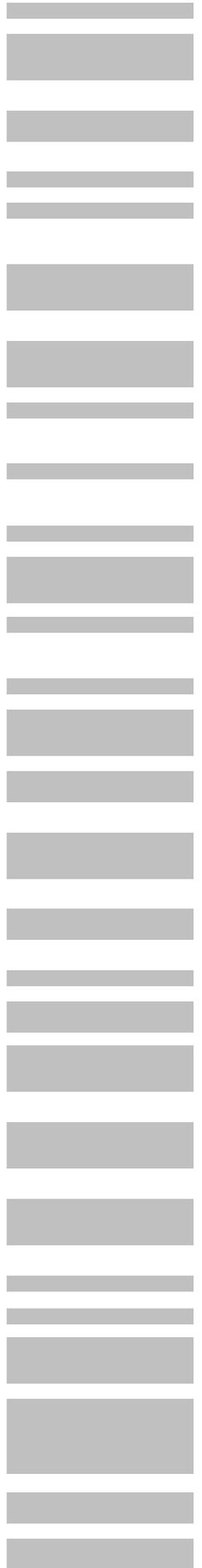*TRUKK SOFT*

Nigra

For Leica Sprinter
Special Software for Levellings

Getting Started Guide

Version 7.0 © 1988-2022

Nigra Special Edition for Leica Sprinter

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Nigra is the Windows version of the DOS software Delta.

Table of Contents

1 Introduction

1.1 Manuals and Help

The following information will help you to understand Nigra for Sprinter and work successfully. Nigra for Sprinter, your software for the evaluation of levellings.

Getting Started Guide. The book you are reading now. The *Getting Started Guide* contains a general overview, system requirements, installation instructions and first steps to use Nigra for Sprinter.

Reference Manual. The reference manual is available as .PDF file to read or print with Acrobat Reader. The manual contains detailed technical information for all items of the Nigra standard version.

Online Help. To access the Nigra help, press the F1 key in Nigra**.**

1.2 Getting Product Support

If you can't find an answer in the section **Questions and Answers** in the online reference or on our website http://www.trukksoft.de, write an e-mail with your question to mail@trukksoft.de or send a fax to 0049-2241-315954. We can only answer if your question is in English or German language.

1.3 General Overview

Nigra for Sprinter is a special software for the evaluation of levellings performed with the digital levels Leica Sprinter 100M, 150M, 200M, and 250M.

Identical in construction to the Leica Sprinter are the levels Geozone Geomax ZDL 700 and Stonex D2.

Nigra for Sprinter encloses all features of the Nigra standard version, except the following:

Support of Leica NA, DNA and LS levels, support of Trimble, Sokkia and Topcon levels, evaluation of movements, creating of profiles, and creating a network file for Nivnet.

When **Nigra** is used in the following, **Nigra for Sprinter** is always meant.

Nigra from version 6.0 runs under the operating systems Windows 7/8/8.1, 10, and 11.

Nigra has international features: The texts for all printouts are stored in separate data files and may be adapted by the user. Files for the languages English and German are included. Evaluations may be performed in meters, feet or inches.

The standard way of working in connection with the Leica Sprinter:
- Execute the levelling
- Transfer raw data to the PC
- Formatting of raw data into Nigra format
- Compute the data

The Nigra **Height Database** in the Microsoft Access-Format can store approximately 10 Mio. points per job. There is an interface for the import of heights from any text files and for the export of heights in the ASCII format.

1.4 Installing Nigra

Before installation: Make sure that the latest Windows updates are installed on your computer.

Close all running applications. Insert the Nigra CD-ROM into the CD drive. If the Nigra setup does not start automatically, navigate to the appropriate folder, and run setup.exe.

Then click on the OK button. The installation starts.

If you got the Nigra setup from a download, unzip the zip file, and start setup.exe.

Follow the setup instructions on the screen. If you have already installed an older Nigra version, choose a different installation folder for Nigra version 7.0 and higher than for the earlier versions. This way you can continue to work with both versions in parallel for a while and gradually switch to Nigra 7.0.

When updating a Windows version of Nigra from 7.0, install Nigra in the same folder as the previous version.

Nigra requires the .Net Framework 4.7.2 or higher to run. If this is not available on your PC, it must be installed separately.

After the installation is complete, an entry is created in the Start menu and an icon on the desktop. Double-click on the Nigra icon to start Nigra.

After installation: The Nigra templates folder is installed by default in *c:\programs (x86)\nigra\templates*. Copy the complete folder to another location (drive or folder) where you have full access rights. Then change the template folder entry in Nigra under *Options, Program Configuration, Misc.* to the new folder.

c:\programs (x86)\nigra = Nigra installation folder

1.5 Uninstalling Nigra

To uninstall Nigra, proceed as follows:

Click on the item **Settings** in the **Start** menu, then on **Control Panel**. Make a double-click on the icon **Add/Remove Programs**. In the box below select the line which contains the name of the Nigra software and click on the button **Add/Remove**. In the dialog box **Select Uninstall Mode** select **Automatic** and click the **Next** button. Then follow the description in the following dialog boxes.

