...

Note that LGO version 4.0 is running under Windows 2000 or Windows XP operating systems. To run all of the example scripts included in the installation Internet Explorer 6.0 is recommended.

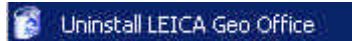
Under Windows 2000 or Windows XP LGO can only be installed successfully if the user is logged in as Administrator.

During the setup process you can decide to either install LEICA Geo Office in a combined installation with full support for GPS, TPS and Level instruments or in a terrestrial installation with full support for TPS and Level instruments. In the terrestrial installation all GPS related functionality is not accessible. Note that in addition to the setup type LEICA Geo Office can easily be further customized by setting panels and screens to only display the information that you need.

Note that LGO is also available as an '**LGO Tools**' installation on a separate CD, which only supports the basic tools for the TPS 300, 400, 700, 800, 1100 and the TPS1200 instruments, the TPS 1000 series and the BUILDER, DNA or SPRINTER levels.

To install LGO please run LAUNCH.EXE from the CD and follow the instructions on the screen.

## How to Install!



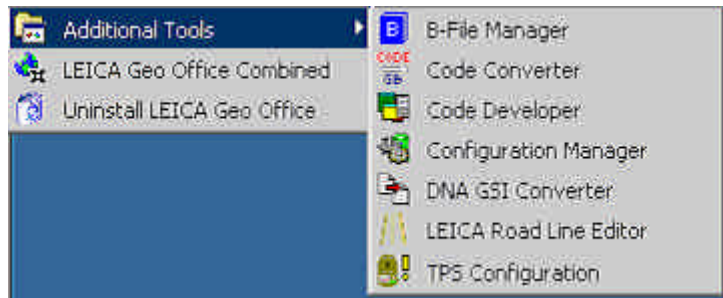
It is also recommended to uninstall any version of Leica Survey Office **before** you install LGO version 4.0.

The LGO version 4.0 installation program will update the dongle drivers and will install the **Microsoft .NET framework version 2.0**, which is required to use the new Design to Field component.

### Note on Windows 64-bit operating systems:

LGO version 4.0 is prepared for Windows 64-bit operating systems. Note however, that the .NET framework for Windows 64-bit must first be downloaded and installed. Also note, that separate USB drivers for the RX1250 terminal are included on the LGO CD.

Note: The installation will add a separate folder '**Additional Tools**' into the Leica Geo Office program group. This includes various GPS, TPS and combined tools as stand-alone applications.



## 4. Closing Remark

Exploit the full potential of your data with LEICA Geo Office. View and manage your TPS, GPS and Level data in an integrated way. Process your data independently or combine your data. LEICA Geo Office ensures you get the best results.



## Leica Geosystems AG

Leica Geosystems AG, Heerbrugg, Switzerland, has been certified as being equipped with a quality system, which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001), and Environmental Management Systems (ISO standard 14001).



Total Quality Management-  
Our commitment to total customer satisfaction.

Ask your local Leica agent for more information about our TQM program