All files installed by Nigra will be removed. Files which are created after installation of Nigra will not be deleted. Therefore, the Nigra folder will not be deleted. You can remove this folder manually after the uninstall procedure is finished.

1.6 Starting Nigra

Start Nigra by clicking on the Nigra icon in the program's menu.

1.7 Quitting Nigra

You quit Nigra by clicking on **Exit** in the **File** menu. Alternatively, you may quit Nigra by pressing the keys [Ctrl]+[F4] if all Nigra windows are closed.

2 First Steps

2.1 Setting Program Parameters

When first starting Nigra, it is advisable to make some program customizations and alter the standard parameters. Select the **Program Configuration** item in the **Options** menu. The parameters are stored in the Windows Registry, separately for each user.
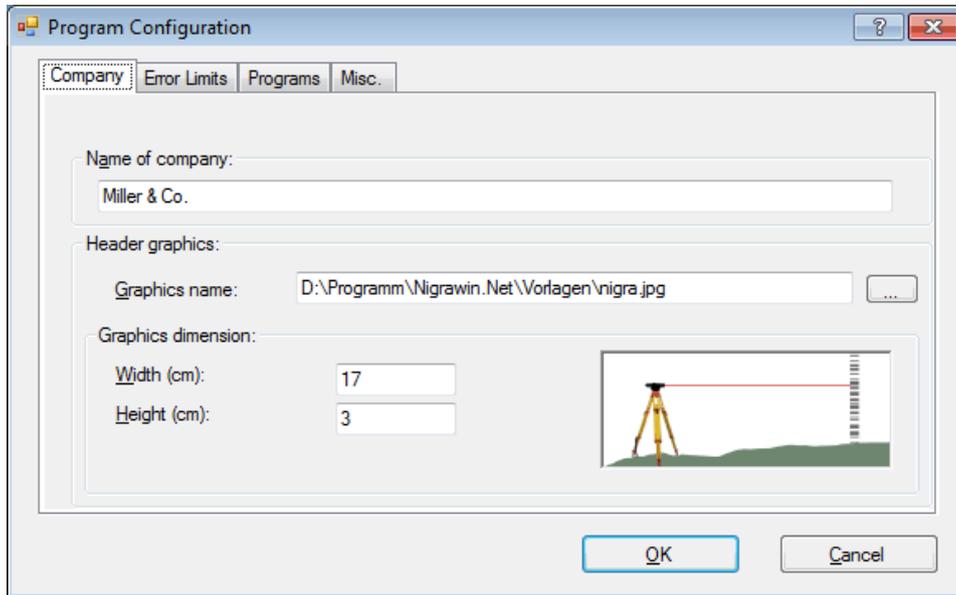
Setting Program Parameters

The individual input fields have the following functions:

Company - Name of Company defines a header for all printouts (for example, company name and address).

Header graphics allows defining a graphics to be printed in the head of a printout (calculation, movement list, etc.) in addition to the company name. Graphics name defines the complete file name of the graphics (including drive and folder). Alternatively, you can double-click on the input field or click on the button on the right side to open a selection dialog box.

In the field **Graphics dimension,** you can define the size of the graphic (width and height). If these values differ from the original graphic size, the graphic will be resized in the printout.

The graphic will be printed with right justification. If you print from the editor, the graphics will not be printed.
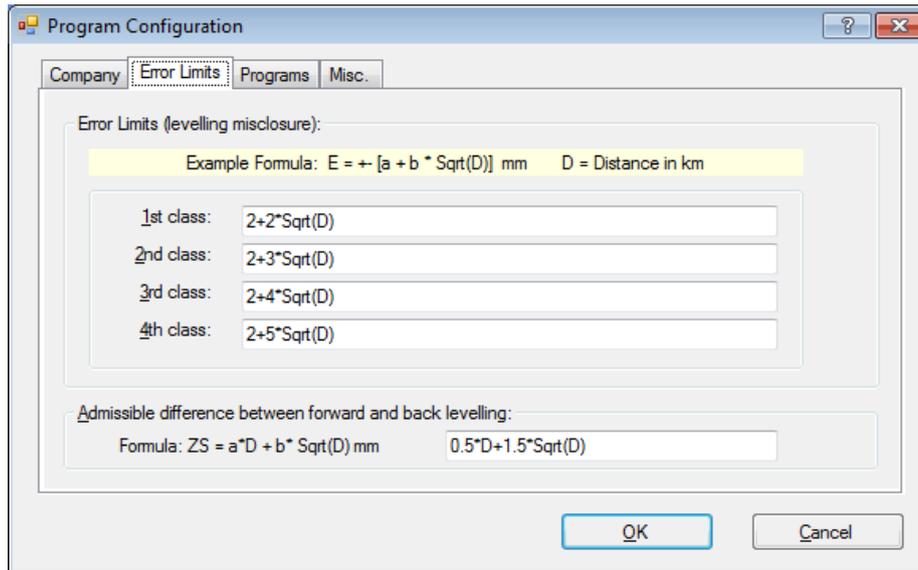
Error Limits:

Error limits defines the boundary values according to the most used formula: (example of unit of measurement "meters")

Misclosure E (in mm) = a + b * √D (in km)

(a = constant error part in mm, b = systematic error part in mm, D = levelling distance in km)

The error limits for the four error classes can be defined in free formula style as a function of the levelling distance D, for example, 2 + 3*Sqrt(D). "Sqrt" means square root and D the levelling distance in km. In modification of this standard formula, you can also calculate, for example, the term 2 + 3*Sqrt(D/2).

When reformatting the digital level raw data, you may choose the error class as required.

Admissible difference between forward and back levelling

When creating a network file with double levellings measured, the difference is calculated and compared with the permissible difference.

If you have chosen the unit of measurement "feet" or "inches", error limits will also be entered in these units.

Programs:

Transfer programs for Digital Levels, Leica: Here an entry is only required if you do not want to use the integrated Nigra data transfer. Enter the name of the transfer program supplied by your manufacturer, including file extensions.

Editor name: An entry is only required if you do not want to use the text editor integrated in Nigra. In any case, the editor must be a Windows program, for example, the word processor WRITE. The editor must be entered completely with drive and path, for example, c:\winnt\system32\write.exe.

A click on the buttons on the right will display a dialog box for selecting a program.

In addition to these program parameters, special parameters can be defined for each job. To do this, however, a particular job must be opened. How to open and start jobs is described in section 2.2.

Miscellaneous (Misc.).
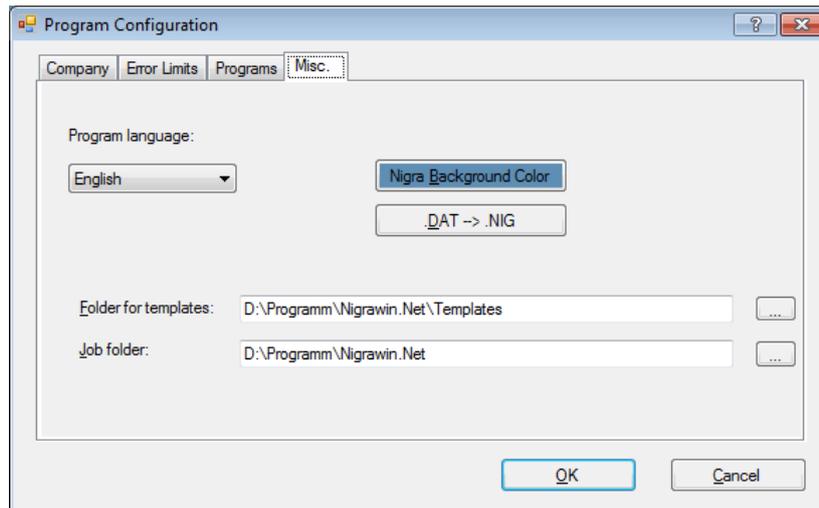
Program Language: The language of Nigra (for menus, dialog boxes, and Help) can be switched between English and German. The texts for printings will not be hereby changed automatically.

Nigra Background Color: Defining the individual color for the Nigra background.

.DAT → .NIG: Changes all file extension in the current folder from .DAT to .NIG. From Nigra rev. 2.0, .NIG is the file extension for Nigra job files with measurement data.

Folder for Templates: With this function you choose a folder for the template files (english.lag, dinicode.txt etc.). The default folder created during the Nigra installation is c:\program files\Nigra\TEMPLATES.

Before using this option, create the new folder and copy all files from c:\program files\Nigra\TEMPLATES to this folder.

c:\program files\Nigra = Nigra installation folder

Job folder: With this entry you can choose a folder which will be shown while opening a project.

When all data have been entered, click OK.

2.2 Opening/New Job

Nigra works job oriented. This greatly facilitates the subsequent handling of the program, as all operations, for example, calculations, refer to this job, and the required parameters and data files are created and selected automatically.

After starting Nigra, first create a new job or open an existing one. Choose from the **File** menu **Open/New Job ...**. You may start a new job in any given folder by entering a job name or choosing an existing job (with the file extension .NIG).

The job name will be shown, complete with the full path name, in the header of the Nigra window.
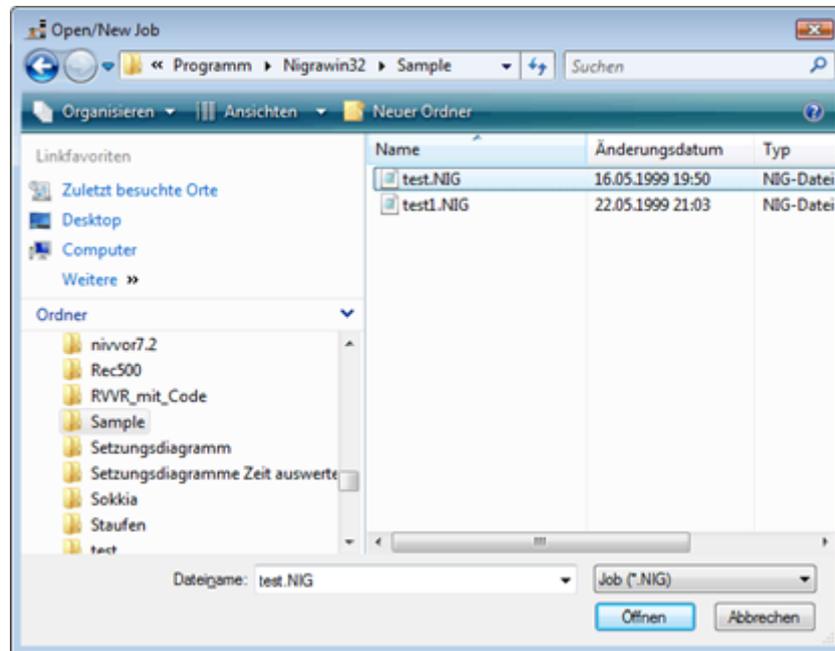
Opening Job

The last 6 jobs opened appear in the bottom item of the **File** menu. If you want to use one of these jobs, click on the desired item.

Several jobs may be processed within one folder. Larger jobs, however, should always be processed in a separate folder.

When setting up a new job, a file is opened with the chosen job name and the file extension .NIG with the following contents:

```
ROptional text for job description up to column 72
x234567890123456789012345678901234567890123456789012345678901234567890123456789012
x         1         2         3         4         5         6         7
xDistance<--- Back    Side    Fore ---><--- Point Number --->
```

In this file your measurement data will be stored, and it is the basis for batch processing. The first four lines are for a better orientation, in case measurement data must be edited. Accidental deletion of this lines is of no importance for further processing.

Apart from these job files there are also job-unconnected files, for example, the raw data after transfer to the PC. They will be allocated to a job only after being reformatted into the Nigra format.

2.3 Individual Configuration

The individual configuration (in the **Option** menu, item **Job Configuration**) enables the user to adapt the program configuration to his special job.

The individual configuration is valid for the job in use and all further jobs to be processed in the same folder. With this configuration you may, for example, define the units of measurement (meters, feet, inches), the country-specific file for the printouts or other preset parameters.

If you create a job in a new folder, the last used job parameters are transferred to the new folder.
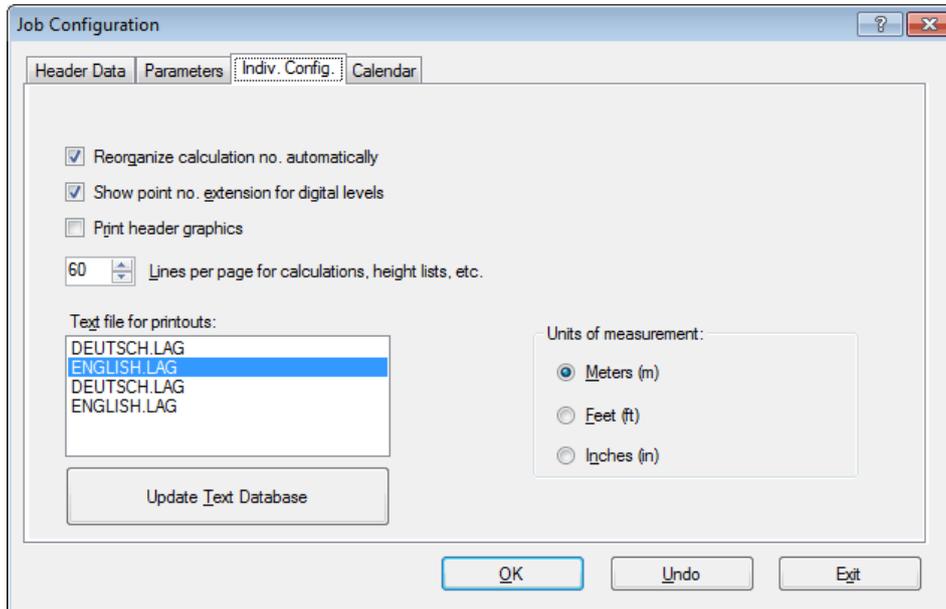
Defining Individual Configuration

Reorganize calculations numbers automatically

Check box activated: The running levelling calculation numbers are automatically renumbered after each reformatting of raw data.

If there are only a few levellings entered into your measurement data file, it is advisable to work with the automatic reorganization function. With very large data files it is advisable not to activate the box and to arrange reorganization with the menu item **Reorganize Calculation No.** from the **File** menu, if required.

Show point number extension for digital levels

Check box activated: Shows the input field for point number extension when reformatting raw data.

Print header graphics

Check box activated: Header graphics chosen in the program configuration will be used in all Nigra printouts.

Lines per page for calculations, height lists, etc.

Fixes the number of lines per printed page before Nigra performs a form feed.

Recommended settings for the selected font Courier New, 10 points: 60 lines per page. The extra lines required for a selected header graphic Nigra automatically considered when creating the file.

Text file for printouts

All texts to be printed are taken from an ASCII file with the file extension .LAG. Standard files supplied with Nigra are DEUTSCH.LAG and ENGLISH.LAG. The files use the following format:

```
*   Point Number      Height  Calc.No. Diff. NC  Date         Comments
69,Point Number       Height  Calc.No. Diff. NC  Date         Comments
```

The syntax is: **running number, Text**. Lines starting with the asterisk (*) contain comments and are skipped. In the example, the text (header for a height report) separated by a comma is allocated to the number 69.

If you want to alter texts, do not alter the supplied files DEUTSCH.LAG or ENGLISH.LAG, but copy them, for example, in the file ENGLISH1.LAG and alter the newly created file. In this way you will avoid that your texts will be overwritten by future Nigra updates. It is possible to create more language files using the same method and to select them in this dialog box.

Nigra does not work directly with the selected file *.LAG, but with an automatically created file Text.XML. After a text modification, this file must be created new by clicking on the button **Update Text Database**.

Note:
Self-created text files may have to be updated after the installation of a Nigra update. Compare your own file with the file ENGLISH.LAG or DEUTSCH.LAG.

Units of measurement

Nigra operates with meters, feet, and inches. After program installation, the standard preset unit of measurement is always meters. In case you want to work with another unit, it can be defined in the dialog box **Units of measurement**.

When reformatting the raw data of the digital level, all measurement data are automatically converted into the chosen unit of measurement in case measurements were taken in another unit of measurement by mistake.

Although the height database originally uses meters as the unit of measurement, the in- and output of heights can alternatively be made in feet or inches (except heights on the screen).

Conversion factors for units of measurement:

```
Meter = Feet*1200/3937      Meter = Inch/39.37
Feet  = Meter*3937/1200     Feet  = Inch/12
Inch  = Meter*39.37         Inch  = Feet*12
```

The unit of measurement feet above means 'US feet'. The Leica Sprinter also knows the unit of measurement 'international feet' (conversion factor meter in feet = 1/0.3048. When using this unit of measurement with a Sprinter and choosing meters in Nigra, the results will be wrong. When using 'international feet' with a Sprinter, choose feet in Nigra every time and don't change the unit of measurement.

3 Levelling with Leica Sprinter

For the evaluation of data measured with the Leica digital level Sprinter 100M, 150M, 200M, and 250M carry out the following steps:

- Transfer raw data to a computer
- Reformat raw data to Nigra format
- Enter heights of connecting points
- Start calculations

The point heights of the raw data file can also be transformed directly in the Nigra height file.

Line Levellings with Sprinter since Firmware Version P01.01.03

The Leica Sprinter since firmware version P01.01.03 (distributed from April 2006) supports line levellings with the observation sequences BF, BIF and BFFB.

Nigra recognizes automatically during reformatting to the Nigra format which observation sequence was selected. If you have measured more than one levelling, carry out the following:

Measure to the last connection point and then an additional (fictitious) measurement to a point with the number **A**. After them you can started a new line levelling. The last levelling must not be finished with the point number **A**.

Free turning points

These points can be measured with the point number 0 or 1, 2, 3, etc. (in case these numbers are not real point numbers). The point numbers 1, 2 ,3, ... can be eliminated during reformatting to the Nigra format.

Line Levellings with Sprinter (Firmware older than version P01.01.03)

Each single measurement with the Leica Sprinter is stored in the GSI format with the code number 330 = single measurement. No code for back-/foresight reading or side shot is stored.

To realize an evaluation as line levelling (also with side shots) certain conventions must be agreed on.

On the condition that no heights will be required in the field, line levellings can be made easy and quickly with the Leica Sprinter in connection with Nigra.

- Power on Sprinter – it can be measured with or without entering of a reference height.

*- Continue by pressing the **MENU** key, select **1. Enter PtNo**, enter point number for the first connecting point and confirm with the **MENU** key.*

- Perform a measurement to the first connecting point (for Nigra this becomes a backside) by pressing the red button on the right side of Sprinter.

> *If a reference point was first entered (with the Δ**H** key**)**, the Sprinter shows*

> ***Meas. Target!***

> *after the measurement to the first connecting point. Before the measurement of the next point first press the **MENU** key, enter the point number of the first measuring point (or foresight), confirm with the **MENU** key, and then press the red button on the right side.*

The next point is normally a foresight for Nigra. To measure a point as side shot, it is first necessary to measure a fictitious point with the point number **Z**, and then the side shot (also

multiple side shots). To confirm the measurement of side shots, measure again a fictitious point with the point number **Z** and then the next foresight.

Changing the station:

Press the **MENU** key to confirm the displayed point number of the last measurement. Afterwards measure the backside and continue the levelling as described before.

Concluding a line levelling:

Measure to the last connecting point and make another fictitious measurement to the point number **A**.

Afterwards a new line levelling can be started by entering a point number (new first connecting point). The last levelling need not be concluded with the point number **A**.

Free turning points

These points can be measured with the point number 0 or 1, 2, 3, etc. (in case these numbers are not real point numbers). The point numbers 1, 2 ,3, ... can be eliminated during reformatting to the Nigra format.

Skipping data records

If data records are already stored which you don't want to erase, register a fictitious point **A0** before beginning a line levelling. All data records until the point **A0** will be skipped when reformatting to the Nigra format. In the next chapter you will learn another method of how to skip data records.

Summary:

1st point measurement = backside to first connecting point
2nd point measurement = foresight
3rd point measurement = backside
..... etc.

n.- point measurement = last foresight

Then perform a point measurement to point **A** and go on with the next levelling.

With side shots:

1st point measurement = backside to first connecting point
2nd point measurement to point Z = then following side shots
3rd measurements of side shots
4th point measurement to point Z = end of side shots
5th point measurement = foresight
etc.

3.1 Sprinter Raw Data → PC

Data transfer with the built-in serial com interface

First connect Sprinter and the computer with the serial data cable.

In Nigra: Menu **Digital-Lev → Leica → NA/DNA/Sprinter Raw Data ←→ PC ...**

In the Nigra dialog box:
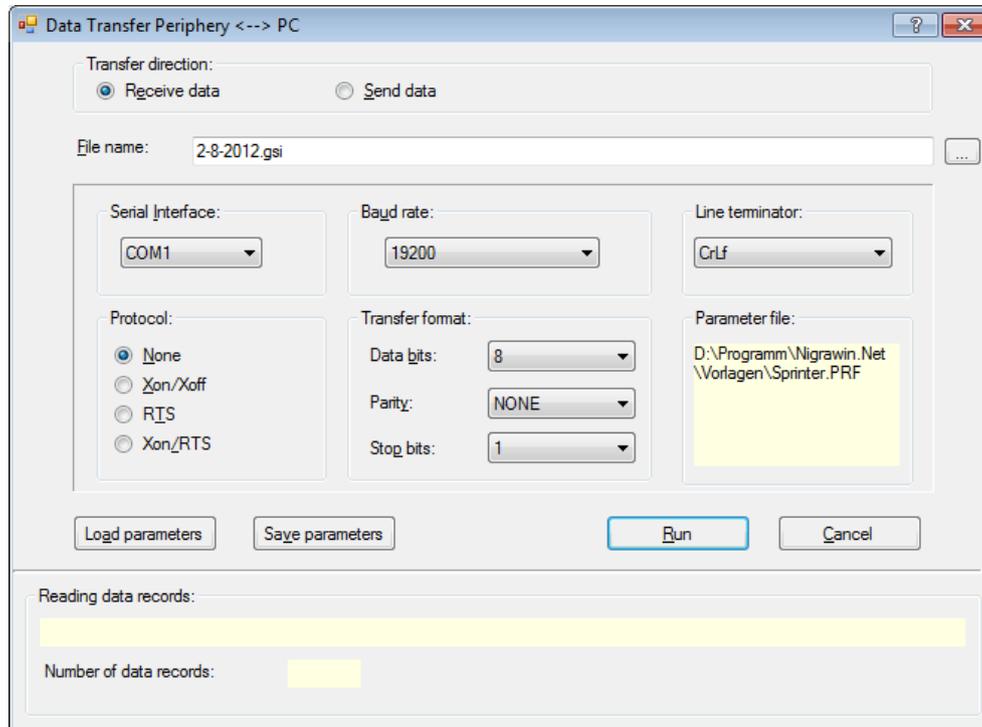
Transfer direction:
Activate **Receive data** to receive data from the Leica Sprinter.

Filename: Enter file name for data you will receive (the file is stored in the job folder) or choose folder and file name by clicking the button on the right.

As a default, the date of the day without file extension is used.

Do not define any file extensions which are in use by Nigra (.NIG, .MDB, .BER etc.)! Always use the standard file extensions .GSI, .NA2 or .DNA for receiving data.

Serial interface: Selection of the serial interfaces Com1, Com2,... Com16. If a non-existing interface is selected, an error message is given out.

The other parameters can be loaded with the button **Load parameters.** Choose the file sprinter.prf from the Nigra template folder.

If all parameters are set correctly, click the **OK** button. In the field below of **Reading data records,** the command **Start data transfer at peripheral device – Waiting for data** appears.

On the Sprinter press **MENU → Settings → RS232** (and **12. RS232** respectively for elderly Sprinters) and set the Sprinter parameters **Baudrate, Parity, Stop Bit** and **Data Bit** to the same values as in the Nigra dialog box.

Now start the data transfer at the Sprinter: Choose **DataManager → Download Data → GSI** and start the data transfer with the **MENU** key.

The data transfer starts and finishes automatically after the last record set is transferred. The data transfer can be aborted by pressing the **Esc** key or clicking on the **Cancel** button.

The transferred data records will be shown in Nigra in the field **Reading data records**.

The Sprinter raw data can be transferred alternatively with the Leica software **Geo Office Tools**. In this case choose the format **GSI2**.

3.2 Edit Raw Data

For editing Sprinter raw data before reformatting into the Nigra format. A dialog box to select a Leica raw data file appears.

3.3 Format Sprinter-GSI → Nigra

The Sprinter raw data format cannot be computed directly by Nigra. By activating this menu item, raw data will be reformatted to the Nigra format.

In case you want to reformat your raw data in parts (if not signed with A0 during levelling), limit the reformatting with the letters **x** and **e** in the first column of a data record of the raw data file:

x   All data records will be ignored until the next x.
e   End of reformatting, the following data will be ignored.

Single data can be ignored by using an asterisk (*) in the first column.

Example for a data record in format GSI-8:

```
      Point no.          Distance       staff reading
11....+00900111 32..00+00014570 331.06+00014960
```

The following word identification (WI) are used for levellings with Sprinter:

11	Point number
330	Staff reading (Measure Only)
331	Staff reading, backside (since firmware P01.01.03)
332	Staff reading, foreside (since firmware P01.01.03)
32	Distance to staff
83	Height of a point

Nigra also processed data who are created with the Leica DataLoader with the function **ASCII Data Listing** (file extension. txt). However, the GSI format should be preferred.

Nigra Formats

After the selection of a raw data file, raw data can be transformed into two different Nigra formats:

- **Measurements**   Transfer of measurement data in a batch file for calculations
- **Height file**   Transfer of levelled raw heights in the Nigra height file

Reformatting of Raw Data

Select one of the following described data formats.

Measurement Data Format

Raw data, supplemented with header data and parameters, are transferred in the Nigra batch file.

Only for Sprinter from firmware P01.01.03: standard staff reading (Measure Only) with the word identification **330** are not transformed to the Nigra-format.

After selection of a raw data file click on the **Header data** button if you want to change header data. Explanations to header data are given the Reference Manual.

Press the **Parameters** button if you want to make some changes for parameters. Comprehensive explanations of parameters are given in the Reference Manual and in the following description.

Besides GSI data also text files in ASCII Data Listing format will be transformed to the Nigra format.

Point Number Extension

During measurements with Sprinter only 8-digit numerical point numbers can be registered. Because often more than 8 digits are necessary, Nigra allows point number extensions, which are performed during the reformatting of **Sprinter Raw Data → Nigra**. Sometimes, point numbers like 12.01, 12.02 etc. may be needed. These numbers can also be generated by the Nigra point number extension function from the numerically stored point number in the raw data format.

The functions for point number extensions are only displayed if they are activated in the menu item **Job Configuration** (**Options** menu).

This method of point number extension is useful, if all point numbers of a file to be reformatted are to be extended with the same character, for example when adding the movement period.

After the entry of a character for the extension of the point numbers and the position (starting at the right) of entry, the original point numbers can be extended by any two alphanumerical character strings, i.e., insert numbers or letters, add, or set before.

The position from the right in the *second string* refers to the point number changed by the first character string.

Point numbers, which should not be changed, must be entered with a negative sign, for example -1248. If no point number extension is selected, the negative sign is stored together with the point number.

Examples:

```
Registered point number= .  ..-00000230
                             ...+00000123
1st string= KD, position from the right = 0 or no entry
```

New point number: 230
**   123KD**

```
Registered point number= ...+00056005
1st string= . (point), position from the right = 3
2nd string= 25, position from the right = 7
```

New point number: 25560.05

```
Registered point number= ...+00000001
1st string= Channel, position from the right = 4
```

New point number: Channel001

The negative sign (for points not to be changed) and leading zeros will be removed from the point number. Point numbers with more than 14 digits due to point number extensions are cut off from the left.

Removing of free turning points (turning points without numbers)

Free turning points can be registered with the number 0. Furthermore, it is possible to eliminate free turning points like 1, 2, 3, etc. by inputting a higher number in the field **Remove turning point numbers** during reformatting (only effective for format **Measurements**).

Note: The last connecting point must have a higher number!

Defining Parameters

Defining Parameters

Levelling Method

The method of levelling is consisting of the **Observation sequence** and the parameter **Evaluation of side shots/turning points**. Leica Sprinter supports line levellings with the observation sequence BF and BFFB. Nigra recognizes automatically with the help of GSI-data which observation sequence was selected.

If the button **Evaluation of side shots/turning points** is activated, the heights of side shots and turning points will be evaluated by batch file calculation. If not, a so-called line levelling will be defined. That is also valid, if line levelling BIF was selected.

With distances check box is activated: Distribution of misclosure is proportional to the distance.

With distances check box is **not** activated: Distribution of misclosure depends on the number of back- and foresights.

Stores value H00 for method of levelling in the batch file: method of levelling = 0 - levelling with side shots, measured in the sequence BF.

Reading sequence: B S S F S S .

No evaluation of side shots/turning points:

Defines a line levelling, i.e., in batch processing only the height differences and the distance sum from the starting- to the endpoint will be calculated. As method of levelling, value H10 is stored in the batch file: Method of levelling = 1 - line levelling, measured in the sequence BF

Reading sequence: B F, no side shots.

Decimal places

The parameters **Dec. readings** and **Dec. heights** have no influence on the reformatting of raw data, but on the calculation output.

Start of Reformatting

If all parameters are set correctly and header data are entered, start reformatting by clicking the **Run** button. Data are added to an existing measurement data file (file extension .NIG) of the current job.

Into the Nigra format can be transformed: point number, distance and staff reading (marked as backsight, side shot or foresight).

Staff readings are kept with all digits. Distances are rounded to 2 digits. If the measurement was performed in units different from the current Nigra unit of measurement, the measurement data will be converted automatically.

Before starting batch file calculations, enter the heights of connecting points (**Heights** menu) and start **Reorganize Calculation No.** (**Files** menu), if this has not been done automatically.

Start of Batch Calculations

By entering **From calculation no. - To calculation no.**, either a complete job or part of a job may be processed. With **Page no.**, any page number may be set as starting point.

All fixed-point heights are always searched in the height database of the current job. All newly calculated heights are also stored in this database.

Click now the icon for viewing the calculation: The calculation is shown on the display.

You can print the calculation from the editor or close the editor and print with the print button.

Format Height File

The heights of all points in raw data, including start- and endpoints, are transferred into the height file. The date (maximum of 10 characters) and comments (maximum 30 characters) from header data are added. In contrast to the import of ASCII files, the set parameters **mean value** and **stop, if error limit is exceeded** are active here. Other parameters, for example method of levelling, are meaningless.

The default setting of the calculation number is 777777. If the mean value of points was calculated, a mean value calculation protocol is generated in the calculation file (**Calculate** menu, item **View Calculations**).

Example

To conclude this section, a complete protocol of measurement data is presented. (Measurement with Leica Sprinter from firmware P01.01.03.)

Sprinter GSI format:
```
11....+00000200 32...6+00018619 331.06+00011283 .....
11....+00002110 32...6+00038622 333.06+00003281 .....
11....+00002111 32...6+00048622 333.06+00004282 .....
11....+00002112 32...6+00058617 333.06-00005281 .....
11....+00002113 32...6+00068616 333.06+00006281 .....
11....+00000000 32...6+00078617 332.06+00008281 .....
11....+00000000 32...6+00088621 331.06+00009280 .....
11....+00000400 32...6+00098621 332.06+00010281 .....
```

Nigra batch file:
```
RTest measurement with Leica Sprinter
x23456789012345678901234567890123456789012345678901234567890123456789012
x         1         2         3         4         5         6         7
xDistance<--- Back    Side    Fore ---><--- Point Number -->
C1
HSankt Augustin      Location
H                    Location
HTest                Order
H                    Order
H12a                 Line
H05/09/2010          Date
Hsunny               Weather
HMeyer               Observer
HLeica-Sprinter      Level
H4 m                 Staff
H                    Comments
H                    Comments
H00                  2.Col.:0=Side,1=no Side,4=Line, 5=Level test
*                    3.Col.:0=BF,BBFF,2=BFFB,4=BFBF,5=FBBF,4.Col.:a=altern.
H1                   Number of staff scales or readings
H0                   Scale constant for 2 staff graduations
H7                   Difference tolerance for two readings
H1                   Staff graduation 1=cm,feet,inches, 0.5=1/2cm
H1                   With distances, 1=yes, 0=no
H4                   Decimal places for heights in calculations
H4                   Decimal places for readings in calculations
E03m                 E/Mean value/Error class/Unit of measurement
D    1.86 b1.128300                               200
D    3.86         s0.328100                       2110
D    4.86         s0.428200                       2111
D    5.86         s-0.528100                      2112
D    6.86         s0.628100                       2113
D    7.86                 f0.828100
D    8.86 b0.928000
D    9.86                 f1.028100               400
E
```

Calculation:

```
Company  XYZ
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Job: Sprinter_english

Calculation No.:  1
Location          Sankt Augustin
Order             Test
Line              12a            Date           05/09/2015
Weather           sunny          Observer       Meyer
Level             Leica-Sprinter Staff          4 m
Staff graduation 1 cm            Reading sequence BF BF(S)
Comments
Calculation of Mean Values: mean value - mean of old and new

Misclosure =         1.3 mm      Max. error E (3) =   2.7 mm

Distance  Back         Side         Fore        Height       Point No.
  1.86   1.1283                                 57.1560            200
  3.86                 0.3281                    57.9563           2110
  4.86                 0.4282                    57.8562           2111
  5.86                -0.5281                    58.8125           2112
  6.86                 0.6281                    57.6563           2113
  7.86                              0.8281       57.4566
  8.86   0.9280
  9.86                              1.0281       57.3574            400

Sum total distances     =     28.44 m   Delta-H=     0.20010 m
Sum backsight distances =     10.72 m
Sum foresight distances =     17.72 m

Sum of all distances (without side shots) =       28.44 m
Max. misclosure =         1.3 mm      (calcul. no. 1)
```

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